The Town of Cummington

Natural Hazard Mitigation Plan Update 2016

Adopted by the Cummington Board of Selectmen on January 12, 2017

Prepared by:
The Cummington Natural Hazards Mitigation Planning Committee

and

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This project was funded by a grant received from the Massachusetts Emergency Management Agency (MEMA) and the Massachusetts Department of Conservation Services (formerly the Department of Environmental Management)

Acknowledgements

The Cummington Board of Selectmen extends special thanks to the Cummington Natural Hazards Mitigation Planning Committee as follows:

Bernard Forgea, Emergency Management Director, Fire Department Chief

Robert Dextraze, Highway Superintendent

Judith Bogart, Board of Health Chair/ Planning Board Member

Michael Perkins II, Chief of Police

Monica Vandoloski, Board of Selectmen

The Cummington Board of Selectmen offers thanks to the Massachusetts Emergency Management Agency (MEMA) for developing the Commonwealth of Massachusetts Natural Hazards Mitigation Plan (www.state.ma.us/dem/programs/mitigate/index.htm), which served as a model for this plan.

In addition, special thanks are extended to the staff of the Pioneer Valley Planning Commission for professional services, process facilitation and preparation of this document.

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1: INTRODUCTION

Hazard Mitigation

The Federal Emergency Management Agency (FEMA) and the Massachusetts Emergency Management Agency (MEMA) define Hazard Mitigation as any sustained action taken to reduce or eliminate long-term risk to people and property from natural hazards such as flooding, storms, high winds, hurricanes, wildfires, earthquakes, etc. Mitigation efforts undertaken by communities will help to minimize damages to buildings and infrastructure, such as water supplies, sewers, and utility transmission lines, as well as natural, cultural and historic resources.

Planning efforts, like the one undertaken by the Town of Cummington and the Pioneer Valley Planning Commission, make mitigation a proactive process. Pre-disaster planning emphasizes actions that can be taken before a natural disaster occurs. Future property damage and loss of life can be reduced or prevented by a mitigation program that addresses the unique geography, demography, economy, and land use of a community within the context of each of the specific potential natural hazards that may threaten a community.

Preparing, maintaining and updating a local natural hazard mitigation plan before a disaster occurs can save the community money and facilitate post-disaster funding. Costly repairs or replacement of buildings and infrastructure, as well as the high cost of providing emergency services and rescue/recovery operations, can be avoided or significantly lessened if a community implements the mitigation measures detailed in the plan. FEMA requires that a community adopt a pre-disaster mitigation plan as a condition for mitigation funding. For example, the Hazard Mitigation Grant Program (HMGP), the Flood Mitigation Assistance Program (FMA), and the Pre-Disaster Mitigation Program are programs with this requirement.

Planning Process

Planning for natural hazard mitigation in Cummington has involved a 5-member committee: Bernard Forgea, Emergency Management Director, Fire Department Chief and Robert Dextraze, Highway Superintendent, Judith Bogart, Board of Health Chair, Michaels Perkins II, Chief of Police, and Monica Vandoloski, Board of Selectmen

The natural hazard mitigation planning process for the Town included the following tasks:

- Reviewing and incorporating existing plans and other information.
- Identifying the natural hazards that may impact the community.
- Conducting a Vulnerability/Risk Assessment to identify the infrastructure at the highest risk for being damaged by the identified natural hazards, particularly flooding.
- Identifying and assessing the policies, programs, and regulations a community is currently implementing to protect against future disaster damages.
- Identifying deficiencies in the current strategies and establishing goals for updating, revising or adopting new strategies.
- Adopting and implementing the final Natural Hazards Mitigation Plan Update.

The key product of this process is the development of an Action Plan with a Prioritized Implementation Schedule.

Committee Meetings

Meetings of the Natural Hazards Mitigation Committee, all of which took place in the Cummington Public Safety Complex, were held on the dates listed below. Agendas for each meeting are included in Appendix E.

- March 29, 2016, 10 a.m.
- April 12, 2016, 1 p.m.
- April 26, 2016, 1 p.m.
- May 10, 2016, 1 p.m.
- May 17, 2016, 1 p.m.

Agendas and sign-in sheets for each meeting can be found in Appendix E. While not all members of the Hazard Mitigation Committee were able to attend each meeting, all members collaborated on the plan and were updated on progress by fellow Committee members after meetings occurred as necessary.

Participation by Public & Entities in Surrounding Communities

On April 12, 2016 the Pioneer Valley Planning Commission sent a press release to all area media outlets to inform private citizens that the planning process to update Cummington's Hazard Mitigation Plan had commenced and that all residents of Cummington were invited to attend plan development sessions. This press release was picked up by the Country Journal. On April 26, 2016, PVPC staff sent an email to surrounding communities chief elected officials, Emergency Management Directors and staff at Departments of Public Works and Highway departments, informing them that the Town of Cummington has started updating its Hazard Mitigation plan. The email included detail on the status of all Hazard mitigation plans in the region as well as a link to the PVPC website page on Hazard Mitigation plans, www.pvpc.org/Hazard_Mitigation.

On May 23, 2016 the Pioneer Valley Planning Commission sent a press release (see Appendix E) to all area media outlets to inform the public that a draft of Cummington's Hazard Mitigation Plan had been placed on PVPC's website, the Town website, and that hard copies were available at the Town offices, PVPC's offices and that all residents, businesses and other concerned parties and stakeholders in Cummington and surrounding communities were encouraged to comment on the plan. The plans were made available in this manner for 30 days.

In addition to media outreach, all public meetings were posted at Cummington's Town Hall (Appendix E) in compliance with the Commonwealth of Massachusetts' open meeting law.

Public Meetings

Two public meetings were held as part of the update to Cummington's Local Hazard Mitigation Plan. These meetings were held on April 21, 2016 and May 26, 2016 at the Community House. Notices of the two public meetings were posted at Cummington Town Offices in compliance with the Commonwealth of Massachusetts' open meeting law. Public meeting agendas and notices can be found in Appendix E. Both meetings were only attended by members of the Hazard Mitigation Committee and no feedback was received.

After the plan was provisionally approved by FEMA, the Board of Selectmen held a public hearing on the plan and adopted the plan.

Participation by Additional Stakeholders

A variety of stakeholders were provided with an opportunity to be involved in the development of the 2016 Hazard Mitigation Plan Update. The different categories of stakeholders that were involved, and the engagement activities that occurred, are described below.

Local and Regional Agencies

The Pioneer Valley Planning Commission (PVPC) is a regional planning agency for forty-three towns and cities in Massachusetts' Hampden and Hampshire Counties. PVPC regularly engages with the Town of Cummington as part of its regional planning efforts, which include the following:

- Developing the Pioneer Valley Regional Land Use Plan, Valley Vision 2, which advocates for sustainable land use throughout the region and consideration for the impact of flooding and other natural hazards on development.

- Developing the Pioneer Valley Climate Action and Clean Energy Plan, which assesses the impact that climate change will have on the region and recommends strategies for mitigation that can be implemented by local municipalities and businesses.

- Collaborating with state agencies, such as the Department of Conservation and Recreation, to maintain inventories of critical infrastructure throughout the region.

All of these PVPC initiatives considered the impact of natural hazards on the region and strategies for reducing their impact to people and property through hazard mitigation activities. The facilitation of the Cummington's 2016 Hazard Mitigation Plan Update by PVPC ensured that the information from these plans was incorporated into the Hazard Mitigation Planning process.

In addition, the PVPC is actively involved in the Western Region Homeland Security Advisory Council (WRHSAC). WHRSAC, which includes representatives from Western Massachusetts municipalities, Fire Departments, Public Works Departments, Police Departments, area hospitals and regional transit from throughout the four counties of western Massachusetts, is responsible for allocating emergency preparedness funding from the US Department of Homeland Security. The representatives of these disciplines who serve on the WRHSAC are charged with sharing the information discussed at meetings with their colleagues at their regular meetings. PVPC attends all WRHSAC meetings and all WRHSAC members are aware of the fact that Cummington was updating its Hazard Mitigation plan. Meetings of WRHSAC regularly involve discussion about how to improve emergency preparedness in western Massachusetts, and hazard mitigation activities are included in this discussion.

For the update of this Hazard Mitigation Plan, PVPC provided feedback from WRHSAC on regional mitigation activities and natural hazards pertaining to Cummington. This was the method through which WRHSAC was engaged in the planning process.

In addition, PVPC staff regularly present to their Executive Committee and Commission (representatives from the 43 cities and towns that comprise the Pioneer Valley, when new projects are launched and when funding opportunities are available). As result, all the communities in the region were informed of Cummington's 2016 Hazard Mitigation Plan Update process and encouraged to comment.

Agencies that have the authority to regulate development

The Cummington Planning Board is the primary Town agency responsible for regulating development in town. Feedback to the Planning Board was ensured through the participation of a member of the Planning Board on the Hazard Mitigation Committee. In addition, the Pioneer Valley Planning Commission, as a regional planning authority, works with all agencies that regulate development in Cummington, including the municipal entities listed above and state agencies, such as Department of Conservation and Recreation and MassDOT. This regular involvement ensured that during the development of the Cummington Hazard Mitigation Plan Update, the operational policies and any mitigation strategies or identified hazards from these entities were incorporated into the Hazard Mitigation Plan.

2: LOCAL PROFILE

Community Setting

Covering about 23 square miles, the rural Town of Cummington is located in Hampshire County in western Massachusetts. Nestled at the foothills of the Berkshires, Cummington is known as one of the "hilltowns." Cummington is situated in the uplands west of the Connecticut River Valley, northwest of Northampton, and east of Pittsfield with an elevation range from 918 feet to 2,080 feet above sea level. Cummington is bordered by the Towns of Ashfield, to the northeast; Goshen, to the East; Chesterfield, to the southeast; Worthington, to the south; Peru, to the southwest; Windsor, to the west-northwest; and Plainfield, to the north.

Because of its fairly remote location, the Town has been able to maintain a quiet, country character. Most current development consists of single-family homes; the remainder of land in Cummington is hilly and forested, with scattered open fields. The Old Creamery Grocery is the Town's only grocery store and gas station. The William Cullen Bryant Homestead is an important historical landmark and is protected by the Trustees of Reservations, and the Westfield River – a federally-designated Wild and Scenic River, flows through stretches of town.

Woolen and cotton mills and the making of palm leaf hats were the main industries in the 19th Century, but when the railroad bypassed the town, many industries vacated. Small family farms with dairy, fruit, or maple syrup operations were active and remain so today. The town's history is rich with artists and performers who made their home in Cummington, a tradition that also continues today.

This rural, residential community, with its scenic landscape and rural character has experienced significant residential population growth in recent years. Between 2000 and 2014, the town saw population decrease of 5.4% to 925 residents, and a 3.9% increase in housing units. Today, Cummington still maintains its traditionally rural roots.

Infrastructure

Cummington's infrastructure reflects its historically rural heritage, with limited town-wide development.

Roads and Highways

The town is traversed by Route 9 from east to west and Route 112 from north to south. But these two routes converge for the majority of their stretch through Town, making for primarily one main thoroughfare into neighboring Goshen.

Transit

The Franklin Regional Transit Authority (FRTA) contracts through MV Transportation to offer paratransit, a door-to-door demand responsive van service throughout Town for elderly.

Public Water and Sewer Service

Cummington's water supply comes from groundwater sources through two public water supply wells and individual private wells. The two public water supply systems, the Cummington Water system and the West Cummington Water system, provide nearly 100 connections in Town. Cummington also has five transient non-community (TNC) wells and one non-transient non-community well.

Cummington does not have a public sewer system or any publicly owned wastewater treatment plants. All residences and businesses are served by on-site septic systems.

Natural Resources

Cummington has been heavily shaped by its natural resources and landscape. Its rocky slopes and remoteness were key factors predicating its rural character originally, now they are sought-after home sites.

Water Resources

Surface waters cover a total of approximately 98 acres of the Town. These water resources provide valuable wildlife habitat and unique natural environments that provide Cummington's residents with prime recreational opportunities and exceptional water quality.

Cummington lies entirely within the northern portion of the Westfield River watershed with over half the Town draining directly into the river. The Westfield River flows southeast across the entire width of the Town for ten miles and the Swift River runs north to south before draining into the Westfield. Other prominent streams in Town include: Bronson Brook, Child's Brook, Kearney Brook, Meadow Brook, Mill Brook, Powell Brook, Swift River, Tower Brook, Westfield Brook, and Wolf Brook.

There are approximately 76 acres of wetlands in Cummington, which occur primarily along the streams and rivers in Town.

Forests and Fields

Over three-quarters (82%) of the total acreage of Cummington is forested, approximately 12,071 acres. Much of the forest is hardwood, consisting of red and white oak, red and sugar maple, cherry, ash, and birch. The majority conifers are white pine and hemlock, with some spots of cedar, red pine, and, rarely, spruce.

Additionally, there are about 1,651 acres of abandoned fields and orchards, this constitutes approximately 12% of Town land. These foregone agricultural lands provide good wildlife habitats. Shrub swampland and meadows each have their unique trees and grasses.

Development

Cummington's pattern of land use evolved from its rural heritage, remoteness of location and rocky terrain, and more recent increase in population.

In addition to other factors, zoning and other land use regulations constitute Cummington's "blueprint" for its future. Land use patterns over time will continue to look more and more like the town's zoning map until the town is finally "built out"—that is, there is no more developable land left. Therefore, in looking forward over time, it is critical that the town focus not on the current use and physical build-out today, but on the potential future uses and build-out that are allowed under the town's zoning map and zoning bylaws. Zoning is the primary land use tool that the town is using to manage development and direct growth to suitable and desired areas while also protecting critical resources and ensuring that development is in keeping with the town's character.

The Cummington Zoning Bylaw establishes two base zones, and two overlay districts:

- Rural-residential (RR) district – base zone district for residential, agricultural, and small business uses;
- Village (V) district – base zone district for light retail and service establishments;
- Floodplain and Westfield River Protection (FP) district – overlay district including all special flood hazard areas and/or 100 feet from the banks of the Westfield River;
- Water Supply Protection district – overlay district including all lands lying within the primary recharge areas of groundwater aquifers.

Although appropriate zoning is relevant to protecting the health and safety of the Town residents, Cummington's two overlay districts are specifically relevant to natural hazard mitigation. The Floodplain district limits development within the floodplain, and prevents potential flood damage, while the Water Supply Protection district prohibits and restricts potentially hazardous uses to prevent groundwater contamination.

The Zoning Bylaw also establishes a Site Plan/Special Permit Approval procedure for specific uses and structures within Cummington. This review allows the Special Permit Granting Authority the ability to review development to ensure that the basic safety and welfare of the people of Cummington are protected.

Current Development Trends

Cummington contains 23 square miles or 14,720 acres of land. The vast majority of this—12,242 acres—is undeveloped. Agricultural land is the second most prolific land use, at approximately 1,642 acres, and there is about one-third as much residential land (almost 550 acres). Land characterized as outdoor recreational land comprises 132 acres, and land characterized as urban open/public land comprises 40 acres. Cummington also has very small and equal amounts of commercial land and industrial land, 16 acres each. Finally, water comprises over 98 acres in Cummington. Currently, development in Cummington is strongly encouraged by existing zoning and other land use regulations to seek areas where the environmental conditions and existing public utilities support such development.

There have been no significant changes in development in Cummington since the first Hazard Mitigation plan was approved in 2010 that have affected the town's vulnerability to natural hazards.

Development in Hazard Areas

Most of the hazards identified in this plan are regional risks and, as such, all new development falls into the hazard area. The exception to this is flooding. According to the Community Information System (CIS) of FEMA, there were 80 structures located within the Special Flood Hazard Area (SFHA) in Cummington as of April 2004, the most current records in the CIS for the Town of Cummington.

National Flood Insurance Program

Cummington is a participating member of the National Flood Insurance Program, and has the following NFIP policy and claim statistics as of 01/13/2016.

- Flood Insurance Maps (FIRMs) are used for flood insurance purposes and are on file.
- FIRMs have been effective since June 1, 1981, with no updates since then. PVPC has requested an update to all Hampshire County FIRMs, but has not been advised if or when these will be completed. Hampden County FIRMs were updated by FEMA as of July 21, 2014 (http://www.mass.gov/anf/docs/itd/services/massgis/nfhl-status.pdf)

- There are 9 in-force policies in effect in Cummington for a total of $1,122,000 worth of flood insurance coverage.
- As of January 13, 2016, there were a total of 13 NFIP loss claims in Cummington for which a total $22,862 was paid.
- There has been one home defined as "Repetitive Loss Properties" under the NFIP within Cummington.

The Town will maintain compliance with the NFIP throughout the next 5-year hazard mitigation planning cycle by monitoring and enforcing its Flood Plain Overlay District and ensuring that the district accurately reflects the 100-year floodplain and FEMA Flood Insurance Rate Map.

3: HAZARD IDENTIFICATION & ANALYSIS

This section presents a summary of disasters that have affected, or could affect, Cummington. Historical research, conversations with local officials and emergency management personnel, available hazard mapping and other weather-related databases were used to develop this list. Information was also drawn from the Massachusetts State Hazard Mitigation Plan. Hazards are identified in the following categories:

1. Floods
2. Severe snows and ice storms
3. Hurricanes
4. Severe thunderstorms, winds, and tornadoes (includes microbursts)
5. Wildfire/brushfire
6. Earthquakes
7. Dam failure
8. Drought

Natural Hazard Analysis Methodology

The analysis of the hazards above is organized in the following categories: Hazard Description, Location, Extent, Previous Occurrences, Probability of Future Events, Impact, and Vulnerability. A description of each of these analysis categories follows.

Hazard Description

The natural hazards identified for Cummington are: floods, severe snowstorms/ice storms, hurricanes, severe thunderstorms / wind / tornadoes/microburst, wildfire/brushfire, earthquakes, dam failure, and drought. Many of these hazards result in similar impacts to a community. For example, hurricanes, tornadoes and severe snowstorms may cause wind-related damage.

Location

Location refers to the geographic areas within the planning area that are affected by the hazard. Some hazards affect the entire planning area universally, while others apply to a specific portion, such as a floodplain or area that is susceptible to wild fires. Classifications are based on the area that would potentially be affected by the hazard, on the following scale.

