

# **The Town of Granby**

# **Local Natural Hazards Mitigation Plan**

**Adopted by the Granby Board of Selectmen on August 16, 2010**

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

and

The Pioneer Valley Planning Commission  
26 Central Street, Suite 34  
West Springfield, MA 01089  
(413) 781-6045  
[www.pvpc.org](http://www.pvpc.org)

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

## Acknowledgements

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

Jeffrey McPherson, EMD

Russell Anderson, Fire Chief

David Desrosiers, Highway Department

Chris Martin, Town Administrator

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

The Pioneer Valley Planning Commission

Catherine Miller, Principal Planner/Project Manager

Khyati Parmar, Transportation Planner

Todd Zukowski, Senior Planner/GIS Specialist

Jim Scace, GIS Specialist

# Table of Contents

1: INTRODUCTION.....	1
Hazard Mitigation.....	1
Planning Process.....	1
2: LOCAL PROFILE .....	4
Community Setting .....	4
Infrastructure .....	4
Natural Resources .....	5
Development.....	6
3: HAZARD IDENTIFICATION & ANALYSIS .....	9
Profiling the Natural Hazards .....	9
Natural Hazard Identification and Vulnerability Assessment .....	10
4: CRITICAL FACILITIES.....	28
Critical Facilities within Hazard Areas .....	28
Category 1 – Emergency Response Services.....	28
Category 2 – Non Emergency Response Facilities.....	30
Category 3 – Facilities/Populations to Protect.....	32
5: MITIGATION STRATEGIES .....	36
General Mitigation Measures .....	36
Flooding.....	37
Severe Snow/Ice Storm .....	39
Hurricanes/Severe Wind.....	41
Tornadoes/Microbursts .....	41
Wildfire/Brushfire .....	42
Earthquake.....	43
Dam Failure .....	44
Drought.....	45
Hazardous Materials .....	46
6: PRIORITIZED IMPLEMENTATION SCHEDULE .....	47
7: PLAN ADOPTION & IMPLEMENTATION.....	49
APPENDICES .....	51
Appendix A – Technical Resources .....	51
Appendix B – List of Acronyms.....	54
Appendix C – Natural Hazard Profiling Methodology .....	55
Appendix D – Past & Potential Hazards/Critical Facilities Map .....	57
Appendix E – Documentation of the Planning Process.....	58
Appendix F – Public Outreach .....	61

# 1: INTRODUCTION

## Hazard Mitigation

---

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

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

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

## Planning Process

---

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

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



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

### **Public Committee Meetings**

**July 23, 2008 11:00-1:00:** Working committee meeting held at Town Offices.

**August 20, 2008 10:00-12:00:** Working committee meeting held at Town Offices.

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

### **Public Meetings with the Board of Selectmen**

In 2005, the Board of Selectmen agreed to begin the process of developing a Local Hazard Mitigation Plan.

In 2010 the Board of Selectmen adopted the Local Natural Hazard Mitigation Plan. Meeting held at Granby Town Offices.

### **Participation by Public & Entities in Surrounding Communities**

On June 30, the Pioneer Valley Planning Commission sent a press release to all area media outlets to inform private citizens that the planning process for Granby's Hazard Mitigation Plan had commenced and that all residents of Granby were invited to attend plan development sessions. In February 2009 PVPC launched a second media release alerting the public in Granby and surrounding communities to the availability of Granby's Hazard Mitigation plan for public review and comment. Granby's Hazard Mitigation Plan was placed on PVPC's website and hard copies were available at PVPC's offices and the Granby Town Hall and all residents, businesses and other concerned parties of Granby and adjacent communities were encouraged to comment on the plan. The plans were made available in this manner for 30 days. Citizens from adjacent municipalities were also encouraged to comment on Granby's plan.

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

In the initial stages of the process of developing hazard mitigation plans for Pioneer Valley communities, the Pioneer Valley Planning Commission conducted a series of outreach efforts to make the public aware of the scope of the region's mitigation activities. In October of 2005, the Planning Commission notified all Select Boards and Chief Elected Officials that their community could participate in the region's mitigation planning process. Again, on April 4, 2006, the Planning Commission mailed a notice of planning activities to all Chief Elected Officials and Select Boards in the Pioneer Valley.

Both mailings explained the purpose of mitigation planning and invited communities to participate in either Round I or Round II of the region's mitigation planning process.

At regular meetings throughout 2006-2008 Pioneer Valley Planning Commission staff presented the planning process that led to the creation of the *Local Natural Hazard Mitigation Plans* to the Western Regional Homeland Security Council. This entity is responsible for orchestrating the homeland security planning activities of Berkshire, Franklin, Hampden and Hampshire Counties. Collectively, this body is responsible for 101 communities, including Granby. Additionally, PVPC staff presented to the Hampshire Regional Emergency Planning Committee

## 2: LOCAL PROFILE

### Community Setting

---

Granby is a rural suburban town comprised of over 28 square miles (approximately 18,000 acres) located in western Massachusetts. Located in the outskirts of Holyoke, east of the Connecticut River, Granby is bordered by Amherst on the north, Belchertown on the east, Ludlow and Chicopee on the south, and South Hadley on the west. Granby is about 15 miles north of Springfield, 46 miles west of Worcester, and 85 miles west of Boston. The Town has maintained much of its traditional rural character while also growing and gradually becoming a suburb of Holyoke and Chicopee.

Founded in 1768, Granby was originally a part of neighboring South Hadley. The Town was once a large agricultural community, with a substantial amount of acreage in dairy farming. With a large section of the Holyoke Mountain Range along the Town's northern border, rugged landscape prevented significant development. Furthermore, with limited water resources, the Town never established an industrial base. But dairy farming remained Granby's staple economy, and the Town still boasts a massive, well-known milk bottle which houses a local dairy bar.

Other attractions include Granby's Dinosaur Museum, renowned for its collection of local dinosaur tracks, the historic Aldrich Mills, and the Granby Congregational Church on the Town's picturesque Town Common.

This semi-rural, residential community, with its scenic farming landscape and proximity to urban hubs of Holyoke and Springfield, has experienced significant residential and commercial development in recent years. Since 1990, the town's population increased 10% to 6,132 residents.

### Infrastructure

---

Granby's infrastructure reflects its traditionally rural character, and its recent suburban growth.

#### **Roads and Highways**

Principal highways are State Route 116 traveling along Granby's northwestern border, and U.S. Route 202 (State Street), which crosses the Town in an east-west orientation and links Granby to Holyoke and Belchertown and points north. Other key routes are West Street, Amherst Street, Batchelor Street, South St/Ferry Hill Road, Pleasant/East Street, Center/Taylor Street, Carver Street, and School Street.

### **Transit**

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

### **Water and Sewer Service**

Granby's water supply comes from groundwater sources through privately owned wells. Granby has 17 transient non-community wells and 4 non-transient non-community wells, which are all considered for interim wellhead protection.

Granby does not its own public sewer system. Over ninety percent of the population relies on private wells; six percent of the population uses private community water systems; and two percent relies on a private water company. South Hadley Fire District #1 sells water to two percent of Granby's population.

Granby's residents use private septic systems to manage the town's waste stream. A small percentage of the town's residents use a community septic system in the Smith Avenue/Leo Drive/Kellogg Street/West Street area.

## **Natural Resources**

---

Granby'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 lack of water power prevented its industrialization. However, more recently, Granby's generally level land has led to its growing residential development.

### **Water Resources**

There are several ponds and small lakes in Granby including:

- Forge Pond
- Batchelor Brook & Pond
- Aldrich Pond
- Stony Brook
- Ingraham Brook
- Turkey Hill Brook

Many other smaller bodies of water are dotted across the landscape of Granby, located in agricultural and wooded areas.

Most of the 151.3 acres of open water in Granby are comprised of small ponds and lakes. These water bodies offer valuable wildlife habitat, unique natural environments, and provide benefits to Granby's human inhabitants in the form of prime recreational opportunities.

The Town of Granby lies within the Connecticut River Watershed, and there are 2898 acres of riparian corridors within Granby. Of these, 1139 acres of land are 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). The Wetlands Act offers additional protection of lands in the area between 100 feet and 200 feet of the mean high water mark of a qualifying stream or river. However, this outer riparian zone is susceptible to limited development in certain instances. Granby currently has no local rivers protection bylaw.

