CITY OF EASTHAMPTON
HAZARD MITIGATION PLAN

Adopted by the Mayor of Easthampton on _____

Prepared by:

Easthampton Hazard Mitigation Committee

and

Pioneer Valley Planning Commission
60 Congress Street First Floor
Springfield MA 01104
(413) 781-6045
www.pvpc.org

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

Table of Contents

Acknowledgements

Thanks to the Easthampton Hazard Mitigation Committee for their work updating the City's 2009 Hazard Mitigation plan.

Mayor Karen Cadieux - mayor@easthampton.org

City Planner, Jessica Allan - allanj@easthampton.org

DPW Director, Joseph Pipczynski - joepip@easthampton.org

Thanks also to the Massachusetts Emergency Management Agency (MEMA) for developing the Commonwealth of Massachusetts Hazard Mitigation Plan, (www.state.ma.us/dem/programs/mitigate/index.htm) which served as a model for this plan and to the Pioneer Valley Planning Commission for their assistance in securing funding for the City to update this plan and for their assistance in facilitating the plan update.

1: PLANNING PROCESS

Introduction

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

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

Preparing a hazard mitigation plan before a disaster saves communities money and facilitates post-disaster funding. Costly repairs or replacement of buildings and infrastructure, as well as the high cost of providing emergency services and rescue/recovery operations, can be avoided or significantly lessened if a community implements the mitigation measures detailed in their plan.

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

Hazard Mitigation Committee

Planning for hazard mitigation in Easthampton involved a three member committee comprised of Mayor Karen Cadieux - mayor@easthampton.org, City Planner, Jessica Allan - allanj@easthampton.org , and DPW Director, Joseph Pipczynski - joepip@easthampton.org. The committee represents City government and the members engaged their colleagues in the local hazard mitigation planning process.

The hazard mitigation planning process for the City included the following tasks:

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

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

Committee Meetings

Meetings of the Hazard Mitigation Committee, which took place at the Municipal Building, 50 Payson Ave, were held on the dates listed below.

January 20, 2015
Overview of hazard mitigation planning, identification and organizing of the planning team, identification of critical facilities, discussion of hazard identification and risk assessment, and review of existing mitigation strategies undertaken by the City.

February 10, 2015
Re-visitation of critical facilities, discussion of history of natural hazard events, and discussion of potential mitigation strategies to be implemented. Reviewing of draft prioritized list of mitigation strategies, based on conversation at previous meeting.

February 24, 2015
Finalization of prioritized implementation strategies, discussion of the plan adoption process and procedures for regular maintenance of the plan.

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

Participation by Public and Neighboring Communities

Two public planning sessions were held as part of the development of the Easthampton plan – on February 10 and 24, 2015. Both meetings occurred after the Hazard Mitigation Committee had provided input on hazards and mitigation strategies relevant to the community. Notice of both public meetings was posted at Easthampton City Hall in compliance with the Commonwealth of Massachusetts' open meeting law. Public meeting agendas and notices can be found in Appendix B.

On January 29 the Pioneer Valley Planning Commission sent a press release to all area media outlets announcing that the hazard mitigation planning process was underway and that the first public outreach meeting would be held on February 10. On February 19, 2015 PVPC sent out another press release stating that the second public outreach meeting would take place on February 24, 2015 and that a draft of the final plan had been placed on PVPC's website. Appendix B includes a screen capture of the PVPC website where the plan was available for download. The press release also indicated that hard copies of the plan were available at PVPC's offices and at Easthampton City Hall, and that all residents, businesses and other concerned parties of Easthampton were encouraged to comment on the plan by e-mailing or calling staff contacts at PVPC or the City.

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

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

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

Local Adoption

In 2011, the Easthampton Mayor agreed to begin the process of updating the city's Hazard Mitigation Plan. After the plan was provisionally approved by FEMA in 2015, the City Council discussed the plan at its regular meeting on ____ and voted to adopt it.

2: LOCAL PROFILE

Community Setting

Geography

Easthampton is located in Hampshire County within the Pioneer Valley region. It is bordered on the north by Easthampton, on the west by Westhampton, on the west and south by Southampton, and on the east by Holyoke. Easthampton is close to the urbanized core of the Springfield metropolitan area.

Population Characteristics

According to the 2010 U.S. Census, there are 16,053 Easthampton residents and a total of 7,635 housing units. The median household income is $55,621 with 5.8 percent of residents below the poverty (American Community Survey 2008-12).

Economy

Easthampton residents travel an average of 22.2 minutes to work each day (ACS 2008-12). As of September 2014, the approximate labor force is 9,321 and the unemployment rate was 5.6 percent, below the state unemployment rate of 6.2 percent.

Climate

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

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

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

Extreme rainfall is a cause of flooding, which is a major concern of this plan. In the last five years, there has also been an increased occurrence of tornadoes and large storms that generate strong wind gusts. A microburst occurred in Easthampton on October 8, 2014.

Infrastructure

Roads and Highways

Major transportation routes include Interstate 91, Route 10, Route 5, and Route 141. Route 10, or Easthampton Street, travels southwest from the Easthampton city line into neighboring Southampton. Route 141, also called Holyoke Street or Mountain Road, begins in the center of the city and bisects the city north to south. Interstate 91 and Route 5 travel north-south and parallel the Connecticut River.

Rail

Pan Am Railways operates a north-south line which travels through city, mostly along Route 5. Restoration of passenger rail service along this line is scheduled for 2015, though there will not be a station stop in Easthampton.

Public Transportation

Within Easthampton, there is both fixed route transit service, provided by the Pioneer Valley Transit Authority (PVTA), and door-to-door accessible van service (paratransit) for elderly and disabled residents.

Water and Sewer

The City of Easthampton provides public water and sewer service. The Barnes Aquifer is a sole source aquifer supplying drinking water to Easthampton through five active wells: the Nonotuck Park well, the Brook Street well, the Hendrick wellfield and Pines well off Hendrick Street, and the Maloney well off of Lovefield Street. The Nonotuck Park well and Brook Street wells are high quality sources that are pure enough to enter the distribution system without any treatment or chemical additions. As of 2014, they account for about 50 percent of the total daily supply. Water from the Pines well and the Hendrick wellfield are treated using packed tower aeration technology.

Natural Resources

Watersheds

Easthampton is part of the Connecticut River Watershed and more specifically, the Manhan River subwatershed. In Easthampton, the Manhan River is the main tributary stream to the Connecticut River. The North Branch of the Manhan, Hannum Brook, and Basset Brook flow into the Manhan from the north. From the south, Broad Brook, White Brook, Wilton Brook and Brickyard Brook flow into a series of man-made ponds in the center of city. These waters eventually reach the Manhan River about a mile above where it empties into the Oxbow and Connecticut River.

Surface Waters

The pond system in Easthampton was created to supply industrial waterpower. There are three distinct waterbodies:

- Nashawannuck Pond, which receives water from the Broad, Wilton and White Brook watersheds
- Upper Mill Pond or Rubber Thread Pond, which is fed by the Wilton Brook
- Lower Mill Pond, which drains tributaries to the Manhan River and is fed by the Plum and Brickyard Brook watersheds

The high rates of development and corresponding increase in impervious surfaces in the Nashawannuck Pond watershed have led, over the years, to water quality and aesthetic problems with the Pond, though many existing mitigation measures have been put in place to control these problems.

Aquifer Recharge Areas

A delineation of the Zone II area was completed for the Hendrick St. wellfield. A Zone II area is defined by the Massachusetts Department of Environmental Protection as the area of an aquifer which contributes water to a well under the most severe pumping and recharge conditions that can be realistically anticipated. This delineation serves as the foundation for the City's Aquifer Protection Overlay Zone, which restricts development in that area.

Wetlands

The bulk of wetlands in Easthampton are the floodplains of the Manhan River. There are also pockets of wetlands scattered throughout the city, including marshes and shrub swamps off of Florence Road, around Bassett Brook, and the Oxbow. These wetlands and floodplains are important for their natural resource and their economic value to the community. They provide flood storage, pollution filtration, and habitat for wildlife. Development on wetlands and flood plains impairs their function and causes costly and sometimes irreparable damage to people, property, and wildlife. Vernal pools, temporary pools of water which form in the spring and usually dry up in the summer, are another important wetland resource. They are particularly important habitat for amphibians. Few vernal pools have been certified in Easthampton, leaving these resources vulnerable to impacts as they may not be easily identified during other seasons of the year.

