Town of Holderness, New Hampshire
Hazard Mitigation Plan

Squam Lake from US Route 3, Holderness

December 2007

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Prepared by:
Holderness Hazard Mitigation Plan Committee

Earl Hansen	Emergency Management Director (EMD)
Richard Mardin	Chief of Fire Department
Harold Maybeck	Assistant Emergency Management Director (AEMD)
Walter Johnson	Town Administrator
Jake Patridge	Chief of Police Department
Peter Furmanick	Road Agent, Department of Public Works
Paul Hatch	Bureau of Emergency Management Field Representative

With Assistance from:
Lakes Region Planning Commission
103 Main Street, Suite #3
Meredith, NH 03253
Internet: www.lakesrpc.org
Phone: (603) 279-8171
Fax: (603) 279-0200

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THE LAKES REGION PLANNING COMMISSION

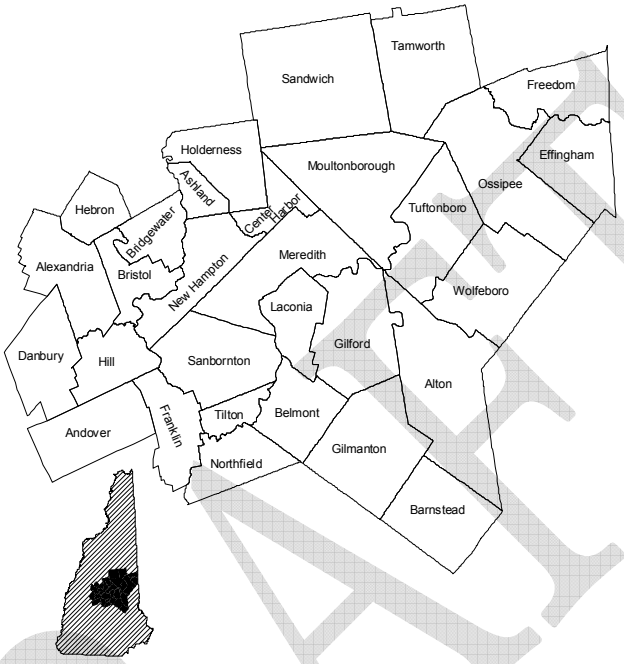

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

The *Holderness Hazard Mitigation Plan* (the 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 Holderness Hazard Mitigation Planning Committee with assistance from the Lakes Region Planning Commission, and contains statements of policy (pages 46-48) adopted by the Board of Selectmen in Chapter VI.

Natural and human hazards for Holderness are summarized as follows:

High Risk	**Moderate Risk**
Ice Jams	Lightning
Flood	Motor Vehicle Accident with Hazardous Materials
	Oil Spill

The Holderness Hazard Mitigation Planning Committee, as shown in Chapter IV, identified "Critical Facilities" and "Populations to Protect" as follows:

Critical Facilities	**Populations to Protect**
Town Hall (EOC)	Holderness Elementary School
Holderness Safety Building	Holderness Prep School
Public Works Garage	Rockywold – Deephaven Camps
Emergency Shelters	Squam Lakes Science Center
Evacuation Routes	
Communications	

The Holderness Hazard Mitigation Planning Committee identified numerous existing hazard mitigation programs including the following:

- Emergency Operations Plan
- School Emergency Plan
- Local Regulations including: Zoning Ordinances, River Corridor Overlay, Flood Hazard Overlay, NFIP, and Subdivision Regulations
- Police, Fire and Public Works Departments Mutual Aid Agreements
- Equipment inspection and replacement programs
- Capital Improvement Plan
- Transportation Improvement Plan
- Maintenance program for culverts and roads

The Holderness Hazard Mitigation Planning Committee developed a list of 33 general mitigation actions and six hazard-specific mitigation actions. These mitigation actions were prioritized based on local criteria. Discussions were held regarding how implementation might occur. The results of these discussions are summarized in Table XVI: Implementation Schedule for Mitigation Actions (pages 46 - 48).

CHAPTER I: PLANNING PROCESS

A. 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 and mitigate future losses from natural or human hazard events. In response to this mandate, the NH Homeland Security and Emergency Management (NH HSEM) and regional planning commissions in the state entered into agreements to aid communities with plan development. The plan development process followed the steps outlined in the *Guide to Hazard Mitigation Planning for New Hampshire Communities.*

B. AUTHORITY

This Hazard Mitigation Plan was prepared in accordance with 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 Hazard Mitigation Plan will be referred to as the "Plan."

C. FUNDING SOURCE

The New Hampshire Department of Safety's Homeland Security and Emergency Management (NH HSEM) funded the Plan with matching funds from the Lakes Region Planning Commission.

D. PURPOSE

The Holderness Hazard Mitigation Plan is a planning tool to be used by the town of Holderness, as well as other local, state, and federal governments, in their efforts to reduce the effects from natural and man-made hazards. The Plan contains statements of policy as outlined in the Implementation Schedule for Mitigation Actions (pages 46-48). All other sections of this plan are support and documentation for informational purposes only and are not included as a statement of policy.

E. SCOPE OF PLAN

The scope of this Plan includes the identification of natural hazards affecting the town of Holderness, as identified by the Holderness Hazard Mitigation Planning Committee

(Committee). The hazards were reviewed under the following categories as outlined in the New Hampshire's Natural Hazards Mitigation Plan:

I. **Flood, Wild Land Fire, Drought** (Flood, Dam Break, Ice Jam, Wildfire, Drought)
II. **Geological Hazards** (Earthquake, Radon, Landslide).
III. **Severe Wind** (Tornado, Hurricane, Thunderstorm, Lightning, Hail, Downburst).
IV. **Winter Weather** (Blizzard/Snow Storm, Ice Storm, Nor'easter, Avalanche).
V. **Other Hazards** (Motor Vehicle Accident involving Hazardous Materials, Oil Spill, Military Aircraft Accident, Pandemic, Rabies).

F. METHODOLOGY

The Lakes Region Planning Commission (LRPC) spoke with the Holderness Emergency Management Director (EMD) in February of 2007, about starting the hazard mitigation plan development process. In March of 2007, the Holderness Hazard Mitigation Planning Committee (Committee) was established by the Holderness Board of Selectmen and EMD for the purpose of developing a long range plan for hazard mitigation. The Committee consisted of department heads including Fire, Police, Public Works, Emergency Management, and Town Administration.

Using the *Guide to Hazard Mitigation Planning for New Hampshire Communities*, the Committee developed the content of the Plan by following the nine-step process set forth in the handbook. The Committee held meetings starting March 26, 2007 through August 24, 2007 in order to develop and review the Plan. The following timeline shows the dates and corresponding Committee actions.

Committee Meetings

March 26, 2007, 9:00 AM: Informational and organizational meeting held at the Holderness Public Safety Building.

Step 1: Hazard Mitigation Plan process and Committee organization
Step 2: Identify Potential Hazards on base map
Identify Critical Facilities

April 16, 2007, 9:00 AM: Working Committee meeting held at the Holderness Public Safety Building.

Step 3: Risk Assessment
Vulnerability Assessment
Step 4: Analyze Development Trends

May 7, 2007, 1:00 PM: Working Committee meeting held at the Holderness Public Safety Building.

Step 5: Identify Existing Plans or Policies
Identify Existing Gaps in Protection

May 30, 2007, 9:00 AM: Working Committee meeting held at the Holderness Public Safety Building.

Step 5: Identify Existing Plans or Policies (continued)
Identify Existing Gaps in Protection (continued)
Step 6: Brainstorm & Evaluate Disaster Minimization Alternatives

June 26, 2007, 9:00 AM: Working Committee meeting held at the Holderness Public Safety Building.

Step 6: Brainstorm & Evaluate Disaster Minimization Alternatives (continued)
Step 7: Determine Priorities (STAPLEE)

July 10, 2007, 9:00 AM: Working Committee meeting held at the Holderness Public Safety Building.

Step 8: Develop Implementation Strategy

August 24, 2007, 9:00 AM: Working Committee meeting held at the Holderness Public Safety Building.

Step 8 (con't): Develop Implementation Strategy

November – December 2007: Public review and comment period.

December 2007: Submitted to NH HSEM/FEMA for review.

February 2008:

Step 9: Adopt & Monitor the Plan

Public Involvement

Announcements and the agenda for each meeting were posted in town in advance of each meeting. Information about the Hazard Mitigation Plan and invitations for the public to attend were posted prominently on the LRPC website. Unfortunately, this did not generate additional comment on the plan or attendance at the meetings. In future Plan revisions, meeting announcements, agenda and meeting notes will be placed on the Holderness website as it becomes further developed in order to reach a greater number of residents.

The Committee held a public comment period in order to obtain additional feedback. The Plan was available for public review at the Town Hall for two weeks and was also sent to the neighboring towns of Center Harbor, Sandwich, Campton, Plymouth, and Ashland. Press releases were distributed to regional networks announcing the public comment period. This provided an opportunity for local and regional businesses, organizations, agencies, educational and health institutions in surrounding towns to review the plan.

G. ACKNOWLEDGMENTS

The Holderness Board of Selectmen extends special thanks to those that assisted in the development of this Plan:

Earl Hansen	Emergency Management Director (EMD)
Richard Mardin	Chief of Fire Department
Harold Maybeck	Assistant Emergency Management Director (AEMD)
Walter Johnson	Town Administrator
Jake Patridge	Chief of Police Department
Peter Furmanick	Road Agent, Department of Public Works
Anne Abear	Town Secretary
Paul Hatch	Bureau of Emergency Management Field Representative
Erica Anderson	Lakes Region Planning Commission

CHAPTER II: COMMUNITY PROFILE

Rugged, heavily wooded slopes dominate the Holderness topography. Nearly 44 percent, or 8,573 acres, of the town's land area is characterized by slopes of 15 percent or greater.[1] The Squam Range, including the Rattlesnake Mountains, Mt. Webster, Mt. Livermore, and Cotton Mountain, forms the northern shoreline of Squam Lake, while Mt. Prospect and The Button form the skyline to the north.

The town of Holderness contains 30.5 square miles of land area (85%) and 5.4 square miles of inland water area (15%).[2] The Pemigewasset River forms the northwestern border with the town of Plymouth, providing a small amount of flood-basin land on the eastern shore. Rivers running through Holderness include Carr Brook and Owl Brook on the northern slope of the Squam Range. The remainder of land in town is characterized by hilly to rolling terrain, divided by inter-connected wetlands, ponds, and lakes. On the southern shore of Squam Lake sits Shepard Hill, surrounded by Little Squam Lake to the west and White Oak Pond and several large wetland areas to the east. Groton, Sheep, Moon and Bowman Islands and part of Great Island are all within Holderness.

The town of Holderness is located on the southeastern edge of Grafton County. It is bordered by Center Harbor, Moultonborough, and Sandwich to the east, Campton to the north, Plymouth to the west and Ashland to the southwest. The population density of Holderness is 67.6 persons per square mile of land area.[3]

Like many New England towns, Holderness's temperatures and precipitation vary greatly. January temperatures range from an average high of 30 degrees Fahrenheit to an average low of 8 degrees Fahrenheit. July temperatures range from an average high of 81 degrees Fahrenheit to an average low of 55 degrees Fahrenheit. Annual precipitation totals average between 42 and 48 inches, where the distribution is slightly lower in the winter months when compared to summer months. Holderness averages about 70 inches of snow per year.[4]

[1] *Lakes Region Planning Commission*, August 6, 2007.
[2] *Holderness Master Plan*, Lakes Region Planning Commission, update 2007.
[3] *New Hampshire Community Profiles*, NH Employment and Security Office, http://www.nhes.state.nh.us/elmi/htmlprofiles/holderness.html, visited August 6, 2007
[4] http://www.city-data.com/city/Holderness-New-Hampshire.html, visited June 19, 2007.

A five-member Board of Selectmen governs the town of Holderness. The town has a 30 member volunteer Fire Department and full-time Fire Chief. The Fire Chief is currently the acting Compliance and Health Officer. The Emergency Management Director and Assistant Emergency Management Director are volunteer positions. The Police Department consists of a full-time Police Chief and five full-time officers. The Road Agent directs a staff of three who maintain 36 miles of town roads. Speare Memorial Hospital is located in Plymouth, four miles to the northwest of Holderness, Lakes Region General Hospital is in Laconia, 17 miles south, and Franklin Regional Hospital is in Franklin, 21 miles to the south. Additional hospitals are also located in Dover, Concord, and Lebanon.

A. DEVELOPMENT TRENDS

Population, Housing Stock, and Growth Patterns

Holderness was the sixth slowest growing community in the Lakes Region between 1980 and 1990 (6.8% population increase). Between 1990 and 2000, the rate of population growth in Holderness nearly doubled from the preceding decade (13.9% increase), but it was still one of the slowest growing communities in the Lakes Region.[5] Table I illustrates the slow population growth continued in Holderness from 2001-2005.[6] Current projections from the NH OEP show population growth will continue at a similar rate in Holderness over the next twenty-five years, where the year-round population in 2030 is projected to be 2,390 (Table II).[7] Holderness has a higher median age (42.1 years in 2000) than the Grafton County average (37.0 years) and the state-wide average (37.1 years), but ranks in the middle compared to other towns in the Lakes Region.

Table I: Holderness Population

Time Period	Population
2005	2,029
2004	2,027
2003	2,017
2002	1,993
2001	1,971

Table II: Holderness Population Projection

Time Period	Population
2005	2,030
2010	2,080
2015	2,180
2020	2,250
2025	2,310
2030	2,390

The estimated percentage of seasonal homes in Holderness in 2000 (33.4%) was more than three times the statewide average (10.3%), higher than the Lakes Region as a whole (29.8%), but lower than Carroll County (42.2%) and Grafton County (36.5%) rates for seasonal homes.[8]

[5] *Lakes Region Demographic Profile.* Lakes Region Planning Commission, 2003, p.3.
[6] http://nhetwork.nhes.state.nh.us/nhetwork/Population.aspx?sid=18, visited August 7, 2007.
[7] *Municipal Population Projections 2010 to 2030*. NH Office of Energy and Planning, January 2007, http://www.nh.gov/oep/programs/DataCenter/Population/documents/MunicipalPopulationProjections2010-2030.pdf, visited August 7, 2007.
[8] *Lakes Region Demographic Profile.* Lakes Region Planning Commission, 2003, p.18-19.

These development trends indicate the possibility of several challenges for local hazard mitigation efforts. The number of seasonal residential units is indicative of people from varying origins spending a portion of their time in the community. The challenge this presents is in providing adequate information to all community members regarding the towns' rules and procedures, which can vary from those in seasonal residents' towns of origin. For example, fire safety information for the influx of summer residents can be of great value, not only for the high instances of campfires, but also for the general fire safety guidelines for residences in wooded areas.

Another possible challenge in dealing with hazardous events is the potential for increased special needs populations. Those typically most at risk from severe weather events are the elderly and young children. Given the increasing age of the population, the likelihood of having additional residents with special medical needs is high.

Future Development

The New Hampshire Office of Energy & Planning (NH OEP) estimates the population of Holderness will be 2,080 in 2010. Evidence of recent growth can be seen by the increase of building permits issued annually (Table III).[9]

Table III: Number of Residential Building Permits in Holderness

Year	Number of Permits
2005	10
2004	13
2003	13
2002	18
2001	15
2000	23

The land available for development within Holderness is limited due to the steep topography as shown in the Holderness Conservation Land and Steep Slopes Map (Appendix E). The valley between Mt. Prospect and the Pemigewasset River, the valley between Mt. Prospect and the Squam Range, along the shoreline, and the area surrounding White Oak Pond are the most developable areas in town. The Committee identified several specific areas in Holderness where redevelopment and future development are expected to occur:

- US Route 3; south of the downtown area, lakefront redevelopment
- NH Route 113; west of the road, lakefront redevelopment
- Beede Road, new development
- Smith Road, new development

[9] http://nhetwork.nhes.state.nh.us/nhetwork/blding.aspx?sid=2, visited June 18, 2007.

CHAPTER III: RISK ASSESSMENT

A. IDENTIFYING HAZARDS

The town of Holderness is prone to a variety of man-made and natural hazards. The Committee used the *2004 Natural Hazard Mitigation Plan*, developed by the New Hampshire Governor's Office of Emergency Management, to identify all hazards that could affect the Lakes Region.[10] The Committee also reviewed plans, ordinances, land use regulations, university databases, and internet sources for information about past hazard events in Holderness. The State Hazard Mitigation Planning Committee identified several natural hazards that have the potential to impact the State. Table IV provides a summary of previous occurrences and severity of these hazards.[11] The following narratives provide an overview for the hazards most likely to impact the Lakes Region.

Table IV: Frequency & Severity of Hazards in New Hampshire

Natural Hazard	Frequency	Severity
Flooding	High	High
Dam Failure	Low	Moderate
Drought	Low	Moderate
Wildfire	High	Low
Earthquake	Low	Low
Landslide	Low	Low
Radon	Moderate	Low
Tornado/Downburst	Moderate	Moderate
Hurricane	Moderate	High
Lightning	Moderate	Low
Severe Winter Weather	High	High
Snow Avalanche	Low	Low

I. Flood, Wild Land Fire, Drought

Flooding

Floods are defined as a temporary overflow of water onto lands that are not normally covered by water. It results from the overflow of rivers and tributaries or inadequate drainage. Flooding in the Lakes Region is most commonly associated with structures and properties

[10] http://www.nh.gov/safety/divisions/HSEM/HazardMitigation/documents/Chapter_IV_Risk_Assessment.pdf, visited August 7, 2007.