There are 2,291 acres of wetlands in Granby. Wetland habitats in town occur primarily along the streams and rivers as well as in lands adjacent to the three major ponds in Granby.

### ***Forests and Fields***

Forest cover is by far the most prominent land use in Granby. More than 11,000 acres of forest exist in the community, constituting over half (62%) of the total acreage of the town.

Additionally, there are approximately 2,480 acres of fields, pastures, and orchards in Granby. Much of these agricultural lands is now abandoned, and provides good wildlife habitats.

## **Development**

---

Granby's pattern of land use evolved from its rural New England agricultural heritage and more recent suburbanization. In turn, Granby's topography, soils, and physiography (lakes, rivers, wetlands and watershed areas) shape and constrain these culturally determined land use patterns.

Since 1990, Granby's population grew 10% during the period between 1990 and 2000, from 5,565 to 5,132 residents. The population is projected to grow another 9% to 6,693 by 2010. In 2003, Granby was identified as the fourth fastest growing community in the Pioneer Valley Region. This contrasts with past population growth statistics where Granby grew only 3% between 1980 and 1990; and decreased (2%) in population between 1970 and 1980. Granby's last large population expansion was during the period between 1960 and 1970, when the residential population grew by 30% from 4,221 to 5,473 people.

In addition to other factors, zoning and other land use regulations constitute Granby'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 Granby Zoning Bylaw establishes eight base zones, and two overlay zones:

- Two residential zones – RS, Residential-Single Family Units, and RM, Residential-Multi-Unit Dwellings;
- Two commercial (business) zones – GB, General Business; and GB-2, General Business (limited uses);
- Two industrial zones – I, Industrial; and I-2, Industrial (Limited Landfill/Solid Water Management and Recycling uses);
- One municipal zone – MD, Municipal District;
- One agricultural zone – AP, Agricultural Preservation; and
- Two overlay zones – FP, Floodplain District; and WSP, Water Supply Protection.

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

- Floodplain District - The floodplain overlay district applies to those areas within the boundary of the one-hundred-year flood that are considered hazardous according to FEMA. It limits some uses for preventing potential flood damage.
- Water Supply Protection District - This purpose of this overlay district is to protect and preserve Granby's groundwater resources from potentially damaging pollution or environmental degradation by regulating certain uses within the district. The regulations state specific prohibited and restricted uses, regulate drainage, detail site plan requirements and special permit procedures.

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

### ***Current Development Trends***

Today, the vast majority of Granby's 28.1 square miles is undeveloped land, totaling more than 12,170 acres. Agricultural land is the second most prolific land use, at approximately 2,582 acres, followed closely by residential land at approximately 2,490 acres. Land for industrial and commercial uses constitutes approximately 130 acres and 118 acres, respectively. Land characterized as urban open/public land constitutes 228 acres, and there are 107 acres of outdoor recreational land throughout Town. Water comprises about 150 acres of land in Granby.

Currently, development in Granby is encouraged by existing zoning and other land use regulations to seek areas where the environmental conditions, such as wetlands and slopes, and existing roadways support such development. While Granby has a village center, there are few incentives in Granby's zoning to encourage development around this existing location.

***Development in Hazard Areas***

Hazards identified in this plan are regional risks and, as such, all new development falls into the hazard area. The exception to this is flooding. According to the Community Information System (CIS) of FEMA, there were 78 structures located within the Special Flood Hazard Area (SFHA) in Granby as of August 2005, the most current records in the CIS for the Town of Granby.

### 3: HAZARD IDENTIFICATION & ANALYSIS

#### Profiling the Natural Hazards

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

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

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

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



## Natural Hazard Identification and Vulnerability Assessment

---

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

### Vulnerability Assessment Methodology

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

**Total value of all structures in Granby (2006): \$578,246,700**

**Median value of a home in Granby (2007): \$220,000**

**Average household size: 2.4 persons**

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

### Flooding

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

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

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

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

In contrast, general flooding events may last for several days. Excessive precipitation within a watershed of a stream or river can result in flooding particularly when development in the floodplain has obstructed the natural flow of the water and/or decreased the natural ability of the groundcover to absorb and retain surface water runoff (e.g., the loss of wetlands and the higher amounts of impervious surface area in urban areas).

A floodplain is the relatively flat, lowland area adjacent to a river, lake or stream. Floodplains serve an important function, acting like large "sponges" to absorb and slowly release floodwaters back to surface waters and groundwater. Over time, sediments that are deposited in floodplains develop into fertile, productive farmland like that found in the Connecticut River valley. In the past, floodplain areas were also often seen as prime locations for development. Industries were located on the banks of rivers for access to hydropower. Residential and commercial development occurred in floodplains because of their scenic qualities and proximity to the water. Although periodic flooding of a floodplain area is a natural occurrence, past and current development and alteration of these areas will result in flooding that is a costly and frequent hazard. In addition to damage of buildings directly in the floodplain, development can result in a loss of natural flood storage capacity and can increase the water levels in water bodies. Flood levels may then increase, causing damage to structures not normally in the flood path.

The Floodplain Map for the Town of Granby shows the 100-year and 500-year flood zones identified by FEMA flood maps. The 100-year flood zone is the area that will be covered by water as a result of a flood that has a one percent chance of occurring in any given year. Likewise, the 500-year flood has a 0.2 percent chance of occurring in any given year.

Areas in the 100-year flood zone in Granby are primarily those lands adjacent to and including the open water areas at Batchelor Pond, and along the several brooks in Granby. There are some broader 500-year floodplains mapped as well, in several low-lying areas throughout Granby, mostly along Porter Swamp, Pitchawam Swamp, Ingraham Brook, and Batchelor Brook.

The major floods recorded in Western Massachusetts during the 20th century have been the result of rainfall alone or rainfall combined with snowmelt. Granby has experienced many flooding events over the last decade. There have been incidents of flooding on East State Street (Route 202) around Ingraham Brook and between the Granby High School and School Street, on the Meadow Glen Drive on the Taylor Street and along the pavement of Carver Street. Generally, these small floods have had minor impacts, temporarily impacting roads and residents' yards. However, there hasn't been any town-wide flooding that caused significant damage.

As described above, flooding can happen on a range of scales. For the purposes of this analysis, the hazard has been broken into two separate types – **Flooding (100-year)** and **Flooding (localized)**. Risk and vulnerability assessment for these separate types of flooding are analyzed below.

### **Flooding (100-year base flood): Low Risk**

There are approximately 1,377 acres of land within the FEMA mapped 100-year floodplain and 1,521 acres of land within the 500-year floodplain within the Town of Granby. According to the Community Information System (CIS) of FEMA, there were 78 structures (all residential) located within the Special Flood Hazard Area (SFHA) in Granby as of August 2005, the most current records in the CIS for the Town of Granby. Therefore, a vulnerability assessment for a 100-year flood equals approximately \$17.16 million of damage, with approximately 187 people impacted.

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

#### **Location:**

East State Street (Route 202) Near Ingraham Brook

- The road is built between the 100 year flood plain and 500 year flood plain;
- This part of road tends to experience flooding in heavy rains, residents have needed rescuing in the past;
- Approximately 3 structures in this area that have been affected or could be affected by a flood incident;
- Vulnerability assessment: \$660,000 (assuming 100% damage to 100% of the structures);
- Cost for repairing or replacing any power lines, telephone lines, and contents of structures are not included.

#### **Extent:**

See information in Location section

**Previous Occurrences:**

Region-wide flooding in 1936 caused significant damage. Direct accounts of the extent of the flooding in Granby do not seem to exist; however there is extensive documentation of the flooding in neighboring communities and therefore flooding Granby can be extrapolated from that information.

An unusually cold and snowy winter, followed by a spell of warm and rainy weather, turned the normal spring rising of the Connecticut River into an unprecedented natural catastrophe in 1936. The flood inundated Hadley, Hatfield, Northampton, Holyoke, and Springfield, as well as smaller towns (Granby was one of these) and villages along its course. In Massachusetts alone, the Great Flood killed ten people and left 50,000 homeless. It was an unmatched natural catastrophe for the Bay State, causing over \$200,000,000 in damage.

