

TOWN OF BELCHERTOWN HAZARD MITIGATION PLAN UPDATE



Adopted by the Belchertown Board of Selectman on _____

Prepared by:

Belchertown Hazard Mitigation Committee

and

Pioneer Valley Planning Commission

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The Belchertown Town Council extends special thanks to the Belchertown Hazard Mitigation Committee as follows:

Rollin DeWitt, Operations Supervisor, WWTP

Robert Lachance, Director, Buildings and Grounds, Belchertown Public Schools

Edward F. Bock, Fire Chief

Leanne Connolly, Conservation Agent

Doug Albertson, Town Planner

Paul Adzima, Building Inspector

Judy Metcalf, Health Department

Steve Williams, Director, DPW

Chris Lorenzo, Highway Supervisor

The Board of Selectmen also offers thanks to the Massachusetts Emergency Management Agency (MEMA) for developing the Commonwealth of Massachusetts Hazard Mitigation Plan, (www.state.ma.us/dem/programs/mitigate/index.htm) which served as a model for this plan and to the Pioneer Valley Planning Commission for their assistance in updating this plan.

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1: PLANNING PROCESS

Introduction

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 Belchertown 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 it.

Preparing a hazard mitigation plan before a disaster saves communities money and facilitates 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 their plan.

FEMA requires that a community adopt a hazard mitigation plan to be eligible for mitigation funding from the Hazard Mitigation Grant Program (HMGP), the Flood Mitigation Assistance Program (FMA), and the Pre-Disaster Mitigation (PDM) Program are programs with this requirement.

Hazard Mitigation Committee

Planning for hazard mitigation in Belchertown involved a nine-member committee:

Rollin DeWitt, Operations Supervisor, WWTP

Robert Lachance, Director, Buildings and Grounds, Belchertown Public Schools

Edward F. Bock, Fire Chief

Leanne Connolly, Conservation Agent

Doug Albertson, Town Planner

Paul Adzima, Building Inspector

Judy Metcalf, Health Department

Steve Williams, Director, DPW

Chris Lorenzo, Highway Supervisor

The 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 the 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 Hazard Mitigation Plan.

The key product of this process was the development of a list of prioritized new mitigation strategies to be implemented in the next five years.

Committee Meetings

Meetings of the Hazard Mitigation Committee, which took place at the Belchertown Town Hall, were held on the dates listed below.

February 12, 2016

Overview of hazard mitigation planning, identification and organizing of the planning team, identification of critical facilities, discussion of hazard identification and risk assessment, and review of existing mitigation strategies undertaken by the Town.

March 10, 2016

Re-visitation of critical facilities, discussion of history of natural hazard events, and discussion of potential mitigation strategies to be implemented.

April 12, 2016

Reviewing of draft prioritized list of mitigation strategies, based on conversation at previous meeting. Finalization of prioritized implementation strategies, discussion of the plan adoption process and procedures for regular maintenance of the plan.

Agendas and sign-in sheets for each meeting can be found in Appendix B. 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.

Participation by Public and Neighboring Communities

Two public planning sessions were held as part of the development of the Belchertown plan – on March 10, 2016 and June 7, 2016. Both meetings occurred after the Hazard Mitigation Committee had provided input on hazards and mitigation strategies relevant to the community. Notice of both public meetings was posted at Belchertown Town Hall in compliance with the Commonwealth of Massachusetts' open meeting law. Public meeting agendas and notices can be found in Appendix B.

On February 25, 2016, the Pioneer Valley Planning Commission sent a press release to all area media outlets announcing that the hazard mitigation planning process was underway and that the first public outreach meeting would be held on March 10, 2016. On May 31, 2016, PVPC sent out another press release stating that the second public outreach meeting would take place on June 7, 2016, and that a draft of the final plan had been placed on PVPC's website. Appendix B includes a screen capture of the PVPC website where the plan was available for download. The press release also indicated that all residents, businesses and other concerned parties of Belchertown were encouraged to comment on the plan by e-mailing or calling staff contacts at PVPC or the Town.

The two press releases also encouraged citizens and municipal officials from nearby communities to comment on Belchertown's plan by e-mailing or calling staff contacts at PVPC or the Town. The Pioneer Valley Planning Commission's regional scope ensured that residents and government officials throughout the Pioneer Valley saw the press release and request for comments.

A list of media organizations that were sent the two press releases is provided in Appendix B. The list of media included television stations, radio stations, and newspapers located in western Massachusetts, northern Connecticut, and southern Vermont.

Public participation will be a critical component of the Hazard Mitigation Plan maintenance process, as discussed in Chapter 6: Plan Review, Evaluation, Implementation, and Adoption.

Select Board Meeting

In 2011, the Belchertown Board of Selectmen agreed to begin the process of developing a Hazard Mitigation Plan. Once the plan was provisionally approved by FEMA in 2015, the Town Council discussed the plan at its regular meeting on [REDACTED] and voted to adopt it.

2: LOCAL PROFILE

Community Setting

Belchertown is a residential community of 14,649 people (2010 Census), with a land area of 55.4 square miles (approximately 34,000 acres) located in western Massachusetts. In land area, it is one of the largest communities in Massachusetts. Located on the eastern edge of the Connecticut River valley, it stretches twelve miles north and south and five miles across. Quabbin Reservoir and the Swift River Valley along the Ware town line define the eastern border. To the north are Pelham and Amherst, and to the west are Granby and Ludlow. Palmer is south. The Springfield metropolitan area lies to the southwest.

Belchertown's settlement began in the 1730s, and for its first 200 years, land use patterns reflected a dispersed agricultural community focused on the three-acre town common with surrounding churches and stores. Up until the time of the Civil War, an active carriage trade thrived in town. Summer residences and informal camps were built on the three lakes to the northwest. Various small manufacturing businesses, mills, and commercial stores were located near the town center and along the Swift River, Jabish Brook, and the major north/south and east/west railroad and transportation hubs. Small farms, horticulture and forestry operations flourished in the outlying areas.

The Belchertown State School, built on approximately 800 acres just west of town center, opened in 1921. The school played a dominant role in the economy and community life from the time it was built until it closed in 1990. At one time, the school had over 1,500 residents, employed about 1,000 people, and had a 200-acre farm that supplied agricultural products to the surrounding community. The town depended upon the state school's infrastructure, including its power plant and wastewater treatment facilities, to serve the town center. This shared arrangement worked to the town's advantage until the state abandoned the property in the 1990s. The New England Small Farms Institute assumed the farm portion of the state school property, while Belchertown's Economic Development and Industrial Commission (EDIC) assumed control of most of the remaining lands for economic development, with plans for a commercial development and a business and technology park. The reuse of the 800-acre state school property is one of the major land use issues facing the town.

Belchertown is also home to Quabbin Reservoir. Constructed from 1934-39, Quabbin is one of the largest drinking water reservoirs in the country. When it was built, it displaced residents from eleven communities; many of these displaced people moved to Belchertown. Today, the reservoir occupies over 1,000 acres of Belchertown's land, and a noted wildlife preserve protecting the surrounding watershed lands comprises another 3,000 acres. Quabbin and other surrounding state protected lands represent approximately 9% of Belchertown's land. Quabbin and closely associated protected lands have essentially prevented any development in Belchertown's northeast corner. Preserving and enhancing the environmental resources within the Quabbin area and surrounding watershed are important issues for the town and its neighbors.

This semi-rural, residential community, with its scenic landscape and proximity to both Amherst and Springfield, has experienced unprecedented residential development. Since 1980, the town's population increased 56% to an estimated 15,000 residents. Today, few farms are left, but many small

businesses flourish in the center of town with its expansive, beautiful Town Common. The annual Belchertown Fair of handicraft exhibits, horse draws, and a church supper is held on the Common.

Geography

Belchertown is located in Hampshire County within the Pioneer Valley region. It is bordered on the north by the towns of Amherst and Pelham as well as the Quabbin Reservoir, on the west by Granby, on the south by Ludlow and Palmer, and on the east by Ware.

Population Characteristics

According to the 2010 U.S. Census, there are 14,649 residents and a total of 5,839 housing units in Belchertown. The median household income is \$74,221 with 7.8% percent of residents living below the poverty line (American Community Survey 2009-2014).

Economy

Belchertown residents travel an average of 27.9 minutes to work each day (ACS 2009-2013). As of December 2014, the approximate labor force is 7,867 and the unemployment rate was 6.2 percent, the same as the state unemployment rate.

Climate

Belchertown is located in Hampshire County, where annual rainfall averages 44 inches and is distributed throughout the year. In addition to rain, snowfall averages 40 inches per season.

Prevailing winds from the south (and from the north/northwest to a lesser extent) reach their highest average speed during the month of April.

In the past few decades, Belchertown and all of New England have seen an increase in the number of extreme rainfall events, defined as large amounts of rain in a short period of time. In Massachusetts, the increase since 1948 has been 81 percent (Environment America Research & Policy Center, 2012).

Extreme rainfall is a cause of flooding, which is a major concern of this plan. In the last five years, there has also been an increased occurrence of tornadoes and large storms that generate strong wind gusts.

Infrastructure

Roads and Highways

Belchertown's town center is located at the approximate geographic center of Town, where several key transportation routes converge – Route 202 (north-south) and Route 9 (east-west) cross just north of where Route 21 and Route 181 also meet. The historic downtown is anchored around the large Town Common, but more recent development has occurred just north of this, where Route 202 crosses Route 9.

Rail

There is no passenger rail service in Belchertown. A freight line runs through the middle of town in a north-south direction, passing through wetlands and flood zones. Some of the freight includes hazardous materials. A rail staging area is found in the town center. Two rail spurs also lead to lumber yards in town.

Public Transportation

The Pioneer Valley Transit Authority (PVTA) provides bus and shuttle service in and out of Belchertown, primarily via the Five College route to UMass. PVTA also contracts with a private company to also offer paratransit, a door-to-door demand responsive van service.

Water and Sewer

There are five important public water supplies with sources in Belchertown (Belchertown Water District, Quabbin Reservoir, Springfield, Amherst, and Bondsville). Three of these, Amherst, Bondsville, and the Belchertown Water District, provide water to customers within Belchertown. The Belchertown Water District is a separate entity and is not part of the town government, but it is integral to the growth and functioning of the town. It serves the center of town, through the lakes, in the north, to the high school in the south. Much of the town's imminent growth will be served by this system, most notably the former state school campus. Growth in Belchertown is dependent on available water and for that water to be clean. Public infrastructure improvements include protecting water supplies – both ground water and surface water.

Belchertown relies mostly upon septic systems for the disposal of wastewater. Septic systems require appropriate soil absorptive ability and water table levels during the wet seasons. Hardpan is a problem northeast of Route 9 and in the southwest of town near the Granby border. Severe wetness is a constraint in eastern and southern Belchertown. Slope is a problem east of the town village and along the western boundary south of Route 202. Slight limitations prevail near the lakes and in the central southwestern part of town.

A new wastewater treatment plant was completed in 2001. Originally built in the 1930s to serve the Belchertown State School, the town took it over in 1992 and doubled its capacity when the state school closed. This plant is at about forty percent of its capacity. Sewer lines currently exist through the center of town south to the end of Springfield Road at Pine Valley Plantation and the proposed golf course on Chauncey Walker Road. The system has been expanded north along Bay Road and Metacomet Street to the lakes and back along Federal Street.

Natural Resources

Watersheds

The pattern of rivers, streams, lakes and ponds reflect the geologic history of Belchertown, for the flow of water is determined and controlled by the topography and soil conditions. Belchertown's complex topography yields five distinct drainage basins or watersheds:

1. Scarborough and Hop brooks drain an area in Northwest Belchertown, flowing west and northwest into and through the Lawrence Swamp;
2. Lampson Brook, Weston Brook and Bachelor Brooks, the outlet of Metacomet Lake, flow generally west into Forge Pond located in Granby;
3. Roaring Brook/Broad Brook watershed in southwest Belchertown is traversed by the Jabish Canal, which diverts water from Jabish Brook to the Springfield Reservoir;
4. Jabish Brook is the major stream in the town with its headwaters in Kights Pond, a reservoir owned by the Springfield Water District. Jabish Brook flows south to the Swift River. A portion of its flow is diverted at the pond just north of Mill Valley Road; and
5. The Swift River is the major watershed in Belchertown, including most of the land in Belchertown owned by the Metropolitan District Commission as part of the Quabbin Reservoir Reservation. The reservoir itself occupies 1,575 acres in Belchertown alone.

Surface Waters

The three lakes in Belchertown (Knight's Pond, Lake Arcadia, Lake Holland, and Lake Metacomet) are a valuable aesthetic and recreational resource. The lakes provide recreation throughout the year. The town beach is situated on the south shore of Lake Arcadia, and Lake Metacomet has a boat ramp and is stocked with fish.

Jabish Brook is the major stream in town. It originates in Knight's Pond near Pelham. In its upper stretch, it is an important component of the Town of Springfield's water supply; Jabish Brook water gets diverted into the Springfield Reservoir in Ludlow via the Jabish Canal. The lower length of the brook is important to the Belchertown and Bondsville aquifers. Each of these water districts has wells near the brook. This water supply receives continual monitoring and is worthy of even greater protection.

