

THE TOWN OF GOSHEN HAZARD MITIGATION PLAN update



Adopted by the Goshen Board of Selectmen on June 6, 2016

Prepared by:

The Goshen Hazard Mitigation Committee

and

Pioneer Valley Planning Commission

60 Congress Street
Springfield, MA 01104
(413) 781-6045

www.pvpc.org

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Pioneer Valley Planning Commission

Catherine Ratté, Principal Planner/Project Manager
Jacob Dolinger, GIS Specialist
Brendan Conboy, Intern

1: PLANNING PROCESS

Introduction

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

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

Preparing a Local Natural Hazards Mitigation Plan before a disaster occurs can save the community money and will facilitate post-disaster funding. Costly repairs or replacement of buildings and infrastructure, as well as the high cost of providing emergency services and rescue/recovery operations, can be avoided or significantly lessened if a community implements the mitigation measures detailed in the Plan. FEMA requires that a community adopt a pre-disaster mitigation plan as a condition for mitigation funding, including the Hazard Mitigation Grant Program (HMGP), the Flood Mitigation Assistance Program (FMA), and the Pre-Disaster Mitigation Program (PDM).

Hazard Mitigation Planning Committee

In 2015, the Town of Goshen completed an update of their 2008 Hazard Mitigation Plan, with assistance provided by the Pioneer Valley Planning Commission. All portions of the plan were reviewed and updated as necessary. Planning for hazard mitigation in Goshen involved a six-member workgroup led by the Town's Emergency Management Director, with participation from the Select Board, the Highway Superintendent, the Fire Chief, the Conservation Commission and the Planning Board

The Hazard Mitigation planning process for the Town included the following tasks:

- Reviewing and incorporating existing plans and polices that regulate and affect the development of the community.

- 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 to mitigate the long-term consequences of natural disasters to the people and infrastructure in the community.
- Adopting and implementing the final Hazard Mitigation Plan.

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

Hazard Mitigation Committee Meetings

Meetings of the Hazard Mitigation Planning Committee, all of which took place at Goshen Town Offices, were held on the dates listed below. Agendas for each meeting are included in Appendix A.

- June 17, 2015, Goshen Town Offices
- July 22, 2015, Goshen Town Offices
- August 13, 2015, Goshen Town Offices

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

Participation by Stakeholders

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

Local and regional agencies involved in hazard mitigation activities and surrounding community engagement and input

The Pioneer Valley Planning Commission is a regional planning agency for 43 towns and cities in Massachusetts' Hampden and Hampshire Counties. PVPC regularly engages with the Town of Goshen as part of its regional planning efforts, which include the following:

- Developing **Our Next Future: An Action Plan for Building a Smart, Sustainable and Resilient Pioneer Valley**, which includes chapters on sustainable land use throughout the region and consideration of the impact of flooding and other natural hazards on development, climate adaptation and mitigation, green infrastructure, and transportation.
- Developing the Pioneer Valley Climate Action and Clean Energy Plan, which assesses the impact that climate change will have on the region and recommends strategies for mitigation that can be implemented by local municipalities and businesses.
- Collaborating with state agencies, such as the Massachusetts Department of Transportation (MassDOT) and the Department of Conservation and Recreation (DCR), to maintain inventories of critical infrastructure throughout the region.

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

In addition, PVPC staff regularly present to their Executive Committee and Commission (representatives from the 43 cities and towns that comprise the Pioneer Valley), when new projects are launched and when funding opportunities are available. As result, all the communities in the region were informed of Goshen's Hazard Mitigation Plan update process and encouraged to comment. PVPC is working on hazard mitigation plans for surrounding communities of Williamsburg, Huntington, Chesterfield, and Westhampton.

The Town of Goshen is very active in the Hampshire Regional Emergency Planning Committee (REPC), and Goshen's EMD, Larry Holmberg made sure other REPC members were aware of Goshen's Hazard Mitigation planning process by speaking on the topic at a meeting of the committee. Mr. Holmberg also serves as the Emergency Management Director for the neighboring community of Chesterfield, so there is very close awareness and integration between these two neighboring communities.

PVPC staff included a summary article on the status of Hazard Mitigation planning in the region in the quarterly Regional Reporter that is mailed to area Chambers of Commerce, all member municipalities, area colleges and universities and other key stakeholders in the region, and also issued a media release on Hazard Mitigation Plan status in the Pioneer Valley in August, 2015.

In this way, neighboring communities, businesses, educational institutions and other key stakeholders were educated about and informed of Goshen's hazard mitigation planning work.

Agencies that have the authority to regulate development

The Town staff and volunteers who participated in the Goshen Hazard Mitigation Committee have direct connections to various municipal committees and boards, within Goshen that have the authority to regulate development. These include the Select Board, the Highway Superintendent, the Conservation Commission and the Planning Board.

In addition, the Pioneer Valley Planning Commission, as a regional planning authority, works with all agencies that regulate development in Goshen, including the municipal entities listed above and state agencies, such as the Department of Conservation and Recreation (DCR) and MassDOT. This regular involvement ensured that during the update of the Goshen Hazard Mitigation Plan, the operational policies and any mitigation strategies or identified hazards from these entities were incorporated into the Hazard Mitigation Plan.

Participation by the Public, Businesses, and Neighboring Communities

Three public meetings were held as part of the update to Goshen's Hazard Mitigation plan – on July 22, 2015, August 13, 2015 and September 30, 2015. The second two meetings occurred after the Hazard Mitigation Committee had provided input on hazards and mitigation strategies relevant to the community. Notice of all three public meetings was posted at Goshen Town Offices in compliance with the Commonwealth of Massachusetts' open meeting law. Public meeting agendas and notices can be found in Appendix A.

No one attended the first two public input meetings, so a third public input meeting was scheduled in the Fall because Goshen does have a seasonal population. No one attended the third public meeting, but if anyone had attended these meetings, comments received would have been considered by the local Hazard Mitigation planning committee and incorporated into the plan as appropriate.

On July 17, 2015, August 10, 2015 and September 17, 2015 the Pioneer Valley Planning Commission sent media releases to all area media outlets to inform the public of the planning process; the first release invited residents and businesses and members of surrounding communities to attend the meeting to learn about the planning process; the second release informed residents and businesses and members of surrounding communities that a draft of the Goshen Hazard Mitigation Plan was available for review and comments at the meeting as well as on PVPC's website. The second release also indicated that hard copies were available at PVPC's offices and at Goshen Town Offices, and that all residents of Goshen were encouraged to comment on the plan by e-mailing or calling staff contacts at PVPC or the Town of Goshen. The media releases can be found in Appendix A. No comments were received.

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

The first two media releases did not get picked up by the local papers, but the third one was turned into an article on the weekly "Country Journal" which serves the "Hilltowns" of western Massachusetts. A copy of the article is included in the appendix. The Hazard Mitigation Committee determined that the most effective outreach strategy for engaging with the public, businesses and neighboring communities was through the media, and so this was the outreach strategy employed for reaching out to all three groups of stakeholders. The press release indicated that residents of Goshen were invited to attend the event, which was also intended to include representatives of businesses in Goshen and residents of neighboring communities.

Businesses and neighboring communities were also provided with an opportunity to provide feedback through the Pioneer Valley Planning Commission. PVPC is regularly involved in land use, transportation, and environmental planning initiatives in Goshen and the greater region including surrounding communities. Feedback received from these other initiatives was incorporated into the hazard mitigation planning process.

Additional outreach to surrounding communities occurred through the quarterly newsletter that PVPC sends out to its member communities about its recent activities. In these articles, adjacent municipalities were encouraged to reach out to PVPC about hazard mitigation plans by e-mailing or calling staff contacts at PVPC. These notices are included in Appendix A.

Select Board Meeting

In 2013, the Goshen Select Board agreed to begin the process of updating the Town's Hazard Mitigation Plan. After the plan was conditionally approved by FEMA, the Select Board voted to adopt the plan on June 6, 2016.

2: LOCAL PROFILE

Community Setting

Covering about 17.7 square miles, the Town of Goshen is located in Hampshire County at the foothills of the Berkshire Mountains in western Massachusetts. Known as one of the “hilltowns,” Goshen is situated in the uplands west of the Connecticut River Valley. It is bordered by the towns of Conway to the northeast, Williamsburg to the east, Chesterfield to the south and southwest, Cummington to the northwest, and Ashfield to the north.

Named after the town in Egypt, Goshen was incorporated in 1781 as an agriculturally-based community. Several civic buildings, the meeting house, and the Congregational Church were built in the mid-1800s. Quarrying was an important industry at this time. One quarry produced what has been called Goshen Stone, and the mineral lithium aluminum silicate – the source of lithium metal – was found in Town.

During the turn of the 19th Century, Goshen became known as a summer resort community, and up until the 1950s, many seasonal homes were built. Hammond Pond was developed with waterfront cottages, and several camps were built throughout Town. The D. A. R. Forest, the first in the United States, was set aside in 1929, providing several outdoor recreation opportunities that still exist today, including a beach at the upper and lower Highland Lake.

Goshen’s lack of good roads and reliable water power prevented any major industrial development. Industry consisted of small mills and home-based businesses, which continue today. Because of its fairly remote location, it has been able to maintain a quiet, country character. Most development consists of single-family homes; the remainder of land in Goshen is hilly and forested, with some scattered open fields in farming.

Goshen’s location within 13 miles of the City of Northampton and 25 miles of the college town of Amherst, and within relatively easy access to Interstate 91, has contributed to its development as a “bedroom community” to these two larger towns, as well as the Town of Greenfield and the cities of Springfield, Chicopee, and Westfield along the I-91 corridor into Connecticut. The Town’s estimated population in 2013 was 1,102 people, resulting in a population density of 62 persons per square mile.

Today, the vast majority of Goshen’s 17.7 square miles is undeveloped land, totaling more than 9,673 acres. Residential land is the second most prolific land use, at approximately 748 acres, followed by agricultural land at approximately 481 acres. Water comprises almost 237 acres of land in Goshen. There are 111 acres of outdoor recreation land in Town, and 34 acres characterized as urban open/public land. Land used for industrial uses constitutes approximately 42 acres, whereas the amount of commercial land is relatively small at just 17 acres.

Development

Despite a rural veneer, Goshen has changed a great deal in the past 50 years. Just before the beginning of World War II, Goshen reached its lowest population, at 224 residents. Several factors have now brought the Town to the edge of a critical transformation, and the Town has experienced growth pressures with the population increasing to 1,102 residents by 2013 estimates.

The Town of Goshen has limited economic resources and is primarily considered a “bedroom community,” since most residents travel outside of town boundaries for employment. However, the housing market has expanded in the Pioneer Valley and as housing pressures intensify in the valley, Goshen and other hill towns are likely to see an increase in new home development over the next several years.

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

The Goshen Zoning Bylaw establishes just one zone district, the Residential-Agricultural District. The Zoning Bylaw also establishes a Special Permit Approval procedure for specific uses and structures within Goshen. This review allows the Special Permit Granting Authority the ability to review development to ensure that the basic safety and welfare of the people of Goshen are protected, and includes several specific evaluation criteria that are relevant to natural hazards.

Currently, development in Goshen is directed, by existing zoning and other land use regulations, to areas where the environmental conditions and existing public utilities support such development. With just one zone district, the Town relies heavily on special permitting and subdivision regulations in order to manage development.

There have been no significant changes in development in Goshen since our first Hazard Mitigation plan was approved in 2009 that have affected our vulnerability to natural hazards.

Infrastructure

Goshen's infrastructure reflects its agricultural and rural roots.

Roads and Highways

Major roadways through Town are Route 9 trending northwest from Williamsburg through Goshen to Cummington, and Route 112 from the intersection of Route 9 at the north end of Goshen Center north to the Ashfield line in Franklin County.

Rail

There is no rail service in Goshen.

Public Transportation

The Pioneer Valley Transit Authority (PVTA) provides contracts through MV Transportation to offer paratransit in Goshen, a door-to-door demand responsive van service.

Public Drinking Water Supply

Goshen's water supply comes from groundwater sources through many private wells and eleven transient non-community wells and one non-transient non-community well.

Sewer Service

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

Schools

There are no Public Schools in Goshen; however, regional schools that Goshen students attend include New Hingham Regional Elementary, and Hampshire Regional High School.

Natural Resources

Goshen's terrain and landscape has played a key role in dictating its development as a rural community. The Town's natural resources led to its development as an agricultural village, reliant on farming and its quarries, and then Goshen's natural beauty was realized by summer vacationers, and more recently, other outdoor recreation enthusiasts and campers.

Forests

The forest resources and woodlands in Goshen are abundant throughout the town. The town has large expanses of permanently and temporarily protected vegetated open space located within a North Central Hardwoods-Hemlock-White Pine zone. The extensive range of these

forestlands encompasses approximately 9,307 acres, which comprises 82% of the total land area in the Town. These areas are habitat for several tree and plant species as well as wildlife.

Water Resources

There are several ponds and small lakes in Goshen including: Lilly Pond, Sears Meadow Pond, Upper Highland Lake, Lower Highland Lake, Hammond Pond, and Damon Pond. Many other smaller bodies of water are scattered across the landscape of Goshen primarily located along streams and in wooded areas. Most of the 227 acres of open water in Goshen are comprised of these small ponds and lakes. These water bodies offer valuable wildlife habitat, unique natural environments, and provide benefits to Goshen's human inhabitants in the form of prime recreational opportunities.

A small portion of northwestern Goshen lies within the Westfield River Watershed and is drained into that system via the Swift River. The remainder of Goshen lies within the Connecticut River Watershed Basin. There are 1,168 acres of 'Natural Land – Riparian' in Goshen within the Westfield River basin and 832 acres of 'Natural Land – Riparian' in Goshen's portion of the Connecticut River basin. These natural lands are areas within the riparian corridor that remain in a "natural state", potentially functioning as a corridor for select species movement, as well as additional ecological purposes.

There are 596 acres of land within the 100-foot Rivers Protection Buffer Area – the inner riparian zone. Development activity in this area is limited by the Massachusetts Wetlands Protection Act (Rivers Protection Act). However, the outer riparian zone is susceptible to limited development in certain instances.