See information in Location section for other instances.

**Probability of Future Events:**

There is a chance of localized flooding within the 100-year flood plain near the Ingraham brook area as well as the area between the North Street, Porter Street and Easton Street where the local farmers previously maintained the ditches. These ditches are not maintained by the farmers anymore and so if they over flow they can cause flooding. These floods are small and generally cause little damage. The chance of a major flood in the 100-year flood plain is by definition 1% in any given year.

**Flooding (localized) – High Risk**

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

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

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

**Location:**

Meadow Glen Drive

- The road usually floods due to heavy rains;
- No critical facilities are located in the area;
- Approximately 6 residential structures in this area that have been affected or could be affected by a flood incident;
- Vulnerability assessment: \$1,320,000 (assuming 100% damage to 100% of the structures);

Cost for repairing or replacing any power lines, telephone lines, and contents of structures are not included.

#### East State Street (Route 202)

- This road tends to get flooded near Ingraham brook culvert and between the Granby High School and School Street near the drainage ditch;
- The Granby High School and the emergency shelters are located between these two areas; The road is also the chief evacuation route of the town;
- In addition, the flooding tends to impact access to several nearby critical facilities, including the Town House (the primary EOC), Fire Department, and Police Department.
- There are approximately 8 residential structures in this area that have been affected or could be affected by a flood incident. With 100% damage to 100% of the structures, the estimated cost of repairing or replacing would be \$1,760,000.

Cost for repairing or replacing any power lines, telephone lines, and contents of structures are not included. There is also potential for the road to be damaged.

#### Carver Street

- This entire street has the problem of water logging at the edges;
- There are no critical facilities along this street;
- There are approximately 10 residential structures in this area that have been affected or could be affected by a flood incident. With 100% damage to 100% of the structures, the estimated cost of repairing or replacing would be \$ 2,200,000.

Cost for repairing or replacing any power lines, telephone lines, and contents of structures are not included. There is also potential for the road to be damaged.

**Extent:**

See information in Location section.

**Previous Occurrences:**

See information in Location section.

**Probability of Future Events:**

There is high chance of localized flooding on the above-mentioned locations but these floods are small and generally cause little damage.

**Severe Snow/Ice Storm – High Risk**

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

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

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

**Location:**

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

### Amherst Street

Any severe winter weather incident can cause critical snow and ice hazards at several points along Amherst Street in the northern portion of Town.

### West Street

Any severe winter weather incident can cause critical snow and ice hazards on the West Street near the West cemetery where there is a history of formation of black ice after snowfall.

### East State Street (Route 202)

In past there has been formation of Black ice along East State Street near the center of the town between the North Street and Lyman Street.

### Snow Drift Areas

In past the problem of Snow drift has been observed on the South Street between the Ferry Hill Road and East Street, on Carver Street near the Meadow Glen Drive, on the West Street near the West cemetery and on School Street North of East State Street / School Street intersection.

### **Extent:**

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

NESIS scores 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.

### **Previous Occurrences:**

- In past, 22 winter storms categorized as major to extreme according to the NESIS scale have been noted since 1960. Additional historically significant winter storms to affect Granby include the Great Snow of 1717 and the Blizzard of 1888
- Moderate risk town wide due to snow, ice and extreme cold.
- There was heavy snowfall in 1969 - several 3 feet events.

### **Probability of Future Events:**

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

### **Hurricanes/Severe Wind – High Risk**

Hurricanes are violent rainstorms with strong winds that can reach speeds of up to 200 miles per hour, and large amounts of precipitation. Hurricanes generally occur between June and November and can result in flooding and wind damage to structures and above-ground utilities. Severe wind can also occur in the absence of a hurricane, especially impacting mountaintops. Global warming will increase the threat of hurricanes and severe wind as oceans and the atmosphere warms. Climate change research indicates that storms like hurricanes will become more intense and more frequent in the future.

### **Location:**

All of Granby is at risk from hurricanes with ridge tops more susceptible to wind damage and the flood-prone portions of town to flooding from the heavy rains.

### **Extent:**

The intensity of a hurricane is measured using a 1-5 rating called the Saffir-Simpson Hurricane Scale. According to NOAA's National Hurricane Center, Saffir-Simpson "...is used to give an estimate of the potential property damage and flooding expected along the coast from a hurricane landfall. Wind speed is the determining factor in the scale..."

The 5 categories are:

- Category 1—winds at 74-95 mph, with storm surge generally 4-5 feet above normal;
- Category 2 —winds at 96-110 mph, with storm surge generally 6-8 feet above normal;
- Category 3—winds at 111-130 mph, with storm surge generally 9-12 feet above normal;
- Category 4—winds at 131-155 mph, with storm surge generally 13-18 feet above normal;
- Category 5—winds greater than 155 mph, with storm surge generally greater than 18 feet above normal.

Granby's location in Western Massachusetts reduces the risk of extremely high winds that are associated with hurricanes, although it can experience some high wind events. During hurricanes or severe wind events, the Town has experienced small blocks of downed timber and uprooting of trees onto structures.

- Estimated wind damage: 5% of the structures with 10% damage, \$2,891,234;
- Estimated flood damage: 10% of the structures with 20% damage, \$11,564,934;



- Vulnerability assessment for a hurricane event (both wind and flood damages): \$14,456,168;
- Cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included.

#### **Previous Occurrences:**

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

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

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

Hurricane/Storm Name	Year	Saffir/Simpson Category (when reached MA)
Great Hurricane of 1938	1938	Unclear, 3 or 4
Great Atlantic Hurricane	1944	1
Carol	1954	3
Edna	1954	1
Diane	1955	Tropical Storm
Donna	1960	Unclear, 1 or 2
Groundhog Day Gale	1976	Not Applicable
Gloria	1985	1
Bob	1991	2
Floyd	1999	Tropical Storm

#### **Probability of Future Events:**

Based upon the past events, it is reasonable to say that there is a low frequency of major hurricanes in Granby (once every fifty years is less than a one percent chance of any such storm occurring in a given year) while the possibility of a less severe hurricane or tropical storm affecting Granby in any given year is approximately 10 percent.

#### **Tornadoes/Microbursts – High Risk**

Tornadoes are swirling columns of air that typically form in the spring and summer during severe thunderstorm events. In a relatively short period of time and with little or no

advance warning, a tornado can attain rotational wind speeds in excess of 250 miles per hour and can cause severe devastation along a path that ranges from a few dozen yards to over a mile in width. The path of a tornado may be hard to predict because they can stall or change direction abruptly.

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

### **Location:**

The hazard area for tornadoes in Granby varies according to the intensity and size of the tornado. It seems that more concern for microbursts is in the valley area along Route 202.

### **Extent:**

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

- Tornadoes/microburst hazard estimates 20% damage to 10% of structures in Town;
- Vulnerability assessment estimates in damages; \$11,564,934;
- Estimated cost does not include building contents, land values or damages to utilities.

### **Previous Occurrences:**

Within Massachusetts, tornadoes have occurred most frequently in Worcester County and in communities west of Worcester, including towns in Hampshire County.

No known tornados have touched down in Granby. In past, microbursts caused minor localized damage with downed trees, limbs, and power lines along the Fred Ruel Road and the Dufresne Park area in Granby

### **Probability of Future Events:**

No known tornados have touched down in Granby, but there have been several high-wind storms and hail events. In Western Massachusetts, the majority of sighted tornadoes have occurred in a swath directly over Granby, known as "tornado alley." Fifteen incidents of tornado activity (all F2<sup>1</sup> or less) occurred in Hampden County between 1959 and 2005.

---

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

## **Wildfires/Brushfire – High Risk**

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

Hampshire County has approximately 252,000 acres of forested land, which accounts for 72% of total land area. Forest fires are therefore a potentially significant issue. In Granby, approximately 62% of the town's total land area is in forest, or about 11,231 acres, and is therefore at risk of fire.

### **Location:**

Approximately 62% of Granby is forested which is under the risk of Wild fire or brush fire. There is more potential for damage along the Harris Street, which is located in the mountainous terrain.

### **Extent:**

The Granby Fire Department reports that it has records of only small brushfires covering less than a few acres at the most. There are almost 30 to 50 brushfires annually out of which 70% are permitted burns.