[11] http://www.nh.gov/safety/divisions/HSEM/HazardMitigation/documents/Chapter_III_Hazard_Analysis.pdf, visited August 9, 2007.

located within a floodplain. There are numerous rivers and streams within the region and significant changes in elevation, leading to some fast-moving water. The region also has a great deal of shoreline, making it exposed to rising water levels as well. Although historically, there have not been high instances of shoreline flooding, the potential always exists for a major flood event to occur. Recent rain events have proven this is becoming an increasing concern as additional development is contributing to flood hazards. As areas are covered with impervious surfaces, less water is allowed to infiltrate. This causes more likelihood of flash floods and sheet flow. Of greatest concern are the waterfront properties on the lakes, ponds, and associated tributaries.

Culvert and roadwork has been conducted throughout the region as a result of localized flooding events. Of particular concern are areas of steep slopes and soils that have limited capacity to infiltrate large rain events. Roads and culverts in close proximity to these conditions are most at risk of localized flooding and erosion.

Dam Failure

Alton earthen dam failure

Dam failure results in rapid loss of water that is normally held back by a dam. These types of floods can be extremely dangerous and pose a threat to both life and property. Dam classifications in New Hampshire are based on the degree of potential damages that a dam failure is expected to cause. Class AA dams are those which would not threaten life or property if a dam failure occurred. Class A dams have the potential for major damage to occur to city roads, with minimal economic losses, and no associated possible loss of life. Both Class AA and A dams are considered *low hazard* dams. A Class B, or *significant hazard,* dam has a potential to cause no probable loss of life, major economic loss to structure or property, structural damage to roads, and major environmental and public loss if it fails or is misoperated. A Class C, or *high hazard*, dam has a potential to cause failure of building foundations, water levels to rise above first floor windows, structural damage to interstate highways, the release of hazardous waste from containment structures, and likely more than one death.[12] The hazard potential for dams relates to damage that would occur if the dam were to break – not the structural integrity of the dam itself. In the Lakes Region, the Town of Alton was impacted by an earthen dam failure on March 12, 1996. Although listed in the NH Hazard Mitigation Plan as a significant hazard, it did result in the loss of one life.

[12] http://www.des.state.nh.us/factsheets/dam/db-15.htm

Ice Jam

Ice forming in riverbeds and against structures often presents significant hazardous conditions for communities. Meltwater or stormwater may encounter these ice formations and apply lateral and/or vertical force upon structures. Moving ice may scour abutments and riverbanks. Ice may also create temporary dams. These dams can create flood hazard conditions where none previously existed.

According to the Corps of Engineers Cold Regions Research and Engineering Laboratory (CRREL), the Pemigewasset River ranks second in the state for the number of ice events where more than 35 events occurred prior to 2000.

Wildfire

A wildfire is defined as a fire in wooded, potentially remote areas that may endanger lives. New Hampshire has about 500 wildfires each year; most of these burn less than half an acre. Much of the Lakes Region is forested and susceptible to fire. A present concern of NH Department of Resources and Economic Development (DRED) Division of Forests & Lands is that the Ice Storm of 1998 has left a significant amount of woody debris in the forests of the region that may fuel future wildfires.[13]

Several areas in the region are relatively remote in terms of access and fire fighting abilities. Of greatest concern are those areas characterized by steep slopes and vast woodlands, with limited vehicular access. These areas include the Ossipee, Squam, Belknap Mountain, and Sandwich Ranges. The islands in the region also pose a unique fire safety concern given that access is limited and most of the islands are predominately wooded with residential development. Most of the residential development on the islands is situated on the shores, and inland fire fighting capabilities are often limited.

Courtesy: White Mountains National Forest

As these once remote areas (the urban wildfire interface) begin to see more development, care should be taken to ensure that adequate fire protection and buffers are established. Techniques include increased buffers between wooded areas and residential buildings, requirements for cisterns or fire ponds, a restriction on the types of allowable building materials such as shake roofs, and special considerations for landscaping. While historically massive wildfires have been western phenomena, each year hundreds of woodland acres burn in New Hampshire. The greatest risk exists in the spring when the snow has melted and before the tree canopy has developed, and in the late summer – early fall. Appropriate

[13] *Summary of State Wildfire Burns*. NH Office of Emergency Management (Table of Tables), June 22, 2007, http://www.nhoem.state.nh.us/mitigation/default.htm.

planning can significantly reduce a community's vulnerability for woodland fires. There are four-zone suggestions that could be potentially helpful for the community.

ZONE 4 is a natural zone of native or naturalized vegetation. In this area, use selective thinning to reduce the volume of fuel. Removing highly flammable plant species offers further protection while maintaining a natural appearance.

ZONE 3 is a low fuel volume zone. Here selected plantings of mostly low growing and fire resistant plants provides a decreased fuel volume area. A few well-spaced, fire resistant trees in this zone can further retard a fire's progress.

ZONE 2 establishes a vegetation area consisting of plants that are fire resistant and low growing. An irrigation system will help keep this protection zone green and healthy.

ZONE 1 is the protection area immediately surrounding the house. Here vegetation should be especially fire resistant, well irrigated and carefully spaced to minimize the threat from intense flames and sparks.[14]

Conflagration

Conflagration is an extensive, destructive fire in a populated area that endangers lives and affects multiple buildings. Historically, many New Hampshire towns were settled in areas along waterways in order to power the mills. Often the town centers were at a low point in the topography, resulting in dense residential development on the steeper surrounding hillsides. Hillsides provide a natural updraft that makes fire fighting more difficult. In particular, structural fires spread more readily in hillside developments because burning buildings pre-heat the structures that are situated above them.

Within the Lakes Region the city of Laconia was the site of one of the most devastating structural fires to occur in the state of New Hampshire. The 1903 Great Lakeport Fire consumed more than 100 homes; two churches, two factories, a large mill, a power plant, and a fire station. The town of Wolfeboro's history includes a significant fire in the winter of 1956. This event is recognized as the last block fire in town and is considered a small conflagration. The majority of structures in the region are old, wood buildings, some of which still lack fire suppression systems. As such, several town and city centers in the region are susceptible to conflagration.

Drought

Drought occurs when less than the normal amount of water is available for extended periods of time. Effects may include decreased soil moisture, groundwater levels, streamflow, and lake, pond, and well levels may drop. Factors that may contribute to drought include reduced rain/snowfall, increased rates of evaporation, and increased water usage. New Hampshire generally receives adequate rainfall; it is rare that the state experiences extended periods of below normal water supplies.

[14] http://www.firewise.org/, visited August 10, 2007.

Since 1990 New Hampshire has had a state Drought Emergency Plan, which identifies four levels of action indicating the severity of the drought: Alert, Warning, Severe, and Emergency. There have been four extended droughts in New Hampshire in the past century and a Drought "Warning" was issued by the Governor's Office in June of 1999.

II. Geological Hazards

Earthquake

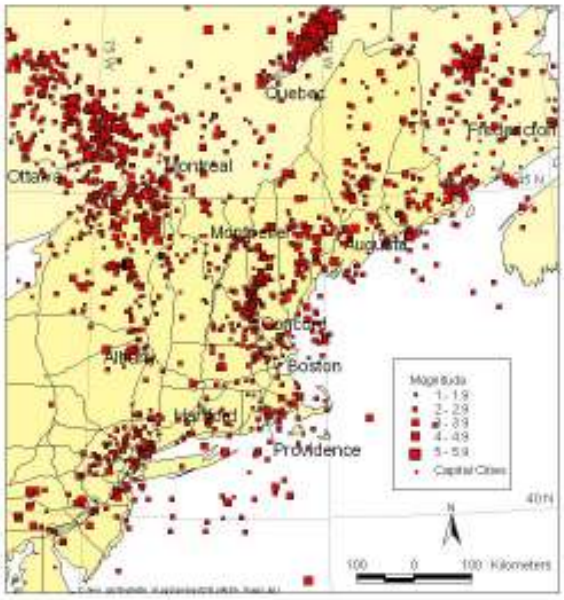
An earthquake is a series of vibrations induced in the Earth's crust by the abrupt rupture and rebound of rocks in which elastic strain has been slowly accumulating. Earthquakes are commonly measured using *magnitude*, or the amount of seismic energy released at the hypocenter of the earthquake. The Richter magnitude scale is a mathematical devise used to compare the size of earthquakes, shown in Table V.[15]

Table V: Richter Magnitude Scale

Magnitude	Earthquake Effects
2.5 or less	Usually not felt, but can be recorded by seismograph.
2.5 to 5.4	Often felt, but only causes minor damage.
5.5 to 6.0	Slight damage to buildings and other structures.
6.1 to 6.9	May cause a lot of damage in very populated areas.
7.0 to 7.9	Major earthquake. Serious damage.
8.0 or greater	Great earthquake. Can totally destroy communities near the epicenter.

New Hampshire is considered to be in an area of moderate seismic activity with respect to other regions of the country. This means the state could experience large (6.5-7.0 magnitude) earthquakes, but not likely to occur as frequently as in a high hazard area like the Pacific coast. On average, every other year the Lakes Region experiences an earthquake, though these earthquakes are mild and go mostly undetected by people. Figure I shows an arc of earthquake activity over the New Hampshire Lakes Region that may affect Holderness.

Figure I: Northeast Seismicity 1975–2006



Source: http://www.bc.edu/research/westonobservatory/

According to the US Geologic Survey, the overall earthquake risk to the state is high due to the built environment. Meaning, many

[15] http://pubs.usgs.gov/gip/earthq4/severitygip.html, visited August 15, 2007.

structures in the state are old or not built to withstand an earthquake. Additionally, due to the unique geology of New Hampshire, earthquake propagation waves travel up to 40 times further than they do in the western United States, possibly enlarging the area of damage.[16] The strongest earthquakes to strike New Hampshire occurred December 20 and 24, 1940 in the town of Ossipee. Both earthquakes had a magnitude of 5.5 and were felt over an area of 400,000 square miles.

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 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. Seismicity may play a role in the mass movement of landforms also. New Hampshire, although mountainous, consists largely of relatively "old" geologic formations that have been worn by the forces of nature for eons prior to the arrival of the Europeans. Consequently, much of the landscape is relatively stable and the exposure to this hazard type is generally limited to areas in the north and north central portion of the state. Formations of sedimentary deposits and along the Connecticut and Merrimack Rivers also create potential landslide conditions.

Although the overall vulnerability for landslides in the state is low, there is considerable terrain susceptible to landslide action. This was exemplified in May of 2003 when the Old Man of the Mountain collapsed. The continuous action of freezing and thawing of moisture in rock fissures causes it to split and separate. This action occurs frequently on the steeply sloped areas of the state, increasing the risk of landslides. In addition to being susceptible to this freeze/thaw process, the Ossipee Mountain Range, Squam Range and other mountains throughout the Lakes Region are also proximate to seismic faults and at risk to increased pressure to development. Consideration must be given to the vulnerability of man-made structures in these areas due to seismicity and/or soils saturation induced landslide activity. Landslide activities are also often attributed to other hazard events. For example, during a recent flood event, a death occurred when a mass of saturated soil collapsed. This death was attributed to the declared flood event.[17] Also, during the 2007 Nor'easter a landslide occurred in Wilton, resulting in the temporary closure of Route 101.

Radon

Radon is a naturally occurring colorless, odorless radioactive gas usually associated with granite rock formations. The gas can seep into basements through the air. It can also be transported via water and is released once the water is aerated, such as during a shower. Extended exposure to radon can lead to higher rates of cancer in humans. Radon is not a

[16] http://www.nh.gov/safety/divisions/HSEM/NaturalHazards/index.html, visited August 10, 2007.

[17] http://www.nh.gov/safety/divisions/HSEM/HazardMitigation/documents/Chapter_III_Hazard_Analysis.pdf, visited August 10, 2007.

singular event – it can take years or decades to see the effects. The NH Department of Public Health Services Bureau of Radiological Health indicates that one third of homes in New Hampshire have indoor radon levels that exceed the US Environmental Protection Agency's "action level" of 4 picocuries per liter (pCi/l).[18] Table VI lists the indoor radon test levels for the four counties comprising the Lakes Region. Carroll County has notably higher levels than the other counties.

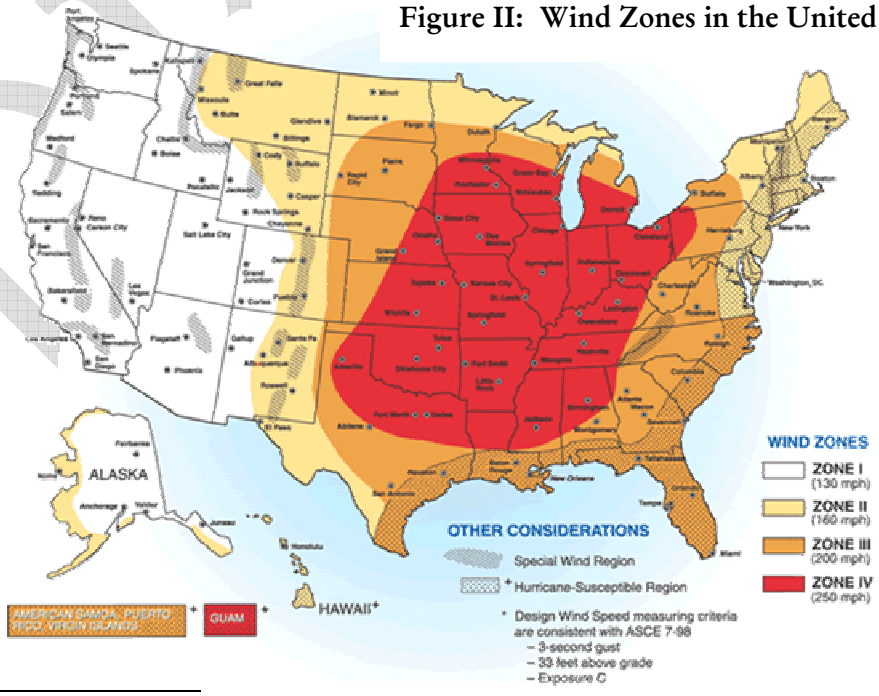
Figure VI: Short-term Indoor Radon Test Results (May 7, 1999)

County	# of Tests	Maximum	% > 4.0 pCi/l
Belknap	744	22.3	14.1
Carroll	1,042	478.9	45.4
Grafton	1,286	174.3	23.2
Merrimack	1,961	152.8	25.2

III. Severe Wind

The Lakes Region is at risk of several types of natural events associated with high winds, including nor'easters, downbursts, hurricanes and tornadoes. Figure II below indicates the building standards that should be implemented in the various wind zones throughout the country.[19] The northeast is located in a zone that should be built to withstand 160 mile an hour wind gusts. A large portion of the northeast, including the Lakes Region, is in a designated hurricane susceptible region.

Figure II: Wind Zones in the United States



[18] http://www.nh.gov/safety/divisions/bem/HazardMitigation/documents/Chapter_III_Hazard_Analysis.pdf, visited August 14, 2007.
[19] http://www.fema.gov/plan/prevent/saferoom/tsfs02_wind_zones.shtm, visited November 16, 2007.

Tornado/Downburst

On average, six tornadoes per year touch down somewhere in New England. There is no way of knowing where or when the next damaging tornado will strike as they are among the most unpredictable weather phenomena. Tornadoes are violent storms, rotational in nature, that extend to the ground with winds that can reach 300 miles per hour. They are produced from thunderstorms and can uproot trees and buildings. Although tornadoes are locally produced, damage paths can be in excess of one mile wide and 50 miles long.[20] The Fujita Scale is used to measure the intensity of a tornado (or downburst) by examining the damage caused in the aftermath, shown in Table VII.[21]

Table VII: The Fujita Scale

F-Scale #	Intensity Phrase	Wind Speed	Type of Damage
F0	Gale tornado	40-72 mph	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.
F1	Moderate tornado	73-112 mph	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	Significant tornado	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	Severe tornado	158-206 mph	Roof and some walls torn off well constructed houses; trains overturned; most trees in forest uprooted.
F4	Devastating tornado	207-260 mph	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	Incredible tornado	261-318 mph	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel reinforced concrete structures badly damaged.
F6	Inconceivable tornado	319-379 mph	These winds are very unlikely. The small area of damage they might produce would probably not be recognizable along with the mess produced by F4 and F5 wind that would surround the F6 winds. Missiles, such as cars and refrigerators would do serious secondary damage that could not be directly identified as F6 damage. If this level is ever achieved, evidence for it might only be found in some manner of ground swirl pattern, for it may never be identifiable through engineering studies.

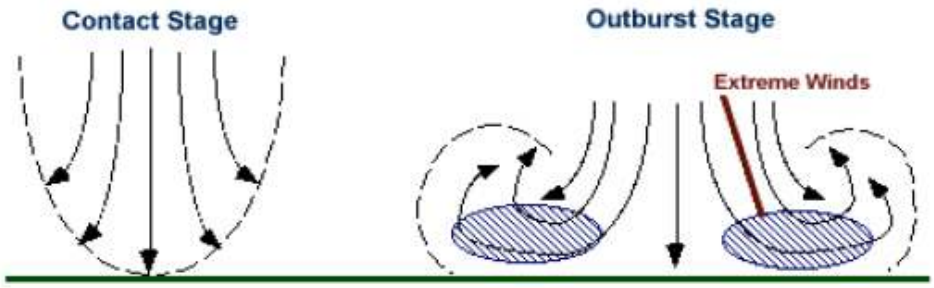
Source: http://www.tornadoproject.com/fscale/fscale.htm

According to the National Oceanic and Atmospheric Administration (NOAA) a downburst is a strong downdraft, rotational in nature, which causes damaging winds on or near the

[20] FEMA Hazards: Tornadoes, http://www.fema.gov/business/guide/section3e.shtm.
[21] http://www.tornadoproject.com/fscale/fscale.htm, visited August 15, 2007.

ground. Winds can exceed 130 mph.[22] Downbursts are 10 times more likely to occur than tornadoes and fall into two categories based on their size:

- microbursts, which cover an area less than 2.5 miles in diameter, and
- macrobursts, which cover an area at least 2.5 miles in diameter.