3: HAZARD IDENTIFICATION AND ANALYSIS

The following section includes a summary of disasters that have affected or could affect Goshen. 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 / levee breach
- Drought
- Extreme Temperatures

Natural Hazard Analysis Methodology

This chapter examines the hazards in the Massachusetts State Hazard Mitigation Plan which are identified as likely to affect Goshen. 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 Goshen are: floods, severe snowstorms/ice storms, hurricanes, severe thunderstorms / wind / tornadoes, wildfire/brushfire, earthquakes, dam failure / levee breach, 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:

| Percentage of Town Impacted by Natural Hazard | |
|---|------------------------------------|
| Land Area Affected by Occurrence | Percentage of Town Impacted |
| Large | More than 50% of the town affected |
| Medium | 10 to 50% of the town affected |
| Small | Less than 10% of the town affected |

Extent

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

Previous Occurrences

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

Probability of Future Events

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

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

Impact

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

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

Vulnerability

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

- 1 – Highest risk
- 2 – High risk
- 3 – Medium risk
- 4 – Low risk
- 5 – Lowest risk

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

Hazard Identification and Analysis Worksheet for Goshen

| Type of Hazard | Location of Occurrence | Probability of Future Events | Impact | Hazard Risk Index Rating |
|--|------------------------|--|----------|--|
| Flooding | Medium | High | Limited | 2 - High risk |
| Severe Snowstorms / Ice Storms | Large | Very High | Limited | 1 – Highest Risk |
| Severe Thunderstorms / Winds / Tornadoes | Medium | Severe thunderstorms: Moderate Winds: Moderate Tornadoes: Very low | Minor | Severe thunderstorms: 2 – High Risk Winds: 2 – High Risk Tornadoes: 4 – Low Risk |
| Hurricanes | Large | Very low | Limited | 4 - Low Risk |
| Wildfire / Brushfire | Small | High | Minor | 3 – Medium Risk |
| Earthquakes | Large | Very low | Critical | 4 - Low Risk |
| Dam Failure / Levee Breach | Medium | Very low | Limited | 3 – Medium Risk |
| Drought | Small | Low | Minor | 5 - Lowest Risk |
| Extreme Temperature | Large | Low | Minor | 5 - Lowest Risk |

Source: Massachusetts Hazard Mitigation Plan

Flooding

Hazard Description

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

- 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.

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).

Location

There are no locations in Goshen that have been susceptible to 100-year floods in the past. At this time, the Town of Goshen has no repetitive loss properties as defined by FEMA's NFIP.

Extent

The average annual precipitation for Goshen and surrounding areas in western Massachusetts has been 50 to 56 during the past several years.

Water levels in Goshen's rivers, streams, and wetlands rise and fall seasonally and during high rainfall events. High water levels are typical in spring, due to snowmelt and ground thaw. This is the period when flood hazards are normally expected. Low water levels occur in summer due to high evaporation and plant uptake (transpiration). At any time, heavy rainfall may create conditions that raise water levels in rivers and streams above bank full stage, which then overflow adjacent lands.

The worst flooding recorded in the Goshen region's recent history occurred following Hurricane Diane in August 1955. While Goshen does not have records of the precise water levels in the Town, the region recorded levels of nearly 20 inches of rain in the greater Springfield area, according to the US Geological survey Report "Floods of August 1955 in the Northeastern States".

Based on past records and the knowledge and experience of members of the Goshen Hazard Mitigation committee and residents, the extent of the impact of localized flooding would be minor. This means that community anticipates very few injuries, if any, and only minor property damage and minimal disruption of the quality of life of residents. There may be temporary shutdown of some facilities.

Previous Occurrences

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

There are three remaining problem culverts in Goshen. The previous problem culverts at Loomis Road and Fuller Road have been upgraded, thanks in part to funding from the HMGP program. The remaining three problem culverts are mapped on the Past and Potential Hazards/Critical Facilities Map (Appendix D). Most of the flood hazard areas listed here were identified due to known past occurrence in the respective area. There are many areas with no record of previous flood incidents that could be affected in the future by heavy rain and runoff.

In 2011 (8/27/2011) Hurricane Irene, that had become Thunder Storm Irene when it affected Goshen, brought rains that caused an estimate \$100,000 in damage. The majority of the damage was to roads because of wash outs due to plugged culverts but the Town Hall was damaged and flooded and grave stones in a cemetery (cultural) were damaged.

Probability of Future Events

Based upon previous data, there is a “very high” chance (between 70 percent and 100 percent in the next year) of localized flooding occurring in Goshen in the next year, however these floods are small and generally cause little damage.

Flooding frequencies for the various floodplains in Goshen 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

In actuality, flooding occurs more frequently than this because the current FEMA-defined flood zones are based on historical patterns of rainfall intensity and frequency, and do not take into account the impacts that climate change will have on Goshen. In future years, it is likely that the currently designated 10-year, 25-year, 100-year and 500-year floodplains will flood more frequently due to climate change.

Impact

The Town faces a “limited” impact, with 10 percent or less of total town area affected, from flooding.

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 town 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 town
- water deep enough to make life difficult, normal life is disrupted and some hardship is endured
- airstrip closed
- travel is most likely restricted to boats

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

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

There are no critical facilities are at risk within Goshen's floodplain.

Vulnerability

Based on the above analysis, Goshen has a hazard index rating of "2 – high risk" for flooding.

There are approximately 405 acres of land within the FEMA mapped 100-year floodplain and 128 acres of land within the 500-year floodplain within the Town of Goshen. According to the Community Information System (CIS) of FEMA, there were 20 structures (all residential) located within the Special Flood Hazard Area (SFHA) in Goshen as of August 2005, the most current records in the CIS for the Town of Goshen.

Utilizing the Town's median home value of \$247,000 (American Community Survey, 2009-2013), up to \$4,940,000 worth of damage could occur within the Special Flood Hazard Area. The damage estimate is a rough estimate and likely reflects a worst-case scenario. Computing more detailed damage assessments based on assessor's records is a labor-intensive task and beyond the scope of this project.

Severe Snowstorms / Ice Storms

Hazard Description

Severe winter storms can pose a significant risk to property and human life. Severe snowstorms and ice storms can involve rain, freezing rain, ice, snow, cold temperatures and wind.

Location

The entire Town of Goshen is susceptible to severe snowstorms, which means the location of occurrence is “large.” Because these storms occur regionally, they would impact the entire city.

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>

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

- 24.0 inches** | January 12, 2011
- 21.9 inches** | February 12, 2006
- 21.0 inches** | February 11-2, 1983
- 18.2 inches** | December 19-20, 1945
- 17.7 inches** | December 29, 1945
- 17.4 inches** | February 19-20, 1934
- 17.0 inches** | February 20-21, 1921
- 16.9 inches** | February 6-7, 1978
- 16.9 inches** | December 26-27, 1947
- 16.3 inches** | March 5, 2001
- 16.2 inches** | February 4, 1926
- 16.0 inches** | February 14, 1914

Previous Occurrences

Based on data available from the National Oceanic and Atmospheric Administration, there are 47 winter storms since 1958 that have registered on the NESIS scale. Of these, approximately 26 storms resulted in snow falls in the Pioneer Valley of at least 10 inches. These storms are listed in the table below, in order of their NESIS severity. In addition to these storms, the Town of Goshen was significantly affected by the ice storm of December 11, 2008.

| Winter Storms Producing Over 10 inches of Snow in Pioneer Valley region, 1958-2014 | | | |
|---|--------------------|-----------------------|-----------------------------|
| Date | NESIS Value | NESIS Category | NESIS Classification |
| 3/4/2013 | 3.05 | 2 | Significant |
| 2/7/2013 | 4.35 | 3 | Major |
| 10/29/2011 | 1.75 | 1 | Notable |
| 1/9/2011 | 5.31 | 3 | Major |
| 2/23/2010 | 5.46 | 3 | Major |
| 3/15/2007 | 2.54 | 2 | Significant |
| 1/21/2005 | 6.8 | 4 | Crippling |
| 2/15/2003 | 7.5 | 4 | Crippling |

| | | | |
|------------|------|---|-------------|
| 3/31/1997 | 2.29 | 1 | Notable |
| 2/2/1995 | 1.43 | 1 | Notable |
| 2/8/1994 | 5.39 | 3 | Major |
| 3/12/1993 | 13.2 | 5 | Extreme |
| 1/25/1987 | 1.19 | 1 | Notable |
| 2/10/1983 | 6.25 | 4 | Crippling |
| 4/6/1982 | 3.35 | 2 | Significant |
| 2/5/1978 | 5.78 | 3 | Major |
| 1/19/1978 | 6.53 | 4 | Crippling |
| 2/18/1972 | 4.77 | 3 | Major |
| 12/25/1969 | 6.29 | 4 | Crippling |
| 2/22/1969 | 4.29 | 3 | Major |
| 2/8/1969 | 3.51 | 2 | Significant |
| 2/5/1967 | 3.5 | 2 | Significant |
| 2/2/1961 | 7.06 | 4 | Crippling |
| 1/18/1961 | 4.04 | 3 | Major |
| 12/11/1960 | 4.53 | 3 | Major |
| 3/2/1960 | 8.77 | 4 | Crippling |
| 2/14/1958 | 6.25 | 4 | Crippling |

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

Probability of Future Events

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

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

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

Impact

The Town faces a “minor” impact or less than 10 percent of total property damaged, from snow or ice storms.

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

Other impacts from snowstorms and ice storms include:

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

Vulnerability

Based on the above assessment, Goshen has a hazard index rating of “1 — high risk” from snowstorms and ice storms. Based on the expertise and experience of the local Hazard Mitigation Committee, ice storms are much more of an anticipated risk of substantive damage than are snow storms.

Using an estimated value of \$146,224,000 for all property in the town and an estimated 5 percent of damage to 10 percent of residential structures, approximately \$ 731,120 worth of damage could occur from a severe snowstorm. This is a rough estimate and likely reflects a worst-case scenario. Computing more detailed damage assessments based on assessor’s records is a labor-intensive task and beyond the scope of this project. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

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 Goshen is at risk from hurricanes, meaning the location of occurrence is "large." Ridgetops are more susceptible to wind damage. Areas susceptible to flooding are also likely to be affected by heavy rainfall.

Extent

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

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

Source: National Hurricane Center, 2012

Previous Occurrences

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

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

While Superstorm Sandy in late October of 2012 had severe impacts on much of the Northeastern United States, there was minimal damage that occurred due to the storm locally in Goshen. No roads were flooded or washed out. No residents encountered long-term displacement due to the storm's impacts. In nearby areas of western Massachusetts, there were modest impacts, with localized flooding and downed power lines. Overall, western Massachusetts was able to send emergency response resources to other states where the storm had a larger impact.¹ Hurricane Irene came and went, but left lingering effects of downed trees and limbs as half a million people across Massachusetts were left without power. In addition, localized flooding caused damage throughout western Massachusetts, but did not cause significant damage in Goshen.

¹ "Western Massachusetts escapes Hurricane Sandy's wrath, but impact elsewhere still being felt." http://www.masslive.com/news/index.ssf/2012/10/western_massachusetts_escapes.html. October 30, 2012. Accessed March 6, 2015.

Probability of Future Events

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

Impact

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

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

The Town faces a “limited” impact from hurricanes, with 10 percent or less of Goshen affected.

Vulnerability

Based on the above analysis, Goshen has a hazard index rating of “4 – low risk” from hurricanes.

Using a total value of all structures in Goshen of \$146,224,000 and an estimated 10 percent of damage to 5 percent of all structures, the estimated amount of wind damage from a hurricane is \$731,120. Estimating that flooding would create 10 percent of damage to 20 percent of structures, the resulting damage would be \$2,924,480. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Severe Thunderstorms / Wind / Tornadoes

Hazard Description

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

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

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

Location

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

Extent

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

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. |

Extent Scale for Hail

CONVERTING TRADITIONAL HAIL SIZE DESCRIPTIONS

Traditional object-to-size conversion for assessment and translation of severe hail reports. We encourage *measurement*, not estimation, of hail size.

| HAIL SIZE (in.) | OBJECT ANALOG REPORTED |
|-----------------|------------------------|
| .50 | Marble, moth ball |
| .75 | Penny |
| .88 | Nickel |
| 1.00 | Quarter |
| 1.25 | Half dollar |
| 1.50 | Walnut, ping pong |
| 1.75 | Golf ball |
| 2.00 | Hen egg |
| 2.50 | Tennis ball |
| 2.75 | Baseball |
| 3.00 | Tea cup |
| 4.00 | Grapefruit |
| 4.50 | Softball |

Previous Occurrences

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

Between 1950 and 2004, no (0) tornadoes have touched down in Goshen. Since the 1950s, there have been close to 9 tornadoes in Hampshire County.

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, as well as Goshen’s location in a high-density cluster of state-wide tornado activity, there is a “very low” probability (less than 1 percent chance in any given year) of a tornado affecting the Town.

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

Impact

Overall, Goshen faces a “minor” impact from severe thunderstorms, winds, or tornadoes, with 10 percent or less of the Town affected.

As indicated as part of the Enhanced Fujita Scale Levels for tornados, the following impacts can result from a tornado:

- EFO - Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
- EF1 - 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 - Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
- EF3 - Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
- EF4 - Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.

Vulnerability

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

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

Using a total value of all structures in Goshen of \$146,224,000 and an estimated 10 percent of damage to 5 percent of all structures, the estimated amount of damage from a tornado is \$2,924,480. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Wildfires / Brushfires

Hazard Description

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

FEMA has classifications for 3 different classes of wildfires:

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

Location

Hampshire County has approximately 252,000 acres of forested land, which accounts for 72% of total land area. Forest fires are therefore a potentially significant issue. In Goshen, approximately 82% of the town's total land area is in forest, or about 9,306 acres, and is therefore at risk of fire. The total amount of town that could be affected by wildfire is categorized as "large," at between 80 percent to 100 percent of the total area. In 2015, the Goshen Fire Department reported fires in the crowns of trees--something not at all common in the Northeast. It is the opinion of the Goshen local Hazard Mitigation planning committee that climate change is changing the way fires react in the Northeast. In addition to changing weather patterns, various insects are coming into the region and causing damage in trees, making the more susceptible to fire.

Extent

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

In Goshen, approximately 82 percent of the town's total land area is in forest, or about 9,306 acres, and is therefore at risk of fire. In drought conditions, a brushfire or wildfire would be a matter of concern. A large wildfire could damage much of the land mass, including vital watershed lands, in a short period of time.