However, moderate risk exists for potential wildfire incidents due to the extensive forest cover. Forested and agricultural areas with high fuel content have more potential to burn. In addition, it is often very difficult to access some of the locations to extinguish the brushfire.

- Up to 30 structures could be impacted by a wildfire in one of the Town's agricultural areas;
- Assuming 100% damage to 100% of the structures, not including costs repairing or replacing any power lines, telephone lines, and contents of structures;
- Vulnerability assessment estimates approximately \$6,600,000 in damages for a wildfire.

## **Previous Occurrences:**

Illegal brushfires are somewhat common in Granby, but most of them are small and quickly contained. According to the Granby Fire Department, there are approximately 30 to 50 unauthorized burns (or brushfires) per year, on average. As a point of comparison, approximately 1,000 burn permits are issued annually. In recent past two major wildfires have been noted in Granby. First one was in the Southeast portion of the town in North of Turkey Hill Road between the Turkey hill brook and Belchertown / Granby town line. Second one was in the North West of the town North of the Batchelor Street in the Mount Holyoke Range State Park.

## **Probability of Future Events:**

Based upon the past events, it is reasonable to say there is a high frequency of wildfires/brushfires in Granby.

## **Earthquakes – Low Risk**

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

## **Location:**

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

## **Extent:**

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

- Moderate potential for serious damage along Route 202 in Granby;
- Structures are mostly wood frame construction, so loss estimates predict 20% of town assessed value, not including Costs of repairing or replacing roads, bridges, power lines, telephone lines, or the contents of the structures;
- Vulnerability assessment estimates approximately \$115,649,340.

### **Previous Occurrences:**

Nineteen earthquakes, intensity V (Modified Mercalli scale) or greater, have centered in Massachusetts since it was colonized by Europeans. A shock in 1755 reached intensity VIII at Boston and was felt across the State. In addition, Massachusetts was affected by some of the more severe Canadian shocks plus the earthquake of 1929 that centered on Grand Banks of Newfoundland.

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

A complete list of earthquakes affecting New England can be found in Table 3-3. None of the recorded earthquakes have been noted to cause any damage in Granby or the surrounding area.

<b>Table 3.3: New England Earthquakes (1924-2002)<sup>2</sup></b> <b>magnitude 4.2 or higher</b>		
<b>Location</b>	<b>Date</b>	<b>Magnitude</b>
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

<sup>2</sup> Northeast States Emergency Consortium Web site: [www.nesec.org/hazards/earthquakes.cfm](http://www.nesec.org/hazards/earthquakes.cfm)

Table 3.4: New England States Record of Earthquakes <sup>2</sup>		
State	Years of Record	Number of Earthquakes
Connecticut	1568 - 1989	137
Maine	1766 - 1989	391
Massachusetts	1627 - 1989	316
New Hampshire	1728 - 1989	270
Rhode Island	1766 - 1989	32
Vermont	1843 - 1989	69
New York	1737 - 1985	24
Total Earthquakes in New England (1568-1989)		1,239

### **Probability of Future Events:**

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

### **Dam Failure – Low Risk**

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

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

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

for conducting dam inspections but then state law was changed to place the responsibility and cost for inspections on the owners of the dams. This means that individual dam owners are now responsible for conducting inspections.

The state has four hazard classifications for dams:

- High Hazard: Dams located where failure or improper operations will likely cause loss of life and serious damage to homes, industrial or commercial facilities, important public utilities, main highways, or railroads.
- Significant Hazard: Dams located where failure or improper operation may cause loss of life and damage to homes, industrial or commercial facilities, secondary highways or railroads or cause interruption of use or service of relatively important facilities.
- Low Hazard: Dams located where failure or improper operation may cause minimal property damage to others. Loss of life is not expected.
- Non-jurisdictional: The storage capacity of the impoundment and height of dam are such that they need not be regulated.

The inspection schedule for dams is as follows:

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

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

### **Location:**

According to DCR sources, as well as local knowledge, there are currently nine (9) dams<sup>3</sup> in Granby. The follow table identifies the dams within the town as well as whether they are classified as low, significant, or high hazard.

---

<sup>3</sup> It is difficult to track down accurate records of dams, as ownership and exact location is not clear. Furthermore, many very old dams listed in DCR records are not in existence anymore, according to local knowledge. This list is compiled from a combination of sources, and then verified by the Committee.

**Table 3.4: Dams in Granby**

Dam Name / Date Built	ID	Owner	Purpose	Condition / Last Inspected	Hazard Risk
Aldrich Lake Dam- 1917	00491	Commonwealth of Mass- DCR	Recreation	Poor- 4/17/98	Significant
Forge Pond Dam – Main Dam / 1900	MA00488	Town of Granby	Recreation	Unknown / Unknown	Low
Forge Pond Dam / 1978	MA00489	Town of Granby	Recreation	No Info.	Low
Dufresne Farm Pond Dam- Unknown	MA02369	Town of Granby, Conservation Commission	Recreation	No Info.	Low
Quenneville Dam- 1950	00492	Mark Niedrala	Recreation	Fair / Unknown	Does not hold Water presently.
Aldrich Dam- 1956	MA01893	Christopher Aldrich	Recreation	Unknown / Unknown	Non-jurisdictional
Chicopee Sportsmen's Club Dam-1957	00490	Chicopee Sportsmen's Club	Recreation	Unknown / Unknown	Non-jurisdictional
Carver Pond Dam- Unknown	MA01892	Barnard Courtois	No Info	Breach	Non-jurisdictional
Randall Pond Dam- Unknown	MA01891	David Randall	No Info.	Unknown / Unknown	Non-jurisdictional

**Extent:**

A vulnerability assessment was done for the inundation area below the significant risk dam, the Aldrich Lake Dam:

**Aldrich Lake Dam**

- No homes in Granby are located in the inundation zone;
- The inundation zone could extend to South Hadley and there are residential structures there which could be damaged;

Water flow during a dam failure could significantly impact the town of South Hadley.

**Previous Occurrences:**

Granby has a no history of any dam failures in the past.

**Probability of Future Events:**

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



## **Drought – Low Risk**

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

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

### **Location:**

A drought would impact all of Granby.

### **Extent:**

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

When evaluating the region's risk for drought on a national level, utilizing a measure called the Palmer Drought Severity Index, Massachusetts is historically in the lowest percentile for severity and risk of drought. Even so, there have been several years of drought-like conditions in Western Massachusetts: 1940-1952, 1980-1983, and 1995-2001. Furthermore, global warming and climate change may have an effect on drought risk in the region. With the projected temperature increases, some scientists think that the global hydrological cycle will also intensify. This would cause, among other effects, the potential for more severe, longer-lasting droughts. Additionally, even minor droughts will increase the risk of wildfire, especially in areas of high recreational use.

### **Previous Occurrences:**

In Massachusetts, six major droughts have occurred statewide since 1930. They range in severity and length, from three to eight years. In many of these droughts, water-supply systems were found to be inadequate. Water was piped in to urban areas, and water-supply systems were modified to permit withdrawals at lower water levels.

Granby has had limited experience with severe drought conditions. The town has not experienced a threat to its water supply, and doesn't anticipate any severe water shortages throughout Town. However, there is some history of the shallow wells in the center of town getting reduced water level in summer.

### **Probability of Future Occurrences:**

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

## **Man-Made Hazards – Hazardous Materials – Medium Risk**

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

The Toxics Release Inventory (TRI) is a publicly available EPA database that contains information on specific toxic chemical releases and other waste management activities reported annually by certain covered industry groups as well as federal facilities. In addition, varying quantities of hazardous materials are manufactured, used, or stored at an estimated 4.5 million facilities in the United States—from major industrial plants to local dry cleaning establishments or gardening supply stores. These hazardous materials are transported regularly over our highways and by rail and if released can spread quickly to any community. Incidents can occur at any time without warning. Human error is the probable cause of most transportation incidents and associated consequences involving the release of hazardous materials.

Granby relies on Holyoke's HazMat team for responding to incidents involving hazardous materials through a mutual aid agreement. There is no history of any major accidents involving some sort of oil or chemical spill, but transportation of chemicals and bio-hazardous materials by vehicle transport on Route 202 and Route 116 (Amherst Road) is a concern. Small areas of hazardous materials storage increase the potential for future incidents.

