## The Town of Belchertown

# Local Natural Hazards Mitigation Plan

**Adopted by the Belchertown Board of Selectmen on _____**

**Prepared by:**
The Belchertown Natural Hazards Mitigation Planning Committee

and

The Pioneer Valley Planning Commission
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# Acknowledgements

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Captain John Workman, Fire Department

Fran Fox, Police Chief

Doug Albertson, Planning Staff

Steve William, Department of Public Works

Judy Metcalf, Director-Quabbin Health District

Paul Adzima, Building Inspector

Leanne Connolly, Conservation Administrator

Ted Bachman, _____

The Belchertown Board of Selectmen offers thanks to the Massachusetts Emergency Management Agency (MEMA) for developing the Commonwealth of Massachusetts Natural Hazards Mitigation Plan (www.state.ma.us/dem/programs/mitigate/index.htm) which served as a model for this plan. In addition, special thanks are extended to the staff of the Pioneer Valley Planning Commission for professional services, process facilitation and preparation of this document.

The Pioneer Valley Planning Commission
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# 1: INTRODUCTION

## Hazard Mitigation

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

Planning efforts, like the one undertaken by the Town of 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 a community.

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

## Planning Process

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

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

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

## Public Committee Meetings

**3/12/09—2-4 pm**: Working committee meeting held at Fire Department.

**3/26/09—2-4 pm**: Working committee meeting held at Fire Department.

**5/12/09—2-4 pm**: Working committee meeting held at Fire Department.

A mailing was made to each committee member prior to each meeting that contained information from the previous meeting, an agenda sheet, and information to be covered.

## Public Meetings with the Board of Selectmen

November 16, 2005: The Board of Selectmen agreed to begin the process of developing a Local Hazard Mitigation Plan. Meeting held at Belchertown Town Offices.

_____, 2009: The Board of Selectmen adopted the Local Natural Hazard Mitigation Plan. Meeting held at Belchertown Town Offices.

## Participation by Public & Entities in Surrounding Communities

On December 15, 2007 the Pioneer Valley Planning Commission sent a press release to all area media outlets to inform private citizens that the planning process for local Hazard Mitigation Plans had commenced. Belchertown was in round two so PVPC issued a second media release on February 5, 2009 (see Appendix E) to all area media outlets to inform the public that Belchertown was starting the process of developing a Hazard Mitigation plan. In October, 2009, the PVPC issued a press release reporting that a draft of Belchertown's Hazard Mitigation Plan had been placed on PVPC's and Belchertown's websites and hard copies were available at PVPC's offices and Belchertown Town Hall and that all residents, businesses and other concerned parties of Belchertown and adjacent communities were encouraged to comment on the plan. The plans were made available in this manner for 30 days. Citizens from adjacent municipalities were also encouraged to comment on Belchertown's plan.

In addition to media outreach, all public meetings were posted at the field Town Hall in compliance with the Commonwealth of Massachusetts' open meeting law.

# 2: LOCAL PROFILE

## Community Setting

Belchertown is a residential community comprised of over 54.5 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 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.

## Infrastructure

Belchertown's infrastructure reflects its early reliance on the state school as well as its fast-paced residential growth in recent years.

### *Roads and Highways*

Belchertown's town center is found 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.

### *Transit*

The Pioneer Valley Transit Authority (PVTA) provides bus and shuttle service in and out of Belchertown, and contracts through MV Transportation to also offer paratransit, a door-to-door demand responsive van service.

### *Rail*

There is an Amtrak rail line running just to the west of Belchertown town center, but the closest stop is in Amherst.

### *Public Water Service*

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 new 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.

### *Sewer Service*

Belchertown relies mostly upon septic systems for the disposal of wastewater. Septic systems require appropriate soil absorptive ability and level of water table 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 when the state school closed. But the plant was obsolete and the town built the new plant to double capacity. 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 is expanded north along Bay Road and Metacomet Street to the lakes and back along Federal Street. This is an urgent project as the lakes have suffered from the many seasonal camps having been converted to year-round residences.

## Natural Resources

Belchertown's most significant natural resource is the Quabbin Reservoir and the large wildlife preserve surrounding it. However, this historically rural town has been shaped by several of its other natural resources as well.

### *Water Resources*

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 City 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.

### *Forests and Fields*

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

Belchertown's pattern of land use evolved from its rural New England heritage, early 20th century state land policies, and late 20th century suburbanization. In turn, Belchertown's topography, soils, and physiography (lakes, rivers, wetlands and watershed areas) shape and constrain these culturally determined land use patterns.

In the early 1900s, two state-funded projects, the Belchertown State School and Quabbin Reservoir, brought major changes to Belchertown and its land use patterns. Each of these altered the settlement patterns, employment opportunities, and transportation routes.

The most recent influence on land use patterns has been population growth and suburbanization. For its first 200 years, Belchertown grew generally at about 2% a year. In 1970, the population was 5,936. By 2000, the population had nearly doubled to 12,968. Projections indicate that Belchertown's population will almost double again in the next twenty-five years. The majority (75%) of these new citizens work elsewhere. Once a "company town" for the state school with an active farming and forestry economy, Belchertown has become a bedroom community for surrounding towns and cities. The result in terms of land use has been a major shift from agricultural activities and forestry to residential uses.

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

The Belchertown Zoning Bylaw establishes ten 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; 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.

### *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.

### *Development in Hazard Areas*

Hazards identified in this plan are regional risks and, as such, all new development falls into the hazard area. The exception to this is flooding. According to the Community Information System (CIS) of FEMA, there were 207 structures located within the Special Flood Hazard Area (SFHA) in Belchertown as of August 1999, the most current records in the CIS for the Town of Belchertown.

# 3: HAZARD IDENTIFICATION & ANALYSIS

## Profiling the Natural Hazards

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

Each of these hazards was assessed by the Committee for location of occurrence, extent, previous occurrences, and probability of future events. (See Appendix C for sources, methodology.) This resulted in a ranking of hazard, by risk, see Table 3.1. More detailed descriptions of each of the points of analysis are included in the Identification and Vulnerability Assessment (below).

**Table 3.1: Hazard Profiling and Risk Index Worksheet**

| Type of Hazard | Location | Extent | Previous Occurrences | Probability of Future Events | Hazard Risk Index Rating |
|---|---|---|---|---|---|
| Flooding (100-year) | Medium | Critical | Yes, 1955 | Moderate | 3 |
| Flooding (localized) | Medium | Limited | Yes(extensive) | Very High | 3 |
| Severe Snow/Ice Storms | Large | Limited | Yes | Very High | 2 |
| Hurricanes/Severe Wind | Large | Critical | Yes | Moderate | 2 |
| Tornado/Microburst | Small | Catastrophic | Yes, microburst yearly | Very High | 1 |
| Wildfire/Brushfire | Small | Limited | Yes (minimal) | Very High | 3 |
| Earthquake | Large | Catastrophic | No | Very Low | 5 |
| Dam Failure | Large | Catastrophic | No | Moderate | 1 |
| Drought | Large | Limited | Yes, 1999 | Low | 4 |
| Man-Made Hazard: Hazardous Materials | Large | Critical | Yes, Jackson Street train derailment | Low | 3 |

## Natural Hazard Identification and Vulnerability Assessment

The following is a description of natural and manmade disasters, and the areas affected by them, that have or could affect the Town of Belchertown. The *Past and Potential Hazards/Critical Facilities Map* (Appendix D) reflects the contents of this analysis.

### Vulnerability Assessment Methodology

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

**Total value of all structures in Belchertown (2006): $1,314,458,861**

**Median value of a home in Belchertown (2006): $235,000**

**Average household size: 2.4 persons**

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

### Flooding

The average annual precipitation for Belchertown and surrounding areas in northwestern Massachusetts is 46 inches. There are three major types of storms that bring precipitation to Belchertown. Continental storms that originate from the west continually move across the region. These storms are typically low-pressure systems that may be slow-moving frontal systems or more intense, fast-moving storms. Precipitation from coastal storms, also known as nor'easters, that travel into New England from the south constitute the second major storm type. In the late summer or early fall, the most severe type of these coastal storms, hurricanes, may reach Massachusetts and result in significant amounts of rainfall. The third type of storm is the result of local convective action. Thunderstorms that form on warm, humid summer days can cause locally significant rainfall.

Floods can be classified as either *flash floods*, which are the product of heavy, localized precipitation in a short time period over a given location or *general floods*, which are caused by precipitation over a longer time period in a particular river basin. There are several local factors that determine the severity of a flooding event, including: stream and river basin topography, precipitation and weather patterns, recent soil moisture

conditions, amount of impervious surface area, and the degree of vegetative clearing. Furthermore, flooding can be influenced by larger, global climate events. Global warming and climate change have the potential to shift current rainfall and storm patterns. Increased precipitation is a realistic result of global warming, and could potentially increase the frequency and intensity of flooding in the region. Currently, floods are one of the most frequent and costly natural hazards in the United States.

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).

In contrast, general flooding events may last for several days. 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).

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. In addition to damage of buildings directly in the floodplain, development can result in a loss of natural flood storage capacity and can increase the water levels in water bodies. Flood levels may then increase, causing damage to structures not normally in the flood path.

The Floodplain Map for the Town of Belchertown shows the 100-year and 500-year flood zones identified by FEMA flood maps. The 100-year flood zone is the area that will be covered by water as a result of a flood that has a one percent chance of occurring in any given year. Likewise, the 500-year flood has a 0.2 percent chance of occurring in any given year. In Belchertown, there are several floodplain areas – primarily along . There are some smaller 500-year floodplains mapped as well, in several low-lying areas throughout Belchertown.

The major floods recorded in Western Massachusetts during the 20th century have been the result of rainfall alone or rainfall combined with snowmelt. Belchertown has experienced many flooding events over the last decade [described below]. Generally,

these small floods have had minor impacts, temporarily impacting roads and residents' yards and basements.

## Flooding (100-year base flood): Moderate Risk

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. According to the Community Information System (CIS) of FEMA, there were 207 structures (all residential) located within the Special Flood Hazard Area (SFHA) in Belchertown as of August 1999, the most current records in the CIS for the Town of Belchertown. Therefore, a vulnerability assessment for a 100-year flood equals approximately $48.65 million of damage, with approximately 497 people impacted.