Aquifer Recharge Areas

Three large wetlands systems are particularly critical to Belchertown's groundwater supplies:

- In northwest Belchertown, wetlands in the Scarborough Brook watershed recharge a major aquifer which underlies the Lawrence Swamp and serve as a water source for Belchertown, Amherst, and Pelham.
- A second system of wetlands, in east-central Belchertown, augments the flow of Jabish Brook and recharges both groundwater and surface water supplies. The aquifer, which underlies this system, provides drinking water drawn from two municipal wells, and water diverted from Jabish Brook into the Jabish Canal serves the Springfield Water and Sewer District.

- The last system of wetlands is located in the lower Jabish Brook watershed in South Belchertown; here, the underlying aquifer supplies South Belchertown and Bondsville (Town of Palmer) with drinking water.

Wetlands

Wetlands found in Belchertown include shrub swamps and beaver ponds, shallow and deep marshes, wet meadows, bogs, forested swamps and seasonally flooded areas, as well as lands within the 100-year floodplains of rivers and streams. In addition, the Soil Conservation Service (SCS) has identified twenty-one soil types in Belchertown that have seasonally high water table and are very poorly drained. According to aerial studies conducted by the University of Massachusetts, Belchertown leads Hampshire County in the number of acres of wetlands, totaling more than 3000 acres or 11% of the total landmass of the town. Large areas of central and southern Belchertown are wetlands.

Wetlands are important to controlling floodwaters by absorbing or holding excess water flows to rivers and streams, reducing peak flood levels. The conservation of wetlands in Belchertown is important not only

Forest

Over half (65%) of the total acreage of Belchertown is forested, approximately 23,131 acres, though the forest is of neither uniform age nor density. 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. Belchertown's forests have been changing for many years. Areas once cleared for agriculture or for timber are now in various stages of returning to maturity.

Additionally, there are many acres of abandoned fields and orchards. These foregone agricultural lands provide good wildlife habitats. Shrub swampland and meadows each have their unique trees and grasses. Studies in the 1970s identified 62 species of trees, 214 species of wildflowers, flowering shrubs and vines and 42 introduced species in Belchertown.

Development

Zoning

The Belchertown Zoning Bylaw establishes eleven base zones, and four overlay zones:

- Five residential zones – VR, village residential; AG-B, rural residential; LR, lakes residential; MDR, multiple-dwelling residential; and MHP, mobile home park residential;
- One open zone – AG-A, primary agriculture;
- Two commercial (business) zones -- B1, limited business; and B2, general business;
- Two industrial zones – LI, light industrial; and I, industrial;
- One mixed use zone – Business Neighborhood Center; and
- Four overlay zones – Wetland Protection, Floodplain, Aquifer Protection, and Historic Village Protection.

Although appropriate zoning is all relevant to protecting the health and safety of the Town residents, three of Belchertown's overlay districts are specifically relevant to natural hazard mitigation. These are outlined here:

- Wetland Protection - This overlay district applies to all lands within 100 feet of the annual high-water line of a stream, lake, pond or watercourse and all lands within 100 feet of poorly drained soils. It provides for oversight by the conservation commission and adds certain requirements to protect wetlands.
- Floodplain - The floodplain overlay applies to those areas within the boundary of the one-hundred-year flood that are considered hazardous according to FEMA. It limits some uses for preventing potential flood damage.
- Aquifer Protection District - This purpose of this overlay district is to protect and preserve Belchertown's groundwater resources from potentially damaging pollution or environmental degradation by regulating certain uses within the district. The regulations state specific prohibited and restricted uses, regulates drainage, details site plan requirements and special permit procedures.

The Zoning Bylaw also establishes a Site Plan/Special Permit Approval procedure for specific uses and structures within Belchertown. 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 Belchertown are protected, and includes several specific evaluation criteria that are relevant to natural hazards. Those criteria include:

- Minimize use of wetlands, steep slopes, floodplains and hilltops;
- Minimize tree, vegetation and soil removal and grade changes;
- Maximize open space retention
- The site plan shall show adequate measures to prevent pollution of surface water or groundwater, to minimize erosion and sedimentation and to prevent changes in groundwater levels, increased runoff and potential for flooding. Drainage shall be designed so that runoff shall not be increased, groundwater recharge is maximized and neighboring properties will not be adversely affected.

Current Development Trends

Today, the vast majority of Belchertown's 54.2 square miles is undeveloped land, totaling more than 24,630 acres. Residential land is the second most prolific land use, at approximately 4,692 acres, followed closely by agricultural land at approximately 3,481 acres. Water comprises almost 2,000 acres of land in Belchertown. Land used for industrial uses constitutes approximately 220 acres, whereas the amount of commercial land is relatively small at just 70 acres. Land characterized as urban open/public land constitutes 337 acres, and there are 116 acres of outdoor recreational land throughout Town.

Currently, development in Belchertown is slightly encouraged by existing zoning and other land use regulations to seek areas where the environmental conditions and existing public utilities support such development. However, Belchertown's existing zoning provides few incentives to guide that development to existing town centers. One exception is the new business neighborhood center district, which guides development in the old State School area.

Since the creation of the last hazard mitigation plan, Belchertown has seen limited development. Single family homes located along rural roads in town have been the most prevalent development. These homes are not likely to impact the town's overall vulnerability to hazard. The old State School area of town, which is slated as a place for the town's future development, has seen some growth. Most recently a senior living facility was built there and could require assistance if evacuations were required. The committee did not believe that recent developments will negatively impact the town's overall vulnerabilities to the hazard identified in this plan. They were, however, concerned that the deteriorating conditions of existing developments could increase the risk of damages. Mobile homes in the Sports Haven travel park are located in a flood plain and have fallen into disrepair over the years. The committee voiced concerns about their current state of repair potentially increasing their vulnerabilities to flooding.

National Flood Insurance Program

Belchertown is a participating member of the National Flood Insurance Program. As of 2016 Belchertown had 4 policies in the A zone and 13 flood policies in other zones of less flood risk for total coverage of \$2,749,200. There are no repetitive loss properties in Belchertown. The Town will maintain compliance with the NFIP throughout the next 5-year Hazard Mitigation Planning cycle by monitoring its Flood Plain Overlay District and ensuring that the district accurately reflects the 100-year flood plain and FEMA Flood Insurance Rate Map (FIRM).

3: HAZARD IDENTIFICATION AND RISK ASSESSMENT

The following section includes a summary of disasters that have affected or could affect Belchertown. Historical research, conversations with local officials and emergency management personnel, available hazard mapping and other weather-related databases were used to develop this list. Identified hazards are the following:

- Floods
- Severe snowstorms / ice storms
- Hurricanes
- Severe thunderstorms / wind / tornadoes
- Wildfires / brushfires
- Earthquakes
- Dam failure
- Drought
- Extreme Temperatures

Natural Hazard Analysis Methodology

This chapter examines all hazards identified by the Massachusetts State Hazard Mitigation Plan which are identified as likely to affect Belchertown. The analysis is organized into the following sections: Hazard Description, Location, Extent, Previous Occurrences, Probability of Future Events, Impact, and Vulnerability. A description of each of these analysis categories is provided below.

Hazard Description

The natural hazards identified for Belchertown are: floods, severe snowstorms/ice storms, hurricanes, severe thunderstorms / wind / tornadoes, wildfire/brushfire, earthquakes, dam failure, drought, and extreme temperatures. 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:

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:

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:

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.

Hazard Identification and Analysis Worksheet for Belchertown

Type of Hazard	Location of Occurrence	Probability of Future Events	Impact	Hazard Risk Index Rating
Floods	Small	Minor Floods – Moderate Moderate floods – Low Major floods - Low	Minor	3 – Medium Risk
Severe Snowstorms / Ice Storms	Large	Very High	Limited	3 – Medium Risk
Hurricanes	Large	Moderate	Critical	3 – Moderate Risk
Severe Thunderstorms / Wind	Large	High	Limited	3 – Moderate Risk
Tornadoes/ Microbursts	Small	Very High	Critical	5 – Very Low Risk
Wildfires / Brushfires	Small	Very Low	Minor	5 – Very Low Risk
Earthquakes	Large	Very Low	Minor	5 – Very Low Risk
Dam Failure	Large	Low	Limited	5 – Very Low Risk
Drought	Large	Low	Limited	4 – Low Risk
Extreme Temperatures	Large	High	Minor	4 – Low Risk

Floods

Hazard Description

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

- **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.

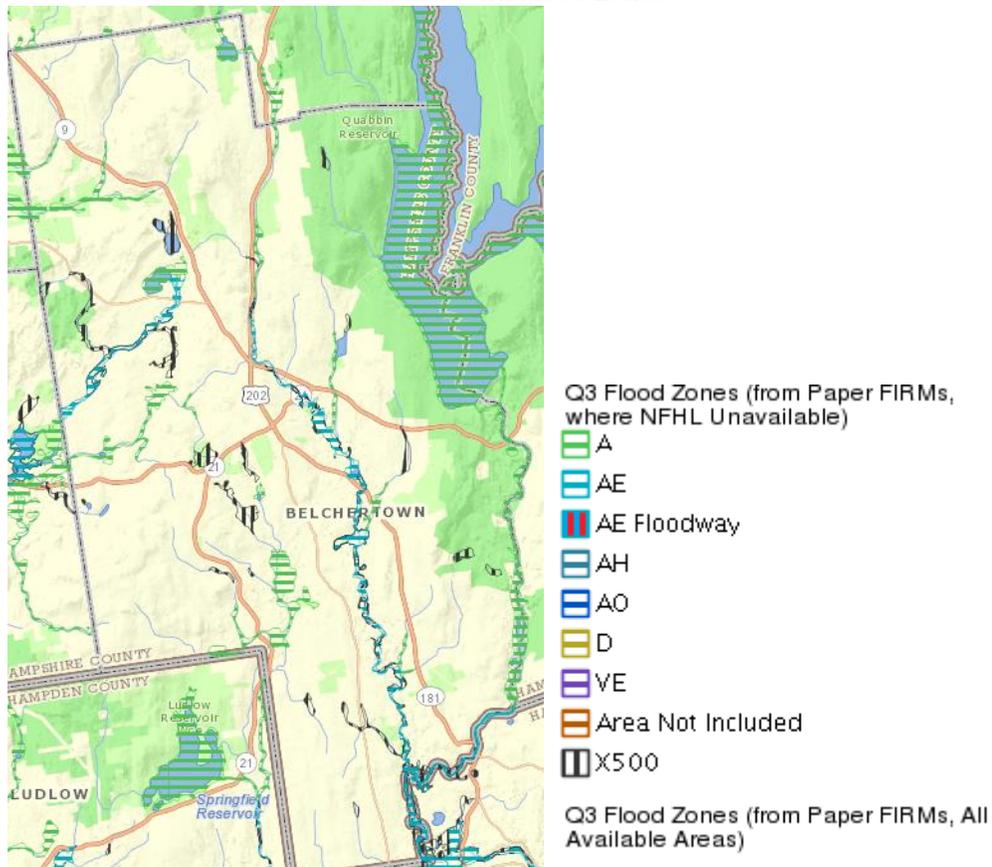
A floodplain is the relatively flat, lowland area adjacent to a river, lake or stream. Floodplains serve an important function, acting like large "sponges" to absorb and slowly release floodwaters back to surface waters and groundwater. Over time, sediments that are deposited in floodplains develop into 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

Floodplains in Belchertown, as mapped by the National Flood Insurance Program total approximately 5,300 acres, or 14 percent of the land in town. The major flood plains are found along the Swift River; along Jabish Brook, from the Center of Belchertown east of the village to Ware; along Broad Brook west of North and South Washington Streets, east of Chauncey Walker Street and Springfield Road, and north of West Street in southwest Belchertown; along Hop Brook from west of Federal Street to Amherst; and along the lakes regions and Batchelor Brook running southeast of Stebbins Street to the Granby border. (Source: 2013 Open Space and Recreation Plan)

There are approximately 1,306 acres of land within the FEMA mapped 100-year floodplain and 496 acres of land within the 500-year floodplain within the Town of Belchertown.

Belchertown Flood Zones



Source: MassGIS Oliver

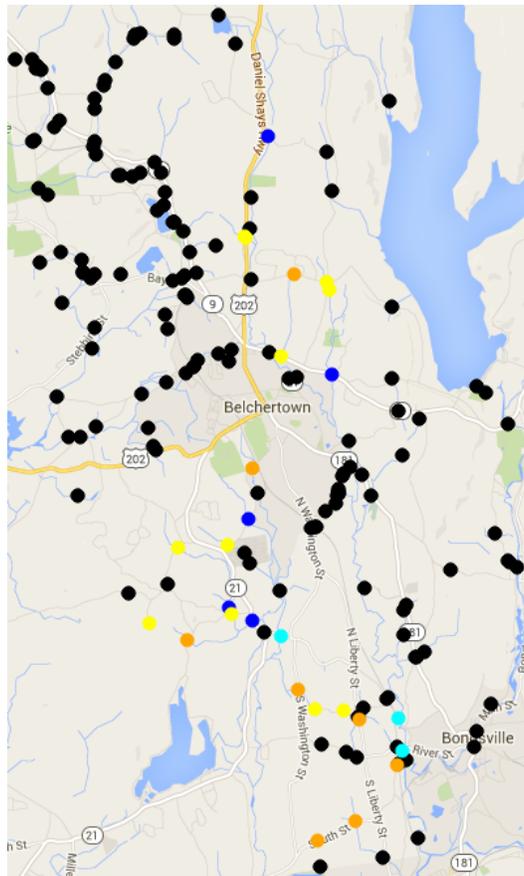
Specific vulnerability assessments were estimated for sites within the SFHA which have been susceptible to 100-year floods in the past, they are described below.