Forest

Forests once covered the area, but were harvested and cleared in the late 1700s to make way for farming. The slopes of the Mount Tom Range, the protected lands of the New England Forestry Foundation, and stretches of land along the Manhan River are currently the largest areas of forested land in Easthampton. In 1999, there were approximately 3690 acres of forest in Easthampton, according to state land use data. The microburst of October 2014 caused significant damage to trees along Hendricks Street and possible changes to the micro-climate as a result of the microburst is being assessed.

Development

Zoning

Easthampton has 11 base zoning districts and 4 overlay districts. The base districts define the allowed uses and dimensional requirements in all parts of the city, while the overlay districts provide for additional restrictions in certain areas. The zoning districts are as follows:

- Residential - Rural A (R-80): Single family, aquifer district
- Residential - Rural B (R-40): Single family, aquifer district
- Residential - Rural C (R-35): Single family
- Residential - Suburban A (R-15): Single and 2 family
- Residential - Suburban B (R-10): Single and 2 family
- Residential – Urban (R-5): Multifamily
- Downtown Business (DB): Commercial, mixed
- Highway Business (HB): Commercial, planned mixed
- Neighborhood Business (NB): Mixed
- Industrial (I): Industrial
- Mixed Use/Mill Industrial (MI): Mixed
- Aquifer Protection District (AP): Overlay district that protects aquifer
- Floodplain and Manhan River Protection Districts (FL): Overlay district that protect floodplain areas around the Manhan River
- Wireless Communications Services District (WCSD): Overlay district addressing industrial, business and city owned land for telecommunications
- Smart Growth Zoning Overlay District (SGZD): Overlay district that encourages smart growth and create affordable housing for all ages and incomes

Current Development Trends

Approximately 17 percent of Easthampton's land is permanently protected. Approximately 35 percent of the land is forested, most of which is fragmented, except near the eastern border where Mt. Tom State Reservation is located and in the northwestern corner of the city. Most parts of Easthampton are at least partially developed, with the most concentrated development adjacent to Routes 10 and 141. The least developed areas, located near the northern and eastern borders, are undeveloped primarily because of steep slopes, streams and wetlands, or protected lands.

Commercial development is primarily located along the major transportation spines: from Route 141 to Cottage and Union Streets terminating at the downtown center at Main Street, and along Route 10 connecting to Easthampton. Housing choices range from apartments to single family homes in rural settings. Easthampton continues to have a significant manufacturing and industrial base compared to its more agrarian neighbors. The arts and cultural scene has flourished in recent years, attracting artists and small entrepreneurs.

According to Census Building Permit Data, after a building boom from 2005 to 2007 during which an average of 70 construction permits were issued per year, development has slowed in the past 5 years.

The average number of building permits issued annually from 2008 to 2012 was fewer than 10. In 2013, 14 building permits were issued.

National Flood Insurance Program

Easthampton is a participating member of the National Flood Insurance Program, and had the following NFIP policy and claim statistics as of 2014.

- Food Insurance Maps (FIRMs) are used for flood insurance purposes and are on file with the Easthampton Planning Board.
- FIRMs have been effective since August 15, 1979, with no updates since this date.
- Easthampton has 25 in-force policies in effect for a total of $ 5,087,600 worth of insurance.
- There have been a total of 27 NFIP claims for which $477,873 has been paid.
- There are five homes defined as "Repetitive Loss Properties" insured under the NFIP within Easthampton, all located near the Oxbow of the Connecticut River.

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

3: HAZARD IDENTIFICATION AND RISK ASSESSMENT

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

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

Natural Hazard Analysis Methodology

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

Hazard Description

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

Location

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

Location of Occurrence, Percentage of City Impacted by Given Natural Hazard	
Location of Occurrence	**Percentage of City Impacted**
Large	More than 50% affected
Medium	10 to 50% affected
Small	Less than 10% affected

Extent

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

Previous Occurrences

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

Probability of Future Events

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

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

Impact

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

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.

Vulnerability

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

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

The ranking is qualitative and is based, in part, on local knowledge of past experiences with each type of hazard. The size and impacts of a natural hazard can be unpredictable. However; many of the mitigation strategies currently in place and many of those proposed for implementation can be applied to the expected natural hazards, regardless of their unpredictability.

Hazard Identification and Analysis Worksheet for Easthampton

Type of Hazard	Location of Occurrence	Probability of Future Events	Impact	Hazard Risk Index Rating
Floods	Small	Very High	Limited	3 – Medium Risk
Severe Snowstorms / Ice Storms	Large	Moderate	Limited	3 – Medium Risk
Hurricanes	Large	Low	Critical	2 – High Risk
Severe Thunderstorms	Large	Moderate	Minor	2 – High Risk
Wind	Large	Moderate	Critical	2 - High Risk
Tornadoes / Microburst	Large	Low	Limited	2 - High Risk
Wildfires / Brushfires	Small	Very High	Minor	5 – Very Low Risk
Earthquakes	Large	Very Low	Minor	5 - Very Low Risk
Dam Failure	Small	Very Low	Minor	5 - Very Low Risk
Drought	Large	Low	Minor	5 - Very Low Risk

Floods

Hazard Description

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

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

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

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

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

Location

There are approximately 722 acres of land within the FEMA mapped 100-year floodplain and 172 acres of land within the 500-year floodplain within the City of Easthampton.

The 100-year flood zone covers mostly narrow bands of level floodplain land along the Manhan River (Main and North Branch), Basset Brook, Broad Brook, the Connecticut River, Nashawannuck Pond, and Lower Mill Pond. In several areas, the flood zone widens to encompass farmland, some residential land, and industrial lands.

In addition to the FEMA designated floodplain, the Hazard Mitigation Committee has identified the following specific areas that are in the 100-year floodplain and most prone to flooding on a regular basis.

- **Lower Fort Hill Road**, near the confluence of the Manhan River and the Oxbow of the Connecticut River
- **West Street**, adjacent to the confluence of the Hannum Brook and the Manhan River
- **Meadowbrook Drive**, parallel to the Manhan River floodplain
- **River Street**, adjacent to the Oxbow of the Connecticut River

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

Extent

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

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

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

The average annual precipitation for Easthampton and surrounding areas in western Massachusetts is 46 inches.

Previous Occurrences

Flooding at Lower Fort Road, West Street, and Meadowbrook Drive occur on an annual basis.

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

> **Action Stage** - the stage which, when reached by a rising stream, represents the level where the NWS or a partner/user needs to take some type of mitigation action in preparation for possible significant hydrologic activity. The type of action taken varies for each gage location. Gage data should be closely monitored by any affected people if the stage is above action stage.
>
> **Minor Flooding** is defined to have minimal or no property damage, but possibly some public threat. A Flood Advisory product is issued to advise the public of flood events that are expected not to exceed the minor flood category. Examples of conditions that would be considered minor flooding include:

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

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

- several buildings flooded with minor or moderate damage
- various types of infrastructure rendered temporarily useless (i.e. fuel tanks cannot be reached due to high water, roads flooded that have no alternates, generator station flooded)
- elders and those living in the lowest parts of the village are evacuated to higher ground
- access to the airstrip is cut off or requires a boat
- water over the road is deep enough to make driving unsafe
- gravel roads likely eroded due to current moving over them
- widespread flooding, but not deep enough to float ice chunks through the community
- water deep enough to make life difficult, normal life is disrupted and some hardship is endured
- airstrip closed
- travel is most likely restricted to boats

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

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

The major flood stage for the Connecticut River at the Northampton station is 120 feet, which has been reached three times since 1935. The moderate flood stage is 115 feet, which has been reached 16 times

since 1935. The minor flood stage is 112 feet, which has been reached 60 times since 1935. The action stage is 110 feet, which has been reached 11 times since 1935.