Specific vulnerability assessments were estimated for sites within the SFHA which have been susceptible to 100-year floods in the past, they are described below. At this time the Town of Belchertown has no repetitive loss properties as defined by FEMA's NFIP.

| Date | Location | Damage |
|---|---|---|
| 1750's | Jabish Brook | Washed out at least 1 Mill |
| 1938 | Through out Town | Street Flooding from hurricane, some bridges washed out |
| 8/18/1955 | Through out Town | 100 Year Flood, damage to bridges, buildings, no access to Three Rivers, no injuries to persons |

Historical data provided by Cliff McCarthy & Gary Bougham, and Shirley Bock.

***Extent***

See information in Location section

***Previous Occurrences***

See information in Location section

***Probability of Future Events***

There is a high likelihood of localized flooding within the 100-year flood plain every year, but these floods are small and generally cause little damage. The chance of a major flood in the 100-year flood plain is by definition 1% in any given year.

## Flooding (localized) – Medium Risk

In addition to the floodplains mapped by FEMA for the 100-year and 500-year flood, Belchertown often experiences minor flooding at isolated locations due to drainage problems, or problem culverts.

Most of the flood hazard areas listed here were identified due to known past occurrence in the respective area. There are many areas with no record of previous flood incidents that could be affected in the future by heavy rain and runoff. Additionally, the vast majority of culverts throughout town tend to be impacted by beavers, so localized flooding can potentially occur at any culvert crossing.

To determine the vulnerability of the Town to localized flood events, the property within identified areas was visually analyzed using aerial photography (Pictometry), which allowed structures to be identified and tallied. Specific vulnerability assessments were estimated for sites which have been susceptible to localized flooding in the past, and are described below.

***Location***

North Washington Street Underpass

South Street Underpass

Pine Street at Franklin Street (Rte 181)

Rural Road between Boardman Road and Granby Line

***Extent***

Not very serious.

***Previous Occurrences***

Limited.

***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.

## Severe Snow/Ice Storm – Medium Risk

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

New England generally experiences at least one or two severe winter storms each year with varying degrees of severity. Research on climate change indicates that there is great potential for stronger, more frequent storms as the global temperature increases.

Severe winter storms typically occur during January and February; however, they can occur from late September through late April.

***Location***

Severe winter weather occurs regionally and therefore would impact the entire town, although several specific locations are more susceptible to damage. These problem areas have been described and assessed for vulnerability.

Higher elevations at the North end of Town

Any severe winter weather incident can cause critical snow and ice hazards at several points along in the northern portion of Town. This is due to significant grade and a hairpin turn, causing driving difficulties and impairing visibility.

Snow Drift Areas
Mill Valley Rd. @ Golf course
Cold Spring Rd. @ UMAS property
Sabin ST. @ UMASS property
North Washington St @ Bardwell St.
George Hanum St. @ Jackson St. and Hamilton ST.
Jackson St. @ Small Farms
Gold St. @ North ad East sides of Reservoir
Maple St. between Front St. & Police Dept.
Chauncey Walker St. (RT #21) between Turkey Hill Rd. & Pine Valley

***Extent***

New England generally experiences at least one or two severe winter storms each year with varying degrees of severity. 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 factor in the area affected by the snowstorm, the snow, and the number of people living in the path of the storm. The NESIS score 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.

***Previous Occurrences***

Belchertown's recent history has not recorded any loss of life due to the extreme winter weather, but there are usually several incidents of property damage or personal injury each winter. In addition, during heavy snow years, accumulations can reach several

feet deep. Belchertown's rolling topography creates some steep grades, sometimes making plowing difficult and causing snow and ice hazards. Many of the farms and open meadows and fields throughout town cause snow drifts. There are a number of buildings in Belchertown with flat roofs, making the susceptible to damage from snow accumulation. These buildings include the elementary, junior high and high schools, Universal NE warehouses and some older homes with flat roofs.

- Belchertown has been subject to 22 winter storms categorized as major to extreme according to the NESIS scale since 1960. Additional historically significant winter storms to affect Belchertown include the Great Snow of 1717 and the Blizzard of 1888. In 1996 Belchertown experienced serious power outages due to winter storms requiring evacuation people from their homes to municipal shelters.
- Moderate risk town wide due to snow, ice and extreme cold.
- Elderly are affected by extreme weather.

***Probability of Future Events***

Based on the NESIS scale, Belchertown is at risk of a major to extreme winter storm in any given year is slightly less than 50 percent.

## Hurricanes/Severe Wind – Medium-High Risk

Hurricanes are violent rainstorms with strong winds that can reach speeds of up to 200 miles per hour, and 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. Severe wind can also occur in the absence of a hurricane, especially impacting mountain tops. Global warming will increase the threat of hurricanes and severe wind as oceans and the atmosphere warms. Climate change research indicates that storms like hurricanes will become more intense and more frequent in the future.

***Location***

All of Belchertown is at risk from hurricanes with hilltops more susceptible to wind damage and the flood-prone portions of town to flooding from the heavy rains.
Several locations which have been susceptible to wind or hurricane damage are described below:

South Golf Road and the whole southern end of town toward Palmer

The higher elevations near the tops of the mountains throughout town precipitate severe wind incidents, especially during severe thunderstorms, hurricanes, or blizzards. However, no damages have been reported.

***Extent***

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. During hurricanes or severe wind events, the Town has experienced small blocks of downed timber and uprooting of trees onto structures. Downed wires because of tree damage caused significant power outages (3 days) in 1996.

- Estimated wind damage: 5% of the structures with 10% damage, $6,572,294;
- Estimated flood damage: 10% of the structures with 20% damage, $26,289,177;
- Vulnerability assessment for a hurricane event (both wind and flood damages): $32,861,472;
- Cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included.
- Wells are affected by lightning strikes.

***Previous Occurrences***

In Massachusetts, sixteen major hurricanes have made landfall since 1851, some of which affected Western Massachusetts. These include: Hurricane Carol in 1954 and Hurricane Gloria in 1985. Hurricanes are usually ranked category 1-5, using the Saffir-Simpson Scale, with category 5 hurricanes being the most severe. Both Hurricane Carol and Gloria were category 1-2 storms, meaning winds ranged from 74-110 mph with the potential for some roofing or window damage to buildings, damage to unanchored mobile homes, trees, or poor construction, and/or some minor flooding.

- 1938 hurricane was a major event - wind damage and flooding statewide.
- Power and phone lines - disruptions of services.
- Flooding/washing of evacuation routes.

**Table 3.2 Major Non-Winter Storms to Affect Belchertown Area**

| Hurricane/Storm Name | Year | Saffir/Simpson Category (when reached MA) |
|---|---|---|
| Great Hurricane of 1938 | 1938 | Unclear, 3 or 4 |
| 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 |

***Probability of Future Events***

Based upon the past events, it is reasonable to say that there is a low frequency of major hurricanes in Belchertown (once every fifty years is less than a one percent chance of any such storm occurring in a given year) while the possibility of a less severe

hurricane or tropical storm affecting Belchertown in any given year is approximately 10 percent.

## Tornadoes/Microbursts – High Risk

Tornadoes are swirling columns of air that typically form in the spring and summer during severe thunderstorm events. In a relatively short period of time and with little or no advance warning, a tornado can attain rotational wind speeds in excess of 250 miles per hour and can cause severe devastation along a path that ranges from a few dozen yards to over a mile in width. The path of a tornado may be hard to predict because they can stall or change direction abruptly. Within Massachusetts, tornadoes have occurred most frequently in Worcester County and in communities west of Worcester, including towns in Hampshire County.

Of additional concern are microbursts, which often do tornado-like damage and can be mistaken for tornadoes. In contrast to the upward rush of air in a tornado, air blasts rapidly downward from thunderstorms to create microbursts. Microbursts and tornadoes are expected to become more frequent and more violent as the earth's atmosphere warms, due to predictions of climate change from global warming.

### ***Location***

The hazard area for tornadoes in Belchertown varies according to the intensity and size of the tornado. There have not been enough tornadoes in Belchertown to accurately predict sections of town that are more likely to experience a tornado.

### ***Extent***

Risk of tornadoes is considered to be medium in Hampshire County. Tornadoes rarely occur in this part of the country; therefore, assessing damages is difficult. River corridors and hill tops are most prone to damage from these events, but as described in Hurricanes/ Severe Winds section, above, there are few hills in Belchertown and little development on them.

Because tornadoes rarely occur in this part of the country, assessing damages is difficult. Microbursts, however, are an annual event. Furthermore, buildings have not been built to Zone 2, Design Wind Speed Codes. The entire Town of Belchertown is vulnerable.

- Tornadoes/microburst hazard estimates 20% damage to 10% of structures in Town;
- Vulnerability assessment estimates in damages; $26,289,177
- Estimated cost does not include building contents, land values or damages to utilities.

### ***Previous Occurrences***

In Western Massachusetts, the majority of sighted tornadoes have occurred in a swath directly over Belchertown, known as "tornado alley." Thirteen incidents of tornado

activity (all F2[1] or less) occurred in Hampshire County between 1959 and 2005. No known tornados have touched down in Belchertown, but there are occasional high-wind storms that result in tree damage and power outages.

No known tornados have ever touched down in Belchertown, but there have been several high-wind storms and hail events.

***Probability of Future Events***

Based upon the past events, it is reasonable to say that there is a low frequency of tornadoes in Belchertown but a high frequency of microbursts.

## Wildfires/Brushfire – Medium Risk

According to FEMA, there are three different classes of wildland fires: surface fires, ground fires and crown fires. The most common type of wildland fire is a surface fire that burns slowly along the floor of a forest, killing or damaging trees. A ground fire burns on or below the forest floor and is usually started by lightening. Crown fires move quickly by jumping along the tops of trees. A crown fire may spread rapidly, especially under windy conditions. While wildfires or brushfires have not been a significant problem in Belchertown, there is always a possibility that changing land use patterns and weather conditions will increase a community's vulnerability. For example, drought conditions can make forests and other open, vegetated areas more vulnerable to ignition. Once the fire starts, it will burn hotter and be harder to extinguish. Soils and root systems starved for moisture are also vulnerable to fire. Residential growth in rural, forested areas increases the total area that is vulnerable to fire and places homes and neighborhoods closer to areas where wildfires are more likely to occur. Global climate changes may also influence precipitation patterns, making the region more susceptible to drought and therefore, wildfires.

Hampshire County has approximately 252,000 acres of forested land, which accounts for 72% of total land area. Forest fires are therefore 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.