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

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

Extent of Wildfires

| Rating | Basic Description | Detailed Description |
|--|--|--|
| CLASS 1: Low Danger (L) Color Code: Green | Fires not easily started | Fuels do not ignite readily from small firebrands. Fires in open or cured grassland may burn freely a few hours after rain, but wood fires spread slowly by creeping or smoldering and burn in irregular fingers. There is little danger of spotting. |
| CLASS 2: Moderate Danger (M) Color Code: Blue | Fires start easily and spread at a moderate rate | Fires can start from most accidental causes. Fires in open cured grassland will burn briskly and spread rapidly on windy days. Woods fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel – especially draped fuel -- may burn hot. Short-distance spotting may occur, but is not persistent. Fires are not likely to become serious and control is relatively easy. |
| CLASS 3: High Danger (H) Color Code: Yellow | Fires start easily and spread at a rapid rate | All fine dead fuels ignite readily and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly and short-distance spotting is common. High intensity burning may develop on slopes or in concentrations of fine fuel. Fires may become serious and their control difficult, unless they are hit hard and fast while small. |
| CLASS 4: Very High Danger (VH) Color Code: Orange | Fires start very easily and spread at a very fast rate | Fires start easily from all causes and immediately after ignition, spread rapidly and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop high-intensity characteristics - such as long-distance spotting - and fire whirlwinds, when they burn into heavier fuels. Direct attack at the head of such fires is rarely possible after they have been burning more than a few minutes. |

| | | |
|--|--|---|
| <p>CLASS 5: Extreme (E)</p> <p>Color Code: Red</p> | <p>Fire situation is explosive and can result in extensive property damage</p> | <p>Fires under extreme conditions start quickly, spread furiously and burn intensely. All fires are potentially serious. Development into high-intensity burning will usually be faster and occur from smaller fires than in the Very High Danger class (4). Direct attack is rarely possible and may be dangerous, except immediately after ignition. Fires that develop headway in heavy slash or in conifer stands may be unmanageable while the extreme burning condition lasts. Under these conditions, the only effective and safe control action is on the flanks, until the weather changes or the fuel supply lessens.</p> |
|--|--|---|

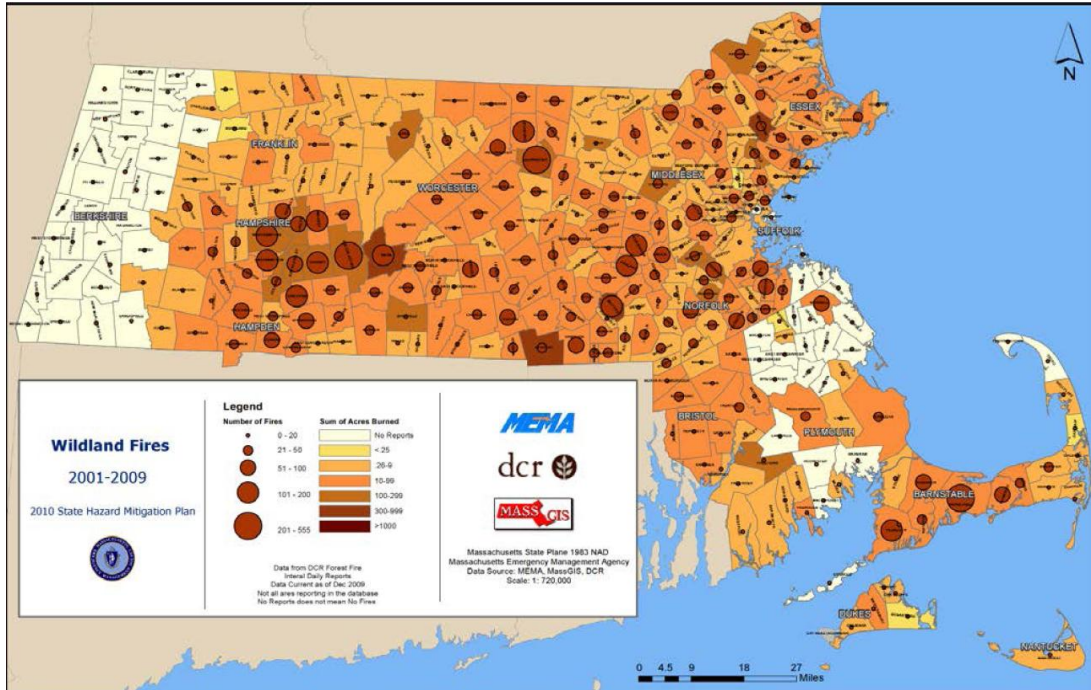
Previous Occurrences

Goshen has an all volunteer Fire Department, and there have not been any major forest fires in Goshen. There have not been any brushfires other than for small backyard burning of brush, for which the Town issues permits.

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

- 1995 – Russell, 500 acres burned on Mt. Tekoa
- 2000 – South Hadley, 310 acres burned over 14 days in the Litihia Springs Watershed
- 2001 – Ware, 400 acres burned
- 2010 – Russell, 320 acres burned on Mt. Tekoa
- 2012 – Eastern Hampden County, dry conditions and wind gusts created a brush fire in Brimfield, and burned 50 acres
- 2015 -- Huntington, 30 acres burned

Wildland Fires in Massachusetts, 2001-2009



Source: Massachusetts Hazard Mitigation Plan

Probability of Future Events

In accordance with the Massachusetts Hazard Mitigation Plan, the Goshen Hazard Mitigation Committee found it is difficult to predict the likelihood of wildfires in a probabilistic manner because the number of variables involved. However, based on previous occurrences, the Committee determined the probability of naturally caused future fire events to be “low” (1 percent to 10 percent probability in the next year). And the vast majority of fires are caused by human error.

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

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

Impact

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

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

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

Vulnerability

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

Using a total value of all structures in Goshen of \$146,224,000 and an estimated 50 percent of damage to 1 percent of all structures, the estimated amount of damage from a forest fire is \$731,120. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Earthquakes

Hazard Description

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

Location

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

Extent

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

² Northeast States Emergency Consortium Web site: www.nesec.org/hazards/earthquakes.cfm.

³ Federal Emergency Management Agency Web site:
www.fema.gov/hazards/earthquakes/quake.shtm.

| 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. |

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

Source: US Federal Emergency Management Agency

Previous Occurrences

The most recent earthquakes to affect Goshen are shown in the table below. IN addition to the New England earthquakes included in the table below, a quake of magnitude 5.8 on Aug. 23, 2011, centered in Virginia was felt all along the coast, including in Goshen. Experts say the region's geology can make the effects felt in an area up to 10 times larger than quakes of similar size on the West Coast.

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

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

| 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 |
| <i>Total Number of Earthquakes within the New England states between 1638 and 1989 is 2262.</i> | | |

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

Probability of Future Events

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

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

Source: USA.com

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

Impact

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

The Town faces a “critical” impact from significant earthquakes, with more than 25 percent of Goshen affected.

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

Vulnerability

Based on the above analysis, Goshen has a hazard index rating of “4- low risk” from earthquakes. Using a total value of all structures in Goshen of \$146,224,000 and an estimated 100 percent of damage to 25 percent of all structures (“critical” impact), the estimated amount of damage from an earthquake is \$36,556,000. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Dam Failure / Levee Breach

Hazard Description

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

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

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

Location

The Town of Goshen has 5 dams on public and private land. The names and hazard levels of the individual structures are:

| Dams and Dikes in Goshen or Affecting Goshen | | | |
|--|--------------------------------|---|-----------------|
| Dam | Street Name | Hazard Level | % Town Affected |
| Lower Highland Lake Dam | East St. | High--refurbishment scheduled for 2017 | 10 |
| Upper Highland Lake Dam | Moore Hill Rd | Significant-refurbishment scheduled 2015-2016 | 10 |
| Upper Highland Lake Dike | Cape St. | Significant--just refurbished | Less than 5 |
| Hammond Acres Lake Dam | Lake Dr. S Chesterfield Rd. | Significant--privately owned | Less than 5 |
| Sears Meadow Dam | Rte 9 | Low | Less than 5 |

The failure of a high hazard dam could affect a “medium” amount of the land area in Goshen, or between 10 and 50 percent of the total land area.

Extent

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

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

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

secondary highways or railroads or cause interruption of use or service of relatively important facilities.

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

Previous Occurrences

To date, there have been no catastrophic dam failures in Goshen.

Probability of Future Events

As Goshen's high hazard dams age, and if maintenance is deferred, the likelihood of a dam bursting will increase, but currently the frequency of dam failures is "very low" with a less than 1 percent chance of a dam bursting in any given year.

Impact

The Town faces a "medium" impact from failure of dams with a high hazard level, with 10 percent of Goshen land area affected.

The estimated property loss of each high hazard and significant hazard dam in Goshen is shown below. Other dams are not expected to have a risk to property and people. Costs are based on the total value of all property in Goshen of \$146,224,000.

If Upper Highland Dam fails, then Lower Highland will go with it.

Vulnerability

Based on this analysis, Goshen has a hazard index rating of "3 – medium risk" from dam failure or levee breach.

Drought

Hazard Description

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

Location

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

Extent

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

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

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

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

Previous Occurrences

In Massachusetts, six major droughts have occurred statewide since 1930.⁴ 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

In 2008 some people's ground wells started drying up and people had limited access to water. Members of the local Hazard Mitigation Committee do not know if this was caused by the D0 drought conditions occurring in 57% of the State in 2008. The problem resolved itself without any intervention required by the Town.

⁴ US Geological Survey Water-Supply Paper 2375. "National Water Summary 1989 – Floods and Droughts: Massachusetts." Prepared by S. William Wandle, Jr., US Geological Survey.

Probability of Future Events

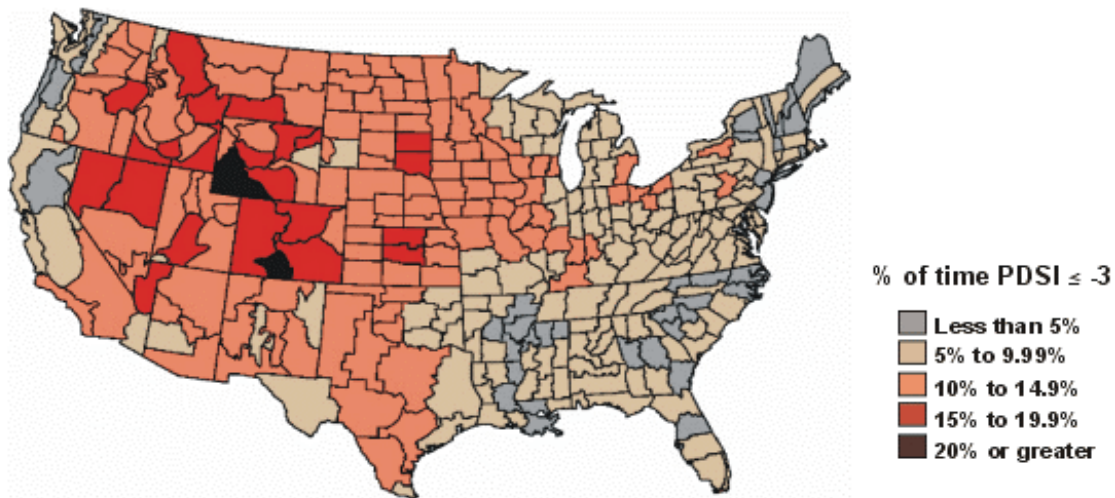
In Goshen, as in the rest of the state, drought occurs at a “low” probability (1 to 10 percent in the next year). Based on past events and current criteria outlined in the Massachusetts Drought Management Plan, it appears that western Massachusetts may be more vulnerable than eastern Massachusetts to severe drought conditions. However, many factors, such as water supply sources, population, economic factors (i.e., agriculture based economy), and infrastructure, may affect the severity and length of a drought event. When evaluating the region’s risk for drought on a national level, utilizing a measure called the Palmer Drought Severity Index, Massachusetts is historically in the lowest percentile for severity and risk of drought.⁵

Due to the water richness of western Massachusetts, Goshen 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.

Palmer Drought Severity Index

1895–1995

Percent of time in severe and extreme drought



⁵ National Drought Mitigation Center – <http://drought.unl.edu>

Impact

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

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

However, the Town's local aquifer supply would help to reduce the effects of widespread drought on the local water supply. The impact of a drought is thus "minor," with very few damages to people or property likely to occur.

Vulnerability

Based on the above assessment, Goshen has a hazard index rating of "4 –low risk" from drought. No loss of property, or damages to people or property is expected due to this hazard.

Extreme Temperatures

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

- Winter (Dec-Feb) Average = 27.51°F
- Summer (Jun-Aug) Average = 68.15°F

Criteria for issuing alerts for Massachusetts are provided on National Weather Service web pages:

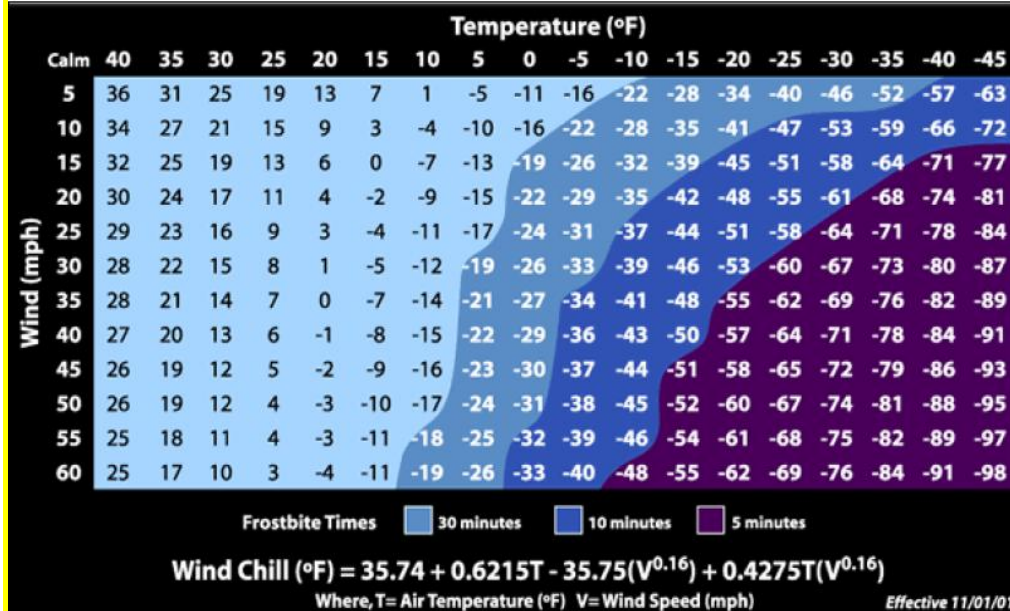
<http://www.erh.noaa.gov/box/warningcriteria.shtml>.