In addition to the FEMA designated floodplain, the Hazard Mitigation Committee has identified the following specific areas as areas that would have the impact on the most people IF they flooded (which is not a usual or regular occurrence).

- Railroad Street
- Bardwell area
- Warren Wright Road (railroad right of way)
- Aqueduct from Quabbin in South Belchertown
- North Washington Street Underpass
- South Street Underpass
- Rural Road between Boardman Road and Granby Line
- Sports Haven Mobile Home Park, located partially in flood zone, with 50 trailers (location of population at highest risk for flood)

Based on these locations, flooding has a “small” location of occurrence, with less than 10 percent of land affected.

There are many culverts in Belchertown, as shown on the map below. There are no culvert areas that experience flooding problems on a regular basis, even though it is unlikely that the majority of culverts are sized to handle 100-year floods. Belchertown is currently in the process of updating its culverts according to new culvert crossing standards issued by MassDEP, and have already addressed any culverts that did flood regularly in the past.



Source: University of Massachusetts Stream Continuity Project 2011 <<https://streamcontinuity.org/index.htm>>

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 Belchertown and surrounding areas in western Massachusetts is 46 inches. In general Belchertown is at a lower risk for flash floods due to its geography. With wide valleys, flash floods generally only become a risk in instances where there is high and rapid snow melt.

Previous Occurrences

Already addressed, rural road addressed by beaver deceivers

The National Weather Service monitors flooding crests for the Connecticut River, at the nearest National Weather Service station in Northampton, Massachusetts. The NWS has various flooding classifications based on water level. These classifications and their definitions are:

Action Stage - the stage which, when reached by a rising stream, represents the level where the NWS or a partner/user needs to take some type of mitigation action in preparation for possible significant hydrologic activity. The type of action taken varies for each gage location. Gage data should be closely monitored by any affected people if the stage is above action stage.

Minor Flooding is defined to have minimal or no property damage, but possibly some public threat. A Flood Advisory product is issued to advise the public of flood events that are expected not to exceed the minor flood category. Examples of conditions that would be considered minor flooding include:

- water over banks and in yards
- no building flooded, but some water may be under buildings built on stilts (elevated)
- personal property in low lying areas needs to be moved or it will get wet
- water overtopping roads, but not very deep or fast flowing
- water in campgrounds or on bike paths
- inconvenience or nuisance flooding
- small part of the airstrip flooded, and aircraft can still land
- one or two homes in the lowest parts of the community may be cut off or get a little water in the crawl spaces or homes themselves if they are not elevated

Moderate Flooding is defined to have some inundation of structures and roads near the stream. Some evacuations of people and/or transfer of property to higher elevations may be necessary. A Flood Warning is issued if moderate flooding is expected during the event. Examples of conditions that would be considered moderate flooding include:

- several buildings flooded with minor or moderate damage
- various types of infrastructure rendered temporarily useless (i.e. fuel tanks cannot be reached due to high water, roads flooded that have no alternates, generator station flooded)
- elders and those living in the lowest parts of the village are evacuated to higher ground
- access to the airstrip is cut off or requires a boat
- water over the road is deep enough to make driving unsafe
- gravel roads likely eroded due to current moving over them

- widespread flooding, but not deep enough to float ice chunks through the community
- water deep enough to make life difficult, normal life is disrupted and some hardship is endured
- airstrip closed
- travel is most likely restricted to boats

Major Flooding is defined to have extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations are necessary. A Flood Warning is issued if major flooding is expected during the event. Examples of conditions that would be considered major flooding include:

- many buildings flooded, some with substantial damage or destruction
- infrastructure destroyed or rendered useless for an extended period of time
- multiple homes are flooded or moved off foundations
- everyone in threatened area is asked to evacuate
- National Guard units assist in evacuation efforts
- erosion problems are extreme
- the airstrip, fuel tanks, and the generator station are likely flooded
- loss of transportation access, communication, power and/or fuel spills are likely
- fuel tanks may float and spill and possibly float downstream
- ice chunks floating through the community that could cause structural damage
- high damage estimates and high degree of danger to residents

In Belchertown the Swift River is the most likely to generate major flooding conditions.

Probability of Future Events

Based upon previous data, it is not very likely that Belchertown will experience localized flooding outside the 100 year flood plain.

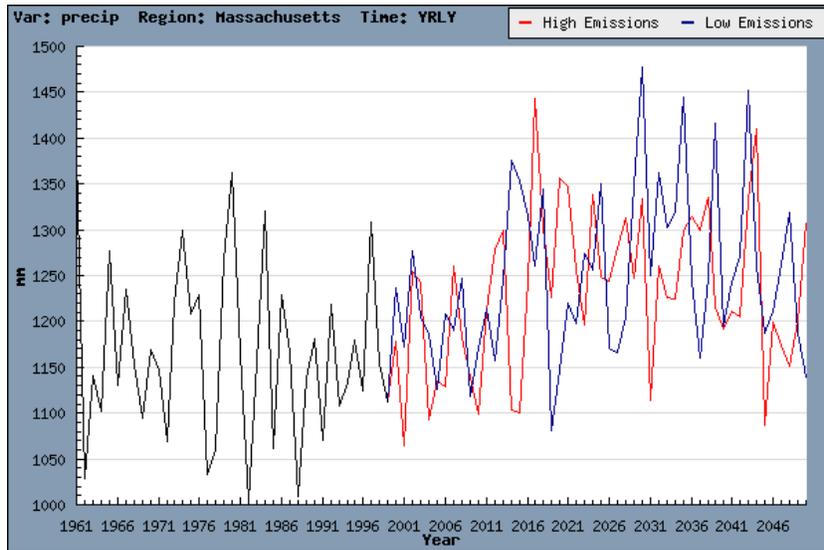
Flooding frequencies for the various floodplains in Belchertown are defined by FEMA as the following:

- 10-year floodplain – 40-70% probability of flooding in any given year
- 25-year floodplain – 2.5 probability of flooding in any given year
- 100-year floodplain – 1 probability of flooding in any given year
- 500-year floodplain – 0.2 probability of flooding in any given year

However, 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 average annual precipitation for Belchertown and surrounding areas in western Massachusetts is 46 inches. This is likely to increase. Rainfall has increased approximately 10% during the past 50 years, and is expected to continue increasing (see figure below).

Massachusetts Rainfall 1961-2050



Source: NECIA 2006

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 from flooding.

Based on the town's median home value of \$255,800 (2009-2014 American Community Survey), and an estimated 10 percent of structures in the town impacted at 20% damage, flooding would create an estimated \$30,112,176 in property damage.

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

Vulnerability

Based on the above analysis, Belchertown has a hazard index rating of “3 - medium risk” for flooding.

Most of Belchertown’s concentrations of population and critical facilities are not located in areas that are prone to flooding, limiting the town’s vulnerability. The Sports Haven Mobile Home Park is considered to be the extremely vulnerable to flooding because it is located partially within a flood zone and many of the homes are not “strapped” onto their foundations. Almost all evacuation routes (Route 202, Route 9, Route 181 and Bay Road) have at least one areas where flooding could impact travel and evacuation attempts.

Severe Snowstorms / Ice Storms

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. The rain, freezing rain, ice, snow, cold temperatures and wind associated with these storms can cause the following risks:

- 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

Location

The entire Town of Belchertown is susceptible to severe snowstorms, making the location of occurrence “large,” with over 50 percent of land area affected. Belchertown has also had specific problems with snow drifts in the following areas:

- | | |
|---|--|
| ▪ Mill Valley Rd. at Golf Course | ▪ George Hanum St. at Jackson St. and Hamilton St. |
| ▪ Cold Spring Rd. at UMASS property | ▪ Jackson St. at Small Farms |
| ▪ Sabin St. at UMASS property | ▪ Maple St. between Front St. & Police Dept |
| ▪ North Washington St. at Bardwell St. | ▪ Chauncey Walker St. (Rt. 21) between Turkey Hill Rd. & Pine Valley |
| ▪ Gold St. at North and East sides of Reservoir | |

Due to the location of power lines in regard to trees, power tends to be lost in the western areas of town around the Quabbin and in the north end of town during storms.

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.

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>

Previous Occurrences

Belchertown generally experiences at least one or two severe winter storms each year with varying degrees of severity. Severe winter storms typically occur during January and February; however, they can occur from late September through late May.

Significant snowstorms that have impacted Belchertown include the following:

- October 2011 snowstorm
- 1996 ice storm (mainly impacting northern section of town)
- Winter 2015 (ran out of places to push snow)

The hazard mitigation committee did not know the largest snowfall to hit Belchertown, and town-specific data for historical snowfall is not readily available. But 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 on the next page, in order of their NESIS severity.

**Winter Storms Producing Over 10 inches of Snow
in the Pioneer Valley, 1958-2015**

Date	NESIS Value	NASIS Category	NESIS Classification
1958-02-14	6.25	4	Crippling
1958-03-18	3.51	2	Significant
1960-03-02	8.77	4	Crippling
1960-12-11	4.53	3	Major
1961-01-18	4.04	3	Major
1961-02-02	7.06	4	Crippling
1964-01-11	6.91	4	Crippling
1966-01-29	5.93	3	Major
1966-12-23	3.81	2	Significant
1967-02-05	3.50	2	Significant
1969-02-08	3.51	2	Significant
1969-02-22	4.29	3	Major
1969-12-25	6.29	4	Crippling
1972-02-18	4.77	3	Major
1978-01-19	6.53	4	Crippling
1978-02-05	5.78	3	Major
1982-04-06	3.35	2	Significant
1983-02-10	6.25	4	Crippling
1987-01-21	5.40	3	Major
1993-03-12	13.20	5	Extreme
1994-02-08	5.39	3	Major
1995-02-02	1.43	1	Notable
1996-01-06	11.78	5	Extreme
1997-03-31	2.29	1	Notable
2000-01-24	2.52	2	Significant
2000-12-30	2.37	1	Notable
2003-02-15	7.50	4	Crippling
2005-01-21	6.80	4	Crippling
2006-02-12	4.10	3	Major
2007-02-12	5.63	3	Major
2007-03-15	2.54	2	Significant
2009-03-01	1.59	1	Notable
2010-02-23	5.46	3	Major
2010-12-24	4.92	3	Major
2011-01-09	5.31	3	Major
2011-01-26	2.17	1	Notable
2011-02-01	5.30	3	Major
2011-10-29	1.75	1	Notable
2013-02-07	4.35	3	Major
2013-03-04	3.05	2	Significant
2013-12-13	2.95	2	Significant
2013-12-30	3.31	2	Significant
2014-02-11	5.28	3	Major
2014-11-26	1.56	1	Notable
2014-12-09	1.49	1	Notable
2015-01-25	2.62	2	Significant
2015-01-29	5.42	3	Major
2015-02-08	1.32	1	Notable

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

Probability of Future Events

Based upon the availability of records for Hampshire County, there is a "moderate" probability (between 10 to 40 percent in any given year) that a severe snow storm will occur in Belchertown.

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 impact of a severe snow or ice storm is classified as "limited," with more than 10 percent of property in the affected area damaged or destroyed.

To approximate the potential impact to property and people that could be affected by this hazard, the total value of all property of \$1,507,480,000 (2014) is used. An estimated 20 percent of damage would occur to 10 percent of structures, resulting in a total of \$30,149,600 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Vulnerability

Based on the above assessment, Belchertown has a hazard index rating of "3 - medium risk" from severe snowstorms and ice storms.

The entire town is vulnerable to the impacts of severe snow and ice. The town's energy and communication infrastructure are particularly vulnerable. In the past snow and ice have downed trees that fall onto power lines causing outages. The police and fire stations in town are vulnerable to snow and ice. Damage or disruption of operations at these facilities could limit the town's ability to respond to hazards. Route 202 and North Main Street have been identified as evacuation routes likely to be impacted by snow and ice.

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 Belchertown is at risk from hurricanes, meaning the location of occurrence is "large," or over 50 percent of land area affected. Ridge tops 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.

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 Belchertown are shown in the following table:

Major Hurricanes and Storms Affecting Belchertown		
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

Belchertown experienced the most impacts from Hurricane Gloria in 1985, when the town lost power for 3 days. It is not known if any of the above hurricanes tracked directly over Belchertown, due to lack of records or the fact that hurricanes tend to become disorganized this far inland.

Probability of Future Events

Belchertown'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 of hurricanes in Belchertown, or a 1 to 10 percent probability in the next year.

Impact

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

Hurricane Damage Classifications			
Storm Category	Damage Level	Description of Damages	Wind Speed (MPH)
1	MINIMAL	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
	Very dangerous winds will produce some damage		
2	MODERATE	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
	Extremely dangerous winds will cause extensive damage		
3	EXTENSIVE	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
	Devastating damage will occur		
4	EXTREME	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
	Catastrophic damage will occur		
5	CATASTROPHIC	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+
	Catastrophic damage will occur		

The impact of a hurricane would be “critical,” with more than 25 percent of total structures damaged.

To approximate the potential impact to property and people that could be affected by this hazard, the total value of all property of \$1,507,480,000 is used. Wind damage of 5 percent to 10 percent of structures would result in an estimated \$7,537,400 of damage. Flood damage of 10 percent to 20 percent of structures would result in \$30,149,600 of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Vulnerability

Based on the above analysis, Belchertown faces a hazard index rating of “3 - moderate risk” from hurricanes.