### **Location:**

There are four sites within Granby considered Tier II Hazardous Materials storage facilities; they are included on the Past & Potential Hazards/Critical Facilities Map (Appendix D).

### **Extent:**

The extent of hazardous chemical release is not predictable as it is dependent on the location including whether it is from a stationary or moving source, amount and type of chemical released, and weather conditions at the time of the release.

### **Previous Occurrences:**

Available data dating from 1998-2003 shows zero releases of hazardous materials (total) from these sites per year.

### **Probability of Future Events:**

Based upon the past events, it is reasonable to say that there is a low likelihood of hazardous chemical releases in Granby.

## 4: CRITICAL FACILITIES

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

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

### Critical Facilities within Hazard Areas

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

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

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

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

### Category 1 – Emergency Response Services

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

- 1) Emergency Operations Center  
Primary: Town Hall- 250 State Street  
Secondary: Granby High School - 385 East State Street

- 2) Fire Station  
Granby Fire Department – 259 East State Street
- 3) Police Station  
Granby Police Department- 259 East State Street
- 4) Highway Department  
Highway Department Garage – 15 Crescent Street
- 5) Water  
The town does not supply water to any of the Residents. There are some residences on New Ludlow Road and some on Route 116 Amherst Road that get water supply from South Hadley.
- 6) Emergency Fuel Stations  
Highway Department – 15 Crescent Street
- 7) Emergency Electrical Power Facility  
1 generator at Granby High School  
1 portable generator, 1 Stationary generator at Highway Garage  
1 generator at Fire Department  
1 generator at Public Safety Building
- 8) Emergency Shelters  
Granby Junior & Senior High School- 385 East State Street  
East Meadow School- 393 East State Street  
West Street School- 14 West Street  
Immaculate Heart of Mary Church- 256 State Street
- 9) Water Sources  
28 locations in Granby recognized by the Fire department.
  1. Pond located in the rear of Granby High School.
  2. Flowing Brook – Route 202 and Turkey Hill Brook (Forge Pond)
  3. Pond – Route 202 – Rimblod Farm (near Chicopee St.)
  4. Pond - 225 Batchelor Street (Wales)]
  5. Flowing Brook – North St. and Batchelor Brook
  6. Pond – 115 Batchelor St.
  7. Flowing Brook – Porter St. and Batchelor Brook
  8. Aldrich Lake – Amherst Street
  9. Pond – Rear 27 West St.
  10. Flowing Brook – Burnett Road at Batchelor Brook
  11. Fire Hydrant – Silver Street, South Hadley and West Street
  12. Fire Hydrant – Morgan Street, South Hadley
  13. Pond – Pleasant St. at Muddy Brook
  14. Fire Hydrant – Morgan St. at New Ludlow Road
  15. Fire Hydrant – South Street at New Ludlow Road
  16. Fire Hydrant – Truby St. at East St.

17. Pond – Center St. at Muddy Brook
18. Fire Hydrant – Taylor St. at East St. in Ludlow
19. Pond – Carver St. at Lyons St.
20. Pond - School Street near # 140
21. Pond – Dufresne Grove off Kendall St.
22. Flowing Brook – Trompke Ave. at Batchelor Brook
23. Flowing Brook – Route 202 at Stoney Brook
24. Flowing Brook – School St. at Batchelor Brook
25. Fire Hydrant – Mary Lyon Drive and Virginia Ave.
26. Pond – Amherst St. at Easton St.
27. Aldrich Lake – Aldrich St.
28. Pond – Kendall St. at Lavoies on Stony Brook

#### 10) Transfer Station

New Ludlow Road, right by the South Hadley/Granby line

#### 11) Communications

There are two Cell towers in Granby on Route 202.

#### 12) Primary Evacuation Routes

Route 202  
Route 116  
Amherst St.  
School St.  
Chicopee St.  
West St.

#### 13) Bridges Located on Evacuation Routes

##### Bridges

<u>Evacuation Route</u>	<u>Crosses</u>	<u>Owner</u>	<u>Year Built</u>	<u>Year Rebuilt</u>
Route 202 (West State Street)	Stony Brook	Mass Highway	1927	1976
Amherst St.	Batchelor Brook	Town	1952	
School St.	Batchelor Brook	Town	1956	

## **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 Granby.

#### 1) Problem Culverts

1. Culvert on Amherst St. over Aldrich Lake.
2. Culvert at Dufresne Park Dam
3. Culvert on Batchelor St. before McDonald Ave.

## 2) Water Supply

28 locations in Granby recognized by the Fire department.

1. Pond located in the rear of Granby High School.
2. Flowing Brook – Route 202 and Turkey Hill Brook (Forge Pond)
3. Pond – Route 202 – Rimblod Farm (near Chicopee St.)
4. Pond - 225 Batchelor Street (Wales)]
5. Flowing Brook – North St. and Batchelor Brook
6. Pond – 115 Batchelor St.
7. Flowing Brook – Porter St. and Batchelor Brook
8. Aldrich Lake – Amherst Street
9. Pond – Rear 27 West St.
10. Flowing Brook – Burnett Road at Batchelor Brook
11. Fire Hydrant – Silver Street, South Hadley and West Street
12. Fire Hydrant – Morgan Street, South Hadley
13. Pond – Pleasant St. at Muddy Brook
14. Fire Hydrant – Morgan St. at New Ludlow Road
15. Fire Hydrant – South Street at New Ludlow Road
16. Fire Hydrant – Truby St. at East St.
17. Pond – Center St. at Muddy Brook
18. Fire Hydrant – Taylor St. at East St. in Ludlow
19. Pond – Carver St. at Lyons St.
20. Pond - School Street near # 140
21. Pond – Dufresne Grove off Kendall St.
22. Flowing Brook – Trompke Ave. at Batchelor Brook
23. Flowing Brook – Route 202 at Stoney Brook
24. Flowing Brook – School St. at Batchelor Brook
25. Fire Hydrant – Mary Lyon Drive and Virginia Ave.
26. Pond – Amherst St. at Easton St.
27. Aldrich Lake – Aldrich St.
28. Pond – Kendall St. at Lavoies on Stony Brook

### **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
  - Phin's Hill Manor
- 3) Public Buildings/Areas
  - Town Hall – 250 State Street
  - Aldrich Hall – 257 East State Street
  - Highway Garage – 15 Crescent Street
  - Granby Free Public Library - 1 Library Lane
  - U.S. Post Office - 63 West State Street
  - Council On Aging – 10 West State Street
  - Public Safety Complex – 259 East State Street
- 4) Schools
  - Granby Junior & Senior High School- 385 East State Street
  - East Meadow School- 393 East State Street
  - West Street Elementary School- 14 West Street

<b>Day Care</b>	<b>Capacity</b>
Berneche, Vivian M.- 290 East State Street	8
Buzzard, Lori Ann- 40 Center Street	6
Cadieux-Neto, Deanna- 5 Meadow Glen Drive	8
Children First Day School- 40 Pleasant Street	20
Cote, Janice- 4 Karen Drive	6
Croteau, Melissa Marie- 5 Mary Lyon Drive	4
Goral, Mary Lou- 154 New Ludlow Road	6
Granby Head Start- 55 Taylor Street	20
Hinkley, Kimberley- 313 Chicopee Street	6
Laporte, Suzanne J.- 77 Easton St.	3
Lawson, Michelle M.- 6 Burke Lane	7
Mick, Rosemarie L.- 472 East State Street	8
Parent, Rebecca J.- 376 Batchelor Street	8
Rosienski, Jo-Ann- 88 Morgan Street	8
ABC Day Care- West State Street	8
Stone, Cindy C.- 130 Amherst St	10
Strycharz, Ann M.- 158 Kendall Street	7
The Children First Club 14 West Street	39

- 5) Churches
  - Church Of Christ- 235 State Street
  - Immaculate Heart of Mary- 256 State Street
  - Living Gate- Taylor Street
  - Baptist Church- West State Street
- 6) Historic Buildings/Sites
  - Town Hall
  - Dinosaur Museum
- 7) Apartment Complexes
  - Granby Heights- Amherst Street
  - Pleasant Valley Estates- Pleasant Street
  - Stony Brook Apartments- West State Street
  - 4 Family Apartments - South Street
  - Crescent Valley Estates-
- 8) Employment Centers
  - Granby Junior & Senior High School- 385 East State Street
  - West Street Elementary School- 14 West Street
  - All Power- 43 West State Street

## **Category 4 – Potential Resources**

---

Contains facilities that provide potential resources for services or supplies.

