

# The Town of Granby Hazard Mitigation Plan Update



Adopted by the Granby Board of Selectmen on August 21, 2017

**The Granby Hazard Mitigation Committee**

and

**Pioneer Valley Planning Commission**

60 Congress Street  
Springfield, MA 01104  
(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 Select Board extends special thanks to the Granby Hazard Mitigation Planning Committee as follows:

Chris Martin, Town Administrator/Emergency Management Director  
David Desrosiers, Highway Superintendent  
Wenda Luff Conservation Commission  
James Trompke, Planning Board  
Alan Wishart Jr., Police Chief  
John Mitchell, Fire Chief

The Granby Select Board offers thanks to the Massachusetts Emergency Management Agency (MEMA) for developing the Massachusetts Hazard Mitigation Plan which served as a model for this plan update. 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 Ratté, Principal Planner/Project Manager  
Ashley Eaton, Planner  
Jacob Dollinger, GIS Specialist

**CERTIFICATE OF ADOPTION**

**Town of Granby, MASSACHUSETTS**

**BOARD OF SELECTMEN**

**A RESOLUTION ADOPTING THE TOWN OF GRANBY HAZARD MITIGATION PLAN UPDATE**

WHEREAS, the Town of Granby established a Committee to update the Town's local Hazard Mitigation plan; and

WHEREAS, the Town of Granby participated in the update of the Town of Granby's local Hazard Mitigation Plan Update;

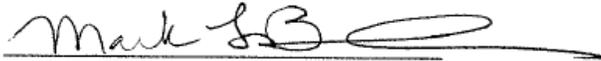
and WHEREAS, the Town of Granby Hazard Mitigation Plan Update contains several potential future projects to mitigate potential impacts from natural hazards in the Town of Granby, and

WHEREAS, a duly-noticed public meeting was held by the Board of Selectmen on August 21, 2017 for the public and municipality to review prior to consideration of this resolution; and

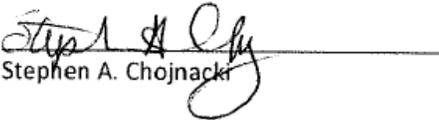
WHEREAS, the Town of Granby authorizes responsible departments and/or agencies to execute their responsibilities demonstrated in the plan, and

NOW, THEREFORE BE IT RESOLVED that the Town of Granby Board of Selectmen formally approves and adopts the Town of Granby Hazard Mitigation Plan Update, in accordance with M.G.L. c. 40.

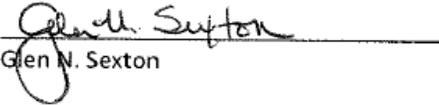
ADOPTED AND SIGNED this 21<sup>st</sup> day of August, 2017



Mark L. Bail, Chairman



Stephen A. Chojnacki



Glen N. Sexton

ATTEST

---

<b>1: Planning Process</b>	<b>1</b>
Introduction	1
Hazard Mitigation Committee	2
Participation by Stakeholders	3
Select Board Meeting	5
<b>2: Local Profile</b>	<b>6</b>
Community Setting	6
Development	6
Infrastructure	9
Natural Resources	9
<b>3: Hazard Identification and Analysis</b>	<b>12</b>
Natural Hazard Analysis Methodology	13
Flooding	17
Severe Snowstorms / Ice Storms	21
Hurricanes / Tropical Storms	26
Severe Thunderstorms / Wind / Tornadoes/Microbursts	30
Wildfire / Brushfire	35
Earthquakes	39
Dam Failure	43
Drought	46
Extreme Temperatures	50
Other Hazards	53
<b>4: Critical Facilities</b>	<b>54</b>
Facility Classification	54
Category 1 – Emergency Response Services	54
Category 2 – Non Emergency Response Facilities	56
Category 3 – Facilities/Populations to Protect	57
Category 4 – Potential Resources	58
<b>5: Mitigation capabilities &amp; Strategies</b>	<b>61</b>
Overview of Mitigation Strategies by Hazard	62
Existing Mitigation Capabilities	64
Completed and Deleted Mitigation Strategies	67
Prioritized Implementation Plan	69
<b>6: Plan review, Evaluation, Implementation, and Adoption</b>	<b>73</b>
Incorporation with Other Planning Documents	73
Plan Monitoring and Evaluation	74
<b>7: Appendices</b>	<b>76</b>
Appendix A - Technical Resources	76
Appendix B – Documentation of the Planning Process	79
Appendix C – List of Acronyms	91
Appendix D – Past and Potential Hazards/Critical Facilities Map	92
Appendix E - Capability Assessment Worksheet	93

# 1: PLANNING PROCESS

## Introduction

---

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

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

Preparing, and updating every five years, a hazard mitigation plan before a disaster, 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.

## Hazard Mitigation Committee

---

Updating the Town of Granbys's Hazard Mitigation plan involved a 6-member committee:

- Chris Martin, Town Administrator/Emergency Management Director
- David Desrosiers, Highway Superintendent
- Wenda Luff Conservation Commission
- James Trompke, Planning Board
- Alan Wishart Jr., Police Chief
- John Mitchell, Fire Chief

The Hazard Mitigation Planning process update for the Town included the following tasks:

- Reviewing and incorporating existing plans and other information including changes in development in the last five years since the Town's first Hazard Mitigation planning process
- Updating the natural hazards that may impact the community from the previous plan
- Conducting a Vulnerability/Risk Assessment to identify the infrastructure at the highest risk for being damaged by the identified natural hazards, particularly flooding
- Identifying and assessing the policies, programs, and regulations the community is currently implementing to protect against future disaster damages
- Identifying deficiencies in the current Hazard Mitigation strategies and establishing goals for updating, revising or adopting new strategies
- Adopting and implementing the final updated Hazard Mitigation Plan

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

### Committee Meetings

Meetings of the Hazard Mitigation Committee, all of which took place at the Granby Senior Center, were held on the dates listed below. Agendas for these meetings are included in Appendix B.

#### **February 23, 2017**

Work group meeting included hazard mitigation planning overview, identifying and organizing of the planning team, a discussion of the public outreach process and an initial discussion of hazard identification and risk assessment.

#### **March 8, 2017**

Work group revisited critical facilities list and map, and worked to identify vulnerabilities associated with each natural hazard.

#### **March 16, 2017**

Work group complete the FEMA Capability Assessment to identify current mitigation strategies undertaken by the town and ways to improve their effectiveness.

### **March 30, 2017**

The group reviewed the list of strategies included in the previous hazard mitigation plan to assess the town's progress. Work group also identified mitigation strategies the town should pursue to lessen its vulnerabilities to hazards. These strategies were then prioritized. The work group also discussed the mechanisms for keeping this plan up to date over its five year implementation time frame.

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

## **Participation by Stakeholders**

---

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

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

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

- Developing the Pioneer Valley Regional Land Use Plan, Valley Vision 2, which advocates for sustainable land use throughout the region and consideration for the impact of flooding and other natural hazards on development.
- Developing the Pioneer Valley Climate Action and Clean Energy Plan, which assesses the impact that climate change will have on the region and recommends strategies for mitigation that can be implemented by local municipalities and businesses.
- Collaborating with state agencies, such as the Department of Conservation and Recreation, to maintain inventories of critical infrastructure throughout the region.

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

In addition, the Pioneer Valley Planning Commission is actively involved in the Western Region Homeland Security Advisory Council (WRHSAC). WRHSAC, which includes representatives from Western Massachusetts municipalities, Fire Departments, Public Works Departments, Police Departments, area hospitals and regional transit from throughout the four counties of western Massachusetts, is responsible for allocating emergency preparedness funding from the US Department of Homeland Security. The representatives of these disciplines who serve on the WRHSAC are charged with sharing the information discussed at meetings with their colleagues at their regular meetings. PVPC attends all WRHSAC meetings and all WRHSAC members are aware of the fact that Granby was updating its Hazard

Mitigation plan. Meetings of WRHSAC regularly involve discussion about how to improve emergency preparedness in western Massachusetts, and hazard mitigation activities are included in this discussion.