The entire town would be vulnerable to the impacts of a hurricane. Areas prone to flooding would be particularly vulnerable. Additionally high winds could impact that town’s communications and energy infrastructure. Older buildings in town, that were built to withstand lower wind standard, may be most susceptible to damage.

Severe Thunderstorms / Wind / Tornadoes/Microbursts

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 the 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 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.

According to the National Weather Service, microbursts are downdrafts in thunderstorms (<http://www.srh.noaa.gov/ama/?n=microbursts>, accessed Feb. 18, 2016). Wind speeds up to 150 miles per hour are possible in microbursts, though their impact area may be less than 2.5 miles in diameter.

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. 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.

Microbursts are sudden down bursts of air 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, and tornadoes. Because of this, the location of occurrence is "large," with over 50 percent of land area 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. Hail damage often correlates with hail size.

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.

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/hailsiz.htm>

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

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.

Previous Occurrences

Because thunderstorms and wind affect Belchertown on an annual basis, there are not significant or specific 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.

There are typically 1 to 3 tornadoes somewhere in southern New England per year. Most occur in the late afternoon and evening hours, when the heating is the greatest. The most common months are June, July, and August, but the Great Barrington, MA tornado (1995) occurred in May and the Windsor Locks, CT tornado (1979) occurred in October.

Within Massachusetts, tornadoes have occurred most frequently in Worcester County and in communities west of Worcester. In 2011, a tornado ranked F3 (Severe Damage) on the Fujita Scale of Tornado Intensity, blew through West Springfield, Westfield, Springfield, Monson, Wilbraham, Brimfield, Sturbridge, and Southbridge. The tornado and related storm killed 3 people and resulted in hundreds of injuries across the state.

A powerful microburst affected Easthampton on October 8th, 2014, that involved winds up to 100 miles per hour. The microburst began on the west side of Mount Tom and moved southwest to northeast along the edge of the range. Several homes lost power and were damaged. There have been no known recent microbursts in Belchertown.

No known tornados have ever touched down in Belchertown.

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.

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>

Based upon the available historical record, there is a "low" probability of tornado occurrence, or between a 1 to 10 percent chance, in any given year. There is a "high" probability, or 40 to 70 percent chance in any given year, of a severe thunderstorm or wind (including microbursts).

Impact

The impact of an event is determined to be “limited,” with less than 25 percent of all structures in Belchertown impacted. This is due to the large land area of the town.

The potential for locally catastrophic damage is a factor in any tornado, severe thunderstorm, or wind event. In Belchertown, a tornado that hit the residential areas would leave much more damage than a tornado with a travel path that ran along its forested uplands, where little settlement has occurred. Most structures in Belchertown 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, with most of Belchertown's housing built before this date.

To approximate the potential impact to property that could be affected by severe weather, tornado, or wind, the total value of all property in Belchertown of \$1,507,480,000 is used. For a tornado, an estimated 100 percent of damage would occur to 1 percent of structures, resulting in a total of \$15,074,800 worth of damage. For a severe thunderstorm or wind, an estimated 20 percent of damage would occur to 10 percent of structures, resulting in a total of \$30,149,600 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in these estimates.

Vulnerability

Based on the above assessment, Belchertown has a hazard index rating of “3 - moderate risk” for severe thunderstorms and winds, and a “5 – very low risk” for tornadoes.

The entire town would be vulnerable to the impacts of a severe thunderstorm, wind, tornadoes and microbursts. The areas most vulnerable to flooding could also be at risk during a severe thunderstorm if substantial rainfall were to occur. Additionally high winds could impact that town's communications and energy infrastructure. Older buildings in town, that were built to withstand lower wind standard, may be most susceptible to damage.

Wildfire / 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. Both wildfires and brushfires can consume homes, other buildings and/or agricultural resources. FEMA has classifications for 3 different classes of wildfires:

- **Surface fires** are the most common type of wildland fire and burn 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 lightning
- **Crown fires** move quickly by jumping along the tops of trees. A crown fire may spread rapidly, especially under windy conditions (these are highly unusual in New England).

The wildfire season in Massachusetts usually begins in late March and typically culminates in early June, corresponding with the driest live fuel periods of the year. April is historically the month in which wildfire danger is the highest. However, wildfires can occur every month of the year. Drought, snow pack, and local weather conditions can expand the length of the fire season. The early and late shoulders of the fire season usually are associated with human-caused fires.

Location

For the most part, Belchertown experiences mostly grass and brushfires, but forest fires are a potentially significant issue. In Belchertown, approximately 65% of the town's total land area is in forest, or about 23,131 acres, and is therefore at risk of fire.

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. Moderate risk exists for potential wildfire incidents, especially near some of the town's forested, agricultural, and recreational lands. Forested and agricultural areas with high fuel content have more potential to burn. In addition, it is often very difficult to access some of the locations to extinguish the brushfire. Up to 200 plus people could be impacted by a wildfire in one of the Town's agricultural areas.

Previous Occurrences

Approximately 700 burn permits are issued annually in Belchertown. The Belchertown Fire Department responds to an average of 34 brush fire calls per year, usually in backyard fields of grass. Over the last 10 years these calls have ranged in size from under a quarter (1/4) acre to ten (10) acres. Historically, the largest brush fire in Belchertown encompassed over three hundred (300) acres. This occurred in the 1950s or 1960s along Routes 9 and 202. Up to 200+ houses could be at risk with the onset of a serious brush fire.

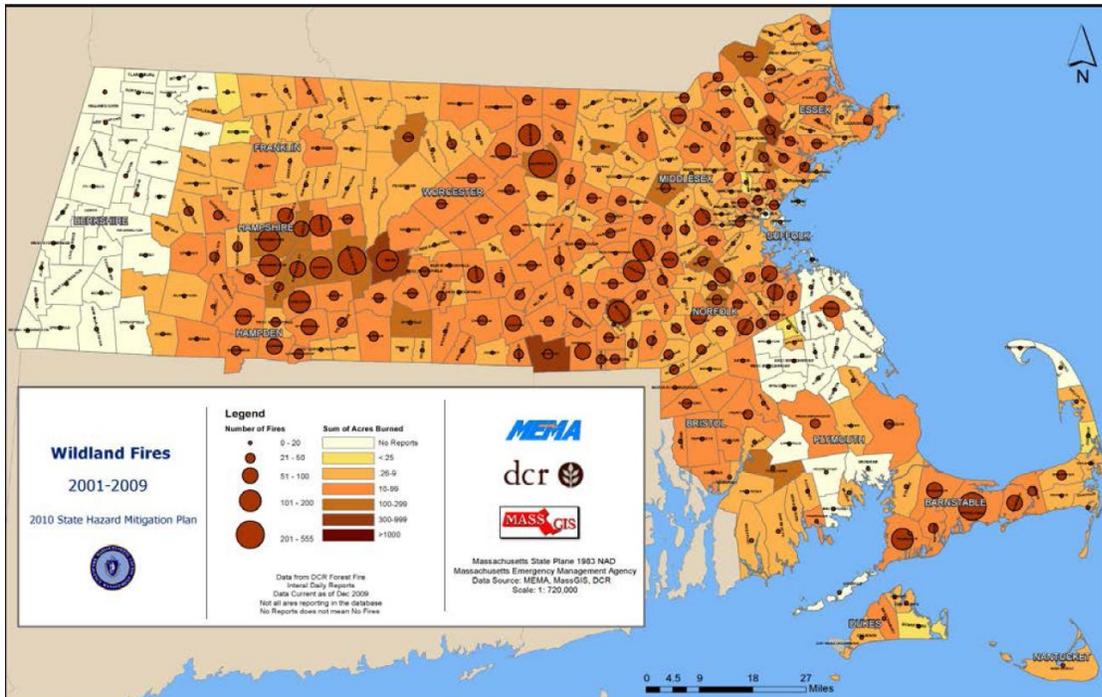
Major wildfires in the Pioneer Valley area include:

- 1995 – Russell, 500 acres burned on Mt. Tekoa
- 2000 – South Hadley, 310 acres burned over 14 days in the Lithia 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

Total Fire Incidents in Belchertown	
2008	52
2009	33
2010	50
2011	45
2012	51
2013	59

Source: Massachusetts Fire Incidence Reporting System, County Profiles, 2013 Fire Data Analysis

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, it was agreed upon that there is a “very low” likelihood of a future wildfire event, with a 1 to 10 percent probability in any given year.

Climate scenarios project summer temperature increases between 2°C and 5°C 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.

Impact

The impact of this hazard is considered “minor,” with minimal property impact.

Vulnerability

Based on the above assessment, Belchertown has a hazard index rating of “5 – very low risk” for wildfires and brushfires.

The forested areas of Belchertown are most vulnerable to the impacts of wildfires and brushfires. Belchertown’s critical infrastructure and most of its population is located in the more developed areas of the town, reducing its vulnerabilities to wildfires.

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. Ground shaking from earthquakes can rupture gas mains and disrupt other utility service. They can also 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 most at risk during an earthquake.

Location

Because of the regional nature of the hazard, all of Belchertown is susceptible to earthquakes. This makes the location of occurrence "large," or over 50 percent of the total land area affected.

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 a earthquake that causes almost complete destruction.

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.

Source: FEMA

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: FEMA

Previous Occurrences

The most recent earthquakes to affect Belchertown are shown in the table below.

Largest Earthquakes Affecting Belchertown, MA, 1924 – 2014		
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

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/earthquakes.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.

Earthquake Index for Hampshire County	
Hampshire County	0.17
Massachusetts	0.70
United States	1.81

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

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. The seismic standards have also been upgraded with the 1997 revision of the State Building Code.

The Hazard Mitigation Committee has determined that an earthquake would have a “minor” impact, with minimal damage to property occurring.

Vulnerability

Based on this analysis, the hazard index rating for Belchertown is “5 - very low risk” for earthquakes.

The whole town is vulnerable to the impacts of an earthquake. The Hazard Mitigation Committee lacks the information necessary to determine how critical facilities would fair if an earthquake were to occur. Destruction to critical facilities could greatly impact the town’s ability to operate and respond. Older buildings are particularly vulnerable to earthquakes because their construction pre-dates building codes that included strong seismic considerations. All evacuation routes in town have at least one bridge and all bridges were built before 1956. These bridges may not be able to withstand an earthquake and could impede evacuation efforts.

Dam Failure

Hazard Description

Dams, levees, and their associated impoundments can provide important benefits to a community, including 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 fails, the potential energy of the stored water behind the dam is released rapidly. Most dam failures occur when floodwaters overtop and erode the material components of the dam.

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's Office of Dam Safety is responsible for regulating dams in the state (M.G.L. Chapter 253, Section 44 and the implementing regulations 302 CMR 10.00). Dams regulated by the Office of Dam Safety must be in excess of 6 feet in height (regardless of storage capacity) and have more than 15 acre feet of storage capacity (regardless of height). Dams that fall below these parameters are known as non-jurisdictional dams. Hydropower dams, such as the West Springfield Dam/Strathmore Paper Co. Dam, are typically regulated through licensing they obtain through the Federal Energy Regulatory Commission.

Dam safety regulations enacted in 2005 transferred significant responsibilities for dams from the State of Massachusetts to dam owners. The financial burden associated with these responsibilities can vary greatly, depending on the number of dams for which an owner is responsible, and the dam's condition and hazard index rating. A hazard index rating (see description of this rating in "Extent" section below) brings with it different requirements related to frequency of inspections by engineers and the need for development of emergency action plans. With these inspections, a dam determined to be in poor or unsafe condition can involve very costly repairs.

In January 2013, the Governor signed into law additional provisions to promote greater dam safety by:

1. extending the requirement of emergency action plans to significant hazard dams (in addition to high hazard dams);
2. strengthening the authority of the Office of Dam Safety by increasing fines for non compliance; and
3. establishing the Dam and Sea Wall Repair and Removal Fund, an annual grant and loan program available to dam owners.

As of March 2015, it is noted on the Office of Dam Safety website, "Prior to implementation of the legislated changes, regulations must be drafted, reviewed and promulgated. Draft regulations will be made available for public comment as part of the promulgation process.