Table 3-1: Location of Occurrence, Percentage of Town Impacted by Given Natural Hazard

Location of Occurrence	Percentage of Town Impacted
Large	More than 50% affected
Medium	10 to 50% affected
Small	Less than 10% affected

Extent
Extent describes the strength or magnitude of a hazard. Where appropriate, extent is described using an established scientific scale or measurement system. Other descriptions of extent include water depth, wind speed, and duration.

Previous Occurrences
Previous hazard events that have occurred are described. Depending on the nature of the hazard, events listed may have occurred on a local, state-wide, or regional level.

Probability of Future Events
The likelihood of a future event for each natural hazard was classified according to the following scale:

Table 3-2: Frequency of Occurrence and Annual Probability of Given Natural Hazard

Frequency of Occurrence	Probability of Future Events
Very High	70-100% probability in the next year
High	40-70% probability in the next year
Moderate	10-40% probability in the next year
Low	1-10% probability in the next year
Very Low	Less than 1% probability in the next year

Impact
Impact refers to the effect that a hazard may have on the people and property in the community, based on the assessment of extent described above. Impacts are classified according to the following scale:

Table 3-3: Impacts, Magnitude of Multiple Impacts of Given Natural Hazard

Impacts	Magnitude of Multiple Impacts
Catastrophic	Multiple deaths and injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of facilities for 30 days or more.
Critical	Multiple injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than 1 week.
Limited	Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than 1 day.
Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of facilities.

Vulnerability

Based on the above metrics, a hazard index rating was determined for each hazard. The hazard index ratings are based on a scale of 1 through 5 as follows:

1 – Very high risk
2 – High risk
3 – Medium risk
4 – Low risk
5 – Very low risk

The ranking is qualitative and is based, in part, on local knowledge of past experiences with each type of hazard. The size and impacts of a natural hazard can be unpredictable.

However, many of the mitigation strategies currently in place and many of those proposed for implementation can be applied to the expected natural hazards, regardless of their unpredictability.

Profiling the Natural Hazards

Historical research, conversations with local officials and emergency management personnel, available hazard mapping and other weather-related databases were used to identify and profile the natural hazards which are most likely to have an impact on Cummington.

Each of these hazards was assessed by the Committee for previous occurrences, location of occurrence, extent of impacts, and probability of future events. This resulted in a ranking of hazard by risk, with 1 being high risk and 5 being low risk (see Table 3.1 below). More detailed descriptions of each of the points of analysis are included in the Identification and Vulnerability Assessment (below).

Table 3-4: Hazard Profiling and Risk Index Worksheet

Type of Hazard	Location of Occurrence	Extent of Impacts	Probability of Future Events	Hazard Risk Index Rating
Flooding (100-year)	Large	Critical	Low	1
Flooding (localized)	Medium	Limited	Very High	2
Severe Snow/Ice Storms	Large	Minor	High	3
Hurricanes	Large	Limited	Low	3
Severe Thunderstorms/ High Wind/ Tornado/ Microburst	Small	Minor	Very Low	4
Wildfire/Brushfire	Large	Minor	Low	3
Earthquake	Large	Critical	Very Low	4
Dam Failure	Small	Minor	Very Low	5
Drought	Large	Minor	Low	5

Natural Hazard Identification and Vulnerability Assessment

The following is a description of natural and manmade disasters, and the areas affected by them, that have or could affect the Town of Cummington. These natural disasters are: floods, severe snowstorms/ice storms, hurricanes, severe thunderstorms/high wind/tornadoes/microbursts, wildland fires/brushfires, earthquakes, dam failure, and drought. The *Past and Potential Hazards/Critical Facilities Map* (Appendix D) reflects the contents of this analysis.

Vulnerability Assessment Methodology

In order to determine estimated losses due to natural hazards in Cummington, each hazard area was analyzed with results shown below. The data below was calculated using FEMA's *Understanding Your Risks: Identifying Hazards and Estimating Losses*, August 2001.

Total value of all structures in Cummington (2016): $101,282,800

Median value of a home in Cummington (2016): $174,860

Average household size: 2.4 persons

Human losses are not calculated during this exercise, but could be expected to occur depending on the type and severity of the hazard. Most of these figures exclude both the land value and contents of the structure. The damage calculations are rough estimate and likely reflect worst-case scenarios. Computing more detailed damage assessment based on assessor's records is a labor-intensive task and beyond the scope of this project.

Flooding

Hazard Description

There are three major types of storms that can generate flooding in Cummington:

- Continental storms are typically low-pressure systems that can be either slow or fast moving. These storms originate from the west and occur throughout the year.

- Coastal storms, also known as nor'easters, usually occur in late summer or early fall and originate from the south. The most severe coastal storms, hurricanes, occasionally reach Massachusetts and generate very large amounts of rainfall.

- Thunderstorms form on warm, humid summer days and cause locally significant rainfall, usually over the course of several hours. These storms can form quickly and are more difficult to predict than continental and coastal storms.

A floodplain is the relatively flat, lowland area adjacent to a river, lake or stream. Floodplains serve an important function, acting like large "sponges" to absorb and slowly release floodwaters back to surface waters and groundwater. Over time, sediments that are deposited in floodplains develop into fertile, productive farmland like that found in the Connecticut River valley. In the past, floodplain areas were also often seen as prime locations for development. Industries were located on the banks of rivers for access to hydropower. Residential and commercial development occurred in floodplains because of their scenic qualities and proximity to the water. Although periodic flooding of a floodplain area is a natural occurrence, past and current development and alteration of these areas will result in flooding that is a costly and frequent hazard.

Location

The Floodplain Map for the Town of Cummington shows the 100-year and 500-year flood zones identified by FEMA flood maps. The 100-year flood zone is the area that will be covered by water as a result of a flood that has a one percent chance of occurring in any given year. Likewise, the 500-year flood has a 0.2 percent chance of occurring in any given year. In Cummington, there are several floodplain areas. Hundred year floodplains are located primarily along the Westfield River, but also along Westfield Brook, Shaw Brook, Meadow Brook and the Swift River. There are some smaller 500-year floodplains mapped as well. These are located primarily along the Westfield River, but there is also a small stretch along the Swift River. Much of Cummington's residential development is located in or near these flood areas.

Extent

Floods can be classified as one of two types: flash floods and general floods.

- **Flash floods** are the product of heavy, localized precipitation in a short time period over a given location. Flash flooding events typically occur within minutes or hours after a period of heavy precipitation, after a dam or levee failure, or from a sudden release of water from an ice jam. Most often, flash flooding is the result of a slow-moving thunderstorm or the heavy rains from a hurricane. In rural areas, flash flooding often occurs when small streams spill over their banks. However, in urbanized areas, flash flooding is often the result of clogged storm drains (leaves

and other debris) and the higher amount of impervious surface area (roadways, parking lots, roof tops).

- **General floods** may last for several days or weeks and are caused by precipitation over a longer time period in a particular river basin. Excessive precipitation within a watershed of a stream or river can result in flooding particularly when development in the floodplain has obstructed the natural flow of the water and/or decreased the natural ability of the groundcover to absorb and retain surface water runoff (e.g., the loss of wetlands and the higher amounts of impervious surface area in urban areas).

The average annual precipitation for Cummington and surrounding areas in northwestern Massachusetts is 46 inches.

Previous Occurrences

Town-wide flooding with the hurricanes of 1938 and 1955 had significant impacts throughout town. In 1938, all the bridges on Route 9 were lost. Photos from the time show that any roads with any slope turned into stream beds and were washed out, particularly Porter Hill Road, Luther Shaw Road, Bug Hill Road, and Lower Bryant Road. (Since these events, the Town has legally discontinued the maintenance of the upper portion of Bug Hill Road.) There were also many evacuations along Main and West Main streets. In 1955, the damage was much the same as in 1938. Following this later hurricane event, the state relocated the road bed for Route 9. The Cummington Natural Hazards Mitigation Planning Committee has noted that the scale of these events were significant, but residents were much more self sufficient in those years and worked with neighbors to make it through tough times. Families back then often had at least a year's worth of food supply on hand, and most families heated with wood (not electricity) and had a good supply of fuel. In addition, most families worked locally and a labor force was ready and able to help respond to the flood event. Farmers came out with dump trucks, tractors and other equipment to help repair roads.

In the early 1980s a major rain event dropping more than six inches of rain an hour washed out many roads in town, including Route 112 and Potash Hill Road. The town was again impacted by flooding when Hurricane Sandy hit New England in 2012.

Probability of Future Events

Based upon previous data, there is a very high probability (more than 70% in any given year) of localized flooding and a low probability of 100-year flooding occurring in Cummington. Flooding frequencies for the various floodplains in Cummington are defined by FEMA as the following:

- 10-year floodplain – 10% chance of flooding in any given year
- 25-year floodplain – 2.5% chance of flooding in any given year
- 100-year floodplain – 1% chance of flooding in any given year
- 500-year floodplain – 0.2% chance of flooding in any given year

Climate scientists predict that in the next few decades, climate change will increase the frequency and intensity of all storms that can cause flooding. Currently, floods are the most costly natural hazard in the United States, and climate change will only increase this damage. More information about the effect of Climate Change can be found in the Pioneer Valley Planning Commission's Climate Action Plan, available at www.sustainableknowledgecorridor.org.

The Massachusetts State Climate Change Adaptation Report has additional information about the impact of climate change and can be accessed at www.mass.gov/eea/air-water-climate-change/climate-change/climate-change-adaptation-report.html.

Impact

Using a total value of all structures in Cummington of $101,282,800 and an estimated 20 percent of damage to 10 percent of all structures, the estimate amount of damage from flooding would be $2,025,656. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate

Specific vulnerability assessments were estimated for sites within the SFHA which have been susceptible to 100-year floods in the past, they are described below. At this time the Town of Cummington has one repetitive loss property as defined by FEMA's NFIP at this time.

West Main Street and Bush Road

- Road located along floodplain of Westfield River;
- Segments of road tend to experience flooding in heavy rains;
- Approximately 28 residential structures in this area that have been affected or could be affected by a flood incident.

West Cummington Road

- Road located along floodplain of Westfield River;
- Segments of road tend to experience flooding in heavy rains;
- Approximately 21 residential structures in this area that have been affected or could be affected by a flood incident;
- This area is entirely residential.

Main Street (formerly Route 9)

- Road located along floodplain of Westfield River;
- Segments of road tend to experience flooding in heavy rains;
- Approximately 31 residential structures in this area that have been affected or could be affected by a flood incident.

Route 9

- Road located along floodplain of Westfield River;
- Segments of road tend to experience flooding in heavy rains;
- Approximately 31 residential structures in this area that have been affected or could be affected by a flood incident.

Porter Hill Road, Luther Shaw Road, and Lower Bryant Road

- All 3 roads have steep slopes that lead into floodplain of Westfield River;
- Segments of road tend to wash out in heavy rains;
- Approximately 28 residential structures in this area that have been affected or could be affected by a flood incident;
- This area is entirely residential.

Flooding (localized) – High Risk

In addition to the floodplains mapped by FEMA for the 100-year and 500-year flood, Cummington often experiences minor flooding at isolated locations due to drainage problems, or problem culverts. Generally, these small floods have had minor impacts, temporarily impacting roads and residents' yards. A storm in 2007 caused widespread damage to roadways in Town. Roads were undermined by floodwaters and caved in. Extensive damage occurred in association with culverts and ditches where there had been little maintenance over a 25-year period. No homes were damaged during this event.

The Highway Superintendent has identified 13 problem culverts in Town that either need to be cleaned or replaced with larger culverts. These culverts are on Stage Road, Harlow Road, Fairgrounds Road, French Road, Dodwells Road, Trow Road, Pleasant Street and Trouble Street.. Most of the flood hazard areas listed here were identified due to known past occurrence in the respective area. There are many areas with no record of previous flood incidents that could be affected in the future by heavy rain and runoff. Additionally, some of the culverts tend to be impacted by beavers.

To determine the vulnerability of the Town to localized flood events, Hazard Mitigation Committee members identified and tallied the number of structures. Specific vulnerability assessments were estimated for sites which have been susceptible to localized flooding in the past, and are described below.

<u>Grout Road</u>

This road has washed out with heavy rainfall, most recently in 1985. There are no critical facilities and no residences located near this trouble spot.

<u>Stage Road</u>

During a 2003 rainfall, sections of this road were lost. Waters rose to about seven to eight feet. There are approximately 36 residences along the entire length of Stage Road.

Vulnerability

Based on the above analysis, Cummington has a hazard index rating of **"2 - High risk"** for flooding (100-year) and a hazard index rating of **"1-Very high risk"** for localized flooding.

Areas of the town situated along the Westfield River and Swift River are most susceptible to flooding. This flooding can impact the structure located in them. The Savoy Road Wells and the Pettingill Memorial Field Wells, which supply the town's water supply, could be impacted during flooding of the Westfield River. The town would not be without access to water supply completely, as a third well is located outside of the flood hazard area. Additionally, the Ladies Benevolent Society, a designated shelter in Cummington, is located in the area that would be impacted by the Westfield River flooding. Most major evacuation routes in the town would also be vulnerable to floods and could impact that town's ability to evacuate.

Severe Snow/Ice Storm

Hazard Description

Snow is characterized as frozen precipitation in the form of six-sided ice crystal. In order for snow to occur, temperatures in the atmosphere (from ground level to cloud level) must be at or below freezing. The strongest form of a severe snow storm is a blizzard. Blizzards are characterized by frequent wind gusts above 35 miles per hour, limited to no visibility due to falling snow and extreme cold that lasts longer than three hours.

Ice storms are liquid rain that falls and freezes upon contact with cold objects. There must be an ice build-up of greater than ¼ inch for it to be considered an ice storm. When more than a ½ inch of ice build-up is forecasted a winter storm warning can be triggered.

Severe winter storms can pose a significant risk to property and human life because the rain, freezing rain, ice, snow, cold temperatures and wind associated with these storms can disrupt utility service, phone service, and make roadways extremely hazardous. Severe winter storms can also be deceptive killers. The types of deaths that can occur as a result of a severe winter storm include: traffic accidents on icy or snow-covered roads, heart attacks while shoveling snow, and hypothermia from prolonged exposure to cold temperatures. Infrastructure and other property are also at risk from severe winter storms and the associated flooding that can occur following heavy snow melt. Power and telephone lines, trees, and telecommunications structures can be damaged by ice, wind, snow, and falling trees and tree limbs. Icy road conditions or roads blocked by fallen trees may make it difficult to respond promptly to medical emergencies or fires. Prolonged, extremely cold temperatures can also cause inadequately insulated potable water lines and fire sprinkler pipes to rupture and disrupt the delivery of drinking water and cause extensive property damage.

New England generally experiences at least one or two severe winter storms each year with varying degrees of severity. Research on climate change indicates that there is great potential for stronger, more frequent storms as the global temperature increases. Severe winter storms typically occur during January and February; however, they can occur from late September through late April.

Location

The entire Town of Cummington is susceptible to severe snowstorms, which means the location of occurrence is “large.” Because these storms occur regionally, they would impact the entire town. Areas with of special concern in terms of snow and ice include: Bryant Farm, Joyners Farm, Howes Farm and Grace Hill Farm, Bryant Road, Brickhouse Lane, Lyman Flats, west and east end of Stage Road, and Harlow Road, Nash Hill Road, Porter Hill Road, Luther Shaw Road, Trouble Street, Mountain Road, Stage Road, Andrew Shaw Road, Harlow Road

Extent

The Northeast Snowfall Impact Scale (NESIS) developed by Paul Kocin of The Weather Channel and Louis Uccellini of the National Weather Service (Kocin and Uccellini, 2004) characterizes and ranks high-impact Northeast snowstorms. These storms have large areas of 10-inch snowfall accumulations and greater. NESIS has five categories: Extreme, Crippling, Major, Significant, and Notable. The index differs from other meteorological indices in that it uses population information in addition to meteorological measurements. Thus NESIS gives an indication of a storm's societal impacts.

NESIS scores are a function of the area affected by the snowstorm, the amount of snow, and the number of people living in the path of the storm. The aerial distribution of snowfall and population information are combined in an equation that calculates a NESIS score which varies from around one for smaller storms to over ten for extreme storms. The raw score is then converted into one of the five NESIS categories. The largest NESIS values result from storms producing heavy snowfall over large areas that include major metropolitan centers.

Table 3-5: Northeast Snowfall Impact Scale Categories

Category	NESIS Value	Description
1	1—2.499	Notable
2	2.5—3.99	Significant
3	4—5.99	Major
4	6—9.99	Crippling
5	10.0+	Extreme

Source: http://www.ncdc.noaa.gov/snow-and-ice/rsi/nesis

While the Town of Cummington has not tracked snowfalls in the community, the weather reporters for the local Channel 3 news station produced this summary report of the top 10 snowfalls recorded in the region since 1905.

24.0 inches | January 12, 2011

21.9 inches | February 12, 2006

21.0 inches | February 11-2, 1983

18.2 inches | December 19-20, 1945

17.7 inches | December 29, 1945

17.4 inches | February 19-20, 1934

17.0 inches | February 20-21, 1921

16.9 inches | February 6-7, 1978

16.9 inches | December 26-27, 1947

16.3 inches | March 5, 2001

16.2 inches | February 4, 1926

The Sperry-Piltz Ice Accumulation (SPIA) Index (below) is a prediction tool (algorithm) that can be used in conjunction with National Weather Service data to predict the impact of winter weather in terms of ice damage. It is currently being tested by the National Weather Service and FEMA in several regions with potential implementation in the future. In the meantime, the index provides an outline of the potential damage impacts of ice storms based on accumulation and wind.

Table 3-6: The Sperry-Piltz Ice Accumulation (SPIA) Index	
Ice Damage Index	**Damage and Impact Descriptions**
0	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
2	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
3	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1-5 days.
4	Prolonged and widespread utility interruptions with extensive damage to main distribution feeder lines and come high voltage transmission lines/structures/ Outages lasting 5-10 days.
5	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.

Source: http://www.spia-index.com/images/SPIAIndexDescription.png

Previous Occurrences

Based on data available from the National Oceanic and Atmospheric Administration, there are 47 winter storms since 1958 that have registered on the NESIS scale. Of these, approximately 26 storms resulted in snow falls in the Pioneer Valley of at least 10 inches. These storms are listed in the table below, in order of their NESIS severity.