Historical Crests of the Connecticut River in Northampton, Directly Upstream from Easthampton

3/19/36	129.4 ft	Major flooding
9/22/38	125 ft	Major flooding
5/31/84	120.8 ft	Major flooding
4/6/60	119.9 ft	Moderate flooding
1/1/49	118.6 ft	Moderate flooding
4/1/87	118 ft	Moderate flooding
3/23/48	117.7 ft	Moderate flooding
3/29/53	117.6 ft	Moderate flooding
8/30/11	117.16 ft	Moderate flooding
5/5/40	117 ft	Moderate flooding
10/9/05	116.3 ft	Moderate flooding
3/15/77	116.2 ft	Moderate flooding
6/3/52	116 ft	Moderate flooding
4/3/76	115.7 ft	Moderate flooding
4/23/69	115.5 ft	Moderate flooding
4/1/51	115.4 ft	Moderate flooding
4/24/58	115.3 ft	Moderate flooding
3/24/68	115.2 ft	Moderate flooding
5/1/56	115 ft	Moderate flooding
7/2/73	114.9 ft	Minor flooding
4/7/52	114.8 ft	Minor flooding
4/19/82	114.8 ft	Minor flooding
3/27/79	114.6 ft	Minor flooding
4/4/05	114.6 ft	Minor flooding
3/19/73	114.6 ft	Minor flooding
4/17/96	114.6 ft	Minor flooding
4/1/98	114.6 ft	Minor flooding
4/17/07	114.5 ft	Minor flooding
12/16/83	114.5 ft	Minor flooding
4/18/94	114.4 ft	Minor flooding
4/13/47	114.4 ft	Minor flooding
4/5/59	114.3 ft	Minor flooding
4/24/01	114.3 ft	Minor flooding
12/22/73	114.2 ft	Minor flooding
5/14/96	114.2 ft	Minor flooding
2/26/81	114.2 ft	Minor flooding
4/2/62	114.1 ft	Minor flooding

4/2/04	114 ft	Minor flooding
4/2/77	114 ft	Minor flooding
3/18/90	113.9 ft	Minor flooding
5/6/72	113.9 ft	Minor flooding
1/19/06	113.7 ft	Minor flooding
4/8/84	113.7 ft	Minor flooding
3/22/45	113.5 ft	Minor flooding
4/1/86	113.5 ft	Minor flooding
4/1/93	113.5 ft	Minor flooding
4/14/11	113.46 ft	Minor flooding
11/30/59	113.4 ft	Minor flooding
3/29/76	113.4 ft	Minor flooding
4/17/93	113.4 ft	Minor flooding
4/21/72	113.3 ft	Minor flooding
10/30/03	113.2 ft	Minor flooding
4/17/14	113.12 ft	Minor flooding
3/31/03	113 ft	Minor flooding
10/27/05	113 ft	Minor flooding
1/10/98	112.9 ft	Minor flooding
4/15/08	112.9 ft	Minor flooding
4/18/11	112.81 ft	Minor flooding
4/17/55	112.8 ft	Minor flooding
3/31/10	112.8 ft	Minor flooding
9/8/11	112.7 ft	Minor flooding
4/6/50	112.7 ft	Minor flooding
9/8/11	112.7 ft	Minor flooding
10/21/75	112.6 ft	Minor flooding
4/4/67	112.5 ft	Minor flooding
5/26/79	112.5 ft	Minor flooding
5/7/89	112.5 ft	Minor flooding
4/16/64	112.4 ft	Minor flooding
4/8/89	112.4 ft	Minor flooding
1/28/96	112.4 ft	Minor flooding
12/19/00	112.4 ft	Minor flooding
4/4/63	112.4 ft	Minor flooding
5/5/71	112.2 ft	Minor flooding
4/6/74	112.2 ft	Minor flooding

3/24/10	112.2 ft	Minor flooding
4/26/70	112.1 ft	Minor flooding
8/20/55	112 ft	Minor flooding
4/11/80	112 ft	Minor flooding
4/19/54	112 ft	Minor flooding
12/13/08	111.9 ft	Action Stage
4/5/90	111.8 ft	Action Stage
4/6/00	111.8 ft	Action Stage

5/21/06	111.8 ft	Action Stage
12/1/59	111.8 ft	Action Stage
4/17/02	111.7 ft	Action Stage
12/26/90	111.7 ft	Action Stage
4/30/88	111.6 ft	Action Stage
5/5/83	111.6 ft	Action Stage
4/4/73	111.6 ft	Action Stage
12/26/03	111.5 ft	Action Stage

Source: National Weather Service

Probability of Future Events

Based upon previous data, there is a very high probability (over 70 percent in any given year) of flash flooding or general flooding occurring in Easthampton.

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

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

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

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

Impact

The City faces a “limited” impact, with 10 percent or more of total area affected, from flooding.

Based on the City's median home value of $231,800 (2008-12 ACS) and an estimated 100 percent of damage to 100 percent of structures affected, the City faces the following estimated impacts from flooding:

- Lower Fort Hill Road - no structures, no impact
- West Street - 2 structures, $463,600
- Meadowbrook Drive - 12 structures, $2,781,600
- River Street - 5 structures, $1,159,000

The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate. Water travels under West Street. Approximately ten years ago the culvert at West Street was re-lined inside because water was decaying the interior.

Vulnerability

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

Severe Snowstorms / Ice Storms

Hazard Description

Severe winter storms can pose a significant risk to property and human life. The rain, freezing rain, ice, snow, cold temperatures and wind associated with these storms can cause the following risks:

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

Location

The entire city of Easthampton is susceptible to severe snowstorms, making the location of occurrence "large," with over 50 percent of land area affected. Easthampton has also had specific problems in the following areas:

- Florence Road
- Ballard Street
- Lyman Street
- O'Neill Street
- East Street
- Line Street, near Phelps Street
- Park Hill Road
- Plain Street
- Oliver Street
- Clark Lane
- Fort Hill Road
- Clapp Street

Extent

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

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

Northeast Snowfall Impact Scale Categories		
Category	**NESIS Value**	**Description**
1	1—2.499	Notable
2	2.5—3.99	Significant
3	4—5.99	Major
4	6—9.99	Crippling
5	10.0+	Extreme

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

Previous Occurrences

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

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

Winter Storms Producing Over 10 inches of Snow in Easthampton, 1958-2014			
Date	**NESIS Value**	**NASIS Category**	**NESIS Classification**
3/12/1993	13.2	5	Extreme
3/2/1960	8.77	4	Crippling
2/15/2003	7.5	4	Crippling
2/2/1961	7.06	4	Crippling
1/21/2005	6.8	4	Crippling
1/19/1978	6.53	4	Crippling
12/25/1969	6.29	4	Crippling
2/10/1983	6.25	4	Crippling
2/14/1958	6.25	4	Crippling
2/5/1978	5.78	3	Major
2/23/2010	5.46	3	Major
2/8/1994	5.39	3	Major
1/9/2011	5.31	3	Major
2/18/1972	4.77	3	Major
12/11/1960	4.53	3	Major
2/7/2013	4.35	3	Major
2/22/1969	4.29	3	Major
1/18/1961	4.04	3	Major
2/8/1969	3.51	2	Significant
2/5/1967	3.5	2	Significant
4/6/1982	3.35	2	Significant
3/4/2013	3.05	2	Significant
3/15/2007	2.54	2	Significant
3/31/1997	2.29	1	Notable
2/2/1995	1.43	1	Notable
1/25/1987	1.19	1	Notable

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

Probability of Future Events

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

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

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

Impact

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

To approximate the potential impact to property and people that could be affected by this hazard, the total value of all property of $1,769,793,000 is used. An estimated 20 percent of damage would occur to 10 percent of structures, resulting in a total of $35,395,860 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Vulnerability

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

Hurricanes

Hazard Description

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

Location

Because of the hazard's regional nature, all of Easthampton is at risk from hurricanes, meaning the location of occurrence is "large," or over 50 percent of land area affected. Ridge tops are more susceptible to wind damage. Areas susceptible to flooding are also likely to be affected by heavy rainfall.

Extent

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

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

Source: National Hurricane Center, 2012

Previous Occurrences

Hurricanes that have affected Easthampton are show in the following table. There is a scientific difference between a hurricane and a super storm. A hurricane has a warm core and a super storm does not.

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

Probability of Future Events

Easthampton's location in western Massachusetts reduces the risk of extremely high winds that are associated with hurricanes, although it can experience some high wind events. Based upon past occurrences, it is reasonable to say that there is a "low" probability of hurricanes in Easthampton, or a 1 to 10 percent probability in the next year.

Impact

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

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

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

To approximate the potential impact to property and people that could be affected by this hazard, the total value of all property of $1,769,793,000 is used. Wind damage of 5 percent to 10 percent of structures would result in an estimated $8,848,965 of damage. Flood damage of 10 percent to 20 percent of structures would result in $35,395,860 of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Vulnerability

Based on the above analysis, Easthampton faces a hazard index rating of “2 - high risk” from hurricanes.

Severe Thunderstorms / Wind / Tornadoes

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

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

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

Location

As per the Massachusetts Hazard Mitigation Plan, the entire city is at risk of high winds, severe thunderstorms, and tornadoes. Because of this, the location of occurrence is “large," with over 50 percent of land area affected.