Location

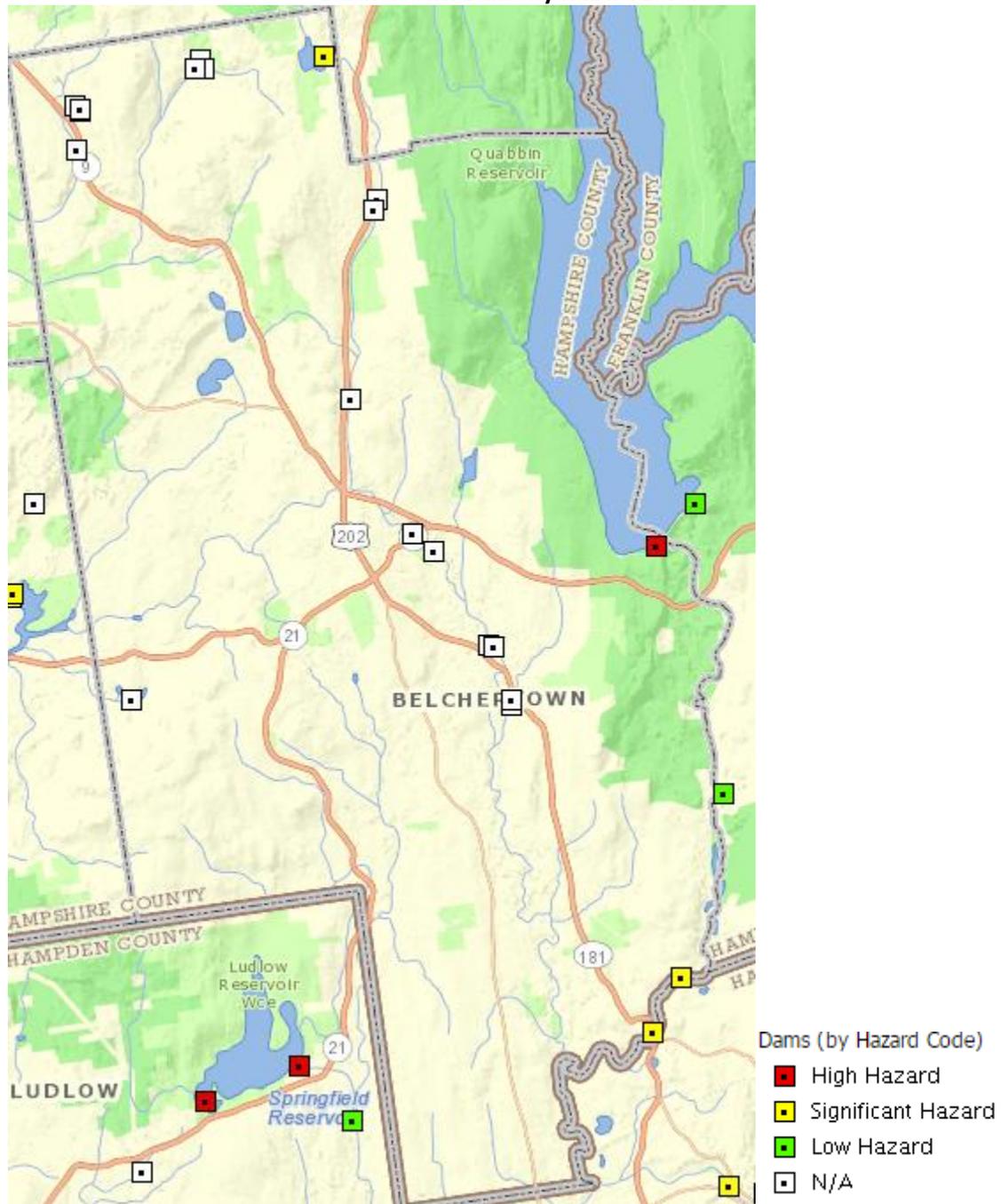
Belchertown has 20 dams located on private and public land as well as two outside the town whose inundation zones include portions of Belchertown. The name and hazard levels of these individual structures are as follows:

Belchertown Dam Location, Ownership, Hazard Levels 2015							
ID	Name	Dam Owner	Hazard Potential	Date of Last Phase 1 Inspection	Condition	Dam Purpose	Regulatory Authority
MA02703	Beaudry Dam	No Record for Privately Owned Non-Jurisdictional Dam	N/A				Non-Jurisdictional
MA02699	Blackmer - Walker Dam	Town of Springfield, Water and Sewer Commission	N/A				Non-Jurisdictional
MA00560	Bondsville Upper Dam	Belchertown Land Trust, Inc.	Significant Hazard	11/20/2013	Poor	Recreation	Office of Dam Safety
MA00561	Bondsville Lower Dam	Unknown (National Fiber, according to town officials)	Significant Hazard	5/22/2012	Fair	Recreation	Office of Dam Safety
MA02700	Canal Dam	Town of Springfield, Department of Parks, Buildings, and Recreation Management	N/A				Non-Jurisdictional
MA02701	Demos Pond Dam	No Record for Privately Owned Non-Jurisdictional Dam	N/A				Non-Jurisdictional
MA02702	Demos Pond Lower Dam	No Record for Privately Owned Non-Jurisdictional Dam	N/A				Non-Jurisdictional
MA01819	Diversion Dam	No Record for Privately Owned Non-Jurisdictional Dam	N/A				Non-Jurisdictional
MA02707	Dorman Pond Dam	No Record for Privately Owned Non-Jurisdictional Dam	N/A				Non-Jurisdictional
MA01814	John Green Lower Reservoir Dam	No Record for Privately Owned Non-Jurisdictional Dam	N/A				Non-Jurisdictional
MA01815	John Green Middle Reservoir	No Record for Privately Owned Non-Jurisdictional	N/A				Non-Jurisdictional

	Dam	Dam					
MA00484	John Green Upper Dam	No Record for Privately Owned Non-Jurisdictional Dam	N/A				Non-Jurisdictional
MA00485	Knights Pond Dam	Town of Springfield, Water and Sewer Commission	Significant Hazard	9/27/2011	Fair	Water Supply	Office of Dam Safety
MA02704	Lower Pratt Pond Dam	No Record for Privately Owned Non-Jurisdictional Dam	N/A				Non-Jurisdictional
MA01816	Pesso Dam	No Record for Privately Owned Non-Jurisdictional Dam	N/A		Washed out (according to town)		Non-Jurisdictional
MA01265	Private Pond dam	No Record for Privately Owned Non-Jurisdictional Dam	N/A				Non-Jurisdictional
MA00588	Quabbin Winsor Dam	DCR - Dept. of Conservation & Recreation-MWRA Operated	High Hazard	8/4/2014	Good	Water Supply	Office of Dam Safety
MA01818	Scarboro Lower Reservoir Dam	No Record for Privately Owned Non-Jurisdictional Dam	N/A				Non-Jurisdictional
MA01817	Scarboro Upper Reservoir Dam	No Record for Privately Owned Non-Jurisdictional Dam	N/A				Non-Jurisdictional
MA02705	Upper Pratt Pond Dam	No Record for Privately Owned Non-Jurisdictional Dam	N/A				Non-Jurisdictional
MA02706	Whitlock Pond Dam	No Record for Privately Owned Non-Jurisdictional Dam	N/A		Washed out (according to town)		Non-Jurisdictional

Source: Massachusetts Office of Dam Safety Rating as of October 2015

Belchertown Dams by Hazard Level



Source: MassGIS Oliver

Though beyond the Town's boundaries and maintained by the Commonwealth of Massachusetts, the Winsor Dam and the Goodnough Dike at the 50,000+ acre feet Quabbin Reservoir, present a serious threat to the residents of Belchertown. The 1993 Emergency Action Plan (EAP) for the Quabbin Reservoir indicates, "The sudden failure of the Winsor Dam or Goodnough Dike would result in a major disaster of unforeseen magnitude...." The Emergency Action Plan indicates that the flood wave begins with a leading edge, followed by the arrival of a peak flood that is then followed by a lengthy flood recession.

Extent

Often dam 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.

If any of the high hazard dams in Belchertown failed, the extent of damage would be significant, but there is no current reason to believe that these dams are at any risk of failure.

Previous Occurrences

To date, there have been no dam failures in Belchertown.

Probability of Future Events

As Belchertown’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 percent 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 hydrograph 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 Belchertown faces a “limited” impact from dam failure, with minimal damage to property occurring.

Vulnerability

Based on this analysis, Belchertown has a hazard risk index rating of “5 – very low” from dam failure.

Given the number of dams within Belchertown and the presence of the dams on the Quabbin Reservoir, most of Belchertown is vulnerable depending on which dam were to fail. A failure of the Windsor Dam and Goodnough Dike, for example, would cause widespread destruction in town.

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. These impacts can have far-reaching effects throughout the region.

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 total land area affected.

Extent

The U.S. Drought Monitor 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.

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 Belchertown, six major droughts have occurred since 1930. 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. The following table indicates previous occurrences of drought since 2000, based on the US Drought Monitor:

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

Source: US Drought Monitor

Belchertown has not been impacted by any previous droughts in the state, though occasionally private water supplies are impacted by drought. Farms in Belchertown are not dependent on the water district.

Probability of Future Events

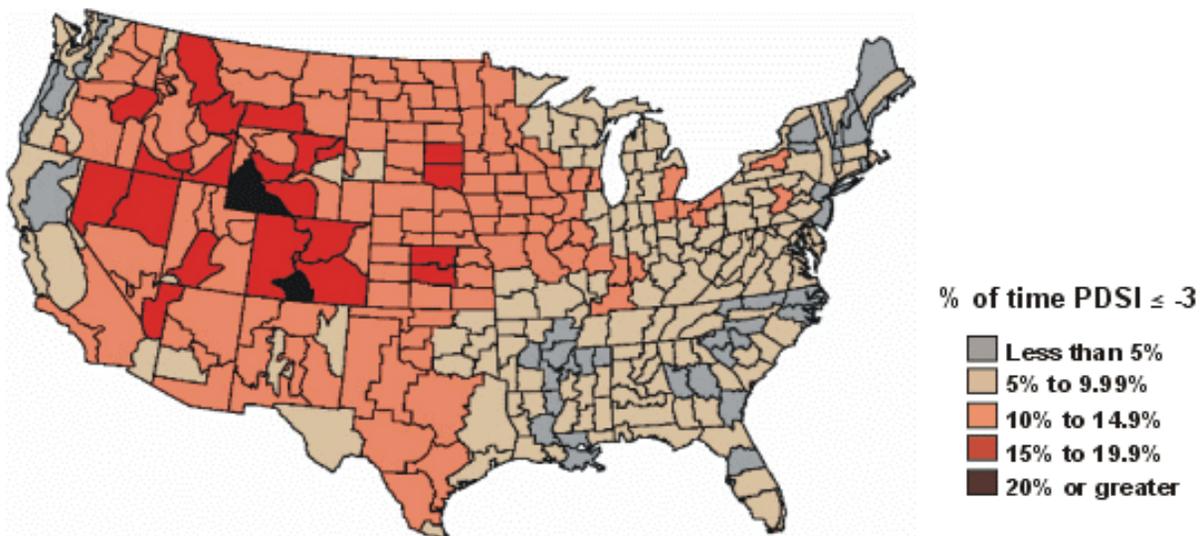
In Belchertown, as in the rest of the state, the probability of drought is "low," or between 1 and 10 percent in any given year.

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. However, global warming and climate change may have an effect on drought risk in the region. With the projected temperature increases, some scientists think that the global hydrological cycle will also intensify. This would cause, among other effects, the potential for more severe, longer-lasting droughts.

Palmer Drought Severity Index

1895–1995

Percent of time in severe and extreme drought



Impact

Due to the water richness of western Massachusetts, Belchertown is unlikely to be adversely affected by anything other than a major, extended drought. . The impacts of drought are categorized by the U.S. Drought Monitor to include:

- Slowing or loss of crops and pastures
- Water shortages or restrictions
- Low water levels in streams, reservoirs, and wells

As a result, the impact of a drought would be “minor” with only minimal property damage or disruption on quality of life.

Vulnerability

Based on the above assessment, Belchertown has a hazard index rating of “5 – very low risk” from drought. While a drought would require water saving measures to be implemented, there would be no foreseeable damage to structures or loss of life resulting from the hazard. Because of this, the Hazard Mitigation Committee has determined the impact from this hazard to be "minor," with minimal damage to people and property.

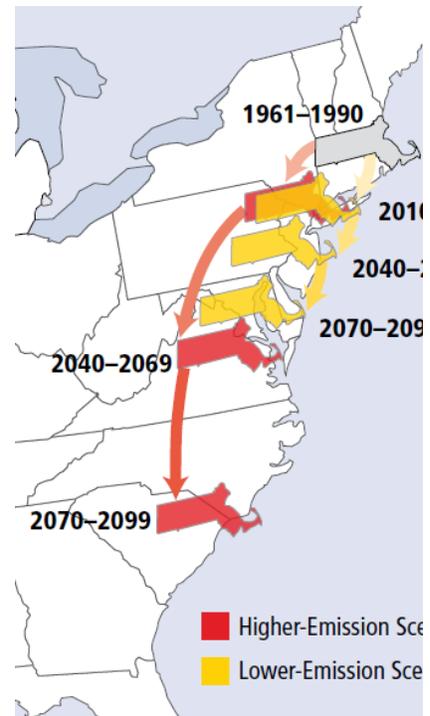
Extreme Temperatures

Hazard Description

Greater variation and extremes in local atmospheric temperatures due to global changes in climate are now among the natural hazards that this plan anticipates. Belchertown is likely to experience more instances of extreme and sustained heat and cold. And, because warmer air holds more moisture, higher temperatures will also bring wetter winters, more severe storms, and more frequent flooding. Locally, there will also be more single-day records highs, and more total days with highs above 90 degrees, and more heat waves with 3 or more days above 90 degrees. More extreme temperatures throughout Western Massachusetts and New England mean that there will be more floods, droughts, and tornados. There will also be more Atlantic hurricanes and nor'easters. Anticipated increases in extreme local temperatures is directly related to many of the previously described vulnerabilities, as well as increasing the risk of heat-related disease and injury, especially among senior citizens and residents unable to afford air conditioning.

Anticipated Climatic Variation

In Western Massachusetts, annual precipitation is expected to increase by 14% by the end of the 21st century. However, most of this precipitation increase will come during the winter months – as much as 30% more than today – while summertime precipitation will actually decrease slightly. Also, most of the added winter precipitation is expected to be in the form of rain, rather than snow. This will mean a continuation of the current regional trend of a decreasing snowfall totals, as well as the number of days with snow cover on the ground, but more precipitation overall. The increased amount of strong precipitation events and overall increase in rainfall, combined with the aging stormwater infrastructure in the region, will likely result in more flooding in the region.



