Town of Charlestown, New Hampshire
Hazard Mitigation Plan Update 2015

Prepared by the Town of Charlestown Hazard Mitigation Committee and
Upper Valley Lake Sunapee Regional Planning Commission

TABLE OF CONTENTS

I. INTRODUCTION **1**

A. BACKGROUND 1
B. PURPOSE 1
C. HISTORY 1
D. SCOPE OF THE PLAN 2
E. METHODOLOGY 2
F. HAZARD MITIGATION GOALS 5
G. ACKNOWLEDGEMENTS 6

II. COMMUNITY PROFILE **7**

A. INTRODUCTION 7
B. DEVELOPMENT TRENDS 9

III. HAZARD IDENTIFICATION **12**

A. WHAT ARE THE HAZARDS IN CHARLESTOWN? 12
B. DESCRIPTIONS OF HAZARDS 12
Dam Failure *13*
Flooding *15*
Hurricane *19*
Tornado & Downburst *22*
Thunderstorms/Lightning/Hail *24*
Severe Winter Weather *27*
Earthquake *31*
Drought *33*
Extreme Heat *35*
Erosion *37*
Wildfire *38*
Natural Water & Air Contaminants *39*
Hazardous Materials Spills *42*
Terrorism *42*
Nuclear *43*
C. HAZARD RISK RATINGS 44
Assessing Probability *44*
Assessing Vulnerability *44*
Assessing Risk *45*

IV. CRITICAL FACILITIES/LOCATIONS **47**

V. DETERMINING HOW MUCH WILL BE AFFECTED **50**

A. IDENTIFYING VULNERABLE FACILITIES 50
B. IDENTIFYING VULNERABLE SPECIAL POPULATIONS 50
C. POTENTIAL LOSS ESTIMATES 50
Dam Failure – Low/Medium Risk – Unknown cost *51*
Flooding – Medium/High Risk - $447,000 Estimated Cost (not including roads, bridges) *51*
Hurricane – Low/Medium Risk – $2.3 Million Estimated Cost *51*
Tornado & Downburst –Medium Risk – No Recorded or Estimated Cost *51*
Thunderstorm/Lightning/Hail – Low/Medium Risk – No Recorded or Estimated Cost *51*
Severe Winter Weather – Medium/High Risk – No Recorded or Estimated Cost *52*
Earthquake – Low Risk - $7.7 million Estimated Cost if All Buildings Impacted *52*
Drought – Low/Medium Risk – No Recorded or Estimated Cost *52*
Extreme Heat – Low/Medium Risk – No Recorded or Estimated Cost *52*
Erosion – Low/Medium Risk – No Recorded or Estimated Cost *53*
Wildfire – Low/Medium Risk – $1,150,000 Estimated Cost *53*
Natural Contaminants – Low/Medium Risk – No Recorded or Estimated Cost *53*
Hazardous Material Spills – Medium Risk – No Recorded or Estimated Cost *53*
Terrorism – Low/Medium Risk – No Recorded or Estimated Cost *54*
Nuclear – Low Risk – No Recorded or Estimated Cost *54*

VI. EXISTING MITIGATION ACTIONS 55

A. EXISTING HAZARD MITIGATION PROGRAMS 55
B. NEW MITIGATION PROGRAMS 60
C. CRITICAL EVALUATION FOR IMPROVEMENTS TO EXISTING PROGRAMS AND NEW PROGRAMS 61
D. EMERGENCY PREPAREDNESS ACTIONS 63

VII. PRIORITIZED IMPLEMENTATION SCHEDULE 66

VIII. ADOPTION & IMPLEMENTATION OF THE PLAN 70

A. IMPLEMENTATION THROUGH EXISTING PROGRAMS 70
B. CONTINUED PUBLIC INVOLVEMENT 71

TABLES

Table II-1: AREA POPULATION TRENDS 11
Table II-2: POPULATION GROWTH IN Charlestown 11
Table II-3: POPULATION PROJECTIONS FOR CHARLESTOWN 11
Table III-1 - DAMS 14
Table III-2: ICE JAMS IN CHARLESTOWN 16
Table III-3: FLOODING 17
Table III-4: STRUCTURE VALUES IN 100-YEAR FLOOD AREAS BY TYPE 19
Table III-5: HURRICANES & TROPICAL STORMS 20
Table III-6: TORNADOES IN OR NEAR SULLIVAN COUNTY 23
Table III-7 - FUJITA SCALE 24
Table III-8: LIGHTNING ACTIVITY LEVEL 26
Table III-9: SCALED PREDICTIVE ICE STORM AFTERMATH INDEX 28
Table III-10: SEVERE WINTER WEATHER 29
Table III-11: EARTHQUAKES 31
Table III-12: RICHTER SCALE and MERCALLI INTENSITY 32
Table III-13: DROUGHT 35
Table III-14: HEAT INDEX 36
Table III-15: EXTREME HEAT 36
Table III-16: RADON – LOW/MEDIUM RISK 40
Table III-17: PROBABILITY OF HAZARD 44
Table III-18: VULNERABILITY OF EXISTING DEVELOPED AREAS 45
Table IV-1: EMERGENCY RESPONSE FACILITIES, SERVICES & STRUCTURES 47
Table IV-2: NON-EMERGENCY RESPONSE FACILITIES & STRUCTURES 48
Table IV-3: FACILITIES & POPULATIONS TO PROTECT 49
Table V-1: VULNERABILITY OF EXISTING DEVELOPED AREAS 50
Table V-2: VULNERABILITY OF POTENTIAL DEVELOPMENT 50
Table VI-1: EXISTING MITIGATION ACTIONS 55
Table VI-2: PUBLIC EDUCATION AND OUTREACH TOPICS 59
Table VI-3: Committee Assessment for New Hazard Mitigation Actions 60
Table VI-4: PROPOSED NEW MITIGATION ACTIONS 61
Table VI-5: PRIORITIZING EXISTING AND PROPOSED MITIGATION STRATEGY IMPROVEMENTS 62

Table VI-6: EMERGENCY PREPAREDNESS ACTIONS 64
Table VII-1: PRIORITIZED IMPLEMENTATION SCHEDULE FOR NEW & EXISTING PROGRAM IMPROVEMENTS 66

FIGURES

Figure III-1: HAIL SIZE COMPARISON CHART 25
Figure III-2: DROUGHT MAPS 34
Figure III-3: MAP OF RADON ZONES 41

APPENDICES

Appendix A: Technical Resources
Appendix B: Hazard Mitigation Assistance Grants
Appendix C: Meeting Documentation
Appendix D: Map of Hazard Areas and Critical Facilities
Appendix E: Town Adoption & FEMA Approvals of Hazard Mitigation Plan

I. INTRODUCTION

A. BACKGROUND

The New Hampshire Department Homeland Security and Emergency Management (NH HSEM) has a goal for all communities within the State of New Hampshire to establish local hazard mitigation plans as a means to reduce future losses from natural or man-made hazard events before they occur. The NH HSEM has provided funding to the Town of Charlestown, to update their local Hazard Mitigation Plan. UVLSRPC wrote the first Charlestown Hazard Mitigation Plan that was approved in 2008. The *Charlestown Hazard Mitigation Plan Update 2015* serves as a strategic planning tool for use by the Town of Charlestown in its efforts to reduce future losses from natural and/or man-made hazard events before they occur. This *Plan* does *not* constitute a section of the Master Plan.

The Charlestown Hazard Mitigation Committee updated the *Charlestown Hazard Mitigation Plan* with the assistance and professional services of the Upper Valley Lake Sunapee Regional Planning Commission (UVLSRPC). After a public meeting held in the Charlestown Town Offices, the Charlestown Town Selectboard adopted the updated plan on April 15, 2015 as shown in Appendix E.

B. PURPOSE

The Charlestown Hazard Mitigation Plan Update 2015 is a planning tool for use by the Town of Charlestown in its efforts to reduce future losses from natural and/or man-made hazards. This plan does not constitute a section of the Town Master Plan, nor is it adopted as part of the Zoning Ordinance.

C. HISTORY

On October 30, 2000, President Clinton signed into law the Disaster Mitigation Act of 2000 (DMA 2000). The ultimate purpose of DMA 2000 is to:

- Establish a national disaster mitigation program that will reduce loss of life and property, human suffering, economic disruption, and disaster assistance costs resulting from disasters, and
- Provide a source of pre-disaster mitigation funding that will assist States and local governments in accomplishing that purpose.

DMA 2000 amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act by, among other things, adding a new section: 322 – Mitigation Planning. This places new emphasis on local mitigation planning. It requires local governments to prepare and adopt jurisdiction-wide hazard mitigation plans as a condition to receiving any hazard mitigation grants. Local governments must review and if necessary, update the mitigation plan annually to continue program eligibility.

Why develop a Mitigation Plan?
Planning ahead to lessen or prevent a disaster will reduce the human, economic, and environmental costs. The State of NH is vulnerable to many types of hazards, including floods, hurricanes, winter storms, wildfires, wind events, and earthquakes. All of these types of events can have significant economic, environmental, and social impacts. The full cost of the damage resulting from the impact of natural hazards – personal suffering, loss of lives, disruption of the economy, and loss of tax base – is difficult to quantify and measure.

D. SCOPE OF THE PLAN

The scope of the *Charlestown Hazard Mitigation Plan Update 2015* includes the identification of natural hazards affecting the Town, as identified by the Charlestown Hazard Mitigation Committee. The hazards were reviewed under the following categories as outlined in the State of New Hampshire Multi-Hazard Mitigation Plan 2010 and Update 2013:

- Dam Failure
- Flooding
- Hurricane
- Tornado & Downburst
- Thunderstorm/Lightning/Hail
- Severe Winter Weather
- Earthquake
- Drought
- Extreme Heat
- Erosion
- Nuclear
- Wildfire
- Natural Contaminants
- Hazardous Materials Spill
- Terrorism

E. METHODOLOGY

Using the *Local Mitigation Planning Handbook by FEMA (2013)*, the Charlestown Hazard Mitigation Committee, in conjunction with the UVLSRPC, developed the content of the *Charlestown Hazard Mitigation Plan Update 2015* by tailoring the nine-task process set forth in the guidebook appropriate for the Town of Charlestown. Many FEMA resources and multiple State and Federal websites were also used as well. The Committee held a total of four posted meetings in 2013. Three meetings were posted inviting the general public. Though notices invited the general public to participate, no public attended the meetings. Draft plans were e-mailed to the neighboring municipal offices and appropriate department heads to obtain comments.

The Charlestown Town Selectboard held a public meeting and adopted the Plan after FEMA conditional approval April 15, 2015 as shown in Appendix E. Prior to the Town of Charlestown approving the updated Plan, a public meeting was held to gain additional input from the citizens of Charlestown and to raise awareness of the ongoing hazard mitigation planning process.

The following hazard mitigation meetings were vital to the development of this Plan:

May 21, 2013
June 11, 2013
June 25, 2013
July 16, 2013

To complete this updated Plan, the Hazard Mitigation Committee followed the following planning steps to re-evaluate the plan sections of the existing 2008 plan and to update it to reflect current information and issues:

Task 1: Determine the Planning Area and Resource (May 2013)
Charlestown is a rural town and chose to continue their planning as process as a single town. The Town chose to work with the Upper Valley Lake Sunapee Regional Planning Commission to provide technical support.

Task 2: Build the Planning Team (May 2013)
Members of the Committee included all relevant personnel as well as any interested citizens. This included a Planning Board member and Selectboard member to represent municipal organizations with general and land use planning authority.

Task 3: Create an Outreach Strategy (May 2013)
The Committee chose to provide public notices to the public to encourage participation at the public meetings. They also put a notice on the town website. Notices were also sent to each of the neighboring towns to invite them to participate in the meetings, send comments, or request a final plan. The final plan will also be available for public review prior to adoption.

Task 4: Review Community Capabilities (May 2013)
Committee members identified facilities that were considered to be of value to the Town for emergency management purposes, for provision of utilities and services, and for historic, cultural and social value. A GIS-generated map was prepared to show critical facilities identified by the Charlestown Hazard Mitigation Committee. A summary listing of "Critical Facilities" is presented in Chapter IV. Costs were determined for losses for each type of hazard. Using information and activities in the handbook, the

Committee and UVLSRPC staff identified existing mitigation strategies which are already implemented in the Town related to relevant hazards. A summary chart and the results of this activity are presented in Chapter VI.

Task 5: Conduct a Risk Assessment (June 2013):
The Committee determined natural and human-made hazards affecting the Town and updated a description, location, and extent of those previous and potential hazards. Existing and future assets were updated to determine vulnerability to potential hazard events. Critical facilities needed during an emergency were identified and given values based on tax data. It was also determined if these facilities are in a hazard zone or not. Other facilities identified are those needed to continue the daily operation of the municipality and those that have dense populations or valued historical structures and vulnerable natural areas.

Task 6: Develop a Mitigation Strategy (June 2013):
The Committee evaluated the goals in the previous plan and determined they were still appropriate. They then determined actions that they could take to meet those goals to reduce their risk to hazard events. They discussed existing regulations, ordinances, and the Master Plan and how they could continue to incorporate hazard mitigation strategies into these documents to include hazard mitigation in land use planning. Committee members agreed to pursue this integration with appropriate municipal boards.

Task 7: Keep the Plan Current: (June 2013):
The plan will be reviewed after every major event to evaluate the effectiveness of the plan. It will also be updated at least every five years as required.

Task 8: Review and Adopt the Plan:
The Committee will incorporate any feedback from Committee members, municipal officials, residents, businesses and institutions, and neighboring communities. The plan will be assessed by using FEMA's Local Mitigation Plan Review Tool prior to sending to NH Homeland Security and Emergency Management for preliminary review. If HSEM considers the plan to meet the requirements, they will forward the draft plan to FEMA for their review. Once FEMA determines the plan meets requirements, the municipality will hold a public meeting to obtain further comments and review the final draft. If there are no major suggested changes, the municipal government will adopt the plan and the adoption form will be sent to HSEM and then to FEMA to receive a final approval of the plan.

Task 9: Create a Safe and Resilient Community:
The municipality will implement the plan by committing to task accomplishment as indicated in the plan. The municipality will take advantage of available funding opportunities such as FEMA's mitigation grant programs. The process for monitoring and updating the Plan can be found in Chapter IX.

UVLSRPC staff compiled the results of tasks one through nine in a draft document, as well as helpful and informative materials from the *State of New Hampshire Natural Multi-Hazard Mitigation Plan* (2010 & Update 2013), which served as a resource for the *Charlestown Hazard Mitigation Plan Update 2015*. The process for monitoring and updating the Plan can be found in Chapter IX.

F. HAZARD MITIGATION GOALS

The Charlestown Hazard Mitigation Committee reviewed the hazard mitigation goals set forth in the previous Hazard Mitigation Plan and revised them as follows:

1. To identify, introduce and implement cost effective Hazard Mitigation measures so as to accomplish the Town's goals and to raise awareness and acceptance of hazard mitigation opportunities generally.

2. To improve upon the protection of the general population, the citizens, and visitors of the Town of Charlestown from natural and human-made hazards.

3. To reduce the potential impact of natural and human-made disasters to:
   - the Town of Charlestown's Critical Support Services,
   - Critical Facilities in the Town of Charlestown,
   - the Town of Charlestown's infrastructure,
   - private property,
   - the Town's economy,
   - the Town's natural environment, and
   - the Town's specific historic treasures and interests.

4. To improve the Town's Disaster Response and Recovery capability as a hazard mitigation strategy to be prepared for emergencies and reduce their impact.

G. ACKNOWLEDGEMENTS

The following people participated in developing the update of this plan as the Hazard Mitigation Committee:

- David Edkins, Town of Charlestown Assistant to Selectboard, Director of Planning and Zoning
- Keith Weed, Town of Charlestown Highway Department Superintendent
- Rose Smith-Hull, Town of Charlestown Planning Board Member
- Richard Lincourt, Town of Charlestown Planning Board Member
- Ed Smith, Town of Charlestown Chief of Police
- Sharon Francis, Town of Charlestown Planning Board Member
- Charles Barely, Town of Charlestown Fire Chief & Emergency Management Director
- David Duquette, Town of Charlestown Water and Wastewater Department Superintendent

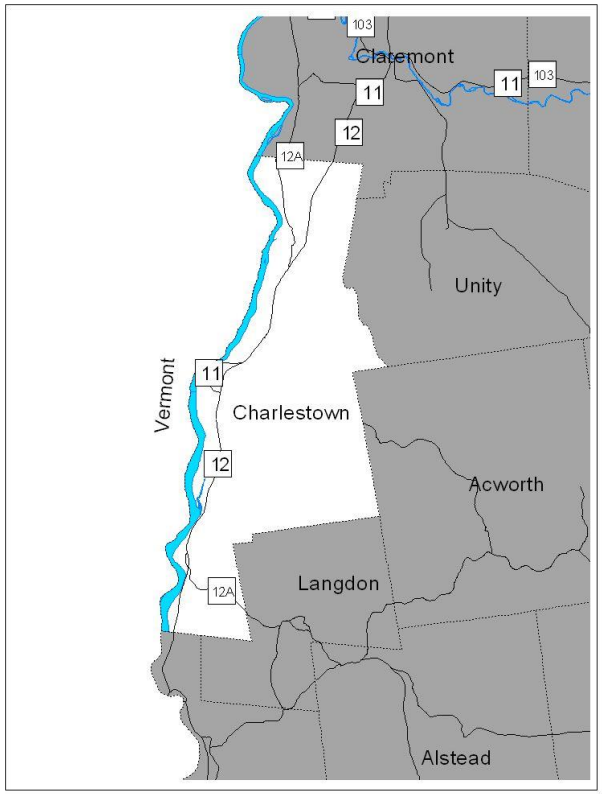
- Elizabeth Lufkin, NH Homeland Security and Emergency Management
- Victoria Davis, Upper Valley Lake Sunapee Regional Planning Commission
- Adam Ricker, Upper Valley Lake Sunapee Regional Planning Commission

The Hazard Mitigation Committee was composed of local officials, citizens of Charlestown and a staff representative of the UVLSPRC for meeting facilitation and plan development. Neighboring communities were invited to review the draft plan which was sent to them by e-mail. The general public was invited to attend three meetings by public postings at the community bulletin board on Main Street, the bulletin board at the Town Clerk's office, and the bulletin board at the Connecticut River Bank. These were posted 10 days prior to the first posted meeting date and remained until the last meeting occurred. No citizens inquired about the update process or attended any of the meetings. No comments were made by neighboring towns. Meeting documentation is provided in Appendix C.

Historical information, relevant data and potential future mitigation strategies were contributed by all parties involved in the planning process. For a record of all meeting topics see Appendix C: Meeting Documentation. The staff representative of the UVLSRPC gathered all information from local officials, agency representatives and public input and compiled the information to develop the Plan.

II. COMMUNITY PROFILE

A. INTRODUCTION[1]



The Town of Charlestown, NH is located in the southwestern corner of the state along the Connecticut River for 13 miles, in Sullivan County. Within the boundaries of the town are the smaller hamlets of North Charlestown and South Charlestown. New Hampshire Route 12 connects Charlestown with the City of Claremont to the north and the Town of Walpole to the south. Route 12A provides access to the Town of Langdon, southeast of Charlestown.

All of Charlestown is within the Connecticut River watershed. In most of the town, surface waters drain into the Little Sugar River, and a small section drains into the Cold River. A watershed is made up of all the land that drains into a body of water. The line that connects all of the highest elevations around the water body defines the boundary of a watershed. As rain and snowmelt travel within this "catch basin" and flow by gravity into the water bodies and ground, they carry various amounts of nutrients and pollutants with them. A watershed approach to water resources planning is critically important, as watersheds are the main units of surface water and groundwater recharge. In addition, the land uses located within a watershed directly impact the water quality.

Charlestown's wetlands are valuable for mitigating flooding events and erosion. Because of their soils and vegetation, wetlands act as a giant sponge during periods of high runoff and flooding, controlling the rate of runoff downstream and slowing floodwaters. In late summer, this stored water is slowly released, maintaining stream flows down river.

Damaging floods along the Connecticut River have been recorded since the 1700s. Principal damaging floods of the twentieth century have occurred in 1913, 1927, 1936, 1938 and 1968. Ice jams near the Bellows Falls Hydropower Dam have backed up as far as

[1] Town of Charlestown Master Plan (2006)

Charlestown. A story in the "Valley News" in 1996 reported flooding in Charlestown, closing Route 12 and necessitating the evacuation of 18 families in the Connecticut River Mobile Home Park.[2]

Charlestown adopted a building code ordinance in 1975 for flood hazard areas. This ordinance was amended in 1981 to comply with the requirements of the National Flood Insurance Program (NFIP). Floodplain maps were prepared by the Federal Emergency Management Agency (revised May 4, 2000, and 2005) and these maps show where flooding is likely to occur.

Approximately ten percent of the Town of Charlestown has slopes greater than 15 percent and the majority of town has slopes of eight to fifteen percent. As the slope increases, the more challenging it is to develop the land and the greater the potential to increase erosion and stormwater runoff and exacerbate flooding. Generally, slopes over 25 percent are considered undevelopable.

There are about 13 miles of State roads in Charlestown. There are about 61 miles of Class V maintained roads and 5 miles of Class VI (unmaintained) roads in Charlestown.

There are a total of approximately 22,870 acres within the town. Currently, there are a total of 14,390 acres of land in Current Use within the town of Charlestown.[3]

[2] Cold Regions Research and Engineering Laboratory (CRREL), Ice Jam Database.
[3] NH Department of Revenue Administration: Summary Inventory of Valuation Form MS-1 for 2012.

B. DEVELOPMENT TRENDS

In September 2004, at the request of the Charlestown Planning Board, UVLSRPC completed a build-out study of the town, in conjunction with the Board's update of the master plan. The build-out analysis is a tool for assessing the compatibility between the community's vision for the future and its current land use regulations. Timing is not relevant to the analysis as it is assumed that time is condensed to allow all possible development to occur today.

The analysis of the potential residential growth associated with undeveloped land in Charlestown indicates that under current zoning, Charlestown has the potential to grow to a year-round population of at least 20,586. This represents a significant percent increase over the 5,114 residents counted in the 2000 US Census. An examination of developed land in Charlestown would likely reveal some infill potential which would increase this number further. It should be noted that this is only potential development, and this may not occur.

Actual lot subdivisions since the previous hazard mitigation plan include the following:

2008 – 2 subdivisions creating 2 new lots
2009 – 5 subdivisions creating 15 new lots
2010 – 4 subdivisions creating 6 new lots
2011 – 1 subdivision creating 1 new lot
2012 – 1 subdivision creating 1 new lot
2013 – 2 subdivisions creating 7 new lots
2014 – 2 subdivisions creating 2 new lots (as of July 30, 2014)

The number of building permits issues issued for new structures is as follows:

2008 – 9 Residential; 0 Commercial/Industrial
2009 – 8 Residential; 1 Commercial/Industrial
2010 – 3 Residential; 2 Commercial/Industrial
2011 – 5 Residential; 1 Commercial/Industrial
2012 – 5 Residential; 2 Commercial/Industrial
2013 – 7 Residential; 2 Commercial/Industrial
2014 – 3 Residential; 1 Commercial/Industrial

Note that the building permit figures reflect new buildings only and do not include additions or alterations to existing buildings. Whelen Engineering in particular has done a number of additions to existing buildings, some fairly substantial, at its campus which are not reflected in the above figures. With fairly minimal development in recent years, Charlestown has not had any development that specifically impacts the town's hazard vulnerability. The town's floodplain ordinance restricts development in the floodplain, which eliminates further vulnerability to flooding through new development.

Charlestown's year-round population increased significantly from 1940 to 1980 and then only slightly between 1980 and 2010. Consistent with regional and statewide trends, the period of most active growth (35%) occurred between 1970 and 1980. Of area communities shown in the table below for comparison, Charlestown and Unity have had the largest average growth rates, at 3.0 and 4.4 per year respectively during the 1970s, and have been growing slower in recent years. The tables below show population growth between 1970 and 2010.

The population projections table shows that growth in Charlestown is predicted to increase of 1.5% to 2.6% in five year spans. This represents a 12% increase in population from 2010 to 2040—substantially less than the development potential available.

The 2007 Charlestown Master Plan adopted has a goal to maintain the rural character of the Town and suggests changes in the zoning ordinance to prevent sprawl and development in potential hazard zones. Increasingly, available sites for development are constrained by steep slopes, exposed ledge, wetlands and other natural features. These sites are more expensive to develop and increase the community's vulnerability to natural hazards such as flooding, landslide, forest fire, and other events. These developments also challenge the capabilities and efficiency of emergency response services in town, as they are often more remote and difficult to access.