Extent

As per the Massachusetts Hazard Mitigation Plan, the extent (severity or magnitude) of extreme cold temperatures are generally measured through the Wind Chill Temperature Index. Wind Chill Temperature is the temperature that people and animals feel when outside and it is based on the rate of heat loss from exposed skin by the effects of wind and cold. The chart shows three shaded areas of frostbite danger. Each shaded area shows how long a person can be exposed before frostbite develops. In Massachusetts, a wind chill warning is issued by the NWS Taunton Forecast Office when the Wind Chill Temperature Index, based on sustained wind, is -25°F or lower for at least three hours.

Extreme temperatures would affect the whole community.

Wind Chills



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

Heat Index

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

Previous Occurrences

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

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

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

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

Probability of Future Events

The probability of future extreme heat and extreme cold is considered to be "low," or between 1 and 10 percent in any given year.

Impact

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

Vulnerability

Goshen's vulnerability from extreme heat and cold is considered to be, "5 - Lowest Risk."

Impacts of Climate Change

Climate change is already causing natural hazards to have more of an impact on Goshen, with hotter summers, wetter winters, more severe storms, and more frequent flooding. In the future, general climatic changes are projected to result in Goshen experiencing higher temperatures and more precipitation. There will also be wider variability in weather extreme and more days of extreme heat above 90 degrees, more heat waves, more floods, more droughts, and more tornados, hurricanes and heavy storms.

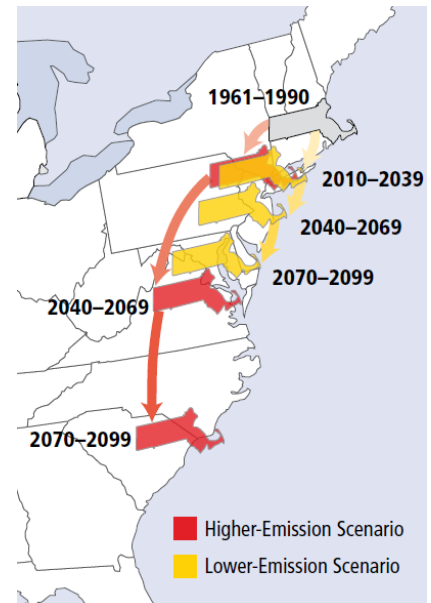
This change in climate will expand the area of Goshen that is within the 100-year and 500-year floodplain, affect critical resources and vulnerable populations, alter local food production, increase the risk of wildfires, and result in increased damage to people and property.

This section identifies the impacts that climate change will have to the various identified hazards affecting Goshen. The information included is derived from several accepted sources:

- The 2007 report of the Northeast Climate Impacts Assessment (NECIA)
- The Pioneer Valley Planning Commission's *Our Next Future: An Action Plan for Building a Smart, Resilient Pioneer Valley*, which includes climate change projections
- The Massachusetts Climate Change Adaptation Report
- The Massachusetts Multi-Hazard Mitigation Plan

The mitigation strategies included in Chapter 5 also take into account the impacts of climate change and provide adaptation strategies where appropriate.

While the exact extent is still uncertain, it is clear that climate change is occurring and will greatly affect Goshen in the upcoming decades. In order to prepare for changes in severe weather and flooding.



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

Increased Flooding

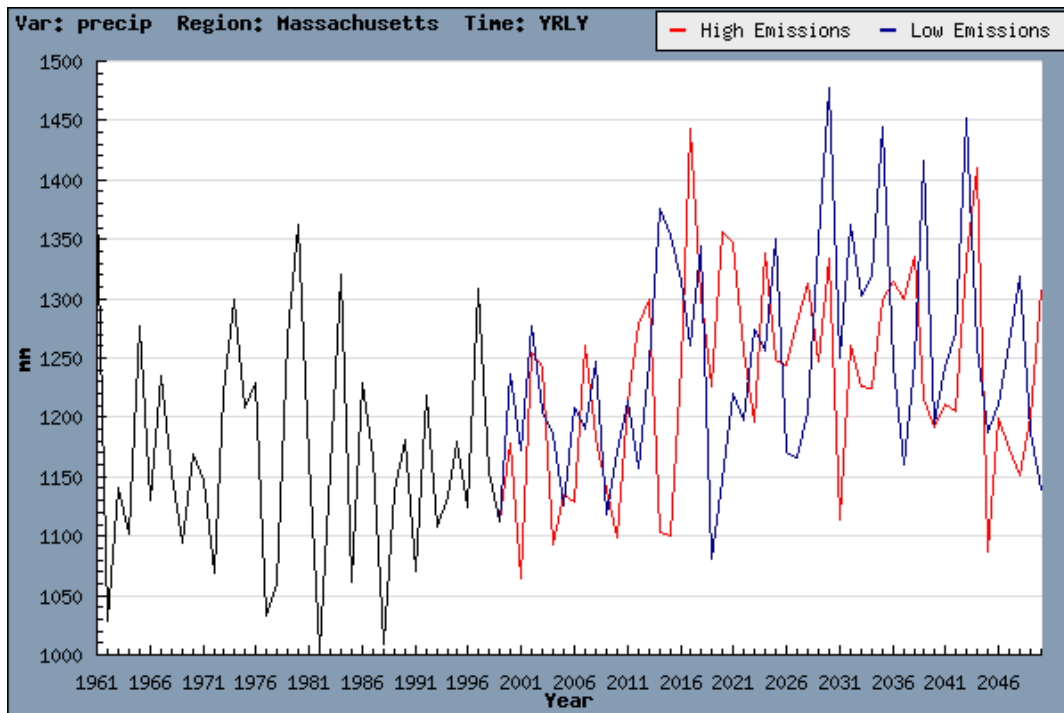
By the end of the 21st century, annual precipitation is expected to increase by 14 percent – however, this increase will be a result of more winter precipitation – an increase of 30 percent– while summer precipitation will actually slightly decrease. Additionally, most of this winter precipitation is projected to be in the form of rain rather than snow. This will result in a continuation of the current trend of an overall decrease in total snowfall, as well as the number of days that have snow cover. The increased amount of strong precipitation events and overall increase in rainfall will likely result in more flooding in the region.

Expected Climatic Variations Due to Climate Change

| Category | Current (1961-1990 avg.) | Predicted Change 2040-2069 | Predicted Change 2070-2099 |
|---------------------------------|-----------------------------|-------------------------------|-------------------------------|
| Average Annual Temperature (°F) | 46° | 50° to 51° | 51° to 56° |
| Average Winter Temperature (°F) | 23° | 25.5° to 27° | 31° to 35° |
| Average Summer Temperature (°F) | 68° | 69.5° to 71.5° | 74° to 82° |
| Days over 90 °F | 5 to 20 days | - | 30 to 60 days |
| Days over 100 °F | 0 to 2 days | - | 3 to 28 days |
| Annual Precipitation | 41 inches | 43 to 44 inches | 44 to 47 inches |
| Winter Precipitation | 8 inches | 8.5 to 9 inches | 9 to 10.4 inches |
| Summer Precipitation | 11 inches | 10.9 to 10.7 inches | 10.9 to 11 inches |

Sources: Massachusetts Climate Adaptation Report 2011, NECIA

Massachusetts Rainfall 1961-2050



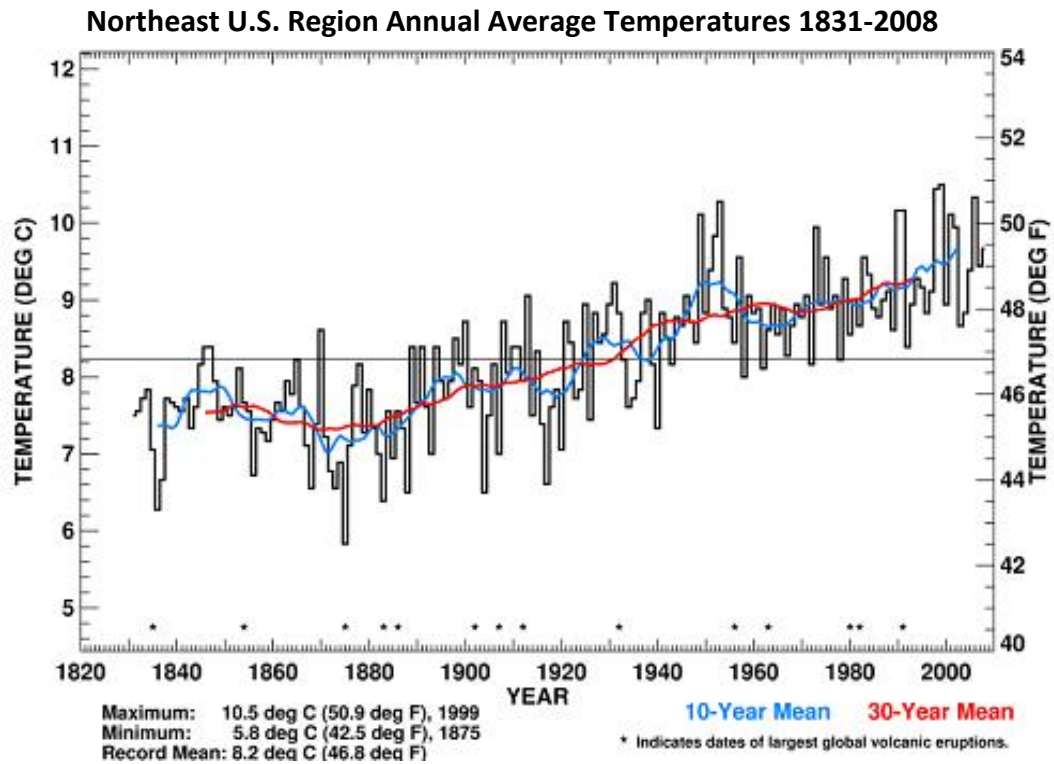
Rainfall has increased approximately 10% during the past 50 years, and is expected to continue to increase. *Source: NECIA*

Increased Temperatures

Average temperatures in the Pioneer Valley have been increasing over time in the Pioneer Valley due to climate change, and this trend is likely to continue in the future. Higher temperatures due to climate change will likely have an effect on future drought risk in Goshen. The climate of the Pioneer Valley is strongly influenced by the weather patterns of the larger Northeast United States, a region ranging from Pennsylvania to Maine. Average temperatures in the Northeast have been increasing since the late 1800s. The overall average annual temperature increase in this area has been approximately .9 degrees C (1.5°F) since approximately 1900.

According to records of the United States Historical Climatology Network, most of this temperature increase has occurred recently, with an average increase of about 0.2 degrees C (0.5°F) per decade since 1970. These higher average temperatures have primarily been the result of warmer winters (December through March), during which there has been an increase of 1.3°F per decade since 1970. In addition to average temperature increases, the number of extremely hot and record heat days has also increased: the number of days with temperatures of 90°F and higher throughout the Northeast has doubled during the past 45 years. The northern portion of the Northeast

currently sees about 5 days per year with temperatures over 90°F and no days over 100°F, while the southern portion sees up to 20 days over 90°F and 2 days over 100°F.



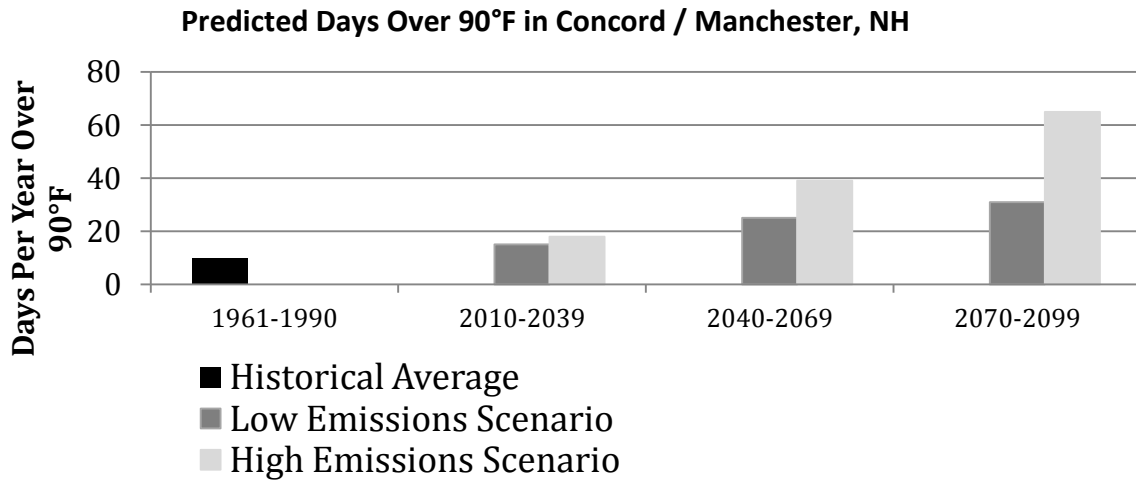
From 1831 to 2008, there was a trend in temperatures steadily increasing at the National Weather Service’s Blue Hill Observatory, the home of the oldest continuously recorded weather records in the U.S. Source: Michael J. Iacono, Atmospheric and Environmental Research, Inc./ Blue Hill Observatory, MA. Plot includes temperature data for 1831–1884 from Milton and Canton that were adjusted to the Blue Hill summit location.

Increased temperatures will have the following projected impacts to people and property:

- Increased temperatures will put stress on small farms and families and individuals who have gardens and small farms to supplement their local food supply and require farming operations to adjust by planting new varieties of crops.
- Changes are also likely to introduce new insect species, pests, and invasive plant species to the region, which will result in further threats to food production and

also adversely affect natural systems and biodiversity. Additional prominence of ticks may potentially also lead to more occurrence of Lyme disease.