Extent

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

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

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

Previous Occurrences

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

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

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

A powerful microburst affected Easthampton on October 8th, 2014 that involved winds up to 100 miles per hour. The microburst began on the west side of Mount Tom and moved southwest to northeast along the edge of the range. Several homes lost power and were damaged.

Probability of Future Events

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

Tornado Index for Hampshire County	
Hampshire County	125.73
Massachusetts	87.60
United States	136.45

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

Based upon the available historical record, there is a “low” probability of tornado occurrence, or between a 1 to 10 percent chance, in any given year. There is a "moderate" probability, or 10 to 40 percent chance in any given year, of a severe thunderstorm or wind.

Impact

The impact of an event is determined to be “limited,” with less than 25 percent of all structures in Easthampton impacted.

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

To approximate the potential impact to property that could be affected by severe weather, tornado, or wind, the total value of all property in Easthampton of $1,769,793,000 is used. For a tornado, an estimated 100 percent of damage would occur to 1 percent of structures, resulting in a total of $17,697,930 worth of damage. For a severe thunderstorm or wind, an estimated 20 percent of damage would occur to 10 percent of structures, resulting in a total of $3,539,586 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in these estimates.

Vulnerability

Based on the above assessment, Easthampton has a hazard index rating of “2 - high risk” from severe thunderstorms, winds, and tornadoes.

Wildfire / Brushfire

Hazard Description

Wildfires are typically larger fires, involving full-sized trees as well as meadows and scrublands. Brushfires are uncontrolled fires that occur in meadows and scrublands, but do not involve full-sized trees. Both wildfires fires and brushfires can consume homes, other buildings and/or agricultural resources. FEMA has classifications for 3 different classes of wildfires:

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

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

Location

As of 1999, there were 3690 acres of forested land in Easthampton. The Hazard Mitigation Committee identified the area around Christopher Clark Road, adjacent to Mt. Tom State Reservation, as having the potential to be affected by a wildfire. There are no structures along this road, which has approximately 410 acres of land.

Based on this data, the location of occurrence is deemed to be “small,” with less than 10 percent of land area affected.

Extent

Wildfires can cause widespread damage to the areas that they affect. They can spread very rapidly, depending on local wind speeds and be very difficult to get under control. Fires can last for several hours up to several days. As of 1999, there were 3690 acres of forested land in Easthampton. Easthampton is approximately 35% forestland most of which is fragmented. Certain forested areas in Easthampton cover remote, impassable areas with rugged terrain that present an insurmountable challenge for firefighters. A large wildfire could damage a large proportion of this land mass, including vital watershed lands, in a short period of time. During a period of prolonged drought, this risk would be exacerbated.

There have not been any major wildfires recorded in Easthampton. However, based on other major wildfires that have occurred in western Massachusetts, it is estimated that such a fire would likely destroy around 50 to 500 acres of forested area.

Because of the Microburst in October 2014, there is a significant amount of dead wood now on the mountainside of Hendrick Street and Mountain road.

Previous Occurrences

Easthampton has averaged slightly more than 10 brushfires per year since 2001, which is as far back as specific records are available. No damage to structures or people was associated with these brushfires.

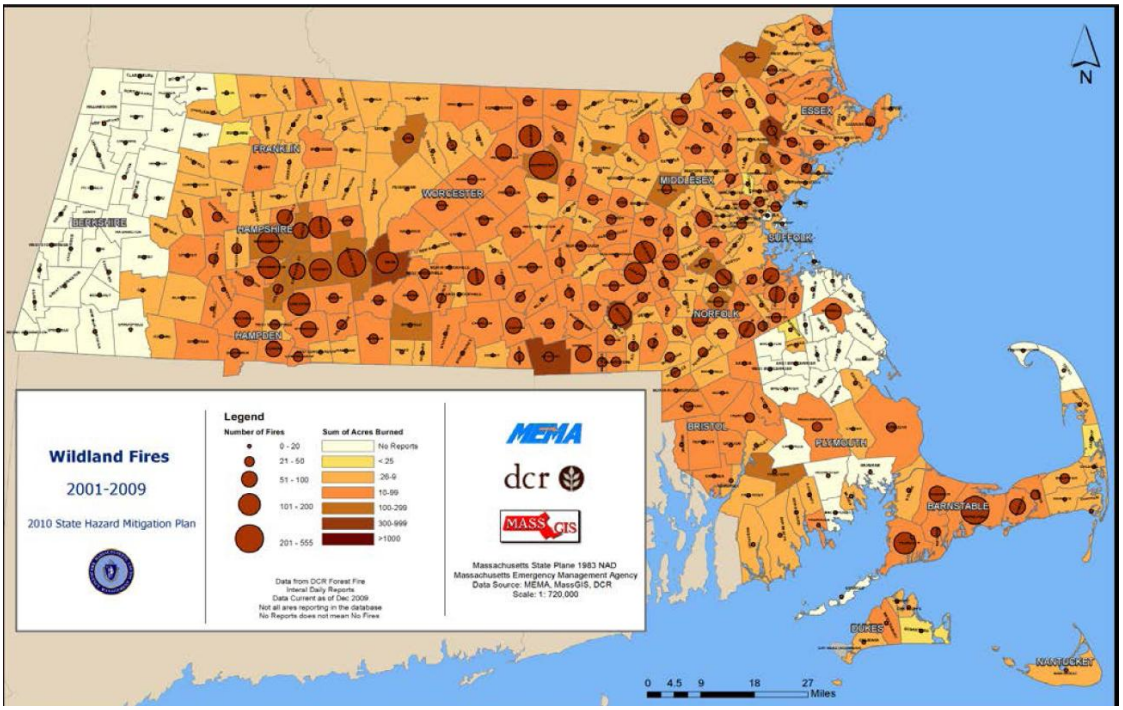
There is no record, recorded or anecdotal, of wildfires in Easthampton. During the past 100 years, there have not been many wildfires occurring in the Pioneer Valley. However, some of the more significant regional wildfires that have occurred in the past 20 years are as follows:

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

Total Fire Incidents in Easthampton	
2008	56
2009	48
2010	52
2011	43
2012	34

Source: Massachusetts Fire Incidence Reporting System, County Profiles, 2012 Fire Data Analysis

Wildland Fires in Massachusetts, 2001-2009



Source: Massachusetts Hazard Mitigation Plan

Probability of Future Events

In accordance with the Massachusetts Hazard Mitigation Plan, the Hazard Mitigation Committee found it is difficult to predict the likelihood of wildfires in a probabilistic manner because the number of variables involved. However, it was agreed upon that there is a “very high” likelihood of a future wildfire event, with a 70 to 100 percent probability in any given year.

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

Impact

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

Vulnerability

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

Earthquakes

Hazard Description

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

Location

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

Extent

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

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

Source: FEMA

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

Source: FEMA

Previous Occurrences

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

Largest Earthquakes Affecting Easthampton, MA, 1924 – 2014		
Location	**Date**	**Magnitude**
Ossipee, NH	December 20, 1940	5.5
Ossipee, NH	December 24, 1940	5.5
Dover-Foxcroft, ME	December 28, 1947	4.5
Kingston, RI	June 10, 1951	4.6
Portland, ME	April 26, 1957	4.7
Middlebury, VT	April 10, 1962	4.2
Near NH Quebec Border, NH	June 15, 1973	4.8
West of Laconia, NH	Jan. 19, 1982	4.5
Plattsburg, NY	April 20, 2002	5.1
Bar Harbor, NH	October 3, 2006	4.2
Hollis Center, ME	October 16, 2012	4.6

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

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

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

Probability of Future Events

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

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

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

Impact

Massachusetts introduced earthquake design requirements into their building code in 1975 and improved building code for seismic reasons in the 1980s. However, these specifications apply only to new buildings or to extensively-modified existing buildings. Buildings, bridges, water supply lines, electrical power lines and facilities built before the 1980s may not have been designed to withstand the forces of an earthquake. The seismic standards have also been upgraded with the 1997 revision of the State Building Code.

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

Vulnerability

Based on this analysis, the hazard index rating for Easthampton is "5 - very low risk" for earthquakes.

Dam Failure

Hazard Description

Dams, levees, and their associated impoundments provide many benefits to a community, such as water supply, recreation, hydroelectric power generation, and flood control. However, they also pose a potential risk to lives and property. Dam or levee failure is not a common occurrence, but dams do represent a potentially disastrous hazard. When a dam fails, the potential energy of the stored water behind the dam is released rapidly. Most dam failures occur when floodwaters above overtop and erode the material components of the dam.