Table 3-7: Winter Storms Producing Over 10 inches of Snow in Pioneer Valley region, 1958-2014			
Date	**NESIS Value**	**NESIS Category**	**NESIS Classification**
3/4/2013	3.05	2	Significant
2/7/2013	4.35	3	Major
10/29/2011	1.75	1	Notable
1/9/2011	5.31	3	Major
2/23/2010	5.46	3	Major
3/15/2007	2.54	2	Significant
1/21/2005	6.8	4	Crippling
2/15/2003	7.5	4	Crippling
3/31/1997	2.29	1	Notable
2/2/1995	1.43	1	Notable
2/8/1994	5.39	3	Major
3/12/1993	13.2	5	Extreme
1/25/1987	1.19	1	Notable
2/10/1983	6.25	4	Crippling
4/6/1982	3.35	2	Significant
2/5/1978	5.78	3	Major

1/19/1978	6.53	4	Crippling
2/18/1972	4.77	3	Major
12/25/1969	6.29	4	Crippling
2/22/1969	4.29	3	Major
2/8/1969	3.51	2	Significant
2/5/1967	3.5	2	Significant
2/2/1961	7.06	4	Crippling
1/18/1961	4.04	3	Major
12/11/1960	4.53	3	Major
3/2/1960	8.77	4	Crippling
2/14/1958	6.25	4	Crippling

Source: http://www.ncdc.noaa.gov/snow-and-ice/rsi/nesis

In addition to these storms, the Town of Cummington was significantly affected by the ice storm of December 11, 2008.This ice storm left most of the town without power for approximately a week. Some residents, however, were without power for up to nine days. There were no injuries or loss of life from this occurrence and the town worked to ensure that everyone was cared for. Beyond local knowledge, there is currently no good information at the local level about the frequency of ice storms in the past. According to the Massachusetts State Hazard Mitigation Plan, there were 20 major ice storms in Hamsphire County between 1971 and 2012. This equates to a major ice storm approximately every two years.

Cummington's recent history has not recorded any loss of life due to the extreme winter weather, but there are usually several incidents of property damage or personal injury each winter. In addition, during heavy snow years, accumulations can reach several feet deep. Cummington's mountainous terrain creates some steep grades, sometimes making plowing difficult and causing snow and ice hazards. Also, many of the farms and open meadows and fields throughout town cause snow drifts.

Probability of Future Events

Based upon the availability of records for Hampshire County, the likelihood that a severe snow storm will affect Cummington is "high" (between 40 and 70 percent in any given year).

Research on climate change indicates that there is great potential for stronger, more frequent storms as the global temperature increases. More information about the effect of Climate Change can be found in the Pioneer Valley Planning Commission's Climate Action Plan, available at www.sustainableknowledgecorridor.org.

The Massachusetts State Climate Change Adaptation Report has additional information about the impact of climate change and can be accessed at www.mass.gov/eea/air-water-climate-change/climate-change/climate-change-adaptation-report.html.

Impact

The Town faces a "minor" impact or less than 10 percent of total property damaged, from snowstorms.

Using a total value of all structures in Cummington of $101,282,800 and an estimated 10 percent of damage to 5 percent of all structures, the estimated amount of damage from snow is $506,414. The cost

of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate

The weight from multiple snowfall events can test the load ratings of building roofs and potentially cause significant damage. Multiple freeze-thaw cycles can also create large amounts of ice and make for even heavier roof loads.

Other impacts from snowstorms and ice storms include:

- Disrupted power and phone service
- Unsafe roadways and increased traffic accidents
- Infrastructure and other property are also at risk from severe winter storms and the associated flooding that can occur following heavy snow melt.
- Tree damage and fallen branches that cause utility line damage and roadway blockages
- Damage to telecommunications structures
- Reduced ability of emergency officials to respond promptly to medical emergencies or fires

Several specific locations are more susceptible to damage. These problem areas have been identified and assessed for vulnerability.

Bryant Farm, Joyners Farm, Howes Farm and Grace Hill Farm

Perhaps the greatest risk during a big snow storm in town is economic. There are three major milk farmers who must get their supply to processors or they stand to lose significant monies. The town works to assist these farmers in clearing all access roads to their farms so that trucks transporting milk can get in and out.

Bryant Road, Brickhouse Lane, Lyman Flats, west and east end of Stage Road, and Harlow Road

Any severe winter weather incident can cause significant snow drifting on these streets. This is due to large open fields that allow the wind to move swiftly across these expanses, moving snow into big drifts along these roadways.

Nash Hill Road, Porter Hill Road, Luther Shaw Road, Trouble Street, Mountain Road, Stage Road, Andrew Shaw Road, Harlow Road

Steep grades along all of these roads can be severely impacted by winter weather, making travel treacherous. These roads are narrow and there is little room to push accumulated snow.

Vulnerability

Based on the above assessment, Cummington has a hazard index rating of “1 — high risk” from snowstorms and ice storms.

All areas of the town and its critical facilities are vulnerable to sever snow and ice. Based on the expertise and experience of the local Hazard Mitigation Committee, ice storms are much more of an anticipated risk of substantive damage than are snow storms. Ice build up on roads could impede travel and evacuation efforts if needed. Additionally, ice can have a devastating impact on the town’s energy and communication infrastructure. Heavy snow in large quantities can put a strain on the town’s buildings and can be challenging to manage in terms of plowing. This can impact evacuation routes in town.

Hurricanes

Hazard Description

Hurricanes are classified as cyclones and defined as any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise in the Northern Hemisphere (or clockwise in the Southern Hemisphere) and whose diameter averages 10 to 30 miles across. The primary damaging forces associated with these storms are high-level sustained winds and heavy precipitation. Hurricanes are violent rainstorms with strong winds that can reach speeds of up to 200 miles per hour and which generate large amounts of precipitation. Hurricanes generally occur between June and November and can result in flooding and wind damage to structures and above-ground utilities.

Location

Because of the hazard's regional nature, all of Cummington is at risk from hurricanes, meaning the location of occurrence is "large." Ridgetops are more susceptible to wind damage. Areas susceptible to flooding are also likely to be affected by heavy rainfall.

Extent

As an incipient hurricane develops, barometric pressure (measured in millibars or inches) at its center falls and winds increase. If the atmospheric and oceanic conditions are favorable, it can intensify into a tropical depression. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and is closely monitored by the National Hurricane Center in Miami, Florida. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane. Hurricane intensity is further classified by the Saffir-Simpson Hurricane Wind Scale, which rates hurricane wind intensity on a scale of 1 to 5, with 5 being the most intense.

Table 3-8: Saffir-Simpson Scale

Category	Maximum Sustained Wind Speed (MPH)
1	74–95
2	96–110
3	111–129
4	130–156
5	157 +

Source: National Hurricane Center, 2012

Previous Occurrences

Hurricanes that have affected the region which includes Cummington are shown in the following table. According to the local Hazard Mitigation Committee and affirmed by the NOAA Historical Hurricane tracks, no hurricanes have tracked directly through Cummington.

Table 3-9: Major Hurricanes and Tropical Storms Affecting Pioneer Valley		
Hurricane/Storm Name	**Year**	**Saffir/Simpson Category (when reached MA)**
Great Hurricane of 1938	1938	3
Great Atlantic Hurricane	1944	1
Carol	1954	3
Edna	1954	1
Diane	1955	Tropical Storm
Donna	1960	Unclear, 1 or 2
Groundhog Day Gale	1976	Not Applicable
Gloria	1985	1
Bob	1991	2
Floyd	1999	Tropical Storm
Irene	2011	Tropical Storm
Sandy	2012	Super Storm

Hurricane Irene in August 2011 and Superstorm Sandy in late October of 2012 had severe impacts on much of the Northeastern United States. While much of Western Massachusetts was only minimally impacted, there was significant damage in Cummington. Many roads were flooded or washed out. No residents, however, encountered long-term displacement due to the storm's impacts.

Probability of Future Events

Cummington's location in western Massachusetts reduces the risk of extremely high winds that are associated with hurricanes, although it can experience some high wind events. Based upon past occurrences, it is reasonable to say that there is a "low" probability (1 percent to 10 percent in any given year) of hurricanes in Cummington. Climate change is projected to result in more severe weather, including increased occurrence of hurricanes and tropical storms. Because of this, the occurrence of hurricanes will increase in the future.

Impact

The Town faces a "limited" impact from hurricanes, with 10 percent or less of Cummington affected. Using a total value of all structures in Cummington of $101,282,800 and an estimated 10 percent of damage to 5 percent of all structures, the estimated amount of damage from wind is $506,414. Using a total value of all structures in Cummington of $101,282,800 and an estimated 20 percent of damage to 10 percent of all structures, the estimate amount of damage from flooding would be $2,025,656. Therefore, damage from a hurricane event (both wind and flood damage) could be estimate at $2,532,070. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate

A description of the damages that could occur due to a hurricane is described by the Saffir-Simpson scale, as shown below.

Table 3-10: Hurricane Damage Classifications			
Storm Category	**Damage Level**	**Description of Damages**	**Wind Speed (MPH)**
1	MINIMAL Very dangerous winds will produce some damage	No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Also, some coastal flooding and minor pier damage. An example of a Category 1 hurricane is Hurricane Dolly (2008).	74-95
2	MODERATE Extremely dangerous winds will cause extensive damage	Some roofing material, door, and window damage. Considerable damage to vegetation, mobile homes, etc. Flooding damages piers and small craft in unprotected moorings may break their moorings. An example of a Category 2 hurricane is Hurricane Francis in (2004).	96-110
3	EXTENSIVE Devastating damage will occur	Some structural damage to small residences and utility buildings, with a minor amount of curtain wall failures. Mobile homes are destroyed. Flooding near the coast destroys smaller structures, with larger structures damaged by floating debris. Terrain may be flooded well inland. An example of a Category 3 hurricane is Hurricane Ivan (2004).	111-129
4	EXTREME Catastrophic damage will occur	More extensive curtain wall failures with some complete roof structure failure on small residences. Major erosion of beach areas. Terrain may be flooded well inland. An example of a Category 4 hurricane is Hurricane Charley (2004).	130-156
5	CATASTROPHIC Catastrophic damage will occur	Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Flooding causes major damage to lower floors of all structures near the shoreline. Massive evacuation of residential areas may be required. An example of a Category 5 hurricane is Hurricane Andrew (1992).	157+

Vulnerability

Based on the above analysis, Cummington has a hazard index rating of "3 – medium risk" from hurricanes.

All areas of the town are vulnerable to the damage caused by hurricanes. The town's communication and energy infrastructure is particularly vulnerable to high winds that frequently accompany hurricanes. The vulnerabilities associated with flooding could be present if there is a substantial amount of rainfall, causing rivers to flood.

Severe Thunderstorms/Wind /Tornadoes/Microburst

Hazard Description

A thunderstorm is a storm with lightning and thunder produced by a cumulonimbus cloud, usually producing gusty winds, heavy rain, and sometimes hail. Effective January 5, 2010, the NWS modified the hail size criterion to classify a thunderstorm as 'severe' when it produces damaging wind gusts in excess of 58 mph (50 knots), hail that is 1 inch in diameter or larger (quarter size), or a tornado (NWS, 2013).

Wind is air in motion relative to surface of the earth. For non-tropical events over land, the NWS issues a Wind Advisory (sustained winds of 31 to 39 mph for at least 1 hour or any gusts 46 to 57 mph) or a High Wind Warning (sustained winds 40+ mph or any gusts 58+ mph). For non-tropical events over water, the NWS issues a small craft advisory (sustained winds 25-33 knots), a gale warning (sustained winds 34-47 knots), a storm warning (sustained winds 48 to 63 knots), or a hurricane force wind warning (sustained winds 64+ knots). For tropical systems, the NWS issues a tropical storm warning for any areas (inland or coastal) that are expecting sustained winds from 39 to 73 mph. A hurricane warning is issued for any areas (inland or coastal) that are expecting sustained winds of 74 mph. Effects from high winds can include downed trees and/or power lines and damage to roofs, windows, etc. High winds can cause scattered power outages. High winds are also a hazard for the boating, shipping, and aviation industry sectors.

Tornadoes are swirling columns of air that typically form in the spring and summer during severe thunderstorm events. In a relatively short period of time and with little or no advance warning, a tornado can attain rotational wind speeds in excess of 250 miles per hour and can cause severe devastation along a path that ranges from a few dozen yards to over a mile in width. The path of a tornado may be hard to predict because they can stall or change direction abruptly. Within Massachusetts, tornadoes have occurred most frequently in Worcester County and in communities west of Worcester, including towns in eastern Hampshire County. High wind speeds, hail, and debris generated by tornadoes can result in loss of life, downed trees and power lines, and damage to structures and other personal property (cars, etc.).

Microbursts are sudden down bursts of air that that funnel air directly down until it hits the ground and disperses outwards. Microbursts most commonly occur during strong thunderstorms. The scale and suddenness of microbursts make them difficult to predict with certainty, but it is possible to forecast the conditions that make microbursts much more likely. The high winds associated with microbursts can knock over full grown trees, damage buildings and are especially problematic for aircrafts.

Location

As per the Massachusetts Hazard Mitigation Plan, the entire Town is at risk of high winds, severe thunderstorms, microbursts, and tornadoes. The plan also identifies Cummington and the surrounding communities as having a high frequency of tornados occurrence within Massachusetts. However, the actual area affected by thunderstorms, wind, or tornadoes is "small," with less than 10 percent of the Town affected.

Extent

An average thunderstorm is 15 miles across and lasts 30 minutes; severe thunderstorms can be much larger and longer. Southern New England typically experiences 10 to 15 days per year with severe thunderstorms. Thunderstorms can cause hail, wind, and flooding.

Microbursts are typically less than three miles across. They can last anywhere from a few seconds to several minutes. Microbursts cause damaging winds up to 170 miles per hour in strength and can be accompanied by precipitation.

Tornadoes are measured using the enhanced F-Scale, shown with the following categories and corresponding descriptions of damage:

Table 3-11: Enhanced Fujita Scale Levels and Descriptions of Damage

EF-Scale Number	Intensity Phrase	3-Second Gust (MPH)	Type of Damage Done
EF0	Gale	65–85	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
EF1	Moderate	86–110	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
EF2	Significant	111–135	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
EF3	Severe	136–165	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
EF4	Devastating	166–200	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.

The extent of hail, which can be present in severe thunderstorms, can be found in the table below.

Table 3-12: Hail Extent	
Hail Size	**Object Analog**
.50	Marble, moth ball
.75	Penny
.88	Nickel
1.00	Quarter
1.25	Half dollar
1.50	Walnut, ping pong
1.75	Golf ball
2.00	Hen egg
2.50	Tennis ball
2.75	Baseball
3.00	Tea cup
4.00	Grapefruit
4.50	Softball

Source: http://www.spc.noaa.gov/misc/tables/hailsize.htm

Previous Occurrences

Because thunderstorms and wind affect the town regularly on an annual basis, there are not significant records available for these events. As per the Massachusetts Hazard Mitigation Plan, there are approximately 10 to 30 days of thunderstorm activity in the state each year.

Between 1950 and 2014, no known tornados have ever touched down in Cummington, and there have been several high-wind storms and hail events. In Western Massachusetts, the majority of sighted tornadoes have occurred in a swath east of Cummington, known as "tornado alley." Thirteen incidents of tornado activity (all F2[1] or less) occurred in Hampshire County between 1959 and 2015.

There was microburst in Cummington in 2015. No one was injured, but solar panels were ruined.

Probability of Future Events

One measure of tornado activity is the tornado index value. It is calculated based on historical tornado events data using USA.com algorithms. It is an indicator of the tornado level in a region. A higher tornado index value means a higher chance of tornado events. Data was used for Hampshire County to determine the Tornado Index Value as shown in the table below.

Table 3-13: Tornado Index for Hampshire County	
Hampshire County	125.73
Massachusetts	87.60
United States	136.45

Source: USA.com http://www.usa.com/hampshire-county-ma-natural-disasters-extremes.htm

[1] F2 refers to the commonly used Fujita Tornado Damage Scale which ranks tornados F0-F5 depending on estimated wind speeds and damages, with F5 the most severe.

Based upon the available historical record, as well as Cummington's location in a high-density cluster of state-wide tornado activity, there is a "very low" probability (less than 1 percent chance in any given year) of a tornado affecting the Town.

As per the Massachusetts Hazard Mitigation Plan, there are approximately 10 to 30 days of thunderstorm activity in the state each year. Thus, there is a "moderate" probability (10 percent to 40 percent chance in any given year) of a severe thunderstorm or winds affecting the Town.

Impact

Overall, Cummington faces a "minor" impact from severe thunderstorms, winds, or tornadoes, with 10 percent or less of the Town affected. Using a total value of all structures in Cummington of $101,282,800 and an estimated 10 percent of damage to 5 percent of all structures, the estimated amount of damage from a tornado is $506,414The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

The potential for locally catastrophic damage is a factor in any tornado, severe thunderstorm, or wind event. In Cummington, a tornado that hit the residential areas would leave much more damage than a tornado with a travel path that ran along the town's forested uplands, where little settlement has occurred. Most buildings in the town have not been built to Zone 1, Design Wind Speed Codes. The first edition of the Massachusetts State Building Code went into effect on January 1, 1975, and an estimated 75% of Cummington's housing stock was built prior to this date.

Vulnerability

Based on the above assessment, Cummington has a hazard index rating of "2- high risk" from severe thunderstorms and winds, and a "4 – low risk" from tornadoes.

All areas of the town are vulnerable to destruction caused by severe thunderstorms, wind and tornadoes. The town's communication and energy infrastructure is particularly vulnerable to high winds that frequently accompany severe thunderstorms and tornados. The vulnerabilities associated with flooding could be present if substantial rain accompanies the severe thunderstorms.

Wildfires/Brushfire

Hazard Description

Wildfires are typically larger fires, involving full-sized trees as well as meadows and scrublands. Brushfires are uncontrolled fires that occur in meadows and scrublands, but do not involve full-sized trees. Typical causes of brushfires and wildfires are lightning strikes, human carelessness, and arson.