***Location***

Approximately 65% of Belchertown is forested so the entire town is at risk of wildfires.

***Extent***

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.

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

- Up to 200+ could be impacted by a wildfire in one of the Town's agricultural areas;
- Assuming 100% damage to 100% of the structures, not including costs repairing or replacing any power lines, telephone lines, and contents of structures;
- Vulnerability assessment estimates approximately $47,000,000 in damages for a wildfire.

***Previous Occurrences***

The Belchertown Fire Department responds to an average of 34 brush fire calls per year. Over the last 10 years these calls have ranged in size from under a quarter (1/4) acre to just over forty (40) acres. Historically, the largest brush fire in Belchertown encompassed over three hundred (300) acres. Up to 200+ houses could be at risk with the onset of a serious brush fire.

As a point of comparison, approximately 1,000 burn permits are issued annually.

***Probability of Future Events***

Based upon the past events, it is reasonable to say there is a medium risk of wildfires in Belchertown.

## Earthquakes – Medium Risk

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. Ground shaking from earthquakes can rupture gas mains and disrupt other utility service, damage buildings, bridges and roads, and trigger other hazardous events such as avalanches, flash floods (dam failure) and fires. Un-reinforced masonry buildings, buildings with foundations that rest on filled land or unconsolidated, unstable soil, and mobile homes not tied to their foundations are at risk during an earthquake. 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.

***Location***

In the event of an earthquake, all of Belchertown would be affected with some portions more impacted than others, depending on the magnitude of the earthquake and the underlying population density.

**Table 3.3: New England Earthquakes (1924-2002)[2] magnitude 4.2 or higher**

| 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 |

Anecdotal reports indicate a small earthquake in 2000.

**Table 3.4: New England States Record of Earthquakes**[2]

| State | Years of Record | Number of Earthquakes |
|---|---|---|
| Connecticut | 1568 – 1989 | 137 |
| Maine | 1766 – 1989 | 391 |
| Massachusetts | 1627 – 1989 | 316 |
| New Hampshire | 1728 – 1989 | 270 |
| Rhode Island | 1766 – 1989 | 32 |
| Vermont | 1843 – 1989 | 69 |
| New York | 1737 - 1985 | 24 |
| Total Earthquakes in New England (1568-1989) | | 1,239 |

***Extent***

Massachusetts introduced earthquake design requirements into their building code in 1975. 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 1975 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.

- Moderate potential for serious damage in downtown Belchertown;
- Structures are mostly wood frame construction, so loss estimates predict 20% of town assessed value, not including Costs of repairing or replacing roads, bridges, power lines, telephone lines, or the contents of the structures;
- Vulnerability assessment estimates approximately $262,891,772.

***Previous Occurrences***

Nineteen earthquakes, intensity V (Modified Mercalli scale) or greater, have centered in Massachusetts since it was colonized by Europeans. A shock in 1755 reached intensity VIII at Boston and was felt across the State. In addition, Massachusetts was affected by

some of the more severe Canadian shocks plus the earthquake of 1929 that centered on Grand Banks of Newfoundland.

Strong earthquakes in the St. Lawrence Valley in 1638, 1661, 1663, and 1732 were felt in Massachusetts. The 1638 and 1663 shocks damaged chimneys at Plymouth, Salem, and Lynn. On June 11, 1643, Newbury, Massachusetts, was strongly shaken. Again in 1727 (November 9) an earthquake described as "tremendous" in one report and "violent" in another caused much damage at Newbury. The shock was felt from the Keenebec River to the Delaware River and from ships at sea to the extreme western settlements. Several strong aftershocks were reported from the area through February 1728.

Tables 3.3 & 3.4 contain information regarding most of the earthquakes, including all of affecting New England, the significant ones. None have been noted to cause any damage in Belchertown or the surrounding area.

***Probability of Future Events***

Based upon the past events, it is reasonable to say that there is a low frequency of major earthquakes in Belchertown (there have been no earthquakes over 4.2 on the Richter scale in nearly 100 years) while the possibility of a less severe earthquake or tropical storm affecting Belchertown in any given year is slightly less than 1 percent but these are unlikely to cause any significant damage.

## Dam Failure – High Risk

Although dams and their associated impoundments provide many benefits to a community, such as water supply, recreation, hydroelectric power generation, and flood control, they also pose a potential risk to lives and property. Dam 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. 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.

Many dams in Massachusetts were built in the 19th century without the benefit of modern engineering design and construction oversight. Dams can fail because of structural problems due to age and/or lack of proper maintenance. Dam failure can also be the result of structural damage caused by an earthquake or flooding brought on by severe storm events. Most earthen dam failures occur when floodwaters above overtop and erode the material components of the dam.

The Massachusetts Department of Conservation and Recreation (MA DCR) was the agency responsible for regulating dams in the state (M.G.L. Chapter 253, Section 44 and the implementing regulations 302 CMR 10.00). Until 2002, DCR was also responsible for conducting dam inspections but then state law was changed to place the

responsibility and cost for inspections on the owners of the dams. This means that individual dam owners are now responsible for conducting inspections.

The state has four 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.
- Non-jurisdictional: The storage capacity of the impoundment and height of dam are such that they need not be regulated.

The inspection schedule for dams is as follows:

- Low Hazard dams – 10 years
- Significant Hazard dams – 5 years
- High Hazard dams – 2 years

The time intervals represent the maximum time between inspections. More frequent inspections may be performed at the discretion of the state. Dams and reservoirs licensed and subject to inspection by the Federal Energy Regulatory Commission (FERC) are excluded from the provisions of the state regulations provided that all FERC-approved periodic inspection reports are provided to the DCR. All other dams are subject to the regulations unless exempted in writing by DCR.

***Location***

According to DCR sources, as well as local knowledge, there are currently twelve (12) dams[3] in Belchertown as well as two outside the town whose inundation zones include portions of Belchertown. The following table identifies the dams within the town and classifies them as low, significant, non-jurisdictional or high hazard.

**Table 3.5: Dams in Belchertown**

| Dam name/ date built | ID | Owner | Purpose | Condition/last inspected | Hazard Risk |
|---|---|---|---|---|---|
| Winsor Dam (in Ware and Belchertown) | DCR | State | Water supply | Unknown | High |
| Knights Pond Dam | MA00485 | Springfield Sewer & Water Commission | S | Poor/ 11-16-05 | Significant |
| Scarboro Upper Reservoir Dam | MA01817 | Town. | ??? | Unknown/ Unknown | Non-jurisdictional |

| Table 3.5: Dams in Belchertown | | | | | |
|---|---|---|---|---|---|
| **Dam name/ date built** | **ID** | **Owner** | **Purpose** | **Condition/last inspected** | **Hazard Risk** |
| Scarboro Lower Reservoir Dam | MA01818 | Town | ??? | Unknown/ Unknown | Non-jurisdictional |
| Diversion Dam | MA01819 | Town | ??? | Unknown/ Unknown | Non-jurisdictional |
| Blackmer-Walker Dam | MA02699 | Springfield Sewer & Water Commission | C | Unknown/ Unknown | Non-jurisdictional |
| Canal Dam | MA02700 | City of Springfield | C | Unknown/ Unknown | Non-jurisdictional |
| Beaudry Dam | MA02703 | John Sullivan? | ??? | Breach/Unknown | Non-jurisdictional |
| Lower Pratt Pond Dam | MA02704 | Richard Hohlstein | ??? | Unknown/ Unknown | Non-jurisdictional |
| Upper Pratt Pond Dam | MA02705 | John H. Conkey, Sr. | ??? | Unknown/ Unknown | Non-jurisdictional |
| Dorman Pond Dam | MA02707 | Linda Zajackowski | ??? | Breach/Unknown | Non-jurisdictional |
| Unknown | MA01265 | Lauren Stress & Lauren McIntyre | ??? | Unknown/ Unknown | Non-jurisdictional |

| Table 3.6: Dams Outside Belchertown with Inundation Zones including Belchertown | | | | | |
|---|---|---|---|---|---|
| **Dam name/ date built** | **ID** | **Owner** | **Purpose** | **Condition/last inspected** | **Hazard Risk** |
| Bondsville Upper Dam (in Palmer) | MA00560 | Belchertown Land Trust | Recreation | Poor/June 1999 | Significant |
| Bondsville Lower Dam (in Palmer) | MA00561 | Unknown | Recreation | Poor/June 1999 | Significant |

Though beyond the Town's boundaries and maintained by the Commonwealth of Massachsuetts, 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.

Following is a table showing the EAP estimates for areas of Belchertown:

| Area | Leading Edge Arrival Time | Peak Flood Arrival Time | Max. Surface Water Elevation |
|---|---|---|---|
| South Belchertown | 1 hour | 2 hours | 425 feet |
| Belchertown | 1 hour | 2 hours | 425 feet |

Belchertown has a history of no dam failures.

***Extent***

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

***Previous Occurrences***

Belchertown has a history of no dam failures.

***Probability of Future Events***

Based upon the past events, it is reasonable to say that there is a low frequency of dam failure in Belchertown.

## Drought – Low Risk

Drought is a normal, recurrent feature of climate. It occurs almost everywhere, although its features vary from region to region. In the most general sense, drought originates from a deficiency of precipitation over an extended period of time, resulting in a water shortage for some activity, group, or environmental sector.

Reduced crop, rangeland, and forest productivity; increased fire hazard; reduced water levels; increased livestock and wildlife mortality rates; and damage to wildlife and fish habitat are a few examples of the direct impacts of drought. Of course, these impacts can have far-reaching effects throughout the region and even the country.

***Location***

A drought would affect all of Belchertown.

***Extent***

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

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. Even so, there have been several years of drought-like conditions in Western Massachusetts: 1940-1952, 1980-1983, and 1995-2001. Furthermore, 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. Additionally, even minor droughts will increase the risk of wildfire, especially in areas of high recreational use.

***Previous Occurrences***

In Massachusetts, six major droughts have occurred statewide 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.

Belchertown has had limited experience with severe drought conditions. The town has not experienced a threat to its water supply, and doesn't anticipate any severe water shortages throughout town. The town is concerned about fire suppression as a result of drought and the water district has instituted drought measures in the mid 1990s. Every other year there is a limitation on burning because of dry conditions. In addition, because the Quabbin is within part of Belchertown, it is always important to consider the greater impacts a local drought could have on this regional water supply.