In addition, PVPC staff regularly present to their Executive Committee and Commission (representatives from the 43 cities and towns that comprise the Pioneer Valley, when new projects are launched and when funding opportunities are available). As result, all the communities in the region were informed of Granby's Hazard Mitigation Plan update process and encouraged to comment.

### **Agencies that have the authority to regulate development**

The Granby Planning Board is the primary Town agency responsible for regulating development in town. Feedback to the Planning Board was ensured through the participation of James Trompke (Vice Chair of the Planning Board) on the Hazard Mitigation Committee. One of the two outreach events also took place during a Planning Board meeting, so all members of the Board learned about and had the opportunity to comment on the plan update process. In addition, the Pioneer Valley Planning Commission, as a regional planning authority, works with all agencies that regulate development in Granby, including the municipal entities listed above and state agencies, such as Department of Conservation and Recreation and MassDOT. This regular involvement ensured that during the development of the Granby Hazard Mitigation Plan, the operational policies and any mitigation strategies or identified hazards from these entities were incorporated into the Hazard Mitigation Plan.

### **Participation by the Public, Businesses, and Neighboring Communities**

Two public planning sessions were held as part of the development of the Granby plan – on March 13, 2017 and April 3, 2017. Both meetings occurred after the Hazard Mitigation Committee had provided input on hazards and mitigation strategies relevant to the community. Notice of both public meetings was posted at Granby Town Hall in compliance with the Commonwealth of Massachusetts' open meeting law. Public meeting agendas and notices can be found in Appendix B.

The Hazard Mitigation Committee determined that the most effective outreach strategy for engaging with the public, businesses and neighboring communities was through the media, and so this was the outreach strategy employed for reaching out to all three groups of stakeholders. The press release indicated that residents of Granby were invited to attend the event, which was also intended to include representatives of businesses in Granby and residents of neighboring communities. Additionally, the Hazard Mitigation Committee felt that by presenting at a regularly scheduled town meetings, more people would be likely to attend. For this reasons, presentations and a discussion about the hazard mitigation process and plan were held at the beginning of a planning board meeting and a Selectboard meeting.

Businesses and neighboring communities were also provided with an opportunity to provide feedback through the Pioneer Valley Planning Commission. PVPC is regularly involved in land use, transportation, and environmental planning initiatives in Granby and surrounding communities. Regular feedback received from these other initiatives was incorporated into the hazard mitigation planning process. Neighboring communities that were provided with an opportunity to comment, included municipalities that directly border Granby which are South Hadley, Belchertown, Ludlow and Chicopee. (South Hadley, Belchertown and Ludlow completed their hazard mitigation plans shortly before Granby and Chicopee

was in the process of updating their plan during the same timeframe as Granby.) These communities were invited to view the plan and attend the public meetings via a press release.

Documentation of Granby's public engagement process can be found in Appendix B.

#### Public Meeting #1 – March 13, 2017

On March 6, 2017, the Pioneer Valley Planning Commission sent a press release to relevant media outlets to announce that there would be a first public outreach meeting about the plan on March 13, 2017. This release was sent to those media identified by the Hazard Mitigation Committee as most relevant to the development of the plan. This meeting took place during a regularly scheduled meeting of the Granby planning board. Participation was limited. Major concerns included high winds that have been more prevalent recently and ensuring that development patterns do not enhance the town's vulnerabilities to hazards.

#### Public Meeting #2-April 3, 2017

On March 24, 2017, PVPC sent out a press release indicating that a second public outreach meeting would take place on April 3, 2017, and also to inform the public that a draft of the Granby Hazard Mitigation Plan had been placed on PVPC's website. The release also indicated that hard copies were available at PVPC's offices and at Granby Town Hall, and that all residents, businesses and other concerned parties of Granby were encouraged to comment on the plan by e-mailing or calling staff contacts at PVPC or the Town. The meeting took place during a regularly scheduled meeting of the Granby Select Board. It was also recorded and will air on Granby's local access television channel. In general, participants agreed with the risk assessment and mitigation strategies selected during this planning process.

Concerns regarding Granby's communication infrastructure were discussed. A few years ago, most of Granby lost telephone service when a lightning bolt struck their municipal phone service center. This impacted residents' ability to call for emergency services if needed. A new action item has been added to address this concern. The town plans to explore whether or not emergency calls would be able to run through Comcast lines if the municipal service went down. It was also suggested that a Local Emergency Planning Committee could be helpful in advancing a number of the actions listed in this plan. A new action item about forming a standing town committee to advance some of this work was also added as a result of this public participation.

Any future input received from the public, as well as any other stakeholders, will be incorporated into the plan during future regular updates. Public participation will be a critical component of the Hazard Mitigation Plan maintenance process. The Hazard Mitigation Committee will hold all future meetings in accordance with Massachusetts open meeting laws. In addition, the public will be invited to provide comments through e-mail. The comments will be reviewed by the Hazard Mitigation Committee and incorporated as appropriate.

#### **Select Board Meeting**

---

In 2014, the Select Board agreed to begin the process of developing a Hazard Mitigation Plan. Once the plan was provisionally approved by FEMA, the Select Board held a public hearing on the plan and then adopted it.

## 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 2000, the town's population increased 2.7% to 6,301 residents.

### Population Characteristics

According to the U.S. Census, there are 6,301 residents and a total of 2,483 housing units. The median household income is \$78,261 with 5.8 percent of residents living in poverty (American Community Survey 2010-2014). Additionally, 14.1% of the town was over the age of 65 in 2015 (up from 11.7% in the 2000). The town is also seeing the number of people under 18 years of age decrease. (Approximately 25% of the town's population was under 18 in 2000 and as of 2015 only 21% of the town was.) These two segments of the population are expected to be the most vulnerable to the impact of natural hazards.

### Development

---

In a community about 18,000 acres in size, close to two-thirds of the community, or about 12,000 acres remain in a forested landscape. Farmland comprise of approximately 2,100 acres, or 11 percent of the total land use in Granby. In 2005, the most recent year of land use statistics from the State, residential development consisted of 10 percent of the total land use in Granby, currently the highest percentage of developed land in the community. Land for industrial and commercial uses constitutes approximately 120 acres and 11.8 acres, respectively. Land characterized as urban open/public land constitutes 624 acres, and there are 128.1 acres of outdoor recreational land throughout Town. Waterbodies and wetlands comprise about 1,100 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.

## Zoning

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;

One commercial (business) zones -- GB, General Business;

Two industrial zones – I, Industrial; and I-2, Industrial (Limited Landfill/Solid Water Management and Recycling uses);

One mixed use zone- VC, Village Center District;

Six overlay zones –Floodplain District; Water Supply Protection; Agricultural Preservation; Mixed Use Development; Business Park Overlay District; and Professional Office Overlay District.

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. The purposes of the flood plain district include;

- To provide that lands in the Town of Granby subject to seasonal or periodic flooding as described hereinafter shall not be used for residence or other purposes in such manner as to endanger the health or safety of the occupant thereof.
- To protect, preserve and maintain the water table and water recharge areas within the Town so as to preserve present and potential water supplies for the public health and safety of the Town of Granby.
- To assure the continuation of the natural flow pattern of the water course(s) within the Town of Granby in order to provide adequate and safe floodwater storage capacity to protect persons and property against the hazards of flood inundation.
- To eliminate new hazards to emergency response officials.
- To prevent the occurrence of public emergencies resulting from water quality, contamination, and pollution due to flooding.
- Eliminate costs associated with the response and cleanup of flooding conditions.
- Reduce damage to public and private property resulting from flooding waters.