At current rates of greenhouse gas accumulation and temperature increases, the climate of Massachusetts will become similar to those of present-day New Jersey or Virginia by 2040-2069, depending on future GHG emissions.
Source: NECIA 2006

Anticipated Climatic Variations for Massachusetts Due to Climate Change

Category	Current (1961-1990 avg.)	Predicted Change 2040-2069	Predicted Change 2070-2099
Average Annual Temperature (°F)	46°	50° to 51°	51° to 56°
Average Winter Temperature (°F)	23°	25.5° to 27°	31° to 35°
Average Summer Temperature (°F)	68°	69.5° to 71.5°	74° to 82°
Days over 90 °F	5 to 20 days	-	30 to 60 days
Days over 100 °F	0 to 2 days	-	3 to 28 days
Annual Precipitation	41 inches	43 to 44 inches	44 to 47 inches
Winter Precipitation	8 inches	8.5 to 9 inches	9 to 10.4 inches

Summer Precipitation	11 inches	10.9 to 10.7 inches	10.9 to 11 inches
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Sources: Massachusetts Climate Adaptation Report 2011, NECIA

Increased temperatures will likely have the following projected impacts to people, property, and the local economy:

- There will be greater stress on special populations, such as senior citizens and economically disadvantaged people, without access to air conditioning during heat waves.
- Increased temperatures and changes in growing seasons for various crops will put stress on current food production and require farming operations to adjust by planting new varieties of crops. There are several farms in Belchertown that will likely be affected.
- Livestock will be at greater risk from extreme and extended heat. There is one dairy farm that will likely need to adapt to increased heat, as well as horse farms and an alpaca farm.
- Maple sugaring businesses are at risk due to changes in spring temperature patterns needed for successful sap collection. There are maple sugaring operations in Belchertown that will likely be affected, including one large commercial operation and several smaller operations.
- Increased energy usage in order to cool buildings in the summer and long-term electrical needs will increase. Brownouts occasionally occur on the Ware side of the Route 9 corridor due to the infrastructure in place there.

As per the Massachusetts Hazard Mitigation Plan, extreme cold is a dangerous situation that can result in health emergencies for susceptible people, such as those without shelter or who are stranded or who live in homes that are poorly insulated or without heat. There is no universal definition for extreme temperatures, with the term relative to local weather conditions. For Massachusetts, extreme temperatures can be defined as those that are far outside the normal ranges. The average temperatures for Massachusetts are:

Winter (Dec-Feb) Average = 27.51°F

Summer (Jun-Aug) Average = 68.15°F

Criteria for issuing alerts for Massachusetts are provided on National Weather Service web pages: <http://www.erh.noaa.gov/box/warningcriteria.shtml>.

Location

Any instances of extreme temperatures that have occurred in the past occurred throughout Belchertown. Extreme cold or heat does not usually require the opening of comfort stations, though plans are in place if they are needed.

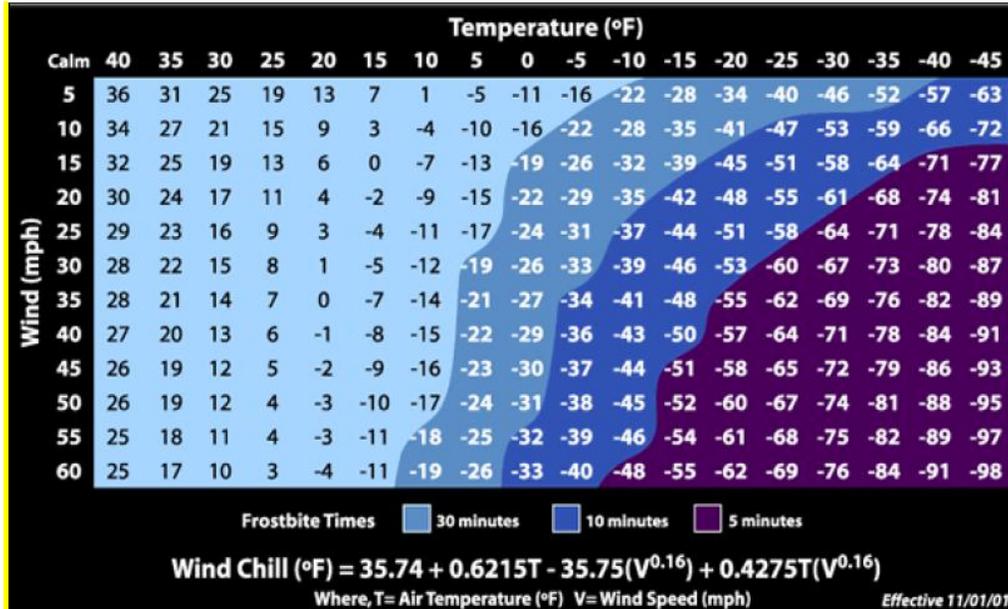
Extent

As per the Massachusetts Hazard Mitigation Plan, the extent (severity or magnitude) of extreme cold temperatures are generally measured through the Wind Chill Temperature Index. Wind Chill Temperature is the temperature that people and animals feel when outside and it is based on the rate of heat loss from exposed skin by the effects of wind and cold. The chart shows three shaded areas of

frostbite danger. Each shaded area shows how long a person can be exposed before frostbite develops. In Massachusetts, a wind chill warning is issued by the NWS Taunton Forecast Office when the Wind Chill Temperature Index, based on sustained wind, is -25°F or lower for at least three hours.

Extreme temperatures would affect the whole community.

Wind Chills



For extremely hot temperatures, the heat index scale is used, which combines relative humidity with actual air temperature to determine the risk to humans. The NWS issues a Heat Advisory when the Heat Index is forecast to reach 100-104 degrees Fahrenheit for 2 or more hours. The NWS issues an Excessive Heat Warning if the Heat Index is forecast to reach 105+ degrees Fahrenheit for 2 or more hours. The following chart indicates the relationship between heat index and relative humidity:

Heat Index

Relative Humidity (%)		80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110	
	40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136	
	45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137		
	50	81	83	85	88	91	95	99	103	108	113	118	124	131	137			
	55	81	84	86	89	93	97	101	106	112	117	124	130	137				
	60	82	84	88	91	95	100	105	110	116	123	129	137					
	65	82	85	89	93	98	103	108	114	121	128	136						
	70	83	86	90	95	100	105	112	119	126	134							
	75	84	88	92	97	103	109	116	124	132								
	80	84	89	94	100	106	113	121	129									
	85	85	90	96	102	110	117	126	135									
	90	86	91	98	105	113	122	131										
	95	86	93	100	108	117	127											
	100	87	95	103	112	121	132											
Category		Heat Index					Health Hazards											
Extreme Danger		130 °F – Higher					Heat Stroke or Sunstroke is likely with continued exposure.											
Danger		105 °F – 129 °F					Sunstroke, muscle cramps, and/or heat exhaustion possible with prolonged exposure and/or physical activity.											
Extreme Caution		90 °F – 105 °F					Sunstroke, muscle cramps, and/or heat exhaustions possible with prolonged exposure and/or physical activity.											
Caution		80 °F – 90 °F					Fatigue possible with prolonged exposure and/or physical activity.											

Previous Occurrences

The following are some of the lowest temperatures recorded in parts of Massachusetts for the period from 1895 to present (Source: NOAA, www.ncdc.noaa.gov):

Blue Hills, MA – -21°F
 Boston, MA – -12°F
 Worcester, MA – -19°F

The following are some of the highest temperatures recorded for the period from 1895 to present (Source: NOAA, www.ncdc.noaa.gov):

- Blue Hills, MA – 101°F
- Boston, MA – 102°F
- Worcester, MA – 96°F

Extreme heat usually requires the opening of shelters on a few occasions per year. In the winters of 2014 and 2015, warming centers were opened for extremely cold temperatures due to the “polar vortex.” During a short burst of extreme cold in February 2016, water service pipes feeding homes froze. During periods when wind chills reach dangerous levels, schools are cancelled and outdoor activities are restricted.

Probability of Future Events

The probability of future extreme heat and extreme cold is considered to be "high," or between 40 and 70 percent in any given year.

Impact

The impact of extreme heat or cold in Belchertown is considered to be "minor," with no property damage and very limited affect on humans.

Vulnerability

Belchertown's vulnerability from extreme heat and cold is considered to be, "4 - low."

Structures and infrastructure within the town are not at risk for damage due to extreme temperatures, but populations that are not prepared to contend with these temperature extremes could be most vulnerable.

Other Hazards

In addition to the hazards identified above, the Hazard Mitigation Committee reviewed the full list of hazards listed in the Massachusetts Hazard Mitigation Plan. Due to the location and context of Belchertown, coastal erosion, landslides, and tsunamis were determined to not be a threat.

Extreme temperatures, while identified in the state Hazard Mitigation Plan, was determined by the Belchertown Hazard Mitigation Committee to not currently be a primary hazard to people, property, or critical infrastructure in Belchertown. While extreme temperatures can result in increased risk of wildfire, this effect is addressed as part of the "Wildfire/Brushfire" hazard assessment. The Hazard Mitigation Committee will continue to assess the impact of extreme temperature and update the Hazard Mitigation Plan accordingly.

4: CRITICAL FACILITIES

Facility Classification

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 community residents and property
- Would create a secondary disaster if a hazard were to impact it

The Critical Facilities List for the Town of Belchertown has been identified utilizing a Critical Facilities List provided by the State Hazard Mitigation Officer. Belchertown's Hazard Mitigation Committee has broken up this list of facilities into three categories:

- Facilities needed for emergency response in the event of a hazard event.
- Facilities identified as non-essential and not required in an emergency response event, but which are considered essential for the everyday operation of the Town.
- Facilities or institutions that include special populations which would need additional attention in the event of a hazard event.

The critical facilities and evacuation routes potentially affected by hazard areas are identified following this list. The Past and Potential Hazards/Critical Facilities Map (Appendix D) also 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.

1. Emergency Operations Center

Belchertown Police Station – 70 State Street
Belchertown Fire Station – 10 North Main Street

2. Fire Station

Belchertown Fire Department – 10 North Main Street

3. Police Station

Belchertown Police Department - 70 State Street
State Police, Belchertown- 485 Ware Road

4. Department of Public Works

DPW Headquarters - 290 Jackson Street

5. Water Department

Belchertown Water District, Inc. - 206 Jabish Street

6. Emergency Fuel Stations

DPW Headquarters - 290 Jackson Street

7. Emergency Shelters

- Belchertown High School (Main Shelter) - 142 Springfield Road
- Senior Center - 60 State Street (kitchen with emergency power)
- Chestnut Hill Community School - 59 State Street (kitchen with emergency power for lights only)
- Swift River Elementary School - 57 State Street (full power but no kitchen)
- Pine Valley Plantation - 281 Chauncey Walker (kitchen with emergency power)
- Hope United Methodist Church - 31 Main Street (kitchen but NO emergency power)
- St. Francis Church - 26 Jabish Street (emergency power)
- Belchertown Fire Station - 10 North Main Street (kitchen with emergency power)

8. Water Sources

Nine driven wells are located just off Jensen Road. Water is stored at a standpipe in back of the Congregational Church on the Town Common. A water storage tank was built on a hilltop off Allen Road between Route 9 and Route 202. The Daigle wells (town well field) are located between Goodell and Federal Streets. The wells were sunk in an aquifer shared by Amherst.

Private wells

Pine Valley Plantation

Village Greene Condo Association

Cold Spring Golf Course (Route 21, Chauncy Walker Street)

Pressure Reducing Valve

Bay Road

9. Transfer Station

135 Hamilton Street

10. Helicopter Landing Sites

LIFE-FLIGHT LANDING ZONE LOCATIONS

1. 641 Daniel Shays Highway-Conkey Lumber parking lot
2. 147 Bay Rd., Harris Milk - open lot next to garage
3. 54 Ware Rd., Greene's gravel bank entrance
4. 485 Ware Rd. State Police barracks, MDC-Quabbin
5. 55 State St. Chestnut Hill School
6. 380 Mill Valley Rd., Mill Valley Country Club
7. Franklin Street Extension
8. 1277 Federal St., parking lot

11. Communications

- Fire station radio tower
- Police station radio tower

12. Primary Evacuation Routes

- Route 181
- Route 202
- Route 9
- Route 21
- Bay Road

13. Bridges/Culverts Located on Evacuation Routes

Bridges

<u>Evacuation Route</u>	<u>Crosses</u>	<u>Owner</u>	<u>Year Built</u>	<u>Year Rebuilt</u>
Route 181 (Depot Street)	Swift River	Mass Highway	1937	1994
Route 181 (Mill Valley Road)	Jabish Brook	Town of Belchertown	1956	NA
Route 202 (Maple Street)	Railroad	Mass Highway	1949	NA
Route 21 (Jabish Street)	Jabish Brook	Town of Belchertown	1956	NA
Route 9 (Ware Road)	Swift River	Mass Highway	1931	NA
Bay Road	Batchelor Brook	Town of Belchertown		

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 Belchertown.

1. Water Supply

- Town wells (listed above)
- Bondsville wells
- Amherst wells (serving north side of town)

2. Water Infrastructure (Pump Stations)

- Nagle Well – Federal Street
- Jabish Street – Wells with pumps
- Allen Road
- Bay Road – valve chamber

3. Water Storage Tanks

4. Sewer Infrastructure (Pump Stations)

- 159 Bay Road
- 185 Metacomet Road
- 195 River Road
- Chauncey Walker
- Pine Valley Plantation
- Stadler street

5. Problem Culverts

None

6. Electrical Substations

Blue Meadow Road

Jensen Street

7. Cross Pipes in Need of Replacement

Boardman Rd. @ Eskeett Road

Kopac Ave. 36" x 50'

Goodell @ Pond 18" x 60'

Warren Wright Rd. between Orchard & Goodell (3) 48" x 60'

8. Communications Towers

Cell towers are located on Amherst Road, Allen Road, Kimball Street, and Park Street

Town and school servers are located at 7 Berkshire Avenue.