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

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

Location

Easthampton has seven dams located on private and public land. The name and hazard levels of these individual structures are as follows:

Dams in Easthampton	
Dam	**Hazard Level**
Lower Mill Pond Dam	Significant
Nashawannuck Pond Dam	Significant
Easthampton Waterworks Dam	Significant
Brakeys Pool Dam	Low
Coleman Pond Dam	Low
Pine Valley Pool Dam	Low
Williston Academy Pond Dam	Low

A dam failure from the Lower Mill Pond Dam, Nashawannuck Pond Dam, or Easthampton Waterworks Dam is estimated to affect less than 10 percent of the total land area in Easthampton, meaning that the location of occurrence "small."

Extent

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

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

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

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

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

Previous Occurrences

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

Probability of Future Events

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

As described in the Massachusetts Hazard Mitigation Plan, dams are designed partly based on assumptions about a river's flow behavior, expressed as hydrographs. Changes in weather patterns can have significant effects on the hydrograph used for the design of a dam. If the hygrograph changes, it is conceivable that the dam can lose some or all of its designed margin of safety, also known as freeboard. If freeboard is reduced, dam operators may be forced to release increased volumes earlier in a storm cycle in order to maintain the required margins of safety. Such early releases of increased volumes can increase flood potential downstream. Dams are constructed with safety features known as "spillways." Spillways are put in place on dams as a safety measure in the event of the reservoir filling too quickly. Spillway overflow events, often referred to as "design failures," result in increased discharges downstream and increased flooding potential. Although climate change will not increase the probability of catastrophic dam failure, it may increase the probability of design failures.

Impact

The Hazard Mitigation Committee has determined that Easthampton faces a “minor" impact from dam failure, with minimal damage to property occurring.

Vulnerability

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

Drought

Hazard Description

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

Location

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

Extent

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

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

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

Previous Occurrences

In Easthampton, six major droughts have occurred since 1930. They range in severity and length, from three to eight years. In many of these droughts, water-supply systems were found to be inadequate. Water was piped in to urban areas, and water-supply systems were modified to permit withdrawals at lower water levels. The following table indicates previous occurrences of drought since 2000, based on the US Drought Monitor:

Annual Drought Status	
Year	**Maximum Severity**
2000	No drought
2001	D2 conditions in 21% of the state
2002	D2 conditions in 99% of the state
2003	No drought
2004	D0 conditions in 44% of the state
2005	D1 conditions in 7% of the state
2006	D0 conditions in 98% of the state
2007	D1 conditions in 71% of the state
2008	D0 conditions in 57% of the state
2009	D0 conditions in 44% of the state
2010	D1 conditions in 27% of the state
2011	D0 conditions in 0.01% of the state
2012	D2 conditions in 51% of the state

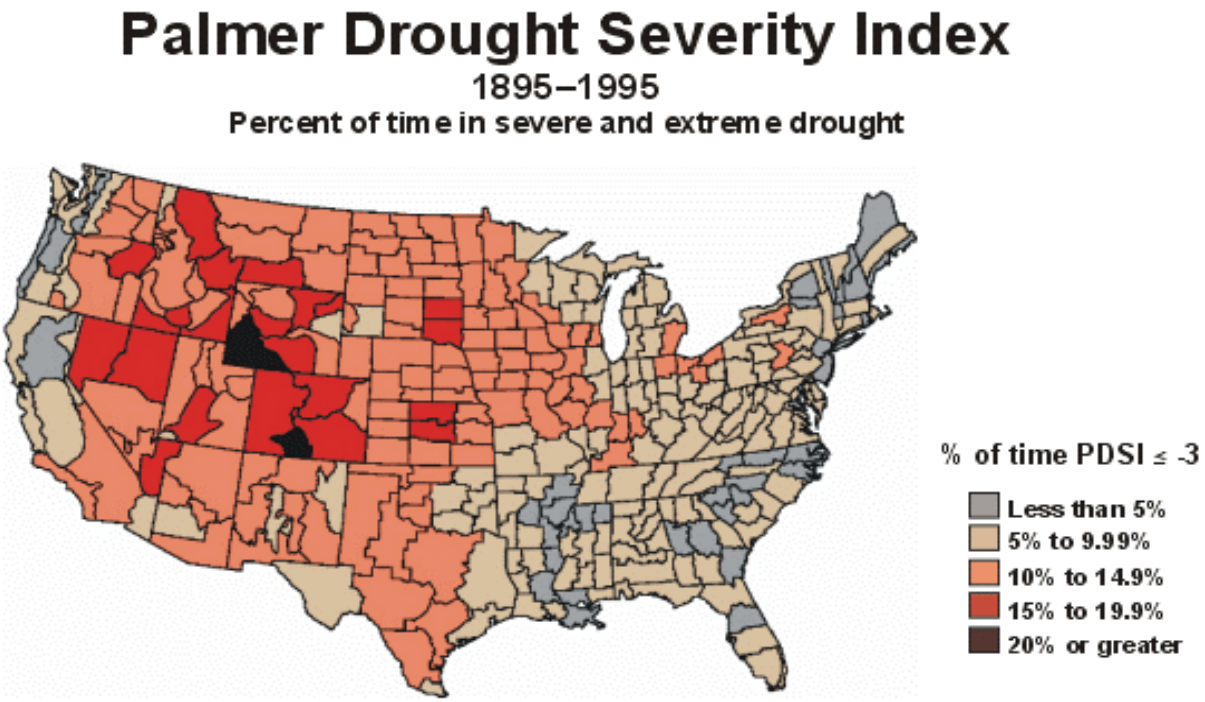
Source: US Drought Monitor

Easthampton has not been impacted by any previous droughts in the state.

Probability of Future Events

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

Based on past events and current criteria outlined in the Massachusetts Drought Management Plan, it appears that western Massachusetts may be more vulnerable than eastern Massachusetts to severe drought conditions. However, many factors, such as water supply sources, population, economic factors (i.e., agriculture based economy), and infrastructure, may affect the severity and length of a drought event. When evaluating the region’s risk for drought on a national level, utilizing a measure called the Palmer Drought Severity Index, Massachusetts is historically in the lowest percentile for severity and risk of drought. However, global warming and climate change may have an effect on drought risk in the region. With the projected temperature increases, some scientists think that the global hydrological cycle will also intensify. This would cause, among other effects, the potential for more severe, longer-lasting droughts.



Impact

Due to the water richness of western Massachusetts, Easthampton is unlikely to be adversely affected by anything other than a major, extended drought. While such a drought would require water saving measures to be implemented, there would be no foreseeable damage to structures or loss of life resulting from the hazard. Because of this, the Hazard Mitigation Committee has determined the impact from this hazard to be "minor," with minimal damage to people and property.

Vulnerability

Based on the above assessment, Easthampton has a hazard index rating of “5 – very low risk” from drought.

Other Hazards

In addition to the hazards identified above, the Hazard Mitigation Committee reviewed the full list of hazards listed in the Massachusetts Hazard Mitigation Plan. Due to the location and context of Easthampton, coastal erosion, landslides, and tsunamis were determined to not be a threat. However, the Hazard Mitigation Committee is concerned about potential landslides on Hendrick Street, East Street and Mountain Road as a result of the microburst in October 2014.

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

4: CRITICAL FACILITIES

Facility Classification

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

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

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

- Facilities needed for emergency response in the event of a hazard event.

- Facilities identified as non-essential and not required in an emergency response event, but which are considered essential for the everyday operation of the city.

- Facilities or institutions that include special populations which would need additional attention in the event of a hazard event.