This district prohibits any new dwelling units or improvements over 50 percent. Uses that are permitting include low-density conservation, agriculture and forestry uses.

Water Supply Protection District - This purpose of this overlay district is “to promote the health, safety and welfare of the community by protecting and preserving the surface and groundwater supply resources of Granby from any use of land or structures, which reduce the quality or

quantity of its water supply resources.” 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**

Between 2011 and 2015, Granby issued 49 single family building permits. Almost all of the single family development occurring in Granby are situated on large lots. These developments are not concentrated in one area of the Town, and it is unlikely that these homes have impacted the town’s vulnerabilities to hazards. Additional development throughout the town could place an additional demand on the emergency response efforts.

There has been very limited commercial development in Granby since the last hazard mitigation plan was created. The town has modified its zoning to allow additional commercial development along Route 202, but nothing has been built under this new zoning yet.

The last noteworthy piece of development to happen in town since the town’s last hazard mitigation plan was the development of a large ground mounted solar facility on East Street. The facility consists of five 750kwh solar installations. The facility is owned by a private entity, but the town has entered into a contract to purchase the energy from the system.

### **National Flood Insurance Program Status**

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

- Flood Insurance Maps (FIRMs) are used for flood insurance purposes and are on file with the Granby Planning Board.
- FIRMs have been effective since January 2, 1980, which is also the date the current map went into effect.
- Granby has 15 in-force policies in effect for a total of \$2,708,100 worth of insurance.
- There have been a total of 3 NFIP claims for which \$14,455 has been paid.
- As of March 2015, there have been no Repetitive Loss Properties in Granby.

The Town will maintain compliance with the NFIP throughout the next five-year Hazard Mitigation Planning cycle by monitoring its Flood Plain Overlay District and ensuring that the district accurately reflects the 100-year flood plain and FEMA Flood Insurance Rate Map (FIRM).

## **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.

### **Public Transportation**

The Pioneer Valley Transit Authority (PVRTA) 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.

### **Drinking Water and Sewer Service**

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. In addition, a section of Granby along Route 116 receives water from South Hadley Fire District #2. There is concern that some a number of the private wells in town may be extremely shallow, which could pose an issue in times of drought.

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. Additionally, a small section of the town is on a public sewer system. This waste is sent to the a Regional Treatment Facility in South Hadley.

### **Schools**

Granby Public Schools has two elementary schools (East Meadow School and West Street School) and a combined Jr./Sr. High School (Granby Jr./Sr. High School). There are currently plan to merge the two elementary schools into a renovated East Meadow School. The West Street School would then be taken offline. This work is expected to be completed for the start of the 2018 school year (September 2018).

The MacDuffie School, a private college-preparatory school, is located in Granby. They serve students in the sixth to twelfth grades.

## **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.

## Surface Water

There are several ponds, lakes, and brooks 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.

## Forests

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. The northern portion of the town includes lands in the Mount Holyoke Range State Park—land managed by the Massachusetts Department of Conservation and Recreation (DCR).

Additionally, there are approximately 2,580 acres of fields, pastures, and orchards in Granby. Much of these agricultural lands are now abandoned, and provides good wildlife habitats.

## Conservation Land

The town currently has 73 parcels (1,800 acres) enrolled in the state's Chapter 61A program (a 1.1% increase from 2010). Chapter 61A is designed to encourage the preservation of farmland and promote active agricultural use by offering significant local tax benefits to property owners will to make a long term commitment to farming. There are an additional 13 parcels (365 acres) enrolled in the Chapter 61 program (a .6% drop from 2010) and 38 parcels (1,362 acres) are enrolled in the Chapter 61B program (a .1% increase from 2010). These two companion state tax programs offer the same local tax benefits to property owners willing to make a long term commitment to forest management and to offer recreation opportunities on their land. Parcels in these three programs are not permanently protected lands, for once the property is sold the land loses its Chapter statue. However, towns have the "right of first

refusal” to purchase any classified land whenever the owner plans to sell or convert it to a residential, commercial, or industrial use.

In addition the town has 11 parcels (389 acres) of land under the state’s Agricultural Preservation Restriction Program (.1% increase since 2010). This program provides permanent protection of farmland as the “development rights” are purchased, preserving the farmland in perpetuity.

The town also own a fair amount of land that is used for recreational purposes. These include:

- Dufresne Park (200 acres)
- Brown/Ellison Park (12 acres)
- Cooley Field (63 acres)
- GHS Field (64 acres)
- Aldrich Lake (1 acre)
- Forge Pond (150 acres)
- Marie Quirk Conservation Area (48 acres)
- Miller Ave (28 acres)
- Ed Trompke “Peeper Pond” (9 acres)
- Ed Trompke Conservation Acre (5 acres)

Lastly, the state Department of Conservation and Recreation owns 2,223 acres of land in Granby. The majority of this land is in the Holyoke Range State Park and 99 acres make up the Sand Plain State Park.

### 3: HAZARD IDENTIFICATION AND ANALYSIS

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

The Hazard Mitigation Committee referred to the 2013 Massachusetts Hazard Mitigation list of hazards as a starting point for determining the relevant hazards in Granby. The table below illustrates a comparison between the relevant hazards in the state plan and in Granby’s plan.

Comparison of Hazard identified in the 2013 Massachusetts Hazard Mitigation Plan and the Granby Hazard Mitigation Plan	
2013 Massachusetts Hazard Mitigation Plan	Town of Granby Relevance
Coastal Hazards	The Town of Granby is not located on the coast and therefore not at risk of coastal hazards.
Dam Failure	Dam Failure is a risk to Granby
Drought (Severe Weather)	Drought is a risk to Granby.
Earthquake	Earthquakes are a risk to Granby.
Extreme Temperature (Severe Weather)	Extreme Temperature is considered a risk to Granby.
Flood (including Ice Jam)	Flooding is a risk to Granby.
High Wind (Severe Weather)	High Wind is a risk to Granby and is included in the Severe Thunderstorm/Wind/Tornado/Microbursts category.
Hurricane/Tropical Storm	Hurricanes are a risk to Granby.
Ice Storm (Severe Winter Weather)	Ice Storms are a risk to Granby and included in the category Severe Snowstorms/Ice Storms.
Landslide	Landslides are not a risk to Granby.
Major Urban Fires	Major Urban Fires are not considered a risk to Granby. However, wildfires and brush fires are considered a risk.
Nor’easter	Nor’easters are a risk to Granby and included in the category Severe Snowstorms/Ice Storms.
Snow & Blizzard (Severe Winter Weather)	Snow & Blizzards are a risk to Granby and included in the category Severe Snowstorms/Ice Storms.
Thunderstorm (Severe Weather)	Thunderstorms are a risk to Granby and included in the category Severe Thunderstorms/Wind/Tornadoes/Microbursts.
Tornado (Severe Weather)	Tornadoes are a risk to Granby and included in the Severe Thunderstorms/Wind/Tornadoes/ Microbursts category.
Tsunami	The Town of Granby is not located on the coast or near the coast for tsunami to be a risk.
Wildland Fire	Wildland Fire is considered a risk to the Town of Granby.