Category 3 – Facilities/Populations to Protect

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

1. Special Needs Population

No Nursing Homes

Group homes are located throughout town

2. Elderly Housing/Assisted Living

161 Federal Street

111 Daniel Shays

41 Everett Avenue

133 Jabish Street

281 Chauncey Walker

6080 Walnut Street

95 George Hannum

3. Schools

Chestnut Hill Community School- 59 State Street

Jabish Brook Middle School- 62 North Washington Street

Swift River Elementary School- 57 State Street

Cold Spring School- 57 South Main Street

Tadgel School – 7 Berkshire Avenue (contains school system IT)

Belchertown High School- 142 Springfield Road

Superintendent's Office – 14 Maple Street

4. Historic Buildings/Sites

Town Center Historic District

4. Major Employment Centers

Hulmes Transportation Service
First Student Inc. - 227 N Liberty St
Routes 9 and 202 area
Department of Conservation & Recreation - 485 Ware Rd
Universal Forest Products Inc-
Belchertown Office Park
Belchertown District Court and Routes 21 and 202 area
Northeast Treaters
Baystate – 95 Sargeant Street
Wing Memorial – 20 Daniel Shays Highway
Schools

5. Mobile Home Parks

Pine Valley – 281 Chauncey Walk
Sports Haven – 370 Mill Valley Road

Category 4 – Potential Resources

Resources for services or supplies are procured in an ad-hoc basis when needed in emergencies. As the resources are numerous, please see Comprehensive Emergency Management Plan, CEMP, updated annually and available through the Town EMD.

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)	Areas near or within the 100-year flood plain	None	Route 202, Route 9, Route 181, and Bay Road
Flooding (localized)	(see location section in flooding)	None	None
Severe Snow/Ice Storm	Town-wide	Police and fire departments	Route 202 North Main Street
Hurricane	Town-wide	Police and fire departments	Route 202 North Main Street
Severe Thunderstorms/Wind/ Tornadoes/Microbursts	Town-wide	None	None
Wildfire/Brushfire	Town-wide	None	All evacuation routes have at least one bridge that could fail during an earthquake.
Earthquake	Town-wide	None	None
Dam Failure	Inundation zones vary by dam	None	Route 181 by the Swift River
Drought	Town-wide	None	None
Extreme Temperatures	Town-wide	None	None

5: MITIGATION STRATEGIES

The Town of Belchertown has developed the following goal to serve as a framework for mitigation of the hazards identified in this plan.

Goal Statement

To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to the following hazards: flooding, severe snowstorms/ice storms, severe thunderstorms, winds, hurricanes, tornadoes, wildfires/brushfires, earthquakes, dam failures, drought, and extreme temperatures.

Overview of Mitigation Capabilities and Strategies by Hazard

An overview of the general concepts underlying mitigation strategies for each of the hazards identified in this plan is as follows:

Flooding

The key factors in flooding are the water capacity of Town 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. The Town of Belchertown currently addresses this problem with a variety of mitigation tools and strategies. Flood-related regulations and strategies are included in the Town's zoning bylaw and subdivision regulations, such as ensuring adequate driveway drainage, restricting development in the floodplain, requiring drainage easements where applicable for subdivisions, and following the Wetlands Protection Act. The Town's conservation agent serves as the floodplain administrator.

The Town of Belchertown currently has a stormwater management plan that is updated every year, as well as a floodplain bylaw to restrict construction in areas subject to flooding. New developments and redevelopments must also adhere to stormwater regulations for special permits, which include criteria that minimize runoff as much as possible. The Town would like to add climate resiliency criteria to the stormwater regulations, and explore the possibility of a stormwater utility. The Town is also adding conservation land in areas prone to flooding, most recently near Jabish Brook and Holland Glen.

Severe Snowstorms / Ice Storms

The Town's current mitigation strategy is to restrict the location and height of telecommunications facilities. To the extent that some of the damages from a winter storm can be caused by flooding, flood protection mitigation measures also assist with severe snowstorms and ice storms. The State Building Code provides minimum snow load requirements for roofs that also assist in mitigation of severe snow storms and ice storms.

In Belchertown the Local Emergency Operations Plan addresses snow and ice storms. The town also engages in regular tree trimming in town right of ways and other town-owned property.

Hurricanes

The flooding associated with hurricanes can be a major source of damage to buildings, infrastructure and a potential threat to human lives. Flood protection measures can thus also be considered hurricane mitigation measures. The high winds that often accompany hurricanes can also damage buildings and infrastructure, similar to tornadoes and other strong wind events. Meeting the requirements of the State Building code would also reduce damages from hurricanes.

In Belchertown the Local Emergency Operations Plan addresses large storms such as hurricanes. The town also engages in regular tree trimming in town right of ways and other town-owned property.

Severe Thunderstorms / Winds / Tornadoes

Most damage from tornadoes and severe thunderstorms come from high winds that can fell trees and electrical wires, as well as generate hurtling debris. Adherence to the Massachusetts Building Code is a primary current mitigation strategy. Current land development regulations, such as restrictions on the height of telecommunications towers, also help prevent wind damages.

Wildfires / Brushfires

Residents must notify the Fire Department when they plan to have a controlled burn on their property. In addition, the Town conducts local outreach to schools about fire safety. The town fire department's ISO rating is 5-5Y.

Earthquakes

Most buildings and structures in the state were constructed without specific earthquake resistant design features. However, the State Building Code helps maintain the structural integrity of structures and helps to mitigate earthquakes. The Town of Belchertown enforces the building code.

Dam Failure

The mitigation measures currently in place focus on regular inspections and permitting process required by the Massachusetts DCR.

Drought

The Town's Aquifer Protection District Overlay designates areas for recharge of aquifers to ensure plentiful access to drinking water. The Town also has a Water Use Restriction Ordinance that allows it to declare a State of Water Conservation, in order to limit water use by residents and businesses.

Extreme Temperatures

The Town of Belchertown utilizes the senior center as a shelter as needed in extreme heat or cold.

General Capabilities

The Town of Belchertown has a capital improvement plan. Though it does not currently address projects that mitigate natural hazards, it is anticipated that it will soon. The Town utilizes a local emergency operations plan and the Board of Health and School District each have a continuity of operations plan.

The Planning Board currently employs interdepartmental review for large projects that involves the fire department, conservation commission, and board of health to assess projects for their impacts on communities, including vulnerabilities to natural hazards.

The Town has a Reverse 911 service to notify residents of hazards. The system could be improved by breaking the contact lists out in terms of natural hazard risk (such as those living near a flood zone). Natural hazard notifications could also be coordinated with public health notifications, such as for eastern equine virus after temperatures and wetness conducive to outbreaks.

Existing Mitigation Strategies

The Town of Belchertown currently has many mitigation strategies in place. These strategies are listed on the following pages and have been evaluated in the “Effectiveness” column. Strategies that were implemented since the last version of this plan are listed in bold.

Description	Hazards Mitigated	Responsible Party	Effectiveness	Potential Changes
Address high priority dams, esp. those in Bondsville that appear to be an imminent threat.	Dam Failure	Belchertown Land Trust (non-profit) Conservation Commission	Effective for town-owned dams.	Revise to only account for town-owned dams.
Identify sources of funding for dam safety inspections	Dam Failure	Conservation Agent	Effective.	Identify how updated DCR regulations will affect future inspections.
Replace top priorities on culvert replacement list.	Floods	DPW	Effective	Consider available grant funding and incorporate stream crossing standards to increase climate resiliency.
Address inappropriate grand-fathered uses in floodplain.	Floods	Planning Director	Not effective (because not yet addressed)	No changes.
Ensure dam owners realize their responsibility to inspect the dams regularly.	Dam Failure	Conservation Agent	Not effective	Delete. State responsibility.

Description	Hazards Mitigated	Responsible Party	Effectiveness	Potential Changes
Educate citizens living in the floodplain about the NFIP.	Floods	Conservation Agent	Not effective, because it is already happening through insurance companies.	Delete strategy.
Implement the goals and strategies of the Belchertown Community Plan (2010) dealing with protection of floodplain, forests, waterbodies, and farmland.	Floods	Conservation Agent Agricultural Commission	Effective. Some APRs have been done for watershed and forest protection.	No changes.
Seek funding for enforcement of earth removal and site plan regulations.	Floods	DPW Building Inspector	Not effective. Already have zoning enforcement officer.	Delete.
Determine if existing generators at shelters are effective, replace if not effective.	All Hazards	Selectmen Schools DPW	Effective.	Strategy complete. Seek implementation funding. Seek generators for wastewater treatment plants and River Street pump station.
Increase enforcement of restrictions prohibiting residents from plowing snow into the road.	Snow Storms	DPW	Not effective. Not a large problem.	Delete.
Work with National Grid Electric Company to facilitate the underground placement of new utility lines in general and existing utility lines in locations where repetitive outages occur (as applicable).	Severe Wind Hurricanes Snow storms / ice storms	National Grid Partnership with DPW	Effective. National Grid has a hazard tree program.	Focus on tree trimming.

Description	Hazards Mitigated	Responsible Party	Effectiveness	Potential Changes
Participate in the creation of a Regional Debris Management Plan.	Floods Droughts	DPW	Not effective. FEMA has existing contracts.	Delete.
Consider invoking penalties for repeat offenders—illegal burns.	Wildfire/brush fire	Fire Department	Not effective. Already a law.	Delete.
Evaluate critical facilities to determine if they are earthquake resistant.	Earthquakes	Zoning/building Inspector	Not effective. Not cost effective.	Delete.

Deleted Mitigation Strategies

The Town of Belchertown has decided not to pursue several mitigation strategies identified in the previous version of its Hazard Mitigation Plan. These deleted strategies, as well as the reason for their deletion, are indicated in the table below.

Description	Hazards Mitigated	Responsible Agency	Reason for Deletion
Ensure dam owners realize their responsibility to inspect the dams regularly.	Dam Failure	Conservation Agent	DCR Office of Dam Safety responsibility.
Educate citizens living in the floodplain about the NFIP.	Floods	Conservation Agent	Already occurring through insurance companies.
Seek funding for enforcement of earth removal and site plan regulations.	Floods	DPW Building Inspector	Under authority of existing zoning enforcement officer.
Increase enforcement of restrictions prohibiting residents from plowing snow into the road.	Snow Storms	DPW	Not a problem in Town.
Participate in the creation of a Regional Debris Management Plan.	Floods Droughts	DPW	FEMA has existing contracts.
Consider invoking penalties for repeat offenders—illegal burns.	Wildfire/brushfire	Fire Department	Laws already exist for this purpose.
Evaluate critical facilities to determine if they are earthquake resistant.	Earthquakes	Zoning/building Inspector	Not cost effective.

Prioritized Implementation Plan

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 which would provide 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 (at a rate of \$25 per hour)
- **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 (at a rate of \$25 per hour)

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.

Description	Status	Hazards Mitigated	Responsible Entity	Timeframe	Funding source	Cost	Priority
Identify sources of funding for dam safety inspections for town-owned dams in light of new DCR inspection requirements.	Not started.	Dam Failure	Conservation Agent	1 year	Town (staff time)	Low	Medium
Identify top priorities on culvert replacement list based on failure or condition, climate resiliency map in OSRP, and ability to meet MA stream crossing standards.	List is started.	Floods	DPW	5+ Year	Town (staff time)	Low	Medium
Address inappropriate grand-fathered uses in floodplain overlay ordinance, such as junkyards and mobile homes and water infrastructure systems.	Not started	Floods	Planning Dept.	1 year	Town (staff time)	Low	Medium-High
Implement the goals and strategies of the Belchertown Community Plan (2010) and 2013 OSRP dealing with protection of floodplain, forests, waterbodies, and farmland.	Pursuing conservation opportunities as they arise.	Floods	Conservation Agent	5+ years	State grants (LAND, etc.) Foundation grants	High	High
Purchase more Agricultural Preservation Restrictions in southern Belchertown, including wetlands around Jabish Brook and town wells.	Not started	Floods	Conservation Agent	5+ years	State grants Foundation grants Town funds	High	High

Description	Status	Hazards Mitigated	Responsible Entity	Timeframe	Funding source	Cost	Priority
Identify funding sources for generators in need of replacement, and for upgraded generators for the wastewater treatment plant and River Street pumping station. The River Street station generator is 30 years old, and the generator at the WWTP is only sized to operate at minimal size of plant and would not last for a long duration.	Not started; back-up power is required for WWTP and pumping station	All	DPW	3-5 years	Town funds	Low	Medium
Partner with National Grid Electric Company to continue identifying hazard trees in order to protect utility lines, especially on evacuation routes and in locations where repetitive outages occur.	Existing partnership is ongoing.	Snow Storms Hurricanes	DPW	Ongoing	Town funds National Grid	Low	Medium - High
Consider working with mobile home owners to encourage anchoring of homes to cement pads, as was done in Pine Valley.	21 are already anchored in Pine Valley, but there are more to be anchored there and in another mobile home park.	Flooding	Building Inspector	5+ years	Private funds	Low	Low

6. Plan Adoption and Implementation

Plan Adoption

Upon completion of the draft Hazard Mitigation Plan, a public meeting was held by the Town staff and the Pioneer Valley Planning Commission on June 7, 2016, to present and request comments from residents. The Hazard Mitigation Plan was then submitted to the Massachusetts Emergency Management Agency (MEMA) and the Federal Emergency Management Agency for their review. Upon receiving conditional approval of the plan by FEMA, the plan was presented to the Town Council and adopted.