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

Category 1 – Emergency Response Services

The City 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**
   Public Safety Complex – 32 Payson Avenue

2. **Fire Station**
   Easthampton Fire Department – 32 Payson Avenue

3. **Police Station**
   Easthampton Police Department – 32 Payson Avenue

4. **Highway Garage**
   30 Northampton Street

5. Water Department

Water Treatment Plant – 109 Hendrick Street
Wastewater Treatment Plant – Gosselin Drive

6. Emergency Fuel Stations

30 Rear Northampton Street

7. Emergency Electrical Power Facility

None

8. Emergency Shelters

White Brook Middle School – 200 Park Street
Easthampton High School – 70 Williston Street
Williston-Northampton – 19 Payson Street
Maple Street School – 7 Chapel Street
Pepin School – 4 Park Street
Council on Aging -- 66 Union Street
Easthampton Community Center -- 12 Clark Street
Center Street School – 9 School Street

9. Dry Hydrants - Fire Ponds - Water Sources

None

10. Transfer Station

30 Northampton Street

11. Utilities

Electrical Substations – East Street, Phelps Street
Telephone Switching Station – Railroad Street

12. Helicopter Landing Sites

None

13. Communications

Radio Antennae – Old Water Tower, Ferry Street, Town Hall, 180 Pleasant Street (Mill 180)
Cable Tower – 90 Loudville Road

14. Primary Evacuation Routes

Route 141 (Holyoke Street), Route 10 (Northampton Street), East Street, Loudville Road

15. Bridges Located on Evacuation Routes

Manhan River Bridge, Route 10 (Northampton Street)
Cottage Street Bridge, Route 141
Manhan River Bridge, Loudville Road

Category 2 – Non Emergency Response Facilities

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

1. **Water Supply**
   Nonotuck Park well, Brook Street well, Hendrick wellfield and Pines, Maloney well

2. **Water Infrastructure (Pump Stations)**
   Hendrick Street plant, Brook Street well, Nonotuck Park well, Maloney well

3. **Water Storage Tanks**
   Drury Lane (4 million gallons), Burt Street (2 million gallons), Reservation Road (1.67 million gallons, offline and being evaluated for repair or replacement)

4. **Sewer Infrastructure (Pump Stations)**
   Hendrick Street, East Street (3), North Street, O'Neil Street, Florence Road, Torrey Street, Ashley Circle, Pomeroy Meadow Road, Truehart Drive, Daley Field Road, Williston Avenue, Brook Street

5. **Problem Culverts**
   None

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**
   Riverside Industries – One Cottage Street

2. **Elderly Housing/Assisted Living (NOTE--all Condominium complexes in City are 55+)**
   Lathrop Community – 100 Russell Brook Road
   John F. Sullivan Housing – 108 Everett Street
   Frederick Dickinson CT Housing – 15 Liberty Street
   Sunrise Manor – Paradise Dr.
   Cliffview Manor – Lussier Circle
   20 Ballard Street
   31-43 Lyman Street
   Treehouse Development – Easthampton Meadow
   Condos-359 Main Street
   Condos-310 East Street

3. **Recreation Areas**
   Nonotuck Park

Daley Field, Daley Field Road
Galbraith Field, Williston-Northampton School
Millside Park

4. Schools

Williston Northampton School – 19 Payson Avenue
Calvary Baptist School – 412 Main Street
Tri-County High School – 199 East Street
Easthampton High School – 70 Williston Avenue
White Brook Middle School – 200 Park Street
Pepin School – 4 Park Street
Center Street School – 7 School Street
Maple Street School – 7 Chapel Street
Little Bear Learn 'N Care -- 189 Northampton Street
Hilltown Charter School -- 1 Industrial Parkway
Sunflower Nursery School – 186C Northampton Street
Young World Day Care – 51 Main Street
All About Children Day Care – 15A Industrial Parkway

5. Churches

Calvary Baptist Church – 413 Main Street
Easthampton Congregational Church – 112 Main Street
God Is Love Believers Church – 280 East Street
Our Lady of the Valley – 33 Adams Street
Saint Philip's Episcopal Church – 128 Main Street
Trinity Lutheran Church – 2 Clark Street

6. Historic Buildings/Sites

Brookside Cemetery – Williston Avenue
St. Bridget's Cemetery – Everett Street
St. Stanislaus Cemetery – Mayher Street
East Street Cemetery – off Parsons Street
Easthampton Public Library – 9 Park Street
Town Hall - 43 Main Street
Town Lodging House – 75 Oliver Street
Nonotuck Park – Daley Field – Lownds Avenue
Historical Society – 5 Holyoke Street
Community Center – 12 Clark Street
Main Street Common / Pulaski Park – Main Street
Emily Williston Memorial Library and Museum -- 1 Ferry Street
Historic Mills - One Cottage Street, One Pleasant Street, Button Bldg-Union Street

7. Apartment Complexes

College Highway Apts. – 390 Main Street
John F. Sullivan Housing – 108 Everett Street
Frederick Dickinson CT Housing – 15 Liberty Street
Sunrise Manor – Paradise Drive
Cliffview Manor – Lussier Circle
Lathrop Community – 100 Russell Brook Road
Viking Landing – 246 Main Street
Wright Homestead – 305 Main Street
180 Northampton Street
20 Ballard Street
22 Nashawannuck Street

8. Employment Centers

Riverside Industries – 1 Cottage Street
Mill 180 – 180 Pleasant Street
Big E's Foodland – 11 Union Street
October Company – 51 Ferry Street
Stik II Products – 41 O'Neil Street
Williston Northampton School – 8 Payson Avenue
Easthampton Dye Works / Cottage Street Studios– One Cottage Street
Easthampton Savings Bank – 36 Main Street
Philipp Manufacturing Company – 19 Ward Avenue

9. Camps

Arcadia Wildlife Sanctuary (Mass Audubon) – 127 Combs Road
Williston-Northampton School – 8 Payson Avenue
Nonotuck Park

10. Mobile Home Parks

None

5: MITIGATION STRATEGIES

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

Goal Statement

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

Overview of Mitigation Strategies by Hazard

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

Flooding

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

Severe Snowstorms / Ice Storms

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

Hurricanes

The flooding associated with hurricanes can be a major source of damage to buildings, infrastructure and a potential threat to human lives. Flood protection measures can thus also be considered hurricane

mitigation measures. The high winds that often accompany hurricanes can also damage buildings and infrastructure, similar to tornadoes and other strong wind events. Meeting the requirements of the State Building code also reduce damages from hurricanes.

Severe Thunderstorms / Winds / Tornadoes

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

Wildfires / Brushfires

Residents must notify the Fire Department when they plan to have a controlled burn on their property. In addition, the City conducts local outreach to schools about fire safety.

Earthquakes

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

Dam Failure

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

Drought

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

Existing Mitigation Strategies

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

Existing or Proposed Protection	Description	Hazards Mitigated	Effectiveness	Potential Changes
Backup Electric Power	Full power generator available at 32 Payson (Public Safety Complex); portable generator can be used at all shelters (White Brook Middle School, Tri-County, and High School)	All hazards	Effective.	None.
State Building Code	The City of Easthampton has adopted the Massachusetts State Building Code, which sets standards for the construction of all new structures.	All hazards	Effective.	None.
Flood Control Structures	There are seven dams within the City of Easthampton.	Floods	Very effective for preventing flooding downstream.	Ensure dam owners realize their responsibility to inspect the dams.
Zoning Bylaws: Area, Height, and Bulk Regulations	Prohibits the construction of buildings within the floodplain or 10 feet of a waterway, unless the first floor is elevated above the floodline.	Floods	Very effective for preventing flood damages to structures.	None.
Zoning Bylaws: Aquifer Protection District Overlay	Areas delineated as primary recharge areas for groundwater aquifers, and watershed areas for reservoirs are protected by strict use regulations.	Floods Droughts	Very effective for preventing groundwater contamination and for controlling stormwater runoff, promoting groundwater recharge.	Add Zone II to northern portion of city.

Existing or Proposed Protection	Description	Hazards Mitigated	Effectiveness	Potential Changes
Zoning Bylaws: Floodplain and Manhan River Protection District Overlay	Areas delineated as part of the 100-year floodplain, and/or within 100 feet of the Manhan River, are protected by strict use regulations.	Floods	Very effective for preventing incompatible development within the floodplain.	None.
Zoning Bylaws: Site Plan Approval	Sets forth specific requirements for site plan approval deal with protecting wetlands and other related natural features, and water quality and supply.	Floods	Very effective for managing very specific impacts.	None.
Zoning Bylaws: Additional Regulations	City has environmental protection standards and filling standards that govern stormwater management, erosion control, and other applicable development impacts.	Floods	Somewhat effective for managing specific impacts, managing stormwater runoff.	Develop Stormwater Bylaw with LID standards.
Subdivision Regulations: Construction Standards	New developments must meet drainage requirements that will allow for conveyance of stormwater.	Floods	Somewhat effective for managing stormwater runoff.	Consider adding infiltration requirements, impervious surface limits, etc.
Wetlands Protection Act River and Stream Protection	City enforces the standards established by Wetlands Protection Act, which protects water bodies and wetlands through the Conservation Commission.	Floods	Somewhat effective at protecting water bodies and wetlands.	Develop local protection ordinance.
National Flood Insurance Program	The City participates in the National Flood Insurance Program and restricts development in the 100-year floodplain.	Floods	Effective.	None.