***Probability of Future Occurrences***

Based upon the past events, it is reasonable to say that there is a low frequency of drought in Belchertown.

## Man-Made Hazards – Hazardous Materials – Low Risk

Hazardous materials are chemical substances, which if released or misused can pose a threat to the environment or health. These chemicals come in the form of explosives, flammable and combustible substances, poisons, and radioactive materials. Hazardous materials in various forms can cause death, serious injury, long-lasting health effects, and damage to buildings, homes, and other property. Many products containing hazardous chemicals are used and stored in homes and businesses routinely. These products are also shipped daily on the nation's highways, railroads, waterways, and pipelines.

The Toxics Release Inventory (TRI), a publicly available EPA database that contains information on specific toxic chemical releases and other waste management activities reported annually by certain covered industry groups as well as federal facilities.

Belchertown relies on the regional HazMat team located in Holyoke for responding to incidents involving hazardous materials through a mutual aid agreement.

***Location***

According to TRI, there are two industries currently releasing hazardous materials within Belchertown's town limits. These two sites, as well as four additional ones, are all considered Tier II Hazardous Materials storage facilities, they are included on the Past & Potential Hazards/Critical Facilities Map (Appendix D).

In addition, varying quantities of hazardous materials are manufactured, used, or stored at an estimated 4.5 million facilities in the United States--from major industrial plants to local dry cleaning establishments or gardening supply stores. These hazardous materials are transported regularly over our highways and by rail and if released can spread quickly to any community. Incidents can occur at any time without warning. Human error is the probable cause of most transportation incidents and associated consequences involving the release of hazardous materials. There is an active railroad

going through Belchertown, NE Central Rail, formerly called Central VT and there was a train derailment that affected Jackson Street. No major highways pass through Belchertown.

| Table 3.7 Tier II Hazardous Materials storage facilities in Belchertown | |
|---|---|
| **Site Name** | **Site Address** |
| Northeast Treaters Inc. | 201 Old Springfield Road |
| Universal Forest Products, Eastern Div. Inc. | 149 Bay Road |
| National Grid Belchertown #509 | Jensen Road |
| First Student, Inc. | 277 North Liberty Street |
| University Of Massachusetts | Sabin Street |
| Verizon Belchertown Dial Ofc (Ma854906) | 35 Jabish Street |
| Belchertown Maintenance Facility/DPW Garage | 290 Jackson Street |
| Belchertown Transfer Station | 143 Hamilton Street |
| Belchertown Wastewater Treatment Plant | 175 George Hannum Road |
| Springfield Terminals Inc | 1066 Federal Street |

***Extent***

The extent of hazardous chemical release is not predictable as it is dependent on the location including whether it is from a stationary or moving source, amount and type of chemical released, and weather conditions at the time of the release, but given the small amount of hazardous chemicals present in Belchertown the extent is likely to be limited.

***Previous Occurrences***

Available data dating from 1998-2003 shows an average of 4 releases of hazardous materials (total) from these sites per year (although there wee no releases in 2002 & 2003) and there has been no property damage or loss of life associated with these releases.

There is no history of any major accidents involving some sort of oil or chemical spill, but transportation of chemicals and bio-hazardous materials by vehicle transport on Routes 202, 9, 21, 191, and Bay Road is a concern. Small areas of hazardous materials storage increase the potential for future incidents.

***Probability of Future Events***

Given available data there are likely to be fewer than four releases of hazardous chemicals each year though data trends may be showing a decrease from that level, and the likelihood of a catastrophic release is very low.

# 4: CRITICAL FACILITIES

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

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

## Critical Facilities within Hazard Areas

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

The Critical Facilities List for the Town of 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 four categories:

- The first category contains facilities needed for Emergency Response in the event of a disaster.
- The second category contains Non-Emergency Response Facilities that have been identified by the Committee as non-essential. These are not required in an emergency response event, but are considered essential for the everyday operation of Belchertown.
- The third category contains Facilities/Populations that the Committee wishes to protect in the event of a disaster.
- The fourth category contains Potential Resources, which can provide services or supplies in the event of a disaster.

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

## Category 1 – Emergency Response Services

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

1) Emergency Operations Center
   Belchertown Wellness Center- 95 Sargent 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, 142 Springfield Road, 323-9419 Kitchen with emergency power, Capacity 1600
- Senior Center, 60 State Street - 323-0421Kitchen with emergency power, Capacity 300
- Chestnut Hill Community School, 59 State Street - 323-0437 Kitchen with emergency power for lights ONLY, Capacity 1600
- Swift River Elementary School, 57 State Street -- 323-0474 full power but no kitchen, Capacity 1200
- Jabish Brook Middle School, 62 North Washington St, 323-0433, lighting only, Capacity 1500
- Pine Valley Plantation, 281 Chauncey Walker, 323-7206 Kitchen with emergency power, Capacity 150-300
- Hope United Methodist Church, 31 Main St 323-7584 kitchen NO emergency Power, Capacity 300
- St. Francis Church, 26 Jabish St 323-6272 emergency power, Capacity 800
- Old Town Hall, Park St 323-0403 No emergency service, Capacity 75
- Belchertown Fire Station, 10 North Main St 323-7571 Kitchen with emergency power, Capacity 50

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

   <u>Private wells</u>
   Pine Valley Plantation
   Village Greene Condo Association

Dry wells

9) Transfer Station
On Past & Potential Hazards/Critical Facilities Map – address

10) Helicopter Landing Sites -- LIFE-FLIGHT LANDING ZONE LOCATIONS

Worcester ETA-17min. Palmer ETA-6min.

Police 323-6685 (freq. 158.82) Fire 323-7571 (freq. 155.145)

1. Site 1: Address: 641 Daniel Shays Highway-Conkey Lumber parking lot
Location specs: 80'x60', Slightly off level Paved parking area, Alongside roadway, Police officer owns land (Dave Conkey)
Cautions:, Trees NE side of lot. Wires on opposite side of road, Possible customers parking in lot
Landmarks:
Alternative Sites: Other possible areas to land on this property
GPS Coordinates: N42 19.72 W072 24.11
2. Site 2: Address: 147 Bay Rd., Harris Milk - open lot next to garage
Location specs: Just past gas pumps on left, packed gravel
Cautions: Wet down landing zone to control Gravel and dust, bumpy, possible trucks parked at location, wires from street along access road.
Landmarks: Railroad tracks and Bay Rd cross here
Alternative Sites: Fields off to the right side
GPS Coordinates: N42 18.04 W072 25.48
3. Site 3: Address: 54 Ware Rd., Greene's gravel bank entrance
Location specs: Enough area right at gate, hard gravel, Good open area on level fields all around
Cautions: Wires along Rt. 9 and to pole in driveway, Traffic concerns right off Rt. 9
Landmarks: Rt. 9, large open fields small pond just east of town center
Alternative Sites: Across the street in Greene's parking area(51 Ware Rd.)
GPS Coordinates: N42 17.00 W072 23.05
4. Site 4: Address: 485 Ware Rd. State Police barracks, MDC-Quabbin
Location specs: Down in front of administration building, in parking lot or on field
Cautions: possible cars in parking lot, soft ground in field
Landmarks: Quabbin, Administration building
Alternative Sites: Up on field next to administration building
GPS Coordinates: N42 16.81 W072 20.87
5. Site 5: Address: 55 State St. Chestnut Hill School
Location specs: Large parking area, A lot of open fields
Cautions: Possible cars in parking lot, Possible soft ground
Landmarks: land in the corner of Rt. 202 & Rt. 21
Alternative Sites:
GPS Coordinates: N42 16.19 W072 24.83

6. Site 6: Address: 380 Mill Valley Rd., Mill Valley Country Club
Location specs: Driving range-parking 100yds. N of entrance Extensive fields surrounding
Cautions: soft ground
Landmarks:
Alternative Sites: Across street in Atkins parking lot
GPS Coordinates: N42 15.51 W072 22.32
7. Site 7: Address: Franklin Street Extension, Left off Franklin St. between Michael Sears upper and lower
Location specs: slightly off level, pavement
Cautions: wires along 181, slightly off level
Landmarks: Old railroad bed
Alternative Sites:
GPS Coordinates: N42 13.69 W072 21.69
8. Site 8: Address: 293 North Liberty St. Martineau Forest Products
Location specs: Field next to road
Cautions: wires along road, soft conditions, two foot lower than road, not good when snow builds up
Landmarks: corner of North Liberty & Bardwell
Alternative Sites: potentially set down opposite side or in intersection
GPS Coordinates: N42 13.61 W072 22.64
9 Site 9: Address: 357 Daniel Shays Highway – Devon Lane
Location specs: fields north of business
Cautions: Trees Need for Police dependent on traffic conditions
Landmarks: RT 202 towards Pelham
Alternative Sites: up to 641 Daniel Shays
GPS Coordinates: N42 18.46 W072 24.26
10 Site 10: Address: 1277 Federal St.-Across from Amherst Self-Storage- parking lot
Location specs: Dirt parking lot, Level, Alongside roadway, .
Cautions: Possible need for Police dependent on traffic conditions
Landmarks: RT 9 roadway near Amherst
Alternative Sites: Across street or in street
GPS Coordinates: N42 20.92 W072 28.09

11) Communications
# cell/radio towers throughout town – see Past & Potential Hazards/Critical Facilities Map.