- Increased energy usage in order to cool buildings in the summer and long-term electrical needs will increase.
- Greater stress on special populations, such as senior citizens, without access to air conditioning during heat waves.



Severe Weather

Temperature and precipitation changes in the region will lead to increased severe and extreme weather events, including:

- Slight decrease in summer precipitation that will result in an increase in the number of droughts. Short-term (1 to 3 month) droughts are likely to increase in their frequency in the Northeast to the level of once per year. According to the Connecticut Climate Adaptation Report, "Facing Our Future," the occurrence of drought in that state is already increasing, with shallower lakes drying up.⁶
- Decreased rainfalls will potentially create more occurrences of wildfires.
- Less dependable rainfall will also impact the Pioneer Valley's food systems, in the form of less dependable rainfall and require the region's farming operations to evolve.
- Increased occurrences of major snowstorms, especially during times previously considered unseasonably warm. Should storms occur when there are still leaves on trees, there could be great damage due to broken limbs, as happened during the snowstorm of 2011.
- Increased occurrences of severe thunderstorms and hurricanes, which will result in more wind damage from major storms and greater flooding.

Secondary Effects

- Disruption of communications services due to damage to cellular phone towers and other communications devices.
- Increased costs of home ownership due to higher flood insurance premiums, which will disproportionately affect low income residents.
- Higher difficulty in the ability of residents to obtain basic services that are heavily reliant on electricity after severe weather events, including gasoline and perishable food items.

⁶ State of Connecticut Department of Environmental Protection. Facing Our Future: Adapting to Connecticut's Changing Climate. March 2009.

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 the Town, coastal erosion, landslides, and tsunamis, were determined not to be a threat.

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

4: CRITICAL FACILITIES

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

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

Critical Facilities within Hazard Areas

The Critical Facilities List for the Town of Goshen has been identified utilizing two sources:

- Goshen's Comprehensive Emergency Management Plan
- Critical infrastructure mapping undertaken by PVPC under contract with the Western Region Homeland Security Advisory Council, which is charged by the Executive Office of Public Safety and Security to administer and coordinate the State Homeland Security Grant for western Massachusetts.

Goshen's Hazard Mitigation Committee has broken up this list of facilities into three categories:

- Facilities needed for Emergency Response in the event of a disaster.
- Non-Emergency Response Facilities that have been identified by the Committee as non-essential. These are not required in an emergency response event, but are considered essential for the everyday operation of Goshen.
- Facilities/Populations that the Committee wishes to protect in the event of a disaster.

The Critical Facilities Map at the end of this Plan identifies these facilities.

Category 1 – Emergency Response Services

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

1. Emergency Operations Center

Primary: Town Hall and Town Offices– 40/42 Main Street

Secondary: Goshen Fire Station – 56 Main Street

2. Fire Station

Goshen Fire Department – Headquarters: 56 Main St.

3. Police Station

Goshen Town Police Department – 40 Main St..

4. Highway Department

Highway Department – 8 Highland Rd.

5. Water

Transient/non-transient non-community wells

20,000 gallon cistern

Dry Hydrants: gravity fed on East St., Brook on East St./Mill River, Pond Hill Rd, at upper end of Hammond Pond, Dam House at Hammond Pond

6. Emergency Fuel Stations

Highway Department – 8 Highland Rd.

MassHighway Garage, Rt. 9 at corner with Spruce corner

7. Emergency Electrical Power Facility

Town Hall, Town Offices, EOC, Police Department, Highway and Fire Departments all have fixed generators capable of providing back-up power to the entire facility.

5 portable generators

8. Emergency Shelters

Goshen Town Hall- 42 Main Street (Route 9)

New Hingham Regional Elementary School, 30 Smith Rd., Chesterfield

9. Transfer Station

Town of Goshen Refuse Disposal and Recycling Center- Wing Hill Rd. and East St.

10. Helicopter Landing Sites

Riding club, Ball Rd. and anywhere there is 100 x 100 landing spot
Tilton Field
(Permitted anywhere feasible.)

11. Communications

Goshen EOC 42 Main St.
Goshen Public Library- 42 Main St. (Wireless Internet Access)
Goshen Fire Department – Headquarters: 56 Main St.

12. Primary Evacuation Routes

Route 112
Route 9

13. Bridges/Culverts Located on Evacuation Routes

Bridges

| <u>Evacuation Route</u> | <u>Crosses</u> | <u>Owner</u> | <u>Year Built</u> | <u>Year Rebuilt</u> |
|-------------------------|----------------|--------------|-------------------|---------------------|
| State Route 9 | Stone Brook | Mass Highway | 1950 | NA |
| State Route 9 | Stone Brook | Mass Highway | 1950 | NA |

There is a bridge heading east on Rt. 9 after Shaw Rd. that has a problem culvert. This is a State highway and is not included in the DPW's list of remaining problem culverts.

Category 2 – Non Emergency Response Facilities

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

1. Water Supply

Hammond Pond
Mill River West Branch
Stone Brook
Swift River
Upper and Lower Highland Lake
Sears Meadow
Webster Brook
Damon Pond

2. Problem Culverts--24 fixed since previous plan

Fuller Rd.
Route 9 at Swift River (State Highway)
Route 9 at East Brook (State Highway)
Two on Sears Road have been temporarily repaired and are scheduled for permanent repair

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

Nursing Home – none
Group Home – none
Neighborhoods with language barriers - none

2. Elderly Housing/Assisted Living

None

3. Public/Private Buildings/Areas

Camp Holy Cross- Cape Street
Camp Howe Youth Summer Camp- DAR Forest Rd.
DAR State Forest- 78 Cape St.
Goshen Public Library - 42 Main St.
U.S. Post Office - 33c Main St.
Institute for the Musical Arts, 165 Cape Street

4. Schools/Daycare

In-home 542 East St.
In-home 172 West St.
In-home 185 West St.

5. Churches

Goshen Congregational Church- 45 Main St.

6. Historic Buildings/Sites

Goshen Cemetery – Mollison Hill Rd.
Goshen Museum- 13 Main St.
John Williams House – 2 Williams Drive
Town Hall – 42 Main Street (eligible for National Register)

7. Apartment Complexes

General Store (3 units) - 31 Main St.
 Whale Inn (3 units) – 2 Main St.
 Mountain Rest Historic District – 1-7 Wildwood Lane

8. Employment Centers

On Route 9 there are Goshen’s large employers: Goshen Stone, George Propane, AccuFab and Lashway Lumber

| Critical Facilities and Evacuation Routes Potentially Affected by Hazard Areas | | | |
|--|----------------------------|--|----------------------------|
| Hazard Type | Hazard Area | Critical Facilities Affected | Evacuation Routes Affected |
| Flooding | | | |
| Severe Snowstorms / Ice Storms | Ridge lines and high areas | | Local roads and Rt. 9 |
| Severe Thunderstorms / wind / tornadoes | | | Local roads and Rt. 9 |
| Hurricanes | | | Local roads and Rt. 9 |
| Wildfire/Brushfire | Whole community | Whole community | Whole community |
| Earthquakes | | | |
| Dam Failure | East St. | Highway Garage-based on inundation maps and only after several days of steady rain | Rt. 9 Eastbound |
| Drought | | | |

(Critical Facilities Map Located In Back of Plan)

5: MITIGATION CAPABILITIES/STRATEGIES

One of the steps of this Hazard Mitigation Plan is to evaluate all of the Town's existing plans, policies and practices related to natural hazards and identify potential gaps in protection. After reviewing these plans, policies and the hazard identification and assessment, the Hazard Mitigation Committee developed a set of hazard mitigation strategies it will work to implement in the five years after FEMA approval of this plan.

Plans reviewed include the Town's Open Space and Recreation Plan, the Community Development Plan, the Green Communities Plan, and the Comprehensive Emergency Management Plan (CEMP). As noted previously, Town zoning and land use regulations were also reviewed. All boards, departments, committees that regulate development were represented on the plan committee.

The Town of Goshen 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, hurricanes, tornadoes, wildfires/brushfires, earthquakes, dam failures, and drought.

Existing Mitigation Capabilities/Strategies

The Town of Goshen had many mitigation strategies and various mitigation capabilities in place prior to the update of this Hazard Mitigation Plan in 2015. These capabilities/strategies are described on the following pages and have been summarized in a table at the end of this chapter.

The CEMP details specific Town responsibilities for each natural (as well as man-made) hazard, providing detailed assignments for each hazard by mitigation and preparedness. To obtain a copy of the CEMP, contact Town EMD.

For a list of completed strategies that were previously identified as part of the prioritized implementation list, see the table of “Deleted and Completed Strategies” later in this section.

Goshen's local Hazard Mitigation Committee used the FEMA Capability Assessment worksheet, as a guide to assess local capabilities to mitigate the consequences on natural hazards in the community.

Goshen has most of the no cost or low cost hazard mitigation capabilities in place. Land use zoning, subdivision regulations and an array of specific policies and regulations that include hazard mitigation best practices, such as limitations on development in floodplains, stormwater management, tree maintenance, etc. Goshen also has appropriate staff dedicated to hazard mitigation-related work for a community its size, including an Emergency Management Director, a professionally run Department of Public Works, a part-time Building Inspector, a Conservation Commission and a Planning Board, as well as a Tree Warden, and Goshen has recommended plans in place, including an Open Space and Recreation Plan, and a Comprehensive Emergency Management Plan. Not only does Goshen have these capabilities in place, but they are also deployed for hazard mitigation as appropriate. The Town also has very committed and dedicated volunteers who serve on Boards and Committees and in Volunteer positions. The Town collaborates closely with surrounding communities and is party to the Statewide Mutual Aid agreements, the Western Massachusetts Mutual Aid agreement sponsored by the Western Regional Homeland Security Council, as well as mutual aid agreements for the fire service and law enforcement. Goshen is also an active member community of the Pioneer Valley Planning Commission (PVPC) and can take advantage of no cost local technical assistance as needed provided by the professional planning staff at the PVPC.

Goshen's most obvious hazard mitigation need is for federal funds to implement prioritized actions. While Goshen is a well-managed fiscally sound Town, it is not a wealthy community and with state constraints on municipalities raising their own funds, Goshen has very limited financial resources to invest in costly hazard mitigation measures. Goshen is, however, committed to locally matching all HMGP grants received.

Flooding

The key factors in flooding are the water capacity of water bodies and waterways, the regulation of waterways by flood control structures, and the preservation of flood storage areas and wetlands. As more land is developed, more flood storage is demanded of the town's water bodies and waterways. The Town currently addresses this problem with a variety of mitigation tools and strategies. Flood-related regulations and strategies are included in the Town's zoning ordinance, and subdivision regulations. Infrastructure like dams and culverts are in place to manage the flow of water.

Management Plans

The Comprehensive Emergency Management (CEM) Plan for Goshen lists the following measures for flood planning:

- Identify areas in the community that are flood prone and define methods to minimize the risk. Review National Flood Insurance Maps.
- Disseminate emergency public information and instructions concerning flood preparedness and safety.
- Community leaders should ensure that Goshen continues to be enrolled in the National Flood Insurance Program.
- Strict adherence should be paid to land use and building codes, (e.g. Wetlands Protection Act), and new construction should not be built in flood-prone areas.
- Ensure that flood control works are in good operating condition at all times.
- Natural water storage areas should be preserved.
- Maintain plans for managing all flood emergency response activities including addressing potentially hazardous dams.

Subdivision Rules and Regulations/Zoning Ordinance

Highlights from Goshen's most recent draft of its Subdivision Rules and Regulations and Zoning Ordinances which mitigate the potential effects of flooding hazards on the Town are summarized in the Table at the end of this chapter. The whole Town is zoned Residential/Agricultural. To opt out of this zoning (to build anything other than AG/Res), applicants must go through a special permit process which effectively regulates development in the community.

National Flood Insurance Program

The National Flood Insurance Program has produced maps that identify floodways across America. Goshen is a participating member of the National Flood Insurance Program, and fourteen (14) homeowners have NFIP policies.

The Flood Insurance Rate Maps (FIRM) in Hampshire County have not been updated since 1980. The Town will maintain compliance with the NFIP throughout the next five-year Hazard Mitigation Planning cycle. The Town has prioritized adoption of the Floodplain Protection district. The FIRM maps are scheduled to be updated by FEMA in the next few years. When these maps are updated, the Town of Goshen will adjust its zoning to accommodate changes to the location of floodplains. There have been no repetitive loss claims in Goshen.

Flood Control Structures

There are no flood control structures in Goshen

Severe Snowstorms / Ice Storms

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

The Town's current mitigation tools and strategies focus on preparedness, with many regulations and standards established based on safety during storm events. 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.

Management Plans

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

Restrictions on Development

The Town of Goshen Bylaws set grade limits on driveways that are included in Section XV 4.D.: Gradients, which, although not specified as weather hazard mitigation, can serve to minimize accident potential and power loss from severe winter storms.

State Building Code

For new or recently built structures, the primary protection against snow-related damage is construction according to the International Building Code, which addresses designing buildings to withstand snow loads. Goshen has a part-time, professional building inspector on its staff.

Improvements to Backup Power Supply

Since the 2009 plan the Town has significantly increased the resilience of its emergency facilities, in case of power loss from hazards such as ice-storms.

Hurricanes / Severe Thunderstorms / Wind / Tornadoes

Hurricanes, severe thunderstorms, and tornadoes all generate high winds that can fell trees, down electrical wires, and generate hurtling debris. This common characteristic means that the same set of mitigation strategies applies equally to all four hazards. For example, current land development regulations, such as restrictions on the height of telecommunications towers, can help prevent wind damages from all four types of hazards. In addition to wind damage, hurricanes can generate significant flooding that damages buildings, infrastructure and threatens human lives. All of the existing mitigation measures listed in the Flooding section are also hurricane mitigation measures.

Management Plans

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

Zoning

The Protective Bylaw requires that any year-round dwelling be on permanent foundations. Seasonal dwellings are allowed without a foundation.

Restrictions on Development - Mobile Homes

According to the Town of Goshen Bylaw, mobile homes are an allowed use by special permit only for temporary residence if one's home is damaged or destroyed by a hazard, allowing time to re-build a permanent structure.