The Town of Charlestown amended its Zoning Ordinance on March 11, 2014. The ordinance divides the town into 11 zones including a zone for watershed protection area. It also provides for alternative subdivisions such as lot size averaging to reduce the area of land impacted by development. The town also has a Drinking Water Protection District Ordinance, a town building code, and a floodplain management ordinance. The Subdivision Regulations allow for cluster and planned unit development subdivisions, again to reduce the area of land impacted by development. The regulations also address soil erosion and sediment control of developments to prevent erosion. A Fire Protection section requires the Fire Chief to complete an inspection of the proposed site to evaluate the availability of existing water supplies in the area.

Currently, there are 47 residences around the AirGas/Irving Gas Bottling site. There is also a new subdivision nearby with 11 undeveloped lots. This is of concern due to the potential for an explosion. There is a mobile home park in the flood zone that was flooded in the 1990s due to an ice jam on the Connecticut River. The Town will continue to evaluate purchase of lands in hazard zones as they become available. This also includes land in the Drinking Water Protection areas around municipal wells.

Table II-1: AREA POPULATION TRENDS

Area	1970	1980	1990	2000	2010
Charlestown	**3,274**	**4,417**	**4,630**	**4,749**	**5,114**
Claremont	14,221	14,557	13,902	13,151	13,355
Unity	709	1,092	1,341	1,530	1,674
Newport	5,899	6,229	6,110	6,269	6,507
Acworth	459	590	776	836	891
Sullivan County	30,949	36,063	38,592	40,458	42,093
New Hampshire	737,578	920,475	1,109,252	1,235,786	1,315,000

Source: US Census

Table II-2: POPULATION GROWTH IN Charlestown

	1970	1980	1990	2000	2010
Population	**3,274**	**4,417**	**4,630**	**4,749**	**5,114**
Decade Change in Population	-	35%	5%	3%	8%

Source: 1970 – 2010 US Census

Table II-3: POPULATION PROJECTIONS FOR CHARLESTOWN

Area	2015	2020	2025	2030	2035	2040
Charlestown	**5,193**	**5,297**	**5,432**	**5,571**	**5,674**	**5,735**
Change in Population	1.5%	2.0%	2.5%	2.6%	1.8%	1.1%

Source: State of New Hampshire, Regional Planning Commissions, Office of Energy and Planning - County Population Projections, 2013

III. HAZARD IDENTIFICATION

The Charlestown Hazard Mitigation Committee reviewed the list of hazards provided in the *State of New Hampshire Multi-Hazard Mitigation Plan 2010 and Update 2013*, and some hazard history for the State of New Hampshire and Sullivan County in particular. A list of past hazard events in Charlestown, Sullivan County, and the State of New Hampshire can be found in the following discussion and tables. After reviewing this information and the Emergency Operations Plan, the Committee conducted a Risk Assessment.

A. WHAT ARE THE HAZARDS IN CHARLESTOWN?

Charlestown is prone to a variety of natural and human-made hazards. The hazards that Charlestown is most vulnerable to were determined through gathering historical knowledge of long-time residents and town officials; research into the CRREL Ice Jam Database, FEMA and NOAA documented disasters, and local land use restrictions; and from the input of representatives from state agencies (NH HSEM). The hazards potentially affecting the Town of Charlestown are dam failure, flooding, hurricane, tornado & downburst, thunderstorm (including lightning and hail), severe winter weather, earthquake, drought, extreme heat, erosion, landslide, wildfire, natural contaminants, hazardous materials spills, and terrorism. Each of these hazards and the past occurrences of these hazards are described in the following sections. Hazards that were eliminated from assessment are those that have not had a direct impact on the Town of Charlestown and are not anticipated to have an impact as determined by the Hazard Mitigation Planning Committee, representatives from state agencies and citizens of the Town of Charlestown. Eliminated hazards include Land Subsidence, Expansive Soils, and Snow Avalanches.

B. DESCRIPTIONS OF HAZARDS

An assessment of each hazard relevant to Charlestown is provided below. An inventory of previous and potential hazards is provided. Past events are shown in the following tables and the potential for future events is then discussed. The “risk” designation for each hazard was determined after evaluations discussed later in this chapter.

- Dam Failure
- Flooding
- Hurricane
- Tornado & Downburst
- Thunderstorm/Lightning/Hail
- Severe Winter Weather
- Earthquake
- Drought
- Extreme Heat
- Erosion
- Wildfire
- Natural Contaminants
- Hazardous Materials Spill
- Terrorism

Dam Failure

Dam failure results in rapid loss of water that is normally held by the dam. These kinds of floods pose a significant threat to both life and property. Appendix D shows the location of active dams in Charlestown.

NH DES assigns a hazard designation to each dam in the state depending upon the potential damage it would cause if the dam failed:

- A "high hazard potential" is indicated if the dam is in a location and of a size that failure or mis-operation of the dam would result in the following: major economic loss to structures or property; structural damage to roads; major environmental; or public health losses; and probable loss of human life.

- A "significant hazard potential" would mean the dam is in a location and of a size that failure or mis-operation of the dam would result in any of the following: major economic loss to structures or property; structural damage to roads; major environmental or public health losses.

- A "low" hazard dam failure could cause some structural damage to buildings and roads.

- A "non-menace" dam failure would not cause any significant damage.

"High" and Significant" hazard potential dam owners must provide NH DES with maps of the potential inundation area if the dam were to fail. It should be noted that there are some exemptions from this requirement such as lagoons.

Past Dam Failure Events

There have been no dam failures within the Town of Charlestown or outside the town that would have affected the town.

Table III-1 - DAMS

Dam #	Class	Dam Name	Water Body	Owner (Now or Formerly)	Status	Area in acres	Height of Dam (Ft)	Drainage Area in Square Miles
41.27	NM	DIERKS HYDRO DAM	LITTLE SUGAR RIVER	ANGELICA DIERKS	ACTIVE	0.2	9	31
41.03	NM	LITTLE SUGAR RIVER	LITTLE SUGAR RIVER	ANGELICA DIERKS	ACTIVE	2	12	0
41.15		WILDLIFE POND	NATURAL SWALE	HARVEY HILL	Not built	0.5	9	0.2
41.21		MOULTON UPPER DAM	TR SUGAR RIVER	GEORGE A MOULTON	Not built	0.1	6	0
41.19	NM	FIRE POND DAM	NATURAL SWALE	OLGA WILLIAMS	ACTIVE	0.14	13	0
41.18	NM	WILDLIFE POND	NATURAL SWALE	TOM BEAUDRY	ACTIVE	0.31	11	0
41.11	NM	WILDLIFE POND	NATURAL SWALE	MR T J FRIZZELL	ACTIVE	0.3	6	0.01
41.07	L	HALL POND DIKE	CLAY BROOK	TOWN	ACTIVE	15.6	7	0.82
41.26	NM	FRIZZELL POND	UNNAMED STREAM	ROBERT FRIZZELL	ACTIVE	0.81	11	0.03
41.06	L	HALL POND DAM	BEAVER BROOK	TOWN	ACTIVE	15.6	9	0.82
41.05		CLAY BROOK WATER SUPPLY DAM	CLAY BROOK	TOWN	RUINS	0	15	5.1
41.22	NM	FRIZZELL STRAWBERRY DAM	UNNAMED STREAM	ROBERT FRIZZELL	ACTIVE	0.1	5	5.2
41.08	NM	UPPER CLAY BROOK DAM	CLAY BROOK	TOWN	ACTIVE	0.75	14	5
41.09	NM	BY PASS DAM	CLAY BROOK	TOWN	ACTIVE	0.1	6	5.1
41.10	L	LOWER RESERVOIR DAM	CLAY BROOK	TOWN	ACTIVE	0.4	11	3.56
41.23	NM	FRIZZELL DAM	UNNAMED STREAM	ROBERT FRIZZELL	ACTIVE	0.4	16	0.01
41.02	NM	CLAY BROOK GRIST MILL DAM	CLAY BROOK	DORIS BACON	ACTIVE	0	16.5	8.2
41.01	NM	CLAY BROOK DAM	CLAY BROOK	DORIS BACON	ACTIVE	0.25	27.5	10.1
41.20	NM	BROWN DAM	UNNAMED STREAM	WALTER BROWN	ACTIVE	0.25	4	0
41.17	NM	RECREATION POND DAM	NATURAL SWALE	CAMP GOOD NEWS	ACTIVE	1.07	8	0
41.13	NM	RECREATION POND	NATURAL SWALE	ROBERT METCALF	ACTIVE	0.45	7	0.02
41.25	NM	PUTNAM POND	UNNAMED STREAM	PUTNAM BROS FARM	ACTIVE	0.2	6	0
41.14	NM	WILDLIFE POND	NATURAL SWALE	WALTER STEARNS	ACTIVE	0.3	6	0
41.04	NM	NORTH CHARLESTOWN RESERVOIR	TR LITTLE SUGAR R	TOWN	ACTIVE	0.4	10	0.52
41.16	NM	FIRE POND DAM	NATURAL SWALE	GEORGE W MOULTON	ACTIVE	0.23	13	0.14
41.29	S	Charlestown Wastewater Lagoons	NA	TOWN	ACTIVE	5.5	4.5	0
41.28	NM	COMSTOCK HYDRO DAM	*BEAVER BROOK*	*LOVELL COMSTOCK II*	ACTIVE	0.009	6	1.48
41.12	NM	FARM POND	NATURAL SWALE	LISA SHAW	ACTIVE	0.4	11	0.04
41.24	NM	PUTNAM LAGOON	NA	PUTNAM BROS FARM	ACTIVE	0.6	13	1.4

Class of potential hazard: NM – non-menace; L-low; S-significant *Source: NH DES*
Material: T-timber; S-stone; E-earth; C-concrete

Potential Future Dam Failure Damage

Although there are 29 dams in Charlestown (2 not built at time of inventory), there is only one "high" or "significant" hazard dams within town. The Charlestown Wastewater Lagoons have been classified by the state as a significant hazard. It is believed that if the lagoons are breached that the water would enter the river without damages to structures; however, this would cause pollution to the river. There are two "low hazard potential" dam: "Hall Pond Dam" on Beaver Brook and "Lower Reservoir Dam" on Clay Brook. All active dams are shown on a map in Appendix D.

Dams located outside the Town of Charlestown, the Wilder, Moore and Comerford Dams would have an impact on Charlestown. See the attached inundation maps for these dams in Appendix D.

The Committee determined that dam failure is a low/medium risk in Charlestown.

Flooding

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

Floods in the Charlestown area are most likely to occur in the spring due to the increase in rainfall and snowmelt; however, floods can occur at any time of the year. A sudden winter thaw or a major summer downpour can cause flooding. Floodplains indicate areas potentially affected by flooding. There are several types of flooding.

<u>100-Year Floods</u> The term "100-year flood" does not mean that flooding will occur once every 100 years, but is a statement of probability to describe how one flood compares to others that are likely to occur. What it actually means is that there is a one percent chance of a flood in any given year. These areas were mapped for all towns in New Hampshire by FEMA. Appendix D displays the "Special Flood Hazards Areas."

<u>River Ice Jams</u> Ice forming in riverbeds and against structures presents significant hazardous conditions. Storm waters encounter these ice formations which may create temporary dams. These dams may create flooding conditions where none previously existed (i.e., as a consequence of elevation in relation to normal floodplains). Additionally, there is the impact of the ice itself on structures such as highway and railroad bridges. Large masses of ice may push on structures laterally and/or may lift structures not designed for such impacts. A search on the Cold Regions Research and Environmental Laboratory (CRREL) did not reveal any ice jams in the last

five years; however, there have been jams that impacted Charlestown in the past in the 1960s, 1996 and 2003 which are summarized in the table below.

.

Table III-2: ICE JAMS IN CHARLESTOWN

DATE	DESCRIPTION	AREA IMPACTED
December 19th, 2003	Connecticut River	"The Connecticut River was sheet ice covered from Bellows Falls up to the Cheshire Bridge. Above Charlestown, a several-mile-long jam filled the channel. This jam had reportedly caused minor flooding of US Route 5 the previous day. Upstream of the jam, a frazil ice cover was actively forming in the bends just upstream of North Charlestown. Above that, the Connecticut River was open as far as Wilder Dam. The White River was also open and carrying frazil ice."
January 19th, 1996	Connecticut River	Damages included road flooding and an evacuation of eighteen families in the Connecticut River Mobile Home Park. Following is a description from the CRREL website: "Jim Lever, CECRL-IE, was on location of the Bellows Falls, VT ice jam on the Connecticut River on 1/21/96. The jam formed on 1/19/96 and Ruth Kitowicz, CENED, contacted J. C. Tatinclaux, CECRL-IE, via telephone on 1/21/96 reporting the jam near the Bellows Falls Hydropower Dam. Lever noted the toe of the jam as 1/2 mile upstream of the dam and the head just below the Rt. 11 Bridge in Springfield. Andy Tuthill, CECRL-IE, observed the jam on 1/22/96. He reported that the toe had plowed into sheet ice, extended upstream for 10 miles with the head being 1/2 mile downstream of the Charlestown, NH Toll Bridge. He also noted that the upper 1/2-mile of the jam was made up of frazil pans and below this was broken sheets and brash ice. Tuthill observed the jam by airplane on 1/25/96 and again on 2/11/96. Scott Acone, CENED-ED-WH, was on the location of the jam on 1/26/96. His report states the same as Tuthill's and Lever's. The NWS reported flooding in Springfield, VT and Charlestown, NH on 1/21/96. Rt. 5 and Rt. 12 were closed due to the flooding. On 1/24/96 the NWS Flood Statement reported backup water on the Black River with field flooding due to the jam in Bellows Falls. The ice jam was still in place on 2/21/96 according to a NWS Flood Watch. A story in the "Valley News" on 1/23/96 reported flooding in Charlestown closing Rt. 12 and the evacuation of 18 families in the Connecticut River Mobile Home Park."
1960s	Connecticut River	Committee recalled ice jam floes were ten feet thick. No damages were recalled as a result.

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

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

Beaver Dams and Lodging Flooding associated with beaver dams and lodging can cause road flooding or damage to property.

Bank Erosion and Failure As development increases, changes occur that increase the rate and volume of runoff, and accelerate the natural geologic erosion process. Erosion typically occurs at the outside of river bends and sediment deposits in low velocity areas at the insides of bends. Resistance to erosion is dependent on the riverbank's protective cover, such as vegetation or rock riprap, or its soils and stability. Roads and bridges are also susceptible to erosion.

Past Flooding Events

The Committee determined there are three other flood areas in the town other than the FEMA designated flood zones. Appendix D shows the Special Flood Hazard Areas. The three flood additional flood areas that have historically experience flooding are: Scotts Drive in North Charlestown; downtown east of NH Route 12, north of the Primary School to Summit Drive; and two areas along Breakneck Hill in the vicinity of Meany Road and Acworth Stage Road. The damage to these areas has been to infrastructure. The roads and storm water systems in these areas have been impacted by the flooding. The downtown flood area has not impacted the buildings, but been limited to significant ponding on the roads and damage to the road infrastructure. The following tables provide a list of floods in the State, County, and Charlestown. Other flooding issues are listed in the Erosion section—primarily for roads.

Table III-3: FLOODING

FLOODING				
Hazard	**Date**	**Location**	**Description of Areas Impacted**	**Damages**
Flood / Severe Storm	April 16, 1987	Cheshire, Carroll, Grafton, Hillsborough, Merrimack, Rockingham, & Sullivan Counties	FEMA Disaster Declaration # 789- DR (Presidentially Declared Disaster). Flooding of low-lying areas along river caused by snowmelt and intense rain.	$4,888,889 in damage.
Flood	August 7-11, 1990	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack & Sullivan Counties, NH	FEMA Disaster Declaration # 876. Flooding caused by a series of storm events with moderate to heavy rains.	$2,297,777 in damage.

FLOODING				
Hazard	**Date**	**Location**	**Description of Areas Impacted**	**Damages**
Flood (Ice Jam)	March 26, 1992	Cold River, Acworth	Ice jam (CRREL) which formed near a bend caused road flooding. Ice was removed by State equipment.	Unknown
Flood	October 29, 1996	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan Counties, NH	FEMA Disaster Declaration # 1144- DR. Flooding caused by heavy rains.	$2,341,273 in damage.
Flood	October 7-18, 2005	Cheshire, Grafton, Merrimack, Sullivan, and Hillsborough Counties, NH	FEMA Disaster Declaration # 1610. Severe storms and flooding; major devastation in neighboring towns of Alstead and Acworth	$3,000,000 in damages.
Flood	October-November 2005	Grafton, Hillsborough, Merrimack, Rockingham, Strafford & Sullivan counties	FEMA Disaster Declaration # DR-1144- NH	Unknown
Flood	April 16, 2007	All counties, NH	FEMA Disaster Declaration # 1695. Severe storms and flooding; 2,005 home owners and renters applied for assistance in NH.	$27,000,000 in damages
Flood	July 24, 2008	Central and Southern NH; Counties Declared: Belknap, Carroll, Merrimack, Rockingham, and Strafford	FEMA DR 1782	Severe storms, tornado, and flooding
Flood	August 14, 2008	Central Northern NH; Counties Declared: Belknap, Carroll, Coos, and Grafton	FEMA Disaster Declaration #1787	$3 million in public assistance; primary damage to roads
Flood	March 14-31, 2010	Statewide	FEMA DR-1913; severe storms & flooding; Declared Counties: Hillsborough and Rockingham Counties	75% federal match
Flood	May 26-30, 2011	Coos and Grafton Counties	FEMA-4006-DR Federal assistance for Coos and Grafton Counties and hazard mitigation statewide	$1.8 million in public assistance; primary impact to roads and bridges
Flood	May 29-31, 2012	Cheshire County	FEMA DR-4065; severe storm and flood event	$3,070,273 in public assist.
Flood	June 26-July 3, 2013	Grafton, Sullivan and Cheshire Counties	FEMA DR-4139; severe storms, flooding, and landslides	$6,252,800 in public assist.

Charlestown became a participating member of the National Flood Insurance Program on April 15, 1981. Updated maps and flood insurance studies for all municipalities within Sullivan County were finalized in May 23, 2006. The Committee expressed concern that the maps do not seem to be very accurate. (See Table VI-1 for strategy.) There are currently six policies in the town with $1,123,000 of insurance for five single-family residences and one non-residential property. However, flood insurance purchase is not a reflection of the number of structures within the flood plain. One single-family residential loss claim of $30,052 has been paid, there are no repetitive losses. (Source: NH OEP office, 8/5/14)

Charlestown's 100-Year Special Flood Areas are all located within the A and AE Zones with a base flood elevation of 308' determined for one area on the Connecticut River as shown on the Special Flood Hazard Areas Map in Appendix D. There are no non-compliant structures in the Town of Charlestown according to the NH Floodplain Insurance Program State Coordinator (July 2014).

As an NFIP participant, the Town of Charlestown has a floodplain ordinance which restricts building within the special floodplains to protect the flow of flood waters and not increase the needed land area for those waters. The Town adopted the model ordinance provided by the NH Floodplain Management Office on March 12, 1996 and the latest revision is dated March 14, 2006. This ordinance is reflected in the zoning ordinance, subdivision regulations, and site plan review regulations.

Potential Future Flooding Events

Future flooding is likely as noted in the above table based upon local knowledge of past flood events. There are currently 36 properties located within the FEMA determined 100-year flood areas. The total structural value of these properties is $1,596,000. There are a total of nine state and town owned bridges with the flood plain.

According to the State's Mitigation Plan, Sullivan County has a high hazard risk for flooding. The Committee determined flooding is a medium/high risk in Charlestown.

Table III-4: STRUCTURE VALUES IN 100-YEAR FLOOD AREAS BY TYPE

Flood Zone	Properties	
	#	Value
Zone A and AE	36	$1,596,000

Hurricane

A hurricane is an intense tropical weather system with a well-defined circulation and maximum sustained winds of 74 mph (64 knots) or higher. Hurricane winds blow in a large spiral around a relative calm center known as the "eye." The "eye" is generally 20 to 30 miles wide, and the storm may extend outward 400 miles. As a hurricane nears land, it can bring torrential rains, high winds, and storm surges. A single hurricane can last for more than 2 weeks over open waters and can run a path across the entire length of the eastern seaboard. August and September are peak months during the hurricane season that lasts from June 1 through November 30. Damage resulting from winds of this force can be substantial, especially considering the duration of the event, which may last for many hours (*NH Multi-Hazard Mitigation Plan 2010 and Update 2013*; FEMA website).

The Saffir-Simpson Hurricane Wind Scale provides categories of sustained winds by miles per hour: 1 – 74-95 mph; 2 – 96-110 mph; 3 – 111-129 mph; 4 – 130 – 156 mph; and 5 – 157 mph or higher. Categories 3 -5 are considered to be major wind events that can cause devastating to catastrophic damage.

Past Hurricane Events

There have been several hurricanes over the years which have impacted New England and New Hampshire. Notably, any damage caused in Charlestown at the time of Tropical Storm Irene was caused by the flooding associated with the torrential rains brought with the storm systems. During Hurricane Sandy, Charlestown did not experience damages from the storm. These are listed below.

Table III-5: HURRICANES & TROPICAL STORMS

HURRICANES AND TROPICAL STORMS				
Hazard	**Date**	**Location**	**Description of Areas Impacted**	**Damages**
Hurricane	August, 1635	n/a		Unknown
Hurricane	October 18-19, 1778	n/a	Winds 40-75 mph	Unknown
Hurricane	October 9, 1804	n/a		Unknown
Gale	September 23, 1815	n/a	Winds > 50mph	Unknown
Hurricane	September 8, 1869	n/a		Unknown
Hurricane	September 21, 1938	Southern New England	Flooding caused damage to road network and structures. 13 deaths, 494 injured throughout NH. Disruption of electric and telephone services for weeks. 2 Billion feet of marketable lumber blown down. Total storm losses of $12,337,643 (1938 dollars). 186 mph maximum winds.	$12,337,643

HURRICANES AND TROPICAL STORMS				
Hazard	**Date**	**Location**	**Description of Areas Impacted**	**Damages**
Hurricane (Carol)	August 31, 1954	Southern New England	Category 3, winds 111-130 mph. Extensive tree and crop damage in NH, localized flooding	Unknown
Hurricane (Edna)	September 11, 1954	Southern New England	Category 3 in Massachusetts. This Hurricane moved off shore but still cost 21 lives and $40.5 million in damages throughout New England. Following so close to Carol it made recovery difficult for some areas. Heavy rain in NH	Unknown
Hurricane (Donna)	September 12, 1960	Southern and Central NH	Category 3 (Category 1 in NH). Heavy flooding in some parts of the State.	Unknown
Tropical Storm (Daisy)	October 7, 1962	Coastal NH	Heavy swell and flooding along the coast	Unknown
Tropical Storm (Doria)	August 28, 1971	New Hampshire	Center passed over NH resulting in heavy rain and damaging winds	Unknown
Hurricane (Belle)	August 10, 1976	Southern New England	Primarily rain with resulting flooding in New Hampshire. Category 1	Unknown
Hurricane (Gloria)	September, 1985	Southern New England	Category 2, winds 96-110 mph. Electric structures damaged; tree damages. This Hurricane fell apart upon striking Long Island with heavy rains, localized flooding, and minor wind damage in NH	Unknown
Hurricane (Bob)	August 19, 1991	Southern New England	Structural and electrical damage in region from fallen trees. 3 persons were killed and $2.5 million in damages were suffered along coastal New Hampshire. Federal Disaster FEMA-917-DR	Unknown
Hurricane (Edouard)	September 1, 1996	Southern New England	Winds in NH up to 38 mph and 1 inch of rain along the coast. Roads and electrical lines damaged	Unknown
Tropical Storm (Floyd)	September 16-18, 1999	Southern New England	FEMA DR-1305-NH. Heavy Rains	Unknown
Hurricane (Katrina)	August 29, 2005 & continuing	East Coast of US and more	FEMA-3258-EM. Heavy rains and flooding devastating SE US	Unknown

HURRICANES AND TROPICAL STORMS				
Hazard	**Date**	**Location**	**Description of Areas Impacted**	**Damages**
Tropical Storm (Tammy)	October 5-13, 2005	East Coast of US	Remnants of Tammy contributed to the October 2005 floods which dropped 20 inches of rain in some places in NH.	Unknown
Tropical Storm (Irene)	August 26 – September 6, 2011	East Coast of US	FEMA-4026-DR for Coos, Carroll, Grafton, Strafford, Belknap, Merrimack and Sullivan Counties; EM-3333 Hillsboro, Rockingham, and Cheshire Counties; there was little effect in Charlestown.	$2 Million primarily for roads and bridges
Hurricane (Sandy)	October 26 – November 8, 2012	East Coast of US	FEMA-4095-DR-NH for Belknap, Carroll, Coos, Grafton and Sullivan Counties.	unknown

Potential Future Hurricane Damage

Hurricane events will affect the entire town. It is impossible to predict into the future what damage will occur in the town. According to the State's mitigation plan, Sullivan County has a medium/high risk for hurricanes. The Committee determined the hurricane risk to be low/medium in Charlestown.