12) Primary Evacuation Routes
Route 181
Route 202
Route 9
Route 21

13) Bridges/Culverts Located on Evacuation Routes
Bridges

| **Evacuation Route** | **Crosses** | **Owner** | **Year Built** | **Year Rebuilt** |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| 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 |

## 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) Problem Culverts
   No problem culverts identified at this time

2) Cross Pipes in Need of Replacement
Pelham Road (2) 12' X 40' (Spring 09)
Franklin St. @ Mile Marker 48-49 24" x 50' (liner?)
Cold Spring Road @ Moore Rd 12" x 40"
Allen Rd. @ Jucket Hill Rd 30" x 50'
Rural Rd. between George Hannum and Granby Line (twin) 36" x 50'
Boardman Rd. @ Rural Rd. (drain low area)
Kopac Ave. 36" x 50'
Kimball St. Drain Line 200' x 12" perf.
Goodell @ Pond 18" x 60'
Warren Wright Rd. between Orchard & Goodell (3) 48" x 60'

3) Water Supply
   Town reservoir

3) Electrical Substations
   Blue Meadow Road
   Jensen Street

## 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 location is confidential--DMR

2) Public Buildings/Areas
   Clapp Memorial Library- 19 South Main Street
   Belchertown Senior Center- 60 State Street

Old Town Hall- Park Street
Tadgel School- 7 Berkshire Avenue
Post Office- 35 Main Street
Lawrence Memorial Hall-2 Jabish Street
Town Hall
Freedom Center-Berkshire Avenue
Teen Center/Rec Department-66 State Street

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
Belchertown High School- 142 Springfield Road
Center Street School-Maple Street
Franklin School Family Center-Franklin Street

| Daycare | Capacity |
|---|---|
| Adams, Amy- 36 Shea Avenue | 4 |
| Aliengena, Lauri J.- 451 Michael Sears Road | 10 |
| Belchertown Community Pre-School- 31 Main Street | 37 |
| Belchertown Day School- 51 State Street | 61 |
| Belchertown Day School After School Program- 51 State Street | 78 |
| Belchertown Day School Before School Program- 57 State Street | 39 |
| Benoit, Breanna- 39 Dana Hill Road | 5 |
| Boivin, Sherri A.- 769 Federal Street | 10 |
| Brandon, Judyann- 689 Federal Street | 10 |
| Brougham, Sandra L.- 101 Mill Valley Road | 8 |
| Burton, Holly- 412 State Street | 5 |
| Coulombe, Darlene- 123 Wilson Road | 6 |
| Cox, April Louise- 6 Pease Lane | 6 |
| Dexter, Susan- 606 Warren Wright Road | 8 |
| Erickson, Lorie A.- 125 Kennedy Road | 6 |
| Forgue, Tracy- 100 Metacomet St. | 6 |
| Fournier, Tracey- 32 Aldrich St. | 4 |
| Hall, Deborah- 191 Munsell Street | 10 |
| Hammond, Cathy L.- 34 Maplecrest Drive | 6 |
| Heath-Lanzarotto, Traci- 221 Allen Rd. | 5 |
| Houle, Kari A.- 92 Clark Street | 6 |
| Howes, Susan M.- 415 East Street | 5 |
| Jitterbugs Early Childhood Program- 432 State Street | 24 |
| Jitterbugs Early Childhood Program- 432 State Street | 10 |
| Lear, Pamela- 281 Chauncy Walker St | 6 |
| Lefebvre, Valerie- 205B Jabish Street | 5 |
| Little Friends Child Care Center- 58 Daniel Shays Highway | 39 |
| Mankowsky, Laura J.- 19 Fuller Street | 4 |
| Michaels, Yvonne M.- 136 Gold Street | 6 |
| Murray, Jennifer J.- 313 Bay Road | 4 |

Piquette, Debra L.- 35 Brandywine Drive 7
Pirog, Patriciaann- 55 Green Avenue 5
Roberts, Robin M.- 15 Oakwood Drive 8
Suarez, Cindy- 505 Allen Road 6
Sullivan, Donna M.- 202 Warner Road 8
Teschke, Cathleen- 27 Robin Lane 4
Tharion, Christine A.- 16 Eugene Drive 8
Thomas, Jennifer L.- 601 North Liberty St. 5
Tinney, Lisa- 281 Chauncy Walker St, Ave E 6
Vilbon, Susan A.- 60 Goodell Street 6
Wagner, Brandi A.- 524 Chauncey Walker 7
Warner, Amy M.- 112 Gulf Road 5

4) Churches
St Francis of Assisi Church- Jabish St.
Belchertown Congregational Church- 18 Park St.
Hope United Methodist Church- 31 Main Street
Dwight Chapel- 885 Federal Street

5) Historic Buildings/Sites
South Cemetery
Mount Hope Cemetery
Clapp Memorial Library- 19 South Main Street
Tadgel Hall- 7 Berkshire Avenue
Town Center Historic District

6) Apartment/Condominium Complexes Elderly Housing Assisted Living

| Project Name | Address | Type | Total SHI Units |
|---|---|---|---|
| Everett Acres | 41 Everett Ave. | Rental | 48 |
| n/a | 45 State/ 95 George Hannum Rd | Rental | 8 |
| East Walnut Hill | 68 East Walnut St. | Rental | 8 |
| n/a | 45 State/ 95 George Hannum Rd | Rental | 12 |
| Mill Hollow Apartments | 133 Jabish St. | Rental | 60 |
| Coldspring Commons | Cold Spring Road | Ownership | 18 |
| Allen Rd | Allen Rd | Ownership | 1 |
| North Liberty St | North Liberty St | Ownership | 1 |
| Amherst Rd | Amherst Rd | Ownership | 1 |
| Maple St | Maple St | Ownership | 1 |
| Chauncey/Wkr lot | Chauncey/Wkr lot | | 1 |

| | | | |
|---|---|---|---|
| | | Ownership | |
| Oakwood Drive | Oakwood Drive | Ownership | 1 |
| Federal St | Federal St | Ownership | 1 |
| Clark St | Clark St | Ownership | 1 |
| Turkey Hill Rd | Turkey Hill Rd | Ownership | 1 |
| Allen St | Allen St | Ownership | 1 |
| Chauncey/WkrLotII | Chauncey/WkrLot | Ownership | 1 |
| Newton St | Newton St | Ownership | 1 |
| Chauncey/Wkr lot III | Chauncey/Wkr lot | Ownership | 1 |
| South Liberty St | South Liberty St | Ownership | 1 |
| DMR Group Homes | Confidential | Rental | 37 |
| **Belchertown Totals (2008)** | | | **205** |
| **Census 2000 Year Round Housing Units** | | | **5,002** |

Stopped 10/8/09

7) Employment Centers
   Hulmes Transportation Service-
   Belchertown High School- 142 Old Springfield Rd
   Swift River Elementary School- 57 State St
   First Student Inc- 227 N Liberty St
   Department of Conservation & Recreation- 485 Ware Rd
   Universal Forest Products Inc-
   Stop and Shop
   Tractor Supply
   Harris Milk Transport
   Belchertown District Court
   Northeast Treaters

## Category 4 – Potential Resources

Contains facilities that provide potential resources for services or supplies.

1) Food/Water
   Checkers General Store & Deli- 33 State Street
   Stop & Shop Supermarket- 40 George Hannum Road
   Country Crossroads Convenience Store- 2 Stadler Street
   Dwight Station Mini Mart- 1099 Federal Street

2) Hospitals/Medical Supplies
   Belchertown Ambulance- 9 East Walnut Street
   CVS Pharmacy- 151 North Main Street
   Super Stop and Shop Pharmacy- 40 George Hannum Road
   University Health Services (About 8 Miles; Amherst)
   Healthsouth Hospital of Western Massachusetts (About 9 Miles; Ludlow)
   Wing Memorial Hospital (About 10 Miles; Palmer)
   Satellite Center-Wing Memorial-Daniel Shays Highway
   Mary Lane Hospital (10 miles in Ware)\Belchertown Wellness Center-Sargent Street
   Cooley Dickinson satellite office
   Hampshire Family Care Center—Turkey Hill Road
   Adolescent and Pediatric Health Center-corner of Henry Drive and State Street

3) Gas/Home Heating Oil/Other Fuels
   Gasoline
   Dwight Station Mini Mart- 1099 Federal Street
   Planet Gas (Rice Oil Company Inc)- 33 State Street
   Mobil R/S #17290- 151 North Main Street
   F L Roberts & Co Inc #453- 122 Federal Street
   Stop & Shop Supermarket- 45 Federal Street
   Arrow Gas- 225 North Liberty Street
   The Board of Health is working on collaborative agreements

   Fuel Oil
   Dwight Station Mini Mart-1099 Federal Street
   Swift River Heating And Air Conditioning- 221 North Liberty St

   Propane
   Arrow Propane/Star Gas Propane- 225 North Liberty Street

   Other Fuel Storage Areas
   Belchertown DPW- 290 Jackson Street
   DCR Quabbin Laboratory- 485 Ware Road
   Mass Highway Department- Ware Road
   Mass Division Of Fisheries And Wildlife- 90 East Street

4) Building Materials Suppliers
   Stadler Hardware & Lumber Inc- 3 Stadler Street
   Valley Welding & Equipment Inc- 100 Old Amherst Road
   Grand Lumber-30 Turkey Hill Road
   Tractor Supply-40 Turkey Hill Road

5) Heavy & Small Equipment Suppliers
   Orchard Hill
   Devon Lane
   Tractor Supply

6) Gravel Pits
   Green's-Ware Road
   Karl's-Federal Street
   Hayward-Allen Road
   Gonsalve's-Hamilton Street

| 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) | None—Town has effectively prevented new construction in flood plain | | |
| | | | |
| Flooding (localized) | North Washington St underpass | | |
| | South St underpass | | |
| | Pine Street @ Franklin ST | | Rte 181 |
| | Rural Rd between Boardman and Granby Line | | |
| Severe Snow/Ice Storm | Mill Valley Rd, Cold Spring Rd | | |
| | Sabin ST, N. Washington St, Bardwell St | | |
| | George Hannum St, Jackson St., Gold St. | | |
| | Maple St., Chauncey Walker St. | | Rte 21 |
| Hurricane/Severe Wind | South Golf Road and the whole southern end of town toward Palmer | | |
| Wildfire/Brushfire | Forested areas | | |
| Earthquake | Town-wide | | |
| Dam Failure | Southern portion of Town | | |
| Drought | Town-wide | | |
| Hazardous Materials | | | |

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

# 5: MITIGATION STRATEGIES

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

**Goal Statement**

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

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

- Zoning Bylaw
- Subdivision Regulations
- Belchertown Community Plan
- CEM Plan
- Other relevant Bylaws as identified (Fire Department Burn Permit Procedures, Building Code, etc.)

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

## General Mitigation Measures

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

Some of these general hazard-related strategies and measures do not fall specifically under the category of "mitigation," but are instead tools for

**What's the CEM Plan?**

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

preparedness. The Hazard Mitigation Planning Committee recognizes that these are also important recommendations for the Town, and has included them here:

- Form Local Emergency Planning Committee.
- Establish system to inventory supplies at existing shelters and develop a needs list and storage requirements. Establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster.
- Collect, periodically update, and disseminate information on emergency information, what to include in a 'home survival kit,' how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to follow during a natural disaster.