Comparison of Relevant Hazards in Granby's initial Hazard Mitigation Plan and this plan update	
2009 Natural Hazard List	2016 Natural Hazard List
Dam Failure	Dam Failure
Drought	Drought
Earthquakes	Earthquakes
	Extreme Temperatures
Floods	Floods
Hurricanes/Sever Wind	Hurricanes
Severe Snowstorms/Ice Storms	Severe Snowstorms/Ice Storms
Tornadoes/Microbursts	Severe Thunderstorms/Wind/Tornadoes/ Microbursts
Wildfire/Brush Fire	Wildfire/Brush Fire

## Natural Hazard Analysis Methodology

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

### Hazard Description

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

### Location

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

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

## Extent

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

## Previous Occurrences

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

## Probability of Future Events

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

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

## Impact

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

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

## **Vulnerability**

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

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

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

Hazard Identification and Risk Analysis				
Type of Hazard	Location of Occurrence	Probability of Future Events	Impact	Hazard Risk Index Rating
Flooding	Small	Low (100 year) Very High(Local)	Limited (100 year) Minor (Local)	4-Low (100 year) 1-Very High (local)
Severe Snowstorms/ Ice Storms	Large	Very High	Limited	3-Medium
Severe Thunderstorms/Winds/ Tornadoes/Microburst	Medium	Very High	Limited	3-Medium
Hurricanes	Large	High	Limited	2-High
Wildfire / Brushfire	Large	High	Minor	3-Medium
Earthquakes	Large	Very Low	Catastrophic	5-Very Low
Dam Failures	Small	Low	Minor	4-Low
Drought	Large	Low	Minor	4-Low
Extreme Temperature	Large	Medium	Minor	4-Low

The hazard mitigation committee felt that most hazard profiles stayed the same. The probability of a dam failure was raised from very low to low because the dams in town are aging and there is often inadequate funding to maintain them. Additionally, the location of a drought was increased from small to large, given that droughts are regional in nature. The private wells and farmlands spread across the town also heighten the likelihood that all of the town would be impacted and not just a small section. High wind events were also ranked higher by the committee due to their increased prevalence. Lastly, the town has added extreme temperatures as a relevant hazard in this plan.

## Flooding

---

### Hazard Description

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

- *Continental storms* are typically low-pressure systems that can be either slow or fast moving. These storms originate from the west and occur throughout the year.
- *Coastal storms*, also known as nor'easters, usually occur in late summer or early fall and originate from the south. The most severe coastal storms, hurricanes, occasionally reach Massachusetts and generate very large amounts of rainfall.
- *Thunderstorms* form on warm, humid summer days and cause locally significant rainfall, usually over the course of several hours. These storms can form quickly and are more difficult to predict than continental and coastal storms.

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

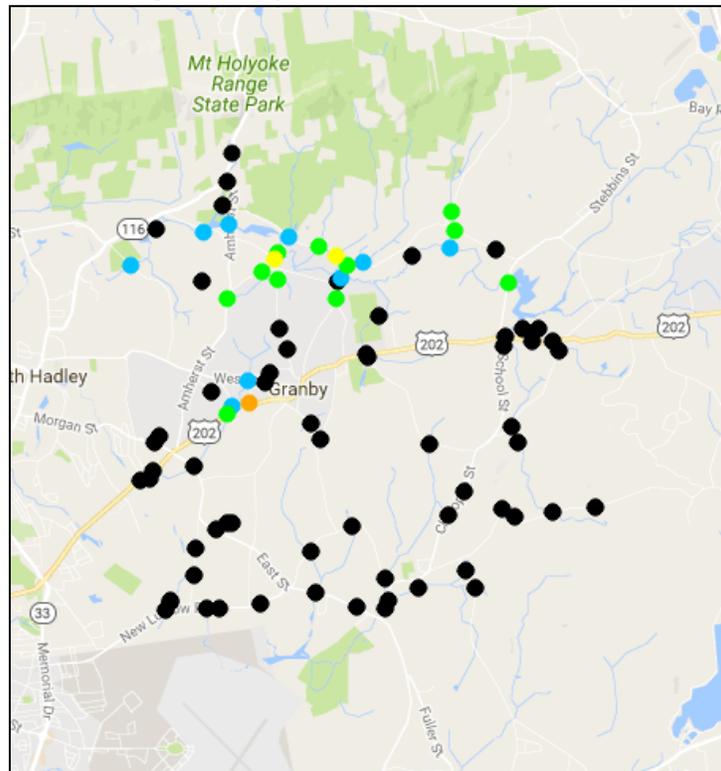
### Location

There are approximately 1,377 acres of land within the FEMA mapped areas subject to inundation by a 1-percent annual chance flood, commonly called the 100-year floodplain and 1,521 acres of land within areas subject to inundation by a 0.2-percent annual chance flood, commonly called the 500-year floodplain within the Town of Granby. Most of this land is in areas adjacent to the Bachelor Brook, Stony Brook and Muddy Brook.

In addition, various parts of Granby have issues with localized flooding, described below

- Meadow Glen Drive
- East State Street (Route 202)
- Carver Street
- Chicopee Street
- Batchelor Street
- Harris Street
- Trompke Avenue

In addition to localized flooding, undersized culverts can cause flooding in areas of town. Below is a map of the culverts and stream crossing in Granby.



The colored circles on the map represent surveyed crossings color coded as follows:

- Full Passage: green ●
- Insignificant barrier: blue green ●
- Minor barrier: blue ●
- Moderate barrier: yellow ●
- Significant barrier: orange ●
- Severe barrier: red ●
- Missing data: magenta ●
- No crossing: black circle with bold red x ❌
- New crossing pending approval: black circle with red slash 🚧

Source: University of Massachusetts Stream Continuity Project 2015. <<https://streamcontinuity.org/index.htm>>

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

## Extent

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

**Flash floods** are the product of heavy, localized precipitation in a short time period over a given location. Flash flooding events typically occur within minutes or hours after a period of heavy precipitation, after a dam or levee failure, or from a sudden release of water from an ice jam. Most often, flash flooding is the result of a slow-moving thunderstorm or the heavy rains from a hurricane. In rural areas, flash flooding often occurs when small streams spill over their banks. However, in urbanized

areas, flash flooding is often the result of clogged storm drains (leaves and other debris) and the higher amount of impervious surface area (roadways, parking lots, roof tops).

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

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

### **Previous Occurrences**

The major floods recorded in Granby have been the result of rainfall alone or rainfall combined with snowmelt. Key floods in Granby include:

- The Great New England Flood of 1936- This region-wide flooding was caused by snow melt and extremely rainy weather. While little information about the flooding impact on Granby is documented, neighboring communities reported substantial damage. In Massachusetts, the Great Flood killed ten people and displaced approximately 50,000 people. It caused over \$200,000,000 in damage.

In recent history, Granby has not been impacted by flooding. Quick passing storms have caused pooling on some roads, but damages have been minimal.

### **Probability of Future Events**

Based on previous occurrences, the probability of flooding in Granby is "Low," with a 1 to 10 percent probability in any given year and the probability of localized flooding is "Very High" with a 70 to 100 percent probability in any given year. Flooding frequencies for the various floodplains in Granby are defined by FEMA as the following:

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

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

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

## **Impact**

The impact of a flood event would fall between “minor” and “limited,” dependent on event severity and precise location. This equates to approximately 10 percent or more of property in affected area damaged. Using the assessed value of all structures in town, \$380,928,200, the total property damage, based on the damage to individual flooding locations discussed in the "location" section, is \$3,809,282. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

## **Vulnerability**

Based on the above analysis, Granby faces a vulnerability of "1-Very High" risk from localized flooding and a “4-Low” risk from 100-year floods.

The Town offices, which also functions as the Senior Center and Primary Emergency Operations Center could be impacted by flooding of the Stony Brook. If this brook were to flood, evacuation efforts on Route 202 could also be compromised. Flooding of the Ingraham Brook could also compromise evacuation efforts on a northern portion of Route 202 and if extremely severe could impact the schools and public safety complex. This, however, is unlikely.