Existing or Proposed Protection	Description	Hazards Mitigated	Effectiveness	Potential Changes
Easthampton Master Plan	Inventories natural features and promotes natural resource preservation in the city, including areas in the floodplain; such as wetlands, groundwater recharge areas, farms and open space, rivers, streams and brooks. The plan highlights the importance of balancing future development with the preservation of natural and scenic resources, and preservation of open space and farmland to provide flood storage capacity.	Floods Droughts	Effective in identifying sensitive resource areas, including floodplains. Encourages forestland and farmland protection, which will help conserve the city's flood storage capacity.	None.
Subdivision Grade Regulations	Development must meet street grade regulations (eight percent maximum) and intersection grade regulations.	Severe snowstorm / ice storm	Effective.	None.
Subdivision Regulations: Underground Utilities	Utilities must be placed underground in all new developments.	Severe snowstorm / ice storm Hurricane Tornado Severe Wind Severe Thunderstorm	Effective for preventing power loss.	None.
Wireless Communication Services District	Restricts the height and other features of wireless communication towers, such as distance that tower can be from edge of property line.	Severe snowstorm / ice storm Hurricane Tornado Severe Wind Severe Thunderstorm	Somewhat effective for preventing damage to nearby property.	None.

Existing or Proposed Protection	Description	Hazards Mitigated	Effectiveness	Potential Changes
Burn Permits	Residents are permitted to obtain burn permits over the phone. State police personnel provide information on safe burn practices. Easthampton residents that wish to participate in open burning must go to the Easthampton Public Safety Complex to fill out a burning permit. There is no fee for this permit. Residents need only to fill out one burning permit for the season. Once permits are on file, residents need to call the day they wish to burn. Open burning may or may not be allowed depending on weather conditions.	Wildfire / brushfire	Effective.	None.
Subdivision Review for Fire Safety	The Fire Chief is involved in the review of subdivision plans. The Definitive Plan of a subdivision is reviewed by the Fire Chief to ensure that the subdivision has sufficient fire protection standards.	Wildfire / brushfire	Effective.	None.
Fire Safety Public Education / Outreach	The Fire Department has an ongoing educational program in the schools. The Easthampton Fire Department has two primary outreach and education measures for fire prevention. First, the Fire Department holds an Open House. Second, three S.A.F.E. (Student Awareness of Fire Education) instructors teach fire safety in all public and private elementary schools throughout the year. Several members participate in educational presentations and demonstrations to the public throughout the year, including portable fire extinguisher instruction and CPR.	Wildfire / brushfire	Effective.	None.
New Dam Construction Permits	State law requires a permit for the construction of any dam, issued by the Massachusetts Department of Conservation and Recreation	Dam Failure	Effective. Ensures dams are adequately designed.	None.

Existing or Proposed Protection	Description	Hazards Mitigated	Effectiveness	Potential Changes
Dam Inspections	Massachusetts DCR has an inspection schedule that is based on the hazard rating of the dam.	Dam Failure	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.
Easthampton Water Use Restriction Ordinance	Allows the City to declare a State of Water Conservation and enforce restrictions, conditions, and requirements limiting the use of water by residents and businesses	Drought	Very effective for enforcing water conservation measures during a drought.	None.

Deleted Mitigation Strategies

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

Deleted Mitigation Strategies					
Action Name	**Action Type**	**Description**	**Hazards Mitigated**	**Responsible Agency**	**Reason for Deletion**
Dam Inspections Funding - Review	Operational Strategy	Incorporate Dam Safety into Development Review Process	Flooding	DPW/Planning	Determined that integration into development review process is not most effective way to address concern given that the dams exist and are not likely to be affected by a new development review process as MA law would likely grandfather existing dams.
Debris Management Plan	Planning document	Regional Debris Management Plan	Consider participation in the creation of a Regional Debris Management Plan	DPW and WRHSAC	The WRHSAC had allocated funds for a regional debris management plan in 2008, but the funds were re-assigned.

Deleted Mitigation Strategies					
Action Name	**Action Type**	**Description**	**Hazards Mitigated**	**Responsible Agency**	**Reason for Deletion**
State Building Code	State regulation	Evaluate older structures to be used as shelters to determine if they are earthquake resistant	Earthquakes	EMD, Board of Health	City Hazard Mitigation committee has determined that this action is not cost effective
Dam Removal	Operational strategy	Remove unnecessary dams	Flooding Dam Failure	Mayor, DPW	City has determined that there are no unnecessary dams in the community
Telecommunications Facilities zoning	Zoning bylaw	In the Zoning regulations for Telecommunications Facilities, add safety and prevention of wind related damage as a stated purpose	Hurricanes Tornadoes Microburst Earthquakes	City Planner	Determined to be unnecessary

Prioritized Implementation Plan

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

Prioritization Methodology

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

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

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

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

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

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

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

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

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

Cost Estimates

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

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

Cost estimates take into account the following resources:

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

Project Timeline

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

Mitigation Strategies to be Implemented									
Mitigation Action	**Status**	**Action Type**	**Description**	**Hazards Mitigated**	**Responsible Entity**	**Timeframe**	**Funding source**	**Cost**	**Priority**
Dam Inspections Funding - Review	under way	Operational strategy	Identify sources of funding for dam safety inspections	Flooding	DPW/PVPC	1 year	Department of Public Works	$800, estimate 8-10 hrs of staff time to research and identify funds	high

Mitigation Strategies to be Implemented									
Mitigation Action	**Status**	**Action Type**	**Description**	**Hazards Mitigated**	**Responsible Entity**	**Timeframe**	**Funding source**	**Cost**	**Priority**
Dam Inspections Schedule	Still to do	Operational Strategy	Ensure dam owners realize their responsibility to inspect dams Create schedule of required dam inspections, send letters of notification to private dam owners at both one year and six months prior to required inspection dates, determine if inspections have been completed, require copies of inspection reports be provided to the city, and initiate appropriate legal actions if inspections are not completed as required.	Flooding Dam Failure	DPW	1 year	Department of Public Works	$2,000, estimate 20-30 hrs staff time annually	Medium

Mitigation Strategies to be Implemented									
Mitigation Action	**Status**	**Action Type**	**Description**	**Hazards Mitigated**	**Responsible Entity**	**Timeframe**	**Funding source**	**Cost**	**Priority**
Aquifer Protection District Overlay		Zoning bylaws	Amend the Aquifer Protection District Overlay and add Zone II to northern portion of city	Flooding Drought	Barnes Aquifer Protection Advisory Committee, Planning Board	5 yrs	DLTA	$10,000	Low
Stormwater bylaw		Regulation	Develop Stormwater and Erosion Control Bylaw with LID standards	Flooding	Planning Board, DPW, Board of Health	2017	DLTA Grant	$10,000	Low
							City Staff		
Easthampton Master Plan	complete	Planning document	Work to implement goals in Master Plan on protection of water supply and quality	Flooding Drought	DPW, Barnes Aquifer Protection Advisory Committee, Mayor	2013	City Staff / Volunteers	0	High

Mitigation Strategies to be Implemented									
Mitigation Action	**Status**	**Action Type**	**Description**	**Hazards Mitigated**	**Responsible Entity**	**Timeframe**	**Funding source**	**Cost**	**Priority**
Undeveloped Properties in Flood Zone	complete	Operational strategy	Prioritize and acquire undeveloped properties within the flood zones throughout the city	Flooding Hurricanes	Planning Department, Conservation Commission, City Council	done	City Staff / Volunteers		
Fire Safety Pamphlet		Operational strategy	Develop and distribute an educational pamphlet on fire safety and prevention	Wildfire Brushfire	Fire Department		City Staff / Volunteers		
Notification System - Reverse 911	complete	Operational strategy	Examine current notification system including feasibility of Reverse 911 City implemented Code Red	Floods Severe Snowstorms / Ice storms Severe Thunderstorm Hurricanes Tornadoes Wildfire / Brushfire Earthquakes Dam Failure	Mayor, City Council	done	City Staff		

Mitigation Strategies to be Implemented									
Mitigation Action	**Status**	**Action Type**	**Description**	**Hazards Mitigated**	**Responsible Entity**	**Timeframe**	**Funding source**	**Cost**	**Priority**
Existing Shelters	complete	Operational strategy	Identify existing shelters that are ~~earthquake resistant as well as~~ outside of floodplain and inundation areas. Disseminate this information to appropriate city departments	Flooding ~~Earthquake~~ Dam Failure	EMD, Board of Health	done	City Staff		
Shelter Inventory	complete	Operational strategy	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	Severe Snowstorms / Ice storms Tornadoes Hurricanes	EMD	done	Homeland Security grants MA EOPS		