State Building Code

For new or recently built structures, the primary protection against wind-related damage is construction that adheres to the State (International--because the Commonwealth adheres to the International Building Code) Building Code, which, when followed, results in buildings that withstand high winds. The Town of Goshen employs a part-time building inspector for all inspection duties and responsibilities.

Flood Mitigation Strategies/Capabilities

Because one of the primary impacts of hurricanes and severe thunderstorms is intense rainfall that generate flooding, all of the flood mitigation strategies/capabilities discussed above are also mitigation strategies for hurricanes and severe thunderstorms.

Wildfires/Brushfires

Wildfire and brushfire mitigation strategies involve educating people about how to prevent fires from starting, as well as controlling burns within the town.

Management Plans

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

Regulatory Measures

Burn Permits: The Town of Goshen does allow open burning under the guidelines of the Department of Environmental Protection. Open Burning is authorized from January to May (State law). Burning is permitted between the hours of 10 am to 4 pm (State law). The Officer in Charge of the Fire Department will determine if burning will be allowed at the beginning of the shift and can suspend burning if weather conditions change.

Subdivision Review: The procedures for the submission of preliminary and definitive subdivision plans require that the Fire Department be an active participant in the review of proposed subdivision plans. This involves verifying that proficient water supplies exist and that access routes to and from a given subdivision adequately meet public safety needs.

Public Education/Outreach: The Goshen Fire Department maintains a public outreach program that targets children and seniors with the intention of spreading information about fire safety within these two populations. Furthermore, the Town has a safety inspection program that works to ensure that fire safety standards are being met.

Restrictions on Development

There are currently no restrictions on development that are based on the need to mitigate the hazards of wildfires and brushfires.

Earthquakes

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

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

Management Plans

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

State Building Code

State and local building inspectors are guided by regulations put forth in the Massachusetts State Building Code. The first edition of the Massachusetts State Building Code went into effect on January 1, 1975 and included specific earthquake resistant design standards. These seismic requirements for new construction have been revised and updated over the years and are part of the current, 8th edition of the Massachusetts State Building Code. Given that most structures in Massachusetts were built before 1975, of many buildings and structures do not have specific earthquake resistant design features. In addition, built areas underlain by artificial fill, sandy or clay soils are particularly vulnerable to damage during an earthquake.

Restrictions on Development

There are no seismic-related restrictions on development beyond that in the building code.

Dam Failures

Dam or levee failure is a highly infrequent occurrence, but a severe incident could prove catastrophic. In addition, dam failure most often coincides with flooding, so its impacts can be multiplied, as the additional water has nowhere to flow.

Management Plans and Regulatory Measures

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

Permits Required for New Dam Construction

Massachusetts State Law (M.G.L. Chapter 253 Section 45) regulates the construction of new dams. A permit must be obtained from the Department of Conservation and Recreation (DCR) before construction can begin. One of the permit requirements is that all local approvals or permits must be obtained. All new dams must adhere to seismic requirements set forth in the 8th Edition of the Massachusetts State Building Code.

Dam Inspections and Removal of Dams

The DCR requires that dams rated as Low Hazards are inspected every ten years and dams that are rated as Medium/Significant Hazards are inspected every five years. High Hazard dams must be inspected every two years.

The Town works with the Department of Conservation and Recreation (DCR), Office of Dam Safety and with the Army Corps of Engineers to assure Dam Safety. The Conservation Commission and the EMD are the Town's primary contacts.

Restrictions on Development

There are no Town restrictions on dam locations. The DCR issues permits for new dams and does have the authority to deny a permit if it is determined that the design and/or location of the dam is not acceptable.

Emergency Action Plan Highland Lakes Upper Dam & Emergency Action Plan Highland Lake Lower Dam

The Town received copies of these plans from GZA Associates. They were updated in June 2013.

Drought

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

State Regulations

The Town of Goshen follows the state's Water Management Act, which limits the amount of water consumption during a state-issued Water Emergency Declaration. For more information visit: www.mass.gov/eea/agencies/massdep/water/drinking/the-massachusetts-water-management-act-program.html.

Existing Hazard Mitigation Measures with Potential Changes Noted

| Existing Action | Description | Area Covered | Effectiveness | Potential Changes |
|-----------------------------------|--|--------------|---|---|
| Goshen Community Plan | Inventories natural features and promotes natural resource preservation in the town, including areas in the floodplain; such as wetlands, groundwater recharge areas, farms and open space, rivers, streams and brooks. | Entire Town. | Effective. | Work to implement relevant goals and policies in Plan. |
| Subdivision Rules and Regulations | <p align="center">Definitive plan requires delineating natural waterways and floodways</p> <p align="center">Design standards require drainage, stormwater easements when near watercourse</p> <p align="center">Utilities – catch basins must be provided to remove surface water off roads</p> | Entire Town. | <p align="center">Somewhat effective for mitigating or preventing localized flooding of roads and other infrastructure.</p> <p align="center">Somewhat effective for controlling impacts from stormwater runoff.</p> <p align="center">Prevents flood damage to infrastructure.</p> | Consider adding stormwater retention/detention requirements |

| Existing Action | Description | Area Covered | Effectiveness | Potential Changes |
|---|--|--|--|--|
| Zoning Ordinance: Use Regulations – Special Permit | Seasonal dwellings converted into year-round residence must show that soil absorption, filtration, ground water supply are not impacted. Earth removal/excavation projects in excess of 100 cubic yards require permit. | Entire town. | Somewhat effective for managing new development, esp. near waterbodies Low. | Consider making all new development near waterbodies, not just conversions, show that soil absorption, filtration, ground water supply are not impacted Consider adding performance standards for run-off, drainage, water pollution caused during earth removal/excavation |
| Participation in the National Flood Insurance Program | As of 2014, there were 14 homeowners with flood insurance policies. | Areas identified by the FEMA maps. | Somewhat effective, provided that the Town remains enrolled in the National Flood Insurance Program. | The Town considered becoming a part of FEMA's Community Rating System and has determined that it is not cost effective to do so at this time. |
| Culvert Replacement | Replace top priorities on culvert replacement list | Areas affected by culverts-varies | Very effective as funding becomes available | None. Since the 2009 plan the Town has effectively worked through the top priority culverts on the list and has one remaining. |
| Dam Inspection | Ensure dam owners realize their responsibility to inspect the dams regularly | Varies by dam-see chart in Dam section | Effective | None |

| Existing Action | Description | Area Covered | Effectiveness | Potential Changes |
|--|---|----------------|--|--------------------------|
| Floodplain Protection District | The Town has drafted a Floodplain Protection District to limit or restrict development within the floodplains, and/or a Groundwater Supply Protection District to limit or restrict development in groundwater recharge areas. | Targeted areas | Anticipated to be effective | Recommend adopting this. |
| Subdivision Regulations – Design Standards for Roads | Standards include street grade regulations (eight to fifteen percent maximum). | Entire Town. | Effective. | None. |
| Zoning Bylaw – Driveway Bylaw | Driveways must be approved, and bylaw also regulates grade of driveways where they meet with roadway | Entire Town. | Effective for preventing incompatible driveways or loss of access. | None. |
| State Building Code | Goshen follows the Massachusetts State (International) Building Code. | Entire Town. | Effective. | None. |
| Backup Electric Power | Shelters have backup power, five mobile generators | Entire Town. | Effective | None |
| Tree Management | List of dangerous trees created annually for Eversource. | Entire Town. | Effective | None |
| Snow Removal Restrictions | Increase enforcement of restrictions prohibiting residents from plowing snow into the road. | Entire Town | Effective | None |
| Regional Debris Management Plan | The Town has planned to participate in the Regional Debris Management Plan that was proposed in 2008 and was never developed. The WRHSAC funded a debris management plan in Franklin County and if funds are available for Hampshire County-Goshen will participate | Entire Town | Effective | None |

| Existing Action | Description | Area Covered | Effectiveness | Potential Changes |
|---|---|--------------|--|-------------------|
| Zoning Bylaw – Permissible Uses by Special Permit | Allows mobile homes/trailers, for temporary use if home is destroyed or damaged | Entire Town. | Somewhat effective for preventing damage to susceptible structures | None. |
| Zoning Bylaw- Protective Bylaw | Requires any year-round dwelling to be on permanent foundations | Entire Town. | Somewhat effective for preventing damage to susceptible structures | None. |
| State Building Code | The Town of Goshen has adopted the Massachusetts State Building Code. | Entire Town. | Effective. | None. |
| Zoning Bylaw – Use Regulation | Sawmills and lumberyards must clean up residue to prevent fire | Entire Town. | Effective | None. |
| Burn Permits | Residents are permitted to obtain burn permits over the phone. State police personnel provide information on safe burn practices. | Entire Town. | Effective. | None. |
| Subdivision Review: Fire Safety | The Fire Department is involved in the review of subdivision plans. | Entire Town. | Effective. | None. |
| Public Education/Outreach | The Fire Department has an ongoing educational program in the schools. | Entire Town. | Effective. | None. |
| Permits required for new dam construction | State law requires a permit for the construction of any dam. | Entire Town. | Effective. Ensures dams are adequately designed. | None. |
| Dam Inspections | DCR Office of Dam Safety has an inspection schedule that is based on the hazard rating of the dam (low, medium, high hazard). | Entire Town. | Low. The responsibility for this is now on dam owners, who may not have sufficient funding | None. |

| Existing Action | Description | Area Covered | Effectiveness | Potential Changes |
|---|--|--------------|---|-------------------|
| | | | to comply. | |
| Subdivision Regulations – Definitive Plan | Proposed layout of water supply must be included. | Entire Town. | Somewhat Effective. | None. |
| Dam Inspections | DCR has an inspection schedule that is based on the hazard rating of the dam (low, medium, high hazard). | Entire Town. | Low. The responsibility for this is now on dam owners, who may not have sufficient funding to comply. | None. |
| | | | | |

Deleted or Completed Mitigation Actions

Several mitigation strategies listed in the 2008 version of the Goshen Hazard Mitigation Plan have been removed or completed in the time since this 5-year update. Deleted and completed strategies, and their status, are indicated in the table below.

Table 6.1: Prioritized Implementation Schedule – 2008 Action Plan Updated with Status 2015
Completed or No longer Included are lined out

| Priority 2008-2015 | Mitigation Action | Responsible Department/Board | Proposed Completion Date | Funding Source/ Estimated Cost | Incorporation into Existing Plans | Status in 2015 |
|--------------------|---|---|--------------------------|--------------------------------|--|---|
| 1->8 | Ensure dam owners realize their responsibility to inspect and maintain the dams. EMD will secure proof from owner of up to date inspection. | EMD | 2009 and ongoing | Local/minimal | n/a | Still to do, move to priority #8 |
| 2-✓ | Seek funding from HMGP for top priority culvert replacement projects. | Highway Dept, SelectBoard, EMD | 2010 | HMGP/significant | Integrate into capitol improvement plan | Completed |
| 6->6 | Consider making all new development near water bodies, not just conversions , show that soil absorption, filtration, ground water supply are not impacted | Planning Board | 2010 | Local/minimal | Integrate into master plan and osrp when/if we create them | Leave in-not yet acted upon |
| 7->5 | Consider adding performance standards for run-off, drainage, water pollution caused during earth removal/excavation | Planning Board | 2010 | Local/minimal | Integrate into master plan and osrp when/if we create them | Leave in-not yet acted upon |
| 8->4 | Consider adding stormwater retention/detention requirements | Planning Board | 2010 | Local/minimal | Integrate into master plan and osrp when/if we create them | Leave in-not yet acted upon |
| 5 | The town should evaluate whether to become a part of FEMA's Community Rating System. | EMD/SelectBoard | 2009 | Local/minimal | Integrate into capitol improvement plan | Evaluated and determined to NOT be cost effective |

| | | | | | | |
|-------|--|--------------------|--------------|--------------------------------------|--|-----------------------------|
| 3 | Need an estimated \$5,000-10,000 for a transfer switch in the Town offices | EMD/Fire Chief/SB | 2009 | Homeland security/HMGP/local/minimal | Integrate into capital improvement plan | Completed |
| 9 | Need to encourage tree warden to inspect trees regularly and prioritize tree removal or trimming as appropriate. | SB/PB/Highway Dept | 2009 ongoing | Local/minimal | Integrate into master plan and osrp when/if we create them | Completed |
| 4 | Identify sources of funding for dam safety inspections. | MEMA/PVPC/EMD/DCR | ongoing | Combined/minimal | n/a | Completed |
| 10->2 | Seasonal dwellings converted into year-round residence must show that ground water supply is not impacted | Planning Board | 2009 | Local/minimal | Integrate into master plan and osrp when/if we create them | Leave in-not yet acted upon |
| | | | | | | |

Prioritized Implementation Plan

Several of the action items previously identified in the 2008 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. Overall mitigation strategy priorities have not changed since the last version of this plan, with specific mitigation strategies addressing all identified hazards through a combination of planning, public outreach, and infrastructure improvements.