- 1) Food/Water
  - Breezy Acres Farm- 25 Pleasant Street
  - Cumberland Farms- North State Pleasant Street
  - Union Mart- 362 E State Street
  - Sevarino's Family Variety- 102 New Ludlow Road
  - Dickinson Farm – 307 East State Street
  - Sapowski Farms – 434 East State Street
  - Red Fire Farm – 7 Carver Street
  - BP Service Station – 30 West State Street
- 2) Hospitals/Medical Supplies
  - Holyoke Hospital – 575 Beech Street, Holyoke
  - Cooley Dickinson – 30 Locust Street, Northampton
  - Bay State – 759 Chestnut Street, Springfield
  - Healthsouth Hospital Of Western Massachusetts (About 7 Miles; Ludlow)
  - Western Massachusetts Hosp (About 8 Miles; Granby)
  - Granby Ambulance- 259 East State Street
  - Center Pharmacy- 242 State Street



3) Gas

Cumberland Farms Inc- 74 West State Street  
Dressels Service Station- 161 West State Street  
BP Service Station- 30 West State Street

Heating Oil

Amber Energy Inc- 72 Pleasant Street  
Halon Oil- 77 West State Street

4) Building Materials Suppliers

Northeast Fasteners- 254 Taylor Street, Granby, MA 01033  
Orange Nut & Bolt Co.- 254 Taylor Street

5) Heavy & Small Equipment Suppliers

All Power- 43 West State Street

6) Gravel Pits

Gregg Orlen- East State Street  
Ondrick Construction Pit - 240 Chicopee Street  
Lane Construction - 17 New Ludlow Road  
John S. Lane- Amherst Street  
Waste Management-  
Leo Fugler- East Street

**Table 4.1: Critical Facilities and Evacuation Routes Potentially Affected by Hazard Areas**

Hazard Type	Hazard Area	Critical Facilities Affected	Evacuation Routes Affected
Flooding (100-year)	East State Street (Route 202) Near Ingraham Brook	Town Hall	Route 202
		Fire Station	
		Police Station	
		Granby High School	
Flooding (localized)	Meadow Glen Drive	Town Hall	Route 202
	East State Street (Route 202)	Fire Station	
	Carver Street	Police Station	
		Granby High School	
Severe Snow/Ice Storm	West Street	Town Hall	Route 202
	East State Street (Route 202)	Fire Station	
		Police Station	
		Granby High School	
Hurricane/Severe Wind	Whole Town		Route 202, Amherst St. , School Street
Wildfire/Brushfire	Forest Area, Harris Street		
Earthquake	-		
Dam Failure	Aldrich Lake Dam		
Drought	-		
Hazardous Materials	Tier II Haz. Material Storage Sites		
	(Appendix D)		

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

## 5: MITIGATION STRATEGIES

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

### Goal Statement

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

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

- Zoning Bylaw
- Subdivision Regulations
- Granby's Community Development Plan
- CEM Plan
- Other relevant Bylaws as identified (Fire Department Burn Permit Procedures, Building Code, etc.)
- Master Plan Draft

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

### General Mitigation Measures

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

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

### What's the CEM Plan?

An important existing general preparedness and response tool is Granby'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.

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

- Re-activate Local Emergency Planning Committee.
- Establish system to inventory supplies at existing shelters and develop a needs list and storage requirements. Establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster.
- Examine current notification system including feasibility of new siren warning system, Internet radio system, or Reverse 911. Develop a preliminary project proposal and cost estimate. (**Police Chief Barry**)

## **Flooding**

---

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

### ***Current Mitigation Measures***

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

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

Existing Strategy		Description	Effectiveness	Potential Changes
Flood Control Structures		Nine dams.	Somewhat effective.	Ensure dam owners realize their responsibility to inspect the dams.
Culvert Replacement		Culvert on Amherst St. over Aldrich Lake. Culvert at Dufresne Park Dam Culvert on Batchelor St. before McDonald Ave.	Very effective for managing flood control needs.	Seek funding from HMGP for top-priority local projects. Alert MassHighway to repair Top priority problem culverts.
	Floodplain Protection District	Areas delineated as part of the 100-year floodplain are protected by strict use regulations.	Very effective for preventing incompatible development within the flood prone areas.	None
Zoning By-Laws	Water Supply Protection District	Overlay district to protect groundwater resources by regulating certain uses.	Very effective for preventing groundwater contamination and for controlling stormwater runoff.	Consider revising definitions for clarification – utilize state model from DEP.
	Open Space Community Development (OSCD)	Provides regulations for cluster subdivision development by special permit. Allows protection of contiguous open space.	Somewhat effective for minimizing impervious surface, allowing for more groundwater infiltration.	
	Environmental Performance Standards	Specific requirements for managing stormwater run-off, erosion control, and water quality.	Effective for regulating construction.	
	Earth Removal	Requires special permit approval for earth removal.	Somewhat effective for preventing water pollution.	Consider creating more performance-based evaluations.
	Site Plan Approval	Specific requirements for new construction to be integrated into the existing environment.	Somewhat effective for preventing incompatible development.	
Subdivision Rules and Regulations		Definitive Plan-- Proposed septic or sewer and water supply must be shown. Additionally-- Hydrology Study and Drainage Calculation; Sanitary Sewer Study; Water Study; Environmental Impact Statement; Development Impact Statement;	Somewhat effective for determining water supply and quality, preventing contamination. Additions-- Effective for determining water supply, quality prior to development.	None
Granby Community Development 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.	Effective in identifying sensitive resource areas, including floodplains. Encourages forest, farmland protection, help conserve the town's flood storage capacity.	Work to implement relevant goals and policies in Plan.
National Flood Insurance Program Participation		As of 2006, there were 16 homeowners with flood insurance policies.	Very effective to prevent and limit development in flood plains.	The town should evaluate whether to become a part of FEMA's Community Rating System. Town should make sure that MAA established via Western region homeland security advisory council (to which 80% of 101 w. MA munis have signed on) applies to administering NFIP following a major storm event. Enhance local officials, builders, developers and other stakeholders' knowledge of how to read and interpret the FIRM.

### **Future Mitigation Measures**

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

- Replace top priorities on culvert replacement list.
  - Itemized list of culvert replacements here.
  - a culvert replacement
  - a culvert replacement
- Ensure dam owners realize their responsibility to inspect the dams regularly.
- Revise the definitions for hazardous materials/wastes in the Water Supply Protection District, utilizing the state model from DEP.
- Create more performance-based evaluations for earth removal and site plan approval.
- Implement the goals and strategies of the Granby Community Development Plan dealing with protection of floodplain, forests, and farmland.
- Evaluate whether to become a part of FEMA's Community Rating System.

#### **What is the NFIP's Community Rating System (CRS)?**

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

### **Severe Snow/Ice Storm**

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

### **Current Mitigation Measures**

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

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

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

Existing Strategy		Description	Effectiveness	Potential Changes
Zoning By-law	Common Driveways	Allows for adjacent lots to share a driveway, fewer curb cuts.	Effective for providing access	
	Granby Design Handbook	Utilities must be placed underground where feasible.	Effective for preventing power loss.	Continue Working with National Grid to facilitate underground utilities as allowed.
State Building Code		The Town of Granby has adopted the Massachusetts State Building Code.	Effective.	
Backup Electric Power		Shelters have backup power, two mobile generators	Very effective in case of power loss.	
Tree Management		List of dangerous trees created annually by National Grid.	Very effective, preventative collaboration.	Encourage them to work on backlog.

### **Future Mitigation Measures**

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

- Work with National Grid to facilitate the underground placement of new utility lines in general and existing utility lines in locations where repetitive outages occur (as applicable).
- Determine if existing generators at shelters are effective, replace if not effective. Determine if new facility under construction will have enough generators in case of emergency.
- Participate in the creation of a Regional Debris Management Plan.