Mitigation Strategies to be Implemented									
Mitigation Action	**Status**	**Action Type**	**Description**	**Hazards Mitigated**	**Responsible Entity**	**Timeframe**	**Funding source**	**Cost**	**Priority**
Shelter Supplies Plan	complete	Operational strategy	Develop and implement a plan for providing access to water, information, shelter, and food stores for special needs populations in city in event of severe winter storm	Floods Severe Snowstorms / Ice storms Severe Thunderstorm Hurricanes Tornadoes Wildfire / Brushfire Earthquakes Dam Failure	EMD, Board of Health	done	Homeland Security grants, Massachusetts Executive Office of Public Safety		
Construction Standards	complete	Planning document	Add infiltration requirements, including impervious surface limits, to the Construction Standards in the subdivision regulations--done for Aquifer Protection zone and determined to be not possible downtown.	Flooding Dam Failure Hurricane	Planning Board	done	Planning Board		
Detention Basins Maintenance		Operational strategy	Develop and implement a plan for maintenance of detention basins	Flooding Hurricanes Dam Failure	DPW, Planning Board	5 yrs	City Staff, DLTA	$5000	low

Mitigation Strategies to be Implemented									
Mitigation Action	**Status**	**Action Type**	**Description**	**Hazards Mitigated**	**Responsible Entity**	**Timeframe**	**Funding source**	**Cost**	**Priority**
Back-up Generators		Operational strategy	Install back-up generators to ensure that all identified shelters have sufficient back-up utility service in the event of primary power failure, pending availability of funding--target COA	Floods Severe Snowstorms / Ice storms Severe Thunderstorm Hurricanes Tornadoes Wildfire / Brushfire Earthquakes Dam Failure	EMD		Commercial Equipment Direct Assistance Program (CEDAP)	$10-50K	Low
Radio Stations Emergency Broadcast		Operational strategy	Collect, periodically update and disseminate information on which local radio stations provide emergency information	Floods Severe Snowstorms / Ice storms Severe Thunderstorm Hurricanes Tornadoes Wildfire / Brushfire Earthquakes Dam Failure	EMD		City Staff		

Mitigation Strategies to be Implemented									
Mitigation Action	**Status**	**Action Type**	**Description**	**Hazards Mitigated**	**Responsible Entity**	**Timeframe**	**Funding source**	**Cost**	**Priority**

6: PLAN REVIEW, EVALUATION, IMPLEMENTATION, AND ADOPTION

Plan Adoption

Upon completion of the draft Hazard Mitigation Plan, a public meeting was held by the City staff and the Pioneer Valley Planning Commission on February 24, 2015 to present and request comments from residents. The Hazard Mitigation Plan was then submitted to the Massachusetts Emergency Management Agency (MEMA) and the Federal Emergency Management Agency for their review. Upon receiving conditional approval of the plan by FEMA, the plan was presented to the City Council and adopted. During the period of review by MEMA, March-May, 2015, the plan remained available for public review and comment on the city's website and on the PVPC website. No additional comments were received.

Plan Implementation

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

Incorporation with Other Planning Documents

Existing plans, studies, reports and municipal documents were incorporated throughout the planning process. This included a review and incorporation of significant information from the following key documents:

- ***Easthampton Master Plan*** - used to identify Community's priorities and sync hazard mitigation strategies with planned actions
- ***Easthampton Comprehensive Emergency Management Plan*** - used to identify critical infrastructure, current emergency operations, and special needs populations
- ***Easthampton Open Space and Recreation Plan -*** used to identify existing hazard mitigation strategies, already proposed mitigation strategies, natural resources, and critical infrastructure
- ***Easthampton Zoning Ordinance and Subdivision Regulations*** - used to identify existing mitigation strategies
- ***Massachusetts' State Hazard Mitigation Plan*** - used to ensure consistency with state identification of mitigation strategies, critical infrastructure, and hazards

The Hazard Mitigation Plan will also be incorporated into updates of the City's Comprehensive Emergency Management Plan.

During regular update meetings for the Hazard Mitigation Plan, the Hazard Mitigation Committee will review whether any of these plans are in the process of being updated. If so, the Hazard Mitigation Committee will provide copies of the Hazard Mitigation Plan to relevant City staff and brief them on the content of the Hazard Mitigation Plan. The Hazard Mitigation Committee will also review current City programs and policies to ensure that they are consistent with the mitigation strategies described in this plan.

Plan Monitoring and Evaluation

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

- Review previous hazard events to discuss and evaluate the effectiveness of current mitigation measures

- Assess how the mitigation strategies of the plan can be integrated with other City plans and operational procedures, including the Zoning Bylaw and Emergency Management Plan

- Review and evaluate progress toward implementation of the current mitigation plan based on reports from responsible parties

- Amend current plan to improve mitigation practices

Following these discussions, it is anticipated that the Hazard Mitigation Committee may decide to reassign the roles and responsibilities for implementing mitigation strategies to different municipal departments and/or revise the goals and objectives contained in the plan. The Committee will review and update the Hazard Mitigation Plan every five years.

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

7: 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
SelectedMA Regional Planning Commissions:
Berkshire Regional Planning Commission (BRPC).....413/442-1521
Franklin Regional Council of Governments (FRCOG).....413/774-3167
Metropolitan Area Planning Council (MAPC).....617/451-2770
Pioneer Valley Planning Commission (PVPC).....413/781-6045
MA Board of Building Regulations & Standards (BBRS).....617/227-1754
DCR Water Supply Protection.....617/626-1379
DCR Waterways.....617/626-1371
DCR Office of Dam Safety.....508/792-7716
DFW Riverways.....617/626-1540
MA Dept. of Housing & Community Development.....617/573-1100
Woods Hole Oceanographic Institute.....508/457-2180
UMass-Amherst Cooperative Extension.....413/545-4800
National Fire Protection Association (NFPA).....617/770-3000
New England Disaster Recovery Information X-Change (NEDRIX – an association of private companies & industries involved in disaster recovery planning).....781/485-0279
MA Board of Library Commissioners.....617/725-1860
MA Highway Dept, District 1.....413/582-0599
MA Division of Marine Fisheries.....617/626-1520
MA Division of Capital & Asset Management (DCAM).....617/727-4050
University of Massachusetts/Amherst.....413/545-0111
Natural Resources Conservation Services (NRCS).....413/253-4350
MA Historical Commission.....617/727-8470
U.S. Army Corps of Engineers.....978/318-8502
Northeast States Emergency Consortium, Inc. (NESEC).....781/224-9876
National Oceanic and Atmospheric Administration: National Weather Service.....508/824-5116
US Department of the Interior: US Fish and Wildlife Service 413/253-8200
US Geological Survey.....508/490-5000

2) Mitigation Funding Resources

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

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

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

3) Internet Resources

Sponsor	Internet Address	Summary of Contents
Natural Hazards Research Center, U. of Colorado	http://www.colorado.edu/litbase/hazards/	Searchable database of references and links to many disaster-related websites.
Atlantic Hurricane Tracking Data by Year	http://wxp.eas.purdue.edu/hurricane	Hurricane track maps for each year, 1886 – 1996
National Emergency Management Association	http://nemaweb.org	Association of state emergency management directors; list of mitigation projects.
NASA – Goddard Space Flight Center "Disaster Finder:	http://www.gsfc.nasa.gov/ndrd/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	http://www.fema.gov/fema/csb.html	Searchable site for access of Community Status Books

Sponsor	Internet Address	Summary of Contents
Book		
Florida State University Atlantic Hurricane Site	http://www.met.fsu.edu/explores/tropical.html	Tracking and NWS warnings for Atlantic Hurricanes and other links
The Tornado Project Online	http://www.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: Documentation of Planning Process

Appendix C: List of Acronyms

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

Appendix D: Critical Facilities Map

CERTIFICATE OF ADOPTION

CITY OF EASTHAMPTON, MASSACHUSETTS

MAYOR KAREN L. CADIEUX

A RESOLUTION ADOPTING THE

EASTHAMPTON HAZARD MITIGATION PLAN

WHEREAS, the City of Easthampton established a Committee to prepare the Easthampton Hazard Mitigation plan; and

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

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

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

NOW, THEREFORE BE IT RESOLVED that the Mayor of Easthampton adopts the Easthampton Hazard Mitigation Plan.

ADOPTED AND SIGNED this _____, _____

_____

Mayor Karen L. Cadieux
City of Easthampton

ATTEST