Prioritization Methodology

The Goshen 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:

- City staff time for grant application and administration (at a rate of \$25 per hour)
- Consultant design and construction cost (based on estimates for projects obtained from city and general knowledge of previous work in city)
- City staff time for construction, maintenance, and operation activities (at a rate of \$25 per hour)

Project Timeline

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

MITIGATION STRATEGIES TO BE IMPLEMENTED

| MITIGATION ACTION | STATUS | ACTION TYPE | HAZARDS MITIGATED | RESPONSIBLE DEPARTMENT/ BOARD | TIMEFRAME | POTENTIAL FUNDING SOURCE(S) | ESTIMATED COST | PRIORITY |
|--|--|------------------------------|--|--------------------------------------|---|--|-----------------------|-----------------|
| Adopt draft Floodplain Protection District | The Town has drafted a Floodplain Protection District to limit or restrict development within the floodplains, and/or a Groundwater Supply Protection District to limit or restrict development in groundwater recharge areas. | Regulatory | Flooding and all hazards that can result in flooding-severe thunderstorms, hurricanes, tornadoes | Planning Board | Start Jan 2017 with adoption by Oct 2017 | Local, State \$\$- District Local Technical Assistance (DLTA) if necessary | low | 1 |
| Expand requirement that seasonal dwellings converted into year-round residence must show that ground water supply is not impacted to all development near water bodies | New action--building on existing capacity. Modify special permit use regulation in Zoning Ordinance to require that all new development near water bodies must show that soil absorption, filtration, and ground water supply are not to mitigate flooding | Regulatory | Flooding and all hazards that can result in flooding-severe thunderstorms, hurricanes, tornadoes | Planning Board, Open Space Committee | Start Jan 2018- conclude by Dec 2-18 | Local, DLTA if necessary and/or Local Technical Assistance (LTA) from the PVPC | low | 2 |
| Replace Fuller Road Culvert | Town made considerable progress from 2009 plan and has one problem culvert remaining on local roads | Construction/ implementation | Flooding and all hazards that can result in flooding-severe thunderstorms, hurricanes, tornadoes | DPW | After funding has been secured, anticipate 9 months of work | HMGP/Local | medium | 3 |
| Permanent repair of problem culverts on Sears Road | The culverts were repaired temporarily and have been scheduled for permanent repair in 2017 | Construction/ Implementation | Flooding and all hazards that can result in flooding-severe thunderstorms, hurricanes, tornadoes | DPW | Jan 2017 to Dec 2017 | Local | low | 4 |

MITIGATION STRATEGIES TO BE IMPLEMENTED

| MITIGATION ACTION | STATUS | ACTION TYPE | HAZARDS MITIGATED | RESPONSIBLE DEPARTMENT/ BOARD | TIMEFRAME | POTENTIAL FUNDING SOURCE(S) | ESTIMATED COST | PRIORITY |
|---|--|---------------------|--|---|----------------------------|------------------------------------|-----------------------|-----------------|
| Add stormwater retention/detention requirements to subdivision rules and regulations | This is a new action that the Hazard Mitigation committee recommends be taken by the Town. | Planning/Regulatory | Flooding and all hazards that can result in flooding-severe thunderstorms, hurricanes, tornadoes | Planning Board, OSRP and/or Master Plan committee | Start Jan 2019 to Dec 2019 | Local, DLTA if necessary | low | 5 |
| Add performance standards for run-off, drainage, water pollution caused during earth removal/excavation | This is a new action that the Hazard Mitigation committee recommends be taken by the Town. | Planning/Regulatory | Flooding and all hazards that can result in flooding-severe thunderstorms, hurricanes, tornadoes | Planning Board, OSRP and/or Master Plan committee | Start Jan 2020 to Dec 2020 | Local, DLTA if necessary | low | 6 |
| Participate in regional debris management plan by attending and actively participating in meetings, collecting and analyzing data, developing an action plan and engaging residents and key stakeholders and assuring adoption as needed. | In 2009 when original Hazard Mitigation plan was finalized, the Western Region Homeland Security Advisory Council (WRHSAC) had planned to fund a regional debris management plan, but funding was diverted. In 2016 WRHSAC is supporting development of a regional debris management plan template for Franklin county; if WRHSAC makes funds available for Hampshire County, Goshen will participate. | Planning/Management | Flooding and all hazards that can result in flooding-severe thunderstorms, hurricanes, tornadoes | EMD | 2019 | WRHSAC | low | 7 |

MITIGATION STRATEGIES TO BE IMPLEMENTED

| MITIGATION ACTION | STATUS | ACTION TYPE | HAZARDS MITIGATED | RESPONSIBLE DEPARTMENT/ BOARD | TIMEFRAME | POTENTIAL FUNDING SOURCE(S) | ESTIMATED COST | PRIORITY |
|---|---|------------------------|--|--------------------------------------|------------------|------------------------------------|-----------------------|-----------------|
| Ensure dam owners realize their responsibility to inspect and maintain the dams. EMD will secure proof from owner of up to date inspection. | This is an ongoing effort and needs to be implemented every two years | Education/ Enforcement | Flooding and all hazards that can result in flooding-severe thunderstorms, hurricanes, tornadoes | EMD | 2017, 2019 | local | low | 8 |
| | | | | | | | | |

6: PLAN REVIEW, EVALUATION, IMPLEMENTATION, AND ADOPTION

Plan Adoption

Upon completion of the draft Hazard Mitigation Plan, a public meeting was held on August 13, 2015 to receive comments. 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 Goshen Board of Selectmen and adopted.

Plan Implementation

The implementation of this plan began upon its formal adoption by the Board of Selectmen and approval by MEMA and FEMA. Those Town departments and boards responsible for ensuring the development of policies, ordinance revisions, and programs as described in Sections 5 and 6 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:

- ***Goshen Zoning Ordinance and Sub-division Regulations*** - The Town's Zoning and Sub-Division Regulations was used to gather identify those actions that the Town is already taking that are reducing the potential impacts of a natural hazard (i.e. floodplain regulations) to avoid duplicating existing successful efforts.
- ***Goshen Comprehensive Emergency Management Plan*** (particularly the Critical Infrastructure Section) – the Critical Infrastructure section was used to identify those infrastructure components in Goshen that have been identified as crucial to the function of the town of Goshen;
- ***Goshen Open Space, Recreation Plan*** - this Plan was used to identify the natural context within which the Goshen mitigation planning would take place. This proved useful insofar as it identified water bodies, rivers, streams, infrastructure components (i.e. water and sewer, or the lack thereof), as well as population trends. This was incorporated to ensure that the Town's mitigation efforts would be sensitive to the surrounding environment.

- ***Goshen Community Development Plan*** - This plan was assessed for any relevant strategies pertaining to mitigation.
- ***Massachusetts' State Hazard Mitigation Plan*** - This plan was used to insure that the town's HMP was consistent with the State's Plan.

After this plan has been approved by both FEMA and the local government, links to the plan will be emailed to all Town staff, boards, and committees, with a reminder to review the plan periodically and work to incorporate its contents, especially the action plan, into other planning processes and documents. In addition, during annual monitoring meetings for the Hazard Mitigation Plan implementation process, 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 remind people working on these plans, policies etc of the Hazard Mitigation plan, and urge them to incorporate the Hazard Mitigation plan into their efforts. The Hazard Mitigation Committee will also review current Town programs and policies to ensure that they are consistent with the mitigation strategies described in this plan. The Hazard Mitigation Plan will also be incorporated into updates of the Town's Comprehensive Emergency Management Plan.

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

Plan Monitoring and Evaluation

The measure of success of the Goshen Hazard Mitigation Plan will be the number of identified mitigation strategies implemented. In order for the Town to become more disaster resilient, there must be a coordinated effort between elected officials, appointed bodies, Town employees, regional and state agencies involved in disaster mitigation, and the general public.

The Goshen Hazard Mitigation Committee will meet on an annual basis or as needed (i.e., following a natural disaster) to monitor the progress of implementation, evaluate the success or failure of implemented recommendations, and brainstorm for strategies to remove obstacles to implementation. Following these discussions, it is anticipated that the committee may decide to reassign the roles and responsibilities for implementing mitigation strategies to different Town departments and/or revise the goals and objectives contained in the plan. The committee will review and update the plan every year, beginning in the fall of 2016. The meetings of the committee will be organized and facilitated by the Emergency Management Director. 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. Hard copies of the plan will be available in Goshen Town Offices at 40 Main Street, open 10 am to 2 pm, Monday through Thursday. The Hazard Mitigation Committee will meet annually to discuss any needs and amendments. Any proposed amendments will be advertised and posted on the Town's website. Any changes will be preceded by a public hearing and solicitation of public comments.

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

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

Plan Mission and Goal

- Is the Plan's stated goal and mission still accurate and up to date, reflecting any changes to local hazard mitigation activities?
- Are there any changes or improvements that can be made to the goal and mission?

Hazard Identification and Risk Assessment

- Have there been any new occurrences of hazard events since the plan was last reviewed? If so, these hazards should be incorporated into the Hazard Identification and Risk Assessment.
- Have any new occurrences of hazards varied from previous occurrences in terms of their extent or impact? If so, the stated impact, extent, probability of future occurrence, or overall assessment of risk and vulnerability should be edited to reflect these changes.
- Is there any new data available from local, state, or Federal sources about the impact of previous hazard events, or any new data for the probability of future occurrences? If so, this information should be incorporated into the plan.

Existing Mitigation Strategies

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

Proposed Mitigation Strategies

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

Review of the Plan and Integration with Other Planning Documents

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

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

7: APPENDICES

Appendix A – Documentation of the Planning Process

Goshen Hazard Mitigation Committee Meeting Agenda

**Goshen Town Hall
June 17, 2015, 6:00 p.m.**

1. Introductions/Administrative
 - a. affirm local Hazard Committee membership
 - b. in-kind reporting
2. Overview of Hazard Mitigation Planning Process
 - a. Background on Hazard Mitigation Planning
 - b. Planning process and requirements
 - i. 3-5 committee meetings
 - ii. 2 public outreach meetings
 - iii. MEMA / FEMA review and conditional approval
 - iv. Select Board adoption
 - v. FEMA final approval
 - c. Schedule for committee and public outreach meetings
3. Review of Chapter 1: Planning Process
4. Review of Chapter 2: Local Profile
5. Review of Chapter 3: Hazard Identification and Risk Assessment
6. Homework:
 - a. for Chapter 4--Critical Facilities: review map and mark up with corrections as needed
 - b. for Chapter 5--Mitigation Strategies: reflect on last 5 years and review strategy chart from previous plan (handout); come prepared to provide input on status of prioritized strategies as well as suggestions for new strategies.
 - c. nothing for Chapter 6- Plan Review, Evaluation, Implementation, and Adoption

Members forgot to initial for June 17 Meeting, but 5 attended (Larry, Todd, Norene, Sue and Roger)

Local Hazard Mitigation Committee
Meeting June 17, 2015

| Initials | Name | Title | Phone | Email |
|----------|----------------|------------------------|--------------|----------------------------|
| | Larry Holmberg | EMD | | lholmberg@crocker.com |
| | Todd Dewkett | Highway Superintendent | 413-268-7062 | Tdewkett12@verizon.net |
| | Norene Roberts | | | robertshistory@verizon.net |
| | Diane Bushee | SelectBoard Chair | 413-268-8236 | bdbushee@verizon.net |
| | Scott Bisbee | SelectBoard Vice Chair | 413-268-8236 | sjbisbee@gmail.com |
| | Sue Labrie | Fire Chief | 413-268-7161 | gfd56x1@msn.com |
| | Roger Culver | Planning Board | | |
| | | | | |
| | | | | |
| | | | | |

Goshen Hazard Mitigation
July 22, 2015
Local Committee

| Name | Initial of present |
|----------------|--------------------|
| Larry Holmberg | LH |
| Roger Culver | RC |
| Susan Labrie | |
| Norene Roberts | NR |
| Scott Bisbee | SB |
| Todd Dewkett | TD |

Goshen Emergency Planning Committee

Meeting Notice

The Goshen Emergency Planning Committee will hold **two (2) meetings on Wednesday, July 22, 2015.**

Public Engagement Meeting regarding Natural Hazard Mitigation Planning

Time: 6:30 pm
Location: Goshen Town Hall
42 Main St
Goshen, MA

The purpose of the meeting is to get the public's concerns, suggestions, and other input about the hazard mitigation planning process and its impact on Goshen and its residents.

The engagement meeting will be immediately followed by a meeting of the

Goshen Emergency Planning Committee

7:00 pm at the Goshen Town Hall

Agenda

1. Minutes of the June 17, 2015 meeting
2. Continued updating Goshen's *Natural Hazards Mitigation Plan*
3. Other business not reasonably foreseen

These are public meetings.

For further information contact: Larry Holmberg, Chair, at 413-296-4247

Goshen Emergency Planning Committee

Meeting Notice

The Goshen Emergency Planning Committee will meet on ^{Thursday} ~~Wednesday~~, August 13, 2015 at 6 pm at the Goshen Town Hall, 42 Main St, Goshen, MA.

Agenda

1. An informational session for the public about natural hazard mitigation and the process to develop and update the current Natural Hazard Mitigation Plan and to get the public's concerns, suggestions, and other input about the hazard mitigation planning process and its impact on Goshen and its residents.
2. Approval of the minutes of the July 22, 2015 meeting
3. Continued updating and final review of Goshen's *Natural Hazards Mitigation Plan*
4. Other business not reasonably foreseen.

These are public meetings.

For further information contact: Larry Holmberg, Chair, at 413-296-4247

| Name | Signature |
|-----------------|-----------------|
| Noene Roberts | Noene Roberts |
| Larry Holmberg | Larry Holmberg |
| Roger Cator | Roger Cator |
| Todd R Dewhett | Todd R Dewhett |
| Scott Bisbee | Scott Bisbee |
| Catherine Pater | Catherine Pater |



MEDIA RELEASE

CONTACT: Catherine Ratte, PVPC Principal Planner, (413) 781-6045 or cratte@pvpc.org
Larry Holmberg, Emergency Management Director (EMD) Town of Goshen
(413) 529-1700 or lholmberg@crocker.com

FOR IMMEDIATE RELEASE
July 17, 2015

Town of Goshen to Hold Public Engagement Event for Hazard Mitigation Plan

Goshen residents, businesses, and surrounding community representatives are invited to provide comments on the update of the Town of Goshen Hazard Mitigation Plan on Wednesday, July 22 at 6:30 pm at Goshen Town Hall, 40 Main Street. The plan is being updated by the Town with assistance from the Pioneer Valley Planning Commission and is funded by the Federal Emergency Management Agency (FEMA) and the Massachusetts Emergency Management Agency (MEMA). All members of the public, representatives from surrounding communities and other interested parties are welcome to attend the event.

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

This planning effort is being undertaken to help the Town of Goshen assess the risks faced from natural hazards, identify action steps that can be taken to prevent damage to property and loss of life, and prioritize funding for mitigation efforts. A mitigation action is any action taken to reduce or eliminate the long-term risk to human life and property from hazards.

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



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MEDIA RELEASE

CONTACT: Catherine Ratté, PVPC Principal Planner/Section Manager, (413) 781-6045 or cratte@pvpc.org Larry Holmberg, Emergency Management Director (EMD) Town of Goshen (413) 529-1700 or lholmberg@crocker.com

FOR IMMEDIATE RELEASE
August 10, 2015

Town of Goshen to Hold Second Public Engagement Event for Completed Draft Update of Hazard Mitigation Plan

Goshen residents are invited to provide comments on the Town of Goshen's Hazard Mitigation Plan on **Thursday, August 13** at 7:00 p.m. at the Goshen Town Hall, 40 Main Street. All members of the public are welcome to attend the event. Local businesses, residents of neighboring communities, and municipal officials of neighboring communities are also encouraged to attend and provide their feedback.