The major damage from downbursts is from falling trees, which may take down power lines, block roads, or damage structures and vehicles. New Hampshire has experienced three such events in the 1990's. One event occurred in Moultonborough on July 26, 1994 and was classified as a macroburst. It affected an area one-half mile wide by 4-6 miles in length.

The tornado/downburst risk for an individual community in New Hampshire is relatively low compared to many other parts of the country. Though the danger that these storms present may be high, the frequency of these storms is relatively low to moderate.

Hurricane

Hurricanes are severe tropical storms that have winds at least 74 miles per hour. In the Lakes Region, they can produce heavy rain and strong winds that could cause flooding or damage buildings, trees, power lines, and cars.[23] Hurricanes are measured by the Saffir-Simpson Hurricane Scale: a 1-5 rating based on a hurricane's intensity using wind speed as the determining factor (Table VIII). The scale is used to give an estimate of the potential property damage and flooding expected from a hurricane landfall.

Table VIII: Saffir-Simpson Hurricane Scale

Category	Characteristics
1	Winds 74-95 mph (64-82 kt or 119-153 km/hr). Storm surge generally 4-5 ft above normal. No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Some damage to poorly constructed signs. Also, some coastal road flooding and minor pier damage.
2	Winds 96-110 mph (83-95 kt or 154-177 km/hr). Storm surge generally 6-8 feet above normal. Some roofing material, door, and window damage of buildings. Considerable damage to shrubbery and trees with some trees blown down. Considerable damage to mobile homes, poorly constructed signs, and piers. Coastal and low-lying escape routes flood 2-4 hours before arrival of the hurricane center. Small craft in unprotected anchorages break moorings.

[22] *Weather Glossary.* National Oceanic and Atmospheric Administration, http://www.srh.noaa.gov/fwd/glossarymain.html, visited June 21, 2007.
[23] http://www.fema.gov/kids/hurr.htm, visited August 15, 2007.

3	Winds 111-130 mph (96-113 kt or 178-209 km/hr). Storm surge generally 9-12 ft above normal. Some structural damage to small residences and utility buildings with a minor amount of curtainwall failures. Damage to shrubbery and trees with foliage blown off trees and large trees blown down. Mobile homes and poorly constructed signs are destroyed. Low-lying escape routes are cut by rising water 3-5 hours before arrival of the center of the hurricane. Flooding near the coast destroys smaller structures with larger structures damaged by battering from floating debris. Terrain continuously lower than 5 ft above mean sea level may be flooded inland 8 miles (13 km) or more. Evacuation of low-lying residences within several blocks of the shoreline may be required.
4	Winds 131-155 mph (114-135 kt or 210-249 km/hr). Storm surge generally 13-18 ft above normal. More extensive curtainwall failures with some complete roof structure failures on small residences. Shrubs, trees, and all signs are blown down. Complete destruction of mobile homes. Extensive damage to doors and windows. Low-lying escape routes may be cut off by rising water 3-5 hours before arrival of the center of the hurricane. Major damage to lower floors of structures near the shore. Terrain lower than 10 ft above sea level may be flooded requiring massive evacuation of residential areas as far inland as 6 miles (10 km).
5	Winds greater than 155 mph (135 kt or 249 km/hr). Storm surge generally greater than 18 ft above normal. Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. All shrubs, trees, and signs blown down. Complete destruction of mobile homes. Severe and extensive window and door damage. Low-lying escape routes are cut off by rising water 3-5 hours before arrival of the center of the hurricane. Major damage to lower floors of all structures located less than 15 ft above sea level and within 500 yards of the shoreline. Massive evacuation of residential areas on low ground within 5-10 miles (8-16 km) of the shoreline may be required.
Source: http://www.nhc.noaa.gov/aboutsshs.shtml	

On September 21, 1938, a Category 3 hurricane claimed 494 lives in New Hampshire and many more throughout New England. Official records at the Weather Bureau in Concord show sustained winds of 56 miles per hour, but around the state, gusts near 100 miles per hour were reported, mostly due to topographical acceleration. The Merrimack River rose nearly 11 feet above its flood stage. The Hanover Gazette reported that in New Hampshire, 60,000 people were homeless and many areas were without power. The Disaster Relief Committee estimated public and private property damages at $12,337,643.[24]

Thunderstorm/Lightning

Thunderstorms have several threats associated with them including heavy rain, high wind, and hail. In a heavy rain storm, large amounts of rain may fall in a short period of time, severely impacting roads and low-lying developments. All thunderstorms contain lightning, which can cause death, injury, and property damage and have great potential to cause structure and wildfires. The discharge of lightning causes an intense sudden heating of air. The air rapidly expands when heated then contracts as it cools which causes a shock wave that we hear as thunder. This shock wave is sometimes powerful enough to damage windows and structures.

[24] http://www.nhoem.state.nh.us/Mitigation/SecIII.shtm#Hurricane

On average, more people are killed by lightning than any other weather event. There is more than $2 billion [of] damage annually in the United States from lightning.[25] In the Lakes Region, however, fewer than two lightning strikes occur per square kilometer annually.[26] While this value is not particularly high, the concern that lightning might ignite a wildfire is quite high since a large percentage of the area is rural and forested.

Hail

High winds can bring down limbs and trees, knocking out electricity and blocking roads. Hail can cause damage to crops, structures and vehicles. Hail is measured by the TORRO intensity scale, shown in Table IX. Although hailstorms are not particularly common in the Lakes Region, which averages less than two hailstorms per year, several have occurred in New Hampshire in the last few years.[27]

Table IX: TORRO Hailstorm Intensity Scale

Code	Diameter	Description	Typical Damage
H0	5-9 mm*	Pea	No damage
H1	10-15 mm	Mothball	Slight damage to plants, crops
H2	16-20 mm	Marble, grape	Significant damage to fruit, crops, vegetation
H3	21-30 mm	Walnut	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	31-40 mm	Pigeon's egg	Widespread glass damage, vehicle damage
H5	41-50 mm	Golf ball	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	51-60 mm	Hen's egg	Aircraft bodywork dented, brick walls pitted
H7	61-75 mm	Tennis ball	Severe roof damage, risk of serious injuries
H8	76-90 mm	Large orange	(Severest recorded in the British Isles) Severe damage to aircraft bodywork
H9	91-100 mm	Grapefruit	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	> 100 mm	Melon	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

***mm** = millimeters (Approximate range since other factors (e.g. number, density of hailstones, hail fall speed, surface wind speed) affect severity
Source: http://www.torro.org.uk/torro/severeweather/hailscale.php

IV. Winter Weather

Severe winter weather occurs frequently in the northeast and the possibility exists to have to withstand several days without power. It is felt that no one area of the region is at greater risk than another, but there are segments of the population that are more at risk. These include the elderly, people that are in need of regular medical care and young children.

[25] *National Lightning Safety Institute webpage,* http://www.lightningsafety.com/nlsi_info/glossary.html, visited August 14, 2007.
[26] *Northeast States Emergency Consortium,* http://www.serve.com/NESEC/, visited August 14, 2007.
[27] *Northeast States Emergency Consortium,* http://www.serve.com/NESEC/, visited June 21, 2007.

Blizzard/Snow Storm

A heavy snowstorm can be defined as one which deposits four or more inches of snow in a twelve hour period.[28] Heavy snows can cause damage to property, disrupt services, and make for unsafe travel, even for emergency responders. Due to poor road conditions, residents may be stranded for several days. Extra pressure is placed on road crews and emergency services under these conditions.

Snow load in severe winter storms is of concern as well. This is particularly true for flat roofed structures. Several small storms can produce the same snow load as a single larger storm and the combined weight of the snow load can damage rooftops. Ice adds additional weight as well. It is not uncommon in New Hampshire to experience mixes of winter precipitation as temperatures fluctuate above and below the freezing mark. While not widespread, instances of collapsed roofs are not uncommon.

Snowstorms are a common occurrence throughout the Lakes Region. Blizzards, which may dump 12" – 36" or more of snow in a one to three-day period are less frequent, but can have a serious impact on structures, utilities, and services. The region typically receives greater than 66" of snow annually – between 1955 and 1985 the annual snowfall was between 6.5 and 8.0 feet. [29]

Ice Storm

An ice storm coats trees, power lines, streets, vehicles, and roofs with a very slick and heavy coating of ice. The major threats to a community due to ice storms include structural damage due to heavy loads on roofs, interruptions of services such as electricity, fuel, water, and communications, as well as hazardous road conditions.

In the winter of 1998, a major ice storm crippled much of New Hampshire, coating everything with as much as three inches of ice. The ice load bent trees and power lines and led to massive power outages throughout the state. This ice storm resulted in over $17 million dollars of damage in New Hampshire alone.[30] The U.S. Army Corps of Engineers, Cold Regions Research and Engineering Laboratory estimates a 40 – 90 year return period for an event with a uniform ice thickness of between 0.75 and 1.25 inches.[31]

[28] http://www.nhoem.state.nh.us/Mitigation/SecIV.shtm, visited November 16, 2007.
[29] *Northeast States Emergency Consortium,* http://www.serve.com/NESEC/, visited June 20, 2007.
[30] http://www.nh.gov/safety/divisions/bem/HazardMitigation/documents/Chapter_III_Hazard_Analysis.pdf, visited November 16, 2007.
[31] http://www.crrel.usace.army.mil/icejams/index.htm, visited November 16, 2007.

Nor'easter

New Hampshire generally experiences at least 1 or 2 nor'easters each year with varying degrees of severity. A nor'easter is defined as a large anticyclone weather system that resides near the New England region. These storms have the potential to inflict more damage than many hurricanes because high winds can last from 12 hours to 3 days, while the duration of hurricanes ranges from 6 to 12 hours. A nor'easter also has the potential to sustain hurricane force winds, produce torrential rain, and create blizzard conditions in winter months.[7] Infrastructure, including critical facilities, may be impacted by these events, and power outages, communications, and transportation disruptions (i.e., snow and/or debris-impacted roads, as well as hazardous to navigation and aviation) are often associated with the event.[32]

In the winter months, the State may experience the additional coincidence of blizzard conditions with many of these events. The added impact of the masses of snow and/or ice upon infrastructure often affects transportation and the delivery of goods and services for extended periods. The 2007 Patriots' Day Nor'easter was one of the largest springtime storms to strike New England.[33] The storm brought heavy snowfall to central and northern New Hampshire which flooded many rivers. The storm also packed hurricane force winds which caused structural damage and power outages from downed trees. To date, FEMA and the U.S. Small Business Administration have obligated nearly $30 million in disaster aid for this nor'easter.

Avalanche

A snow avalanche is a slope failure, similar to a landslide, consisting of a mass of rapidly moving, fluidized snow that slides down a mountainside. The flow can be composed of ice, water, soil, rock and trees.[34] Most avalanches result from structural weaknesses in the snow pack caused by temperature fluctuations or multiple snowfall events. Avalanches occur on steep slopes averaging 25-50 degrees and are triggered by both natural events (thermal changes, blizzards, seismic activity) and human activities (i.e. skiers, hikers, snowmobilers, sound waves). While avalanches are more common in the Presidential Range in Northern New Hampshire, conditions exist in a few mountain ranges within the Lakes Region as well.

V. Other Hazards

The Lakes Region, as its name suggests, is comprised of many surface waterbodies. Many of the towns in the region depend on a portion of this resource to provide public drinking water to the community. Area tourism and water recreation are also highly dependent on the availability of clean and attractive water resources. For these reasons the protection of surface waters in the Lakes Region is highly valued both as a necessity and for economic reasons. The

[32] *State of New Hampshire Natural Hazards Mitigation Plan*. NH Office of Energy and Planning, Aug. 15, 2005 http://www.nhoem.state.nh.us/mitigation/.
[33] http://www.fema.gov/about/regions/regioni/patriotsdaynoreaster.shtm, visited October 1, 2007.
[34] http://www.nh.gov/safety/divisions/HSEM/HazardMitigation/, visited August 15, 2007.

leading potential sources of water contamination include in transit and fixed hazardous materials.

Motor Vehicle Accident involving Hazardous Materials
Hazardous materials, i.e., chemicals and chemical compounds in many forms, are found virtually everywhere - in common household products; agricultural fertilizers and pesticides; carried by vehicles as fuels, lubricants, and transported products; and, used in business and industrial processes. When improperly used, released, or spilled, they can burn or explode, diffuse rapidly through the air or in water, and endanger those who come in contact with them.

Chemicals, of all types are used, stored, and transported throughout the Lakes Region. The types and locations of many of these hazardous materials are unknown. While the New Hampshire Department of Environmental Services maintains a database of hazardous waste generators and underground storage tanks located in the state, detailed information on the types and volume of hazardous materials that are transported through the region is not documented. Likewise, only a small portion of the stored hazardous materials are reported and cataloged. Thus, there is a potential of a hazardous material incident at every transportation accident or fire in the area. Further, there is extensive use of liquefied gases for heating in the area, which means that significant amounts are transported, by both vehicle and major gas pipelines, and stored in the region.

Several major north-south and east-west transportation connections to points throughout central New Hampshire and beyond are found in the Lakes Region. These major roadways and a passenger railway are in many places located in close proximity to local water resources. The region is at risk of an over-land hazardous material spill that could cause infiltration of spilled hazardous materials into the water resources. The potential for water resources to be contaminated is increased by the miles of storm drains that outlet directly into surface water bodies.

A review of accident data provided by the NH Department of Transportation for the years 1996-2000 on US Route 3 and intersecting roadways indicate that nearly half (46%) of accidents reported occurred at or in close proximity to NH Route 25 (25%), NH Route 104 (11%), and NH Route 106 (10%). These four routes represent the most significant north-south and east-west connections in the Lakes Region. Though the data does not show a definitive increase in accidents reported, the volume of traffic on these major routes has increased significantly in recent years. It is presumed that this traffic increase has been accompanied by an increase in the volume of hazardous materials traveling through the region.

Oil Spill

As noted under the Hazardous Materials heading, NH Route 25 is a major east-west corridor for the transport of oil from Portland, ME to central and western portions of New Hampshire. This corridor is also close to numerous surface waterbodies and lies atop the largest aquifer in the state – the Ossipee Aquifer. Since oil is the most commonly used home heating fuel in the state, trucks are regularly traveling all types of roads in the region. Spillage of oil in any of these areas has the potential to result in the contamination in countless drinking water wells, surface waters, wetlands, and ground water.

Pandemic

A pandemic is a global disease outbreak. A flu pandemic occurs when a new influenza virus emerges for which people have little or no immunity, and for which there is no vaccine. The disease spreads easily person-to-person, can cause serious illness, and can sweep across the country and around the world in very short time.[35] The New Hampshire Department of Health and Human Services is developing an epidemic and pandemic response plan so that communities can be prepared and respond to outbreaks.[36] The town of Holderness is part of a ten community all health hazards region and is a host community for mass inoculation of vaccines.

As of June 2006, the Avian Influenza H5N1 virus has infected 81 people and killed 52 in 10 countries in Asia and Africa. The total number of deaths for the first half of 2006 has already exceeded the total for 2005. Currently, most of the H5N1 cases have been a result of human contact with infected poultry and the spread of the virus has not continued beyond that person. Concerns about the H5N1 virus would increase exponentially if the virus was capable of being transmitted from human-to-human. Although no human-to-human cases have been reported, viruses have the ability to mutate. It is extremely difficult to predict where the next outbreak will occur, so preparing for the possibility of an outbreak is important. The Lakes Region of New Hampshire has a large influx of seasonal visitors, which could make viral containment very difficult. The US Department of Health & Human Services estimates that nearly 2 million people in the United States would perish if the Avian Influenza H5N1 virus able to be transmitted from human-to-human. [21]

[35] http://www.pandemicflu.gov/, visited August 15, 2007.
[36] http://www.dhhs.state.nh.us/DHHS/CDCS/ppcc.htm, visited August 15, 2007.

Infectious Diseases are diseases or viruses which negatively impact human health and can be contracted from insect, animal, human, or through the air. In 2005, the West Nile Virus infected 3,000 people and killed 119 in 44 states and Washington, DC. In comparison, annually the flu infects approximately 10-20% of the United States population (28-56 million people), resulting in approximately 20,000 deaths. Currently, there is no known cure for West Nile Virus, no medicine exists to treat it, and no vaccine is available to prevent it.[37]

Concerns regarding West Nile Virus include fear about mosquito populations that carry the virus. A study from the state of Wisconsin indicates that mosquitoes responsible for transmitting the West Nile Virus don't prefer wetlands, but breed prolifically in stagnant water in discarded tires, birdbaths, and roof gutters. These artificial containers lack the natural predators that keep mosquito populations in check in naturally occurring wetlands. Often these artificial containers are located near developed areas providing mosquitoes with human hosts.[38]

Eastern equine encephalitis (EEE) is also of concern to the Lakes Region as it is one of the most serious mosquito-borne diseases in the United States. EEE causes disease in humans, horses, and some bird species. Symptoms of EEE include flu-like illness, inflammation of the brain, coma, and death with a mortality rate of approximately one-third. There is no specific treatment for the disease but the Centers for Disease Control and Prevention (CDC) suggests using EPA-registered insect repellant, wearing protective clothing, and removing standing water which are breeding grounds for mosquitoes.