FEMA has classifications for 3 different classes of wildfires:

- Surface fires are the most common type of wildfire, with the surface burning slowly along the floor of a forest, killing or damaging trees.
- Ground fires burn on or below the forest floor and are usually started by lightening
- Crown fires move quickly by jumping along the tops of trees. A crown fire may spread rapidly, especially under windy conditions.

Location

In Cummington, approximately 82% of the town's total land area is in forest, or about 12,071 acres, and is therefore at risk of fire. The total amount of town that could be affected by wildfire is categorized as "large," at between 80 percent to 100 percent of the total area.

Extent

Wildfires can cause widespread damage to the areas that they affect. They can spread very rapidly, depending on local wind speeds and be very difficult to get under control. Fires can last for several hours up to several days.

As described in the next section describing previous occurrences of wildfire, there have not been any major wildfires recorded in Cummington. However, based on other major wildfires that have occurred in western Massachusetts, it is estimated that such a fire would likely destroy around 50 to 500 acres of forested area.

The overall extent of wildfires is shown in the table below:

Extent of Wildfires

Table 3-14: Wildfire Rating and Description		
Rating	**Basic Description**	**Detailed Description**
CLASS 1: Low Danger (L) Color Code: Green	Fires not easily started	Fuels do not ignite readily from small firebrands. Fires in open or cured grassland may burn freely a few hours after rain, but wood fires spread slowly by creeping or smoldering and burn in irregular fingers. There is little danger of spotting.
CLASS 2: Moderate Danger (M) Color Code: Blue	Fires start easily and spread at a moderate rate	Fires can start from most accidental causes. Fires in open cured grassland will burn briskly and spread rapidly on windy days. Woods fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel – especially draped fuel -- may burn hot. Short-distance spotting may occur, but is not persistent. Fires are not likely to become serious and control is relatively easy.
CLASS 3: High Danger (H) Color Code: Yellow	Fires start easily and spread at a rapid rate	All fine dead fuels ignite readily and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly and short-distance spotting is common. High intensity burning may develop on slopes or in concentrations of fine fuel. Fires may become serious and their control difficult, unless they are hit hard and fast while small.
CLASS 4: Very High Danger (VH) Color Code: Orange	Fires start very easily and spread at a very fast rate	Fires start easily from all causes and immediately after ignition, spread rapidly and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop high-intensity characteristics - such as long-distance spotting - and fire whirlwinds, when they burn into heavier fuels. Direct attack at the head of such fires is rarely possible after they have been burning more than a few minutes.
CLASS 5: Extreme (E) Color Code: Red	Fire situation is explosive and can result in extensive property damage	Fires under extreme conditions start quickly, spread furiously and burn intensely. All fires are potentially serious. Development into high-intensity burning will usually be faster and occur from smaller fires than in the Very High Danger class (4). Direct attack is rarely possible and may be dangerous, except immediately after ignition. Fires that develop headway in heavy slash or in conifer stands may be unmanageable while the extreme burning condition lasts. Under these conditions, the only effective and safe control action is on the flanks, until the weather changes or the fuel supply lessens.

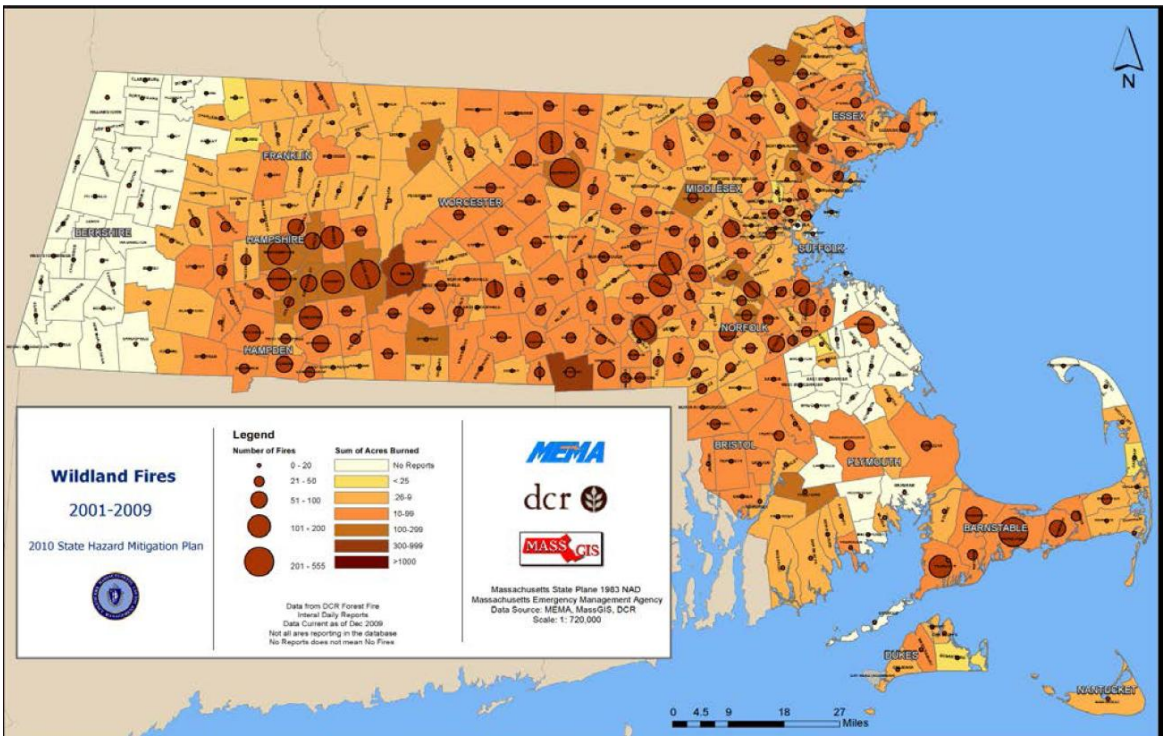
Previous Occurrences

Cummington has not had a brush fire since the 1950s when a large blaze burned up many forested acres near Dodwell Street and Brickhouse Flats. The whole town is wooded and damage from a fire could be high. Most of the residences in Town, however, are located along West Main Street and Main Street where fields and open spaces tend to provide a break between homes and the forest. Illegal brushfires are kept to a minimum in Cummington through a very limited burn season and through serious enforcement of permits. According to the Cummington Fire Department, there are on average approximately two to three unauthorized burns (or brushfires) per year.

During the past 100 years, there have not been many wildfires occurring in the Pioneer Valley. However, several have occurred during the past 20 years, as shown in the list below:

- 1995 – Russell, 500 acres burned on Mt. Tekoa
- 2000 – South Hadley, 310 acres burned over 14 days in the Litihia Springs Watershed
- 2001 – Ware, 400 acres burned
- 2010 – Russell, 320 acres burned on Mt. Tekoa
- 2012 – Eastern Hampden County, dry conditions and wind gusts created a brush fire in Brimfield, and burned 50 acres

Wildland Fires in Massachusetts, 2001-2009



Source: Massachusetts Hazard Mitigation Plan

Probability of Future Events

In accordance with the Massachusetts Hazard Mitigation Plan, the Hazard Mitigation Committee found it is difficult to predict the likelihood of wildfires in a probabilistic manner because the number of variables involved. However, based on previous occurrences, the Committee determined the probability

of naturally caused future fire events to be “low” (1 percent to 10 percent probability in the next year). And the vast majority of fires are caused by human error.

Climate scenarios project summer temperature increases between 2ºC and 5ºC and precipitation decreases of up to 15 percent. Such conditions would exacerbate summer drought and further promote high-elevation wildfires, releasing stores of carbon and further contributing to the buildup of greenhouse gases. Forest response to increased atmospheric carbon dioxide—the so-called “fertilization effect”—could also contribute to more tree growth and thus more fuel for fires, but the effects of carbon dioxide on mature forests are still largely unknown.

Climate change is also predicted to bring increased wind damage from major storms, as well as new types of pests to the region. Both increased wind and the introduction of new pests could potentially create more debris in wooded areas and result in a larger risk of fires.

Impact

While a large wildfire could damage much of the landmass of Cummington, these areas are not populated by people, meaning that wildfire affected areas are not likely to cause damage to property. For this reason, the Town faces a “minor” impact from wildfires, with very few damages likely to occur.

Using a total value of all structures in Cummington of $101,282,800 and an estimated 50 percent of damage to 1 percent of all structures, the estimated amount of damage from a forest fire is $506,414. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Both wildfires and brushfires can consume homes, other buildings and/or agricultural resources. The impact of wildfires and brushfires are as follows:

- Impact to benefits that people receive from the environment, such as food/water and the regulation of floods and drought
- Impact on local heritage, through the destruction of natural features
- Impact to the economy, due to damage to property and income from land following a wildfire
- Impact through the destruction of people and property

Vulnerability

Based on the above assessment, Cummington has a hazard risk index of “3 – medium risk” from wildfires.

Because 82% of the town is forested, all areas are vulnerable to wildfires. Depending on the size and magnitude of the burn, all critical facilities and evacuation routes could be vulnerable.

Earthquakes

Hazard Description

An earthquake is a sudden, rapid shaking of the ground that is caused by the breaking and shifting of rock beneath the Earth's surface. Earthquakes can occur suddenly, without warning, at any time of the year. New England experiences an average of 30 to 40 earthquakes each year although most are not noticed by people.[2] Ground shaking from earthquakes can rupture gas mains and disrupt other utility service, damage buildings, bridges and roads, and trigger other hazardous events such as avalanches, flash floods (dam failure) and fires. Un-reinforced masonry buildings, buildings with foundations that rest on filled land or unconsolidated, unstable soil, and mobile homes not tied to their foundations are at risk during an earthquake.[3]

Location

Because of the regional nature of the hazard, the entire Town of Cummington is susceptible to earthquakes. This makes the location of occurrence "large," or over 50 percent of the total area.

Extent

The magnitude of an earthquake is measured using the Richter Scale, which measures the energy of an earthquake by determining the size of the greatest vibrations recorded on the seismogram. On this scale, one step up in magnitude (from 5.0 to 6.0, for example) increases the energy more than 30 times. The intensity of an earthquake is measured using the Modified Mercalli Scale. This scale quantifies the effects of an earthquake on the Earth's surface, humans, objects of nature, and man-made structures on a scale of I through XII, with I denoting a weak earthquake and XII denoting an earthquake that causes almost complete destruction.

Table 3-15: Richter Scale Magnitudes and Effects

Magnitude	Effects
< 3.5	Generally not felt, but recorded.
3.5 - 5.4	Often felt, but rarely causes damage.
5.4 - 6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1 - 6.9	Can be destructive in areas up to about 100 kilometers across where people live.
7.0 - 7.9	Major earthquake. Can cause serious damage over larger areas.
8 or >	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

[2] Northeast States Emergency Consortium Web site: *www.nesec.org/hazards/earthquakes.cfm.*
[3] Federal Emergency Management Agency Web site: *www.fema.gov/hazards/earthquakes/quake.shtm.*

Table 3-16: Modified Mercalli Intensity Scale for and Effects			
Scale	**Intensity**	**Description Of Effects**	**Corresponding Richter Scale Magnitude**
I	Instrumental	Detected only on seismographs.	
II	Feeble	Some people feel it.	< 4.2
III	Slight	Felt by people resting; like a truck rumbling by.	
IV	Moderate	Felt by people walking.	
V	Slightly Strong	Sleepers awake; church bells ring.	< 4.8
VI	Strong	Trees sway; suspended objects swing, objects fall off shelves.	< 5.4
VII	Very Strong	Mild alarm; walls crack; plaster falls.	< 6.1
VIII	Destructive	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged.	
IX	Ruinous	Some houses collapse; ground cracks; pipes break open.	< 6.9
X	Disastrous	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread.	< 7.3
XI	Very Disastrous	Most buildings and bridges collapse; roads, railways, pipes and cables destroyed; general triggering of other hazards.	< 8.1
XII	Catastrophic	Total destruction; trees fall; ground rises and falls in waves.	> 8.1

Source: US Federal Emergency Management Agency

Previous Occurrences

The most recent earthquakes to affect the region are shown in the table below. Experts say the region's geology can make the effects felt in an area up to 10 times larger than quakes of similar size on the West Coast. These earthquakes were not felt in Cummington and did not cause any damage.

Table 3-17: Largest Earthquakes Affecting the Region, MA, 1925 – 2015		
Location	**Date**	**Magnitude**
Ossipee, NH	December 20, 1940	5.5
Ossipee, NH	December 24, 1940	5.5
Dover-Foxcroft, ME	December 28, 1947	4.5
Kingston, RI	June 10, 1951	4.6
Portland, ME	April 26, 1957	4.7
Middlebury, VT	April 10, 1962	4.2
Near NH Quebec Border, NH	June 15, 1973	4.8
West of Laconia, NH	Jan. 19, 1982	4.5
Plattsburg, NY	April 20, 2002	5.1
Bar Harbor, NH	October 3, 2006	4.2
Hollis Center, ME	October 16, 2012	4.6

Source: Northeast States Emergency Consortium website, www.nesec.org/hazards/earthquakes.cfm

Table 3-18: New England States Record of Historic Earthquakes		
State	**Years of Record**	**Number Of Earthquakes**
Connecticut	1668 - 2007	137
Maine	1766 - 2007	544
Massachusetts	1668 - 2007	355
New Hampshire	1638 - 2007	360
Rhode Island	1776 - 2007	38
Vermont	1843 - 2007	73
New York	1840 - 2007	755
Total Number of Earthquakes within the New England states between 1638 and 1989 is 2262.		

Source: Northeast States Emergency Consortium website www.nesec.org/hazards/earthquake.cfm

Probability of Future Events

One measure of earthquake activity is the Earthquake Index Value. It is calculated based on historical earthquake events data using USA.com algorithms. It is an indicator of the earthquake activity level in a region. A higher earthquake index value means a higher chance of earthquake events. Data was used for Hampshire County to determine the Earthquake Index Value as shown in the table below.

Table 3-19: Earthquake Index for Hampshire County	
Hampshire County	0.17
Massachusetts	0.70
United States	1.81

Source: USA.com

Based upon existing records, there is a “very low” frequency (less than 1 percent probability in any given year) of an earthquake in Cummington.

Impact

Massachusetts introduced earthquake design requirements into their building code in 1975 and improved building code for seismic reasons in the 1980s. However, these specifications apply only to new buildings or to extensively-modified existing buildings. Buildings, bridges, water supply lines, electrical power lines and facilities built before the 1980s may not have been designed to withstand the forces of an earthquake. This is particularly true for a large number of the buildings in Cummington, most of which could likely be completely destroyed by a significant earthquake. The seismic standards have also been upgraded with the 1997 revision of the State Building Code. Liquefaction of the land near water could also lead to extensive destruction.

The Town faces a “critical” impact from significant earthquakes, with more than 25 percent of Cummington affected. Using a total value of all structures in Cummington of $101,282,800 and an estimated 100 percent of damage to 25 percent of all structures (“critical” impact), the estimated amount of damage from an earthquake is $25,320,700. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

While a significant earthquake, estimated to be approximately of magnitude 6.1 or higher, would cause the impact described above, a smaller earthquake would have "minor" impact from a smaller earthquake, with only small damage to property. As shown in the table of the Richter Scale above, an earthquake of 6.0 or lower would result in at most slight damage to well-designed buildings, which are the vast majority of structures in Cummington. Earthquakes between 3.5 and 5.4 would be felt but rarely cause damage, and earthquakes smaller than 3.5 would not be noticed.

Vulnerability

Based on the above analysis, Cummington has a hazard index rating of “4- low risk” from earthquakes.

The entire town is vulnerable to earthquakes. Older buildings are more vulnerable because their construction pre-dates building codes that included seismic considerations. This includes much of Cummington’s building stock, including some of the town’s historic structures. A loss of these structures could also result in a loss of the town’s historic and cultural identity. Evacuation routes with bridges are also vulnerable to the impact of an earthquake. Route 9 and West Main Street both have bridges and all other evacuation routes in town include a number of culverts, meaning that if a big enough earthquake were to hit, evacuation and response efforts could be hampered.

Dam Failure

Hazard Description

Dams and levees and their associated impoundments provide many benefits to a community, such as water supply, recreation, hydroelectric power generation, and flood control. However, they also pose a potential risk to lives and property. Dam or levee failure is not a common occurrence, but dams do represent a potentially disastrous hazard. When a dam or levee fails, the potential energy of the stored water behind the dam is released rapidly. Most dam or levee failures occur when floodwaters above overtop and erode the material components of the dam. Often dam or levee breeches lead to catastrophic consequences as the water rushes in a torrent downstream flooding an area engineers refer to as an "inundation area." The number of casualties and the amount of property damage will depend upon the timing of the warning provided to downstream residents, the number of people living or working in the inundation area, and the number of structures in the inundation area.

Many dams in Massachusetts were built during the 19th Century without the benefit of modern engineering design and construction oversight. Dams of this age can fail because of structural problems due to age and/or lack of proper maintenance, as well as from structural damage caused by an earthquake or flooding.

The Massachusetts Department of Conservation and Recreation Office of Dam Safety is the agency responsible for regulating dams in the state (M.G.L. Chapter 253, Section 44 and the implementing regulations 302 CMR 10.00). To be regulated, these dams are in excess of 6 feet in height (regardless of storage capacity) and have more than 15 acre feet of storage capacity (regardless of height). Dam safety regulations enacted in 2005 transferred significant responsibilities for dams from the State of Massachusetts to dam owners, including the responsibility to conduct dam inspections.

Location

According to DCR sources, as well as local knowledge, there are currently three (3) dams in Cummington[4]. The follow table identifies the dams within the town as well as whether they are classified as low, significant, or high hazards.

Table 3-20: Cummington Dams, Classified by Hazard Risk

Dam name/ date built	ID	Owner	Purpose	Hazard Risk
Cummington Activity Center Dam @ Swift River Academy	MA01848	Graeme Dawson		Downgraded from Low to Non jurisdictional
Dam @ Bryant Homestead	Not on state list	Trustees of the Reservations	Fire Pond	
Dam @ Shire Village	Not on state list			

[4] It is difficult to track down accurate records of dams, as ownership and exact location is not clear. Furthermore, many very old dams listed in DCR records are not in existence anymore, according to local knowledge. This list is compiled from a combination of sources, and then verified by the Committee.