The meeting will include an overview of the hazard mitigation planning process, a summary of existing mitigation initiatives, and an outline of recommended strategies for addressing natural hazards in Goshen. Municipal officials and PVPC staff will be available to answer questions and listen to comments on the draft plan, which is posted at www.pvpc.org. A paper copy of the plan will also be available at Goshen Town Hall.

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

At the same time as Goshen is updating their plan, numerous other communities in the region are also developing new or updating existing Hazard Mitigation plans including, Chesterfield, Williamsburg, Cummington, Huntington, and Chester.

For more information and for a complete list of Hazard Mitigation Plan status in the Pioneer Valley, please contact PVPC's Catherine Ratté at cratte@pvpc.org or (413) 781-6045.

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Catalyst for Regional Progress

PVPC

Timothy W. Brennan, Executive Director

MEDIA RELEASE

CONTACT: Catherine Ratté, PVPC Principal Planner/Section Manager, (413) 781-6045 or cratte@pvpc.org Larry Holmberg, Emergency Management Director (EMD) Town of Goshen (413) 529-1700 or lholmberg@crocker.com

FOR IMMEDIATE RELEASE
September 17, 2015

Town of Goshen to Hold Third Public Engagement Event for Completed Draft Update of Hazard Mitigation Plan

Goshen residents are invited to provide comments on the Town of Goshen's Hazard Mitigation Plan on **Wednesday, September 30** at 7:00 p.m. at the Goshen Town Hall, 40 Main Street. All members of the public are welcome to attend the event. Local businesses, residents of neighboring communities, and municipal officials of neighboring communities are also encouraged to attend and provide their feedback.

The meeting will include an overview of the hazard mitigation planning process, a summary of existing mitigation initiatives, and an outline of recommended strategies for addressing natural hazards in Goshen. Municipal officials and PVPC staff will be available to answer questions and listen to comments on the draft plan, which is posted at www.pvpc.org. A paper copy of the plan will also be available at Goshen Town Hall.

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

At the same time as Goshen is updating their plan, numerous other communities in the region are also developing new or updating existing Hazard Mitigation plans including, Chesterfield, Williamsburg, Cummington, Huntington, and Chester.

For more information and for a complete list of Hazard Mitigation Plan status in the Pioneer Valley, please contact PVPC's Catherine Ratté at cratte@pvpc.org or (413) 781-6045.

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they need to find. 3315


Lisa Connell • 607-3211

Goshen

Event on Updated Hazard Mitigation Plan

For several months, members of Goshen's fire, highway, and emergency management departments, the Select Board, the Planning Board and Conservation Commission have been working to update Goshen's Natural Hazard Mitigation Plan. This plan is important because, among other things, it allows the Town to access grant funds to mitigate the impact of natural events like severe weather, flooding, drought, etc. A large culvert on East Street was replaced after receiving a hazard mitigation grant.

The final draft of the plan is ready and Goshen residents are invited to review the plan and provide comments on the Plan on Wednesday, September 30 at 7:00 p.m. at the Goshen Town Hall, 40 Main Street. All members of the public are welcome to attend the event. Local businesses, residents of neighboring communities, and municipal officials of neighboring communities are also encouraged to attend and provide their feedback.

The meeting will include an overview of the hazard mitigation planning process, a summary of existing mitigation initiatives, and an outline of recommended strategies for addressing natural hazards in Goshen. Municipal officials and Pioneer Valley Planning Commission (PVPC) staff will be available to answer questions and listen to comments on the draft plan, which is posted at www.pvpc.org. A paper copy of the plan will also be available at Goshen Town Hall. You may also call Larry Holmberg, the Goshen Emergency Management Director, at 296-6247 if you would like more information.

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

At the same time as Goshen is updating their plan, numerous other communities in the region are also developing new or updating existing Hazard Mitigation plans including, Chesterfield, Williamsburg, Cummington, Harrington, and Chester.

Goshen Hazard Mitigation Plan Update

July 22, 2015



ENTERING INC. ITH GOSHEN

pvpc

Agenda

- Overview and benefits of hazard mitigation
- Plan development process
- Identified hazards and mitigation strategies
- Questions and discussion




What is Hazard Mitigation?

FEMA "Any sustained action taken to reduce or eliminate long-term risk to people and property from natural hazards."

Examples:

- Limiting development in high-risk areas
- Retrofiting structures to protect them from floods, high winds, etc.
- Minor drainage flood control projects in areas of localized flooding
- Fire safety education




Mitigation and Preparedness

| Hazard Mitigation | Emergency Preparedness |
|-------------------------|---|
| Planning and zoning | Evacuation plans and emergency shelters |
| Open space preservation | Radio communications equipment |
| Education and outreach | Emergency response drills |
| Drainage improvements | |

Benefits of Hazard Mitigation


- Makes community eligible to apply for MEMA/FEMA grant opportunities for hazard mitigation projects
- Manages Risk
- Having a plan provides an approach for using limited resources more effectively



Components of a Hazard Mitigation Plan

Questions considered:

- What are the hazards in Goshen?
- How is Goshen affected by these hazards?
- How effective are current mitigation strategies?
- What new strategies could be implemented?



Overview of Planning Process

- Three to five Hazard Mitigation Committee meetings plus multiple consultations and reviews
- Hazard Mitigation Committee members:
 - Larry Holmberg, Emergency Management Director
 - Susan Labrie, Fire Chief
 - Norano Roberts, Conservation Commission
 - Roger Culver, Planning Board
 - Scott Bialbo, SelectBoard
 - Todd Dowkett, Highway Superintendent

Overview of Planning Process (continued)

- Two public outreach meetings
- After meetings, the plan will be revised with comments incorporated and submitted to MEMA and FEMA for comment
- Select Board will then review and adopt

Goshen Hazard Mitigation Plan

Public Outreach Event
August 13, 2015





Agenda

- Overview of hazard mitigation
- Content of Goshen Hazard Mitigation Plan
 - Hazard identification and risk assessment
 - Critical infrastructure
 - Existing strategies for mitigating hazards
 - Proposed strategies for mitigating hazards
- Question and comment period

What is Hazard Mitigation?

According to FEMA:

"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."

Benefits of Hazard Mitigation

- Makes community eligible to apply for Hazard Mitigation funds from FEMA
- Mitigation is less expensive than disaster clean up
- Having a plan provides an approach for using limited resources more effectively

Overview of a Hazard Mitigation Plan

Purpose of plan:
Lessen the long-term consequences of natural disasters

Key plan components:

1. Hazard identification and assessment
2. Identification of critical infrastructure
3. Existing and proposed mitigation strategies
4. Proposed schedule for implementation of strategies

Goshen Hazard Mitigation Working Group

Goshen staff and volunteers have completed a draft process to review and update the Town's current Hazard Mitigation Plan. Public comments will also be incorporated into this update.

Hazard Mitigation Working Group members:

- Larry Halberg, Emergency Management Director
- Susan Laskin, Fire Chief
- Nancy Fabiani, Conservation Commission
- Roger Cohen, Planning Board
- Scott Blake, Zoning Board
- Todd Conroy, Highway Superintendent

The Pioneer Valley Planning Commission assisted the Town with the development of the plan, through funding from FEMA via NEMA.

Hazard Assessment

| Type of Hazard | Level of Exposure | Probability of Hazard Occurrence | Impact | Level of Vulnerability |
|--|-------------------|--|--|------------------------|
| Flooding | Medium | High | Severe | High |
| Mass Extermination of Bees | High | Very High | Severe | High |
| Mass Production of Antibiotic Resistant Bacteria | Medium | Mass Production of Antibiotic Resistant Bacteria | Mass Production of Antibiotic Resistant Bacteria | High |
| Severe Drought | High | Severe | Severe | High |
| Wildfire Hazard | High | High | Severe | High |
| Wildfire Hazard | High | Severe | Severe | High |
| Wildfire Hazard | High | Severe | Severe | High |
| Wildfire Hazard | High | Severe | Severe | High |
| Wildfire Hazard | High | Severe | Severe | High |

Existing and New Mitigation Strategies

- Goshen's draft plan includes a list of existing mitigation strategies, as well as strategies to be pursued in the future
- The Hazard Mitigation Committee evaluated existing strategies in terms of effectiveness and added additional strategies
- The list of strategies to be pursued in the future was prioritized

Next Steps in Planning Process

- Plan available for public review at www.pvpc.org
- Plan to be submitted for review by MEMA and FEMA, with public comments incorporated

Question and Comments

Contact information:

Catherine Ratto
 Pioneer Valley Planning Commission
 E-mail: cratto@pvpc.org
 Phone: 413-781-6045

Media Organizations Sent Press Releases

| Media Organization | Address | Town | State | Zip Code |
|-------------------------------------|------------------------|-------------------|--------------|-----------------|
| African American Point of View | 688 Boston Road | Springfield | MA | 01119 |
| Agawam Advertiser News | 23 Southwick Street | Feeding Hills | MA | 01030 |
| Amherst Bulletin | 115 Conz Street | Northampton | MA | 01060 |
| Belchertown Sentinel | 1 Main Street | Belchertown | MA | 01007 |
| Berkshire Eagle | 75 South Church Street | Pittsfield | MA | 01202 |
| Brattleboro Reformer | 62 Black Mountain Rd. | Brattleboro | VT | 05301 |
| CBS 3 Springfield | One Monarch Place | Springfield | MA | 01144 |
| Chicopee Register | 380 Union Street | West Springfield | MA | 01089 |
| CommonWealth Magazine | 18 Tremont Street | Boston | MA | 02108 |
| Country Journal | 5 Main Street | Huntington | MA | 01050 |
| Daily Hampshire Gazette | 115 Conz Street | Northampton | MA | 01060 |
| El Sol Latino | P.O. Box 572 | Amherst | MA | 01004 |
| Going Green | PO Box 1367 | Greenfield | MA | 01302 |
| Hilltown Families | P.O. Box 98 | West Chesterfield | MA | 01084 |
| Holyoke Sun | 138 College Street | South Hadley | MA | 01075 |
| Journal Register | 24 Water Street | Palmer | MA | 01069 |
| La Voz Hispana | 133 Maple Street #201 | Springfield | MA | 01105 |
| Ludlow Register | 24 Water Street | Palmer | MA | 01069 |
| Massachusetts Municipal Association | One Winthrop Street | Boston | MA | 02110 |
| Quaboag Current | 80 Main Street | Ware | MA | 01082 |
| Recorder | 14 Hope Street | Greenfield | MA | 01302 |
| Reminder | 280 N. Main Street | East Longmeadow | MA | 01028 |
| Southwick Suffield News | 23 Southwick Street | Feeding Hills | MA | 01030 |
| State House News Service | State House | Boston | MA | 02133 |
| Tantasqua Town Common | 80 Main Street | Ware | MA | 01082 |
| The Longmeadow News | 62 School Street | Westfield | MA | 01085 |
| The Republican | 1860 Main Street | Springfield | MA | 01102 |
| The Westfield News | 62 School Street | Westfield | MA | 01085 |
| Town Reminder | 138 College Street | South Hadley | MA | 01075 |
| Urban Compass | 83 Girard Avenue | Hartford | CT | 06105 |
| Valley Advocate | 115 Conz Street | Northampton | MA | 01061 |
| Vocero Hispano | 335 Chandler Street | Worcester | MA | 01602 |
| WAMC Northeast Public Radio | 1215 Wilbraham Road | Springfield | MA | 01119 |

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|------------------------------|---------------------|------------------|----|-------|
| Ware River News | 80 Main Street | Ware | MA | 01082 |
| West Springfield Record | P.O. Box 357 | West Springfield | MA | 01098 |
| WFCR-Public Radio | 131 County Circle | Amherst | MA | 01003 |
| WGBY-Public TV | 44 Hampden Street | Springfield | MA | 01103 |
| WGGB ABC40/FOX 6 News | 1300 Liberty Street | Springfield | MA | 01104 |
| WHMP-FM | 15 Hampton Avenue | Northampton | MA | 01060 |
| Wilbraham-Hampden Times | 2341 Boston Road | Wilbraham | MA | 01095 |
| Worcester Telegram & Gazette | 20 Franklin Street | Worcester | MA | 01615 |
| WRNX/WHYN/WPKR Radio | 1331 Main Street | Springfield | MA | 01103 |
| WWLP-TV 22 | PO Box 2210 | Springfield | MA | 01102 |

Appendix B – List of Acronyms

| | |
|----------|---|
| FEMA | Federal Emergency Management Agency |
| MEMA | Massachusetts Emergency Management Agency |
| PVPC | Pioneer Valley Planning Commission |
| EPA | Environmental Protection Agency |
| DEP | Massachusetts' Department of Environmental Protection |
| NWS | National Weather Service |
| HMGP | Hazard Mitigation Grant Program |
| FMA | Flood Mitigation Assistance Program |
| SFHA | Special Flood Hazard Area |
| CIS | Community Information System |
| DCR | Massachusetts Department of Conservation and Recreation |
| FERC | Federal Energy Regulatory Commission |
| TRI | Toxics Release Inventory |
| FIRM | Flood Insurance Rate Map |
| NFIP | National Flood Insurance Program |
| CRS | Community Rating System |
| BOS | Board of Selectmen |
| 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 C – Past and Potential Hazards / Critical Facilities Map



Goshen, Massachusetts Predisaster Hazard Mitigation Plan Past & Present Hazards with Critical Facilities



CERTIFICATE OF ADOPTION
TOWN OF GOSHEN, MASSACHUSETTS
BOARD OF SELECTMEN
A RESOLUTION ADOPTING THE GOSHEN
HAZARD MITIGATION PLAN UPDATE

WHEREAS, the Town of Goshen established a Committee to update the Goshen Hazard Mitigation plan; and

WHEREAS, several public planning meetings were held between June and August, 2015 regarding the development and review of the Goshen Hazard Mitigation Plan Update; and

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

WHEREAS, a duly-noticed public hearing was held by the Goshen Board of Selectmen on June 6, 2016 to formally approve and adopt the Goshen Hazard Mitigation Plan Update.

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

ADOPTED AND SIGNED this 6th day of June, 2016.