Summary

It is cost prohibitive to make the built environment resistant to the most devastating natural hazards that could occur, though reasonable measures can be taken to minimize loss of life and property damage. The town may be affected by an unavoidable extraordinary circumstance such as a violent earthquake, but historically, events of this magnitude have been infrequent. Those natural events that are common to the northeast also have common elements of concern for public safety. These include the potential for long-term power outages, the potential need for short-term sheltering facilities, and the availability of equipment and trained personnel. Key to loss prevention in these relatively common event scenarios is pre-event planning that critically assesses communications within the community, mutual aid resources regionally, public awareness and education, and emergency response training.

B. PROFILING HAZARD EVENTS

Identifying hazards of potential import to Holderness was based on local knowledge of department heads and town management, internet research, and conversation with the New

[37] http://www.cdc.gov/ncidod/dvbid/westnile/qa/prevention.htm, visited August 15, 2007.
[38] http://www.dnr.state.wi.us/, visited August 15, 2007.

Hampshire Homeland Security and Emergency Management and other agencies. A matrix was created to determine an overall hazard risk assessment rating. Each criterion (probability of occurrence and vulnerability) was given a rating of severe, moderate, or minimal to show which hazards are the greatest threat to the community, based on indicators: danger/destruction, economic, environmental, social, and political planning level. These ratings were then transformed into numerical values 3, 2, and 1, respectively. The overall risk rating associated with each hazard was determined by multiplying the two factors. This resulted in risk ratings ranging from 1 to 9; 1-3 = minimal risk, 4-6 = moderate risk, 7-9 = severe risk. This Plan will focus on those events that pose at least a moderate risk to the town of Holderness as determined by the Committee (Table X). The entire Risk Assessment Matrix can be found in Appendix H.

The extent (i.e. magnitude or severity) has been determined through research and past events in Holderness, and the potential degree of damage that could occur. Extent was based on potential assistance needed, as defined below:

- Minimal: local residents can handle the hazard event without help from outside sources
- Moderate: county or regional assistance is needed to survive and/or recover
- Severe: state or federal assistance is necessary to survive and/or recover

Table X: Town of Holderness Risk Assessment

	Extent			Probability of Occurrence			Vulnerability			
Hazard Type	Severe	Moderate	Minimal	High	Moderate	Low	High	Moderate	Low	**Risk Rating**
Flood, Drought, Extreme Heat & Wildfire										
Flood		X		3			3			**9**
Ice Jam		X		3			3			**9**
Drought			X			1			1	**1**
Extreme Heat			X			1			1	**1**
Wildfire	X					1	3			**3**
Geologic Hazards										
Earthquake			X			1			1	**1**
Landslide			X			1			1	**1**
Radon			X		2				1	**2**
Severe Wind Hazards										
Thunder Storm/Lightning	X			3				2		**6**
Hurricane	X					1			1	**1**
Tornado/Downburst	X				2			2		**4**
Hail			X		2				1	**2**
Winter Weather Hazards										
Blizzard/Snow Storm		X		3					1	**3**
Ice Storm	X				2			2		**4**
Nor'easter		X		3					1	**3**
Avalanche			X			1			1	**1**

Human-Related Events										
MV Accident involving Hazardous Materials	X				2		3			**6**
Oil Spills	X				2		3			**6**
Military Aircraft Accident	X					1		2		**2**
Pandemic	X					1			1	**1**
Other										
Rabies		X			2				1	**2**
Recreational Activities		X		3					1	**3**

It should be noted that the ranking of individual hazards for the purposes of planning discussion, should not in any way diminish the potential severity of the impacts of a given hazard event. Further, hazards ranked as low risk may have the impact of increasing the risk of other hazards when they occur. For example, in the event of a drought, the risk of woodland fire may be greater. In combination, hazard events may have the impact of overwhelming existing emergency response systems. Similarly, the likelihood of each hazard addressed in this plan is based on historic events and local knowledge.

I. HIGH RISK HAZARDS

Flood
Location: Localized
Specific Areas of Concern: floodplain, all shoreline areas, and roads identified as prone to flooding or washout (Perkins Lane, Perch Pond Road, Coxboro Road, East Holderness Road, Macruellis Road, NH 113, North and South River Roads), Pemigewasset River, Squam River
Critical Facilities: Structures and Services, Emergency Shelters, Essential Services, US Route 3 Bridge over the Pemigewasset River, Downtown Holderness Bridge
Extent: Moderate
Probability of Occurrence: High
Overall Risk: High

Several instances of localized culvert flooding have been identified and a maintenance schedule is being implemented (Appendix J). Specific areas of concern are shown as the blue hatched area on the Critical Facilities and Potential Hazards Map in Appendix D. The associated costs of culvert flooding and washouts are readily calculated based on materials, labor and equipment expenses used by DPW. Many of the culverts of concern are located on less traveled roads in town.

Development causes greater potential for culvert and road washouts. It can also increase the potential for flooding on neighboring properties if stormwater is not properly designed and incorporated on-site. Impeded stream flows and steep slope degradation can also contribute to stormwater flooding. The Holderness zoning ordinance currently prohibits development on slopes greater than 25 percent and is drafting a steep slopes ordinance limiting development on

15-25 percent slopes. Holderness participates in the FEMA Flood Insurance program, enabling residents to purchase flood insurance policies.

Ice Jam
Location: Localized
Specific Areas of Concern: NH Route 175A Bridge over the Pemigewasset River, residences and structures adjacent to the river, evacuation route, commercial area
Critical Facilities: Essential Services, infrastructure
Extent: Moderate
Probability of Occurrence: High
Overall Risk: High

It is estimated that the extent of potential damage in the event of an ice jam would include damage to area businesses, residences and infrastructure through flooding or debris. Heavy damage to the surrounding area is estimated by the EMD to cost the town of Holderness $5,000 for manpower, equipment, and replacement costs. This estimate is for the town of Holderness expenses only and does not include the town of Plymouth, residential or business, or Plymouth State University expenses. Other associated costs are uncertain. The old bridge is currently being replaced with a larger structure on two piers, where there were none before. This design concerns the town since this the potential for ice jams is magnified with the addition of the piers in the river. NH Route 175A is heavily traveled and is an essential connection for emergency response and the hospital between Plymouth, Holderness and surrounding communities. In the event of damage to NH Route 175A or the bridge, emergency response would likely be impeded.

I. MODERATE RISK HAZARDS

Thunderstorm and Lightning
Location: Localized
Specific Areas of Concern: Residences, limited access areas, forests
Critical Facilities: Essential Services, Special Populations, Emergency Shelters
Extent: Severe
Probability of Occurrence: High
Overall Risk: Moderate

The concern that lightning might ignite a wildfire in Holderness is quite high due to the amount of forested mountains in town. Additionally, most of the town has steep terrain with low accessibility, further impeding fire fighting ability. Holderness averages one structure fire a year as a result of lightning. There are numerous small wildfires throughout town as a result of lightning and people. One example was the Livermore wildfire that smoldered for four days because crews couldn't easily access the site.

Tornado/Downburst
Location: Localized
Specific Areas of Concern: loss of power; critical infrastructure, residential areas, limited access areas, forests
Critical Facilities: Essential Services, Structures and Services, Special Populations, Emergency Shelters
Extent: Severe
Probability of Occurrence: Moderate
Overall Risk: Moderate

In Holderness, the major damage from downbursts or tornados come from falling trees, which may take down power lines, block roads, or damage structures and vehicles. One event occurred in Moultonborough on July 26, 1994 and was classified as a macroburst. It affected an area one-half mile wide by 4-6 miles in length. This same storm produced wind damage typical of a micro/macroburst in Holderness. The town has been impacted by several similar storms in recent years, although most have gone unreported.

Ice Storm
Location: Regional
Specific Areas of Concern: Elementary school, Residences, inaccessible roads from downed trees and power lines, power outages
Critical Facilities: Essential Services, Populations to Protect, Emergency Shelters
Extent: Severe
Probability of Occurrence: Moderate
Overall Risk: Moderate

During an ice storm the major threats to a community come from structural damage, interruptions of services such as electricity, fuel, water, and communications, as well as hazardous road conditions. Snow accumulation on roofs, especially when combined with ice, can lead roofs to collapse. The build up of snow and ice on trees can knock limbs and trees onto power lines, causing power outages and blocking roads. Due to poor road conditions, residents may be stranded for several days. In order to keep these roads cleared, extra pressure is placed on road crews and emergency services under these conditions. Town plows and contractors hired for winter road maintenance have to work around the clock.

Motor Vehicle Accident involving Hazardous Materials
Location: Localized to Regional
Specific Areas of Concern: waterbodies, intersections, roads/evacuation routes, water supplies
Critical Facilities: Structures and Services, Commercial Districts, Marinas, Fuel Station, Public and Private Beaches, Holderness Safety Building, Highway Department,
Extent: Severe
Probability of Occurrence: Moderate
Overall Risk: Moderate

The costs associated with cleaning up a hazardous spill can vary greatly dependent on the substance, quantity and resources threatened. US Route 3/NH Route 25, NH Route 113, and I-93 intersect in Holderness, near many critical infrastructures. There is concern by the Committee that the effects of a hazardous material spill along any of these routes could impact both the town's Essential Services and Special Populations.

A hazardous spill that occurs during transport would also threaten multiple water resources including Squam Lake, Little Squam Lake, White Oak Pond, Oak Brook, Squam River and Pemigewasset River. An incident on portions of East Holderness Road could also affect the town of Meredith's drinking water supply. Costs associated with spill containment and clean-up involving water resources are certain to be high. Holderness also has several above- and under-ground storage tanks that contain hazardous material, located at the Highway garage, gas station, auto body repair shop, the marinas, and NH Route 175A. These tanks could pose an immediate threat to adjacent water bodies if they were to exceed their secondary containment safeguards.

Oil Spill
Location: Regional
Specific Areas of Concern: schools, childcare, island residences, inaccessible roads from downed trees and power lines, power outages
Critical Facilities: Essential Services, Structures and Services, Special Populations, Emergency Shelters
Extent: Severe
Probability of Occurrence: Moderate
Overall Risk: Moderate

Most oil tankers have the capacity to carry 1000 gallons of home heating oil. The trucks travel throughout Holderness and the area daily to fulfill their deliveries. NH Route 25/3 and NH Route 113 intersect in downtown Holderness. NH Route 175 connects NH Route 25/3 at the Ashland town line and at the Holderness School in the northwestern section of town. A portion of Interstate 93 is also in the northwestern corner of town. All of these are heavily traveled roads for vehicles of all types, including oil tankers. The town of Holderness Fire Department has enough spill containment equipment to control a small spill. Large spills would exceed the town's equipment and manpower capacity. The state's spill response team should be alerted immediately if a spill is large or if it is near a waterbody, regardless of the size.

C. HISTORICAL HAZARD EVENTS

The most recent hazard event had little impact on the town of Holderness. On March 21, 2007 an earthquake measuring 2.7 on the Richter scale, occurred on the northern slopes of Mount Morgan. Tremors were felt in Holderness and neighboring towns. Another recent hazard event had much more of an impact. On January 7 and 8, 1998, a devastating ice storm

hit and mainly affected upstate New York, northern New Hampshire and Vermont, much of Maine, and southeast Canada. Some locations received over 3 inches of rain (as freezing rain), with radial ice thickness of one inch or more. New England reported over 500,000 customers without power and overall damages approached $3 billion for Canada and were at least $1.4 billion for the U.S. In New Hampshire, 140,000 people lost electricity, some for as long as eight days, 38 shelters were set up that served 700 refugees, and two storm related deaths were reported.

The following hazard, as described in this plan, has yet to occur in Holderness or historic records were unavailable: motor vehicle accident involving hazardous materials. Through Committee discussion, incidents similar to a chemical spill were identified. A tanker trunk spilled fuel along NH Route 25 (date unknown) in neighboring Moultonborough, and the fire department has responded to occasional small (usually < 10 gallon) fuel spills at local gas stations. Table XI details additional historic events that have impacted the town of Holderness within the last eighty years.

Table XI: Past Hazard Events

Hazard	Date	Location	Impacts/Assessment
Tornado	July 14, 1963	Grafton County	F1
Tornado	June 27, 1964	Grafton County	F0
Tornado	August 11, 1966	Grafton County	F2
Tornado	August 25, 1969	Grafton County	F1
Tornado	July 21, 1972	Grafton County	F1
Tornado	July 21, 1972	Grafton County	F1
Tornado	May 11, 1973	Grafton County	F2
Tornado	June 11, 1973	Grafton County	F0
Downburst	July 6, 1999	Grafton and Carroll County	Large macroburst in Moultonborough affecting surrounding region.
Drought	1929-1936	Statewide	Regional
Drought	1939-1944	Statewide	Sever in Southeast
Drought	1947-1950	Statewide	Moderate
Drought	1960-1969	Statewide	Longest record continuous period of below normal precipitation.
Drought	June 1, 1999	Statewide	Governor's Office declaration moderate drought for most of the state.
Earthquake	December 24, 1940	Carroll County	5.5 - felt over 400,000 square miles. Severe damage.
Earthquake	January 18, 1982	Sanbornton, NH	Gaza Corners had a 4.5 quake felt throughout the state.
Earthquake	March 21, 2007	Holderness	Epicenter on slopes of Mount Morgan. 2.7 on Richter scale. Tremors felt in Holderness, Ashland, and Campton.
Flood	July 4, 1973	Grafton County	Fourteen bridges and many roadways were damaged totaling $171,000. In Holderness, US Route 3, Hardhack Road were flooded.

Hazard	Date	Location	Impacts/Assessment
Flood	July 1, 1986 - August 10, 1986	Statewide	Severe summer storms with heavy rains, flash flooding and severe high winds
Flood	August 7-11, 1990	Statewide	Wide spread flooding, a series of storm events with moderate to heavy rains
Flood	October 1, 1996	Grafton County	Heavy Rains
Flood	October - November 1995	Grafton County	Heavy Rains
Flood	September 12, 2003	Statewide	Severe storms and flooding
Flood	October 26, 2005	Statewide	Severe storms and flooding
Flood	May, 12 - June 30, 2006	Statewide	Severe storms and flooding
Forest Fire	1978	Holderness	Burned Rattlesnake Mountain
Forest Fire	August 9, 2001	Holderness	Livermore - Fire caused by lightning burned 0.75 acres.
Hurricane	1938	Statewide	Severe storms, flooding along Pemigewasset River
Hurricane	September 9, 1991	Statewide	Hurricane Bob, severe storms
Hurricane	September 18- 19, 1999	Grafton County	Heavy Rains associated with tropical storms, Hurricane Floyd affected the area.
Blizzard	March 16, 1993	Statewide	High winds and record snowfall
Ice Storm	January 7, 1998	Statewide	In Grafton County there was moderate to severe conditions. 52 communities in county were impacted, six injuries and one fatality, major roads closures, 67,586 with our electricity, 2,310 with out phone service, one communication tower, 17 million dollars of damages to the public.
Nor'easter	April 27, 2007	Statewide	Nor'easter caused flooding, damage in excess of $29 million as of October 1, 2007.
Snow Storm	December 1, 1973	Grafton County	Two back-to-back snow storms
Snow Storm	February 6, 2001	Grafton County	Accumulation of 34 inches
Snow Storm	March 16, 1993	Statewide	
Snow Storm	March 30, 2005	Statewide	$6.5 million in public assistance
Snow Storm	January 15, 2004	Statewide	
Snow Storm	March 28, 2001	Statewide	

Table Sources:
1 = http://www.tornadoproject.com
2 = New Hampshire Homeland Security and Emergency Management (NHHSEM)
3 = National Oceanic and Atmospheric Administration (NOAA)
4 = National transportation Safety Board (NTSB)
5 = Federal Emergency Management Agency (FEMA)
6 = Northeast States Emergency Consortium (NESEC)
7 = National Interagency Fire Center (NIFC)

CHAPTER IV: VULNERABILITY ASSESSMENT

A. CLASSIFICATION OF CRITICAL INFRASTRUCTURE

The list of critical infrastructure for the town of Holderness was identified by the Committee. The critical infrastructure list was broken into five categories, 1) Essential Services; 2) Structures and Services; 3) Emergency Shelters; 4) Special Populations; 5) Other. The first category contains facilities essential in a hazard event. The second category contains non-essential facilities that have been identified by the Committee as services and facilities to protect. The third category is a list of the pre-defined emergency shelters within the community. The fourth category contains populations that the Committee wished to protect in the event of a disaster. The fifth category contains other infrastructure that was important to the Committee. The Critical Facilities and Potential Hazards Map is located in Appendix D.