Extent

Often dam or levee breaches lead to catastrophic consequences as the water ultimately rushes in a torrent downstream flooding an area engineers refer to as an "inundation area." The number of casualties and the amount of property damage will depend upon the timing of the warning provided to downstream residents, the number of people living or working in the inundation area, and the number of structures in the inundation area.

Dams in Massachusetts are assessed according to their risk to life and property. The state has three hazard classifications for dams:

- *High Hazard*: Dams located where failure or improper operation will likely cause loss of life and serious damage to homes, industrial or commercial facilities, important public utilities, main highways, or railroads.

- *Significant Hazard*: Dams located where failure or improper operation may cause loss of life and damage to homes, industrial or commercial facilities, secondary highways or railroads or cause interruption of use or service of relatively important facilities.

- *Low Hazard*: Dams located where failure or improper operation may cause minimal property damage to others. Loss of life is not expected.

Previous Occurrences

Cummington has a history of one dam failure, during the 1955 flood. The dam, which was located on the Westfield River and generated power for Paper Mill Village in West Cummington, was never reconstructed. There are several minor dams or other water-control devices throughout town, mostly owned privately. However, none of the current dams hold significant amounts of water.

Probability of Future Events

As Cummington's dams age, and if maintenance is deferred, the likelihood of a dam failure will increase, but, currently the frequency of dam failures is less than 1% in any given year, or "very low."

As described in the Massachusetts Hazard Mitigation Plan, dams are designed partly based on assumptions about a river's flow behavior, expressed as hydrographs. Changes in weather patterns can have significant effects on the hydrograph used for the design of a dam. If the hygrograph changes, it is conceivable that the dam can lose some or all of its designed margin of safety, also known as freeboard. If freeboard is reduced, dam operators may be forced to release increased volumes earlier in a storm cycle in order to maintain the required margins of safety. Such early releases of increased volumes can increase flood potential downstream.

Dams are constructed with safety features known as "spillways." Spillways are put in place on dams as a safety measure in the event of the reservoir filling too quickly. Spillway overflow events, often referred to as "design failures," result in increased discharges downstream and increased flooding potential. Although climate change will not increase the probability of catastrophic dam failure, it may increase the probability of design failures

Impact

The Hazard Mitigation Committee has determined that Cummington faces a “minor" impact from dam failure, with minimal damage to property occurring. Using a total value of all structures in Cummington of $101,282,800 and an estimated 10% of damage to 1% of all structures, the estimated amount of damage from a dam failure is $101,282. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Vulnerability

Based on this analysis, Cummington has a hazard risk index rating of **“5 - Very Low Risk”** from dam failure.

The Bryant Homestead and Shire Village Camp have been identified as vulnerable areas if a dam were to fail. The Bryant Homestead is a historical and cultural amenity for the town and a dam failure could result in the loss of it. Additionally, dam failure could affect Route 9 and West Cummington Road, impeding evacuation efforts.

Drought

Hazard Description

Drought is a normal, recurrent feature of climate. It occurs almost everywhere, although its features vary from region to region. In the most general sense, drought originates from a deficiency of precipitation over an extended period of time, resulting in a water shortage for some activity, group, or environmental sector. Reduced crop, rangeland, and forest productivity; increased fire hazard; reduced water levels; increased livestock and wildlife mortality rates; and damage to wildlife and fish habitat are a few examples of the direct impacts of drought. Of course, these impacts can have far-reaching effects throughout the region and even the country.

Location

Because of this hazard's regional nature, a drought would impact the entire town, meaning the location of occurrence is "large" or over 50 percent of the Town affected.

Extent

The severity of a drought would determine the scale of the event and would vary among city residents depending on whether the residents' water supply is derived from a private well or the public water system.

The U.S. Drought Monitor also records information on historical drought occurrence. Unfortunately, data could only be found at the state level. The U.S. Drought Monitor categorizes drought on a D0-D4 scale as shown below.

Table 3-21: U.S. Drought Monitor

Classification	Category	Description
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered
D1	Moderate Drought	Some damage to crops, pastures; streams, reservoirs, or wells low, some water shortages developing or imminent; voluntary water-use restrictions requested
D2	Severe Drought	Crop or pasture losses likely; water shortages common; water restrictions imposed
D3	Extreme Drought	Major crop/pasture losses; widespread water shortages or restrictions
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies

Source: US Drought Monitor, http://droughtmonitor.unl.edu/classify.htm

Previous Occurrences

In Massachusetts, six major droughts have occurred statewide since 1930.[5] They range in severity and length, from three to eight years. In many of these droughts, water-supply systems were found to be inadequate. Water was piped in to urban areas, and water-supply systems were modified to permit withdrawals at lower water levels. As of September of 2016, most of the state has been impacted by an extended drought. The drought's impact on Cummington has been minimal.

The following table indicates previous occurrences of drought since 2000, based on the US Drought Monitor:

Table 3-22: Annual Drought Status

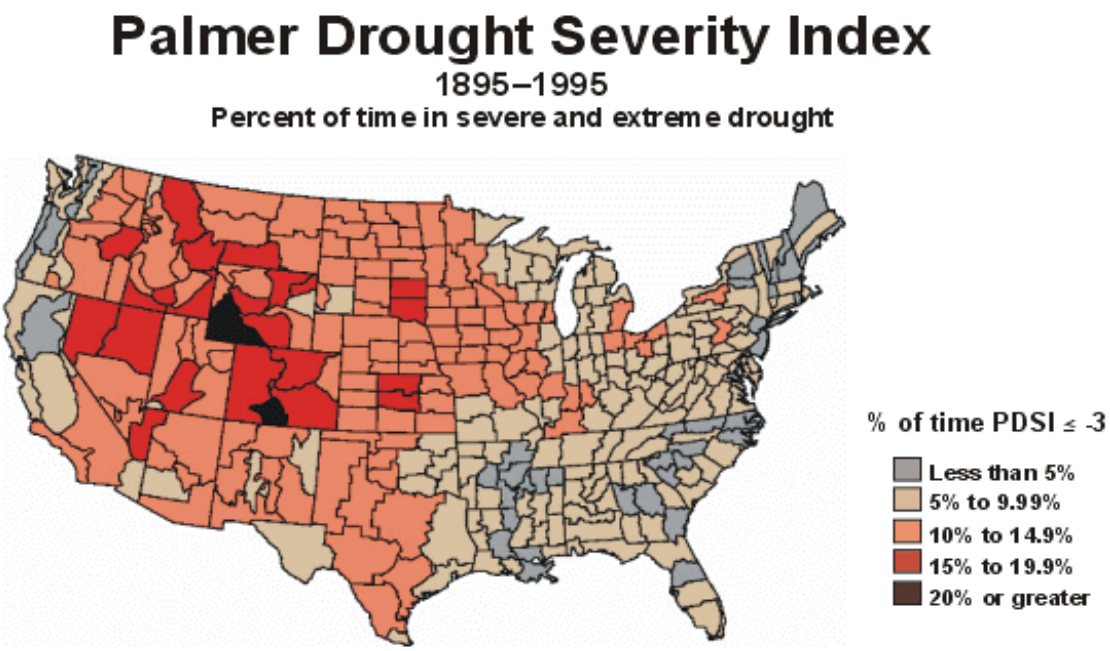
Year	Maximum Severity
2000	No drought
2001	D2 conditions in 21% of the state
2002	D2 conditions in 99% of the state
2003	No drought
2004	D0 conditions in 44% of the state
2005	D1 conditions in 7% of the state
2006	D0 conditions in 98% of the state
2007	D1 conditions in 71% of the state
2008	D0 conditions in 57% of the state
2009	D0 conditions in 44% of the state
2010	D1 conditions in 27% of the state
2011	D0 conditions in 0.01% of the state
2012	D2 conditions in 51% of the state
2013	D1 conditions in 60% of the state
2014	D1 conditions 54% of the state
2015	D3 conditions in 52% of the state

Source: US Drought Monitor

Probability of Future Events

In Cummington, as in the rest of the state, drought occurs at a "low" probability (1 to 10 percent in the next year). Based on past events and current criteria outlined in the Massachusetts Drought Management Plan, it appears that western Massachusetts may be more vulnerable than eastern Massachusetts to severe drought conditions. However, many factors, such as water supply sources, population, economic factors (i.e., agriculture based economy), and infrastructure, may affect the severity and length of a drought event. When evaluating the region's risk for drought on a national level, utilizing a measure called the Palmer Drought Severity Index, Massachusetts is historically in the lowest percentile for severity and risk of drought.[6]

[5] US Geological Survey Water-Supply Paper 2375. "National Water Summary 1989 – Floods and Droughts: Massachusetts." Prepared by S. William Wandle, Jr., US Geological Survey.
[6] National Drought Mitigation Center – http://drought.unl.edu



Impact

The impact of droughts is categorized by the U.S. Drought Monitor include:

- Slowing or loss of crops and pastures
- Water shortages or restrictions
- Minor to significant damage to crops, pastures;
- Low water levels in streams, reservoirs, or wells

Due to the water richness of Western Massachusetts, Cummington is not likely to be impacted by anything other than a major, extended drought. However, the Town's local aquifer supply would help to reduce the effects of widespread drought on the local water supply. The impact of a drought is thus "minor," with very few damages to people or property likely to occur.

Vulnerability

Based on the above assessment, Cummington has a hazard index rating of "5 – very low risk" from drought. No loss of property or damages to people or property is expected due to this hazard.

While a major, extended drought would require water saving measures to be implemented to ensure that the town has a sufficient water supply, there would be no foreseeable damage to structures or loss of life resulting from the hazards.

4: CRITICAL FACILITIES

A Critical Facility is defined as a building, structure, or location which:

- Is vital to the hazard response effort.
- Maintains an existing level of protection from hazards for the community.
- Would create a secondary disaster if a hazard were to impact it.

Critical Facilities within Hazard Areas

Hazards identified in this plan are regional risks and, as such, all critical facilities fall into the hazard area. The exception to this is flooding. There are several critical facilities that fall within the 100-year floodplain as shown in the table at the end of this section.

The Critical Facilities List for the Town of Cummington has been identified utilizing a Critical Facilities List provided by the State Hazard Mitigation Officer. Cummington's Hazard Mitigation Committee has broken up this list of facilities into four 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 have been identified by the Committee as non-essential. These are not required in an emergency response event, but are considered essential for the everyday operation of Cummington.
- The third category contains Facilities/Populations that the Committee wishes to protect in the event of a disaster.
- The fourth category contains Potential Resources, which can provide services or supplies in the event of a disaster.

The critical facilities and evacuation routes potentially affected by hazard areas are identified in Table 4-1, following this list. The Past and Potential Hazards/Critical Facilities Map (Appendix D) identifies these facilities.

Category 1 – Emergency Response Services

The Town has identified the Emergency Response Facilities and Services as the highest priority in regards to protection from natural and man-made hazards.

Emergency Operations Center

- Primary: Public Safety Complex, 8 Fairgrounds Road
- Secondary: Community House, 33 Main Street
- Tertiary: Highway Department, 20 Fairgrounds Road

Volunteer Fire Department, Public Safety Complex, 8 Fairgrounds Road

Police Department, 18 A Main Street

Community House, 33 Main Street (houses essential town records)

Water Supply
- Savoy Road Well
- Pettingill Memorial Field Well (along Westfield River), drive is between 12 and 16 Main Street
- Fanny Rogers Spring, off Dodwells Road

Water Supply (other public sources)
- Greenwood School of Music, 32 Harlow Road
- Farmstand
- Old Creamery, 445 Berkshire Trail (Route 9)
- Shire Village Camp, Mellor Road
- Academy at Swift River, 151 South Street

Water Storage Tanks
- Bush Road, Plainfield
- Dodwells Water Storage Tank, Dodwells Road
- Village Storage Tank, Route 9

Emergency Fuel Stations
- Town Garage @ Highway Department, 20 Fairgrounds Road

Emergency Electrical Power (portable units)
- Cummington Volunteer Fire Department ,16 Main Street (5 portable units)

Emergency Shelters (* indicates emergency generators)
- Berkshire Trail Elementary School Building, 2 Main Street
- *Community House, 33 Main Street
- Fairgrounds (in summer)
- Greenwood School of Music, 32 Harlow Road
- *Public Safety Complex, 8 Fairgrounds Road
- Shire Village Camp, Mellor Road (in summer)
- *Academy at Swift River, 151 South Street
- Village Church, 31 Main Street
- West Cummington Congregational Church Parish House, 1 Church Lane

Transfer Station, 12 Fairgrounds Road

Helicopter Landing Sites
- Pettingill Memorial Field, 14 Main Street (3 season only)
- Route 9 (if Pettingill Memorial Field covered in snow)

Communications

- Cell tower—12 Andrew Shaw Road
- Cell tower—Stage Road
- Public Safety Complex, 8 Fairgrounds Road
- Verizon Central Office, 27 Main Street

Primary Evacuation Routes *

- Route 9 (to the east and west)
- Route 112 (to the south)
- Plainfield Road (to the north—if on north side of Westfield River)
- Fairgrounds Road to Porter Hill Road to Route 112 (to the south)
- West Main to Bush Road
- West Cummington Road
- Savoy Road (to the north—once bridge is rebuilt, currently an unofficial detour)

*flooding could be problematic for many of these routes.

Bridges/Culverts Located on Evacuation Routes

- Route 9— 17 culverts, 7 bridges
- Route 112—28 culverts
- Plainfield Road—25 culverts
- Fairgrounds Road—11culverts
- Porter Hill Road—23 culverts
- West Main—12 culverts, 2 bridges
- Bush Road—5 culverts
- West Cummington Road—40 culverts

Category 2 – Non Emergency Response Facilities

The town has identified these facilities as non-emergency facilities; however, they are considered essential for the everyday operation of Cummington.

Problem Culverts

The Town's Highway Superintendent developed a list of problem culverts. This task was a mitigation action for the Town in their previous Hazard Mitigation Plan. Problem Culverts include:

Stage Road West:

- 2' culvert is too small. Needs 4' culvert or bigger
- Two 15" culverts need cleaning
- One 15" needs to be replaced

Stage Road East:

- Two 15" culverts are too small. Needs to be replaces with 18"
- One 15" culvert needs to be cleaned

Harlow Road:

- One 15" culvert needs cleaning

Fairgrounds Road

- 3’ culvert is underwater. Road needs to be raised.

French Road

- 2’ culvert needs end inlet cleaned

Dodwells Road

- Keep 3 inlets clean from farmer

Trow Road

- Replace one 10” culvert with 15” culvert

Pleasant Street

- Replace one 12” culvert with 15” culvert

Trouble Street

- Clean three 15” culverts

Category 3 – Facilities/Populations to Protect

The third category contains people and facilities that need to be protected in event of a disaster.

Elderly Housing/Assisted Living

▪ Hillside Terrace--Hampshire County Housing for the Elderly, 37 Main Street

Public Buildings/Areas

▪ Community House, 33 Main Street (home to the Senior Center, Town Offices, Emergency Operations Center back-up, family center, records storage facility for Town, T1 connection)
▪ Bryant Free Library, 455 Berkshire Trail
▪Berkshire Trail Elementary School Building- 2 Main Street (Home to the Family Center)

Schools

▪ Academy at Swift River, 174-176 Nash Road

Camps and Campgrounds

▪ Greenwood School of Music, 32 Harlow Road
▪ Shire Village Camp, Mellor Road
▪ Fairgrounds, 97 Fairgrounds Road

Churches

▪ Village Church, 31 Main Street
▪ West Cummington Congregational Church, 1 Church Lane

Historic Buildings/Sites

▪ Bryant Homestead
▪ Kingman Tavern Museum, 41 Main Street
▪ All of Main Street in Cummington and West Cummington

- Dunham House- 38 Main Street

Apartment Complexes
- Elm Tree, 48 Main Street
- Kellogg family house, 30 Main Street
- Deer Hill House, 36 West Main Street
- 17 Main Street
- Todd Moden Estates, Stage Road

Category 4 – Potential Resources

Contains facilities that provide potential resources for services or supplies.

Food
- Old Creamery, 445 Berkshire Trail (Route 9)
- Farmstand, 135 Plainfield Road

Hospitals/Medical Supplies (nearest)
- Ambulance Station, Goshen
- Worthington Medical Center, Worthington
- Cooley Dickinson Hospital, Northampton
- Berkshire Medical Center, Pittsfield

Gas
- Town Garage at Highway Department, 20 Fairgrounds Road

Building Materials Suppliers
- Cummington Supply, Main Street

Heavy & Small Equipment Suppliers (no commercial operations)

- Peter Marcoux, 470 Stage Road (contracted with the Town)
- Volunteer Fire Department, 16 Main Street
- Bacon's, Williamsburg (closest supplier of small equipment)

Table 4-1: Critical Facilities and Evacuation Routes Potentially Affected by Hazard Areas			
Hazard Type	**Hazard Area**	**Critical Facilities Affected**	**Evacuation Routes Affected**
Flooding (100-year)	All along Westfield River	▪ Savoy Road Wells ▪ Pettingill Memorial Field Wells ▪ Ladies Benevolent Society (shelter)	▪ Route 9 ▪ West Cummington Road ▪ West Main to Bush Road
	Westfield River at confluence with Swift River	None	Route 9
Flooding (localized)	Warner Farm, south end of Fairgrounds Road--beaver activity	None	▪ Fairgrounds to Porter Hill Road
	Westfield River on west end of town	▪ Ladies Benevolent Society (shelter)	▪ West Main to Bush Road
Severe Snow/Ice Storm	Entire town	All facilities	All routes affected, though Route 9 usually in best condition
Hurricane/Severe Wind	Entire town	All facilities	Possibly all
Wildfire/Brushfire	Entire town	Depends on magnitude/location	Depends on location
Earthquake	Entire town	Depends on magnitude	Possibly all
Dam Failure	Bryant Homestead (Trustees of Reservation seeking permits to dredge fire pond and restore dam); Shire Village	None	▪ Route 9 ▪ West Cummington Road
Drought	Entire town	Depends on magnitude	NA
Hazardous Materials	Route 9 corridor, especially Kings Corner, Arch Bridge, West Main Street Bridge, stretch of road behind elderly housing	Water supplies of both villages Hillside Manor (LPG tanks)	Route 9

(Past & Potential Hazards/Critical Facilities Map Located In Appendix D)

5: MITIGATION STRATEGIES

One of the steps of this Natural Hazard Mitigation Plan is to evaluate all of the town's existing policies and practices related to natural hazards and identify potential gaps in protection. Once these gaps in protection are identified, future mitigation strategies can be crafted and recommended. This is done by evaluating existing and future measures in comparison to the Town's goal statement for natural hazard mitigation.