## Severe Snowstorms / Ice Storms

---

### Hazard Description

Snow is characterized as frozen precipitation in the form of six-sided ice crystal. In order for snow to occur, temperatures in the atmosphere (from ground level to cloud level) must be at or below freezing. The strongest form of a severe snow storm is a blizzard. Blizzards are characterized by frequent wind gusts above 35 miles per hour, limited to no visibility due to falling snow and extreme cold that lasts longer than three hours.

Ice storms are liquid rain that falls and freezes upon contact with cold objects. There must be an ice build-up of greater than ¼ inch for it to be considered an ice storm. When more than a ½ inch of ice build-up is forecasted a winter storm warning can be triggered

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

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

### Location

The entire town of Granby is susceptible to severe snowstorms. Because these storms occur regionally, they impact the entire town. As a result, the location of occurrence is “large,” with over 50 percent of land area affected. 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 snow drifts.

The following areas have been identified by the Hazard Mitigation Committee as areas where ice forms during winter storm events:

- Amherst Street in the northern portion of town
- West Street near the West Cemetery
- East Street (Route 202) near the solar farm (Acre Brook area)

The following areas have been identified by the Hazard Mitigation Committee as areas where snow drifts happen during winter storm events:

- South Street between Ferry Hill Road and East Street
- Carver Street near Meadow Glen Drive
- West Street near the West Cemetery
- School Street north of the East State Street and School Street intersection

- Truby Street
- East Street at Morgan Street
- New Ludlow Road

## Extent

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

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

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

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

The Sperry-Piltz Ice Accumulation (SPIA) Index (below) is a prediction tool (algorithm) that can be used in conjunction with National Weather Service data to predict the impact of winter weather in terms of ice damage. It is currently being tested by the National Weather Service and FEMA in several regions with potential implementation in the future. In the meantime, the index provides an outline of the potential damage impacts of ice storms based on accumulation and wind.

The Sperry-Piltz Ice Accumulation (SPIA) Index	
Ice Damage Index	Damage and Impact Descriptions
0	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
2	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
3	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1-5 days.
4	Prolonged and widespread utility interruptions with extensive damage to main distribution feeder lines and come high voltage transmission lines/structures/ Outages lasting 5-10 days.
5	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.

Source: <http://www.spia-index.com/images/SPIAIndexDescription.png>

### Previous Occurrences

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

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

Winter Storms Producing Over 10 inches of Snow in the Pioneer Valley, 1958-2013			
Date	NESIS Value	NASIS Category	NESIS Classification
3/12/1993	13.2	5	Extreme
3/2/1960	8.77	4	Crippling
2/15/2003	7.5	4	Crippling
2/2/1961	7.06	4	Crippling
1/21/2005	6.8	4	Crippling
1/19/1978	6.53	4	Crippling
12/25/1969	6.29	4	Crippling
2/10/1983	6.25	4	Crippling
2/14/1958	6.25	4	Crippling
2/5/1978	5.78	3	Major

2/23/2010	5.46	3	Major
2/8/1994	5.39	3	Major
1/9/2011	5.31	3	Major
2/18/1972	4.77	3	Major
12/11/1960	4.53	3	Major
2/7/2013	4.35	3	Major
2/22/1969	4.29	3	Major
1/18/1961	4.04	3	Major
2/8/1969	3.51	2	Significant
2/5/1967	3.5	2	Significant
4/6/1982	3.35	2	Significant
3/4/2013	3.05	2	Significant
3/15/2007	2.54	2	Significant
3/31/1997	2.29	1	Notable
2/2/1995	1.43	1	Notable
1/25/1987	1.19	1	Notable

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

In recent history, there has been no loss of life from snow or ice storms, but each year there are incidences of property damage and personal injuries. The October Snow Storm in 2011, which caused major damages and disruptions across New England, also impact Granby. Most residents of the town were without electric for over a week. Given the prevalence of private wells, this also meant the most residents were without access to water. While this was a severe storm paired with trees still in full foliage, most winter storms that hit Granby are manageable and simply more of a nuisance.

There currently isn't good local data on ice storms in Granby. According to the state hazard mitigation plan, there were 20 ice storms in Hampshire County between 1971 and 2012. This equates to a major ice storms every two years. Areas located in higher elevation are more likely to experience ice storms.

### **Probability of Future Events**

Based upon the availability of records for Hampshire County, the likelihood that a severe snow storm will hit Granby in any given year is "Very High," or a 70 to 100 percent probability in any given year.

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

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

## **Impact**

The impact of an event would be "Limited," with between 10 and 25 percent of property in the affected area damaged. To approximate the potential impact to property and people that could be affected by this hazard, the total value of all residential property in town, \$380,928,200, is used.

An estimated 20 percent of damage would occur to 10 percent of structures, resulting in a total of \$7,618,564 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

## **Vulnerability**

Based on the above assessment, Granby faces a "3- Medium" vulnerability from severe snow storms and ice storms.

The Town's power and communication infrastructure could be vulnerable to the impacts of a severe snow or ice storm. This could cause residents and businesses to lose power and could impact the Town's ability to operate normally. Additionally, buildings with flat roofs are especially vulnerable to damage, especially when the snow is wet and heavy. (Almost all of the town buildings in Granby have flat roofs.) Lastly, because Granby is highly forested, a severe snow or ice storm could also cause a lot of damage in the form of downed trees.

## Hurricanes / Tropical Storms

---

### Hazard Description

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

### Location

Because of the hazard's regional nature, all of Granby is at risk from hurricanes and tropical storms, meaning the location of occurrence is "large," with over 50 percent of land area affected. Ridgetops are more susceptible to wind damage and flood-prone areas are susceptible to flooding from heavy rains that usually accompany hurricane.

### Extent

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

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

Source: National Hurricane Center, 2012

### Previous Occurrences

Hurricanes that have affected Granby are shown in the following table.

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

Source: National Hurricane Center, 2012

Hurricane Gloria (1985) tracked directly through Granby, but did not cause significant damage according to the Hazard Mitigation Committee. These hurricanes and tropical storms did not cause any significant damage to Granby.

### Probability of Future Events

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. Based upon past occurrences, it is reasonable to say that there is a “high” probability of hurricanes or tropical storms, or a 40 to 70 percent probability in any given year.

### Impact

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

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

The Town of Granby faces a “Limited” impact from hurricanes, with more than 10 percent of property in the affected area damaged.

To approximate the potential impact to property and people that could be affected by this hazard, the total value of all property in town, \$380,928,200 is used. Wind damage of 5 percent with 10 percent of

structures damaged would result in an estimated \$1,904,641 of damage. Estimated flood damage to 10 percent of the structures with 20 percent damage to each structure would result in \$7,618,564 of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

### **Vulnerability**

Based on the above analysis, Granby faces a "high" vulnerability from hurricanes and tropical storms.

The entire town would be vulnerable to the impact of a hurricane. Areas prone to flooding are particularly vulnerable. Additionally high winds could impact the town's communication and energy infrastructure and older buildings.

DRAFT

## **Severe Thunderstorms / Wind / Tornadoes/Microbursts**

---

### **Hazard Description**

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

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

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

Microbursts often cause 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**

As per the Massachusetts Hazard Mitigation Plan, the entire Town is at risk of high winds, severe thunderstorms, and tornadoes. However, the actual area that would be affected by these hazards is "Medium," or between 10 and 50 percent of total land area. There is most concern for microbursts in the valley along Route 202.

## Extent

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

Microbursts are typically less than three miles across. They can last anywhere from a few seconds to several minutes. Microbursts cause damaging winds up to 170 miles per hour in strength and can be accompanied by precipitation.

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

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

The extent of hail that can be present in severe thunderstorms can be found in the table below.