Essential Services:
Facility: Holderness Safety Building
Location: 922 US Route 3
Hazard Vulnerability: High

Facility: Town Hall – Emergency Operations Center
Location: 1089 US Route 3
Hazard Vulnerability: High

Facility: Highway Department
Location: 62 Beede Road
Hazard Vulnerability: High

Facility: Holderness Elementary School (shelter)
Location: 3 School Street
Hazard Vulnerability: High

Facility: Cell Tower
Location: Smith Road
Hazard Vulnerability: High

Holderness Safety Building

Holderness Town Hall (EOC)

Structures and Services:
- Town Center Bridge
- US Route 3 Bridge over the Pemigewasset River
- Culverts, town-wide
- NH Route 25, US Route 3, NH Route 113, NH Route 175, I-93; evacuation routes
- Holderness Post Office, 846 Rte. 3
- Holderness Public Library, 866 Rte. 3
- Holderness School ice rink & fieldhouse, Rte. 175
- PSU fieldhouse, 27 Fieldhouse Road
- Holderness School lab, Chapel Lane

Emergency Shelters:
- Holderness Elementary, 3 School Street

Special Populations:
- Holderness Elementary School, 3 School Street
- Holderness School, Chapel Lane
- Ace Program, Elementary School, 3 School Street
- Seasonal Summer Camps
- Islands

Other:
- Village District, Rte. 3
- Commercial Districts; Rte. 3 in village & near Rte. 175A Plymouth, North Rte. 175 at Campton Town Line
- Kimball Marina, Rte. 3 village
- Squam Boats Livery, Rte. 3 village
- 2 Fuel Stations on Rte. 175A and in village
- Squam Lakes Natural Science Center, 113 Science Ctr. Road
- Owl Brook Hunter Education Facility
- Pemigewasset Fish and Game Club

NH Route 175A Bridge

Holderness School

Kimball Marina

B. NATURAL HAZARDS VULNERABILITY OF CRITICAL FACILITIES

The Critical Facilities and Potential Hazards Map (Appendix D) identifies the location of critical facilities in relation to mapped hazard areas. No essential service critical facilities are located within the flooding hazard area. The Critical Facilities Natural Hazards Vulnerability Assessment, Appendix G, ranks each moderate to high risk hazard discussed in Chapter III for each critical facility. They are ranked low to high, based on the potential economic, environmental and social impacts, and level of danger/damage to buildings, infrastructure and services of the hazard to the facility. The natural hazards co-occurrence of greatest concern for critical facilities and identified hazards is the potential for a flood or ice jam on the Pemigewasset River. Also of concern is the potential for a wildfire in the steep mountains in town. It was established through discussion that these co-occurrences are of concern, and they are the focus of several identified mitigation strategies (pages 44-48) including;


Mt. Morgan from Rattlesnake Mountain

- Update vulnerable culverts and bridges throughout town
- Update FIRM maps with aerial overlays
- Attain back country rescue & wildfire suppression equipment

C. MANMADE VULNERABILITY OF CRITICAL FACILITIES

All identified critical facilities were individually assessed on their vulnerability to intentional disruption. Although Holderness is not considered a high target area for terrorism, it is important for a community to identify and be aware of potential targets. A Federal Emergency Management Agency (FEMA) hazard vulnerability matrix was used to asses the vulnerability of all critical facilities in Holderness to manmade hazards. Each facility was rated based on seven criteria; visibility, target, access, mobility, hazard materials, collateral damage, and population impact. Each criteria was scored on a three point scale, one being low vulnerability and five being high vulnerability. The assessment, in Appendix F, rates the Holderness Safety Building, Town Hall, Highway Garage, schools, bridges, and marinas as the facilities most at risk from manmade hazards. It was also noted that the Emergency Operations Plan does address a terrorist event at local schools. In future updates to the Plan, the Committee may wish to conduct a formal review of each facility using a detailed vulnerability matrix.

The man-made co-occurrence of greatest concern for critical facilities and identified hazards is the potential for a hazardous materials spill on or adjacent to US Route 3. A mitigation strategy (pages 44-48) to address this concern is to: Continue to provide emergency responders with additional hazardous materials training.

D. ESTIMATING POTENTIAL LOSSES TO CRITICAL FACILITIES

The critical facilities identified in Holderness are estimated to be worth over $5.6 million dollars. Table XII provides an estimate of the current monetary value for each of the publicly owned critical facilities in Holderness. These values can also be used to determine potential loss estimates in the event a natural or manmade hazard damages a part of or the entire facility. The estimates were generated by the town assessor and are based on property tax documentation.

Table XII: 2007 Value of Public Critical Facilities in Holderness

TYPE	NAME	CLASSIFICATION	VALUE
School / Shelter	Holderness Central School	Populations to Protect	$3,699,900
EOC/Administration	Town Hall	Essential Services	$283,700
Recreation	Town Forest	Structures & Services	109,500
Public Works	DPW Garage	Essential Services	$230,500
Library	Holderness Public Library	Structures & Services	$200,600
Public Works	Transfer Station	Structures & Services	$4,300
Dam	White Oak Pond Dam	Structures & Services	$32,100
Bridge	Central School Bridge	Structures & Services	$300,000
Protection/Shelter	Fire/Police Station	Essential Services	$740,400

CHAPTER V: MITIGATION STRATEGIES

A. STATE OF NEW HAMPSHIRE HAZARD MITIGATION GOALS[39]

The State of New Hampshire Natural Hazard Mitigation Plan prepared and maintained by the New Hampshire Homeland Security and Emergency Management (NH HSEM), sets forth the following overall hazard mitigation goals for the State of New Hampshire:

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

II. To reduce the potential impact of natural and man-made disasters on the State's Critical Support Services.

III. To reduce the potential impact of natural and man-made disasters on Critical Facilities in the State.

IV. To reduce the potential impact of natural and man-made disasters on the State's infrastructure.

V. To improve Emergency Preparedness.

VI. Improve the State's Disaster Response and Recovery Capability.

VII. To reduce the potential impact of natural and man-made disasters on private property.

VIII. To reduce the potential impact of natural and man-made disasters on the State's economy.

IX. To reduce the potential impact of natural and man-made disasters on the State's natural environment.

X. To reduce the State's liability with respect to natural and man-made hazards generally.

XI. To reduce the potential impact of natural and man-made disasters on the State's specific historic treasures and interests as well as other tangible and intangible characteristics which add to the quality of life of the citizens and guests of the State.

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

[39] NH Homeland Security and Emergency Management website. http://www.nhoem.state.nh.us/mitigation/, visited June 19, 2007.

B. TOWN OF HOLDERNESS, NEW HAMPSHIRE HAZARD MITIGATION GOALS

The Holderness Hazard Mitigation Planning Committee concurs with the State Hazard Mitigation goals and further defined goals most pertinent to the town. Based on the hazards studied, and the assessment of current and proposed mitigation strategies, the Committee recommends the following hazard mitigation goals for the town of Holderness:

Goal I: Community and Resource Protection
Reduce the potential impact of natural and manmade disasters on the town's residents and visitors, as well as its critical facilities, property, economy, and natural resources, while improving the emergency communication, alert, and response systems.

Goal II: Outreach and Education
Improve public awareness of the impacts of potential hazards and hazard preparedness, while increasing the public's involvement in emergency response and recovery.

Goal III: Coordination and Communication
Ensure plans are in place to address various emergency situations and that regular communication occurs between various departments and with local, regional, and state officials; thereby ensuring that those involved are aware of their responsibilities.

Goal IV: Damage Prevention
Minimize the damage and public expense which might be caused to public and private buildings and infrastructure due to natural and manmade hazards.

C. EXISTING MITIGATION STRATEGIES

A review of existing mitigation strategies was conducted. The assessment included review of pertinent documents including the zoning ordinance, subdivision regulations, emergency management plan, site plan regulations, annual report, and discussion with Committee members. Table XIII details the mitigation strategies that currently exist or are in the process of being developed for the town of Holderness.

Table XIII: Existing Mitigation Strategies

Entity	Description	Area Covered	Enforcement
Zoning	▪ River Corridor Overlay – Pemigewasset River [200+' frontage; 150' setback; 125' septic setback] ▪ Flood Hazard Overlay [west of I-93; construction restricted] ▪ NFIP [updated March 2007] ▪ FIRM [updated 2002] ▪ Steep Slopes Ordinance (2008 warrant article) Currently no building >25% ▪ Restrictions on Roads – no roads >10% slope ▪ Master Plan recommends water availability [cistern, sprinkler] protection for new developments ▪ Structure Fire [hazards must be demolished or fixed in 1 yr] ▪ Shoreline Structure [no dug-in slips; no dredged inlets] ▪ Shoreland Protection [CSPA standards adopted] ▪ Special Events Permit [notify FD/Selectmen required large party] ▪ Emergency Actions allowed [water/septic repairs without permit under conditions] ▪ Require access for FD & emergency responders on all property	Town	Planning Board

Entity	Description	Area Covered	Enforcement
Subdivision Regulations	▪ [6.2] Unsafe Land non-buildable ▪ [6.3] Pemigewasset River Corridor Overlay District ▪ [6.4] Flood Hazard Areas ▪ [6.5] Unsuitable Land ▪ [6.7] Lot Area requirements ▪ [6.14] Grading & Drainage requirements ▪ [6.19 E] Road Grade Requirements ▪ [7.2] Street Size Requirements ▪ [7.3] Drainage/Culverts ▪ New: All new development & subdivisions require cistern	Town	Planning Board
Sewer/Water Service	▪ Plymouth Water & Sewer	North & South River St. Holderness School PSU Field house	Selectmen
Septic Systems	▪ Zoning: 1 acre minimum ▪ [grandfathered sites 0.25 acre lots with septic] ▪ Town allows alternative septic systems ▪ Subdivision Regulations: Notify town when replace/fix septic system	Town	Health Officer
Radio Communications	▪ NOAA Communications Tower [Smith Road] ▪ Lakes Region Response – FD ▪ Plymouth Dispatch – PD ▪ Dedicated town-wide channel – DPW	Region – partial coverage due to mountains	Fire Chief
Police Department	▪ Full-time PD Chief ▪ 4 full-time officers & 1 seasonal full-time officer ▪ Member of Central NH Special Operations Unit ▪ DARE program ▪ 100% NIMS/ICS Certified ▪ Mutual Aid has CIP ▪ Digital Communication	Town	Police Chief
Highway Department	▪ Full-time Road Agent ▪ 3 full-time staff ▪ C.I.P. ▪ Town maintenance plan ▪ Members of State Mutual Aid ▪ Conduct road reconstruction [TIP] ▪ Have a 20-year repair schedule for roads	Town	Road Agent

Entity	Description	Area Covered	Enforcement
Fire Department	▪ Part-time FD Chief ▪ 30 Volunteer Fire Fighters ▪ Inspection/Maintenance Plan for equipment ▪ 100% Haz Mat Awareness Certified ▪ 100% NIMS/ICS Certified ▪ FD Boat launched [May 2007] ▪ Trails mapped ▪ Logging roads mapped ▪ Capital Reserve Fund for FD ▪ Conducted drill at PSU [March 2007 - very successful] ▪ Holderness School has an Emergency Plan and conducts drills ▪ Expendable Trust Fund [fires & flood]	Town/Region	Fire Chief
Emergency Operations Plan	▪ EOP – updated 2003 [due to complete 12/2007]	Town	Emergency Management Director
Compliance Officer	▪ Inspects oil burners, wood stoves ▪ [No town building codes – uses state code system]	Town	Selectmen
Dry Hydrants	▪ Several exist. [RC&D will map these as part of Water Resource Plan]	Town	Fire Chief
Shelters	▪ Elementary School [Plan updated 2006] ▪ Sprinkler system installed [2007]	Town	Emergency Management Director
Town Administration	▪ GIS Program going online June 2007: Roads, Culverts, Bridges, Tax Maps, Building Locations, Utility Poles	Town	Town Administrator
Transfer Station	▪ 1 full-time, 1 part-time staff ▪ Open 5 days a week ▪ Owns parcel for relocation ▪ CRF for equipment [created 2007] ▪ Began planning process for replacement or improvement of station	Town	Road Agent

D. GAPS IN EXISTING MITIGATION STRATEGIES

During the review of pertinent documents, the Committee identified gaps in the existing strategies. Identifying these gaps fostered the brainstorming sessions that generated the ultimate list of mitigation actions. Table XIV details the gaps, identified by the Committee, that currently exist for the town of Holderness.

Table XIV: Gaps in Existing Mitigation Strategies

Entity	Description	Area Covered	Enforcement
Zoning	▪ Incomplete Steep Slopes Ordinance (2008 warrant article) ▪ No requirement for water availability to protect new developments/ subdivisions ▪ No requirement for accessible water access easements ▪ Keep FIRM maps updated with aerial overlay [digitized flood maps] ▪ Would like to have free municipal access to any cell tower installed in town ▪ Lack town planner/code enforcement officer ▪ Improve ground and surface water protection	Town	Planning Board
Subdivision Regulations	▪ Additional road restrictions for slopes – possibly adopt driveway ordinances/regulations from state	Town	Planning Board
Radio Communications	▪ Need repeater for Highway Dept. [Smith Road] ▪ Need better coverage in town [losing analog in a year, looking into satellite] ▪ Would like wireless communication between Town Hall [EOC], Safety Building, and elementary school [shelter]	Town	N/A
Police Department	▪ Lack a garage for their cruisers and equipment ▪ Lack a sally port	Town	Police Chief
Highway Department	▪ 0% have taken the NIMS/ICS training [needs to be 100% complete] ▪ Culvert Maintenance Plan used when repair/replace roads (otherwise as needed) ▪ Upgrade dirt roads as needed – no formal schedule	Town	Road Agent
Emergency Operations Plan	▪ EOP – update 2003 plan with FEMA formatting [due to complete 12/2007]	Town	Emergency Management Director

Entity	Description	Area Covered	Enforcement
Fire Department	▪ Do not have wildfire suppression or back country rescue equipment [i.e. Gator, ATVs, trailers, portable fire suppression equip, etc.] although have many hiker rescues/year and high risk of wildfires ▪ The response time to the north end of town is slow due to road condition and distance [currently rely on Plymouth FD] ▪ Lack of timely, cost-effective ambulance/responder coverage [currently Plymouth covers area and cost is rising] ▪ New response boat is launched but lacks equipment [GPS, laptop, radios, water-rescue equipment, medical supplies, etc.] ▪ Need phone lines, cell phones, laptops, satellite internet	Town/Region	Fire Chief
Compliance Officer	▪ Adopt town building codes – recommend energy efficient standards ▪ Hire a Code Enforcement Officer	Town	Selectmen
Dry Hydrants	▪ Create and Implement dry hydrant maintenance plan	Town	Fire Chief
Shelter	▪ School shelter needs to upgrade their generator to accommodate the sprinkler system ▪ Lack supplies for shelter [cots, blankets, toiletries]	Town	Emergency Management Director
Emergency Operations Center	▪ Town Hall lacks communication systems in event of emergency. Need phone lines, cell phones, laptops, satellite internet ▪ Lacks generator	Town	Emergency Management Director
Septic Systems	▪ Allow and encourage more use of alternative septic systems ▪ Enforce septic system pollution problems ▪ Create maintenance/inspection program ▪ Enact more restrictive septic system setback from shoreline to protect water quality	Town	Selectmen
Transfer Station	▪ Lacks building for recycling/trash collection ▪ Need garage for equipment; enclose dumpster & crusher; enclose recycling ▪ Do not have a CRF or Bond for equipment or facility ▪ Need pads under dumpsters/crushers	Town	Road Agent

Entity	Description	Area Covered	Enforcement
Holderness School	▪ Designate the Holderness School as a shelter ▪ Purchase generator ▪ Lack adequate central alarm system wired to the FD [planned 2007] ▪ Should follow safety recommendations outlined in inspections	Town	Emergency Management Director/Fire Chief

E. IDENTIFICATION AND ANALYSIS OF MITIGATION ACTIONS

The use of the existing mitigation strategies and multiple brainstorming sessions yielded recommended mitigation strategies. These strategies can be used to reduce the effects of hazards on both new and existing buildings and infrastructure, and other aspects of the community. These strategies were then prioritized using the STAPLEE method which analyzes Social, Technical, Administrative, Political, Legal, Economic, and Environmental aspects of a project and is commonly used by public administration officials and planners to make planning decisions. The scoring guide the Committee used for each mitigation action is found in Appendix I. Table XV represents the average score given to each mitigation goal by the Committee. Higher priority is placed on recommendations that received a higher STAPLEE score, with the maximum score being 3.0. The mitigation strategies listed in Table XV were modified from those ranked during the STAPLEE prioritization activity (Appendix I) to better represent actions the town of Holderness can take.

Table XV. Recommended Mitigation Strategies in Ranked Order

Goal		Recommendation	STAPLEE Score
Community & Resources Protection	1	Construct a garage for the Police Department.	3.0
	2	Attain back country rescue & wildfire suppression equipment [gator, etc].	3.0
	3	Purchase contain/confine equipment for chemical spills.	3.0
	4	Obtain shelter designation for Holderness Prep School & purchase generator.	2.9
	5	Attain shelter necessities. [cots, blankets, towels, etc.]	2.9
	6	Construct a Public Safety Substation for the Fire & Police Departments at the Holderness School, including a generator.	2.9
	7	Investigate Ambulance Service options for Holderness.	2.7
	8	Construct a building for the Transfer Station.	2.6
	9	Construct a sally-port for the Police Department.	1.7
Outreach & Education	1	Implement septic system maintenance & education plan.	2.4

Coordination & Communication	1	Incorporate the 2007 Hazard Mitigation Plan in the Emergency Operations Plan.	3.0
	2	Update GIS data layers and availability of GIS information.	3.0
	3	Update EOP to include FEMA NIMS/ICS requirements.	3.0
	4	Purchase communications equipment for Town Hall/EOC.	3.0
	5	Develop DPW procedures for contain/confine chemical spills.	3.0
	6	Update FIRM maps with aerial overlays [digitized flood maps].	3.0
	7	Revise ordinance for free municipal access on new cell towers.	2.9
	8	Establish & Fill position for a Compliance/Code Enforcement Officer.	2.9
	9	Acquire repeater for town on radio tower to establish better communication.	2.7
	10	Work with the Department of Safety, 911 Mapping Bureau to fix known problems with GIS road data to limit confusion in emergency planning and emergency response.	**
	11	Improve regional cooperation and communication among towns and agencies in the area and state.	**
	12	Continue to provide emergency responders with additional hazardous materials training.	**
	13	Include a recommendation in the Master Plan to maintain the Hazard Mitigation Plan.	**
Damage Prevention	1	Create and implement dry hydrant installation and maintenance plan per recommendations in the Holderness Water Resources Plan (Appendix K).	3.0
	2	Purchase generator for Town Hall/EOC.	3.0
	3	Upgrade shelter generator at the Elementary School.	3.0
	4	Update DPW Maintenance and Education Plan to include NIMS and ICS.	2.9
	5	Revise ordinance to require water supply for fire suppression at new developments/subdivisions.	2.9
	6	Adopt Steep Slopes regulations, including state driveway standards for steep slopes.	2.4
	7	Adopt Building Codes to include sprinkler and life safety requirements.	2.3
	8	Update vulnerable culverts and bridges, identified by the DPW, throughout town, including: Central School Bridge, Perkins Lane, Perch Pond Road, Coxboro Road, E. Holderness Road, NH Route 113, Range Road, Mountain Road, Old Burley Farm Road, Hardhack Road.	**
	9	Ensure that development projects comply with the existing mitigation strategies of the subdivision regulations, site plan review, and building codes.	**
	10	Include in the plan submission sections of both site plan and subdivision regulations a reference to the Hazard Mitigation Plan, and require the applicant to articulate how the proposal complies with the standards of the plan and achieves a "no adverse impact" status as it relates to emergency situations.	**

Recommendations with a STAPLEE score of " ** " were added later in plan development. The Committee came to a consensus in formulating the strategies and decided not to specify a score but to include them as necessary mitigation strategies.