Tornado & Downburst

"A tornado is a violent windstorm characterized by a twisting, funnel shaped cloud. These events are spawned by thunderstorms and, occasionally by hurricanes, and may occur singularly or in multiples. They develop when cool air overrides a layer of warm air, causing the warm air to rise rapidly. Most vortices remain suspended in the atmosphere. Should they touch down, they become a force of destruction." (*NH Multi-Hazard Mitigation Plan 2010*). The Fujita Scale is the standard scale for rating the severity of a tornado as measured by the damage it causes. Most tornadoes are in the F0 to F2 Class. Building to modern wind standards provides significant property protection from these hazard events. New Hampshire is located within Zone 2 for Design Wind Speed for Community Shelters, which suggests that buildings should be built to withstand 160 mph winds.

Significantly high winds occur especially during tornadoes, hurricanes, winter storms, and thunderstorms. Falling objects and downed power lines are dangerous risks associated with high winds. In addition, property damage and downed trees are common during severe wind occurrences. A downburst is a severe, localized wind blasting down from a thunderstorm. These "straight line" winds are distinguishable from tornadic activity by the pattern of destruction and debris. Downbursts fall into two categories: 1. Microburst,

which covers an area less than 2.5 miles in diameter, and 2. Macroburst, which covers an area at least 2.5 miles in diameter. Most downbursts occur with thunderstorms, but they can be associated with showers too weak to produce thunder.

Past Tornado & Downburst Events

The following table displays tornadoes occurring in Sullivan County between 1950 and 1995 as provided by the "Tornado Project" (www.tornadoproject.com) and the *NH Multi-Hazard Mitigation Plan 2010*.

Table III-6: TORNADOES IN OR NEAR SULLIVAN COUNTY

TORNADOES & DOWNBURSTS – MEDIUM RISK			
	Date	**Fujita Scale**	**Damages**
Tornado	September 9, 1821	Most intense in NH	Killed 6 people; crossed Lake Sunapee
Tornado	July 14, 1963	F1	No deaths or injuries; costs unknown
Tornado	June 27, 1964	F0	No deaths or injuries; costs unknown
Tornado	August 11, 1966	F2	No deaths or injuries; costs unknown
Tornado	August 25, 1969	F1	No deaths or injuries; costs unknown
Tornado	May 31, 1972	F1	No deaths or injuries; costs unknown (Merrimack County)
Tornado	July 21, 1972	F1	No deaths or injuries; costs unknown
Tornado	May 11, 1973	F2	No deaths or injuries; costs unknown
Tornado	June 11, 1973	F0	No deaths or injuries; costs unknown
Tornado	August 15, 1976	F1	No deaths; 5 injuries; costs unknown (Merrimack County)
Tornado	August 13, 1999	F1	No deaths or injuries; costs unknown
Tornado	July 6, 1999	F2	No deaths or injuries; costs unknown (Merrimack County); in New London two roofs blown off structures; power outages,; downed trees, utility pole, and wires
Tornado	Summer 2006	NA	Began in Barnet, VT and moved to Monroe, NH
Tornado	April 15, 2007	NA	Numerous trees were knocked down in Enfield, NH
Tornado	July 24, 2008	(EF 2)	DR 1799: Numerous trees and utility poles down and tearing down houses near Concord; 1 fatality and 2 injuries

Source: www.tornadoproject.com

Table III-7 - FUJITA SCALE

Fujita Scale		
Scale	**Wind Strength (MPH)**	**Typical Damage**
F0	**<73**	**Light damage:** Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	**73-112**	**Moderate damage:** Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	**113-157**	**Considerable damage:** Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
F3	**158-206**	**Severe damage:** Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown
F4	**207-260**	**Devastating damage:** Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated
F5	**261-318**	**Incredible damage:** Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yds); trees debarked; incredible phenomena will occur.

Source: http://www.spc.noaa.gov

Potential Future Tornado and Downburst Damage

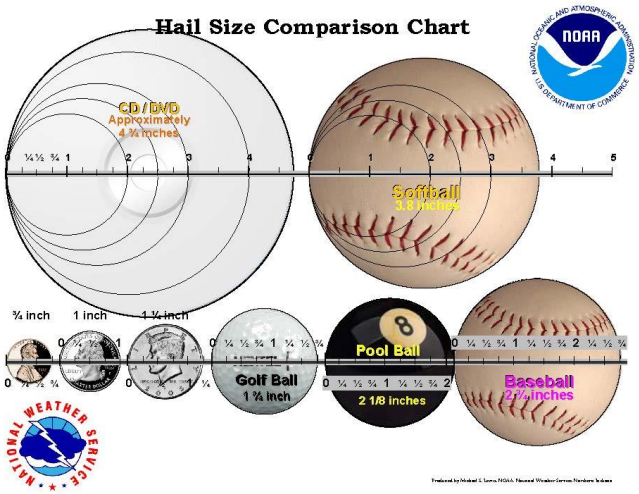
It is impossible to predict where a tornado or downburst will occur or what damage it will inflict. The Charlestown Committee does not recall tornadoes or downbursts in Charlestown. The FEMA website places the State of NH in the Zone II Wind Zone which provides that a community shelter should be built to a 160 mph "design wind speed." According to the State's mitigation plan, Sullivan County has a medium risk for tornadoes. The Committee determined there is a medium risk for tornadoes and downbursts in Charlestown.

Thunderstorms/Lightning/Hail

A thunderstorm is a rain shower during which you hear thunder. Since thunder comes from lightning, all thunderstorms have lightning. A thunderstorm is classified as "severe" when it contains one or more of the following: hail three-quarter inch or greater, winds gusting in excess of 50 knots (57.5 mph), tornado. Hail is a form of precipitation that occurs when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere where they freeze into ice. When the hail

particle becomes heavy enough to resist the updraft, it falls to the ground. The resulting wind and hail can cause death, injury, and property damage. . Below is a comparison charge for the various sizes of hail.

Figure III-1: HAIL SIZE COMPARISON CHART



An average thunderstorm is 15 miles in diameter and lasts an average of 30 minutes. Winter thunderstorms are rare because the air is more stable, strong updrafts cannot form because the surface temperatures during the winter are colder.

Lightning is a giant spark of electricity that occurs within the atmosphere or between the atmosphere and the ground. As lightning passes through the air, it heats the air to a temperature of about 50,000 degrees Fahrenheit, considerably hotter than the surface of the sun. Fires are a likely result of lightning strikes, and lightning strikes can cause death, injury, and property damage. It is impossible to predict where lightning will strike. There have probably been lightning strikes throughout Charlestown, but there is no record of damage.

A lightning activity level has been developed by the National Weather Service and is shown below:

Table III-8: LIGHTNING ACTIVITY LEVEL

Lightning Activity Level	Description
1	No thunderstorms
2	Isolated thunderstorms: Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a five minute period.
3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a 5 minute period.
4	Scattered thunderstorms. Moderate rain is commonly produced. Lightning is frequent, 11 to 15 cloud to ground strikes in a 5 minute period.
5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to ground strikes in a 5 minute period.
6	Dry lightning (same as LAL3, but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag Warning.

Source: http://graphical.weather.gov/definitions/defineLAL.html

Past Thunderstorm Events

There have been lightning strikes in Charlestown, but none were noteworthy according to the Committee. A thunderstorm with lightning or hail could impact the entire town, although lightning is more likely in isolated areas.

Potential Future Thunderstorm Damage

It is inevitable that thunderstorms will occur in Charlestown's future. Lightning, hail, or wind from a thunderstorm could impact anywhere in town. It is not possible to estimate potential damage. On a few occasions, lightning has hit near the transfer station and burned out the load cells of the scales. It has also hit near the water facility's pumping stations and shorted out the variable frequency drives controlling the pumps. According to the State's mitigation plan, Sullivan County has a medium risk of a lightning hazard. The risk for future thunderstorm damage was determined by the Committee to be low/med risk in Charlestown.

Table III-THUNDERSTORMS/LIGHTNING/HAIL

Thunderstorms/Lightning/Hail				
Hazard	**Date**	**Location**	**Description of Areas Impacted**	**Damages**
Hail	June 16, 2007	Charlestown	A severe thunderstorm produced large hail (.75 in) in southwestern New Hampshire.	unknown
Hail	August 3, 2007	Charlestown	An isolated thunderstorm produced large hail in Sullivan County with .75 inch hail in Charlestown.	unknown
Thunderstorm	August 25, 2007	Charlestown	A severe thunderstorm downed several trees..	unknown
Hail	July 19, 2008	Charlestown	A severe thunderstorm produces hail of .75 inch near Charlestown.	unknown

Severe Winter Weather

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

Heavy Snow Storms A heavy snowstorm is generally considered to be one which deposits four or more inches of snow in a twelve-hour period… A blizzard is a sustained wind or frequent gusts greater than or equal to 35 miles per hour accompanied by falling and/or blowing snow, frequently reducing visibility to less than ¼ mile for three hours or more (NOAA National Weather Service). Therefore, intense Nor'easters, which occur in the winter months, are often referred to as blizzards. The definition includes the conditions under which dry snow, which has previously fallen, is whipped into the air and diminishes visual range. Such conditions, when extreme enough, are called "white outs."

Ice Storms Freezing rain occurs when snowflakes descend into a warmer layer of air and melt completely. When these liquid water drops fall through another thin layer of freezing air just above the surface, they don't have enough time to refreeze before reaching the ground. Because they are "supercooled," they instantly refreeze upon contact with anything that is at or below O degrees C, creating a glaze of ice on the ground, trees, power lines, or other objects. A significant accumulation of freezing rain lasting several hours or more is called an ice storm. This condition may strain branches of trees, power lines and even transmission towers to the breaking point and often creates treacherous conditions for highway travel and aviation. Debris impacted roads make emergency access, repair and cleanup extremely difficult.

The National Weather Service has developed a Scaled Predictive Ice Storm Aftermath (SPIA) Index. The potential impacts are scaled from 0 to 5 and suggest potential electrical outage coverage and duration. Current ice storm warnings are based on forecast of ice accumulation only. SPIA reports on the combined effects of the predicted ice and wind. Below is a chart of the SPIA index levels.

Table III-9: SCALED PREDICTIVE ICE STORM AFTERMATH INDEX

Ice & Wind: Average Ice in Inches and Wind in Miles per hour	**<15 mph**	**15-25 mph**	**25-35 mph**	**≥35 mph**
0.10 – 0.25 inches	0	1	2	3
0.25 – 0.50 inches	1	2	3	4
0.50 – 0.75 inches	2	3	4	5
0.75 – 1.00 inches	3	4	5	5
1.00 – 1.50 inches	4	5	5	5
>1.50 inches	5	5	5	5

"Nor'easters" Nor'easters can occur in the eastern United States any time between October and April, when moisture and cold air are plentiful. They are known for dumping heavy amounts of rain and snow, producing hurricane-force winds, and creating high surfs that cause severe beach erosion and coastal flooding. A Nor'easter is named for the winds that blow in from the northeast and drive the storm up the east coast along the Gulf Stream, a band of warm water that lies off the Atlantic coast.

There are two main components to a Nor'easter: Gulf Stream low-pressure system (counter-clockwise winds) generate off the coast of Florida. The air above the Gulf Stream warms and spawns a low-pressure system. This low circulates off the southeastern U.S. coast, gathering warm air and moisture from the Atlantic. Strong northeasterly winds at the leading edge of the storm pull it up the east coast. As the strong northeasterly winds pull the storm up the east coast, it meets with cold Arctic high-pressure system (clockwise winds) blowing down from Canada. When the two systems collide, the moisture and cold air produce a mix of precipitation.

Winter conditions make Nor'easters a normal occurrence, but only a handful actually gather the force and power to cause problems inland. The resulting precipitation depends on how close you are to the converging point of the two storms. Nor'easter events which occur toward the end of a winter season may exacerbate the spring flooding conditions by depositing significant snow pack at a time of the season when spring rains are poised to initiate rapid snow pack melting.

Past Extreme Winter Weather Events

The following table provides a list of past extreme winter weather events in New Hampshire and Charlestown.

Table III-10: SEVERE WINTER WEATHER

SEVERE WINTER WEATHER/ICE STORMS				
Hazard	**Date**	**Location**	**Description of Areas Impacted**	**Damages**
Ice Storm	December 17-20, 1929	New Hampshire	Unprecedented disruption and damage to telephone, telegraph and power system. Comparable to 1998 Ice Storm (see below)	Unknown
Blizzard	February 14-17, 1958	New Hampshire	20-30 inches of snow in parts of New Hampshire	Unknown
Snow Storm	March 18-21, 1958	New Hampshire	Up to 22 inches of snow in south central NH	Unknown
Snow Storm	December 10-13, 1960	New Hampshire	Up to 17 inches of snow in southern NH	Unknown
Snow Storm	January 18-20, 1961	New Hampshire	Up to 25 inches of snow in southern NH	Unknown
Snow Storm	February 2-5, 1961	New Hampshire	Up to 18 inches of snow in southern NH	Unknown
Snow Storm	January 11-16, 1964	New Hampshire	Up to 12 inches of snow in southern NH	Unknown
Blizzard	January 29-31, 1966	New Hampshire	Third and most severe storm of 3 that occurred over a 10-day period. Up to 10 inches of snow across central NH	Unknown
Snow Storm	December 26-28, 1969	New Hampshire	Up to 41 inches of snow in west central NH	Unknown
Snow Storm	February 18-20, 1972	New Hampshire	Up to 19 inches of snow in southern NH	Unknown
Snow Storm	January 19-21, 1978	New Hampshire	Up to 16 inches of snow in southern NH	Unknown
Blizzard	February 5-7, 1978	New Hampshire	New England-wide. Up to 25 inches of snow in central NH	Unknown
Snow Storm	February, 1979	New Hampshire	President's Day storm	Unknown
Ice Storm	January 8-25, 1979	New Hampshire	Major disruptions to power and transportation	Unknown

SEVERE WINTER WEATHER/ICE STORMS				
Hazard	**Date**	**Location**	**Description of Areas Impacted**	**Damages**
Snow Storm	April 5-7, 1982	New Hampshire	Up to 18 inches of snow in southern NH	Unknown
Ice Storm	February 14, 1986	New Hampshire	Fiercest ice storm in 30 yrs in the higher elevations in the Monadnock region. It covered a swath about 10 miles wide from the MA border to New London NH	Unknown
Extreme Cold	November-December, 1988	New Hampshire	Temperature was below 0 degrees F for a month	Unknown
Ice Storm	March 3-6, 1991	New Hampshire	Numerous outages from ice-laden power lines in southern NH	Unknown
Snow Storm	1996	Regional	Two major storms with five feet of snow in a week	Unknown
Snow Storm	1997	New Hampshire	Power outages throughout region due to heavy snowfall	Unknown
Ice Storm	January 15, 1998	New Hampshire; Substantial power outages in Charlestown	Federal disaster declaration DR-1199-NH, 20 major road closures, 67,586 without electricity, 2,310 without phone service, $17+ million in damages to Public Service of NH alone	Unknown
Snow Storm	2000	Regional	Heavy snow	Unknown
Snow Storm	March 5-7, 2001	New Hampshire	Heavy snow.	Unknown
Snow Storm	December 6-7, 2003	New Hampshire	Heavy snow. Federal Disaster Declaration FEMA-3193-NH	Unknown
Snow Storm	February 10-12, 2005	New Hampshire	Heavy snow. Federal Disaster Declaration FEMA-3208-NH	Unknown
Ice Storm	December 2008	New Hampshire	Debris removal. FEMA DR-1812; power outages in region for up to 10 days; downed trees blocked roads and damaged utility lines	$15 Million
Wind Storm	February 23 – March 3, 2010	New Hampshire	FEMA DR-1892; Federal funding to Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan Counties; power loss	$2 Million
Snow Storm	October 29-30, 2011	Statewide	EM-3344; FEMA-4049 Hillsborough & Rockingham Counties	Unknown
Ice Storm	January 27, 2012	Region	Isolated power outages in region; several limbs down	Unknown

SEVERE WINTER WEATHER/ICE STORMS				
Hazard	**Date**	**Location**	**Description of Areas Impacted**	**Damages**
Snow Storm	February 8-10, 2013	New Hampshire	Heavy Snow. FEMA DR-4105	Unknown

Potential Future Severe Winter Damage:

There is the potential for severe winter damage every year. An event would affect the entire town. According to the State's mitigation plan, Sullivan County has a high risk for severe winter weather. The Committee determined severe winter weather to be a medium/high risk in Charlestown.

Earthquake

The following is a list of earthquakes which have impacted New England, New Hampshire, and potentially Charlestown.

Table III-11: EARTHQUAKES

EARTHQUAKES			
Date	**Location**	**Magnitude**	**Damage**
1638	Central NH	6.5-7	
October 29, 1727	Off NH/MA coast	NA	Widespread damage Massachusetts to Maine: cost unknown
December 29, 1727	Off NH/MA coast	NA	Widespread damage Massachusetts to Maine: cost unknown
November 18, 1755	Cape Ann, MA	6.0	Much damage: cost unknown
1800s	Statewide	83 felt earthquake in NH	Unknown
1900s	Statewide	200 felt earthquake in NH	Unknown
March 18, 1926	Manchester, NH	Felt in Hillsborough Co	Unknown
Dec 20, 1940	Ossipee, NH	Both earthquakes 5.5	Damage to homes, water main rupture: cost unknown.
December 24, 1940	Ossipee, NH	NA	Unknown
December 28, 1947	Dover-Foxcroft, ME	4.5	Unknown
June 10, 1951	Kingston, RI	4.6	Unknown
April 26, 1957	Portland, ME	4.7	Unknown
April 10, 1962	Middlebury, VT	4.2	Unknown

EARTHQUAKES			
Date	**Location**	**Magnitude**	**Damage**
June 15, 1973	Near Quebec Border	4.8	Unknown
Summer 1977-1978*	Centered in Franklin	NA	unknown
January 19, 1982	West of Laconia	4.5	Structure damage 15 miles away in Concord: cost unknown
October 20, 1988	Near Berlin, NH	4	Unknown
September 26, 2010	New Hampshire	3.4	Centered in Boscawen, NH
August 23, 2011	Central Virginia, East Coast	5.8	Felt in Charlestown

Source: earthquake.usgs.gov/earthquakes/states/new_hampshire/history.php for earthquakes through 1964. NH Multi-Hazard Mitigation Plan, 2010 for 1973-1982; earthquake.usgs.gov/earthquakes (12/13/11)
**Committee recollection*

Table III-12: RICHTER SCALE and MERCALLI INTENSITY

Richter Scale and Mercalli Intensity		
Richter Scale	**Modified Mercalli Intensity**	**Average Earthquake Effects**
1.0-3.0	I	**I** – Not felt except by a very few under especially favorable conditions.
3.0-3.9	II-III	**II** – Felt only by a few persons at rest, especially on upper floors of buildings. **III** – Felt quite noticeably by persons indoors. Standing motor cars may rock slightly.
4.0-4.9	IV-V	**IV** – Felt indoors by many, outdoors by few during the day. Dishes, windows, doors disturbed; walls make cracking sound. V – Felt by nearly everyone; many awakened. Some dishes, windows broken.
5.0-5.9	VI-VII	**VI** – Felt by all. Some heavy furniture moved; a few instances of fallen plaster. **VII** – Damage negligible in buildings of good design and construction, considerable damage in poorly built or badly designed structures; some chimneys broken.
6.0-6.9	VII-IX	**IX** – Damage considerable in specially designed structures; damage great is substantial buildings, with partial collapse.
7.0 and higher	VIII or higher	**VIII** and higher: damage slight in specially designed structures. Fall of chimneys, factory stacks, columns, monuments, walls. **X** – Some well-built wooden structures destroyed, most masonry and frame structures destroyed with foundations. **XI** – Few if any masonry structures remain standing. Bridges destroyed. **XII** – Total damage. Lines of sight and level are distorted. Objects thrown in air.

Potential Future Earthquake Damage:

A United States Geographic Survey mapping tool on the web (geohazards.cr.usgs.gov/ projects) projects a 5 – 6 peak ground acceleration (pga) with 10% probability of exceedance in 50 years for the Town of Charlestown. This pga rating is equivalent to a Modified Mercalli Intensity of "V" with moderate perceived shaking and very light potential damage. An earthquake event would impact the entire town. According to the State's mitigation plan, Sullivan County has a medium risk for earthquakes. The Committee determined the risk to be low in Charlestown.

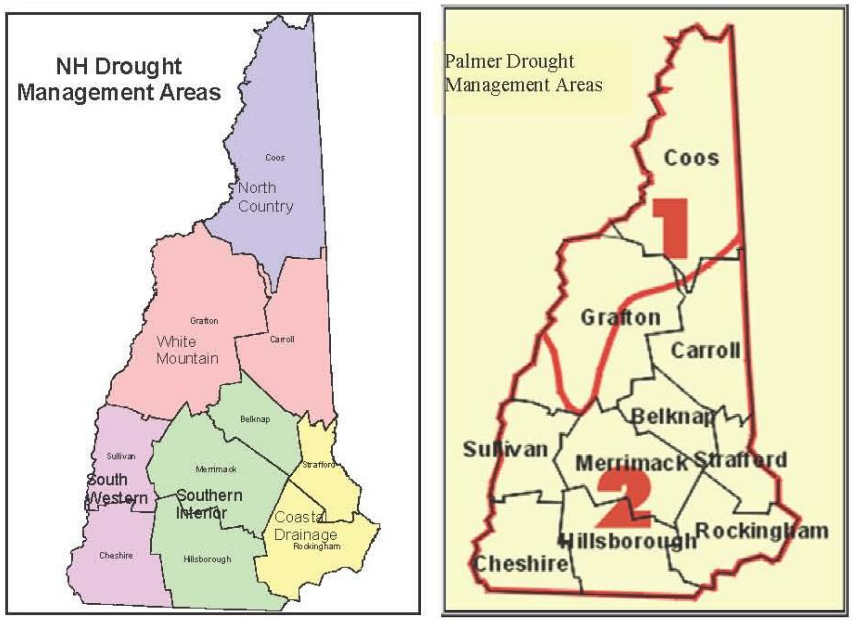
Drought

Droughts or abnormally low precipitation are generally not as damaging or disruptive as floods, but are more difficult to define. A drought is a natural hazard that evolves over months or even years and can last as long as several years or only a few months. Fortunately, droughts are rare in New Hampshire. The severity of the water deficit if gauged by the degree of moisture deficiency, its duration, and the size of the area affected. The effects of drought are indicated through measurements of soil moisture, groundwater levels and stream flow; however, not all of these indicators will be low during a drought. Not all of these indicators will be minimal during a particular drought. For example, frequent minor rainstorms can replenish the soil moisture without raising ground water levels or increasing stream flow.

Low stream flow correlates with low ground water level because it is ground water discharge to streams and rivers that maintain stream flow during extended dry periods. Low stream flow and low ground water levels commonly cause diminished water supply. This could affect the municipal water supply.

New Hampshire breaks the State into five Drought Management Areas, with one in the north, one across the central region, and three along the southern portion of the State. The National Oceanic and Atmospheric Administration (NOAA) and the US government use the Palmer Drought Survey Index for conditions of the nation. The Palmer Drought Management areas divide the State into two areas and use the Palmer Drought Severity Index which is based on rainfall, temperature, and historic data. The Town of Charlestown is in Area 2. The NH Drought Management Team, coordinated by the NH Department of Environmental Services Dam Bureau, use these maps to help determine which areas are hardest hit.

Figure III-2: DROUGHT MAPS



Past Drought Events

Around 2001-2002, Charlestown and other nearby towns had drought issues. This occurred again in 2010.

Table III-13: DROUGHT

Date	Location	Description	Damages
1929-1936	Statewide	Regional. Recurrence Interval 10 to > 25 years	Unknown
1939-1944	Statewide	Severe in southeast and moderate elsewhere. Recurrence Interval 10 to > 25 years	Unknown
1947-1950	Statewide	Moderate. Recurrence Interval 10 to > 25 years	Unknown
1960-1969	Statewide	Regional longest recorded continuous spell of less than normal precipitation. Encompassed most of the Northeastern US. Recurrence Interval > 25 years	Unknown
2001-2002	Statewide	Affected residential wells and agricultural water sources; third worst drought on record, exceeded only by the drought of 1956-1966 and 1941-1942; recurrence level not determined yet	Unknown
2010	Mostly southern counties	Affected dug wells and those in hillsides; affected Charlestown and surrounding towns.	Unknown

Source: NH DES through 2002; Concord Monitor August 22, 2010

Potential Future Drought Damage

Drought will affect the entire town. The damage will depend upon the crops being grown at the time of the drought. No cost has been assigned to residential wells going dry though new wells may have to be dug or drilled. According to the State's mitigation plan, Sullivan County has a medium risk for drought. The Committee determined that drought is a low/medium risk in Charlestown.