## Flooding

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

### *Current Mitigation Measures*

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

**Table 5-1: Existing Flood Hazard Mitigation Measures**

| Existing Strategy | | Description | Effectiveness | Potential Changes |
|---|---|---|---|---|
| Flood Control Structures | | Fourteen dams. | Somewhat effective. Concerned about high risk dams. | Ensure dam owners realize their responsibility to inspect the dams. |
| Culvert Replacement | | Priority list of necessary culvert replacements and other construction projects to` effectively manage flooding. | Very effective for managing flood control needs. | Seek funding from HMGP for top-priority projects. |
| Zoning By-Laws | Wetland Protection District | Overlay district to delineate areas protected through the Mass Wetlands Protection Act | Very effective for preventing development within flood storage areas/wetlands. | |

| | | | | |
|---|---|---|---|---|
| | Floodplain Protection District | Areas delineated as part of the 100-year floodplain are protected by strict use regulations. | Very effective for preventing incompatible development within the flood prone areas. | |
| | Aquifer Protection District | Overlay district to protect groundwater resources by regulating certain uses, drainage, site plan requirements, and special permit procedures. | Very effective for preventing groundwater contamination and for controlling stormwater runoff. | |
| | Open Space Community Development (OSCD) | Provides regulations for cluster subdivision development by special permit. Allows protection of contiguous open space. | Somewhat effective for minimizing impervious surface, allowing for more groundwater infiltration. | **No changes necessary** |
| | Common Driveway | Provides for minor residential development without additional roads thereby lessening environmental impact. | Effective for minimizing impervious surface, allowing more groundwater infiltration. | |
| | Earth Removal | Regulates sand and gravel operations, and regulates soil removal, emphasizes environmental concerns. | Somewhat effective for preventing water pollution. | Seek funding for enforcement. |
| | Site Plan Approval | Proposed uses must meet requirements for drainage and preventing erosion and pollution to waterbodies. | Somewhat effective for preventing incompatible development. | |
| | Stormwater Runoff | Regulations for rates of stormwater runoff post-construction. | Effective for managing stormwater runoff. | |
| Subdivision Regulations | Definitive Plan | Flooding must be taken into consideration in plan; required measures to prevent stormwater runoff and maintain groundwater supply. | Very effective for managing stormwater runoff. | |
| | | Environmental Analysis required | Effective for evaluating impacts of development on water bodies prior to construction. | |
| | Design Standards | Stormwater detention basin requirements | Very effective for managing stormwater runoff. | |
| Belchertown Community Plan | | Inventories natural features and promotes natural resource preservation in the town, including areas in the floodplain; such as wetlands, groundwater recharge areas, farms and open space, rivers, | Effective in identifying sensitive resource areas, including floodplains. Encourages forest, farmland protection, help conserve the | Work to implement relevant goals and policies in Plan. |

| | | | |
|---|---|---|---|
| | streams and brooks. | town's flood storage capacity. | |
| National Flood Insurance Program Participation | As of 2006, there were 14 homeowners with flood insurance policies. | Somewhat effective, provided that the town remains enrolled in the National Flood Insurance Program. | The town should evaluate whether to become a part of FEMA's Community Rating System. |

***Future Mitigation Measures***

Several potential changes to the Town's current strategies have been identified in the above table, and these, as well as recommendations for other future mitigation strategies, are compiled below:

- Address high priority dams, esp. those in Bondsville that appear to be an imminent threat.
- Replace top priorities on culvert replacement list.
  - Itemized list of culvert replacements here.
  - a culvert replacement
  - a culvert replacement
- Address inappropriate grand-fathered uses in floodplain.
- Ensure dam owners realize their responsibility to inspect the dams regularly.
- Educate citizens living in the floodplain about the NFIP.
- Implement the goals and strategies of the Belchertown Community Plan dealing with protection of floodplain, forests, and farmland.
- Seek funding for enforcement of earth removal and site plan regulations.

## Severe Snow/Ice Storm

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

***Current Mitigation Measures***

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

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

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

| Existing Strategy | | Description | Effectiveness | Potential Changes |
|---|---|---|---|---|
| Zoning By-law | Common Driveways | Allows for adjacent lots to share a driveway, fewer curb cuts. | Effective for providing access | |
| Subdivision Regulations | Improvements | Utilities must be placed underground | Effective for preventing power loss. | Work with National Grid to facilitate underground utilities as allowed. |
| | Design Standards | Standards include street grade regulations (minimum 1%; maximum 8%); and intersection grade regulations (maximum 2%). | Effective. | |
| State Building Code | | The Town of Belchertown has adopted the Massachusetts State Building Code. | Effective. | |
| Backup Electric Power | | Shelters have backup power, three mobile generators | Very effective in case of power loss. | |
| Tree Management | | List of dangerous trees created annually for National Grid. | Very effective, preventative collaboration. | Work with National Grid to facilitate underground utilities as allowed. |

***Future Mitigation Measures***

Several potential changes to the Town's current strategies have been identified in the above table, and these, as well as recommendations for other future mitigation strategies, are compiled below:

- Determine if existing generators at shelters are effective, replace if not effective.
- Increase enforcement of restrictions prohibiting residents from plowing snow into the road.
- 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).
- Participate in the creation of a Regional Debris Management Plan.

**What is a Regional Debris Management Plan?**

Natural disasters can precipitate a variety of debris, including trees, construction and demolition materials and personal property. After a natural disaster, potential threats to the health, safety and welfare of impacted citizens can be minimized through the implementation of a debris management plan. Such a plan can be critical to recovery efforts after a disaster, including facilitating the receipt of FEMA funds for debris clearance, removal and disposal.

## Hurricanes/Severe Wind

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

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

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

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

## Tornadoes/Microbursts

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

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

| Table 5-3: Existing Severe Wind Hazard Mitigation Measures (Including Hurricane, Tornado, Microburst Hazards) | | | | |
|---|---|---|---|---|
| **Existing Strategy** | | **Description** | **Effectiveness** | **Potential Changes** |
| Zoning By-law | Zone Districts – Mobile Home Park | Mobile homes are permitted in this district. | Somewhat effective for preventing damage to susceptible structures | |
| | Accessory Uses | Regulations size, location of accessory structures to mobile homes. | | |
| | Wireless Communications Facilities | Wireless communication towers/facilities need special permit. Standards restrict height and setbacks. | Somewhat effective for preventing damage to nearby property | |
| Subdiv Regs | Improvements | Utilities must be placed underground | Effective for preventing power loss. | Work with National Grid to facilitate underground utilities as allowed. |
| State Building Code | | The Town has adopted the MA State Building Code. | Effective. | |
| Tree Management DPW maintains municipal trees and has a tree management program | | List of dangerous trees created annually for National Grid. | Very effective, preventative collaboration. | |

***Future Mitigation Measures***

Several potential changes to the Town's current strategies have been identified in the above table, and these, as well as recommendations for other future mitigation strategies, are compiled below:

- Work with National Grid to facilitate the underground placement of new utility lines in general and existing utility lines in locations where repetitive outages occur (as applicable).
- Participate in the creation of a Regional Debris Management Plan.

## Wildfire/Brushfire

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

***Current Mitigation Measures***

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

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

| Existing Strategy | | Description | Effectiveness | Potential Changes |
|---|---|---|---|---|
| Zoning By-law | Site Plan Approval | Special granting authority can request Fire Department inspection/review of any plan. | Effective. | |
| Subdivision Regulations | Definitive Plan | A fire protection agreement must be signed by the Fire Department as part of the Plan. Includes standards for water supply, fire ponds, etc. | Effective. | |
| Burn Permits | | Residents must obtain burn permits, and personnel provide information on safe burn practices. | Effective. | Consider invoking penalties for repeat offenders. |
| Public Education/ Outreach | | The Fire Department has an ongoing educational program in the schools. | Effective. | None. |

***Future Mitigation Measures***

Several potential changes to the Town's current strategies have been identified in the above table, and these, as well as recommendations for other future mitigation strategies, are compiled below:

- Consider invoking penalties for repeat offenders.

## Earthquake

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

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

***Current Mitigation Measures***

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

**Table 5-5: Existing Earthquake Hazard Mitigation Measures**

| Existing Strategy | | Description | Effectiveness | Potential Changes |
|---|---|---|---|---|
| Zoning By-law | Wireless Communications Facilities | Wireless communication towers/facilities need special permit. Standards restrict height and setbacks. | Somewhat effective for preventing damage to nearby property | |
| State Building Code | | The Town of Belchertown has adopted the State Building Code. | Effective for new buildings only. | Evaluate older structures categorized as critical facilities to determine if they are earthquake resistant. |
| Debris Management Plan | | A debris management plan could be developed. | Effective. | Consider participation in the creation of a Regional Debris Management Plan. |

***Future Mitigation Measures***

Potential changes to the Town's current strategies have been identified in the above table, and these are compiled below:

- Evaluate critical facilities to determine if they are earthquake resistant.
- Participate in the creation of a Regional Debris Management Plan.

## Dam Failure

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

***Current Mitigation Measures***

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

**Table 5-6: Existing Dam Failure Hazard Mitigation Measures**

| Existing Strategy | Description | Effectiveness | Potential Changes |
|---|---|---|---|
| New Dam Construction Permits | State law requires a permit for the construction of any dam. | Effective. Ensures dams are adequately designed. | None. |

| | | | |
|---|---|---|---|
| Dam Inspections | DCR has an inspection schedule that is based on the hazard rating of the dam (low, medium, high hazard). | Low. The responsibility for this is now on dam owners, who may not have sufficient funding to comply. | Identify sources of funding for dam safety inspections. Incorporate dam safety into development review process. |

***Future Mitigation Measures***

Recent changes in legislation have shifted some of the responsibility of dam safety onto dam owners. The Town recognizes the need to adjust to this change. Several potential changes to the Town's current strategies have been identified in the above table, and these, as well as recommendations for other future mitigation strategies, are compiled below:

- Identify sources of funding for dam safety inspections.
- Work with State of Massachusetts to understand and get training relative to Emergency Action Plan for Winsor Dam and Goodnough Dike. (If 1990 EAP for dam and dike are most recent, exert pressure for updates to these plans.)
- Obtain all most recent maps of inundation areas and evacuation routes for other high hazard dams.
- Educate citizens living in inundation zones about evacuation routes in case of dam failure, pending the availability of funding.