Hail Extent	
Hail Size	Object Analog
.50	Marble, moth ball
.75	Penny
.88	Nickel
1.00	Quarter
1.25	Half dollar
1.50	Walnut, ping pong
1.75	Golf ball
2.00	Hen egg
2.50	Tennis ball
2.75	Baseball
3.00	Tea cup
4.00	Grapefruit
4.50	Softball

Source: <http://www.spc.noaa.gov/misc/tables/hailsiz.htm>

Rainfall records for a 24-hour period and per month are listed below:

Rainfall Records for Granby, MA		
Month	24-Hour Record	Monthly Record
January	2.8"	8.9"
February	3.23"	7.68"
March	2.8"	7.72"
April	3.55"	8.75"
May	3.62"	11.54"
June	3.74"	10.4"
July	4.33"	9.73"
August	7.56"	18.68"
September	3.86"	8.67"
October	3.39"	9.06"
November	2.44"	7.56"
December	2.99"	7.25"

Source: <http://www.myforecast.com/bin/climate.m?city=19373&metric=false>

### Previous Occurrences

Because thunderstorms and wind affect the town regularly on an annual basis, there are not significant records available for these events. As per the Massachusetts Hazard Mitigation Plan, there are approximately 10 to 30 days of thunderstorm activity in the state each year. Most occur in the late afternoon and evening hours, when the heating is the greatest. On average, since 1993, there have been

between 5-6 severe thunderstorms per year (defined as with winds over 50 miles per hour) in the region around Granby.

Within Massachusetts, tornadoes have occurred most frequently in Worcester County and in communities west of Worcester. The most common months are June, July, and August, but the Great Barrington, MA tornado (1995) occurred in May and the Windsor Locks, CT tornado (1979) occurred in October. Nine incidents of tornado activity (F3 or less) have occurred in Hampshire County since 1954 and one known tornado has touched down in Granby in 1966. There is no documentation of damage caused by this tornado. In 2011, a tornado ranked F3 (Severe Damage) on the Fujita Scale of Tornado Intensity, blew through the region impacting the towns of West Springfield, Westfield, Springfield, Monson, Wilbraham, Brimfield, Sturbridge, and Southbridge. The tornado and related storm killed 3 people and resulted in hundreds of injuries across the state.

Most recently, on February 25, 2017, an EF1 tornado touched down in Conway and Goshen, Massachusetts. The tornado damaged dozens of homes, hundreds of trees and left 75% of the residents without power. This was the first tornado in Massachusetts to touch down in February since record keeping started in the 1950s. Nine incidents of tornado activity (F3 or less) have occurred in Hampshire County since 1954 and no known tornadoes have touched down or tracked through Chicopee.

Granby experience a microburst in recent history in Dufresne Park, which caused damage to trees. A number of surrounding communities have also experience microbursts recently including Chicopee and Easthampton.

### Probability of Future Events

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

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

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

Based upon the available historical record, the estimated probability of a tornado in Granby is "low," or between 1 and 10 percent in any given year. Based upon local knowledge and the increased prevalence of microburst in surrounding communities, the estimated probability of a microburst in Granby is "moderate," or between 10 and 40 percent in any given year.

As per the Massachusetts Hazard Mitigation Plan, there are approximately 10 to 30 days of thunderstorm activity in the state each year. Thus, there is a "Very High" probability (70 to 100 percent change in any given year) of a severe thunderstorm or winds affecting the town.

Overall, there is a "Very High," or 70 to 100 percent, probability that Granby will be impact by severe wind, microbursts, tornados and/or thunderstorms in a given year.

### **Impact**

Overall, the Town of Granby faces a "Limited" impact from severe thunderstorms, winds, microbursts or tornadoes, with between 10 and 25 percent of the town affected. The potential for locally catastrophic damage is a factor in any severe weather event. In Granby, a tornado that hit residential areas would leave much more damage than a tornado with a travel path that ran along the town's forested areas, where little settlement has occurred. Most buildings in town have not been built to Zone 1, Design Wind Speed Codes. The first edition of the Massachusetts State Building Code went into effect on January 1, 1975, with most of the town's housing built before this date.

To approximate the potential impact to property and people that could be affected by severe weather, tornado, or wind, the total value of all residential property in town, \$380,928,200 is used. An estimated 100 percent of damage would occur to 1 percent of structures, resulting in a total of \$3,809,282 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

### **Vulnerability**

Based on the above assessment, Granby has a "medium" vulnerability from severe thunderstorms, winds, microbursts and tornadoes.

The entire town would be vulnerable to the destruction caused by severe thunderstorms, wind, microbursts and tornadoes. The vulnerabilities associated with flooding could be present if substantial rain accompanies severe thunderstorms. Additionally, high winds could impact the town's communication and energy infrastructure and older buildings. Most, if not all of the town's critical facilities, were designed to withstand lower wind speeds and could be damaged or destroyed by high wind events, microbursts of tornadoes.

## Wildfire / Brushfire

---

### Hazard Description

Wildfires are typically larger fires, involving full-sized trees as well as meadows and scrublands. Brushfires are uncontrolled fires that occur in meadows and scrublands, but do not involve full-sized trees. Both wildfires and brushfires can consume homes, other buildings and/or agricultural resources. Typical causes of brushfires and wildfires are lightning strikes, human carelessness, and arson.

FEMA has classifications for 3 different classes of wildfires:

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

### Location

Approximately 24.8 square miles of Granby (62 percent) is forested and therefore at risk of wildfire. The location of occurrence is "large," with more than 50% percent of land area affected. This is most potential for damage along Harris Street, which is located in the mountainous terrain of Granby.

### Extent

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

In Granby, 62 percent of the land is forested (24.8 square miles), and is therefore at risk of fire. A large wildfire could damage almost all of the town's land mass in a short period of time. However, Massachusetts receives more than 40 inches of rain per year and much of the landscape is fragmented, and together these two traits make wildfires uncommon in Massachusetts. Nevertheless, in drought conditions, a brushfire or wildfire would be a matter of concern. A large wildfire could damage a large swath of Granby's landscape, including vital watershed lands, in a short period of time. The forested land in Granby, during a wildfire, may render emergency personnel unable to counter the fire due to the terrain.

Based major wildfires that have occurred in western Massachusetts, it is estimated that such a fire would likely destroy around 50 to 500 acres of forested area.

## Previous Occurrences

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

- 1995 – Russell, 500 acres burned on Mt. Tekoa
- 2000 – South Hadley, 310 acres burned over 14 days in the Litchia Springs Watershed
- 2001 – Ware, 400 acres burned
- 2010 – Russell, 320 acres burned on Mt. Tekoa
- 2012 – Eastern Hampden County, dry conditions and wind gusts created a brush fire in Brimfield, and burned 50 acres
- 2016 - Montgomery, 60 acres burned on Mt. Tekoa

As a point of reference, the total number of fire incidences in Granby for the last five available years is provided below. These include structural, automotive and brush fires.