Extreme Heat

Extreme heat is characterized by abnormally high temperatures and/or longer than average time periods of high temperatures. These event conditions may impact the health of both humans and livestock. The National Weather Service developed a heat index based upon temperature and relative humidity. This is shown below.

Table III-14: HEAT INDEX

NOAA's National Weather Service

Heat Index

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution | Extreme Caution | Danger | Extreme Danger

Past Extreme Heat Events

The following table lists the extreme heat events in the past which included the Northeast and New Hampshire.

Table III-15: EXTREME HEAT

Date	Location	Description	Damage
July, 1911	New England	11-day heat wave in New Hampshire	Unknown
Late June to September, 1936	North America	Temps to mid 90s in the northeast	Unknown
June - August, 1999	Northeast	Mean temperatures well above long-term average	Unknown
Early August, 2001	New Hampshire	Mid 90s and high humidity	Unknown
August 2-4, 2006	New Hampshire	Regional heat wave and severe storms	Unknown
July 2010	Northeast	Regional heat wave	Unknown

Potential Future Extreme Heat Events

Extreme heat would impact the entire town though those with air conditioning in their homes would have less impact. The costs of extreme heat are most likely to be in human life. The elderly are especially susceptible to extreme heat. The State did not develop a county risk factor for extreme heat in its *NH Multi-Hazard Mitigation Plan 2010*. The Committee determined extreme heat to be a low/medium risk in Charlestown.

Erosion

Soil erosion, although a natural process, can be greatly accelerated by improper construction practices. Because of the climate in New Hampshire and the general nature of our topography, eroded soils can be quickly transported to a wetland, stream, or lake. The New Hampshire Department of Environmental Services (DES) regulates major construction activities to minimize impacts upon these resources. A properly conducted construction project should not cause significant soil erosion.

Soil becomes vulnerable to erosion when construction activity removes or disturbs the vegetative cover. Vegetative cover and its root system play an extremely important role in preventing erosion by: (1) Shielding the soil surface from the impact of falling rain drops; (2) Reducing the velocity of runoff; (3) Maintaining the soil's capacity to absorb water, and (4) Holding soil particles in place.

Because of the vegetation's ability to minimize erosion, limiting its removal can significantly reduce soil erosion. In addition, decreasing the area and duration of exposure of disturbed soils is also effective in limiting soil erosion. The designer must give special consideration to the phasing of a project so that only those areas actively under construction have exposed soils. Other factors influencing soil erosion are: (1) Soil types, (2) Land slope, (3) Amount of water flowing onto the site from up-slope, and (4) Time of year of disturbance.

Past Erosion Events

There are about twelve miles of State roads, 43 miles of Class V roads (maintained town roads), and nine miles of Class VI roads (unmaintained town roads) in Charlestown. The Committee identified spots along Stage Road which have been mitigated for erosion problems.

Potential Erosion Events

Due to the topography of the town, there is always potential for erosion. As properties are developed there will be less vegetative buffer to protect the town from erosion during rainstorms. The Connecticut River has seen erosion increase and will continue to erode. The Committee determined there was a low/medium risk for erosion damage in Charlestown.

Wildfire

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

Increased severity over recent years has decreased capability to extinguish wildfires. Wildfires are unpredictable and usually destructive, causing both personal property damage and damage to community infrastructure, cultural and economic resources. Negative short term effects of wildfires include destruction of timber, forage, wildlife habitats, scenic vistas and watersheds. Some long term effects include erosion and lowered water quality.

There are many types and causes of fires. Wildfires, arson, accidental fires and others all pose a unique danger to communities and individuals. Since 1985, approximately 9,000 homes have been lost to urban/wild land interface fires across the United States (Northeast States Emergency Consortium: www.nesec.org). The majority of wildfires usually occur in April and May, when home owners are cleaning up from the winter months, and when the majority of vegetation is void of any appreciable moisture making them highly flammable.

The threat of wildlfires for people living near wildland areas or using recreational facilities in wilderness areas is real. Dry conditions at various times of the year and in various parts of the United States greatly increase the potential for wildlfires. Advance planning and knowing how to protect buildings in these areas can lessen the devastation of a wildfire. To reduce the risk to wildfire, it is necessary to consider the fire resistance of structures, the topography of property and the nature of the vegetation in the area.

According to the National Wildfire Coordination Group, there are categories of wildfire based upon size: Class A - one-fourth acre or less; Class B - more than one-fourth acre, but less than 10 acres; Class C - 10 acres or more, but less than 100 acres; Class D - 100 acres or more, but less than 300 acres; Class E - 300 acres or more, but less than 1,000 acres; Class F - 1,000 acres or more, but less than 5,000 acres; Class G - 5,000 acres or more.

Past Wildfire Events

In 2008, there was a wildfire in a forested area on Sam's Hill which burned about 10 acres. It had been a dry spring, and local firefighters spent several days trying to get the fire under control. It was believed to be started by a campfire.

Potential Future Wildfire Events

There are many large, contiguous forest tracts in Charlestown. Where development interfaces with the forested areas is called the "urban interface." These are the areas where structures could be impacted by a wildfire; these areas are scattered throughout the town. The most likely areas for wildfire are where ice storm impact downs trees and branches providing fuel for a fire under drought conditions. During drought condition, many areas may be at risk for wildfire. According to the State's mitigation plan, Sullivan County has substantial debris to fuel a wildfire remaining from the ice storm of 1998 and 2008 and heavy forest cover. The plan gives the county a high risk of wildfire. The Committee did not feel that wildfire is a significant potential hazard in Charlestown and determined that the risk of wildfire in Charlestown is low/medium. Special consideration was given to the extensive rail road tracks in Charlestown which have cause small brush fires along the tracks in the past. However, due to track upgrades the concern is not as significant as it was at one time.

Natural Water & Air Contaminants

Radium, radon and uranium are grouped together because they are radionuclides, unstable elements that emit ionizing radiation. These three particular substances are a health risk only if taken into the body by ingestion or inhalation. They occur naturally in the environment, uranium and radium as solids in rock while radon exists as a gas. Radionuclides are undetectable by taste, odor, or color, so only analytical testing can determine if they are present in water. Because they are associated with rock, wells drilled into bedrock are more likely to contain elevated levels of radionuclides than shallow or dug wells.

Radon gas can also be found in the soil. Openings between the soil and buildings, such as foundation cracks and where pipes enter, provide conduits for radon to move into structures. The difference in air pressure, caused by heated indoor air moving up and out of buildings, results in a flow of soil gas toward the indoors, allowing radon to potentially accumulate in structures. Air quality in a home can also be tested for radon. Following is a map of New Hampshire by the U.S. EPA to show radon zones.

There are many other natural contaminants which can render drinking water unsafe such as arsenic. The municipal well in North Charlestown requires treatment for arsenic The Drinking Water and Groundwater Bureau of the NH Department of Environmental Services has several fact sheets available to address these natural materials and suggests which materials to be included in testing. See their list of fact sheets at http://www.des.state.nh.us/dwg.htm.

Past Natural Water & Air Contaminant Events

There have been no known events related to natural water and air contamination in Charlestown although uranium is a known water contaminant in neighboring towns. Uranium was found when constructing I-89 to the east and northeast of Unity. It is also anticipated that although no one is aware of any radon contamination, given that we are in the "Granite State," it is likely that some homes are affected by radon. The municipal wells in North Charlestown require treatment for arsenic.

Table III-16: RADON – LOW/MEDIUM RISK

RADON					
Summary Table of Short-term Indoor Radon Test Results in NH's Radon Database 11/04/2003)					
County	**# Tests**	**G. Mean**	**Maximum**	**% > 4.0 pCi/l**	**% > 12.0 pCi/l**
Belknap	744	1.3	22.3	14.4	1.3
Carroll	1042	3.5	478.9	45.4	18
Cheshire	964	1.3	131.2	15.6	2.3
Coos	1072	3.2	261.5	41	17
Grafton	1286	2.0	174.3	23.2	5.2
Hillsborough	2741	2.1	202.3	29.6	6.8
Merrimack	1961	2.0	152.8	25.2	6
Rockingham	3909	3.0	155.3	40	9.5
Strafford	1645	3.4	122.8	44	13
Sullivan	**466**	**1.4**	**29.4**	**15.7**	**2.1**
STATEWIDE	**15860**	**2.4 pCi/L**	**478.9 pCi/L**	**32.4**	**8.6**

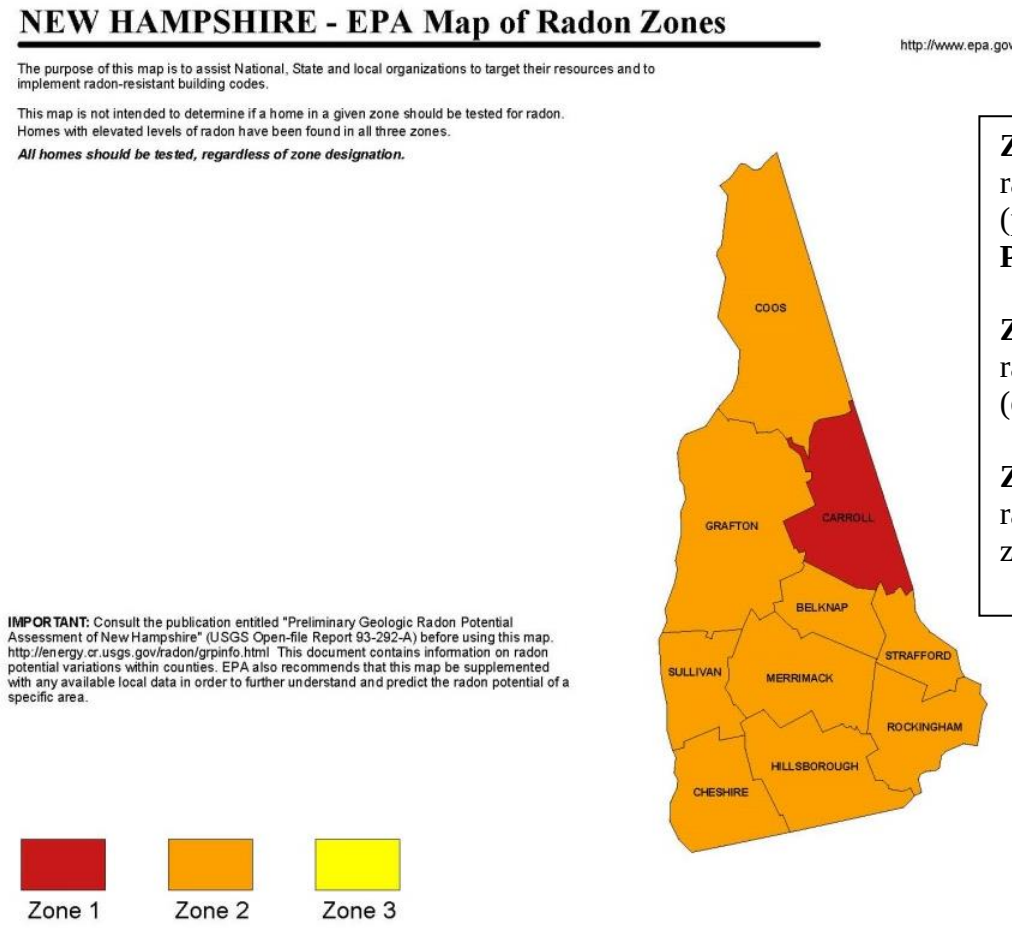
Potential Future Natural Air & Water Contaminant Damage:

Although there are no known records of illness that can be attributed to radium, radon, or uranium or other contaminants in Charlestown, residents should be aware that they are present. Houses with granite and dirt cellars are at increased risk to radon

gas infiltration. According to the table above, Sullivan County radon levels are below average for the State. According to the State's mitigation plan, Sullivan County has a medium probability of a radon related hazard.

In addition radium, radon, and uranium as well as other natural materials can be present in drinking water. Residents, especially with bedrock wells, should be aware of the possibility of water contamination and the availability of testing and remediation. The Committee determined that the risk of natural contaminants is low/medium in Charlestown.

Figure III-3: MAP OF RADON ZONES



Zone 1 counties have a predicted average indoor radon screening level greater than 4 pCI/L (picocuries per liter) (red zones) **Highest Potential**

Zone 2 counties have a predicted average indoor radon screening level between 2 and 4 pCi/L (orange zones) **Moderate Potential**

Zone 3 counties have a predicted average indoor radon screening level less than 2 pCi/L (yellow zones) **Low Potential**

Hazardous Materials Spills

Hazardous materials spills or releases can cause loss of life and damage to property. Short or long-term evacuation of local residents and businesses may be required, depending on the nature and extent of the incident. The spills may occur on-site at hazardous waste generators or in transport through town.

In Charlestown, there are 71 potential hazardous waste generators listed on the NH Department of Environmental Services (DES) "one-stop" list. These are not all active producers at the moment, but they are potential generators at some point in time and have obtained a hazardous waster generator identification number in the past to transport hazardous waste. Although most of these generators are small businesses probably generating little waste, there are larger industries that could be considered large generators. These hazardous materials could be transported to Charlestown as materials for production or fuel and from Charlestown to sites of disposal.

Past Hazardous Waste Spill Events

No known significant spills have occurred in Charlestown.

Potential Future Hazardous Waste Spill Damage

Although there have not been any significant spills in Charlestown, hazardous materials spills could occur along the NH Route 12 or the railroad tracks that run along to Connecticut River. In addition, heating fuel is delivered to homes on many of the town's roads: spills could occur at storage tanks during the filling of the tanks. There conceivably could be spills near any home in Charlestown due to home heating fuel delivery. The property owner is responsible for clean-up. The State oversees these reported spills.

The State did not determine county risk for hazardous waste spills in the *NH Multi-Hazard Mitigation Plan Update 2010*. The Committee determined a hazardous waste spill is a medium risk.

Terrorism

Terrorism has been defined in many ways. The word terrorism is derived from the Latin term "terrere" which means to frighten. Section 802 of the USA Patriot Act expanded the definition of terrorism to cover "domestic," as opposed to international terrorism. A person engages in domestic terrorism if they do an act "dangerous to human life" that is a violation of the criminal laws of a state or

the United States, if the act appears to be intended to: (i) to intimidate or coerce a civilian population; (ii) to influence the policy of a government by intimidation or coercion; or (iii) to affect the conduct of a government by mass destruction, assassination, or kidnapping; and (C) occur primarily within the territorial jurisdiction of the United States."

Past Terrorism Events

There have been no terrorism events within Charlestown in the past.

Future Terrorism Events

Terrorism is not considered a major risk, although vandalism is an occasional problem. The Committee determined that the risk of terrorism is a low/medium risk in Charlestown.

Nuclear

A nuclear spill or melt down can cause significant life loss and disruption of daily life for areas near a nuclear plant. Short and long-term relocation of residents and businesses within the 10 mile radius of a nuclear plant may be required. Charlestown is not within the 10 mile zone of the nuclear power plant in Vernon, VT; however, it is close enough that in the event of a significant incident people may be relocated to Charlestown and Charlestown residents may seek alternate shelter farther from the plant. It is anticipated that Entergy will close their nuclear plant, Vermont Yankee, by the end of 2014.

Past Nuclear Events

There have not been any nuclear events within Charlestown or that have had an impact on Charlestown.

Future Terrorism Events

The committee determined the risk of a nuclear event that would impact Charlestown to be low.

C. HAZARD RISK RATINGS

The Town of Charlestown Hazard Mitigation Committee reviewed each potential hazard and rated the probability of occurrence and vulnerability (cost if the hazard actually occurs) to come up with an overall risk rating. These ratings were reevaluated and changed in 2013. The ratings were based on past occurrences of hazards affecting the State of New Hampshire, Sullivan County, and the Town of Charlestown. The two highest risks in Charlestown were determined to be Flooding and Severe Winter Weather.

Assessing Probability

The process involved assigning a number to each hazard type based on its potential of occurring determined using the committee's knowledge of past events:

1 – Low: may occur less than once in a 25 year period
2 – Medium: may occur once within a 10-25 year period
3 – High: may occur once or more than once within a 10 year period

An n/a score was given if there was insufficient evidence to make a decision. To ensure some balance with a more scientific measurement, the plan also identifies the probability of occurrence from the State Hazard Plan as shown in Table III-10. For comparative purposes the Low rating was given a designation of "1," the Medium rating a designation of "2," and the High rating a designation of "3." These figures are shown in Table III-18 and III-19.

Table III-17: PROBABILITY OF HAZARD

Probability of Hazard Occurring in Sullivan County from State Plan											
Flood	**Dam Failure**	**Drought**	**Wildfire**	**Earth-quake**	**Land-slide**	**Radon**	**Tornado**	**Hurricane**	**Lightning**	**Severe Winter**	**Avalanche**
H	L	M	H	M	M	M	M	M	M	H	L

Assessing Vulnerability

A relative scale of 1 to 3 was used to determine the impact and cost for human death and injury, property losses and damages, and business/agricultural impact: 1 – limited damage and cost; 2 - moderate amount of damage and cost, and 3 – high damage and cost.

Table III-18: VULNERABILITY OF EXISTING DEVELOPED AREAS

Committee Assessment of Vulnerability	Human Impact	Property Impact	Economic Impact	Vulnerability
	Probability of death or injury	Physical losses and damages	Cottage businesses & agriculture	Avg. of human/ property/ business impact
Dam Failure	3	3	3	3
Flooding	2	3	2	2.3
Hurricane	3	3	3	3.0
Tornado & Downburst	2	2	2	2.0
Thunderstorm/Lightning/Hail	1	1	1	1.0
Severe Winter/Ice Storms	2	2	2	2.0
Earthquake	1	1	1	1.0
Drought	1	1	3	1.6
Extreme Heat	1	1	1	1.0
Erosion	1	2	1	1.3
Wildfire	1	2	1	1.3
Natural Contaminants	1	1	1	1.0
HazMat Spills	3	2	2	2.3
Terrorism	3	2	2	2.3
Nuclear	1	1	2	1.3

Assessing Risk

The averages of each vulnerability and probability were multiplied to arrive at the overall risk the hazard has on the community. The overall risk or threat posed by a hazard over the next 25 years was determined to be high, medium, or low.

HIGH**:** There is very strong potential for a disaster of major proportions during the next 25 years; or (2) history suggests the occurrence of multiple disasters of moderate proportions during the next 25 years. The threat is significant enough to warrant major program effort to prepare for, respond to, recover from, and mitigate against this hazard. This hazard should be a major focus of the town's emergency management training and exercise program.

MEDIUM/HIGH: There is strong potential for a disaster of significant proportions during the next 25 years. The threat is significant enough to warrant major program effort to prepare for, respond to, recover from, and mitigate against this hazard. This hazard should be a major focus of the town's emergency management training and exercise program.

MEDIUM: There is moderate potential for a disaster of less than major proportions during the next 25 years. The threat is great enough to warrant modest effort to prepare for, respond to, recover from, and mitigate this hazard. This hazard should be included in the town's emergency management training and exercise program.

MEDIUM/LOW: There is slight potential for disaster in the in the next 25 years. The modest threat warrants modest effort to prepare for, respond to, recover from, and mitigate this hazard. This hazard should be included in the town's emergency management training and exercise program.

LOW**:** There is little potential for a disaster during the next 25 years. The threat is such as to warrant no special effort to prepare for, respond to, recover from, or mitigate this hazard. This hazard need not be specifically addressed in the town's emergency management training and exercise program except as generally dealt with during hazard awareness training.

Table III-13: RISK ASSESSMENT

Risk Assessment 0-1.9 Low 2-3.9 Low/Med 4-5.9 Med 6-7.9 Med-High 8-9 High				
Hazards	**Probability based on Committee Review**	**Vulnerability based on Committee Review**	**Risk Rating (Probability x Vulnerability)**	**Risk**
Dam Failure	1	3	3	Low/Medium
Flooding	3	2.3	6.9	Medium/High
Hurricane	1	3.0	3.0	Low/Medium
Tornado & Downburst	2	2.0	4.0	Medium
Thunderstorm/Lightning/Hail	3	1.0	3.0	Low/Medium
Severe Winter	3	2.0	6.0	Medium/High
Earthquake	1	1.0	1.0	Low
Drought	2	1.6	3.2	Low/Medium
Extreme Heat	2	1.0	2.0	Low/Medium

Risk Assessment 0-1.9 Low 2-3.9 Low/Med 4-5.9 Med 6-7.9 Med-High 8-9 High				
Hazards	**Probability based on Committee Review**	**Vulnerability based on Committee Review**	**Risk Rating (Probability x Vulnerability)**	**Risk**
Erosion	3	1.3	3.9	Low/Medium
Wildfire	3	1.3	3.9	Low/Medium
Natural Contaminants	2	1.0	2.0	Low/Medium
HazMat	2	2.3	4.6	Medium
Terrorism	1	2.3	2.3	Low/Medium
Nuclear	1	1.3	1.3	Low

IV. CRITICAL FACILITIES/LOCATIONS

The Critical Facilities list, identified by the Charlestown Hazard Mitigation Committee, is divided into three categories. The first category contains facilities needed for emergency response in the event of a disaster. The second category contains non-emergency response facilities that are not required in an event, but that are considered essential for the everyday operation of the Town of Charlestown. The third category contains facilities/populations that the Committee wishes to protect in the event of a disaster. Values for all buildings in this document were obtained from town tax records for main structures plus accessory structures for 2012. The equalization to current values is very close to 100%.

Table IV-1: EMERGENCY RESPONSE FACILITIES, SERVICES & STRUCTURES

Critical Facility	**Hazard Vulnerability**	**Replacement Value**
Waste Water Treatment Plant	Flood, Severe Winter Weather, Earthquake	$50,700
Library/Municipal Building	Severe Winter Weather	$505,400
Town Hall	Severe Winter Weather	$445,200
Water and Sewer Department	Severe Winter Weather	unknown

Critical Facility	Hazard Vulnerability	Replacement Value
Fire Department/Police	Severe Winter Weather	$345,400
Highway Department	Severe Winter Weather	$82,800
Sewer Pump Station Old Springfield Road	Severe Winter Weather	unknown
Sewer Pump Station Old Claremont Road	Severe Winter Weather	$45,900
Ambulance – Springfield Road	Severe Winter Weather	$121,100
Bull Run Well	Severe Winter Weather	$12,400
Clay Brook Well	Severe Winter Weather	unknown
North Charlestown Wells	Flood, Severe Winter Weather	unknown
Clay Brook Storage Tank	Flood, Severe Winter Weather	unknown
North Charlestown Tank/Pump Station	Severe Winter Weather	$48,700
Solid Waste Transfer Station	Severe Winter Weather	$45,900
Old Cheshire Toll Bridge (spans Connecticut River)	Flood, Severe Winter Weather	unknown

Table IV-2: NON-EMERGENCY RESPONSE FACILITIES & STRUCTURES

Critical Facility	Hazard Vulnerability	Replacement Value
Clay Brook Dams	Flood, Dam Breach/Failure, Severe Winter Weather	unknown
Hall's Pond Dam	Flood, Dam Breach/Failure, Severe Winter Weather, Earthquake	unknown
Charlestown Primary School	Fixed Hazardous Materials Site, Severe Winter Weather	$1,835,500

Town Pool	Severe Winter Weather	$25,900
Charlestown Middle School	Fixed Hazardous Materials Site, Severe Winter Weather	$1,458,600
Bakery Building	Severe Winter Weather	$147,000
North Charlestown Community School	Fixed Hazardous Materials Site, Severe Winter Weather	$1,057,400
Patch Park	Flood, Severe Winter Weather	unknown
Senior Center	Severe Winter Weather	$210,600
Fort at No. 4 Historic Site	Flood, Severe Winter Weather	$466,100

Table IV-3: FACILITIES & POPULATIONS TO PROTECT

Critical Facility	Hazard Vulnerability	Replacement Value
47 Residences Around AirGas/Irving Gas Bottling; new subdivision with 11 undeveloped lots	Chemical Fire, Fixed Hazardous Materials Site, Severe Winter Weather	unknown
Residences Around Whelen	Chemical Fire, Hazardous Material Site	unknown

V. DETERMINING HOW MUCH WILL BE AFFECTED

A. IDENTIFYING VULNERABLE FACILITIES

It is important to determine which critical facilities and other structures are the most vulnerable and to estimate potential losses. The first step is to identify the facilities most likely to be damaged in a hazard event. To do this, the locations of critical facilities were compared to the location of past and potential hazard events. Facilities and structures located in federally and locally determined flood areas, dam inundation areas, etc. were identified and included in the analysis. There is neither large land areas slated for potential development nor large development projects in the works, so vulnerability of undeveloped land was not analyzed except to note logical future development areas.