F. IMPLEMENTATION OF MITIGATION ACTIONS

There are many factors that influence how a town chooses to spend its energy and resources in implementing recommended actions. Factors include:

- Urgency
- How quickly an action could be implemented
- Likelihood that the action will reduce future emergencies
- Regulations required to implement the action
- Administrative burdens
- Time (both paid and volunteer)
- Funding availability
- Political acceptability of the action.

In the context of these factors, the Committee discussed the mitigation actions and utilized the STAPLEE method as a guide to reach consensus regarding their relative level of priority, recognizing that some actions are of greater priority to different town departments. This implementation schedule contains a matrix (Table XVI) indicating the parties responsible for bringing about these actions, a time frame, and potential funding sources. To keep the plan current, the implementation schedule should be updated and re-evaluated on a regular basis as outlined in the monitoring section of this plan.

Table XVI: Implementation Schedule for Mitigation Actions

POTENTIAL HAZARDS	PROPOSED MITIGATION ACTION	Responsible Party	Potential Funding	Time Frame	Status
All	Acquire repeater for town on radio tower to establish better communication.	DPW	Town	2007	Active
All	Attain shelter necessities. [cots, blankets, towels, etc.]	EMD	Town	2008	Planning
Flood	Adopt Steep Slopes regulations, including state driveway standards for steep slopes.	Planning Board	Town	2009	Active
All	Investigate Ambulance Service options for Holderness.	Selectmen Fire Department	Town	2009	Planning
All	Construct a Public Safety Substation for the Fire & Police Departments at the Holderness School, including a generator.	Fire Department	Homeland Security Town	2010	Planning
All	Construct a garage for the Police Department.	Police Department	Town	2009	Planning
All	Revise ordinance to require water supply for fire suppression at new developments/subdivisions.	Planning Board	Town	2008	Planning
Flood/Ice Jam	Update FIRM maps with aerial overlays [digitized flood maps].	Planning Board Selectmen	State GRANIT FEMA	2008	Active

POTENTIAL HAZARDS	PROPOSED MITIGATION ACTION	Responsible Party	Potential Funding	Time Frame	Status
MVA	Construct a sally-port for the Police Department.	Police Department	Town	2012	Planning
All	Revise ordinance for free municipal access on new cell towers.	Planning Board Selectmen	Town	2008	Planning
All	Attain back country rescue & wildfire suppression equipment [gator, etc].	Fire Department	Homeland Security FEMA NH Forestry	2009	Planning
All	Update DPW Maintenance and Education Plan to include NIMS and ICS.	Road Agent Selectmen	Town	2007	Ongoing
All	Obtain shelter designation for Holderness Prep School & purchase generator.	EMD	FEMA Red Cross	2010	Planning
All	Implement septic system maintenance & education plan.	Health Officer	Town	2009	Planning
All	Update GIS data layers and availability of GIS information.	Town Administrator	Town	2007	Ongoing
All	Update EOP to include FEMA NIMS/ICS requirements.	EMD	FEMA	2008	Planning
All	Establish & Fill position for a Compliance/Code Enforcement Officer.	Selectmen	Town	2009	Planning
All	Adopt Building Codes to include sprinkler and life safety requirements.	Selectmen	Town	2009	Planning
All	Upgrade shelter generator at the Elementary School.	EMD	FEMA	2008	Planning
All	Include a recommendation in the Master Plan to maintain the Hazard Mitigation Plan.	EMD	FEMA	2008	Active
All	Purchase generator for Town Hall/EOC.	EMD Town Administrator	FEMA Town	2009	Planning
All	Create and implement dry hydrant installation and maintenance plan per recommendations in the Holderness Water Resources Plan (Appendix K).	Fire Department	USDA Town	2009	Planning
All	Purchase contain/confine equipment for chemical spills.	Fire Department	Town FEMA	2008	Ongoing
All	Develop DPW procedures for contain/confine chemical spills.	Fire Department	Town	2007	Ongoing
MVA HazMat	Construct a building for the Transfer Station.	Selectmen	Town	2010	Planning
All	Purchase communications equipment for Town Hall/EOC.	EMD	FEMA	2009	Planning

POTENTIAL HAZARDS	PROPOSED MITIGATION ACTION	Responsible Party	Potential Funding	Time Frame	Status
All	Incorporate the 2007 Hazard Mitigation Plan in the Emergency Operations Plan.	EMD	Town	2007	Active
All	Work with the Department of Safety, 911 Mapping Bureau to fix known problems with GIS road data to limit confusion in emergency planning and emergency response.	Selectmen	Town DOS	2007	Ongoing
MVA HazMat	Continue to provide emergency responders with additional hazardous materials training.	EMD	FEMA DOS	2007	Ongoing
Flood	Update vulnerable culverts and bridges, identified by the DPW, throughout town, including: Central School Bridge, Perkins Lane, Perch Pond Road, Coxboro Road, E. Holderness Road, NH Route 113, Range Road, Mountain Road, Old Burley Farm Road, Hardhack Road.	Road Agent	Town FEMA	2007	Ongoing
All	Ensure that development projects comply with the existing mitigation strategies of the subdivision regulations, site plan review, and building codes.	Planning Board	Town	2007	Ongoing
All	Include in the plan submission sections of both site plan and subdivision regulations a reference to the Hazard Mitigation Plan, and require the applicant to articulate how the proposal complies with the standards of the plan and achieves a "no adverse impact" status as it relates to emergency situations.	Planning Board	Town	2008	Planning
All	Improve regional cooperation and communication among towns and agencies in the area and state.	Selectmen	FEMA Town	2009	Ongoing

CHAPTER VI: PLAN ADOPTION AND MONITORING

A. IMPLEMENTATION

The Hazard Mitigation Plan Evaluation Committee, established by the Selectboard and EMD, will meet annually and provide a mechanism for ensuring that an attempt is made to incorporate the actions identified in the plan into ongoing town planning activities. Essential elements of implementation require all responsible parties for the various recommendations understand what is expected of them, and that they are willing to fulfill their role in implementation. It is therefore important to have the responsible parties clearly identified when the town adopts the final plan. Where appropriate it would be helpful to have any hazard mitigation activities identified in job descriptions.

NH RSA 674:2(e) makes the recommendation that a natural hazard section may be included in the town master plan. Inclusion of this document as an addendum to the Holderness Master Plan provides an opportunity for issues addressed in this plan to be taken into consideration when planning for development within the community. The capital improvement planning that occurs in the future will also contribute to the goals in the Hazard Mitigation Plan. When appropriate, an effort will be made to incorporate this plan into the Holderness Master Plan, Capital Improvements Plan, Transportation Improvement Plan, and Emergency Operations Plan. Within a year after the town officially adopts the Hazard Mitigation Plan, an attempt will be made to have hazard mitigation strategies integrated into these existing mechanisms and into all other ongoing town planning activities.

B. PLAN MAINTENANCE

The Holderness Hazard Mitigation Planning Committee and the Board of Selectmen, in order to track progress and update the mitigation strategies identified in Chapter V-E, will review the Holderness Hazard Mitigation Plan every year or after a hazard event. The town of Holderness Emergency Management Director is responsible for initiating this review and needs to consult with members of the Holderness Committee identified in this Plan. Changes will be made to the Plan to accommodate projects that have failed, or are no longer: (1) consistent with the timeframe identified, (2) the community's priority, (3) lack funding resources. Priorities that were not ranked high, but identified as potential mitigation strategies, will be reviewed as well during the monitoring and update of this Plan to determine feasibility of future implementation. In keeping with the process of adopting the Plan, a public hearing will be held to receive public comment on the Plan. Maintenance and updating will be held during the annual review period, best suggested time is mid-year, and the final product adopted by the Board of Selectmen. The Committee will meet quarterly as part of this plan maintenance. The Emergency Management Director is also responsible for resubmitting the plan to FEMA to be re-approved every five years.

C. ADOPTION

The Holderness Board of Selectmen by majority vote does hereby adopt the Holderness Hazard Mitigation Plan, as a statement of policy. Actions for implementation under this statement of policy are set forth in priority order in the "Implementation of Mitigation Actions" and "Plan Maintenance" sections of this document. All other sections of this Plan are supporting documentation for informational purposes only and not included as the statement of policy.

Date

HOLDERNESS BOARD OF SELECTMEN

Peter S. Francesco, Chairman

Barbara Currier, Selectman

Sidney Lovett, Selectman

Suzanne Peoples, Selectman

Peter Webster, Selectman

APPENDIX A: TECHNICAL RESOURCES

NH Homeland Security and Emergency Management 271-2231
http://www.nh.gov/safety/divisions/bem/
Hazard Mitigation Section 271-2231
http://www.nh.gov/safety/divisions/bem/HazardMitigation/index.html

Federal Emergency Management Agency ..... (617) 223-4175
http://www.fema.gov/
FEMA, National Flood Insurance Program, Community Status Book
http://www.fema.gov/fema/csb.htm

NH Regional Planning Commissions:
Central NH Regional Planning Commission 796-2129
http://www.cnhrpc.org/
Lakes Region Regional Planning Commission 279-8171
http://www.lakesrpc.org/
Nashua Regional Planning Commission 883-0366
http://www.nashuarpc.org/
North Country Council 444-6303
http://www.nccouncil.org/
Rockingham Regional Planning Commission 778-0885
http://www.rpc-nh.org/
Southern New Hampshire Regional Planning Commission 669-4664
http://www.snhpc.org/
Southwest Regional Planning Commission 357-0557
http://www.swrpc.org/
Strafford Regional Planning Commission 742-2523
http://www.strafford.org/
Upper Valley Lake Sunapee Regional Planning Commission 448-1680
http://www.uvlsrpc.org/

NH Governor's Office of Energy and Planning 271-2155
http://www.nh.gov/oep/index.htm

NH Department of Transportation 271-3734
http://www.nh.gov/dot/index.htm

NH Department of Cultural Affairs 271-2540
http://www.nh.gov/nhculture/
Division of Historical Resources 271-3483
http://www.nh.gov/nhdhr/

NH Department of Environmental Services 271-3503
http://www.des.state.nh.us/
Air Resources 271-1370
http://www.des.state.nh.us/ard_intro.htm
Waste Management 271-2900
http://www.des.state.nh.us/waste_intro.htm
Water Division 271-3406
http://www.des.state.nh.us/water_intro.htm
Pollution Prevention Division 271-6460
http://www.des.state.nh.us/nhppp/

NH Municipal Association 224-7447
http://www.nhmunicipal.org/LGCWebsite/index.asp

NH Fish and Game Department 271-3421
http://www.wildlife.state.nh.us/

NH Department of Resources and Economic Development 271-2411
http://www.dred.state.nh.us/
Natural Heritage Inventory 271-3623
http://www.dred.state.nh.us/divisions/forestandlands/bureaus/naturalheritage/aboutus.htm
Division of Forests and Lands 271-2214
http://www.dred.state.nh.us/divisions/forestandlands/index.htm
Division of Parks and Recreation 271-3255
http://www.nhparks.state.nh.us/

NH Department of Health and Human Services 271-8835
http://www.dhhs.nh.gov/DHHS/DHHS_SITE/default.htm
Greater Plymouth Public Health Network Coordinator:
Ann Graves 536-1120
http://www.dhhs.state.nh.us/DHHS/CDCS/LIBRARY/Fact+Sheet/PPCC-AHR-Map.htm

Northeast States Emergency Consortium, Inc. (NESEC) ..... (781) 224-9876
http://www.nesec.org/

US Department of Commerce ..... (202) 482-2000
http://www.commerce.gov/
National Oceanic and Atmospheric Administration ..... (202) 482-6090
http://www.noaa.gov/
National Weather Service, Eastern Region Headquarters
http://www.erh.noaa.gov/
National Weather Service, Tauton, Massachusetts ..... (508) 824-5116
http://www.erh.noaa.gov/er/box/
National Weather Service, Gray, Maine ..... (207) 688-3216
http://www.erh.noaa.gov/er/gyx/

US Department of the Interior
http://www.doi.gov/
US Fish and Wildlife Service 225-1411
http://www.fws.gov/
US Geological Survey 225-4681
http://www.usgs.gov/
US Geological Survey Real Time Hydrologic Data
http://waterdata.usgs.gov/nwis/rt
US Army Corps of Engineers ..... (978) 318-8087
http://www.usace.army.mil/

US Department of Agriculture
http://www.usda.gov/wps/portal/usdahome
US Forest Service ..... (202) 205-8333
http://www.fs.fed.us/

Public Service of New Hampshire 436-7708
http://www.psnh.com/

Cold Region Research Laboratory 646-4187
http://www.crrel.usace.army.mil/

National Emergency Management Association ..... (859) 244-8000
http://nemaweb.org

National Aeronautics and Space Administration
http://www.nasa.gov/
NASA – Goddard Space Flight Center "Disaster Finder"
http://disasterfinder.gsfc.nasa.gov/
NASA Optical Transient Detector
http://thunder.msfc.nasa.gov/

Dartmouth Flood Observatory
http://www.dartmouth.edu/artsci/geog/floods/

National Lightning Safety Institute
http://lightningsafety.com/

The Tornado Project Online
http://www.tornadoproject.com/

National Severe Storms Laboratory
http://www.oar.noaa.gov/atmosphere/atmos_nssl.html

Plymouth State University Weather Center
http://vortex.plymouth.edu/

APPENDIX B: MITIGATION FUNDING RESOURCES

404 Hazard Mitigation Grant Program (HMGP) ..... NH Bureau of Emergency Management
406 Public Assistance and Hazard Mitigation..... NH Bureau of Emergency Management
Community Development Block Grant (CDBG) .....NH HSEM, 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 Office of Energy & Planning
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 2098 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 & Economic Development
Wetlands Programs.....NH Department of Environmental Services

APPENDIX C: PUBLIC NOTICE EXAMPLE

Holderness Hazard Mitigation
Planning Committee

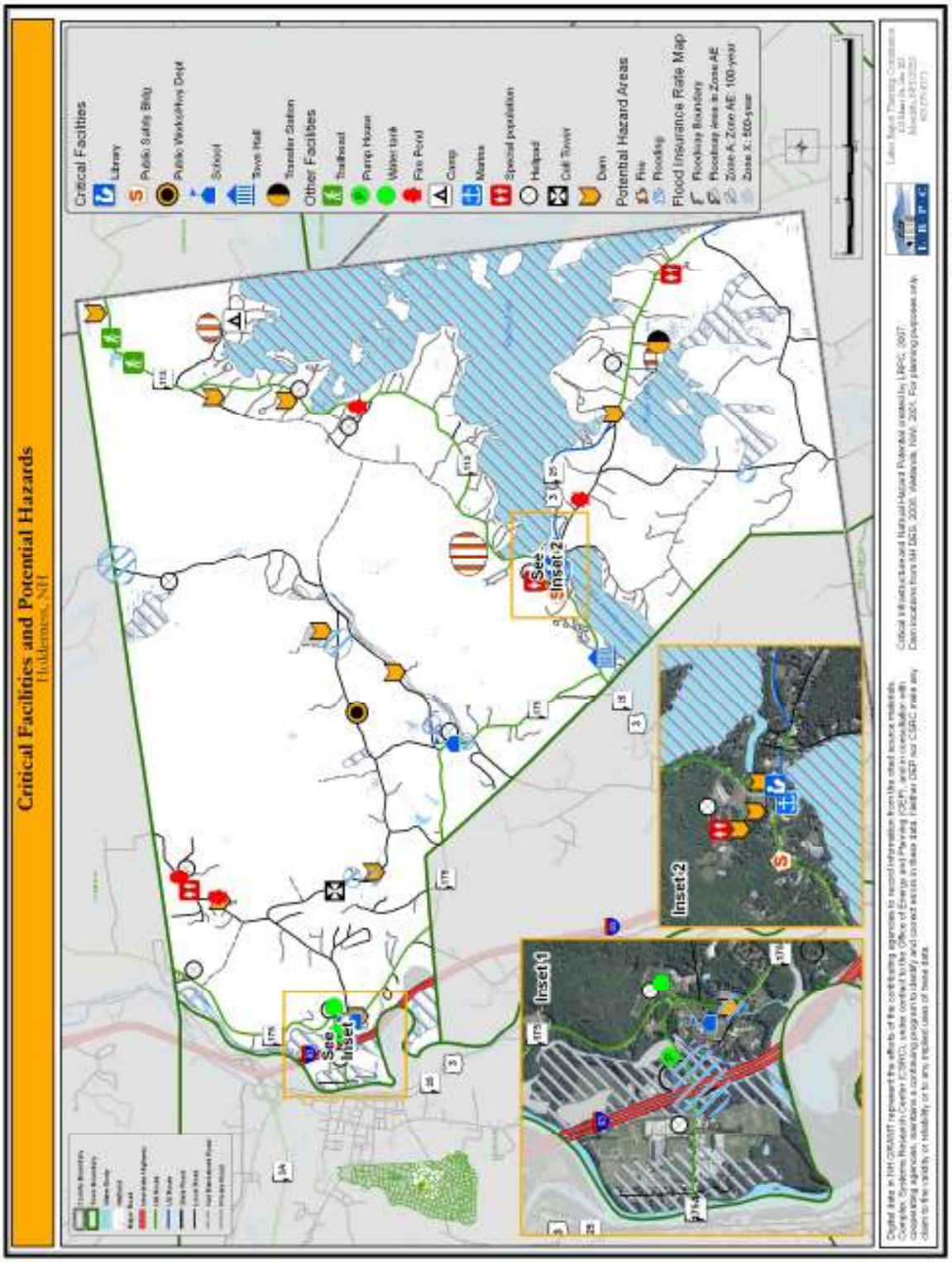
The Holderness Board of Selectmen has appointed a Committee to develop a Hazard Mitigation Plan for the community. The Committee is represented by a variety of local interests including the Emergency Management Director, Public Works, Fire Department, Police Department, and Town Manager. The Committee's focus will be on the natural and manmade hazards that put Holderness at risk, and the development of recommendations to protect the safety and well being of town residents. The Committee will hold its sixth meeting on August 24, 2007 from 9:00 - 11:00 a.m. at the Holderness Fire/Police Station. The general public is encouraged to attend.