Total Fire Incidents in Granby	
2010	35
2011	24
2012	24
2013	34
2014	25

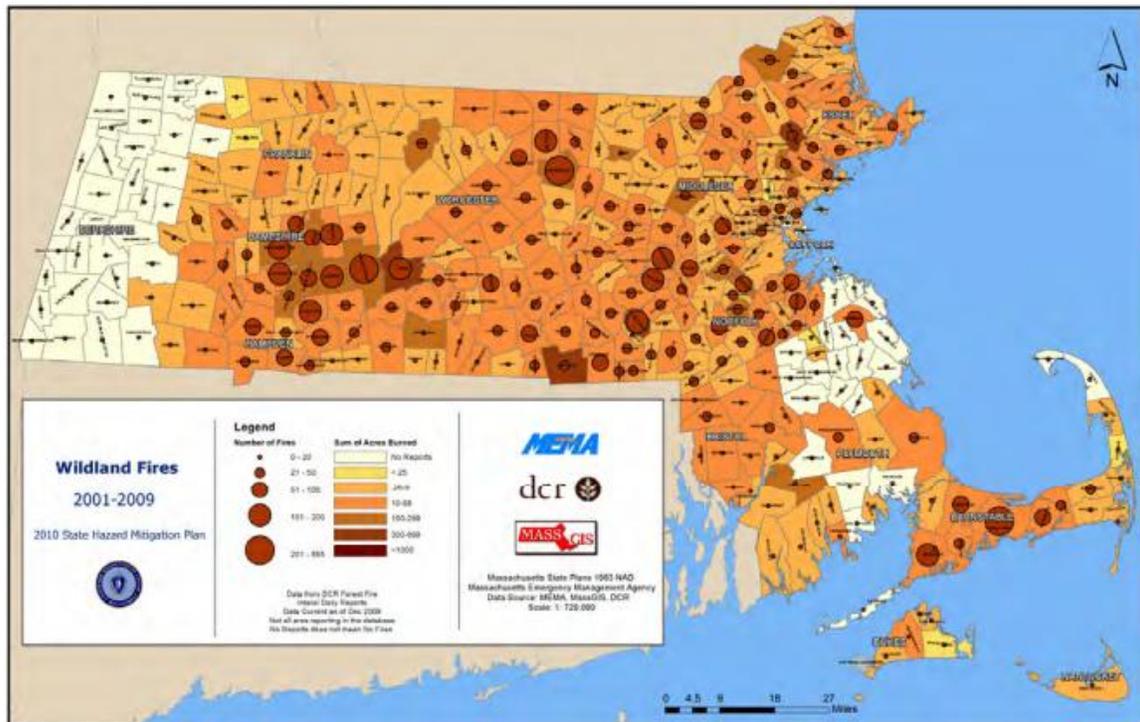
Source: Massachusetts Fire Incidence Reporting System, County Profiles, 2014 Fire Data Analysis

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

Recent wildfires/ brush fires in Granby include:

- Southeast portion of town near between Turkey Hill Brook and the Belchertown/Granby town line.
- Northwest portion of town in the Mount Holyoke Range State Park

## Wildland Fires in Massachusetts, 2001-2009



Source: Massachusetts Hazard Mitigation Plan

### Probability of Future Events

In accordance with the Massachusetts Hazard Mitigation Plan, the Hazard Mitigation Committee found it is difficult to predict the likelihood of wildfires in a probabilistic manner because the number of variables involved. However, given the proximity of previous wildfires, and their proximity to the Town, the likelihood of a future wildfire is determined to be “moderate,” or between a 10 and 40 percent probability in any given year.

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

### Impact

Granby faces a “minor” impact from wildfires, with minimal damage anticipated in such an event.

To approximate the potential impact to property and people that could be affected by this hazard, the total value of all property in town, \$380,928,200 is used.

An estimated 100 percent of damage would occur to 1 percent of structures, resulting in a total of \$3,809,282 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

### **Vulnerability**

Based on the above assessment, Granby faces a "Medium" vulnerability from wildfire and brushfires.

While a significant of Granby is forested, most of the heavily forested land is conservation lands (Dufresne Park and the Mount Holyoke Range State Park. The impacts to critical facilities and personal property would be limited, as they are located in the less forested sections of town.

## Earthquakes

---

### Hazard Description

An earthquake is a sudden, rapid shaking of the ground that is caused by the breaking and shifting of rock beneath the Earth's surface. Earthquakes can occur suddenly, without warning, at any time of the year. New England experiences an average of 30 to 40 earthquakes each year although most are not noticed by people.<sup>1</sup> 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.<sup>2</sup>

### Location

Because of the regional nature of the hazard, the entire town is susceptible to earthquakes, and the location of occurrence is "large," with over 50 percent of land affected.

### Extent

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

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

<sup>1</sup> Northeast States Emergency Consortium Web site: [www.nesec.org/hazards/earthquakes.cfm](http://www.nesec.org/hazards/earthquakes.cfm).

<sup>2</sup> Federal Emergency Management Agency Web site: [www.fema.gov/hazards/earthquakes/quake.shtm](http://www.fema.gov/hazards/earthquakes/quake.shtm).

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

Source: US Federal Emergency Management Agency

### Previous Occurrences

The most recent earthquakes in the region that could have affected the Town of Granby are shown in the table below. There is no record of any damage to the Town of Granby as a result of these earthquakes.

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

Source: Northeast States Emergency Consortium website, [www.nesec.org/hazards/earthquakes.cfm](http://www.nesec.org/hazards/earthquakes.cfm)

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

Source: Northeast States Emergency Consortium website: [www.nesec.org/hazards/earthquakes.cfm](http://www.nesec.org/hazards/earthquakes.cfm)

### Probability of Future Events

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

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

Based upon existing records, there is a “very low” frequency of earthquakes in Granby, with less than a 1 percent chance of an earthquake in any given year.

**Impact**

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

The impact of an earthquake in Granby would be “catastrophic.” To approximate the potential impact to property and people that could be affected by this hazard, the total value of all property in town, \$380,928,200 is used.

An estimated 100 percent of damage would occur to 25 percent of structures, resulting in a total of \$95,282,050 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

**Vulnerability**

Based on this analysis, Granby maintains a "Very Low" vulnerability from earthquakes.

Older buildings are particularly vulnerable to earthquakes because their construction pre-dates building codes that included strong seismic consideration. The town has a number of historical buildings that could be damaged or destroyed if a large enough earthquake were to happen. A loss of these historic buildings could represent a loss of Granby’s history and culture. There have been no studies done to determine how Granby’s critical infrastructure, such as the Town Hall would fair in an earthquake. The town’s Public Safety Complex and Library were both built recently. It is likely that these town buildings would fair best. Lastly all of the Town’s evacuation routes contain either bridges or underpasses, and could be obstructed if a bridge were to fall as a result of an earthquake.

## Dam Failure

---

### Hazard Description

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

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

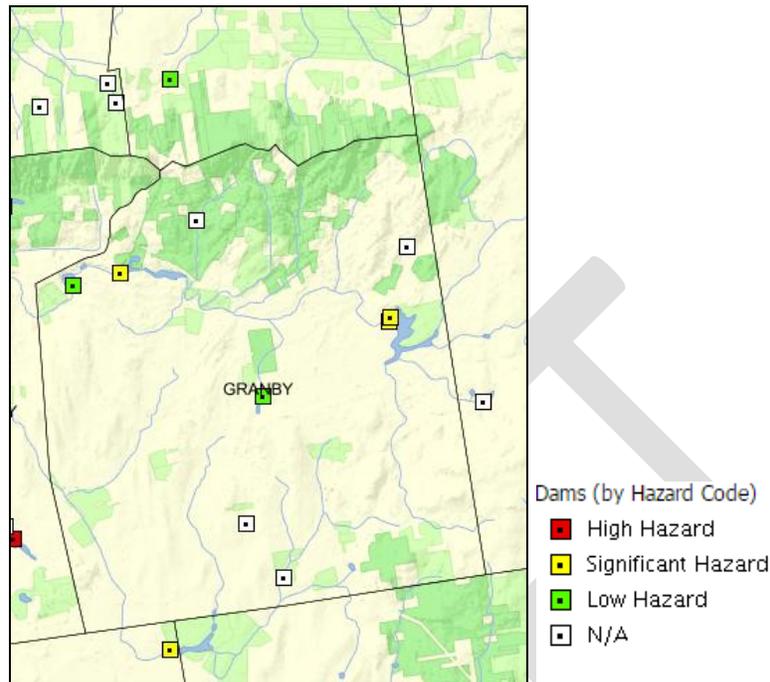
The Massachusetts Department of Conservation and Recreation Office of Dam Safety is the agency responsible for regulating dams in the state (M.G.L. Chapter 253, Section 44 and the implementing regulations 302 CMR 10.00). To be regulated, these dams are in excess of 6 feet in height (regardless of storage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

### Location

Granby has 5 dams located within its boundaries. The location of occurrence for a dam failure has been determined to be "small," with less than 10 percent of land area affected.