Table V-1: VULNERABILITY OF EXISTING DEVELOPED AREAS

Area	Hazard	Critical Facilities	Buildings (residential & non-residential)	Infrastructure	Natural Resources	Total Known Building Value
A and AE Flood Zone	Flooding	None	$1,596,000	Unknown	Unknown	$1,596,000

Table V-2: VULNERABILITY OF POTENTIAL DEVELOPMENT

Area	Hazard	Critical Facilities	Projected Buildings	Projected Infrastructure	Projected Value
Lots around	HazMat	None	N/A	N/A	N/A

B. IDENTIFYING VULNERABLE SPECIAL POPULATIONS

There are a few centers of special populations in town including local elementary schools, the town offices, the town hall during special meetings, and the library. The elderly and physically or mentally impaired residents are also residing throughout the town in their homes.

C. POTENTIAL LOSS ESTIMATES

This section identifies areas in town that are most vulnerable to hazard events and estimates potential losses from these events. It is difficult to ascertain the amount of damage caused by a natural hazard because the damage will depend on the hazard's extent and

severity, making each hazard event quite unique. In addition, human loss of life was not included in the potential loss estimates, but could be expected to occur. FEMA's *Understanding Your Risks: Identifying Hazards and Estimating Losses* (August 2001) was used in estimating loss evaluations. The value of structures was determined by using town records. The Town's tax maps were used to determine number of units within each hazard area. The land damage cost, structure content loss costs, and function loss cost were not determined.

Dam Failure – Low/Medium Risk – Unknown cost

There are is one dams designated as "significant" or "high" hazard potential within Charlestown. Connecticut River dams upstream have a high hazard potential and are in a position to impact Charlestown in the event of dam failure. The municipal sewage lagoons could pose a threat though they have not been categorized as a dam with risk.

Flooding – Medium/High Risk - $447,000 Estimated Cost (not including roads, bridges)

There are approximately 36 homes located within the FEMA designated Special Flood Hazard areas. The total value of the buildings (including residential and non-residential) is $1,596,000. Assuming a 28 % structural damage to the buildings, the damage would total close to $447,000. There are 10 town and state bridges and several sections of road in these flood areas. No value estimate has been done for these structures. No estimate for contents of buildings was done.

Hurricane – Low/Medium Risk – $2.3 Million Estimated Cost

Damage caused by hurricanes can be severe and expensive. Charlestown has been impacted in the past by both wind and flooding damage as a result of hurricanes. The total assessed value of all structures within Charlestown is approximately $230 million. It is random which structures would be impacted and how much. There is no standard loss estimation available and no record of past costs. If 10% of the buildings received 10% damage, the damage cost would be about $2.3 million.

Tornado & Downburst –Medium Risk – No Recorded or Estimated Cost

Tornadoes, downbursts, and microbursts are relatively uncommon natural hazards in New Hampshire, although microbursts in 2007 caused substantial damage. On average, about six tornado events strike each year. In the State of NH, the average annual cost of tornadoes between 1950 and 1995 was $197,000 (The Disaster Center). These wind events occur in specific areas, so calculating potential town-wide losses is difficult. There is no standard loss estimation model available for tornadoes due to their random nature.

Thunderstorm/Lightning/Hail – Low/Medium Risk – No Recorded or Estimated Cost

According to the Federal Alliance for Safe Homes, in an average year, hail causes more than $1.6 billion worth of damage to residential roofs in the United States, making it, year in and year out, one of the most costly natural disasters. Lightning is one of the most underrated severe weather hazards, yet it ranks as the second-leading weather killer in the United States. More deadly than

hurricanes or tornadoes, lightning strikes in America each year killing an average of 73 people and injuring 300 others, according to the National Weather Service. There is no cost estimation model for thunderstorms due to their random nature.

Severe Winter Weather – Medium/High Risk – No Recorded or Estimated Cost
Ice storms often cause widespread power outages by downing power lines, and these storms can also cause severe damage to trees. New England usually experiences at least one or two severe snowstorms, with varying degrees of severity, each year. All of these impacts are a risk to the community and put all residents, especially the elderly, at risk.

According to a study done for the Institute for Catastrophic Loss Reduction (Canada) and the Institute for Business and Home Safety (U.S.), the 1998 Ice Storm inflicted $1.2 billion (U.S.) worth of damage in the U.S. and Canada. In New Hampshire alone, over 67,000 people were without power (http://www.meteo.mcgill.ca/extreme/Research_Paper_No_1.pdf). U.S. average insurance claim was $1,325 for personal property, $1,980 for commercial property, and $1,371 for automobiles.

Earthquake – Low Risk - $7.7 million Estimated Cost if All Buildings Impacted
Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines, and precipitate landslide and flash flood events. Four earthquakes in NH between 1924 and 1989 had a magnitude of 4.2 or more. Two of these occurred in Ossipee, one west of Laconia, and one near the Quebec border. Buildings have not been subject to any seismic design level requirement for construction and would be susceptible to structural damage. The dams, bridges, and roads would be vulnerable to a sizable earthquake event.

FEMA's *Understanding Your Risks: Identifying Hazards and Estimating Costs*, August 2001 provides that an earthquake with a 5% peak ground acceleration (as determined by the US Geologic Survey for the area) could cause damage to single family residences by around 10% of the structural value. If 10% of buildings in Charlestown were impacted by an earthquake, the estimated damage could be around $23 million.

Drought – Low/Medium Risk – No Recorded or Estimated Cost
A long drought would cause damage to crops and dry up wells. There is no cost estimate for this hazard in Charlestown.

Extreme Heat – Low/Medium Risk – No Recorded or Estimated Cost
Excessive heat kills more people in the U.S. than tornadoes, hurricanes, floods, and lightning combined. The elderly, very young, obese and those who work outdoors or have substance abuse problems are most at risk from succumbing to heat. Additionally, people in urban areas are more susceptible as asphalt and cement tend to hold in heat throughout the night (Federal Alliance of Safe Homes website). The costs for this hazard are in terms of human suffering. It is not anticipated that there would be any structural or infrastructure costs.

Erosion – Low/Medium Risk – No Recorded or Estimated Cost
Development on steep slopes can cause substantial erosion in the adjacent area. This can impact the adjacent roads in the area by making them more susceptible to erosion and washout. Construction itself can cause erosion if best management practices are not used to control run-off from disturbed soils, and the rooftops of buildings displace water which would have gone into the ground. This is then exacerbated by the steep slopes where the run-off moves more quickly and can cause more damage**.** There continues to be erosion along the Connecticut River.

Wildfire – Low/Medium Risk – $1,150,000 Estimated Cost
The risk of fire is difficult to predict based on location. Forest fires are more likely to occur during drought years. In addition, areas and structures that are surrounded by dry vegetation that has not been suitably cleared are at high risk. Fire danger is generally universal, however, and can occur practically at any time. Dollar damage would depend on the extent of the fire and the number and type of buildings burned. Since the entire developed area of Charlestown interfaces with forest, all structures are potentially vulnerable to wildfire. The estimated value of all structures in the Town is approximately $230 million. If 1% of the structures received 50% damage, the total estimated cost would be about $1,150,000.

According to the Sullivan County Forester, big wildfires are uncommon in Sullivan County as the weather here is generally not favorable for a high probability of ignition and rapid spread. Additionally, there are enough roads and people in the county that fires are generally spotted and addressed before they are too large. Occasionally weather conditions are more favorable as was seen in the 1950s on Croydon Mountain.

Natural Contaminants – Low/Medium Risk – No Recorded or Estimated Cost

The cost of a radon hazard would be the health of individuals exposed to radon. No cost estimate is provided for this hazard.

Hazardous Material Spills – Medium Risk – No Recorded or Estimated Cost

The cost of a hazardous material spill would depend upon the extent of the spill, the location of the spill in relation to population, structures, infrastructure, and natural resources, as well as the type of hazardous material. The cost of any clean-up would be imposed upon the owner of the material. However, other less tangible costs such as loss of water quality might be borne by the community. No cost estimate has been provided for this possible hazard. Charlestown has a total of 71 Hazardous Waste Generators that currently have an active permit.

Terrorism – Low/Medium Risk – No Recorded or Estimated Cost

The cost of any terrorism event is unpredictable and not estimated in this document. The Committee does not feel that terrorism is a substantial threat in Charlestown

Nuclear – Low Risk – No Recorded or Estimated Cost

The cost of a nuclear event is unpredictable and not estimated in this document. The Committee felt that the risk to Charlestown was low.

VI. EXISTING MITIGATION ACTIONS

A. EXISTING HAZARD MITIGATION PROGRAMS

The following table provides the existing mitigation actions in Charlestown. The fourth or "Effectiveness" column ranks each program as one of the following: "high" – the existing program works as intended and meets its goals; "average" – the existing program works though there is room for improvement; and "low" – the existing program does not work as intended or falls short of its goals. The fifth column lists if there were recommendations for improvement in the previous hazard mitigation plan and if those recommendations were put into action or not and if not, why not. The final column provides either an update of the mitigation action or proposed improvements that are currently being recommended for the future. Any proposed actions or actions to be continued are shown in red and will be shown again in future tables for evaluation, prioritization, and scheduling for implementation.

Table VI-1: EXISTING MITIGATION ACTIONS

Existing Mitigation Action & Description	Hazard Type/Service Area	Responsible Local Agent	Effectiveness (Low, Average, High)	Recommendations in Previous Hazard Mitigation Plan/*Actions Taken to Meet Recommendations or Not Met*	Update/Future Proposed Improvements
National Flood Insurance Program - Provides insurance program for homes in the FEMA determined flood zones or anywhere else	Flooding/Entire Town	Town Administrator/ Selectboard/ Planning Board	Average	Work with FEMA to correct mapping of streams/ DEFERRED as Town Manager contacted FEMA and the change will require much Town time. (Streams from NFIP map do not match town maps and flood zones are across road from stream)	Continue enforcing the existing floodplain ordinance; add information about NFIP to education program (See Education Program below); work with FEMA to correct mapping of streams-see floodplain ordinance action below.
Conservation Fund – The Conservation Commission has a fund for land protection	Multi-Hazards/ Entire Town	Conservation Commission	Low	No recommendations in previous plan	Continue to watch for available properties within hazard areas and Drinking Water Protection districts
NH Shoreland Protection Act – A program to protect within 200' of water bodies of 10 acres or more and 4th order streams.	Flooding & Erosion/ Entire Town	NH DES; Planning Board	Average	No recommendations in previous plan	Continue to review proposed land development and subdivisions considering Act

Existing Mitigation Action & Description	Hazard Type/Service Area	Responsible Local Agent	Effectiveness (Low, Average, High)	Recommendations in Previous Hazard Mitigation Plan/*Actions Taken to Meet Recommendations or Not Met*	Update/Future Proposed Improvements
Winter Highway Operations – Town Highway Department policies of plowing priority roads for school buses and evacuation routes.	Severe Winter Weather/ Entire Town	Highway Agent	High	No recommendations in previous plan	Continue to evaluate roads for priority of maintenance during the winter
Storm Water Drainage – Replace storm drain lines to prevent flooding and wet areas; NH DOT finished Main St and Town finished Depot St in 2013	Flooding/ Downtown	Town Administrator/ NHDOT	High	Perform an initial study of the storm water system in the downtown area to mitigate the potential for flooding. / *A portion of the study has been COMPLETED.*	Replace smaller pipe under RR crossing on RR Street as this is a inefficient pinch point to prevent flooding; continue assessing east side of village and repairing as need found
Town Master Plan - Most recent version is 2007; provides a vision for the town with goals to achieve that vision	All Hazards/Entire Town	Planning Board	Average	No recommendations in the previous plan	Refer to the Hazard Mitigation Plan and Local Emergency Operations Plan in the Master Plan.
Drinking Water Protection Ordinance – Protects municipal areas around three municipal wells; drought requirements	Contamination & Drought/ Entire Town	Planning Board and Zoning Adm.	Average	No recommendations in the previous plan	Continue to implement ordinance
HazMat Prevention	HazMat Spills/Entire Town	EMD	Average	Prevent a hazardous materials spill from affecting developed areas along the railroad by placing stricter controls for development along the railroad. / DELETED as no political support.	No plans for further action.
Railroad HazMat Prevention	HazMat Spills/Entire Town	EMD	Average	Place gates at all railroad crossings to prevent the derailment of railway cars carrying hazardous materials. / DELETED: *No actions taken as it is not within the town's control.*	The gates are still desired by town officials but they are not within municipal control.
Conservation Commission – Advise Town Boards about conservation concerns & review State wetland applications	Flooding, Erosion/Entire Town	Conservation Commission	Average	No recommendations in previous plan	Continue to advise boards and review wetlands applications

Existing Mitigation Action & Description	Hazard Type/Service Area	Responsible Local Agent	Effectiveness (Low, Average, High)	Recommendations in Previous Hazard Mitigation Plan/*Actions Taken to Meet Recommendations or Not Met*	Update/Future Proposed Improvements
Zoning Ordinance – Regulates land use and provides watershed protection	All Hazards/Entire Town	Planning Board	Average.	Establish a steep slopes ordinance to protect new structures from areas of potential landslides. / *DEFERRED as no support.*	Continue to work on establishing a steep slope ordinance.
Floodplain Ordinance – Restricts floodplain development	Flooding, Erosion/Entire Town	Planning Board	Average	Implement stricter floodplain regulations to mitigate flooding effects on new development. Insure FEMA stream maps are correct in locating streams. / *DEFERRED*: *No action taken due to poor quality of maps*.	Implement stricter floodplain regulations when the map quality improves. Lobby for better floodplain mapping for the region.
Subdivision Regulations – Regulates division of land	Flooding, Erosion/Entire Town	Planning Board	Average	No recommendations in previous plan	Evaluate subdivision regulations for incorporation of hazard mitigation strategies
Site Plan Review Regulations – regulates non-residential and multi-family development	Flooding, Erosion/Entire Town	Planning Board	Average	No recommendations in previous plan	Evaluate site plan review regulations for incorporation of hazard mitigation strategies
Driveway Permitting – Evaluate curb cuts on town roads for culvert needs and sight distance	Erosion/Entire Town	Highway Agent	Average	No recommendations in previous plan	Continue to require permits for driveway curb cuts.
Building Code Standards – State residential and non-residential building codes	Earthquake, Wind Events/Entire Town	Planning Board	Average	Update building codes to protect structures against powerful wind gusts associated with hurricanes, and against the infrequent event of a small earthquake. / DELETED: *Not necessary due to adoption of the state building code.*	Continue to follow the state building code which provides for earthquake, wind event, and snow load mitigation..
Hazard tree trimming - Program for cutting hazardous branches and trees as necessary;	Wind & Winter Events/Entire Town	Highway Department	High	No recommendations in previous plan. Only a comment that utility companies not responsive.	Continue to address hazard tree trimming as needed.

Existing Mitigation Action & Description	Hazard Type/Service Area	Responsible Local Agent	Effectiveness (Low, Average, High)	Recommendations in Previous Hazard Mitigation Plan/*Actions Taken to Meet Recommendations or Not Met*	Update/Future Proposed Improvements
Ice Jam – Perform Ice Jam Study	Ice Jam/Along Connecticut River	Planning Board & Town Administrator	Low	Hire CRREL to perform ice jam study to prevent flooding along river. / *DEFERRED due to lack of resources.*	No action recommended in the future.
Public Education & Outreach – hazard preparation and mitigation	All hazards/Entire Town	Town Administrator	Average	Start a hazard mitigation column in the Charlestown newspaper, "Our Town". / COMPLETED: *Have written articles.*	Continue to write articles in "Our Town." Provide program as provided in following table.
Road & Bridge Improvements - Mitigate problem areas to prevent substantial future damage from natural hazards	Flooding & Erosion/Entire Town	Highway Supt.	Average	Conduct a town wide culvert inventory to determine the condition of the culverts, and their ability to adequately carry water under roads and bridges. / *COMPLETED map inventory in 2011*	Keep culvert inventory database current.
				Replace 10' culvert on Fling Road with 24' bridge/COMPLETED 2012	Remove from next update.
				Replace Pecor Road two pipe set with a single culvert to upgrade capacity /COMPLETED *received grant in 2014*	Received grant and will do construction this year. Remove from next update.
				This project not in previous plan.	Replace 10' multi plate steel culvert on Cheshire Turnpike.
				This project not in previous plan.	Replacement of Borough Road Bridge that is currently on the State's Red List.
				This project not in previous plan.	Completion of Route 12 reconstruction project to reduce HazMat spill potential and erosion.

The Town of Charlestown will provide a public education and outreach program by using brochures and the town website to reach their citizens. There will also be one-on-one outreach as appropriate. Below is a table showing the potential topics and outreach methods. Dam failure is not included as this is performed by the State Dam bureau in their assessment of all dams in the State. Landslide is also not included as there is only one possible site in town.

Table VI-2: PUBLIC EDUCATION AND OUTREACH TOPICS

Natural Hazard	Educational Topics	Outreach Methods
Multi-Hazard	Shelters; evacuation routes; proper evacuation procedures; emergency kits and family plans	Town web site Town meeting display
Flooding	National Flood Insurance Program participation; building in a floodplain; stormwater runoff; driving on flooded roads; protecting natural systems which provide flood mitigation; securing property items such as propane tanks prior to a flood	Town web site Brochures
Wind Events (Hurricane, Tornado, Downburst	Wind retrofits such as shutters, hurricane clips; school and town official sheltering basics; resident and business sheltering basics; window coverings	Town web site
Severe Winter Weather	Installation of carbon monoxide monitor and alarms; ventilation of fuel-burning equipment; protecting water pipes	Town web site
Thunderstorms/Lightning/Hail	Taking cover; staying inside when it thunders	Town web site
Earthquake	Structural and non-structural home retrofitting; securing furnishings	Town web site
Drought	Water-saving measures; crop insurance; soil and water conservation practices by farmers	Town web site
Extreme Heat	Preparing for extreme heat; air conditioning; cooling shelters	Town web site
Erosion	High risk areas; stormwater management; bank stabilization; water body buffers	Town web site
Wildfire	Most vulnerable areas; reducing fuel for fires such as dry brush	Town web site; Fire Department and Fire Warden interactions
Natural Contaminants	Testing for contaminants in air and water	Town web site
Hazardous Materials Spills	What to do if there's a fuel delivery spill	Town web site

B. NEW MITIGATION PROGRAMS

The Committee evaluated the existing programs and proposed improvements to determine if they were addressing all the hazards they felt could impact the town. Table VII-3 summarizes this evaluation and notes where new programs could be implemented to address all hazards.

Table VI-3: Committee Assessment for New Hazard Mitigation Actions

Hazard	Committee Ideas and Assessment
Drought	Connect two separate water systems to ensure continuous water supply; water & sewer emergency operations plans. Water Ordinance provides rationing restrictions during low water. A new well was recently drilled to provide greater water capacity.
Earthquake & Severe Wind	For earthquake and major wind events, the Town already has the State building codes which take these events into account. The Committee did not feel they could adopt more stringent requirements since these events are so rare. Consideration was given to requiring burying utility lines, but it was determined to be too expensive.
Erosion	Road maintenance and upgrades; Subdivision and Site Plan Review regulations address stormwater; Driveway Regulations assure proper culvert size; culvert inventory to assure proper culvert size throughout town
Extreme Temperatures	Currently have no air conditioned facilities in Town; may install AC in community room in Silsby Library/Municipal Building
Flood	NFIP member; adopted Flood Plain Ordinance; working toward improving floodplain maps
Thunderstorms, Lightning and Hail	There have been a few major lightning strikes in town, and the Committee would like to evaluate potential mitigation strategies for the school and town facilities to prevent further damage by lightning.
Severe Winter Weather	The Town does its best to maintain the roads in winter to keep them clear of snow and debris. The Town already has adopted the State's International Building Code and International Residential Code which are enforced by the Building Inspector. The Town provides shelters during major storms and power outages.
Wildfire	There have been a couple instances of campfires starting or potentially starting wildfires. The Committee evaluated the possibility of regulations to keep people from building in wildland-urban interface, but this did not seem appropriate for such a rural town, and again, new regulations are not going to be supported. The Committee felt this could be addressed in the education program they have implemented. Fire Department has sign to show daily fire danger.

Table VI-4 provides a list of proposed new mitigation actions including ones that had been proposed in the previous plan. If these actions had not been accomplished since the last plan, then there is an explanation, however, all mitigation actions are new.

Table VI-4: PROPOSED NEW MITIGATION ACTIONS

Proposed New Mitigation Action Description	Hazard Type/Service Area	Responsible Local Agent	If Recommended in Previous Plan, why was it not put into place?
Water & Sewer – Update Emergency Action Plans for each well system in the next 5 years.	Drought, Lightning, Contamination/Entire Town	Water & Sewer Supt.	Was not in previous plan.
Water System – Connect the two water systems to each other for reliability	Flooding & Drought/Entire Town	Water & Sewer Supt.	Was not in previous plan.
Cooling Shelter – Install air conditioner in community room	Extreme Heat	Town Administrator	Was not in previous plan
Lightning Mitigation Evaluation – Evaluate lightning mitigation strategies such as grounding and surge protection for the school and other town buildings & facilities	Lightning	Transfer Station Superintendent; Water & Sewer Superintendent; Building Inspector	Was not in previous plan

C. CRITICAL EVALUATION FOR IMPROVEMENTS TO EXISTING PROGRAMS AND NEW PROGRAMS

The Charlestown Hazard Mitigation Committee reviewed each of the proposed improvements to existing programs and proposed new programs identified for existing mitigation programs using the following factors:

- Does it reduce disaster damage?
- Does it contribute to community objectives?
- Does it meet existing regulations?
- Can it be quickly implemented?
- Is it socially acceptable?
- Is it technically feasible?
- Is it administratively possible?
- Does the action offer reasonable benefits compared to cost of implementation?

Each mitigation strategy was evaluated and assigned a score (High – 3; Average – 2; and Low – 1) based on the criteria.

The Charlestown Hazard Mitigation Committee assigned the following scores to each strategy for its effectiveness related to the critical evaluation factors listed above, and actions had the following scores, with the highest scores suggesting the highest priority. These scores are re-evaluated during each update process for new and existing strategies.

Table VI-5: PRIORITIZING EXISTING AND PROPOSED MITIGATION STRATEGY IMPROVEMENTS

Rank	Strategy Improvement	Hazard	Reduce Damage	Community Objectives	Existing Regulations	Quickly Implemented	Socially Acceptable	Technically Feasible	Administration Possible	Benefit - Cost	TOTAL SCORE	Mitigate Existing or New Development or Both
1	**Public Education and Outreach Program**	All Hazards	3	3	3	3	3	3	3	3	24	Both
1	**Water & Sewer –** Update Emergency Action Plans for each well system	Drought, Flooding, Contamination	3	3	3	3	3	3	3	3	24	Both
1	**NH Route 12** – complete NH Route 12 reconstruction	Flooding & Erosion	3	3	3	3	3	3	3	3	24	Both
1	**Cheshire Turnpike** – Upgrade 10' multi plate steel culvert	Flooding & Erosion	3	3	3	3	3	3	3	3	24	Both
1	**Winter Highway Operations -** Continue to evaluate roads for priority of maintenance during the winter	Severe Winter Weather	3	3	3	3	3	3	3	3	24	Both
1	**Drinking Water Protection Ordinance** - Continue to implement ordinance	Drought, Contamination, Flooding	3	3	3	3	3	3	3	3	24	Both
1	**Driveway Permitting** - Continue to require permits for driveway curb cuts.	Erosion	3	3	3	3	3	3	3	3	24	New
1	**Building Code Standards** - Continue to follow the state building code which provides for earthquake, wind event, and snow load mitigation.	Wind Events, Earthquakes, Flooding	3	3	3	3	3	3	3	3	24	New
2	**Cooling Shelter –** Install air conditioner in community room	Extreme Heat	3	3	3	3	3	3	2	3	23	Both
2	**Water System – Connect the two water systems together**	Drought	3	3	3	3	2	3	3	3	23	Both
2	**Hazard Tree Trimming** - Continue to address hazard tree trimming as needed.	Severe Winter Weather	2	3	3	3	3	3	3	3	23	Both
2	**NH Shoreland Protection Act** - Continue to review proposed land development and subdivisions considering Act	Flooding & Erosion	2	3	3	3	3	3	3	3	23	Both
2	**Storm Water Drainage –** Upgrade RR crossing pipe	Flooding	3	3	3	2	3	3	3	3	23	Both
3	**Lightning Mitigation Evaluation –** Evaluate lightning mitigation strategies such as grounding and surge protection for the school and other town buildings & facilities	Lightning	1	3	3	3	3	3	3	3	22	Both
3	**NFIP** –Work with FEMA to correct maps	Flooding	3	3	3	1	3	3	3	3	22	Both

Rank	Strategy Improvement	Hazard	Reduce Damage	Community Objectives	Existing Regulations	Quickly Implemented	Socially Acceptable	Technically Feasible	Administration Possible	Benefit - Cost	TOTAL SCORE	Mitigate Existing or New Development or Both
3	**Conservation Commission** - Continue to advise boards and review wetlands applications	Flooding & Erosion	1	3	3	3	3	3	3	3	22	Both
4	**Borough Road Bridge –** Upgrade the bridge; currently on red list.	Flooding & Erosion	2	3	3	1	3	3	3	3	21	Both
4	**Subdivision Regulations** - Evaluate subdivision regulations for incorporation of hazard mitigation strategies	All Hazards	1	3	3	2	3	3	3	3	21	New
4	**Site Plan Review Regulations** - Evaluate site plan review regulations for incorporation of hazard mitigation strategies	All Hazards	1	3	3	2	3	3	3	3	21	New
5	**Conservation Fund** - Continue to watch for available properties within hazard areas and Drinking Water Protection districts	Flooding & Erosion; Contamination	2	3	3	3	3	3	1	3	20	Both
6	**Town Master Plan** – Incorporate Hazard Mitigation Plan into Master Plan.	All Hazards	2	3	2	1	3	3	2	3	19	Both
6	**Zoning Ordinance** – Update ordinance to establish steep slope district	Erosion	3	3	1	1	2	3	3	3	19	New
7	**Floodplain Ordinance** – Implement more strict regulations when the floodplain map quality improves.	Flooding	3	3	3	1	1	1	2	3	17	Both
8	**Culvert Inventory** – Keep the culvert inventory database up to date, training personnel to use database	Flooding & Erosion	1	1	2	2	3	1	2	3	15	Both

D. EMERGENCY PREPAREDNESS ACTIONS

Although this is a hazard mitigation plan, the Committee felt it was important to address new and proposed emergency preparedness actions. It is sometimes difficult to distinguish between hazard mitigation and emergency preparedness. Essentially, emergency preparedness is the preparation to act once a hazard has occurred. And as has been discussed previously, hazard mitigation includes actions to eliminate or reduce hazards before they happen. Table VI-7 below is a list of the emergency preparedness actions that the Committee felt should be addressed and included in this plan.