Hazard Mitigation Planning is as important to reducing disaster losses, as are appropriate regulations and land-use ordinances. The most significant areas of concern for Holderness include ice jams and flooding, vehicle accidents involving hazardous materials, oil spills, and lightning. With the development of the Holderness Hazard Mitigation Plan, community leaders will be able to identify goals and actions to reduce the impacts of these and other hazards. Holderness community leaders want the town to be a disaster resistant community and believe that the development of a Hazard Mitigation Plan will bring Holderness one-step closer to that goal. For more information please call the Holderness Town Hall at 968-3537.

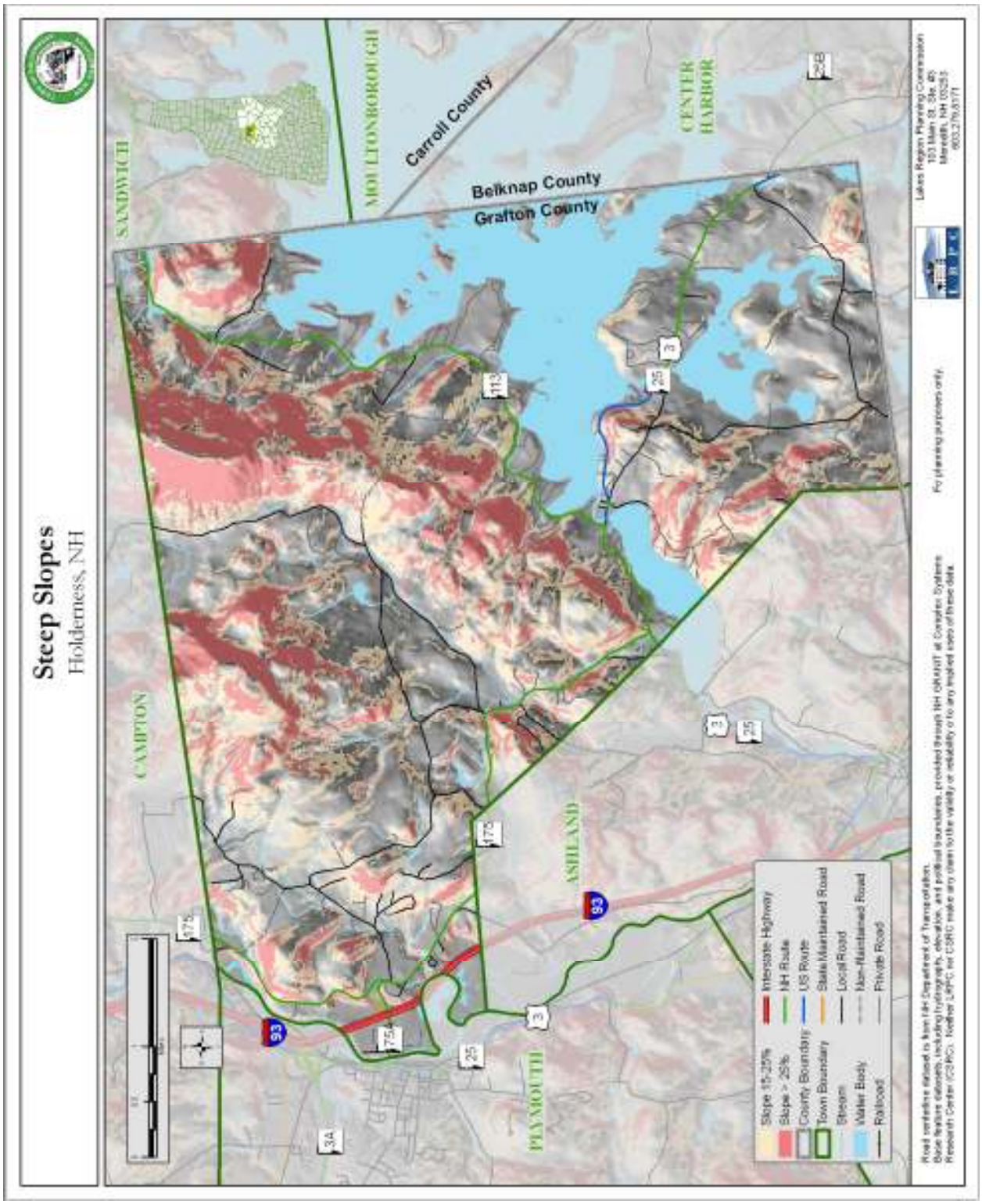
For More Information, Call:

Earl Hansen, Holderness Emergency Management Director, 968-3537
Erica Anderson, Regional Planner, Lakes Region Planning Commission, 279-8171

APPENDIX D: CRITICAL FACILITIES & POTENTIAL HAZARDS MAP



APPENDIX E: STEEP SLOPES MAP



APPENDIX F: MANMADE HAZARD ASSESSMENT

Critical Facilities Vulnerability Matrix: Holderness, NH

TYPE	Facility/Infrastructure	Total
EOC	Town Hall	3
Public Works	Highway Dept.	2
Library	Holderness Public Library	1
School/Shelter	Holderness Elementary K-8	3
School	Holderness School (Prep HS)	3
Post Office	Holderness Post Office	2
Bridge	Town Center Bridge	3
Bridge	NH Route 175A Bridge over the Pemigewasset River	3
Infrastructure	Culverts, town wide	1
Infrastructure	Evacuation Routes: US Route 3, I-93 and NH Routes 25, 113, and 175	3
PD/FD	Holderness Safety Building	3
Haz Materials	Holderness School Ice Rink	2
Haz Materials	PSU Fieldhouse	2
Haz Materials	Holderness School chem. lab	2
Haz Materials	Holderness School field house	1
Summer Camp	Rockywold/Deephaven	2
Beach	Public and Private Beaches	2
Historic Resources	Historical Society Bldg.	1
Commercial	Commercial Districts; US Rte. 3 village & NH Rte. 175A	2
Unique Features	Squam Science Center	2
Marina	Kimball Marina	3
Marina	Squam Boats Livery	3
Fuel/Hazard Materials	Fuel Stations throughout town	2
Com Tower	Communication tower (NOAA)	2

Classifications:
Essential Services
Emergency Shelters
Populations to protect
Structures and Services
Other

Total based on:
Visibility
Target
Access
Mobility
Hazard Materials
Collateral Damage
Population Impact

Vulnerability:
3 = high
2 = medium
1 = low

APPENDIX G: CRITICAL FACILITIES NATURAL HAZARDS VULNERABILITY ASSESSMENT

Natural Hazards Vulnerability of Critical Facilities Matrix: Holderness, NH							
	Natural Hazards Vulnerability						
Facility/Infrastructure	Flood	Ice Jam	Thunderstorm/ Lightning	Tornado/ Downburst	Ice Storm	Motor Vehicle Accident involving Hazardous Materials	Oil Spill
Town Hall	low	low	medium	medium	high	low	low
Highway Dept.	low	low	low	medium	high	low	medium
Holderness Public Library	low	low	low	low	low	medium	low
Holderness Elementary K-8	medium	low	low	low	high	low	medium
Holderness School (Prep HS)	low	low	medium	medium	high	medium	medium
Holderness Post Office	low	low	low	medium	low	medium	medium
Town Center Bridge	low	low	low	low	low	medium	medium
NH Route 175A Bridge over the Pemigewasset River	high	high	low	low	medium	medium	medium
Culverts, townwide	high	high	medium	low	high	low	low
Evacuation Routes: US Route 3, I-93 and NH Routes 25, 113, and 175	high	high	medium	medium	high	high	medium
Holderness Safety Building	low	low	medium	high	high	medium	medium
Holderness School Ice Rink	low	low	low	medium	low	medium	medium
PSU Fieldhouse	high	high	low	medium	low	medium	medium
Holderness School chem lab	low	low	low	low	low	low	low
Holderness School field house	low	low	low	low	low	medium	low
Rockywold/Deephaven	low	low	high	high	low	low	low
Historical Society Bldg.	low	low	medium	medium	low	low	low
US Rte. 3 village	low	low	medium	medium	high	high	high
NH Rte. 175 @ Campton town line	low	low	medium	medium	medium	high	high
Squam Lakes Science Center	low	low	high	medium	medium	low	low
Kimball Marina	medium	low	medium	medium	low	medium	medium
Squam Boats Livery	medium	low	medium	medium	low	medium	medium
Communication tower (NOAA)	low	low	high	medium	medium	low	low
Flood Hazard Zone 175A	high	high	medium	medium	medium	high	high

APPENDIX H: RISK ASSESSMENT MATRIX

Holderness	Risk Assessment																
	Geographic Area					Extent			Specific Areas of Concern	Probability of Occurrence			Vulnerability			
Hazard Type	Localized	Town-wide	Regional	State-wide	Other (explain)	Severe	Moderate	Minimal	Describe potential impact areas (critical facilities, floodplain, etc)	High	Moderate	Low	High	Moderate	Low	Risk Rating
Flood, Drought, Extreme Heat & Wildfire																
Flood	X						X		PSU Field house is in the Pemi River floodway	3			3			**9**
Ice Jam	X						X		Concern for bridge pilings on Pemi River	3			3			**9**
Drought	X							X				1			1	**1**
Extreme Heat			X					X				1			1	**1**
Wild Land Fire	X					X			Majority of town is rural & mountainous			1	3			**3**
Geologic Hazards																
Earthquake			X					X				1			1	**1**
Landslide	X							X				1			1	**1**
Radon	X							X			2				1	**2**
Severe Wind Hazards																
Thunder Storm/ Lightning	X					X				3				2		**6**
Hurricane				X		X						1			1	**1**
Tornado/ Downburst			X			X					2			2		**4**
Hail	X							X			2				1	**2**
Winter Weather Hazards																
Blizzard/Snow Storm			X				X			3					1	**3**
Ice Storm			X			X					2			2		**4**
Nor'easter			X				X			3					1	**3**
Avalanche	X							X				1			1	**1**
Human-Related Events																
MV Accident involving Hazardous Materials	X					X			Near water could be large impact		2		3			**6**
Oil Spills	X					X			Same as above		2		3			**6**
Military Aircraft Accident			X			X			Holderness is in military training flight path			1		2		**2**
Pandemic			X			X			Holderness is a POD for vaccines			1			1	**1**
Other																
Rabies				X			X		10 year cycle		2				1	**2**
Recreational Activities	X						X		Hiking, boating, ice fishing, island rescue	3					1	**3**

APPENDIX I: STAPLEE RESULTS

This section contains a summary of STAPLEE rankings for each of the proposed Mitigation Actions by the Holderness Hazard Mitigation Committee. The highest possible rank in each of the seven categories is 3.0, the lowest is 1.0. The scores for each of the criteria have been averaged and then totaled

Mitigation Action: Acquire repeater for town on radio tower to establish better communication.

Criteria	Score
Is it socially acceptable?	3.0
Is it Technically feasible and potentially successful?	3.0
Is it administratively workable?	3.0
Is it politically acceptable?	3.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	2.0
Are other environmental approvals required?	2.0
Total Score	**2.7**

Mitigation Action: Attain shelter necessities. [cots, blankets, towels, etc.]

Criteria	Score
Is it socially acceptable?	3.0
Is it Technically feasible and potentially successful?	3.0
Is it administratively workable?	3.0
Is it politically acceptable?	3.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	2.0
Are other environmental approvals required?	3.0
Total Score	**2.9**

Mitigation Action: Adopt Steep Slopes regulations, including state driveway standards for steep slopes.

Criteria	Score
Is it socially acceptable?	2.0
Is it Technically feasible and potentially successful?	3.0
Is it administratively workable?	2.0
Is it politically acceptable?	2.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	2.0
Are other environmental approvals required?	3.0
Total Score	**2.4**

Mitigation Action: Investigate Ambulance Service options for Holderness.

Criteria	Score
Is it socially acceptable?	3.0
Is it Technically feasible and potentially successful?	2.0
Is it administratively workable?	2.0
Is it politically acceptable?	3.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	3.0
Are other environmental approvals required?	3.0
Total Score	**2.7**

Mitigation Action: Construct a Public Safety Substation for the Fire & Police Departments at the Holderness School, including a generator.

Criteria	Score
Is it socially acceptable?	3.0
Is it Technically feasible and potentially successful?	3.0
Is it administratively workable?	2.0
Is it politically acceptable?	3.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	3.0
Are other environmental approvals required?	3.0
Total Score	**2.9**

Mitigation Action: Construct a garage for the Police Department.

Criteria	Score
Is it socially acceptable?	3.0
Is it Technically feasible and potentially successful?	3.0
Is it administratively workable?	3.0
Is it politically acceptable?	3.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	3.0
Are other environmental approvals required?	3.0
Total Score	**3.0**

Mitigation Action: Revise ordinance to require water supply for fire supression at new developments/subdivisions.

Criteria	Score
Is it socially acceptable?	3.0
Is it Technically feasible and potentially successful?	3.0
Is it administratively workable?	3.0
Is it politically acceptable?	3.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	3.0
Are other environmental approvals required?	2.0
Total Score	**2.9**
Comments: RC&D are currently mapping hydrants	

Mitigation Action: Update FIRM maps with aerial overlays [digitized flood maps].

Criteria	Score
Is it socially acceptable?	3.0
Is it Technically feasible and potentially successful?	3.0
Is it administratively workable?	3.0
Is it politically acceptable?	3.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	3.0
Are other environmental approvals required?	3.0
Total Score:	**3.0**
Comments: GRANIT is working on statewide coverage of this.	

Mitigation Action: Construct a sally-port for the Police Department.

Criteria	Score
Is it socially acceptable?	1.0
Is it Technically feasible and potentially successful?	1.0
Is it administratively workable?	2.0
Is it politically acceptable?	1.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	1.0
Are other environmental approvals required?	3.0
Total Score	**1.7**

Mitigation Action: Revise ordinance for free municipal access on new cell towers.

Criteria	Score
Is it socially acceptable?	3.0
Is it Technically feasible and potentially successful?	2.0
Is it administratively workable?	3.0
Is it politically acceptable?	3.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	3.0
Are other environmental approvals required?	3.0
Total Score	**2.9**

Mitigation Action: Attain back country rescue & wildfire suppression equipment [gator, etc].

Criteria	Score
Is it socially acceptable?	3.0
Is it Technically feasible and potentially successful?	3.0
Is it administratively workable?	3.0
Is it politically acceptable?	3.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	3.0
Are other environmental approvals required?	3.0
Total Score	**3.0**

Mitigation Action: Update DPW Maintenance and Education Plan.

Criteria	Score
Is it socially acceptable?	3.0
Is it Technically feasible and potentially successful?	2.0
Is it administratively workable?	3.0
Is it politically acceptable?	3.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	3.0
Are other environmental approvals required?	3.0
Total Score	**2.9**

Mitigation Action: Obtain shelter designation for Holderness Prep School & purchase generator.

Criteria	Score
Is it socially acceptable?	3.0
Is it Technically feasible and potentially successful?	3.0
Is it administratively workable?	2.0
Is it politically acceptable?	3.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	3.0
Are other environmental approvals required?	3.0
Total Score	**2.9**

Mitigation Action: Implement septic system maintenance & education plan.

Criteria	Score
Is it socially acceptable?	3.0
Is it Technically feasible and potentially successful?	1.0
Is it administratively workable?	1.0
Is it politically acceptable?	3.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	3.0
Are other environmental approvals required?	3.0
Total Score	**2.4**

Mitigation Action: Update GIS data layers and availability of GIS information.