## Drought

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

***Current Mitigation Measures***

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

**Table 5-7: Existing Drought Hazard Mitigation Measures**

| Existing Strategy | | Description | Effectiveness | Potential Changes |
|---|---|---|---|---|
| Zoning By-law | Aquifer Protection District | Areas delineated as recharge areas for aquifers are protected by strict use regulations. | Very effective for preventing groundwater contamination and for controlling stormwater runoff, promoting groundwater recharge. | |

| | | | | |
|---|---|---|---|---|
| | Industrial Regulations | Strict regulations on discharges, with respect to their impact on groundwater, water supply. | Effective for preventing groundwater or surface water contamination. | |
| Subdiv Regs | Definitive Plan | Environmental Analysis required | Effective for evaluating impacts of development on groundwater, water quality prior to construction. | |
| Belchertown Community Plan | | Makes recommendations for protecting Belchertown's water quality/supply. | Somewhat effective for raising awareness about protecting water quality, supply, and conservation. | Implement plan goals. |

***Future Mitigation Measures***

Potential changes to the Town's current strategies have been identified in the above table, and these, as well as recommendations for other future mitigation strategies, are compiled below:

- In regards to the Belchertown Community Plan, implement the goals and strategies dealing with protection of waterbodies and forestland.

## Hazardous Materials

Hazardous materials are in existence throughout Town, and are constantly being moved on Belchertown's roads and highways. However, there is no way to anticipate where and when a hazardous materials spill or explosion could take place. Therefore, it makes is somewhat difficult to determine mitigation strategies, but Belchertown has some regulations currently in place to mitigate the impacts of a hazardous materials disaster.

**Table 5-8: Existing Hazardous Materials Hazard Mitigation Measures**

| Existing Strategy | | Description | Effectiveness | Potential Changes |
|---|---|---|---|---|
| Zoning By-law | Aquifer Protection District | No hazardous materials permitted within areas delineated as recharge areas for groundwater aquifers. | Very effective for preventing groundwater contamination. | |
| | Industrial Regulations | Many hazardous substances prohibited. Strict regulations storage of any flammable materials; no emission or discharges. | Somewhat effective for preventing haz-mat fire, spill. | |

***Future Mitigation Measures***

Potential changes to the Town's current strategies have been identified in the above table, and these are compiled below:

# 6: PRIORITIZED IMPLEMENTATION SCHEDULE

## Summary of Critical Evaluation

The Belchertown Hazard Mitigation Planning Committee reviewed each of the recommendation future mitigation measures identified, and used the following factors to prioritize mitigation projects:

- Ability to reduce loss of life
- Ability to reduce disaster damage
- Social acceptability
- Ability to complete or be combined w/other actions
- Technical feasibility / potential success
- Impact on the environment
- Administrative workability
- Ability to meet regulations
- Political acceptability
- Ability to save or protect historic structures
- Legal implementation
- Ability to meet other community objectives
- Economic impact
- The duration of its implementation period
- Environmental compatibility

## Project Prioritization

The Belchertown Hazard Mitigation Planning Committee created the following prioritized schedule for implementation of prioritized items. The table lists items in order of priority.

*Note: As additional information becomes available regarding project leadership, timeline, funding sources, and/or cost estimates, the Plan will be reviewed and amended accordingly.*

| Table 6.1: Prioritized Implementation Schedule – Action Plan | | | | | |
|---|---|---|---|---|---|
| **Priority** | **Mitigation Action** | **Responsible Department/Board** | **Proposed Completion Date** | **Funding Source/ Estimated Cost** | **Incorporation into Existing Plans** |
| 1 | Address high priority dams, esp. those in Bondsville that appear to be an imminent threat. | DPW | 2010 | unknown | CEMP, Master Plan |
| 2 | Identify sources of funding for dam safety inspections | DPW | 2010 | Integrate into existing budget | CEMP |
| 3 | Replace top priorities on culvert replacement list. | DPW | 2015 | $500,000 | HMGP |
| 4 | Address inappropriate grand-fathered uses in floodplain. | Planning Dept. | 2011 | Integrate into existing budget | Master Plan |
| 5 | Ensure dam owners realize their responsibility to inspect the dams regularly. | DPW | 2010 | Integrate into existing budget | CEMP |
| 6 | Educate citizens living in the floodplain about the NFIP. | DPW | 2011 | Integrate into existing budget | CEMP |
| 7 | Implement the goals and strategies of the Belchertown Community Plan dealing with protection of floodplain, forests, waterbodies,and farmland. | Planning Dept. | 2015 | Integrate into existing budget | Master Plan |
| 8 | Seek funding for enforcement of earth removal and site plan regulations. | Planning Dept. | 2012 | Integrate into existing budget | Master Plan |
| 9 | Determine if existing generators at shelters are effective, replace if not effective. | EMD | 2010 | Integrate into existing budget | CEMP |

| | | | | | |
|---|---|---|---|---|---|
| 10 | Increase enforcement of restrictions prohibiting residents from plowing snow into the road. | DPW | 2011 | Integrate into existing budget | Master Plan |
| 11 | 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). | DPW | 2012 | Integrate into existing budget | Master Plan |
| 12 | Participate in the creation of a Regional Debris Management Plan. | DPW, EMD | 2013 | Homeland Security | CEMP, Master Plan |
| 13 | Consider invoking penalties for repeat offenders—illegal burns. | Fire Dept. | 2010 | Integrate into existing budget | CEMP |
| 14 | Evaluate critical facilities to determine if they are earthquake resistant. | DPW | 2015 | Integrate into existing budget | CEMP, Master Plan |
| | | | | | |
| | | | | | |
| | | | | | |
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| | | | | | |

# 7: PLAN ADOPTION & IMPLEMENTATION

## Plan Adoption

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

## Plan Implementation

The implementation of the Belchertown Local Natural Hazards Mitigation Plan will begin following its formal adoption by the Belchertown Board of Selectmen and approval by MEMA and FEMA. Specific town departments and boards will be responsible for ensuring the development of policies, bylaw revisions, and programs as described in Sections 5 and 6 of this plan. The Belchertown Natural Hazards Planning Committee will oversee the implementation of the plan.

## Plan Monitoring and Evaluation

The measure of success of the Belchertown Local Natural Hazards Mitigation Plan will be the number of identified mitigation strategies implemented. In order for the town to become more disaster resilient and better equipped to respond to natural disasters, there must be a coordinated effort between elected officials, appointed bodies, town employees, regional and state agencies involved in disaster mitigation, and the general public.

The Belchertown Natural Hazards Planning Committee will meet on an annual basis or as needed (i.e., following a natural disaster) to monitor the progress of implementation, evaluate the success or failure of implemented recommendations, and brainstorm strategies to remove obstacles to implementation. Those parties noted in Section 6 of the plan, all of whom have a representative on the Belchertown Natural Hazards Planning Committee, will be responsible for seeing that the actions are implemented and will report on their progress at the annual plan review meetings. The recommendations in this plan will be integrated into existing plans as appropriate.

Outreach to the public, surrounding communities, agencies, businesses, academia, non-profits, or other interested parties outside of the town of Belchertown will be done in advance of each annual meeting in order to solicit their participation in assessment of the plan. Following these discussions, it is anticipated that the committee may decide to reassign the roles and responsibilities for implementing mitigation strategies to different town departments and/or revise the goals and objectives contained in the plan. At a minimum, the committee will review and update the plan every five years,

beginning in the fall of 2013. The meetings of the committee will be organized and facilitated by the Emergency Management Director or the Belchertown Board of Selectmen.

The approved Westhampton Hazard Mitigation Plan will be available for public review at the Town Hall, the public library and at the PVPC offices for ongoing public review and comment.

CERTIFICATE OF ADOPTION

TOWN OF BELCHERTOWN, MASSACHUSETTS

BOARD OF SELECTMEN

A RESOLUTION ADOPTING THE BELCHERTOWN

NATURAL 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 February and June 2009 regarding the development and 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 Board of Selectmen on _____, 2009 to formally approve and adopt the Belchertown Hazard Mitigation Plan.

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

ADOPTED AND SIGNED this _____, 2009.

_____, Chair
Belchertown Board of Selectmen

Belchertown Board of Selectmen

Belchertown Board of Selectmen

ATTEST

# APPENDICES

## Appendix A – Technical Resources

### 1) Agencies

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

### 2) Mitigation Funding Resources

404 Hazard Mitigation Grant Program (HMGP) .....Massachusetts Emergency Management Agency
406 Public Assistance and Hazard Mitigation .....Massachusetts Emergency Management Agency

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

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

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

## 3) Internet Resources

| Sponsor | Internet Address | Summary of Contents |
|---|---|---|
| Natural Hazards Research Center, U. of Colorado | http://www.colorado.edu/litbase/ha zards/ | Searchable database of references and links to many disaster-related websites. |
| Atlantic Hurricane Tracking Data by Year | http://wxp.eas.purdue.edu/hurricane | Hurricane track maps for each year, 1886 – 1996 |
| National Emergency Management Association | http://nemaweb.org | Association of state emergency management directors; list of mitigation projects. |
| NASA – Goddard Space Flight Center "Disaster Finder: | http://www.gsfc.nasa.gov/ndrd/dis aster/ | Searchable database of sites that encompass a wide |

| | | |
|---|---|---|
| | | range of natural disasters. |
| NASA Natural Disaster Reference Database | http://ltpwww.gsfc.nasa.gov/ndrd/main/html | Searchable database of worldwide natural disasters. |
| U.S. State & Local Gateway | http://www.statelocal.gov/ | General information through the federal-state partnership. |
| National Weather Service | http://nws.noaa.gov/ | Central page for National Weather Warnings, updated every 60 seconds. |
| USGS Real Time Hydrologic Data | http://h20.usgs.gov/public/realtime.html | Provisional hydrological data |
| Dartmouth Flood Observatory | http://www.dartmouth.edu/artsci/g eog/floods/ | Observations of flooding situations. |
| FEMA, National Flood Insurance Program, Community Status Book | http://www.fema.gov/fema/csb.html | Searchable site for access of Community Status Books |
| Florida State University Atlantic Hurricane Site | http://www.met.fsu.edu/explores/tropical.html | Tracking and NWS warnings for Atlantic Hurricanes and other links |
| The Tornado Project Online | http://www.tornadoroject.com/ | Information on tornadoes, including details of recent impacts. |
| National Severe Storms Laboratory | http://www.nssl.uoknor.edu/ | Information about and tracking of severe storms. |
| Independent Insurance Agents of America IIAA Natural Disaster Risk Map | http://www.iiaa.iix.com/ndcmap.html | A multi-disaster risk map. |
| Earth Satellite Corporation | http://www.earthsat.com/ | Flood risk maps searchable by state. |
| USDA Forest Service Web | http://www.fs.fed.us/land | Information on forest fires and land management. |

## Appendix B – List of Acronyms

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

# Appendix C – Natural Hazard Profiling Methodology[4]

In order to adeptly profile each of the hazards, a Hazard Identification and Analysis Matrix was prepared to organize the information that was gathered for this project.