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

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

## **Hurricanes/Severe Wind**

---

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

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

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

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

## **Tornadoes/Microbursts**

---

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

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



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

Existing Strategy		Description	Effectiveness	Potential Changes
Zoning By-law	Use Regulations – Prohibited Uses	Mobile homes/trailers are prohibited in all zone districts in Town.	Somewhat effective for preventing damage to susceptible structures	
	Granby Design Handbook	Utilities must be placed underground where feasible.	Effective for preventing power loss.	Work with National Grid to facilitate underground utilities as allowed.
State Building Code		The Town has adopted the MA State Building Code.	Effective.	

#### ***Future Mitigation Measures***

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

- Participate in the creation of a Regional Debris Management Plan.

### **Wildfire/Brushfire**

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

#### ***Current Mitigation Measures***

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

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

Existing Strategy		Description	Effectiveness	Potential Changes
Zoning By-law	Performance Standards	Construction must meet Town's Comprehensive Fire Code; Fire Chief is permitted to make recommendations for fire prevention measures.	Very effective for mitigating fires in developed areas.	
	Site Plan Approval	Special granting authority can request Fire Department inspection/review of any plan.	Effective.	
Burn Permits		Residents must obtain burn permits, and personnel provide information on safe burn practices.	Somewhat effective.	
Public Education/Outreach		The Fire Department has an ongoing educational program in the schools.	Effective.	None.

### ***Future Mitigation Measures***

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

- Water Supply Sources listed in the previous section need to be recertified to maintain low insurance rates.

## **Earthquake**

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

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

### ***Current Mitigation Measures***

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

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

Existing Strategy	Description	Effectiveness	Potential Changes
State Building Code	The Town of Granby has adopted the State Building Code.	Effective for new buildings only.	

**Future Mitigation Measures**

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

- Participate in the creation of a Regional Debris Management Plan.

**Dam Failure**

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

**Current Mitigation Measures**

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

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

Existing Strategy	Description	Effectiveness	Potential Changes
New Dam Construction Permits	State law requires a permit for the construction of any dam.	Effective. Ensures dams are adequately designed.	None.
Dam Inspections	DCR has an inspection schedule that is based on the hazard rating of the dam (low, medium, high hazard).	Low. The responsibility for this is now on dam owners, who may not have sufficient funding to comply.	Identify sources of funding for dam safety inspections. Incorporate dam safety into development review process.

**Future Mitigation Measures**

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

- Collaborate with the PVPC to identify sources of funding for dam safety inspections.

## Drought

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

### Current Mitigation Measures

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

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

Existing Strategy		Description	Effectiveness	Potential Changes
Zoning By-law	Water Supply Protection District	Areas delineated as recharge areas for aquifers are protected by strict use regulations.	Very effective for preventing groundwater contamination and for controlling stormwater runoff, promoting groundwater recharge.	Consider revising definitions for clarification – utilize state model from DEP.
	Special Use Regulations – Multi-family Dwellings	Water supply must be shown on site plan; regulates on-site waste disposal systems.	Somewhat effective for managing supply of water and protecting groundwater sources.	
	Special Use Regulations – Open Space Communities	Developer must prove that groundwater pollution is not greater after development than before.	Effective for protecting groundwater sources.	
	Administration – Special Permit	Approval requires that provisions be made to maximize groundwater recharge.	Somewhat effective for protecting groundwater supply.	Consider including performance standards.
	Administration – Site Plan	Approval requires the plan to include "sufficient" measures to prevent groundwater pollution and maximize recharge.		
Granby Community Development Plan		Makes recommendations for protecting Granby's water quality/supply.	Somewhat effective for raising awareness about protecting water quality, supply, and conservation.	Implement plan goals.

### **Future Mitigation Measures**

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

- Revise Water Supply Protection District to clarify definitions for hazardous materials/wastes, utilizing the state model from DEP.
- In regards to the Granby Community Plan, implement the goals and strategies dealing with protection of waterbodies and forestland.
- Create Water Conservation Guidelines to use as an educational tool for Town residents.
- Add performance-based standards for groundwater recharge and pollution prevention for special permit/site plan approval.

### **Hazardous Materials**

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

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

Existing Strategy		Description	Effectiveness	Potential Changes
Zoning By-law	Floodplain District	No hazardous materials use/storage permitted within district.	Effective for preventing contamination during flood.	
	Water Supply Protection District	No hazardous materials permitted within areas delineated as recharge areas for groundwater aquifers.	Very effective for preventing groundwater contamination.	Consider revising definitions for clarification – utilize state model from DEP.
	Performance Standards – Water Quality	Regulates containment area for outdoor storage of fuel and other hazardous materials.	Very effective for preventing damage from spills.	

### **Future Mitigation Measures**

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

- Revise Water Supply Protection District to clarify definitions for hazardous materials/wastes, utilizing the state model from DEP.

## 6: PRIORITIZED IMPLEMENTATION SCHEDULE

### Summary of Critical Evaluation

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

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

### Project Prioritization

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

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



**Table 6.1: Prioritized Implementation Schedule – Action Plan**

Priority	Mitigation Action	Responsible Department/Board	Proposed Completion Date	Funding Source/ Estimated Cost	Incorporation into Existing Plans
1	Seek funding from HMGP for top-priority local projects. Alert MassHighway to repair top propriety problem culverts that are their responsibility.	EMD/Highway Dept	2013	HMGP, MassHighway/ \$500,000	CIP, CEMP
2	Ensure dam owners realize their responsibility to inspect and maintain their dams.	EMD/Highway Dept	2011	Minimal cost, can be absorbed by Town	OSRP
3	Collaborate with PVPC to identify sources of funding for dam safety inspections.	EMD/Highway Dept	2011	Minimal cost, can be absorbed by Town	CIP
4	Consider revising water supply protection district definitions for clarification—using DEP's model language	Planning Board	2011	Minimal cost, can be absorbed by Town	Master Plan
5	Consider creating more performance-based evaluations for earth removal and site plan review.	Planning Board	2011	Minimal cost, can be absorbed by Town	Master Plan
6	Work to implement relevant goals of Granby's Community Development plan, and pending Master Plan—inventorying of natural resources etc.	Planning Board	2013	Self-help funds, EOEA/ \$50,000	Master Plan, OSRP
7	The Town should evaluate whether or not to become a part of FEMA's Community Rating System	EMD, SelectBoard	2013	Minimal cost, can be absorbed by Town	Master Plan
8	Work with National Grid to facilitate the underground placement of new utility lines in general and existing utility lines in locations where repetitive outages occur (as applicable).	Highway Dept/EMD	ongoing	Astronomical/National Grid	Master Plan
9	Determine if existing generators at shelters are effective, replace if not effective. Determine if new facility under construction will have enough generators in case of emergency.	EMD, Fire Chief	2010	Town funds/\$25,000	Master Plan
10	Participate in the creation of a regional debris management plan.	Highway Dept, EMD, Select Board	2010	Minimal cost, can be absorbed by Town	Master Plan
11	Create water conservation guidelines to use as an educational tool for Town residents.	Highway Dept	2011	Minimal cost, can be absorbed by Town	Master Plan

## **7: PLAN ADOPTION & IMPLEMENTATION**

### **Plan Adoption**

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

### **Plan Implementation**

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

### **Plan Monitoring and Evaluation**

The measure of success of the Granby Local Natural Hazards Mitigation Plan will be the number of identified mitigation strategies implemented. In order for the town to become more disaster resilient and better equipped to respond to natural disasters, there must be a coordinated effort between elected officials, appointed bodies, town employees, regional and state agencies involved in disaster mitigation, and the general public. The Granby Natural Hazards Planning Committee will meet on an annual basis or as needed (i.e., following a natural disaster) to monitor the progress of implementation, evaluate the success or failure of implemented recommendations, and brainstorm for strategies to remove obstacles to implementation. Those parties noted in Section 6 of the plan, all of whom have a representative on the Granby Natural Hazards Planning Committee, will be responsible for seeing that the actions are implemented and will report on their progress at the annual plan review meetings. The plan will be available for ongoing public review and comment at the Town Hall, Town Library and at the PVPC offices.