Plan Implementation

The implementation of this plan began upon its formal adoption by the Town Council and approval by MEMA and FEMA. Those Town departments and boards responsible for ensuring the development of policies, ordinance revisions, and programs as described in Chapter 5 of this plan will be notified of their responsibilities immediately following approval. The Hazard Mitigation Committee will oversee the implementation of the plan.

Incorporation with Other Planning Documents

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:

- ***Belchertown Open Space and Recreation Plan*** - used to identify existing hazard mitigation strategies, already proposed mitigation strategies, natural resources, and critical infrastructure
- ***Belchertown Zoning Ordinance 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 Hazard Mitigation Plan will also be incorporated into updates of the Town's Comprehensive Emergency Management Plan.

During regular update meetings for the Hazard Mitigation Plan, the Hazard Mitigation Committee will review whether any of these plans are in the process of being updated. If so, 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.

While it is the understanding of the Hazard Mitigation Committee that the previous Hazard Mitigation plan has been integrated into other planning mechanisms in the Town, the committee did not track this work. The committee is committed to doing so going forward.

Plan Monitoring and Evaluation

The Town's Emergency Management Director will call meetings of all responsible parties to review plan progress as needed, corresponding with the annual review of the stormwater plan, or 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 entail the following actions:

- Review previous hazard events to discuss and evaluate the effectiveness of current mitigation measures
- Assess how the mitigation strategies of the plan can be integrated with other Town plans and operational procedures, including the Zoning Bylaw and Emergency Management Plan
- 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 Hazard Mitigation Committee may decide to reassign the roles and responsibilities for implementing mitigation strategies to different municipal departments and/or revise the goals and objectives contained in the plan. The Committee will review and update the Hazard Mitigation Plan every five years.

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, as well as comment via e-mail or phone. 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.

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
Selected MA Regional Planning Commissions:	
Berkshire Regional Planning Commission (BRPC).....	413/442-1521
Franklin Regional Council of Governments (FRCOG).....	413/774-3167
Metropolitan Area Planning Council (MAPC).....	617/451-2770
Pioneer Valley Planning Commission (PVPC).....	413/781-6045
MA Board of Building Regulations & Standards (BBRS).....	617/227-1754
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 1.....	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.....	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)	MA Emergency Management Agency
406 Public Assistance and Hazard Mitigation	MA 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)	MA Emergency Management Agency
Emergency Generators Program by NESEC‡	MA Emergency Management Agency
Emergency Watershed Protection (EWP) Program.....	USDA, Natural Resources Conservation
Service Flood Mitigation Assistance Program (FMAP).....	MA Emergency Management Agency
Flood Plain Management Services (FPMS).....	US Army Corps of Engineers
Mitigation Assistance Planning (MAP).....	MA Emergency Management Agency
Mutual Aid for Public Works.....	Western Massachusetts Regional Homeland Security Advisory Council
National Flood Insurance Program (NFIP) †	MA Emergency Management Agency
Power of Prevention Grant by NESEC‡	MA 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/hazards/	Searchable database of references and links to many disaster-related websites.
Atlantic Hurricane Tracking Data by Year	http://wxp.eas.purdue.edu/hurricane	Hurricane track maps for each year, 1886 – 1996
National Emergency Management Association	http://nemaweb.org	Association of state emergency management directors; list of mitigation projects.
NASA – Goddard Space Flight Center “Disaster Finder:	http://www.gsfc.nasa.gov/ndrd/disaster/	Searchable database of sites that encompass a wide range of natural disasters.
NASA Natural Disaster Reference Database	http://ftpwww.gsfc.nasa.gov/ndrd/main/html	Searchable database of worldwide natural disasters.
U.S. State & Local Gateway	http://www.statelocal.gov/	General information through the federal-state partnership.
National Weather Service	http://nws.noaa.gov/	Central page for National Weather Warnings, updated every 60 seconds.
USGS Real Time Hydrologic Data	http://h20.usgs.gov/public/realtime.html	Provisional hydrological data
Dartmouth Flood Observatory	http://www.dartmouth.edu/artsci/geog/floods/	Observations of flooding situations.
FEMA, National Flood Insurance Program, Community Status	http://www.fema.gov/fema/csb.html	Searchable site for access of Community Status Books

Sponsor	Internet Address	Summary of Contents
Book		
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.tornadooproject.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.iaa.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: Documentation of Planning Process

Belchertown Hazard Mitigation Committee Meeting Agenda

**Belchertown Town Hall, Selectmen's Meeting Room
Friday, February 12, 10 a.m. – 12 p.m.**

1. Introductions/Administrative
 - a. Affirm local Hazard Committee membership
 - b. Review in-kind match and reporting procedure
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

**Belchertown Hazard Mitigation Plan Update Committee
Meeting #2 Agenda**

**Belchertown Town Hall
March 10, 2016 3 p.m. – 5 p.m.**

1. Highlights of changes made since first meeting (chapters 1-3)
2. Review of Chapter 4: Critical Facilities and Critical Facilities/Hazards Map
3. Review of Chapter 5: Hazard Identification and Risk Assessment

**Belchertown Hazard Mitigation Plan Update Committee
Meeting #3 Agenda**

**Belchertown Town Hall
April 12, 2016 10 a.m. – 12 p.m.**

1. Highlights of changes made since first meeting (chapters 1-4)
2. Continue review of Chapter 5: Hazard Identification and Risk Assessment
3. Review of Chapter 6: Plan Review, Adoption, and Implementation

**Belchertown Hazard Mitigation Plan Update
Public Engagement Event #1**

**Belchertown Town Hall – Selectmen’s Room
March 10, 2016, 5 p.m.**

1. Overview and benefits of hazard mitigation
2. Plan development process
3. Identified hazards and vulnerability assessment
4. Next steps, questions, and discussion

**Belchertown Hazard Mitigation Plan Update
Public Engagement Event #2**

**Belchertown Town Hall – Selectmen’s Room
June 7, 2016, 5 p.m.**

1. Overview of hazard mitigation
2. Content of Belchertown Hazard Mitigation Plan
 - a. Hazard identification and risk assessment
 - b. Critical infrastructure
 - c. Existing strategies for mitigating hazards
 - d. Proposed strategies for mitigating hazards
3. Question and comment period

MEDIA RELEASE

CONTACT: Jaimye Bartak, PVPC Senior Planner, (413) 781-6045 or jbartak@pvpc.org
Doug Albertson, Belchertown Town Planner, (413) 323-0407 or planning@Belchertown.org

FOR IMMEDIATE RELEASE
March 3, 2016

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

Belchertown residents, businesses, and surrounding community residents and representatives are invited to provide comments on the update of the Town of Belchertown Hazard Mitigation Plan Update on Thursday, March 10, at 5 pm at the Selectmen Room, Town Hall, 2 Jabish Street. 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).

The meeting will include an overview of the hazard mitigation planning process and a discussion of existing mitigation initiatives addressing natural hazards in Belchertown. Municipal officials and PVPC staff will be available to answer questions and listen to comments on the draft plan.

This planning effort is being undertaken to help the Town of Belchertown 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 Jaimye Bartak at jbartak@pvpc.org or (413) 781-6045.

Tuesday, June 7, 2016 - 5:00pm

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

Belchertown residents, businesses, and surrounding community residents and representatives are invited to provide comments on the update of the Town of Belchertown Hazard Mitigation Plan on Tuesday, June 7, 2016, at 5 pm in Selectmen Room, Town Hall, 2 Jabish Street.

The purpose of the 2016 Hazard Mitigation Plan Update is to identify and assess Belchertown'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 Belchertown, 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 will be 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).

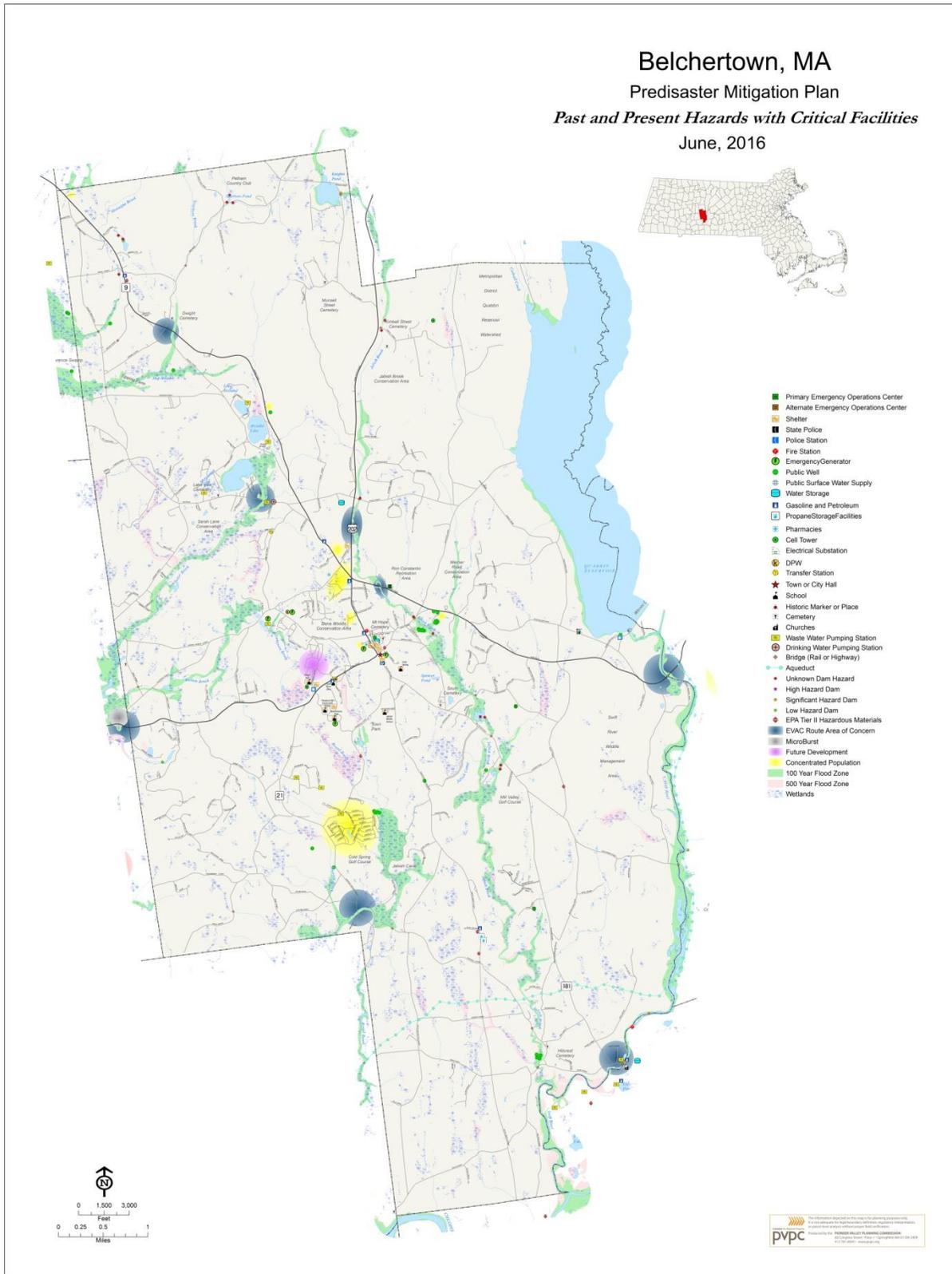
Upon completion, the plan will be presented to the Town of Belchertown for adoption and submitted to Massachusetts Emergency Management Agency (MEMA) and Federal Emergency Management Agency (FEMA) for review and approval. A FEMA approved plan makes the community eligible for federal and state mitigation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

For more information, please contact PVPC's Jaimye Bartak at jbartak@pvpc.org or (413) 781-6045.

Appendix C: 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
DPW	Department of Public Works
LEPC	Local Emergency Planning Committee
EMD	Emergency Management Director
Con Com	Conservation Commission
Ag Com	Agricultural Commission
EOC	Emergency Operations Center
CEM Plan	Comprehensive Emergency Management Plan
EMA	Emergency Management Agency
RACES	Radio Amateur Civil Emergency Service
WMECO	Western Massachusetts Electric Company
HAZMAT	Hazardous Materials

Appendix D: Critical Facilities Map



CERTIFICATE OF ADOPTION

TOWN OF BELCHERTOWN, MASSACHUSETTS

BOARD OF SELECTMEN

A RESOLUTION ADOPTING THE

BELCHERTOWN HAZARD MITIGATION PLAN

WHEREAS, the Town of Belchertown established a Committee to prepare the Belchertown Hazard Mitigation plan; and

WHEREAS, several public planning meetings were held between _____ and _____ regarding the review of the Belchertown Hazard Mitigation Plan; and

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

WHEREAS, a duly-noticed public hearing was held by the Belchertown Town Council on _____, _____ to formally approve and adopt the Belchertown Hazard Mitigation Plan.

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

ADOPTED AND SIGNED this _____, _____

Board of Selectmen
Town of Belchertown

ATTEST