Table VI-6: EMERGENCY PREPAREDNESS ACTIONS

Existing Emergency Preparedness Action & Description	Type/Service Area	Responsible Local Agent	Effectiveness (Low, Average, High)	Recommendations in Previous Hazard Mitigation Plan/*Actions Taken to Meet Recommendations or Not Met*	Update/Future Proposed Improvements
Local Emergency Operations Plan - Most recent version is 2011; Describes the preparation and response necessary for the Town to address emergency situations	Emergency Preparedness/ Entire Town	EMD & Assistant EMD	High	No recommendation in the previous plan.	Update the plan in 2015
Charlestown School(s) Emergency Plan – Addresses hazards, deficiencies, evacuation, relocation, drills, lockdown	Emergency Preaparedness/ Charlestown Schools	EMD & School Administration	High	No recommendation in the previous plan.	Continue to work with the schools for safety drills and update the school emergency plans.
Emergency Shelter – Schools and Senior Center	Emergency Preparedness/ Entire Town	EMD	Average	Acquire generators for the schools and senior center to provide citizens of Charlestown with shelter in the event of a severe winter storm resulting in a power outage. / DEFERRED: w*as not completed due to lack of resources.*	Continue to work on obtaining the needed resources to acquire generators.
Haz/Mat Program – Provides emergency response to hazardous materials spills; Member of Southwest Fire Mutual Aid	Emergency Preparedness/ Entire Town	EMD & Fire Chief	High	Not in previous plan	Continue to participate in mutual aid agreement with Southwest Mutual Aid.
Charlestown Fire Department – Participate in ongoing training	Emergency Preparedness/ Entire Town	Fire Chief	High	Continue training fire personnel in the use of Sullivan County's hazardous materials clean-up trailer provided through a grant from Homeland Security. / COMPLETED *The department has participated in ongoing training.*	Continue to utilize trainings for the fire department.

Existing Emergency Preparedness Action & Description	Type/Service Area	Responsible Local Agent	Effectiveness (Low, Average, High)	Recommendations in Previous Hazard Mitigation Plan/*Actions Taken to Meet Recommendations or Not Met*	Update/Future Proposed Improvements
Mutual Aid – Police – Agreement among municipal police departments to provide assistance as needed	Emergency Preparedness/ Entire town	Police Chief	High	No recommendations in previous plan.	Continue to participate in the mutual aid program with all surrounding towns and Sullivan County.
Mutual Aid – Fire – Agreement with Southwestern Fire Mutual Aid	Emergency Preparedness/ Entire Town	Fire Chief	High	No recommendations in previous plan.	Continue to participate in the mutual aid program; evaluating alternative dispatch options.
Dam Emergency Action Plans – Plans to show inundation areas if dam were to fail	Emergency Preparedness/ Entire Town	Private owners and Water Superintendent for Town dams	Average	No recommendations in previous plan	Continue to evaluate dams; have breached several dams which are not needed
Emergency Communication – emergency dispatch serves the Town	Emergency Preparedness/ Entire town	Police Chief	High	Improve all emergency services communication by placing a repeater on the cell tower on Birch Drive. / COMPLETED 2013	Build communications tower with repeaters at the highest point in town.
Mutual Aid – Roads - Member of NH mutual aid.	Emergency Preparedness/ Entire Town	Highway Supt.	Average	No recommendations in previous plan.	Continue mutual aid membership.
Communications – Radio between municipal vehicles	Emergency Preparedness/ Entire Town	Selectboard, Hwy Agent, Fire Chief, Police Chief	Low	No recommendations in previous plan.	The water and sewer departments need upgraded system to be on the same network as highway and public safety.
Class VI Road Policy – Provides emergency personnel access to remote areas of town No subdivision allowed	Emergency Preparedness/ Entire town	Planning Board	Average	Not in previous plan.	Continue with the policy.

VII. PRIORITIZED IMPLEMENTATION SCHEDULE

The Charlestown Hazard Mitigation Committee created the following action plan for implementation of priority mitigation strategies:

The timeframe's for project completion are defined as:

SHORT TERM: 1 years or less, or ongoing
MEDIUM TERM: 2-3 years
LONG TERM: 4-5 years

Table VII-1: PRIORITIZED IMPLEMENTATION SCHEDULE FOR NEW & EXISTING PROGRAM IMPROVEMENTS

Location: Mitigation Action	Who (Leadership)	When	How (Funding Sources)	Cost (Estimated)
Public Education and Outreach Program – Expand program	Town Administrator\ EMD	Short Term	NA	$0 – Staff Time
Water & Sewer – Update Emergency Action Plans for each well system	Water & Wastewater Superintendent	Medium Term	NA	$0 – Staff Time
NH Route 12 – complete NH Route 12 reconstruction	NH DOT /Town Administrator/Highway Supt.	Medium Term	State/Federal Grants (DOT)	$18,189,000
Cheshire Turnpike – Upgrade 10' multi plate steel culvert	Highway Supt.	Long Term	Hazard Mitigation Assistance Grants	$250,000
Winter Highway Operations - Continue to evaluate roads for priority of maintenance during the winter	Highway Superintendent	Ongoing throughout the life of the plan	Taxes	$0 – Staff Time

Location: Mitigation Action	Who (Leadership)	When	How (Funding Sources)	Cost (Estimated)
Drinking Water Protection Ordinance - Continue to implement ordinance	Planning & Zoning Administrator	Ongoing throughout the life of the plan	Taxes	$0 – Staff Time
Driveway Permitting - Continue to require permits for driveway curb cuts.	Highway Superintendent	Ongoing throughout the life of the plan	Taxes	$0 – Staff Time
Building Code Standards - Continue to follow the state building code which provides for earthquake, wind event, and snow load mitigation.	Building Inspector	Ongoing throughout the life of the plan	Taxes	$0 – Staff Time
Cooling Shelter – Install air conditioner in community room	Town Administrator	Short Term	Taxes/ Grant from Sullivan Country Nutrition Program	$6,000
Water System – Connect the two water systems together	Water & Wastewater Superintendent/Water Commissioners	Long term	Taxes/USDA grant	Needs bid
Hazard Tree Trimming - Continue to address hazard tree trimming as needed.	Highway Superintendent	Ongoing throughout the life of the plan	Taxes	$0 – Staff Time; $4,500 contractor
NH Shoreland Protection Act - Continue to review proposed land development and subdivisions considering Act	Planning & Zoning Administrator	Ongoing throughout the life of the plan	Taxes	$0 – Staff Time
Storm Water Drainage – Upgrade RR crossing pipe	Highway Superintendent	Short Term	Taxes	$115,000
Lightning Mitigation Evaluation – Evaluate lightning mitigation strategies such as grounding and surge protection for the school and other town buildings & facilities	Transfer Station Superintendent; Water & Wastewater Superintendent; Building Inspector	Short Term	Taxes	$0 – Staff Time

Location: Mitigation Action	Who (Leadership)	When	How (Funding Sources)	Cost (Estimated)
NFIP –Work with FEMA to correct maps	Planning & Zoning Administrator	Long Term	Taxes	$0 – Staff Time
Conservation Commission - Continue to advise boards and review wetlands applications	Conservation Commission Chair	Ongoing throughout the life of the plan	NA	$0 – Commission Member Time
Borough Road Bridge – Upgrade the bridge; currently on red list.	Highway Supt.	Medium Term	Taxes/ State Aid Bridge (DOT)	$200,000
Subdivision Regulations - Evaluate subdivision regulations for incorporation of hazard mitigation strategies	Planning Board/ Planning & Zoning Administrator	Short Term	Taxes	$0 – Staff Time; Planning Board Members
Site Plan Review Regulations - Evaluate site plan review regulations for incorporation of hazard mitigation strategies	Planning Board/ Planning & Zoning Administrator	Short Term	Taxes	$0 – Staff Time; Planning Board Members
Conservation Fund - Continue to watch for available properties within hazard areas and Drinking Water Protection districts	Conservation Commission; Water & Wastewater Superintendent	Ongoing throughout the life of the plan	Taxes/ Dedicated Conservation Fund	Depends on property value
Town Master Plan – Incorporate Hazard Mitigation Plan into Master Plan.	Planning Board	Medium Term	Taxes/Volunteer Time	$0 - Volunteer Time
Zoning Ordinance – Update ordinance to establish steep slope district	Planning Board/ Planning & Zoning Administrator	Short Term	Taxes	$0 – Staff Time; Planning Board Members
Floodplain Ordinance – Implement more strict regulations when the floodplain map quality improves.	Planning Board	Unknown (dependent on filing paperwork with FEMA)	Taxes	$0 - Volunteer and Staff Time

Location: Mitigation Action	Who (Leadership)	When	How (Funding Sources)	Cost (Estimated)
Culvert Inventory – Keep the culvert inventory database up to date; and train personnel to use database.	Highway Supt.	Ongoing throughout the life of the plan	Highway Budget	$0 - Staff Time
Water & Sewer – Update Emergency Action Plans for each well system in the next 5 years.	Water and Sewer Supt.	Short Term	Water and Sewer Rate Payers	$3,000
Water System – Connect the two water systems to each other.	Water Supt.	Medium Term	Water and Sewer Rate Payers and USDA Grant	$500,000 - $750,000

VIII. ADOPTION & IMPLEMENTATION OF THE PLAN

A good plan needs to provide for periodic monitoring and evaluation of its successes and challenges, and to allow for updates of the Plan where necessary. In order to track progress and update the Mitigation Strategies identified in the Plan, the Town of Charlestown will revisit the Hazard Mitigation Plan *annually, or within 90 days of a hazard event*. The Charlestown Emergency Management Director will initiate this review and should consult with the Hazard Mitigation Committee. Changes will be made to the plan to accommodate for projects that have failed, or that are not considered feasible after a review for their consistency with the evaluation criteria, the timeframe, the community's priorities, and funding resources. Priorities that were not ranked highest, but that were identified as potential mitigation strategies, will be reviewed as well during the monitoring and update of this plan, to determine feasibility for future implementation. Previously, the review of the Hazard Mitigation Plan following a disaster has not been formally completed; however, it has been used as a resource to shift infrastructure priorities following storm events. The plan will be updated and submitted for FEMA approval at a minimum every five years as required by the Disaster Mitigation Act 2000.

A. IMPLEMENTATION THROUGH EXISTING PROGRAMS

Many municipalities have web sites where they can share information about hazard mitigation and emergency management. The use of the web site by its citizens is often dictated by the availability of broadband service to easily access the web. The Town of Charlestown has provided a link to the Regional Planning Commission's web page, "A Citizen's Guide to Hazard Mitigation and Emergency Management."

Municipalities have documents to convey town goals and objectives that are used to guide future programs. They can be used to promote and implement hazard mitigation. A Municipal Master Plan outlines how the community wants to grow and develop. It includes overall goals and objectives of the community and recommendations for ordinances and regulations to accomplish those goals. A zoning ordinance is a common vehicle to implement goals of the master plan and regulates land use. It can be used to restrict development in flood zones, steep sloped areas, buffer zones around wetlands and water bodies, drinking water recharge areas, hillsides, and ridgelines. These areas may be "overlay districts" mapped out for protection. A zoning ordinance can also require best management practices in forestry and timber harvesting and stormwater management to prevent erosion. A floodplain management plan is part of the zoning ordinance and has typically followed a format recommended by the NH Flood Management Program.

Other municipal documents include regulations such as Curb Cut Regulations, Excavation Regulations, Subdivision Regulations and Site Plan Review Regulations. Curb Cut Regulations are used to make sure the culverts at the intersection of driveways and roads are adequate to handle runoff water or stream flow. Excavation Regulations are used to restrict the removal of earth including distance to

seasonal high water table and the requirements to restore the site once the excavation is completed. This is essential to make sure the area is graded and re-vegetated to reduce the chances of erosion. Subdivision Regulations determine how lots are to be laid out in a subdivision. This might include requirements for fire protection, stormwater runoff management, vegetated buffers, and reference back to the zoning ordinance. Site Plan Review Regulations are for multi-family housing and commercial development. Again, these regulations refer back to the zoning ordinance. The regulations can determine site specific development requirements such as parking, open space, vegetated buffers, and traffic flow.

Subdivision Regulations and Site Plan Review Regulations typically refer back to the Zoning Ordinance, so it may be more effective to amend the zoning ordinance to address hazard mitigation through specific restrictions though this can vary by municipality.

Another important municipal document is the Capital Improvements Program which is a "budget of the future" to consider potential capital expenditures such as new roads, equipment, schools, parks. This allows a systematic evaluation of potential projects. Any capital expenditures related to hazard mitigation will be incorporated into this document.

There are other regulations and ordinances that municipalities may adopt such as to regulate water use during a drought or restrict development in areas around drinking water sources. This all varies by municipality.

It should also be noted that many municipalities do not update these documents very often, and some towns do not have them at all. However, where they exist, they offer the potential to include hazard mitigation and emergency management topics.

In Charlestown, the most recent version of the Master Plan is 2007, the latest version of Subdivision Regulations is 2003, the most recent Site Plan Review Regulations is 1999, and the Zoning Ordinance is 2010. The most critical documents to reference hazard mitigation are primarily the master plan and the zoning ordinance. Since Charlestown has not updated their Master Plan in many years, this addition of Hazard Mitigation remains a proposal for the future. The Zoning Ordinance was amended in 2010 to include lot size averaging to provide more open space during a subdivision. The town will continue to evaluate its documents to include hazard mitigation.

B. CONTINUED PUBLIC INVOLVEMENT

The public will continue to be invited to participate in the hazard mitigation planning process. In future years, a public meeting will be held (separate from the adoption hearing) to inform and educate members of the public. It is hoped that a separate meeting discussing hazard mitigation and emergency management will create more interest in the process. Additionally, a press release to local newspapers (to be published at their discretion) and information will be posted on the Town website and on the three bulletin boards.

Copies of the Hazard Mitigation Plan will be shared with the following parties for reference:

- Select Board Offices in neighboring towns
- NH Homeland Security & Emergency Management
- Charlestown Select Board
- Charlestown Conservation Commission
- Charlestown Planning Board
- Upper Valley Lake Sunapee Regional Planning Commission

RESOURCES USED IN THE PREPARATION OF THIS PLAN

FEMA *Multi-Hazard Mitigation Planning Guidance Under the Disaster Mitigation Act of 2000*, March 2004, Last Revised June 2007

FEMA 386-1 *Getting Started: Building Support for Mitigation Planning*, September 2002

FEMA 386-2 *Understanding Your Risks: Identifying Hazards and Estimating Costs*, August 2001

FEMA 386-3 *Developing the Mitigation Plan: Identifying Mitigation Actions and Implementation Strategies*, April 2003

Ice Storm '98 by Eugene L. Lecomte et al for the Institute for Catastrophic Loss Reduction (Canada) and the Institute for Business & Home Safety (U.S.), December 1998

Town of Charlestown Emergency Operations Plan, 2011

Town of Charlestown Master Plan, 2007

NH HSEM's *State of New Hampshire Multi-Hazard Mitigation Plan 2010 and Update 2013*

www.fema.gov/news/disasters.fema: Website for FEMA's Disaster List
www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms: Website for National Oceanic & Atmospheric Administration Disaster List

www.tornadoproject.com: Website for The Tornado Project

www.crrel.usace.army.mil/: Website for Cold Regions Research and Engineering Laboratory Website (CRREL)

www.nesec.org: Website for Northeast States Emergency Consortium

http://earthquake.usgs.gov/research/hazmaps/products_data/2002/ceus2002.php: Website for area earthquake information

APPENDICES

Appendix A: **Technical Resources**

Appendix B: **Hazard Mitigation Assistance Grants**

Appendix C: **Meeting Documentation**

Appendix D: **Map of Hazard Areas and Critical Facilities**

Appendix E: **Town Adoption & FEMA Approvals of Hazard Mitigation Plan**

APPENDIX A:

Technical Resources

APPENDIX A: TECHNICAL RESOURCES

1) Agencies

New Hampshire Homeland Security and Emergency Management
Hazard Mitigation Section 271-2231
Federal Emergency Management Agency ..... (617) 223-4175
NH Regional Planning Commissions:
Upper Valley Lake Sunapee Regional Planning Commission 448-1680
NH Executive Department:
Governor's Office of Energy and Community Services 271-2611
New Hampshire Office of State Planning 271-2155
NH Department of Cultural Affairs: 271-2540
Division of Historical Resources 271-3483
NH Department of Environmental Services: 271-3503
Air Resources 271-1370
Waste Management 271-2900
Water Resources 271-3406
Water Supply and Pollution Control 271-3504
Rivers Management and Protection Program 271-1152
NH Office of Energy and Planning 271-2155
NH Municipal Association 224-7447
NH Fish and Game Department 271-3421
NH Department of Resources and Economic Development: 271-2411
Natural Heritage Inventory 271-3623
Division of Forests and Lands 271-2214
Division of Parks and Recreation 271-3255
NH Department of Transportation 271-3734
Northeast States Emergency Consortium, Inc. (NESEC) ..... (781) 224-9876
US Department of Commerce:
National Oceanic and Atmospheric Administration:
National Weather Service; Gray, Maine 207-688-3216

US Department of the Interior:
US Fish and Wildlife Service 225-1411
US Geological Survey 225-4681
US Army Corps of Engineers ..... (978) 318-8087
US Department of Agriculture:
Natural Resource Conservation Service 868-7581

2) Mitigation Funding Resources

404 Hazard Mitigation Grant Program (HMGP) ..... NH Homeland Security and Emergency Management
406 Public Assistance and Hazard Mitigation ..... NH Homeland Security and 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 Homeland Security and Emergency Management
Emergency Generators Program by NESEC‡ ..... NH Homeland Security and Emergency Management
Emergency Watershed Protection (EWP) Program ..... USDA, Natural Resources Conservation Service
Flood Mitigation Assistance Program (FMAP) ..... NH Homeland Security and Emergency Management
Flood Plain Management Services (FPMS) ..... US Army Corps of Engineers
Mitigation Assistance Planning (MAP) ..... NH Homeland Security and Emergency Management
Mutual Aid for Public Works ..... NH Municipal Association
National Flood Insurance Program (NFIP) † ..... NH Office of Energy and Planning
Power of Prevention Grant by NESEC‡ ..... NH Homeland Security and Emergency Management
Project Impact ..... NH Homeland Security and Emergency Management
Roadway Repair & Maintenance Program(s) ..... NH Department of Transportation
Section 14 Emergency Stream Bank Erosion & Shoreline Protection ..... US Army Corps of Engineers
Section 103 Beach Erosion ..... US Army Corps of Engineers
Section 205 Flood Damage Reduction ..... US Army Corps of Engineers
Section 208 Snagging and Clearing ..... US Army Corps of Engineers
Shoreland Protection Program ..... NH Department of Environmental Services
Various Forest and Lands Program(s) ..... NH Department of Resources and Economic Development
Wetlands Programs ..... NH Department of Environmental Services

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

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

3) Websites

Sponsor	Internet Address	Summary of Contents
Natural Hazards Research Center, U. of Colorado	http://www.colorado.edu/litbase/hazards/	Searchable database of references and links to many disaster-related websites.
Atlantic Hurricane Tracking Data by Year	http://wxp.eas.purdue.edu/hurricane	Hurricane track maps for each year, 1886 – 1996
National Emergency Management Association	http://nemaweb.org	Association of state emergency management directors; list of mitigation projects.
NASA – Goddard Space Flight Center "Disaster Finder:	http://www.gsfc.nasa.gov/ndrd/disaster/	Searchable database of sites that encompass a wide range of natural disasters.
NASA Natural Disaster Reference Database	http://ltpwww.gsfc.nasa.gov/ndrd/main/html	Searchable database of worldwide natural disasters.
U.S. State & Local Gateway	http://www.statelocal.gov/	General information through the federal-state partnership.
National Weather Service	http://nws.noaa.gov/	Central page for National Weather Warnings, updated every 60 seconds.
USGS Real Time Hydrologic Data	http://h20.usgs.gov/public/realtime.html	Provisional hydrological data
Dartmouth Flood Observatory	http://www.dartmouth.edu/artsci/geog/floods/	Observations of flooding situations.
FEMA, National Flood Insurance Program, Community Status Book	http://www.fema.gov/fema/csb.htm	Searchable site for access of Community Status Books
Florida State University Atlantic Hurricane Site	http://www.met.fsu.edu/explores/tropical.html	Tracking and NWS warnings for Atlantic Hurricanes and other links

Sponsor	Internet Address	Summary of Contents
National Lightning Safety Institute	http://lightningsafety.com/	Information and listing of appropriate publications regarding lightning safety.
NASA Optical Transient Detector	http://www.ghcc.msfc.nasa.gov/otd.html	Space-based sensor of lightning strikes
LLNL Geologic & Atmospheric Hazards	http://wwwep.es.llnl.gov/wwwep/ghp.html	General hazard information developed for the Dept. of Energy.
The Tornado Project Online	http://www.tornadoroject.com/	Information on tornadoes, including details of recent impacts.
National Severe Storms Laboratory	http://www.nssl.uoknor.edu/	Information about and tracking of severe storms.
Independent Insurance Agents of America IIAA Natural Disaster Risk Map	http://www.iiaa.iix.com/ndcmap.htm	A multi-disaster risk map.
Earth Satellite Corporation	http://www.earthsat.com/	Flood risk maps searchable by state.
USDA Forest Service Web	http://www.fs.fed.us/land	Information on forest fires and land management.

APPENDIX B:

Hazard Mitigation Assistance Grants

APPENDIX B:
HAZARD MITIGATION ASSISTANCE GRANTS

Hazard Mitigation Assistance (HMA) grant programs of the Department of Homeland Security (DHS) Federal Emergency Management Agency (FEMA), presents a critical opportunity to protect individuals and property from natural hazards while simultaneously reducing reliance on Federal disaster funds. The HMA programs provide pre-disaster mitigation grants annually to local communities. The statutory origins of the programs differ, but all share the common goal of reducing the loss of life and property due to natural hazards. Eligible applicants include State-level agencies including State institutions; Federally recognized Indian Tribal governments; Public or Tribal colleges or universities (PDM only); and Local jurisdictions.

All subapplicants for Flood Mitigation Assistance Program (FMA) must currently be participating in the National Flood Insurance Program (NFIP) to be eligible to apply for this grant. Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation (PDM) mitigation project subapplications for projects sited within a special flood hazard area are eligible only if the jurisdiction in which the project is located is participating in the NFIP. There is no NFIP participation requirement for HMGP and PDM project subapplications located outside the special flood hazard area. Properties included in a project subapplication for FMA funding must be NFIP-insured at the time of the application submittal. Flood insurance must be maintained at least through completion of the mitigation activity.