Criteria	Score
Is it socially acceptable?	3.0
Is it Technically feasible and potentially successful?	3.0
Is it administratively workable?	3.0
Is it politically acceptable?	3.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	3.0
Are other environmental approvals required?	3.0
Total Score	**3.0**

Mitigation Action: Update EOP to include FEMA NIMS/ICS requirements.

Criteria	Score
Is it socially acceptable?	3.0
Is it Technically feasible and potentially successful?	3.0
Is it administratively workable?	3.0
Is it politically acceptable?	3.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	3.0
Are other environmental approvals required?	3.0
Total Score	**3.0**

Mitigation Action: Establish & Fill position for a Compliance/Code Enforcement Officer.

Criteria	Score
Is it socially acceptable?	3.0
Is it Technically feasible and potentially successful?	3.0
Is it administratively workable?	3.0
Is it politically acceptable?	2.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	3.0
Are other environmental approvals required?	3.0
Total Score	**2.9**

Mitigation Action: Adopt Building Codes.

Criteria	Score
Is it socially acceptable?	1.0
Is it Technically feasible and potentially successful?	3.0
Is it administratively workable?	2.0
Is it politically acceptable?	1.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	2.0
Are other environmental approvals required?	3.0
Total Score	**2.1**

Mitigation Action: Upgrade shelter generator at the Elementary School.

Criteria	Score
Is it socially acceptable?	3.0
Is it Technically feasible and potentially successful?	3.0
Is it administratively workable?	3.0
Is it politically acceptable?	3.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	3.0
Are other environmental approvals required?	3.0
Total Score	**3.0**

Mitigation Action: Incorporate the 2007 Hazard Mitigation Plan in the Emergency Operations Plan.

Criteria	Score
Is it socially acceptable?	3.0
Is it Technically feasible and potentially successful?	3.0
Is it administratively workable?	3.0
Is it politically acceptable?	3.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	3.0
Are other environmental approvals required?	3.0
Total Score	**3.0**

Mitigation Action: Purchase generator for Town Hall/EOC.

Criteria	Score
Is it socially acceptable?	3.0
Is it Technically feasible and potentially successful?	3.0
Is it administratively workable?	3.0
Is it politically acceptable?	3.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	3.0
Are other environmental approvals required?	3.0
Total Score	**3.0**

Comments: Currently there is no generator at EOC

Mitigation Action: Create and implement dry hydrant installation and maintenance plan.

Criteria	Score
Is it socially acceptable?	3.0
Is it Technically feasible and potentially successful?	3.0
Is it administratively workable?	3.0
Is it politically acceptable?	3.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	3.0
Are other environmental approvals required?	3.0
Total Score	**3.0**

Comments:

Mitigation Action: Purchase contain/confine equipment for chemical spills.

Criteria	Score
Is it socially acceptable?	3.0
Is it Technically feasible and potentially successful?	3.0
Is it administratively workable?	3.0
Is it politically acceptable?	3.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	3.0
Are other environmental approvals required?	3.0
Total Score	**3.0**
Comments: Disposal needs env. approvals	

Mitigation Action: Develop DPW procedures for contain/confine chemical spills.

Criteria	Score
Is it socially acceptable?	3.0
Is it Technically feasible and potentially successful?	3.0
Is it administratively workable?	3.0
Is it politically acceptable?	3.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	3.0
Are other environmental approvals required?	3.0
Total Score	**3.0**
Comments:	

Mitigation Action: Construct a building for the Transfer Station.

Criteria	Score
Is it socially acceptable?	3.0
Is it Technically feasible and potentially successful?	2.0
Is it administratively workable?	3.0
Is it politically acceptable?	3.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	3.0
Are other environmental approvals required?	1.0
Total Score	**2.6**
Comments:	

Mitigation Action: Revise local ordinances to include sprinkler and life safety requirements.

Criteria	Score
Is it socially acceptable?	1.0
Is it Technically feasible and potentially successful?	3.0
Is it administratively workable?	3.0
Is it politically acceptable?	1.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	2.0
Are other environmental approvals required?	3.0
Total Score	**2.3**
Comments: State may pass standards for sprinklers in all homes in legislature	

Mitigation Action: Purchase communications equipment for Town Hall/EOC.

Criteria	Score
Is it socially acceptable?	3.0
Is it Technically feasible and potentially successful?	3.0
Is it administratively workable?	3.0
Is it politically acceptable?	3.0
Is there legal authority to implement?	3.0
Is it economically beneficial?	3.0
Are other environmental approvals required?	3.0
Total Score	**3.0**

APPENDIX J: HOLDERNESS ROAD MAINTENANCE SCHEDULE

Road Name	Year Completed	Rebuild or Culverts	Estimated Road Length	Project Resurfacing
Avery Street		Recommended to pave entire road to coincide with DOT Project		2007
Beede Road	2006 Single Course Top		1.00 paved	2021
Bob House Road	2006 Modified Base Only		.050 Paved	2009
Burleigh Farm Road			.550 Paved	2008
Central School Road	2003 - box culvert installed - 2" base-1" top DA White - Construction Co. - Michie Concrete		.200 Paved	2018
Christian Lane	2018 - 2" base - 1" top if approved			2018
College Road	2001-Joint project w/Center Harbor -Pike		.070 paved	2016
Coxboro Road	1995-Sectional Repair - New Gravel-2" base-1" top on repaired sections		2.20 paved	2010
	2001-Repave Lovett Hill - S turns			
E. Holderness Road	2000-1" new gravel - 2" base-Route 3 end. ME Latulippe w/Pike.		2.63 Paved	2016-Route 3 end - possible pave to Whitman Hill (2015)
	2001-1" top - Route 3 Section - Pike			
	2012-2" base if approved bottom of Beij Hill to Whitman Hill			2012-2" base if approved bottom of Beij Hill to Whitman Hill
	2006 - Modified Base only - Regrind Coxboro End			2009 - Coxboro End needs top only
Hardhack Road	2006 Single Course Top - Partial Project	3 Culverts replaced - including Jack Evans. Road raised w/blackpack	.680 paved	2012
Hawkins Pond Road	2001 - New Gravel - Leigh Johnson w/GMI 2" base-1" top		.200 paved	2016
Heritage Hill Road			.870 paved	2011

Road Name	Year Completed	Rebuild or Culverts	Estimated Road Length	Project Resurfacing
Hob Nob Lane			.200 paved	2011
Howe Road	2018-2" base - 1" top - if approved			2018
Lane Road	1997-New gravel-new design		3972' x 20'	2019
	2004-2" base- 1" top - GMI			
Lincoln Road	2002-Single Course - 2" GMI		.200 paved	2017
Livermore Road	2004-Single Course 2" top - GMI		1000'x17' paved	2020 (2019)
Locust Drive			.120 paved	2009
Marston Road	2005-Asphalt removed - 6" ledge pack added. 2" base- 1" top		760' x 20' paved	2020
McCrellis Hill Road	2014-2" base material if approved	Recommend to pave entire road		2014
Meadowview Drive	2009-2" base if approved	Recommend to pave entire road	.310 paved	2009
	2017 - 1" top if approved for paving			2017
Merrillwood Drive	1998 - Single course Overlay	Recommend to pave entire road	.270 paved	2013
	2009-2" base if approved			2009
Mt. Prospect Road	1994-Sectional Repair		2.89 paved	2013
	1998-Sectional rebuilds - Ambrose Construction - GMI			
North Ashland Road	2002 - Shim to level - 1" top		.220 paved	2017
North River Street		Recommend to pave entire road to coincide with DOT project	.220 paved	2007
Oak Hill Road	2005-Regrind 6" gravel added - 2" base - 1" top PIKE		1130'x20' cul-de-sac	2020
Old N. Holderness			.150 Paved	2009
Owl Brook Road	2004-Regrind 800'-6" of Ledge pack over regrind- 2" base-1" top-GMI		755'x20' paved	2020(2019)
Perch Pond Road	2001-Pug Mill Mix			2012
	2003-Pug Mill Mix			
Perkins Lane			.310 Paved	2007
Pinehurst Road	1999-new gravel-2" base-1" top - Leigh Johnson - GMI		.950 paved	2014
Piper Road	2" base - 1" top if approved			2018
Prospect Ridge Road	2000-2" base		2800'x20'-cul-de-sac	2019
	2004-1" top - GMI			
Sargent Road	2002-Single Course - 2" top		1.00 paved	2017

Road Name	Year Completed	Rebuild or Culverts	Estimated Road Length	Project Resurfacing
Seven Pines Road	2006-single course - top - Hardhack Road End		.080 paved	2007
Shepard Hill Road	2000-update intersection of Route 3 - 2" single course		2100'x20' paved	2020
	2001-reshape "backside" of Hill			
	2005 - Former College Road - North section - Regrind 900' - 2" base - 1" top - Pike			
Smith Road	2001 - Mt. Prospect end - New Gravel - Leigh Johnson w/GMI-2" base - 1" top		.550 paved	2016
	2008- Ed Ford End			2008
South River Street		Recommend to Pave entire street to coincide with DOT project		2007
Stonepost Road	2005-Regrind-2" base-1" top-Pike		1470'x20 - cul-de-sac	2021
Ta Da Dump Road			.230 Paved	2007
Trivett Lane	1998-Shim-1" top		.170 Paved	2013(2011)

APPENDIX K: WATER RESOURCES PLAN STAPLEE RESULTS

This section pertains to the town of Holderness Water Resources Plan (Appendix L) and contains a summary of STAPLEE rankings for each of the proposed Water Resources Plan Mitigation Actions by the Holderness Hazard Mitigation Committee. The highest possible rank in each of the seven categories is 3.0, the lowest is 1.0. The scores for each of the criteria have been averaged and then totaled.

Mitigation Action: Install a cistern at Beede Road: #020 Carr Brook Draft Site

Criteria	Score
Is it socially acceptable?	3
Is it Technically feasible and potentially successful?	3
Is it administratively workable?	3
Is it politically acceptable?	3
Is there legal authority to implement?	3
Is it economically beneficial?	3
Are other environmental approvals required?	2
Total Score	**2.8**

Mitigation Action: Install a cistern at #008 E. Holderness Rd. Draft Site

Criteria	Score
Is it socially acceptable?	3
Is it Technically feasible and potentially successful?	3
Is it administratively workable?	3
Is it politically acceptable?	3
Is there legal authority to implement?	3
Is it economically beneficial?	3
Are other environmental approvals required?	2
Total Score	**2.8**

Mitigation Action: Construct Dry Hydrant system at #002 "Squam Boat Draft Site"

Criteria	Score
Is it socially acceptable?	3
Is it Technically feasible and potentially successful?	3
Is it administratively workable?	3
Is it politically acceptable?	3
Is there legal authority to implement?	3
Is it economically beneficial?	3
Are other environmental approvals required?	2
Total Score	**2.8**

Mitigation Action: Construct Dry Hydrant system at #003 "Christain lane Draft site"

Criteria	Score
Is it socially acceptable?	3
Is it Technically feasible and potentially successful?	3
Is it administratively workable?	3
Is it politically acceptable?	3
Is there legal authority to implement?	3
Is it economically beneficial?	3
Are other environmental approvals required?	2
Total Score	**2.8**

Mitigation Action: Construct Dry Hydrant system at #005 "White Oak Pond draft Site"

Criteria	Score
Is it socially acceptable?	3
Is it Technically feasible and potentially successful?	3
Is it administratively workable?	3
Is it politically acceptable?	3
Is there legal authority to implement?	3
Is it economically beneficial?	3
Are other environmental approvals required?	2
Total Score	**2.8**

Mitigation Action: Construct Dry Hydrant system at #006 "Lewis Piper Draft Site

Criteria	Score
Is it socially acceptable?	3
Is it Technically feasible and potentially successful?	3
Is it administratively workable?	3
Is it politically acceptable?	3
Is there legal authority to implement?	3
Is it economically beneficial?	3
Are other environmental approvals required?	2
Total Score	**2.8**

Mitigation Action: hydrant Construct dry hydrant at #001 "Curry Place Draft Site"

Criteria	Score
Is it socially acceptable?	3
Is it Technically feasible and potentially successful?	3
Is it administratively workable?	3
Is it politically acceptable?	3
Is there legal authority to implement?	3
Is it economically beneficial?	3
Are other environmental approvals required?	2
Total Score	**2.8**

Mitigation Action: hydrant Construct dry hydrant at #004 "Overlook Draft Site"

Criteria	Score
Is it socially acceptable?	3
Is it Technically feasible and potentially successful?	3
Is it administratively workable?	3
Is it politically acceptable?	3
Is there legal authority to implement?	3
Is it economically beneficial?	3
Are other environmental approvals required?	2
Total Score:	**2.8**

Mitigation Action: hydrant Construct dry hydrant at #007, "Wolfberg Draft Site"

Criteria	Score
Is it socially acceptable?	3
Is it Technically feasible and potentially successful?	3
Is it administratively workable?	3
Is it politically acceptable?	3
Is there legal authority to implement?	3
Is it economically beneficial?	3
Are other environmental approvals required?	2
Total Score	**2.8**

Mitigation Action: hydrant Construct dry hydrant at #010 "Mountaineers Draft Site"

Criteria	Score
Is it socially acceptable?	3
Is it Technically feasible and potentially successful?	3
Is it administratively workable?	3
Is it politically acceptable?	3
Is there legal authority to implement?	3
Is it economically beneficial?	3
Are other environmental approvals required?	2
Total Score	**2.8**

Mitigation Action: hydrant Construct dry hydrant at #021 "Marrer Draft Site"

Criteria	Score
Is it socially acceptable?	3
Is it Technically feasible and potentially successful?	3
Is it administratively workable?	3
Is it politically acceptable?	3
Is there legal authority to implement?	3
Is it economically beneficial?	3
Are other environmental approvals required?	2
Total Score	**2.8**

Mitigation Action: hydrant Construct dry hydrant or cistern at #022 "Sargent Road Draft Site"

Criteria	Score
Is it socially acceptable?	3
Is it Technically feasible and potentially successful?	3
Is it administratively workable?	3
Is it politically acceptable?	3
Is there legal authority to implement?	3
Is it economically beneficial?	3
Are other environmental approvals required?	2
Total Score	**2.8**

Mitigation Action: Establish a dry hydrant/fire pond construction and maintenance program that will include records kept of semi-annual or annual flow tests on each hydrant and cleaning or maintenance dredging of fire ponds.

Criteria	Score
Is it socially acceptable?	3
Is it Technically feasible and potentially successful?	3
Is it administratively workable?	3
Is it politically acceptable?	3
Is there legal authority to implement?	3
Is it economically beneficial?	3
Are other environmental approvals required?	3
Total Score	**3**

Mitigation Action: Amend or include money in the Capitol Improvement Plan for water drafting site development

Criteria	Score
Is it socially acceptable?	3
Is it Technically feasible and potentially successful?	3
Is it administratively workable?	3
Is it politically acceptable?	3
Is there legal authority to implement?	3
Is it economically beneficial?	3
Are other environmental approvals required?	3
Total Score	**3**

Mitigation Action: Establish a Steep Slopes Ordinance to restrict and/or prohibit development in difficult to reach areas.

Criteria	Score
Is it socially acceptable?	3
Is it Technically feasible and potentially successful?	3
Is it administratively workable?	3
Is it politically acceptable?	3
Is there legal authority to implement?	3
Is it economically beneficial?	3
Are other environmental approvals required?	3
Total Score	**3**

Mitigation Action: Amend subdivision regulations to require onsite water storage, minimum fire flow, fire breaks in wildland/urban interface areas.

Criteria	Score
Is it socially acceptable?	3
Is it Technically feasible and potentially successful?	3
Is it administratively workable?	3
Is it politically acceptable?	2
Is there legal authority to implement?	3
Is it economically beneficial?	3
Are other environmental approvals required?	3
Total Score	**2.8**

Mitigation Action: Encourage referral to Water Resource Plan and maps by Planning Board when reviewing subdivision proposals.

Criteria	Score
Is it socially acceptable?	3
Is it Technically feasible and potentially successful?	3
Is it administratively workable?	3
Is it politically acceptable?	3
Is there legal authority to implement?	3
Is it economically beneficial?	3
Are other environmental approvals required?	3
Total Score	**3**

Mitigation Action: Map and assess water sites and other resources along woods roads and trails for wildland firefighting.

Criteria	Score
Is it socially acceptable?	3
Is it Technically feasible and potentially successful?	3
Is it administratively workable?	3
Is it politically acceptable?	3
Is there legal authority to implement?	3
Is it economically beneficial?	3
Are other environmental approvals required?	3
Total Score	**3**

Mitigation Action: Implement program to provide training to fire personnel on wildland fire suppression, dry hydrant design, site evaluations of water resources, etc.

Criteria	Score
Is it socially acceptable?	3
Is it Technically feasible and potentially successful?	3
Is it administratively workable?	3
Is it politically acceptable?	3
Is there legal authority to implement?	3
Is it economically beneficial?	3
Are other environmental approvals required?	3
Total Score	**3**

Mitigation Action: Establish driveway standards that address slope, width, access. Emergency response to residential homes in remote and difficult access areas is often hampered by design of driveways.

Criteria	Score
Is it socially acceptable?	3
Is it Technically feasible and potentially successful?	3
Is it administratively workable?	3
Is it politically acceptable?	3
Is there legal authority to implement?	3
Is it economically beneficial?	3
Are other environmental approvals required?	3
Total Score	**3**

APPENDIX L: HOLDERNESS WATER RESOURCES PLAN