The matrix is organized into the following sections: Type of Hazard, Location of Occurrence, Extent of Impacts, Previous Occurrences, Probability of Future Occurrence, and Hazard Index. The Hazard Index was completed to rank the hazards according to the frequency of occurrence and the amount of potential damage likely to occur. The Hazard Index forms the basis for concentrating the future mitigation efforts outlined in this plan. A description of each of the matrix categories is provided below. The completed Matrix is shown as Table 3.1 (Section 3).

***Location of Occurrence***

The classifications are based on the area of the Town of Belchertown that would potentially be affected by the hazard. The following scale was used:

**Table C.1: Location of Occurrence, Percentage of Town Impacted of Given Natural Hazard**

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

***Extent of Impacts***

The extent of direct impacts an affected area could potentially suffer were classified according to the following scale:

**Table C.2: Extent of Impacts, Magnitude of Multiple Impacts of Given Natural Hazard**

| Extent of 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. |

***Previous Occurrences***

Whether or not previous hazard events had occurred is also included, with detailed descriptions of specific previous occurrences within the hazard identification and vulnerability assessments, if necessary.

***Probability of Future Occurrence***

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

**Table C.3: Frequency of Occurrence and Annual Probability of Given Natural Hazard**

| Frequency of Occurrence | Probability of Future Event |
|---|---|
| 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 |

***Hazard Index***

The hazard index ratings were determined after assessing the frequency, location and impact classifications for each hazard. The hazard index ratings are based on a scale of 1 (highest risk) through 5 (lowest 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.

The Hazard Ratings are labeled as follows:

1 – High Risk
2 – Medium-High Risk
3 – Medium Risk
4 – Medium Low Risk
5 – Low Risk

## Appendix D – Past & Potential Hazards/Critical Facilities Map

# Appendix E – Documentation of the Planning Process

**Belchertown Hazard Mitigation Planning Committee**
**Meeting #1 February , 2009 ___ pm**
**Belchertown Town Offices**
**AGENDA**

**1) Introduction & Purpose of Committee**

**2) What is Hazard Mitigation Planning?**

**3) Begin Review of Draft Plan**

**4) Identify Critical Facilities** (to be shown on Base map)

- Identify Critical Facilities on Base Map. The following list contains items that should be clearly identified on the map, as they apply to your community:

| | |
|---|---|
| - Emergency Operations Center | - Nursing Homes |
| - Emergency Fuel Facilities | - Elderly Housing |
| - Town/City Hall | - Day-Care Facilities |
| - Police Station | - Correctional Facilities |
| - Fire Station | - Other Congregate Care Facilities |
| - Public Works Garages | - Shelters |
| - Water Treatment Facilities | - Special Needs Populations |
| - Sewage Treatment Plants | - Hazardous Materials Facilities |
| - Water Tower/Supply Pumps | - Access Roads to Critical Facilities |
| - Power Plants | - Evacuation Routes |
| - Electrical Power Substations | - Unique or Historic Resources |
| - Schools | - Commercial Economic Impact Areas |
| - Major Highways and Roadways | - Socio-Economic Impact Areas |
| - Bridges | - Areas with Second Language Needs |
| - Dams | - Hospitals |

**and Evacuation Routes Potentially Affected By Hazard Areas**

**5. Hazards Analysis Methodology**

- Identify Past Hazard Occurrences, Location and Damage Assessments
- Hazard Identification and Analysis Worksheet

**6. Analyze Development Trends**

Review local zoning districts. Identify planned and proposed subdivisions and other common developments. Is planned development at risk by natural hazards? Are there mitigation measures that can be taken to prevent loss of life, property damage, and disruption of governmental services and general business activities.

**7. Review Vulnerability Assessment Methodology and Potential Loss Estimates**

**8. Schedule and Agenda for next meeting**

**TOWN CLERK: Please Post this notice per M.G. L. Chapter 39, Section 23, A-C**

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**Belchertown Hazard Mitigation Planning Committee**
**Meeting #2, March 26, 2009, 2 pm**
**Belchertown Town Offices**
**AGENDA**

**1. Finalize Critical Facilities and Evacuation Routes Potentially Affected By Hazard Areas**

**2. Review Vulnerability Assessment Methodology and Potential Loss Estimates**

**3. Establish Mitigation Goals and Objectives**

**4. Schedule and Agenda for next meeting**

**TOWN CLERK: Please Post this notice per M.G. L. Chapter 39, Section 23, A-C**

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**Belchertown Hazard Mitigation Planning Committee**
**Meeting #3**
**May 12, 2009 2 pm**
**Belchertown Town Offices**
**AGENDA**

1. **Finalize Revised Map of Critical Facilities**
2. **Final Review of plan**
3. **Affirm Action Plan of Hazard Mitigation Strategies**
4. **Review Plan Adoption and Implementation**

**CITY CLERK: Please Post this notice per M.G. L. Chapter 39, Section 23B**

# Appendix F – Public Outreach

**PRESS RELEASE**

CONTACT: Catherine Miller, Pioneer Valley Planning Commission, (413) 781-6045

FOR IMMEDIATE RELEASE
December 14, 2007

**Pre-Disaster Mitigation Plans Under Development**

The Pioneer Valley Planning Commission is beginning the process of drafting pre-disaster mitigation plans for the Communities of Amherst, **Belchertown**, Brimfield, Chicopee, Cummington, Goshen, Granby, Huntington, Palmer, Southampton, Springfield, Westfield, West Springfield, Westhampton, Williamsburg, and Worthington.

This planning effort is being undertaken to help communities assess the risks they face 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.

Individuals interested in their community's Hazard Mitigation plan can contact PVPC to request information on their community's plan development. In 2006-2007, PVPC facilitated development of plans for 16 communities in Hampshire and Hampden counties. Following completion of this second round of 16 hazard mitigation plans, PVPC will be developing a regional Hazard Mitigation plan. Communities with approved plans will be eligible for Hazard Mitigation Grant Program funding from the Massachusetts Emergency Management Agency.

These pre-disaster mitigation plans are being developed with assistance from the Pioneer Valley Planning Commission with funding provided by the Massachusetts Emergency Management Agency. For additional information, please contact Catherine Miller at (413) 781-6045 or cmiller@pvpc.org.

**PRESS RELEASE**

CONTACT: Catherine Miller, Pioneer Valley Planning Commission, (413) 781-6045

FOR IMMEDIATE RELEASE
June 30, 2008

**Pre-Disaster Mitigation Plans Public Comment Period**

The Pioneer Valley Planning Commission, in conjunction with local Hazard Mitigation Planning Committees, has produced drafts of Pre-disaster Mitigation Plans for the communities of Cummington, Palmer, Southampton, Westfield and Westhampton. Residents, business owners and other concerned parties of the named municipalities as well as of adjacent communities are encouraged to comment on each and all of the plans. The plans are currently able to be viewed on the Pioneer Valley Planning Commission website (under Projects and Plans) and the websites of the municipalities, where possible. Paper copies of the plans may be obtained at the Pioneer Valley Planning Commission offices at 26 Central Street, West Springfield or at the individual City/Town Halls. The plans will be available for the next 30 days.

Over the upcoming months pre-disaster mitigation plans will be developed for Amherst, **Belchertown**, Brimfield, Chicopee, Goshen, Granby, Huntington, Springfield, West Springfield, Williamsburg, and Worthington and will also be available for public comment as they are developed.

This planning effort is being undertaken to help communities assess the risks they face 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.

In 2006-2007, PVPC facilitated development of plans for 16 communities in Hampshire and Hampden counties. Following completion of this second round of 16 hazard mitigation plans, PVPC will be developing a regional Hazard Mitigation plan. Communities with approved plans are eligible for Hazard Mitigation Grant Program funding from the Massachusetts Emergency Management Agency.

These pre-disaster mitigation plans are being developed with assistance from the Pioneer Valley Planning Commission with funding provided by the Massachusetts Emergency Management Agency. For additional information, please contact Catherine Miller at (413) 781-6045 or cmiller@pvpc.org.

Catalyst for Regional Progress

PVPC

Timothy W. Brennan, Executive Director

**PRESS RELEASE**

CONTACT: Catherine Miller, Pioneer Valley Planning Commission, (413) 781-6045

FOR IMMEDIATE RELEASE
February 5, 2009

**Pre-Disaster Mitigation Plans Public Comment Period**

The Pioneer Valley Planning Commission, in conjunction with local hazard mitigation planning committees, has produced drafts of pre-disaster mitigation plans for the communities of Huntington, Worthington, Granby, and Goshen. Residents, business owners, and other concerned parties of these municipalities and adjacent communities are encouraged to comment on these plans, which are currently available for viewing on PVPC's website at www.pvpc.org (under Projects and Plans) and the websites of the municipalities, where possible. Paper copies of the plans may be obtained at the Pioneer Valley Planning Commission offices at 26 Central Street, West Springfield or at the individual city and town halls. The plans will be available for the next 30 days.

Starting this month pre-disaster mitigation plans will be developed for Amherst, **Belchertown**, Brimfield, Chicopee, Springfield, West Springfield, and Williamsburg, and will also be available for public comment as they are developed.

This planning effort is being undertaken to help communities assess the risks they face 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.

PVPC has previously facilitated development of plans for 21 communities in the Hampshire and Hampden county areas. Following completion of all 32 local hazard mitigation plans, PVPC will be developing a regional hazard mitigation plan. Communities with approved plans are eligible for Hazard Mitigation Grant Program funding from the Massachusetts Emergency Management Agency.

These pre-disaster mitigation plans are being developed with assistance from the Pioneer Valley Planning Commission with funding provided by the Massachusetts Emergency Management Agency. For additional information, please contact PVPC's Catherine Miller at (413) 781-6045 or cmiller@pvpc.org.

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