The HMA grant assistance includes three programs:

1. *Hazard Mitigation Grant Program (HMGP*): This program assists in the implementation of long-term hazard mitigation measures following a major disaster.

2. *The Pre-Disaster Mitigation (PDM) program*: This provides funds for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. PDM grants are awarded on a competitive basis.

3. *The Flood Mitigation Assistance (FMA) program*: This provides funds so that cost-effective measures can be taken to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insured under the NFIP. The long-term goal of FMA is to reduce or eliminate claims under the NFIP through mitigation activities.

Potential eligible projects are shown in the following table by grant program. For further information on these programs visit the following FEMA websites:

HMGP - http://www.fema.gov/hazard-mitigation-grant-program

PDM – www.fema.gov/government/grant/pdm/

FMA – www.fema.gov/government/grant/fma

Mitigation Project:	HMPG	PDM	FMA
1. Mitigation Projects	**X**	**X**	**X**
Property Acquisition and Structure Demolition	**X**	**X**	**X**
Property Acquisition and Structure Relocation	**X**	**X**	**X**
Structure Elevation	**X**	**X**	**X**
Mitigation Reconstruction			**X**
Dry Floodproofing of Historic Residential Structures	**X**	**X**	**X**
Dry Floodproofing of Non-residential Structures	**X**	**X**	**X**
Minor Localized Flood Reduction Projects	**X**	**X**	**X**
Structural Retrofitting of Existing Buildings	**X**	**X**	
Non-structural Retrofitting of Existing Buildings and Facilities	**X**	**X**	**X**
Safe Room Construction	**X**	**X**	
Wind Retrofit for One- and Two-Family Residences	**X**	**X**	
Infrastructure Retrofit	**X**	**X**	**X**
Soil Stabilization	**X**	**X**	**X**
Wildfire Mitigation	**X**	**X**	
Post-Disaster Code Enforcement	**X**		
Generators	**X**	**X**	
5% Initiative Projects	**X**		
Advance Assistance	**X**		
2. Hazard Mitigation Planning	**X**	**X**	**X**
3. Management Costs	**X**	**X**	**X**

OTHER HAZARD MITIGATION ASSISTANCE FUNDING

Environmental Protection Agency

The EPA makes available funds for water management and wetlands protection programs that help mitigate against future costs associated with hazard damage.

Mitigation Funding Sources Program	Details	Notes
Clean Water Act Section 319 Grants	Grants for water source management programs including technical assistance, financial assistance, education, training, technology transfer, demonstration projects, and regulation. http://www.epa.gov/OWOW/NPS/cwact.html	Funds are provided only to designated state and tribal agencies
Clean Water State Revolving Funds	State grants to capitalize loan funds. States make loans to communities, individuals, and others for high-priority water-quality activities. http://www.epa.gov/owow/wetlands/initiative/srf.html	States and Puerto Rico
Wetland Program Development Grants	Funds for projects that promote research, investigations, experiments, training, demonstrations, surveys, and studies relating to the causes, effects, extent, prevention, reduction, and elimination of water pollution. http://www.epa.gov/owow/wetlands/initiative/#financial	See website

National Oceanic and Atmosphere Administration (NOAA)

NOAA is the major source for mitigation funding related to coastal zone management and other coastal protection projects.

Mitigation Funding Sources Program	Details	Notes
Coastal Services Center Cooperative Agreements	Funds for coastal wetlands management and protection, natural hazards management, public access improvement, reduction of marine debris, special area management planning, and ocean resource planning. http://www.csc.noaa.gov/funding/	May only be used to implement and enhance the states' approved Coastal Zone Management programs
Coastal Services Center Grant Opportunities	Formula and program enhancement grants for implementing and enhancing Coastal Zone Management programs that have been approved by the Secretary of Commerce. http://www.csc.noaa.gov/funding/	Formula grants require non-federal match
Coastal Zone Management Program	The Office of Ocean and Coastal Resource Management (OCRM) provides federal funding and technical assistance to better manage our coastal resources. http://coastalmanagement.noaa.gov/funding/welcome.html	Funding is reserved for the nation's 34 state and territory Coastal Zone Management Programs
Marine and Coastal Habitat Restoration	Funding for habitat restoration, including wetland restoration and dam removal. http://www.nmfs.noaa.gov/habitat/recovery/	Funding available for state, local and tribal governments and for- and non-profit organizations.

Floodplain, Wetland and Watershed Protection Programs

USACE and the U.S. Fish and Wildlife Service offer funding and technical support for programs designed to protect floodplains, wetlands, and watersheds.

Funding and Technical Assistance for Wetlands and Floodplains Program	Details	Notes
USACE Planning Assistance to States (PAS)	Fund plans for the development and conservation of water resources, dam safety, flood damage reduction and floodplain management. http://www.lre.usace.army.mil/planning/assist.html	50 percent non-federal match
USACE Flood Plain Management Services (FPMS)	Technical support for effective floodplain management. http://www.lrl.usace.army.mil/p3md-o/article.asp?id=9&MyCategory=126	See website
USACE Environmental Laboratory	Guidance for implementing environmental programs such as ecosystem restoration and reuse of dredged materials. http://el.erdc.usace.army.mil/index.cfm	See website
U.S. Fish & Wildlife Service Coastal Wetlands Conservation Grant Program	Matching grants to states for acquisition, restoration, management or enhancement of coastal wetlands. http://ecos.fws.gov/coastal_grants/viewContent.do?viewPage=home	States only. 50 percent federal share
U.S. Fish & Wildlife Service Partners for Fish and Wildlife Program	Program that provides financial and technical assistance to private landowners interested in restoring degraded wildlife habitat. http://ecos.fws.gov/partners/viewContent.do?viewPage=home	Funding for volunteer-based programs

Housing and Urban Development

The Community Development Block Grants (CDBG) administered by HUD can be used to fund hazard mitigation projects.

Mitigation Funding Sources Program	Details	Notes
Community Development Block Grants (CDBG)	Grants to develop viable communities, principally for low and moderate income persons. CDBG funds available through Disaster Recovery Initiative. http://www.hud.gov/offices/cpd/communitydevelopment/programs/	Disaster funds contingent upon Presidential disaster declaration
Disaster Recovery Assistance	Disaster relief and recovery assistance in the form of special mortgage financing for rehabilitation of impacted homes. http://www.hud.gov/offices/cpd/communitydevelopment/programs/dri/assistance.cfm	Individuals
Neighborhood Stabilization Program	Funding for the purchase and rehabilitation of foreclosed and vacant property in order to renew neighborhoods devastated by the economic crisis. http://www.hud.gov/offices/cpd/communitydevelopment/programs/neighborhoodspg/	State and local governments and non-profits

Bureau of Land Management

The Bureau of Land Management (BLM) has two technical assistance programs focused on fire mitigation strategies at the community level.

Mitigation Funding Sources Program	Details	Notes
Community Assistance and Protection Program	Focuses on mitigation/prevention, education, and outreach. National Fire Prevention and Education teams are sent to areas across the country at-risk for wildland fire to work with local residents. http://www.blm.gov/nifc/st/en/prog/fire/community_assistance.html	See website
Firewise Communities Program	Effort to involve homeowners, community leaders, planners, developers, and others in the effort to protect people, property, and natural resources from the risk of wildland fire before a fire starts. http://www.firewise.org/	See website

U.S. Department of Agriculture

There are multiple mitigation funding and technical assistance opportunities available from the USDA and its various sub-agencies: the Farm Service Agency, Forest Service, and Natural Resources Conservation Service.

Mitigation Funding Sources Agency Program	Details	Notes
USDA Smith-Lever Special Needs Funding	Grants to State Extension Services at 1862 Land-Grant Institutions to support education-based approaches to addressing emergency preparedness and disasters. http://www.csrees.usda.gov/funding/rfas/smith_lever.html	Population under 20,000
USDA Community Facilities Guaranteed Loan Program	This program provides an incentive for commercial lending that will develop essential community facilities, such as fire stations, police stations, and other public buildings. http://www.rurdev.usda.gov/rhs/cf/cp.htm	Population under 20,000
USDA Community Facilities Direct Loans	Loans for essential community facilities. http://www.rurdev.usda.gov/rhs/cf/cp.htm	Population of less than 20,000
USDA Community Facilities Direct Grants	Grants to develop essential community facilities. http://www.rurdev.usda.gov/rhs/cf/cp.htm	Population of less than 20,000
USDA Farm Service Agency Disaster Assistance Programs	Emergency funding and technical assistance for farmers and ranchers to rehabilitate farmland and livestock damaged by natural disasters. http://www.fsa.usda.gov/	Farmers and ranchers
USDA Forest Service National Fire Plan	Funding for organizing, training, and equipping fire districts through Volunteer, State and Rural Fire Assistance programs. Technical assistance for fire related mitigation. http://www.forestsandrangelands.gov/	See website
USDA Forest Service Economic Action Program	Funds for preparation of Fire Safe plans to reduce fire hazards and utilize byproducts of fuels management activities in a value-added fashion. http://www.fs.fed.us/spf/coop/programs/eap/	80% of total cost of project may be covered
USDA Natural Resources Conservation Service Emergency Watershed Protection Support	Funds for implementing emergency measures in watersheds in order to relieve imminent hazards to life and property created by a natural disaster. http://www.nrcs.usda.gov/programs/ewp/	See website

Mitigation Funding Sources Agency Program	Details	Notes
Services		
USDA Natural Resources Conservation Service Watershed Protection and Flood Prevention	Funds for soil conservation; flood prevention; conservation, development, utilization and disposal of water; and conservation and proper utilization of land. http://www.nrcs.usda.gov/programs/watershed/index.html	See website

Health and Economic Agencies

Alternative mitigation programs can be found through health and economic agencies that provide loans and grants aimed primarily at disaster relief.

Federal Loans and Grants for Disaster Relief Agency Program	Details	Notes
Department of Health & Human Services Disaster Assistance for State Units on Aging (SUAs)	Provide disaster relief funds to those SUAs and tribal organizations who are currently receiving a grant under Title VI of the Older Americans Act. http://www.aoa.gov/doingbus/fundopp/fundopp.asp	Areas designated in a Disaster Declaration issued by the President
Economic Development Administration (EDA) Economic Development Administration Investment Programs	Grants that support public works, economic adjustment assistance, and planning. Certain funds allocated for locations recently hit by major disasters. http://www.eda.gov/AboutEDA/Programs.xml	The maximum investment rate shall not exceed 50 percent of the project cost
U.S. Small Business Administration Small Business Administration Loan Program	Low-interest, fixed rate loans to small businesses for the purpose of implementing mitigation measures. Also available for disaster damaged property. http://www.sba.gov/services/financialassistance/index.html	Must meet SBA approved credit rating

Research Agencies

The United States Geological Survey (USGS) and the National Science Foundation (NSF) provide grant money for hazard mitigation-related research efforts.

Hazard Mitigation Research Grants Agency Program	Details	Notes
National Science Foundation (NSF) Decision, Risk, and Management Sciences Program (DRMS)	Grants for small-scale, exploratory, high-risk research having a severe urgency with regard to natural or anthropogenic disasters and similar unanticipated events. http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5423&org=SES	See website
U.S. Geological Survey (USGS) National Earthquake Hazards Reduction Program	The purpose of NEHRP is to provide products for earthquake loss reduction to the public and private sectors by carrying out research on earthquake occurrence and effects. http://www.usgs.gov/contracts/nehrp/	Community with a population under 20,000

Appendix C: Meeting Documentation

Meeting #1: Tuesday, May 21, 2013 1:00 – 3:00 PM (2 hours)

- General discussion of requirements and in-kind match process
- Review goals of hazard mitigation plan and revise (hand out)
- Review hazards (see poster – Add hazards? Remove hazards?)
- Identify and map past/potential hazards (update map & lists in Chapter 2)
- Flooding – Are there any non-FEMA flood areas?
- Specific past and potential events of hazards not in 2008 plan (recent events)
- Potential development areas in town (compare with list in 2008 plan)
- Identify critical facilities (update map and list)
- Determine Vulnerability to Hazards for Town
- Determine Probability of Hazards for Town
- Review Critical Facilities & hazard vulnerability
- Discuss future meetings, public notice, stakeholders to be notified, notices to abutting towns

Meeting #2 Tuesday, June 11, 2013 – 1:00 – 3:00 PM (2 hours)

- Review previously determined potential mitigation efforts (were they implemented? If not, why not and are they still on the table to be implemented?)
- Brainstorm improvements to existing mitigation efforts
- Brainstorm potential new mitigation efforts

Meeting #3 Tuesday, June 25, 2013 – 1:00 – 3:00 PM (2 hours)

- Evaluate the past and potential mitigation efforts
- Develop a prioritized implementation schedule and discuss the adoption and monitoring of the plan

Meeting #4 Tuesday, July 16, 2013 - 1:00 – 2:00 PM (1 hour)

- Review and revise draft plan

Charlestown Hazard Mitigation Plan Update

The Charlestown Hazard Mitigation committee will be meeting to work on an update to the plan. The meeting schedule is as follows:

June 11, 2013 – 1:00 to 3:00 PM at the Fire Station

June 25, 2013 – 1:00 to 3:00 PM at the Community Room (Library/Municipal BLDG)

June 9, 2013 – 1:00 to 2:00 PM at the Town Hall

Vickie Davis

From: Vickie Davis
Sent: Wednesday, August 06, 2014 2:45 PM
To: 'Doree Russell'; Rick Bergeron (firechief@claremontnh.com); Bruce Temple (dpwdirector@claremontnh.com); Alex Scott (policechief@claremontnh.com); Tracy Decker (unitysecretary@myfairpoint.net); Kathi Bradt (townoff@sover.net); 'townoflangdon@yahoo.com'; 'jclough@walpolenh.us'; 'r.hurlburt35@comcast.net'; 'walpolepd@comcast.net'
Cc: Moore, Parker (Parker.Moore@dos.nh.gov); David Edkins (dedkins@charlestown-nh.gov)
Subject: Town of Charlestown Hazard Mitigation Plan Update 2014 Review
Attachments: HazMitPlanUpdateCHAR2014DRAFT_2.pdf

Greetings,

The Town of Charlestown is inviting you to review their attached draft Hazard Mitigation Plan. Since natural hazards do not recognize municipal boundaries, this is your opportunity to work together for shared hazard mitigation.

Please have a look at the attached plan and make any comments to me (contact information below) or Dave Edkins, Charlestown Town Administrator prior to August 31, 2014. Also feel free to contact us with any questions.

Thank you for your consideration.

Victoria Davis
Upper Valley Lake Sunapee Regional Planning Commission
10 Water Street, Suite 225
Lebanon, NH 03766
603-448-1680
603-448-0170 fax

Please join the conversation at the Regional Forum on the Future
http://regionalplan.uvlsrpc.org/regional-forum/

Visit our Household Hazardous Waste web site at http://hhw.uvlsrpc.org
Visit our Waste web site at http://waste.uvlsrpc.org
Visit the Healthy Home Facebook Page at www.Facebook.com/HealthyHomeProgram

Join our Mailing List

Find us on facebook

Please consider the environment before printing this e-mail.

Charlestown Hazard Mitigation Meeting - May 21, 2013	
Name	**Position**
Adam Ricker	UVLSRPC
Victoria Davis	UVLSRPC
Keith O. Cleal	Town Highway
Rae Smith-Hull	Planning Board
Liz Lufkin	NH. HSEM
Dick Lincourt	Planning Board
Don Elkins	Town of Charlestown
Ed Smith	Chief of Police.
Sharon Frances	Planning Board
Charles Baraly	Fire Chief / EMD

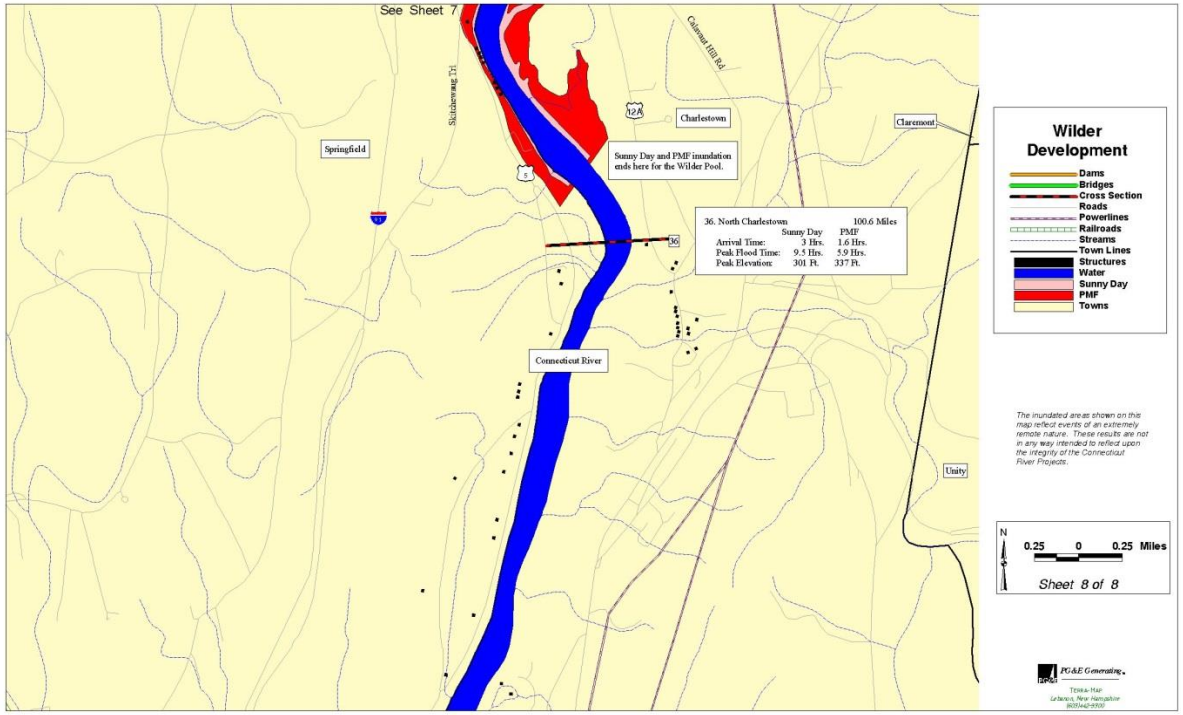
Charlestown Hazard Mitigation Meeting - June 11, 2013	
Name	**Position**
Adam Richer	UVLSRPC
Liz Lufkin	HSEM
Dick Lincourt	CPB
Keith O. Weed	Hwy
Dave Duquette	Water, Wastewater
Dave Elkins	Charlestown
Ed Smith	Police
Sharon Frances	Planning Board

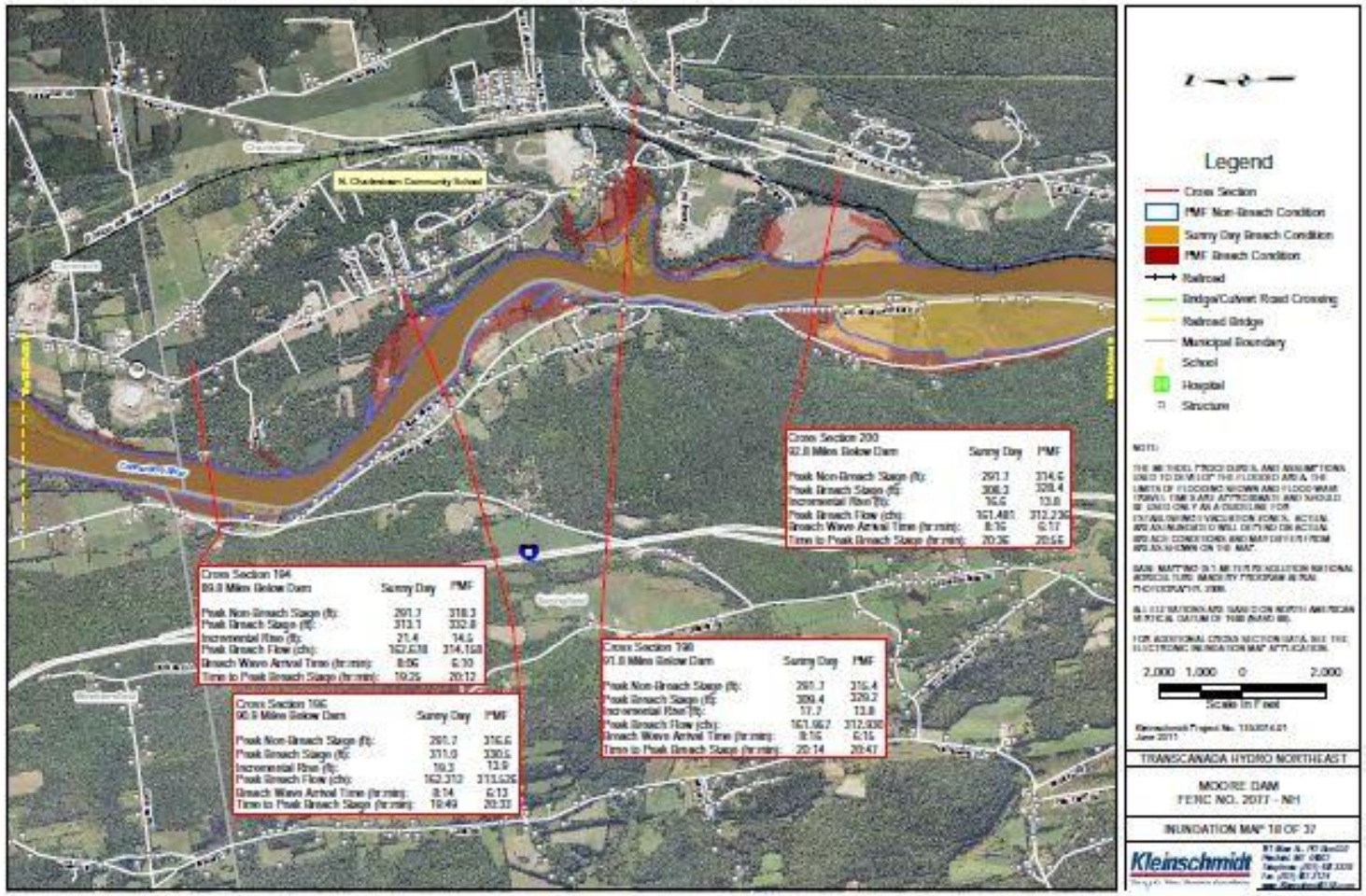
Charlestown Hazard Mitigation Meeting - July 16, 2013	
Name	**Position**
Adam Ricker	UVLSRPC
David Edkins	Admin. Asst. & Planning & Zoning
Dick Lincourt	Planning Board Alt.
ED Smith	P.D.
Keith O. Wood	HIGHWAY