Goal Statement

To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to natural disasters. To provide adequate shelter, water, food and basic first aid to displaced residents in the event of a natural disaster and to provide adequate notification and information regarding evacuation procedures, etc., to residents in the event of a natural disaster.

For the extent of this analysis, the Committee reviewed the following Town documents:

- Zoning By-Laws
- Subdivision Regulations
- Cummington Community Development Plan
- CEM Plan
- Other relevant By-Laws as identified (Fire Department Burn Permit Procedures, Building Code, etc.)

This section of the plan serves to identify current mitigation strategies and recommend future mitigation strategies. This is done both generally, and by hazard type.

General Mitigation Measures

Several of the recommended mitigation measures have multiple benefits because, if implemented, they will mitigate or prevent damages from more than one type of natural hazard. These do not fall under one hazard type, but could be put into place for facilitation of better natural hazard protection generally.

Some of these general hazard-related strategies and measures do not fall specifically under the category of "mitigation," but are instead tools for preparedness. The Hazard Mitigation Planning Committee recognizes that these are also important recommendations for the Town, and has included them here:

What's the CEM Plan?

An important existing general preparedness and response tool is Cummington's Comprehensive Emergency Management Plan (CEM Plan). Although the CEM Plan is focused on the procedural response to an emergency, it organizes information, includes supply and information inventories, and outlines detailed steps for increasing

Flooding

The key factors in flooding are the water capacity of water bodies and waterways, the regulation of waterways by flood control structures, and the preservation of flood storage areas and wetlands. As more land is developed, more flood storage is demanded of the town's water bodies and waterways.

Current Mitigation Measures

The Town currently addresses this problem with a variety of mitigation tools and strategies. Flood-related regulations and strategies are included in the Town's zoning by-law, subdivision regulations, as well as a proposed stormwater management by-law. Relevant goals are included in the adopted Open Space and Recreation Plan. Infrastructure like dams and culverts are in place to manage the flow of water. These current mitigation strategies are outlined in the following table.

Table 5-1: Existing Flood Hazard Mitigation Measures

Existing Strategy		Description	Effectiveness	Potential Changes
Zoning By-Law	Floodplain and Westfield River Protection District	Areas delineated as part of the 100-year floodplain and/or within 100 feet of the Westfield River are protected by strict use regulations.	Effective for preventing incompatible development within the flood prone areas.	No Changes.
	Water Supply Protection District	Overlay district to protect groundwater resources by regulating certain uses, drainage, and special permit procedures.	Very effective for preventing groundwater contamination and for controlling stormwater runoff.	By law updated in 2008. No changes.
Subdivision Regulations	Definitive Plan	Plan must show storm drainage easements.	Somewhat effective for managing stormwater runoff.	No Changes.
	Design Standards	Easement – if water body traverses property, stormwater drainage easement required.		
		Protection of Natural Resources – "due regard" must be shown for significant natural features, including water bodies.	Somewhat effective for preserving open spaces and limiting impervious surfaces, protecting waterbodies.	
	Required Improvements	Street and Roadway – Adequate disposal of surface water is required.	Somewhat effective for managing drainage.	
Cummington Open Space Plan		Open Space and Recreation Element inventories natural resources and promotes their preservation, including areas in the floodplain; such as wetlands, groundwater recharge areas, farms and open space, rivers, streams and brooks.	Effective in identifying sensitive resource areas, including floodplains. Encourages forest, farmland protection, help conserve the town's flood storage capacity.	Work to implement relevant goals and policies in Plan.

National Flood Insurance Program Participation	As of 2006, there were 5 homeowners with flood insurance policies.	Somewhat effective, provided that the town remains enrolled in the National Flood Insurance Program.	Evaluate whether to become a part of FEMA's Community Rating System.

Severe Snow/Ice Storm

Winter storms can be especially challenging for emergency management personnel. The Massachusetts Emergency Management Agency (MEMA) serves as the primary coordinating entity in the statewide management of all types of winter storms and monitors the National Weather Service (NWS) alerting systems during periods when winter storms are expected. Even though the storm has usually been forecast, there is no certain way for predicting its length, size or severity. Therefore, mitigation strategies must focus on preparedness prior to a severe snow/ice storm.

Current Mitigation Measures

The Town's current mitigation tools and strategies focus on preparedness, with many regulations and standards established based on safety during storm events. These current mitigation strategies are outlined in the following table.

Note: To the extent that some of the damages from a winter storm can be caused by flooding, all of the flood protection mitigation measures described in Table 5-1 in the previous section can also be considered as mitigation measures for severe snow/ice storms.

Table 5-2: Existing Severe Snow/Ice Storm Hazard Mitigation Measures

Existing Strategy		Description	Effectiveness	Potential Changes
Subdivision Regulations	Design Standards	Standards include street grade regulations (minimum 0.5%; maximum 12%).	Effective.	No Changes.
	Required Improvements	Street and Roadway – Adequate disposal of surface water is required.	Somewhat effective for preventing ice.	No Changes.
State Building Code		The Town of Cummington has adopted the Massachusetts State Building Code.	Effective.	No Changes.
Backup Electric Power		There are 3 mobile generators that can be used at Community House and school backup power	Effective in case of power loss.	No Changes.
Tree Management		Tree warden phones WMECO immediately when danger with power lines due to tree	Very effective, preventative collaboration.	No Changes.
Town Bylaws		Bylaws prohibit residents from putting snow in roadway. Penalty is $150 fine.	Very effective.	Address as needed.

Hurricanes

Of all the natural disasters that could potentially impact Cummington, hurricanes provide the most lead warning time because of the relative ease in predicting the storm's track and potential landfall. MEMA assumes "standby status" when a hurricane's location is 35 degrees North Latitude (Cape Hatteras) and "alert status" when the storm reaches 40 degrees North Latitude (Long Island). Even with significant warning, hurricanes can do significant damage – both due to flooding and severe wind.

The flooding associated with hurricanes can be a major source of damage to buildings, infrastructure and a potential threat to human lives. Therefore, all of the flood protection mitigation measures described in Table 5-1 can also be considered hurricane mitigation measures.

The high winds that oftentimes accompany hurricanes can also damage buildings and infrastructure. But regulations can be put into place to help minimize the extent of wind damages.

The Town's current mitigation strategies to deal with severe wind are equally applicable to wind events such as tornadoes and microbursts. Therefore, the analysis of severe wind strategies is coupled with this hazard.

Severe Thunderstorms/ High Wind/Tornadoes/Microbursts

The location and extent of potential damaging impacts of a tornado, microburst or high wind are completely unpredictable. Most damage from tornadoes or microbursts comes from high winds that can fell trees and electrical wires, generate hurtling debris and, possibly, hail. According to the Institute for Business and Home Safety, the wind speeds in most tornadoes are at or below design speeds that are used in current building codes. In addition, current land development regulations can also help prevent wind damages.

The following table outlines the Town's existing mitigation strategies that help prevent wind damages, whether from hurricanes, tornadoes, microbursts, or any other event.

Table 5-3: Existing Severe Wind Hazard Mitigation Measures (Including Hurricane, Tornado, Microburst Hazards)

Existing Strategy		Description	Effectiveness	Potential Changes
Zoning By-Law	Use Regulations	Mobile homes are allowed by special permit in all zone districts for six months	Low effectiveness, mobile homes are very susceptible to flood damages.	No Changes. Only allowed temporarily when rebuilding after fire.
	Personal Wireless Service Facilities and Repeaters	Wireless communication towers/facilities standards restrict height and setbacks.	Very effective for preventing damage to nearby property	No Changes.
State Building Code		The Town has adopted the MA State Building Code.	Effective.	No Changes.

Tree Management	Tree warden phones WMECO immediately when danger with power lines due to tree	Very effective, preventative collaboration.	No Changes.

Wildfire/Brushfire

Although somewhat common, the vast majority of brushfires in Cummington are small and quickly contained. However, as with any illegal fire or brushfire, there is always the risk that a small brushfire could grow into a larger, more dangerous wildfire, especially if conditions are right. Therefore, it is important to take steps to prevent wildfires and brushfires from turning into natural disasters.

Current Mitigation Measures

The following table identifies what the Town is currently doing to manage brushfires and makes some suggested potential changes and recommendations for decreasing the Town's likelihood of being heavily impacted by a wildfire or brushfire.

Table 5-4: Existing Wildfire/Brushfire Hazard Mitigation Measures

Existing Strategy	Description	Effectiveness	Potential Changes
Burn Permits	Residents must obtain burn permits, and personnel provide information on safe burn practices.	Very effective.	Continue to put annual reminder notice in newspaper about burn regulations and use reverse 911 as needed.
Public Education/ Outreach	The Fire Department has an ongoing educational program in the schools.	Effective.	No Changes.

Earthquake

Although there are five mapped seismological faults in Massachusetts, there is no discernable pattern of previous earthquakes along these faults nor is there a reliable way to predict future earthquakes along these faults or in any other areas of the state. Consequently, earthquakes are arguably the most difficult natural hazard to plan for.

Most buildings and structures in the state were constructed without specific earthquake resistant design features. In addition, earthquakes precipitate several potential devastating secondary effects such as building collapse, utility pipeline rupture, water contamination, and extended power outages. Therefore, many of the mitigation efforts for other natural hazards identified in this plan may be applicable during the Town's recovery from an earthquake.

Current Mitigation Measures

The Town's most relevant existing mitigation measures are described in the following table.

Table 5-5: Existing Earthquake Hazard Mitigation Measures				
Existing Strategy		**Description**	**Effectiveness**	**Potential Changes**
Zoning By-law	Personal Wireless Service Facilities and Repeaters	Wireless communication towers/facilities standards restrict height and setbacks.	Very effective for preventing damage to nearby property.	By law updated in 2008. No changes.
State Building Code		The Town of Cummington has adopted the State Building Code.	Effective for new buildings only.	No Changes.

Dam Failure

Dam failure is a highly infrequent occurrence, but a severe incident could prove catastrophic. In addition, dam failure most often coincides with flooding, so its impacts can be multiplied, as the additional water has no where to flow.

Current Mitigation Measures

The only mitigation measures currently in place are the state regulations governing the construction, inspection, and maintenance of dams. This is managed through the Office of Dam Safety at the Department of Conservation and Recreation.

Table 5-6: Existing Dam Failure Hazard Mitigation Measures			
Existing Strategy	**Description**	**Effectiveness**	**Potential Changes**
New Dam Construction Permits	State law requires a permit for the construction of any dam.	Effective. Ensures dams are adequately designed.	No Changes.
Dam Inspections	DCR has an inspection schedule that is based on the hazard rating of the dam (low, medium, high hazard).	Low. The responsibility for this is now on dam owners, who may not have sufficient funding to comply.	No Changes.

Drought

Although Massachusetts does not face extreme droughts like many other places in the country, it is susceptible to dry spells and drought. And unlike other places, drought can most likely be effectively mitigated in regions like the Pioneer Valley if measures are put into place.

Current Mitigation Measures

Cummington has several water protection regulations in place, as evidenced in the section on flooding. Additional regulations and mitigation options, specific to drought mitigation, are included here.

Table 5-7: Existing Drought Hazard Mitigation Measures				
Existing Strategy		**Description**	**Effectiveness**	**Potential Changes**
Zoning By-law	Water Supply Protection District	Overlay district to protect groundwater resources by regulating certain uses, drainage, and special permit procedures.	Very effective for preventing groundwater contamination and for controlling stormwater runoff.	No Changes.
Subdiv Regs	Definitive Plan	Proposed water supply must be included in plan.	Effective for ensuring sufficient water supply prior to development.	No Changes.
Cummington Open Space Plan		Makes recommendations for protecting Cummington's water quality/supply.	Somewhat effective for raising awareness about protecting water quality, supply, and conservation.	Implement plan goals.

Status of 2008 Mitigation Action Strategies

Many of the strategies in Cummington's 2008 Plan have been completed in the time since this five-year update. The strategies and their corresponding status can be found below. Strategies highlighted in grey are strategies that are ongoing or have not yet been completed and are being pulled forward into this plan update's prioritized action plan.

Table 5-8: 2008 Action Plan Status

Mitigation Action	Responsible Department/Board	Proposed Completion Date/ Reporting Date	Funding Source	Estimated Cost	Status
Develop list of priority culverts for replacement and identify other roadway construction projects to effectively manage flooding.	Highway Superintendent	2008	Town Staff	NA	Done. Highway Superintendent created list.
Replace culverts on priority list, pending availability of funding.	Highway Department	Ongoing	Hazard Mitigation Grant Program	TBD	Ongoing. Some have been replaced.
Conduct cost benefit analysis of purchasing equipment to maintain culverts, namely a backhoe/bucket loader.	Highway Superintendent	2008	Town Staff	NA	Done. Bought a bucket loader in 2006
Require that all storage tanks replaced in Water Supply Protection District be replaced with tanks that are double walled with interstitial space.	Planning Board, Fire Department	2009 and ongoing	Town Staff/Volunteers	NA	Done. The last known one was removed in 2013.
Establish system to inventory supplies at existing shelters and develop a needs list and storage requirements. Establish arrangements with local or neighboring vendors for supplying shelters at Community House and new Public Safety Complex with food and first aid supplies in the event of a natural disaster.	Emergency Management Director, and Board of Selectmen	Ongoing	Town Staff/Volunteers	NA	Done. People show up when needed.

Implement the goals and strategies of the Cummington Open Space and Recreation Plan dealing with protection of floodplain, forests, and farmland.	Conservation Commission, Planning Board, Board of Selectmen, Agricultural Commission	Ongoing	Town Staff/Volunteers	NA	Ongoing.
Collect and distribute emergency information from Red Cross and MEMA on what to include in a 'home survival kit,' how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to follow during a natural disaster, pending availability of funding.	Emergency Management Director, and Board of Selectmen	2009	Town Staff/Volunteers	$5,000	Done via Council On Aging "SAFE"- working with Minister at Red Cross. Happen 3-4 times throughout the year.
Examine current notification system including feasibility of new siren warning system, internet radio system, or Reverse 911. Develop a preliminary project proposal and cost benefit analysis.	Emergency Management Director, and Board of Selectmen	2009	Town Staff/Volunteers	NA	Done. Implemented a reverse 911 program
Inventory bridges, and develop estimate of what would cost to replace with major events, pending availability of funding.	Highway Department, Board of Assessors	2010	Town Staff/Volunteers	NA	Pull forward. State will be doing in the near future
Determine if generators for use at shelters are effective, replace if not effective, pending availability of funding.	Emergency Management Director	2013	Town Staff/Volunteers, Grants	TBD	Done. Shelters are equipped and ongoing checks to ensure generators function.
Prohibit mobile homes from Floodplain Protection district altogether, as they are more susceptible to damage from natural hazards	Planning Board	2010	Town Staff/Volunteers	NA	Done. Mobile homes not allowed in town unless homeowners displaced from fire. Have one year to rebuild and remove mobile home.
Install emergency generator at new public safety complex, pending availability of funding.	Emergency Management Director, Board of Selectmen, Fire Chief, Police Chief	2009	Town Staff/Volunteers, Grants	TBD	Done. Generator in place.

In upgrading roads, implement design and construction where feasible that mitigates ice buildup and snow removal.	Emergency Management Director, Board of Selectmen, Highway Superintendent	ongoing	Town Staff/Volunteers,	NA	Ongoing. Progress has been made.
Clarify terms used in zoning by-law regarding personal wireless and service facilities and repeaters.	Planning Board	2010	Volunteers	NA	Done. Bylaws were updated.
Put reminder notice in newspaper about burn regulations.	Fire Chief	Annually, starting 2008	Town Staff/Volunteers	NA	Done. Information is on website and work with the County Journal.
Ensure that all identified shelters have sufficient back-up utility service in the event of primary power failure.	Emergency Management Director	2009	Town Staff/Volunteers	NA	Done. Use generators as needed.
Remind residents of water conservation guidelines through information that accompanies water bills and with notice in newspaper.	Water Commission	2009	Town Staff/Volunteers	$1,000	Done. Water board sends out information.
Update the definitions for hazardous materials/wastes in the Water Supply Protection district, utilizing the state model from DEP, pending availability of funding.	Planning Board, Conservation Commission	2009	Town Staff/Volunteers	NA	Done. Bylaws Updated.
Review stormwater management provisions within Subdivision Regulations and consider more performance-based evaluations.	Planning Board	2009	Volunteers/LTA from PVPC	$2,500	Done. Cluster zoning section has water provisions.

6: PRIORITIZED IMPLEMENTATION SCHEDULE

Several of the action items previously identified in the previous version of this Hazard Mitigation Plan are currently continuing, either because they require more time to secure funding or their construction process is ongoing. In addition, the Hazard Mitigation Committee identified several new strategies that are also being pursued. These new strategies are based on experience with currently implemented strategies, as well as the hazard identification and risk assessment in this plan.

Prioritization Methodology

The Hazard Mitigation Planning Committee reviewed and prioritized a list of previously identified and new mitigation strategies using the following criteria:

- **Application to multiple hazards** – Strategies are given a higher priority if they assist in the mitigation of several natural hazards.

- **Time required for completion** – Projects that are faster to implement, either due to the nature of the permitting process or other regulatory procedures, or because of the time it takes to secure funding, are given higher priority.

- **Estimated benefit** – Strategies providing the highest degree of reduction in loss of property and life are given a higher priority. This estimate is based on the Hazard Identification and Analysis Chapter, particularly with regard to how much of each hazard's impact would be mitigated.

- **Cost effectiveness** – in order to maximize the effect of mitigation efforts using limited funds, priority is given to low-cost strategies. For example, regular tree maintenance is a relatively low-cost operational strategy that can significantly reduce the length of time of power outages during a winter storm. Strategies that have identified potential funding streams, such as the Hazard Mitigation Grant Program, are also given higher priority.