Outreach to the public, surrounding communities, agencies, businesses, academia, non-profits, or other interested parties outside of the town of Granby will be done in advance of each annual meeting in order to solicit their participation in assessment of the plan. Following these discussions, it is anticipated that the committee may decide to reassign the roles and responsibilities for implementing mitigation strategies to different town departments and/or revise the goals and objectives contained in the plan. At a minimum, the committee will review and update the plan every five years, beginning in the winter of 2013. The meetings of the committee will be organized and facilitated by the Emergency Management Director or the Granby Board of Selectmen.



CERTIFICATE OF ADOPTION

TOWN OF GRANBY, MASSACHUSETTS

BOARD OF SELECTMEN

A RESOLUTION ADOPTING THE GRANBY

NATURAL HAZARD MITIGATION PLAN

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

WHEREAS, several public planning meetings were held between January and May 2007 regarding the development and review of the Granby Hazard Mitigation Plan; and

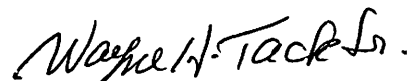
WHEREAS, the Granby Hazard Mitigation Plan contains several potential future projects to mitigate hazard damage in the Town of Granby, and

WHEREAS, a duly noticed public hearing was held by the Granby Board of Selectmen on August 16, 2010 to formally approve and adopt the Granby Hazard Mitigation Plan.


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

ADOPTED AND SIGNED this sixteenth day of August 2010.

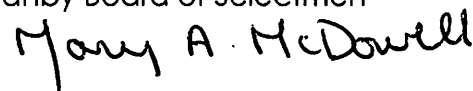
Wayne H. Tack Sr., Chair  
Granby Board of Selectmen



Mark L. Bail  
Granby Board of Selectmen



Mary A. McDowell  
Granby Board of Selectmen



ATTEST

# APPENDICES

## Appendix A – Technical Resources

### 1) Agencies

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

### 2) Mitigation Funding Resources

404 Hazard Mitigation Grant Program (HMGP) .....	Massachusetts Emergency Management Agency
406 Public Assistance and Hazard Mitigation .....	Massachusetts Emergency Management Agency
Community Development Block Grant (CDBG).....	DHCD, also refer to RPC
Dam Safety Program.....	MA Division of Conservation and Recreation
Disaster Preparedness Improvement Grant (DPIG) .....	Massachusetts Emergency Management Agency
Emergency Generators Program by NESEC† .....	Massachusetts Emergency Management Agency
Emergency Watershed Protection (EWP) Program.....	USDA, Natural Resources Conservation

Service Flood Mitigation Assistance Program (FMAP) .....Massachusetts Emergency Management Agency  
 Flood Plain Management Services (FPMS).....US Army Corps of Engineers  
 Mitigation Assistance Planning (MAP).....Massachusetts Emergency Management Agency  
 Mutual Aid for Public Works.....Western Massachusetts Regional Homeland Security Advisory Council  
 National Flood Insurance Program (NFIP) † .....Massachusetts Emergency Management Agency  
 Power of Prevention Grant by NESEC‡ .....Massachusetts Emergency Management Agency  
 Roadway Repair & Maintenance Program(s).....Massachusetts Highway Department  
 Section 14 Emergency Stream Bank Erosion & Shoreline Protection .....US Army Corps of Engineers  
 Section 103 Beach Erosion.....US Army Corps of Engineers  
 Section 205 Flood Damage Reduction.....US Army Corps of Engineers  
 Section 208 Snagging and Clearing .....US Army Corps of Engineers  
 Shoreline Protection Program.....MA Department of Conservation and Recreation  
 Various Forest and Lands Program(s).....MA Department of Environmental Protection  
 Wetlands Programs .....MA Department of Environmental Protection

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

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

### 3) Internet Resources

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

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

## **Appendix B – List of Acronyms**

---

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

## Appendix C – Natural Hazard Profiling Methodology<sup>4</sup>

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

The matrix is organized into the following sections: Type of Hazard, Location of Occurrence, Extent of Impacts, Previous Occurrences, Probability of Future Occurrence, and Hazard Index. The Hazard Index was completed to rank the hazards according to the frequency of occurrence and the amount of potential damage likely to occur. The Hazard Index forms the basis for concentrating the future mitigation efforts outlined in this plan. A description of each of the matrix categories is provided below. The completed Matrix is shown as Table 3.1 (Section 3, page 9).

### **Location of Occurrence**

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

<b>Table C.1: Location of Occurrence, Percentage of Town Impacted of Given Natural Hazard</b>	
<b>Location of Occurrence</b>	<b>Percentage of Town Impacted</b>
Large	More than 50% of the town affected
Medium	10 to 50% of the town affected
Small	Less than 10% of the town affected

### **Extent of Impacts**

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

<b>Table C.2: Extent of Impacts, Magnitude of Multiple Impacts of Given Natural Hazard</b>	
<b>Extent of Impacts</b>	<b>Magnitude of Multiple Impacts</b>
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.

<sup>4</sup> Source: information adapted from Town of Holden Beach, NC Community-Based Hazard Mitigation Plan, July 15, 2003, and Hyde County, NC Multi-Hazard Mitigation Plan, Sept 2002; and the Massachusetts Emergency Management Agency (MEMA).

Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of facilities.
-------	--

### **Previous Occurrences**

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

### **Probability of Future Occurrence**

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

<b>Table C.3: Frequency of Occurrence and Annual Probability of Given Natural Hazard</b>	
<b>Frequency of Occurrence</b>	<b>Probability of Future Event</b>
Very High	70-100% probability in the next year
High	40-70% probability in the next year
Moderate	10-40% probability in the next year
Low	1-10% probability in the next year
Very Low	Less than 1% probability in the next year

### **Hazard Index**

The hazard index ratings were determined after assessing the frequency, location and impact classifications for each hazard. The hazard index ratings are based on a scale of 1 (highest risk) through 5 (lowest risk). The ranking is qualitative and is based, in part, on local knowledge of past experiences with each type of hazard. The size and impacts of a natural hazard can be unpredictable however; many of the mitigation strategies currently in place and many of those proposed for implementation can be applied to the expected natural hazards, regardless of their unpredictability.

The Hazard Ratings are labeled as follows:

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

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



## **Appendix E – Documentation of the Planning Process**

---

**Granby Hazard Mitigation Planning Committee  
Meeting #1 July 23, 2008 11:00 am  
Granby Town Offices  
AGENDA**

**1. Introduction & Purpose of Committee**

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

**3. Hazards Analysis Methodology**

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

**4. Analyze Development Trends**

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

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

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

---

**Granby Hazard Mitigation Planning Committee  
Meeting #2, August 20, 2008 12:00 pm  
Granby Town Offices  
AGENDA**

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

- Identify Critical Facilities on Base Map. The following list contains items that should be clearly identified on the map, as they apply to your community:
  - Emergency Operations Center- Nursing Homes
  - Emergency Fuel Facilities
  - Town/City Hall
  - Police Station
  - Fire Station
  - Public Works Garages
  - Water Treatment Facilities
  - Sewage Treatment Plants
  - Water Tower/Supply Pumps
  - Power Plants
  - Electrical Power Substations
  - Schools
  - Major Highways and Roadways
  - Elderly Housing
  - Day-Care Facilities
  - Correctional Facilities
  - Other Congregate Care Facilities
  - Shelters
  - Special Needs Populations
  - Hazardous Materials Facilities
  - Access Roads to Critical Facilities
  - Evacuation Routes
  - Unique or Historic Resources
  - Commercial Economic Impact Areas
  - Socio-Economic Impact Areas

- Bridges
- Dams

- Areas with Second Language Needs
- Hospitals

## **2. Identify Evacuation Routes Potentially Affected By Hazard Areas**

## **3. Establish Mitigation Goals and Objectives**

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

---

## **Appendix F – Public Outreach**

---

### **PRESS RELEASE**

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

FOR IMMEDIATE RELEASE

December 14, 2007

#### **Pre-Disaster Mitigation Plans Under Development**

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

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

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

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

—30—

## PRESS RELEASE

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

FOR IMMEDIATE RELEASE  
February 5, 2009

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

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

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

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

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

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