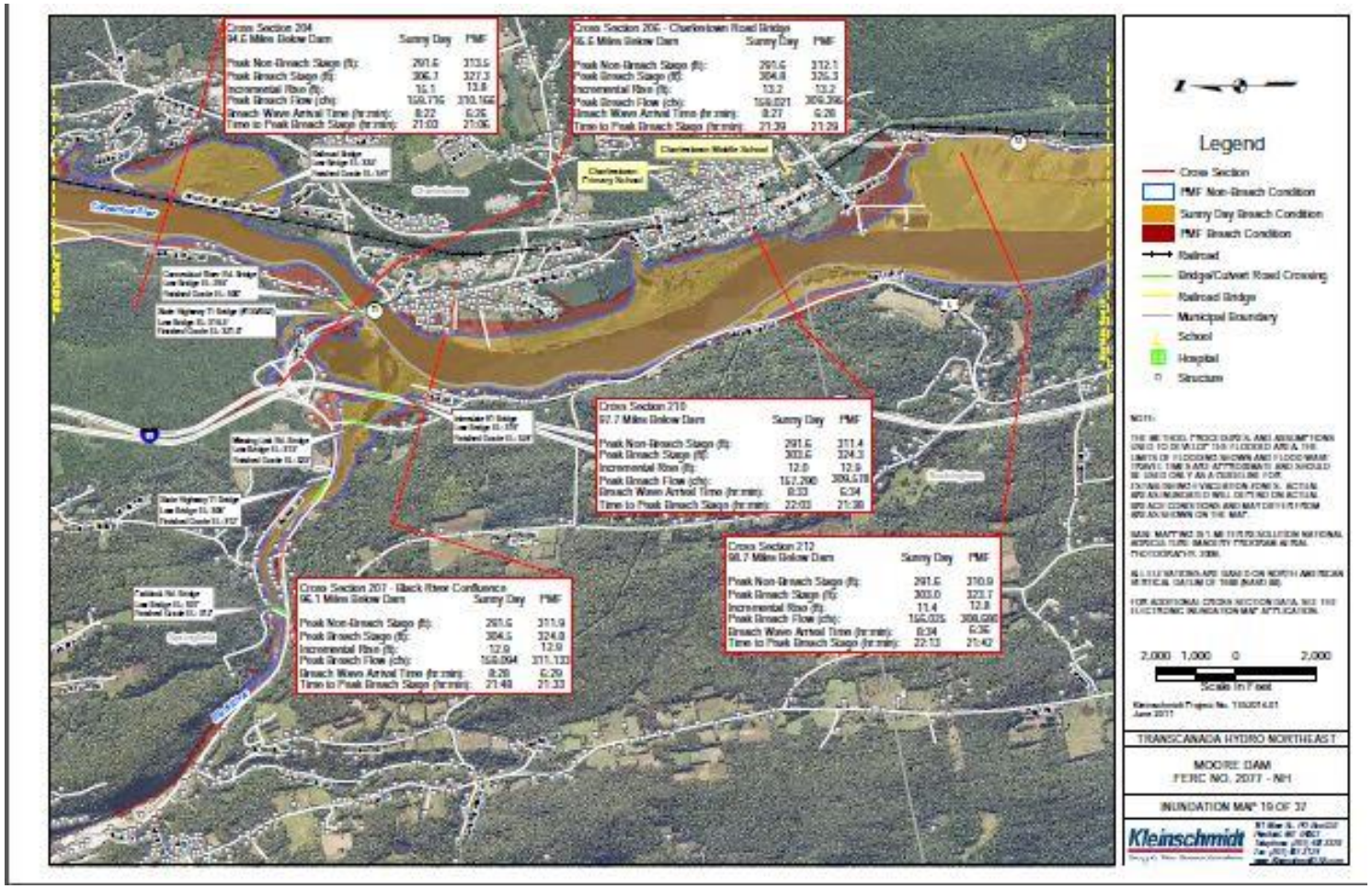
Charlestown Hazard Mitigation Meeting - June 25, 2013		
Name	**Position**	e-mail
Adam Ricker	UVLSRPC	
DAVID DUQUETTE	TOWN WATER & SEWER	dduquette@charlestown-nh.gov
Ed Smith	Police	chief@charlestownpd.com
Keith O. Weed	Highway	ctownhwy@sover.net
Dick Lincourt	CPB alternate	rlincourt@att.net

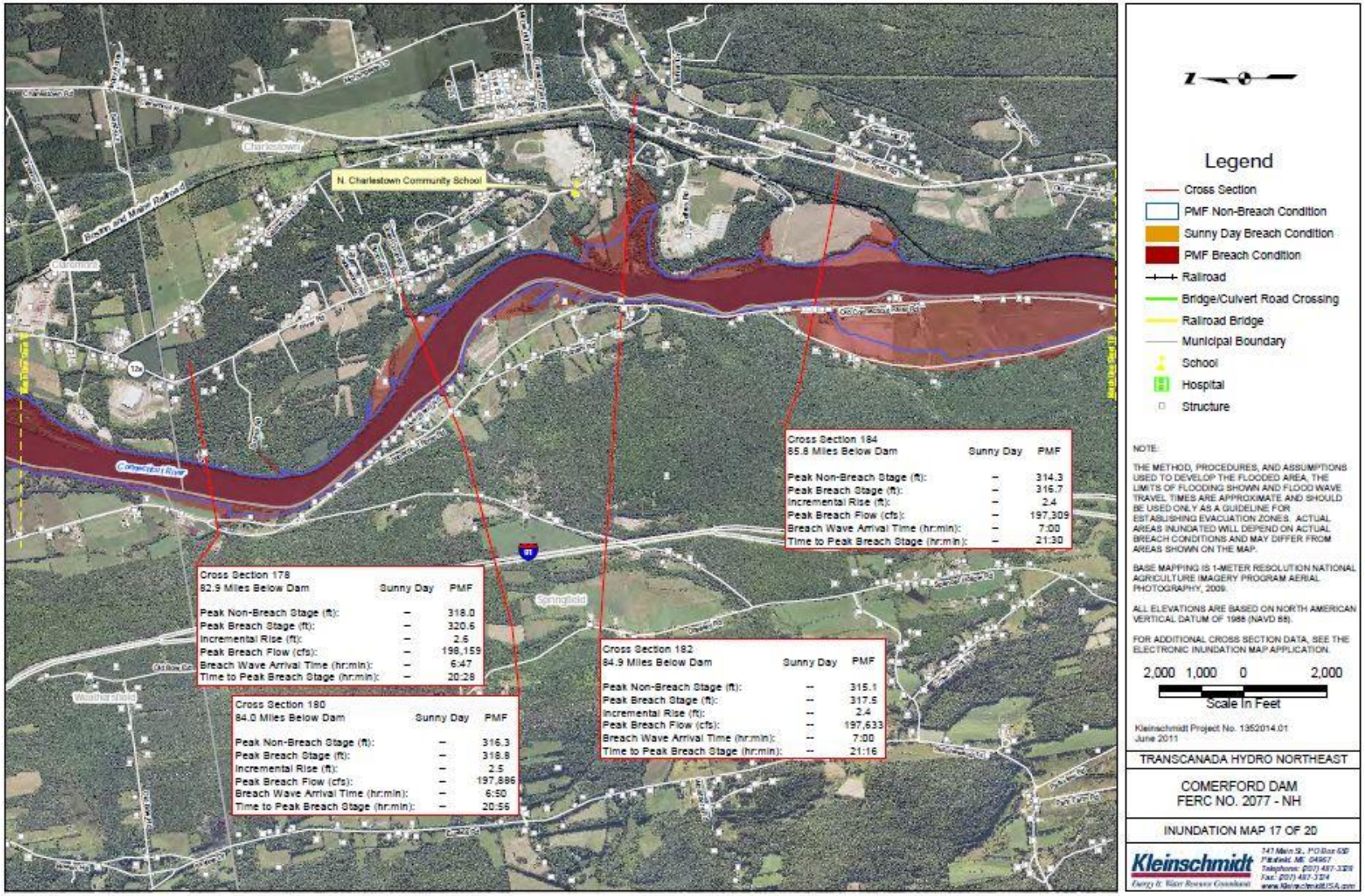
APPENDIX D:

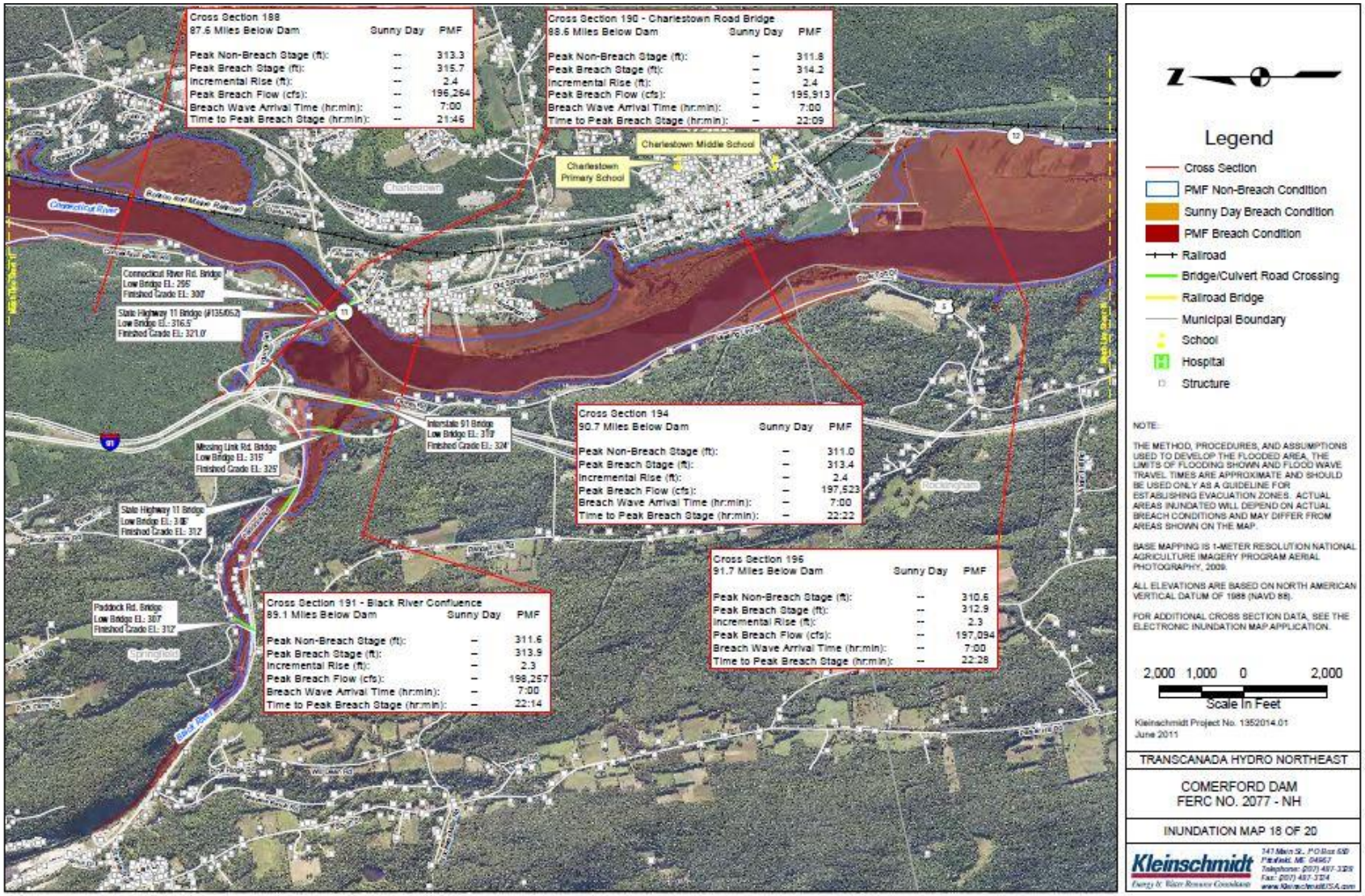
Map of Hazard Areas and Critical Facilities and Dam Inundation




N. Charlestown Community School
Cross Section 200
92.0 Miles Below Dam
Sunny Day PMF
Peak Non-Breach Stage (ft): 291.7 314.6
Peak Breach Stage (ft): 308.2 328.4
Incremental Rise (ft): 16.6 13.8
Peak Breach Flow (cfs): 161,481 312,232
Breach Wave Arrival Time (hr:min): 8:16 6:17
Time to Peak Breach Stage (hr:min): 20:36 20:56
Cross Section 194
89.8 Miles Below Dam
Sunny Day PMF
Peak Non-Breach Stage (ft): 291.7 318.3
Peak Breach Stage (ft): 313.1 332.8
Incremental Rise (ft): 21.4 14.5
Peak Breach Flow (cfs): 162,638 314,168
Breach Wave Arrival Time (hr:min): 8:06 6:10
Time to Peak Breach Stage (hr:min): 19:26 20:12
Cross Section 196
91.8 Miles Below Dam
Sunny Day PMF
Peak Non-Breach Stage (ft): 291.7 315.4
Peak Breach Stage (ft): 309.4 329.2
Incremental Rise (ft): 17.7 13.8
Peak Breach Flow (cfs): 161,667 312,936
Breach Wave Arrival Time (hr:min): 8:15 6:15
Time to Peak Breach Stage (hr:min): 20:14 20:47
Cross Section 198
90.8 Miles Below Dam
Sunny Day PMF
Peak Non-Breach Stage (ft): 291.7 316.6
Peak Breach Stage (ft): 311.0 330.5
Incremental Rise (ft): 19.3 13.9
Peak Breach Flow (cfs): 162,312 313,526
Breach Wave Arrival Time (hr:min): 8:14 6:13
Time to Peak Breach Stage (hr:min): 19:49 20:33
Legend
Cross Section
PMF Non-Breach Condition
Sunny Day Breach Condition
PMF Breach Condition
Railroad
Bridge/Culvert Road Crossing
Railroad Bridge
Municipal Boundary
School
Hospital
Structure
2,000 1,000 0 2,000
Scale in Feet
TRANSCANADA HYDRO NORTHEAST
MOORE DAM
FERC NO. 2077 - NH
INUNDATION MAP 18 OF 37
Kleinschmidt


Cross Section 204
94.6 Miles Below Dam
Sunny Day PMF
Peak Non-Breach Stage (ft): 291.6 313.6
Peak Breach Stage (ft): 306.7 327.3
Incremental Rise (ft): 15.1 13.8
Peak Breach Flow (cfs): 159,776 310,166
Breach Wave Arrival Time (hr:min): 8:22 6:26
Time to Peak Breach Stage (hr:min): 21:03 21:06
Cross Section 206 - Charlestown Road Bridge
95.5 Miles Below Dam
Sunny Day PMF
Peak Non-Breach Stage (ft): 291.6 312.1
Peak Breach Stage (ft): 304.8 326.3
Incremental Rise (ft): 13.2 13.2
Peak Breach Flow (cfs): 159,021 309,396
Breach Wave Arrival Time (hr:min): 8:27 6:28
Time to Peak Breach Stage (hr:min): 21:39 21:29
Cross Section 210
97.7 Miles Below Dam
Sunny Day PMF
Peak Non-Breach Stage (ft): 291.6 311.4
Peak Breach Stage (ft): 303.6 324.3
Incremental Rise (ft): 12.0 12.9
Peak Breach Flow (cfs): 157,290 309,518
Breach Wave Arrival Time (hr:min): 8:33 6:34
Time to Peak Breach Stage (hr:min): 22:03 21:38
Cross Section 212
98.7 Miles Below Dam
Sunny Day PMF
Peak Non-Breach Stage (ft): 291.6 310.0
Peak Breach Stage (ft): 303.0 323.7
Incremental Rise (ft): 11.4 12.8
Peak Breach Flow (cfs): 156,035 308,686
Breach Wave Arrival Time (hr:min): 8:34 6:36
Time to Peak Breach Stage (hr:min): 22:13 21:42
Cross Section 207 - Black River Confluence
96.1 Miles Below Dam
Sunny Day PMF
Peak Non-Breach Stage (ft): 291.6 311.9
Peak Breach Stage (ft): 304.5 324.8
Incremental Rise (ft): 12.9 12.9
Peak Breach Flow (cfs): 158,094 311,133
Breach Wave Arrival Time (hr:min): 8:28 6:29
Time to Peak Breach Stage (hr:min): 21:48 21:33
Legend
Cross Section
PMF Non-Breach Condition
Sunny Day Breach Condition
PMF Breach Condition
Railroad
Bridge/Culvert Road Crossing
Railroad Bridge
Municipal Boundary
School
Hospital
Structure
2,000 1,000 0 2,000
Scale in Feet
TRANSCANADA HYDRO NORTHEAST
MOORE DAM
FERC NO. 2077 - NH
INUNDATION MAP 19 OF 37
Kleinschmidt


N. Charlestown Community School
Charlestown
Claremont
Springfield
Connecticut River
Cross Section 178
82.9 Miles Below Dam
Sunny Day PMF
Peak Non-Breach Stage (ft): – 318.0
Peak Breach Stage (ft): – 320.6
Incremental Rise (ft): – 2.6
Peak Breach Flow (cfs): – 198,159
Breach Wave Arrival Time (hr:min): – 6:47
Time to Peak Breach Stage (hr:min): – 20:28
Cross Section 180
84.0 Miles Below Dam
Sunny Day PMF
Peak Non-Breach Stage (ft): – 316.3
Peak Breach Stage (ft): – 318.8
Incremental Rise (ft): – 2.5
Peak Breach Flow (cfs): – 197,886
Breach Wave Arrival Time (hr:min): – 6:50
Time to Peak Breach Stage (hr:min): – 20:56
Cross Section 182
84.9 Miles Below Dam
Sunny Day PMF
Peak Non-Breach Stage (ft): – 315.1
Peak Breach Stage (ft): – 317.5
Incremental Rise (ft): – 2.4
Peak Breach Flow (cfs): – 197,633
Breach Wave Arrival Time (hr:min): – 7:00
Time to Peak Breach Stage (hr:min): – 21:16
Cross Section 184
85.8 Miles Below Dam
Sunny Day PMF
Peak Non-Breach Stage (ft): – 314.3
Peak Breach Stage (ft): – 316.7
Incremental Rise (ft): – 2.4
Peak Breach Flow (cfs): – 197,309
Breach Wave Arrival Time (hr:min): – 7:00
Time to Peak Breach Stage (hr:min): – 21:30
Legend
Cross Section
PMF Non-Breach Condition
Sunny Day Breach Condition
PMF Breach Condition
Railroad
Bridge/Culvert Road Crossing
Railroad Bridge
Municipal Boundary
School
Hospital
Structure
NOTE:
THE METHOD, PROCEDURES, AND ASSUMPTIONS USED TO DEVELOP THE FLOODED AREA, THE LIMITS OF FLOODING SHOWN AND FLOOD WAVE TRAVEL TIMES ARE APPROXIMATE AND SHOULD BE USED ONLY AS A GUIDELINE FOR ESTABLISHING EVACUATION ZONES. ACTUAL AREAS INUNDATED WILL DEPEND ON ACTUAL BREACH CONDITIONS AND MAY DIFFER FROM AREAS SHOWN ON THE MAP.
BASE MAPPING IS 1-METER RESOLUTION NATIONAL AGRICULTURE IMAGERY PROGRAM AERIAL PHOTOGRAPHY, 2009.
ALL ELEVATIONS ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
FOR ADDITIONAL CROSS SECTION DATA, SEE THE ELECTRONIC INUNDATION MAP APPLICATION.
2,000 1,000 0 2,000
Scale In Feet
Kleinschmidt Project No. 1352014.01
June 2011
TRANSCANADA HYDRO NORTHEAST
COMERFORD DAM
FERC NO. 2077 - NH
INUNDATION MAP 17 OF 20
Kleinschmidt


Cross Section 188
87.6 Miles Below Dam
Sunny Day PMF
Peak Non-Breach Stage (ft): -- 313.3
Peak Breach Stage (ft): -- 315.7
Incremental Rise (ft): -- 2.4
Peak Breach Flow (cfs): -- 196,264
Breach Wave Arrival Time (hr:min): -- 7:00
Time to Peak Breach Stage (hr:min): -- 21:46
Cross Section 190 - Charlestown Road Bridge
88.6 Miles Below Dam
Sunny Day PMF
Peak Non-Breach Stage (ft): -- 311.8
Peak Breach Stage (ft): -- 314.2
Incremental Rise (ft): -- 2.4
Peak Breach Flow (cfs): -- 195,913
Breach Wave Arrival Time (hr:min): -- 7:00
Time to Peak Breach Stage (hr:min): -- 22:09
Charlestown Middle School
Charlestown Primary School
Connecticut River
Boston and Maine Railroad
Connecticut River Rd. Bridge
Low Bridge El.: 295'
Finished Grade El.: 300'
State Highway 11 Bridge (#135/052)
Low Bridge El.: 316.5'
Finished Grade El.: 321.0'
Interstate 91 Bridge
Low Bridge El.: 310'
Finished Grade El.: 324'
Missing Link Rd. Bridge
Low Bridge El.: 315'
Finished Grade El.: 325'
State Highway 11 Bridge
Low Bridge El.: 308'
Finished Grade El.: 312'
Paddock Rd. Bridge
Low Bridge El.: 307'
Finished Grade El.: 312'
Cross Section 194
90.7 Miles Below Dam
Sunny Day PMF
Peak Non-Breach Stage (ft): -- 311.0
Peak Breach Stage (ft): -- 313.4
Incremental Rise (ft): -- 2.4
Peak Breach Flow (cfs): -- 197,523
Breach Wave Arrival Time (hr:min): -- 7:00
Time to Peak Breach Stage (hr:min): -- 22:22
Cross Section 196
91.7 Miles Below Dam
Sunny Day PMF
Peak Non-Breach Stage (ft): -- 310.6
Peak Breach Stage (ft): -- 312.9
Incremental Rise (ft): -- 2.3
Peak Breach Flow (cfs): -- 197,094
Breach Wave Arrival Time (hr:min): -- 7:00
Time to Peak Breach Stage (hr:min): -- 22:28
Cross Section 191 - Black River Confluence
89.1 Miles Below Dam
Sunny Day PMF
Peak Non-Breach Stage (ft): -- 311.6
Peak Breach Stage (ft): -- 313.9
Incremental Rise (ft): -- 2.3
Peak Breach Flow (cfs): -- 198,257
Breach Wave Arrival Time (hr:min): -- 7:00
Time to Peak Breach Stage (hr:min): -- 22:14
Charlestown
Springfield
Rockingham
Black River
Legend
Cross Section
PMF Non-Breach Condition
Sunny Day Breach Condition
PMF Breach Condition
Railroad
Bridge/Culvert Road Crossing
Railroad Bridge
Municipal Boundary
School
Hospital
Structure
NOTE:
THE METHOD, PROCEDURES, AND ASSUMPTIONS USED TO DEVELOP THE FLOODED AREA, THE LIMITS OF FLOODING SHOWN AND FLOOD WAVE TRAVEL TIMES ARE APPROXIMATE AND SHOULD BE USED ONLY AS A GUIDELINE FOR ESTABLISHING EVACUATION ZONES. ACTUAL AREAS INUNDATED WILL DEPEND ON ACTUAL BREACH CONDITIONS AND MAY DIFFER FROM AREAS SHOWN ON THE MAP.
BASE MAPPING IS 1-METER RESOLUTION NATIONAL AGRICULTURE IMAGERY PROGRAM AERIAL PHOTOGRAPHY, 2009.
ALL ELEVATIONS ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
FOR ADDITIONAL CROSS SECTION DATA, SEE THE ELECTRONIC INUNDATION MAP APPLICATION.
2,000 1,000 0 2,000
Scale In Feet
Kleinschmidt Project No. 1352014.01
June 2011
TRANSCANADA HYDRO NORTHEAST
COMERFORD DAM
FERC NO. 2077 - NH
INUNDATION MAP 18 OF 20
Kleinschmidt

APPENDIX E:

FEMA Approvals and Town Adoption of Hazard Mitigation Plan

Town of Charlestown, New Hampshire
Board of Selectmen
A Resolution Adoption the Charlestown Hazard Mitigation Plan Update 2015

WHEREAS, the Town of Charlestown received assistance from the Upper Valley Lake Sunapee Regional Planning Commission through funding from the NH Homeland Security and Emergency Management to prepare a hazard mitigation updated plan; and

WHEREAS, several planning meetings to develop the hazard mitigation plan update were held in May through July, 2013 and then presented to the Board of Selectmen for review and discussion on April 15, 2015; and

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

WHEREAS, the Board of Selectmen held a public meeting on April 15, 2015 to formally approve and adopt the Charlestown Hazard Mitigation Plan Update 2015.

NOW, THEREFORE BE IT RESOLVED that the Charlestown Board of Selectmen adopt the Charlestown Hazard Mitigation Plan Update 2015.

APPROVED and SIGNED this 15th day of April, 2015.

TOWN OF CHARLESTOWN
BOARD OF SELECTMEN

_____
Chair

(seal)

ATTEST: _____

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

FEMA

JUL 07 2015

Steven Neill, Chair
Selectboard
Town of Charlestown
216 Main Street
P.O. Box 385
Charlestown, NH 03603

Dear Mr. Neill:

Thank you for the opportunity to review the Town of Charlestown, New Hampshire Hazard Mitigation Plan Update 2015. The Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) Region I has evaluated the plan for compliance with 44 C.F.R. Pt. 201. The plan satisfactorily meets all of the mandatory requirements set forth by the regulations.

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

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

The Town of Charlestown, New Hampshire Hazard Mitigation Plan Update 2015 must be reviewed, revised as appropriate, and resubmitted to FEMA for approval within **five years of the plan approval date of June 25, 2015** in order to maintain eligibility for mitigation grant funding. We encourage the Town to continually update the plan's assessment of vulnerability, adhere to its maintenance schedule, and implement, when possible, the mitigation actions proposed in the plan.

JUL 7 2015

Once again, thank you for your continued dedication to public service demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please do not hesitate to contact Marilyn Hilliard at (617) 956-7536.

Sincerely,

For Paul F. McCool

Paul F. Ford
Acting Regional Administrator

PFF: mh

cc: Beth Peck, New Hampshire State Hazard Mitigation Officer
Jennifer Gilbert, Asst. New Hampshire State NFIP Coordinator
Parker Moore, New Hampshire Hazard Mitigation Program Assistant
David Edkins, Planning & Zoning, Charlestown
Adam Ricker, Assistant Planner, UVLSRPC

Enclosure