- **Eligibility Under Hazard Mitigation Grant Program –** The Hazard Mitigation Grant Program (HMGP) provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. Funding is made available through FEMA by the Massachusetts Emergency Management Agency. Municipalities apply for grants to fund specific mitigation projects under MEMA requirements

The following categories are used to define the priority of each mitigation strategy:

- **Low** – Strategies that would not have a significant benefit to property or people, address only one or two hazards, or would require funding and time resources that are impractical.
- **Medium** – Strategies that would have some benefit to people and property and are somewhat cost effective at reducing damage to property and people.
- **High** – Strategies that provide mitigation of several hazards and have a large benefit that warrants their cost and time to complete.

Several hazard mitigation strategies identified in the previous Hazard Mitigation Plan have not yet been completed, but were changed in priority during the update of this plan by the Hazard Mitigation Committee. The Committee changed priorities by evaluating the entire list of mitigation strategies in a comprehensive manner according to the factors listed above. For strategies that have changed in priority, the previous priority is provided in parenthesis in the "Priority" column.

Cost Estimates

Each of the following implementation strategies is provided with a cost estimate. Projects that already have secured funding are noted as such. Where precise financial estimates are not currently available, categories were used with the following assigned dollar ranges:

- **Low** – cost less than $50,000
- **Medium** – cost between $50,000 – $100,000
- **High** – cost over $100,000

Cost estimates take into account the following resources:

- **Municipal staff time** for grant application and administration
- **Consultant design and construction cost** (based on estimates for projects obtained from Town and general knowledge of previous work in the Town)
- **Municipal staff time** for construction, maintenance, and operation activities

Project Timeline

Each strategy is provided with an estimated length of time it will take for implementation. Where funding has been secured for the project, a specific future date is provided for when completion will occur. However, some projects do not currently have funding and thus it is difficult to know exactly when they will be completed. For these projects, an estimate is provided for the amount of time it will take to complete the project once funding becomes available.

Table 6-1: Mitigation Strategies to be Implemented									
Mitigation Action	**Status**	**Action Type**	**Description**	**Hazards Mitigated**	**Responsible Entity**	**Time frame**	**Funding source**	**Cost**	**Priority**
Replace Problem Culverts.	Ongoing	Operational Strategy	Replace culverts on the problem culvert list found in this plan as funding becomes available.	Flooding.	Highway Superintendent	Est 18 months from funding award Jan 2018-June 2019	Hazard Mitigation Grant Program	High	med
Implement the goals and strategies of the Cummington Open Space and Recreation Plan	Ongoing	Planning Strategy	Strategies dealing with protection of floodplain, forests, and farmland will have the greatest impact.	All hazards.	Conservation Commission, Planning Board, Board of Selectmen, Agricultural Commission	July 2017-June 2019	Town Staff/ Volunteers	Medium	high
Inventory bridges, and develop estimate of what would cost to replace with major events, pending availability of funding.	Ongoing. (State will be doing)	Operational Strategy	Coordinate with the state to inventory bridges and develop estimates for cost of replacement if a disaster were to occur.	All hazards.	Highway Department, Board of Assessors	Depends on State prioritization process Jan 2019-June 2020	Town Staff/ Volunteers/ MassDOT	Medium	med
In upgrading roads, implement design and construction where feasible that mitigates ice buildup and snow removal.	Ongoing	Operational Strategy	As roads are upgraded, use designs that lessen ice buildup and make snow removal easier.	Severe Snow/Ice Storms.	Emergency Management Director, Board of Selectmen, Highway Superintendent	18 mo's from funding award July 2020-Dec 2021	Town Staff/ Volunteers/ MassDOT	High	med
Apply for Storm Ready Certification	New	Community Awareness	Storm Ready Certification helps ensure the town has alert systems and plans to respond to all hazards.	All hazards.	Emergency Management Director	July 2017-June 2018	Town Staff	Low	high
Consider raising public money to raise Fairgrounds Road and replace culvert	New	Operational Strategy	Fairgrounds Road currently has an undersized culvert and section of the road that is lower than frequent flooding. Raise public funds to replace this.	Flooding.	Board of Selectmen	Jan 2021-Dec 2021	Town Staff/ Volunteer	High	med

Table 6-1: Mitigation Strategies to be Implemented									
Mitigation Action	**Status**	**Action Type**	**Description**	**Hazards Mitigated**	**Responsible Entity**	**Time frame**	**Funding source**	**Cost**	**Priority**
Beaver Control	New	Operational Strategy	Use beaver deceivers in locations prone to beaver activity in order to lessen the amount of flooding caused by them.	Flooding.	Conservation Commission, Highway Superintendent	July 2019-June 2020	Town/DCR	Medium	low
Consider firewise certification	New	Operational Strategy	Take actions to reduce risks of wildfires.	Wildfires	Emergency Management Director	July 2017-June 2018	Town Staff/ Volunteer	Low	low
Integrate Hazard Mitigation into ongoing planning process	New	Planning Strategy	Plans will include goals and recommendations to address topics with relevance to hazard mitigation planning, especially flood control.	All hazards.	Planning Board	As Town plans are updated OSRP should be updated first Jan 2018-Dec 2019	Town Staff/ Volunteer	Medium	med
Discourage flat roods on municipal buildings	New	Planning Strategy	Discourage flat roofs, which can be problematic during heavy snow events.	Severe Snow/ Ice Storms	Planning Board	Jan 2017-June 2017	Town Staff/ Volunteer	Low	low
Consider snow fences	New	Operational Strategy	Consider snow fences in areas most prone to drifts.	Severe Snow/ Ice Storms	Highway Superintendent	Jan 2017-Dec 2017	DPW and SelectBoard	Medium	med
Pursue Solarize Participation.	New	Operational Strategy	This state initiative helps facilitate the installation of solar energy systems for residence and businesses.	All hazards.	Board of Selectmen, Planning Board	June 2016-July 2017	Town Staff/ Volunteer	Low	high

Table 6-1: Mitigation Strategies to be Implemented									
Mitigation Action	**Status**	**Action Type**	**Description**	**Hazards Mitigated**	**Responsible Entity**	**Time frame**	**Funding source**	**Cost**	**Priority**
Consider adopting Green Communities certification	New	Operational Strategy	By becoming a Green Communities Certification, the community could become eligible for state funds to make municipal buildings more resilient and energy efficient.	All hazards.	Board of Selectmen, Planning Board	July 2017-June 2018	Town Staff/ Volunteer	Low	high
Prepare disaster preparedness booklet and distribution	New	Community Awareness.	Develop and distribute an educational pamphlet to residents and business owners.	All hazards.	EMD with PVPC assistance	July 2017-Dec 2017	Town/DLTA	Medium	med

7: PLAN ADOPTION & IMPLEMENTATION

Plan Adoption

Upon completion, copies of the Draft Local Hazards Mitigation Plan for the Town of Cummington were distributed to the town boards for their review and comment. A public meeting was held by the Cummington Board of Selectmen to present the draft copy of the Cummington Local Natural Hazards Mitigation Plan to town officials and residents and to request comments from this committee and the general public. The Natural Hazards Mitigation Plan was formally approved by the Board of Selectmen and forwarded to the Massachusetts Emergency Management Agency (MEMA) and the Federal Emergency Management Agency (FEMA) for their approval.

Plan Implementation

The implementation of the Cummington Local Natural Hazards Mitigation Plan will begin following its formal adoption by the Cummington Board of Selectmen and approval by MEMA and FEMA. Those town departments and boards responsible for ensuring the development of policies, bylaw revisions, and programs as described in Sections 5 and 6 of this plan will be notified of their responsibilities immediately following approval and will integrate their hazard mitigation responsibilities into their annual work plans as appropriate. Cummington's Board of Selectmen will oversee the implementation of the plan.

Incorporation with Other Planning Documents

Cummington has a series of planning and regulatory capabilities that prevent and reduce the impacts of hazards. Many of these are assessed in the tables in Chapter 5. Existing plans, studies, reports and municipal documents were incorporated throughout the planning process. This included a review and incorporation of significant information from the following key documents:

- **Cummington Comprehensive Emergency Management Plan** - used to identify critical infrastructure, current emergency operations, and special needs populations
- **Cummington Open Space and Recreation Plan -** used to identify existing hazard mitigation strategies, already proposed mitigation strategies, natural resources, and critical infrastructure
- **Cummington Zoning Bylaw and Subdivision Regulations** - used to identify existing mitigation strategies
- **Massachusetts State Hazard Mitigation Plan** - used to ensure consistency with state identification of mitigation strategies, critical infrastructure, and hazards

The 2016 update of the Cummington Hazard Mitigation Plan will also be incorporated into updates of the Town's Comprehensive Emergency Management Plan.

The members of the Town's Hazard Mitigation Committee will stay engaged with the status and advancement of these plans and whenever any of these plans are in the process of being updated, the Hazard Mitigation Committee will provide copies of the Hazard Mitigation Plan to relevant Town staff and brief them on the content of the Hazard Mitigation Plan. The Hazard Mitigation Committee will also review current Town programs and policies to ensure that they are consistent with the mitigation strategies described in this plan.

Plan Monitoring and Evaluation

The Cummington Board of Selectmen will monitor and evaluate plan progress annually at one of the quarterly "all boards meetings." These review meetings will occur on an annual basis in each of the following years: 2017, 2018, 2019, 2020, 2021, and as needed (*i.e.*, following a natural disaster). The public will be notified of these meetings in advance through a posting of the agenda at Town Hall. In addition, responsible parties identified for specific mitigation actions will be asked to submit their reports in advance of the meeting. Meetings of the committee will be organized and facilitated by the Emergency Management Director. Meetings will entail the following actions:

- Review events of the year to discuss and evaluate major issues, effectiveness of current mitigation, and possible mitigation for future events.
- Review and evaluate progress toward implementation of the current mitigation plan based on reports from responsible parties.
- Amend current plan to improve mitigation practices.

Following these discussions, it is anticipated that the committee may decide to reassign the roles and responsibilities for implementing mitigation strategies to different town departments and/or revise the goals and objectives contained in the plan. The committee will review and update the Cummington Local Natural Hazards Mitigation Plan every five years. The first updated plan will be submitted to MEMA and FEMA in the fall of 2021. To achieve this, the planning process to update the plan will need to start in the spring of 2021.

Information on how the 2007 Hazard Mitigation Plan was incorporated into other planning processes and documents was not tracked. Following this plan update, the Hazard Mitigation Committee will note when they reach out to other Town staff about the incorporation of applicable hazard mitigation strategies into plan updates.

The Town's Emergency Management Director will call meetings of all responsible parties to review plan progress as needed, based on occurrence of hazard events. The public will be notified of these meetings in advance through a posting of the agenda at Town Hall. Responsible parties identified for specific mitigation actions will be asked to submit their reports in advance of the meeting.

Meetings will involve evaluation and assessment of the plan, regarding its effectiveness at achieving the plan's goals and stated purpose. The following questions will serve as the criteria that is used to evaluate the plan:

Plan Mission and Goal

- Is the Plan's stated goal and mission still accurate and up to date, reflecting any changes to local hazard mitigation activities?

- Are there any changes or improvements that can be made to the goal and mission?

Hazard Identification and Risk Assessment

- Have there been any new occurrences of hazard events since the plan was last reviewed? If so, these hazards should be incorporated into the Hazard Identification and Risk Assessment.

- Have any new occurrences of hazards varied from previous occurrences in terms of their extent or impact? If so, the stated impact, extent, probability of future occurrence, or overall assessment of risk and vulnerability should be edited to reflect these changes.

- Is there any new data available from local, state, or Federal sources about the impact of previous hazard events, or any new data for the probability of future occurrences? If so, this information should be incorporated into the plan.

Existing Mitigation Strategies

- Are the current strategies effectively mitigating the effect of any recent hazard events?
- Has there been any damage to property since the plan was last reviewed?
- How could the existing mitigation strategies be improved upon to reduce the impact from recent occurrences of hazards? If there are improvements, these should be incorporated into the plan.

Proposed Mitigation Strategies

- What progress has been accomplished for each of the previously identified proposed mitigation strategies?
- How have any recently completed mitigation strategies affected the Town's vulnerability and impact from hazards that have occurred since the strategy was completed?
- Should the criteria for prioritizing the proposed mitigation strategies be altered in any way?
- Should the priority given to individual mitigation strategies be changed, based on any recent changes to financial and staffing resources, or recent hazard events?

Review of the Plan and Integration with Other Planning Documents

- Is the current process for reviewing the Hazard Mitigation Plan effective? Could it be improved?
- Are there any Town plans in the process of being updated that should have the content of this Hazard Mitigation Plan incorporated into them?
- How can the current Hazard Mitigation Plan be better integrated with other Town planning tools and operational procedures, including the zoning bylaw, the Comprehensive Emergency Management Plan, and the Capital Improvement Plan?

Public participation will be a critical component of the Hazard Mitigation Plan maintenance process. The Hazard Mitigation Committee will hold all meetings in accordance with Massachusetts open meeting laws and the public invited to attend. The public will be notified of any changes to the Plan via the meeting notices board at Town Hall, and copies of the revised Plan will be made available to the public at Town Hall.

CERTIFICATE OF ADOPTION
TOWN OF CUMMINGTON, MASSACHUSETTS

BOARD OF SELECTMEN

A RESOLUTION ADOPTING THE CUMMINGTON

NATURAL HAZARD MITIGATION PLAN UPDATE

WHEREAS, the Town of Cummington established a Committee to prepare the Cummington Natural Hazard Mitigation Plan Update; and

WHEREAS, several public planning meetings were held between March and May 2016 regarding the development and review of the Cummington Natural Hazard Mitigation Plan Update; and

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

WHEREAS, a duly-noticed public hearing was held by the Cummington Board of Selectmen on JAN 12, 2016 2017 to formally approve and adopt the Cummington Natural Hazard Mitigation Plan Update.

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

ADOPTED AND SIGNED this 12th Jan, 2016 7.

Rusell L Sears III

Rusell L. Sears III, Chair
Cummington Board of Selectmen

James Drawe
Cummington Board of Selectmen

Monica M. Vandoloski

Monica Vandoloski
Cummington Board of Selectmen

ATTEST Donna C Jordan
Cummington Town Clerk

8: APPENDICES

Appendix A – Technical Resources

1) Agencies

Massachusetts Emergency Management Agency (MEMA)……508/820-2000
Hazard Mitigation Section ……617/626-1356
Federal Emergency Management Agency (FEMA) ……617/223-4175
MA Regional Planning Commissions:
Berkshire Regional Planning Commission (BRPC)……413/442-1521
Cape Cod Commission (CCC)……508/362-3828
Central Massachusetts Regional Planning Commission (CMRPC)……508/693-3453
Franklin Regional Council of Governments (FRCOG)……413/774-3167
Martha's Vineyard Commission (MVC)……508/693-3453
Merrimack Valley Planning Commission (MVPC)……978/374-0519
Metropolitan Area Planning Council (MAPC)……617/451-2770
Montachusett Regional Planning Commission (MRPC)……978/345-7376
Nantucket Planning and Economic Development Commission (NP&EDC)……508/228-7236
Northern Middlesex Council of Governments (NMCOG)……978/454-8021
Old Colony Planning Council (OCPC)……508/583-1833
Pioneer Valley Planning Commission (PVPC)……413/781-6045
Southeastern Regional Planning and Economic Development District (SRPEDD)……508/823-1803
MA Board of Building Regulations & Standards (BBRS)……617/227-1754
MA Coastal Zone Management (CZM)……617/626-1200
DCR Water Supply Protection……617/626-1379
DCR Waterways……617/626-1371
DCR Office of Dam Safety……508/792-7716
DFW Riverways……617/626-1540
MA Dept. of Housing & Community Development……617/573-1100
Woods Hole Oceanographic Institute……508/457-2180
UMass-Amherst Cooperative Extension……413/545-4800
National Fire Protection Association (NFPA)……617/770-3000
New England Disaster Recovery Information X-Change (NEDRIX – an association of private companies & industries involved in disaster recovery planning) ……781/485-0279
MA Board of Library Commissioners……617/725-1860
MA Highway Dept, District 2……413/582-0599
MA Division of Marine Fisheries……617/626-1520
MA Division of Capital & Asset Management (DCAM)……617/727-4050
University of Massachusetts/Amherst……413/545-0111
Natural Resources Conservation Services (NRCS)……413/253-4350
MA Historical Commission……617/727-8470
U.S. Army Corps of Engineers……978/318-8502
Northeast States Emergency Consortium, Inc. (NESEC)……781/224-9876
National Oceanic and Atmospheric Administration: National Weather Service; Taunton, MA……508/824-5116
US Department of the Interior: US Fish and Wildlife Service ……413/253-8200
US Geological Survey ……508/490-5000

2) Mitigation Funding Resources

404 Hazard Mitigation Grant Program (HMGP) .....Massachusetts Emergency Management Agency
406 Public Assistance and Hazard Mitigation .....Massachusetts Emergency Management Agency
Community Development Block Grant (CDBG).....DHCD, also refer to RPC
Dam Safety Program.....MA Division of Conservation and Recreation
Disaster Preparedness Improvement Grant (DPIG) .....Massachusetts Emergency Management Agency
Emergency Generators Program by NESEC‡ .....Massachusetts Emergency Management Agency
Emergency Watershed Protection (EWP) Program.....USDA, Natural Resources Conservation
Service Flood Mitigation Assistance Program (FMAP) .....Massachusetts Emergency Management Agency
Flood Plain Management Services (FPMS).....US Army Corps of Engineers
Mitigation Assistance Planning (MAP).....Massachusetts Emergency Management Agency
Mutual Aid for Public Works.....Western Massachusetts Regional Homeland Security Advisory Council
National Flood Insurance Program (NFIP) † .....Massachusetts Emergency Management Agency
Power of Prevention Grant by NESEC‡ .....Massachusetts Emergency Management Agency
Roadway Repair & Maintenance Program(s).....Massachusetts Highway Department
Section 14 Emergency Stream Bank Erosion & Shoreline Protection .....US Army Corps of Engineers
Section 103 Beach Erosion.....US Army Corps of Engineers
Section 205 Flood Damage Reduction.....US Army Corps of Engineers
Section 208 Snagging and Clearing .....US Army Corps of Engineers
Shoreline Protection Program.....MA Department of Conservation and Recreation
Various Forest and Lands Program(s).....MA Department of Environmental Protection
Wetlands Programs .....MA Department of Environmental Protection

‡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 NESEC 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. MEMA can provide additional information regarding participation in the NFIP-CRS Program.

3) Internet Resources

Sponsor	Internet Address	Summary of Contents
Natural Hazards Research Center, U. of Colorado	http://www.colorado.edu/litbase/ha zards/	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/dis aster/	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/g eog/floods/	Observations of flooding situations.
FEMA, National Flood Insurance Program, Community Status Book	http://www.fema.gov/fema/csb.html	Searchable site for access of Community Status Books
Florida State University Atlantic Hurricane Site	http://www.met.fsu.edu/explores/tropical.html	Tracking and NWS warnings for Atlantic Hurricanes and other links
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.html	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 – List of Acronyms

FEMA	Federal Emergency Management Agency
MEMA	Massachusetts Emergency Management Agency
PVPC	Pioneer Valley Planning Commission
EPA	Environmental Protection Agency
DEP	Massachusetts' Department of Environmental Protection
NWS	National Weather Service
HMGP	Hazard Mitigation Grant Program
FMA	Flood Mitigation Assistance Program
SFHA	Special Flood Hazard Area
CIS	Community Information System
DCR	Massachusetts Department of Conservation and Recreation
FERC	Federal Energy Regulatory Commission
TRI	Toxics Release Inventory
FIRM	Flood Insurance Rate Map
NFIP	National Flood Insurance Program
CRS	Community Rating System
BOS	Board of Selectmen
BOH	Board of Health
LEPC	Local Emergency Planning Committee
EMD	Emergency Management Director
Con Com	Conservation Commission
EOC	Emergency Operations Center
CEM Plan	Comprehensive Emergency Management Plan
WMECO	Western Massachusetts Electric Company
HAZMAT	Hazardous Materials

Appendix C – Capability Assessment

Worksheet 4.1 Capability Assessment Worksheet

Jurisdiction: _Cummington_____

Local mitigation capabilities are existing authorities, policies, programs, and resources that reduce hazard impacts or that could be used to implement hazard mitigation activities. Please complete the tables and questions in the worksheet as completely as possible. Complete one worksheet for each jurisdiction.

Planning and Regulatory

Planning and regulatory capabilities are the plans, policies, codes, and ordinances that prevent and reduce the impacts of hazards. Please indicate which of the following your jurisdiction has in place.

Plans	**Yes/No Yr**	**Does the plan address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?**
Comprehensive/Master Plan	Y	2003- Community Development. (No, No, No)
Capital Improvements Plan	N/Y	Fire, Police and DPW have 5 year plan in progress
Economic Development Plan	N	
Local Emergency Operations Plan	Y	CEMP
Continuity of Operations Plan	N	But informally feel they have a good system in place which has proven to be the case in past disasters
Transportation Plan	Not Local	Part of the regional plan FRTA
Stormwater Management Plan	N	
Community Wildfire Protection Plan	N	
Other special plans (e.g. brownfields, redevelopment, disaster recovery, coastal zone management, climate change adaptation)	Y	Open Space and Recreation Plan

Building Code, Permitting, and Inspections	**Y/N**	**Are codes adequately enforced?**
Building Code	Y	Version/Year: State Building Code
Building Code Effectiveness Grading Schedule (BCEGS) Score	N	Score:

Fire Department ISO Rating	Y	Rating:
Site plan review requirements	Y	

Land Use Planning & Ordinances	**Y/N**	**Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced?**
Zoning Ordinance	Y	
Subdivision ordinance	Y	
Floodplain ordinance	Y	
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	Y	Steep slopes and tree removal
Flood insurance rate maps	Y	
Acquisition of land use for open space and public recreation uses		Permissible but no specific local code
Other		

How can these capabilities be expanded and improved to reduce risk?	
We could stay connected to Planning Board to make sure we are using best practices	

Administrative & Technical

Identify whether your community has the following administrative and technical capabilities. These include staff and their skills and tools that can be used for mitigation planning and to implement specific mitigation actions. For smaller jurisdictions without local staff resources, if there are public resources at the next higher level of government that provide technical assistance, indicate so in your comments.

Administration	**Y/N**	**Describe capability Is coordination effective?**
Planning Board	Y	Yes
Mitigation Planning Committee	Y	Ad hoc to update this plan and maintain
Maintenance programs to reduce risk (e.g. tree trimming, clearing drainage systems)	Y	Informal as needed
Mutual aid agreements	Y	Police, Fire and Highway Department

Staff	**Y/N FT/PT**	**Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?**
Chief Building Official	Y (pt)	Yes- not trained, but knowledgeable. Very effective
Floodplain Administrator	N	
Emergency Manager	Y	Yes
Community Planner	N	Planning Board- Works with FRCOG, HCOG, and PVPC

Civil Engineer	N	Available as needed
GIS Coordinator	N	Received GIS support from PVPC
Other		

Technical	**Y/N**	**Describe capability** **Has capability been used to assess/mitigate risk in the past?**
Warning systems/services (Reverse 911, outdoor warning signals)	Y	Reverse 911 and Blackboard connect in place
Hazard data and information	Y	Through EMD, Police, Fire and Highway Department
Grant writing	Y	No one grant writer, but Existing staff do write grants and review with support from FRCOG, HCOG, and PVPC
Hazus analysis	N	
Other		

How can these capabilities be expanded and improved to reduce risk?	

Financial

Identify whether your jurisdiction has access to or is eligible to use the following funding resources for hazard mitigation.

Funding Resource	**Access Eligibility Y/N**	**Has the funding resource been used in the past and for what type of activities? Could the resource be used to fund future mitigation actions?**
Capital Improvements Project funding	Y	Have capital projects on Town Meeting agenda
Authority to levy taxes for specific purposes	Y	Yes- examples: school roof and dump.
Fees for water, sewer, gas or electric services	Y	Water
Impact fees for new development	N	
Storm water utility fee	N	
Incur debt through general obligation bonds and/or special tax bonds	Y	For broadband
Community development block grants	Y	Hilltown CDC- Road money in the past. Money for income eligible housing rehab--roofs and septic, accessibility
Other federal funding programs	Y	USDA water loan and federal funding used for Public Safety Complex

State funding programs	Y	Chap 90- Road money. STRAPP- pothole monies. Winter storm Emergency Money.
Other		

How can these capabilities be expanded and improved to reduce risk?	

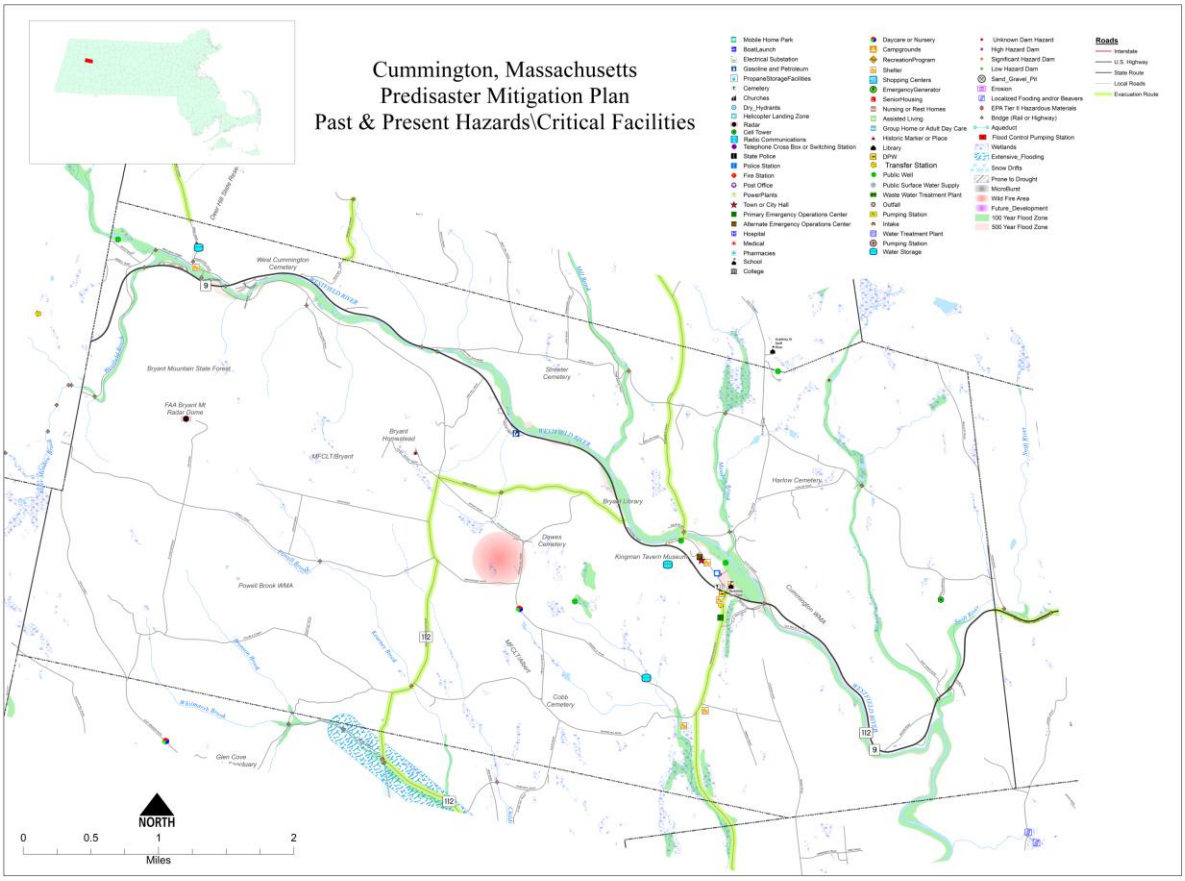
Education & Outreach

Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information.

Program/Organization	**Y/N**	**Describe program/organization and how it relates to disaster resilience and mitigation**
Local citizens groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Y	Citizen group organized against pipeline SAFE program
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	Y	Work with older adults through the Council on Aging.
Natural disaster or safety related school programs	Y	Program ended. Central Berkshire.
StormReady certification	N	Town will consider application
Firewise Communities certification	N	
Public-private partnership initiatives addressing disaster-related issues	Y	Highway Dept has relationships with area businesses in the event of a disaster for supply, equipment, materials provision.
Other		

How can these capabilities be expanded and improved to reduce risk?	

Appendix D – Past & Potential Hazards/Critical Facilities Map



Appendix E – Documentation of the Planning Process

Cummington Hazard Mitigation Committee
Meeting #1 Agenda

Cummington Public Safety Complex
March 29, 2016 11:00- 1:00 p.m.

1. Introductions/Administrative
    a. affirm local Hazard Committee membership

2. Overview of Hazard Mitigation Planning Process

    a. Background on Hazard Mitigation Planning

    b. Planning process and requirements
        i. 3-5 committee meetings
        ii. 2 public outreach meetings
        iii. MEMA / FEMA review and conditional approval
        iv. Select Board adoption
        v. FEMA final approval

    c. Schedule for committee and public outreach meetings

3. Review of Chapter 1: Planning Process

4. Review of Chapter 2: Local Profile

5. Review of Chapter 3: Hazard Identification and Risk Assessment

6. Homework:
    a. for Chapter 4--Critical Facilities: review map and mark up with corrections as needed
    b. for Chapter 5--Mitigation Strategies: reflect on last 5 years and review strategy chart from previous plan (handout); come prepared to provide input on status of prioritized strategies as well as suggestions for new strategies.

Cummington Hazard Mitigation Committee
Meeting #3 Agenda

Cummington Public Safety Complex
April 26, 2016 1:00-3:00 p.m.

1. Introductions/Administrative
    a. affirm local Hazard Committee membership

2. Capability Assessment--using FEMA worksheet

3. Assess Status of Recommendations included in 2008 plan

4. Review and provide any missing information Chapter 1: Planning Process

5. Review and provide any missing information Chapter 2: Local Profile

6. Review and provide any missing information Chapter 3: Hazard Identification and Risk Assessment

7. Homework:
    a. for Chapter 4--Critical Facilities: review map and mark up with corrections as needed

Planning process and requirements

i. 3-5 committee meetings
ii. 2 public outreach meetings
iii. MEMA / FEMA review and conditional approval
iv. Select Board adoption
v. FEMA final approval

Cummington Hazard Mitigation Committee
Meeting #4 Agenda

Public Safety Complex
May 10, 2016 1:00-3:00 p.m.

1. Finalize Capability Assessment as needed

2. Finalize status report of strategies from 2008 plan

3. Complete review and edits to Chapters 4-6

4. Start process of identifying new strategies-time permitting

Planning process and requirements

a. 3-5 committee meetings
b. 2 public outreach meetings
c. MEMA / FEMA review and conditional approval
d. Select Board adoption
e. FEMA final approval

Cummington Hazard Mitigation Committee
Meeting #5 Agenda

Town Hall
May 17 2016 1:00-3:00 p.m.

1. Culvert List
2. In-kind match form signed and filled out
3. Finalize Capability Assessment--toward new Actions
4. Finalize status of 2008 Plan actions--toward new Actions
5. Complete new Action Strategy char
6. Prep for Second Public Meeting

Planning process and requirements

i. 3-5 committee meetings
ii. 2 public outreach meetings
iii. MEMA / FEMA review and conditional approval
iv. Select Board adoption
v. FEMA final approval

Catalyst for Regional Progress
PVPC
Timothy W. Brennan, Executive Director

MEDIA RELEASE

CONTACT: Catherine Ratte, PVPC Planner, (413) 781-6045 or cratte@pvpc.org

FOR IMMEDIATE RELEASE
April 12, 2016

Town of Cummington Schedules Public Engagement Event for Hazard Mitigation Plan

Cummington residents, business owners, stakeholders and representatives from surrounding communities are invited to provide comments on the development of the Town of Cummington's Hazard Mitigation Plan on **Thursday, April 21** at 7:00 p.m. at the Community House, 33 Main Streets. All members of the public are welcome to attend the event. Local businesses, residents of neighboring communities, and municipal officials of neighboring communities are also encouraged to attend and provide their feedback.

The meeting will include an introduction to the Hazard Mitigation planning process, a summary of existing mitigation initiatives, and an overview of past hazards in the Town. Municipal officials and PVPC staff will be available to answer questions and listen to comments.

The plan is being produced by the Town with assistance from the Pioneer Valley Planning Commission and is funded by the Federal Emergency Management Agency (FEMA) and the Massachusetts Emergency Management Agency (MEMA). This planning effort is being undertaken to help the Town of Cummington assess the risks faced from natural hazards, identify action steps that can be taken to prevent damage to property and loss of life, and prioritize funding for mitigation efforts. A mitigation action is any action taken to reduce or eliminate the long-term risk to human life and property from hazards.

For more information, please contact PVPC's Catherine Ratté at cratte@pvpc.org or (413) 781-6045.

MEDIA RELEASE

CONTACT: Ashley Eaton, PVPC Planner, (413) 781-6045 or aeaton@pvpc.org.
Chief Bernard Forgea, Cummington Fire Chief, (413) 634-5458 or firechief@cummington-ma.gov

FOR IMMEDIATE RELEASE
May 23, 2016

Town of Cummington to Hold Second Public Engagement Event for Hazard Mitigation Plan Update

Cummington residents, businesses, and surrounding community residents and representatives are invited to provide comments on the update of the Town of Cummington Hazard Mitigation Plan on Thursday, May 26, 2016, at 7 pm in the Cummington Community House, 33 Main Street.

The purpose of the 2016 Hazard Mitigation Plan Update is to identify and assess Cummington's natural hazard risks and determine how to best minimize and manage them. A mitigation action is any action taken to reduce or eliminate the long-term risk to human life and property from hazards. Public participation and input is essential!

The meeting will include a discussion of existing mitigation initiatives addressing natural hazards in Cummington, and the strategies as currently proposed by the committee. Municipal staff and PVPC staff will be available to answer questions and listen to comments on the draft plan. The meeting provides an opportunity for you to share your opinions and participate in the mitigation planning process. A draft of the plan is available for review on the PVPC website.

The plan is being updated by the Town with assistance from the Pioneer Valley Planning Commission and is funded by the Federal Emergency Management Agency (FEMA) and the Massachusetts Emergency Management Agency (MEMA).

Upon completion, the plan will be presented to the Town of Cummington for adoption and submitted to Massachusetts Emergency Management Agency (MEMA) and Federal Emergency Management Agency (FEMA) for review and approval. A FEMA approved plan makes the community eligible for federal and state mitigation grant funding.

For more information, please contact PVPC's Ashley Eaton at aeaton@pvpc.org or (413) 781-6045.

Cummington Hazard Mitigation Plan
Mtg #1 3/29/16

Name	Role/signature
Chief Bernie Forgea EMD	BEF
Highway Superintendent Robert Destrempe	
Con Comm	
STAFF	
Catherine Ratte, MPC	
Ashley Eaton, PVPC	
Meghan Conroy, PVPC	

Cummington Hazard Mitigation Planning

April 12 2016 #2
Meeting Sign In

Name	Signature
Bernard Forgea-EMD/Fire Chief	BFF
Robert Dextrase-Hwy Super	RD
Monica Wandolski-SelectBoard	MW
Judith Bogart-BOH	JB
Michael Perkins-Chief of Police	

Sign In Sheet — Cummington Hazard Mitigation

Mtg #3 4/26/16

Name	Represents
Bruce M. Waddock	Selectboard
Robert Dixon	Highway Dept

Catherine Rutter

Cummington Hazard Mitigation Plan Update Committee Mtg #~~3~~ 4
Sign-In Sheet
May 10, 2016,1-3 pm, Public Safety Complex

Name	Position	E-mail
Robert DeFrezza	Highway Superintendent	
Monica Chmielewski		
Judith Bogert	Board of Health	
Michael Perkins	Police Chief	mperkins@cummingtonpolice.com
Ashley Eastman	TVDC	

Cummington Hazard Mitigation Planning

May 17 2016 #5
Meeting Sign in

Name	Signature
Bernard Forgea-EMD/Fire Chief	
Robert Dextrase-Hwy Super	
Monica Wandolski-SelectBoard	
Judith Bogart-BOH	
Michael Perkins-Chief of Police	