Dams in Granby			
Dam	Hazard Level	Purpose	Condition
Aldrich Lake Dam	Significant	Recreation	Satisfactory
Forge Pond Dam-	Significant	Recreaiton	Poor
Forge Pond Dike	Significant	Recreation	Poor
Dufresne Farm Pond Dam	Low	Recreation	Poor
Quenneville Dam	Low-Does not hold water currently	Roadway for Site Develop.	Unsafe

The location of dams in Granby can be seen on the map below.



Source: Mass GIS Oliver

## Extent

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

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

- *High Hazard*: Dams located where failure or improper operation will likely cause loss of life and serious damage to homes, industrial or commercial facilities, important public utilities, main highways, or railroads.
- *Significant Hazard*: Dams located where failure or improper operation may cause loss of life and damage to homes, industrial or commercial facilities, secondary highways or railroads or cause interruption of use or service of relatively important facilities.
- *Low Hazard*: Dams located where failure or improper operation may cause minimal property damage to others. Loss of life is not expected.

## Previous Occurrences

To date, there have been no dam or levee failures in Granby.

## **Probability of Future Events**

As Granby's dams age, and if maintenance is deferred, the likelihood of a dam failure will increase, but, currently the frequency of dam failures is "Low" with 1 to 10 percent chance of a dam failing in any given year.

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

## **Impact**

An impact from a dam failure event could range from "minor" to "catastrophic," with approximately 25 percent of property in the affected area damaged or destroyed. To approximate the potential impact to property and people that could be affected by this hazard, the total value of all property in town, \$380,928,200 is used. An estimated 100 percent of damage would occur to 20 percent of structures, resulting in a total of \$76,185,640 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

A vulnerability assessment was done for the inundation area below the Aldrich Lake Dam, which is one of the dam in Granby categorized as a significant risk. It is expected that no homes in Granby would be impacted if this dam were to fail. There is, however, potential that inundation zone could extend into South Hadley and impact residential structures there.

## **Vulnerability**

Based on this analysis, Granby has a "Low" vulnerability from dam or levee failure.

The vulnerabilities associated with dam failure would vary depending on which dam were to fail. A study shown on the Aldrich Dam has suggested that no structures in Granby would be impact. If the Forge Pond Dam were to fail, there are a number of structures that could be impacted including the MacDuffie School and businesses along Route 202. Additionally, Route 202—a primary evacuation route in town—could be inundated.

# Drought

---

## Hazard Description

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

## Location

Because of this hazard’s regional nature, a drought would impact the entire town, resulting in a “large” location of occurrence, or more than 50 percent of total land area affected.

## 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. Granby’s Public Water Supply is supplied by six wells; these six wells supply 70 percent of the town’s water needs. Massachusetts’ wells are permitted according to their ability to meet demand for 180 days at maximum capacity with no recharge; if these conditions extended beyond the thresholds that determine supply capacity the damage from a drought could be widespread due to depleted groundwater supplies. The U.S. Drought Monitor also records information on historical drought occurrence. Unfortunately, data could only be found at the state level. The U.S. Drought Monitor categorizes drought on a D0-D4 scale as shown below.

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

## Previous Occurrences

In Massachusetts, six major droughts have occurred statewide since 1930.<sup>3</sup> They range in severity and length, from three to eight years. In many of these droughts, water-supply systems were found to be inadequate. Water was piped in to urban areas, and water-supply systems were modified to permit withdrawals at lower water levels. The following table indicates previous occurrences of drought since 2000, based on the US Drought Monitor:

Annual Drought Status	
Year	Maximum Severity
2000	No drought
2001	D2 conditions in 21% of the state
2002	D2 conditions in 99% of the state
2003	No drought
2004	D0 conditions in 44% of the state
2005	D1 conditions in 7% of the state
2006	D0 conditions in 98% of the state
2007	D1 conditions in 71% of the state
2008	D0 conditions in 57% of the state
2009	D0 conditions in 44% of the state
2010	D1 conditions in 27% of the state
2011	D0 conditions in 0.01% of the state
2012	D2 conditions in 51% of the state
2013	D1 conditions in 60% of the state
2014	D1 conditions in 54% of the state
2015	D1 conditions in 100% of the state
2016	D3 conditions in 52% of the state

Source: US Drought Monitor

During the summer of 2016, Granby, the Pioneer Valley and the state were in the midst of a drought and are still working to replenish water systems during the creation of this plan. Many parts of the state saw D3 (extreme drought) conditions.

Most of the residents in Granby rely on private wells in order to get water for their everyday activities. Many of the private wells in town are considered shallow and can experience reduced water levels in the summer. According to the Granby Board of Health, 10 residents applied to have new wells dug on their property during the summer of 2016. Because the drought, their shallow wells had gone dry and required deeper wells in order to access the ground water. These ten wells were scattered across the town. As a point of comparison, no applications to dig replacement wells were submitted the year before.

<sup>3</sup> US Geological Survey Water-Supply Paper 2375. "National Water Summary 1989 – Floods and Droughts: Massachusetts." Prepared by S. William Wandle, Jr., US Geological Survey.

To date, Granby has not been impacted significantly by any previous droughts in the state. There is a history of shallow wells in the center of town experiencing reduced water levels in the summer. Beyond this, the town has not experienced a threat to its water supply.

### Probability of Future Events

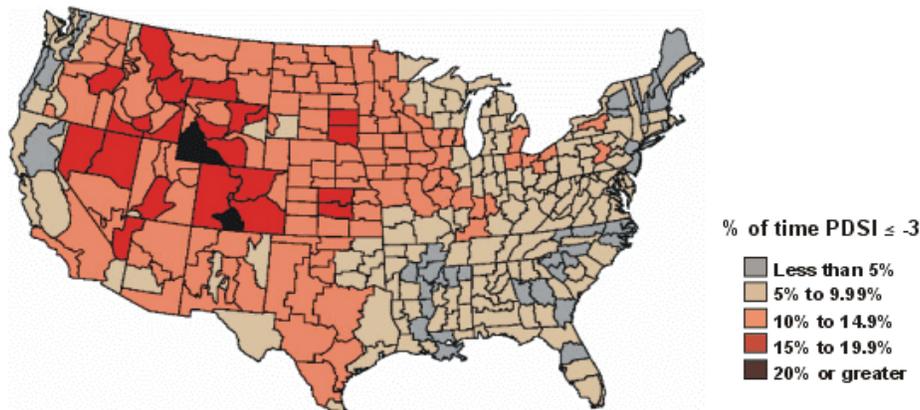
In Granby, as in the rest of the state, drought has a "low" probability of future occurrence, or between 1 and 10 percent in any given year.

Based on past events and current criteria outlined in the Massachusetts Drought Management Plan, it appears that western Massachusetts may be more vulnerable than eastern Massachusetts to severe drought conditions. However, many factors, such as water supply sources, population, economic factors (i.e., agriculture based economy), and infrastructure, may affect the severity and length of a drought event. When evaluating the region's risk for drought on a national level, utilizing a measure called the Palmer Drought Severity Index, Massachusetts is historically in the lowest percentile for severity and risk of drought.<sup>4</sup>

## Palmer Drought Severity Index

1895–1995

Percent of time in severe and extreme drought



### Impact

Due to the water richness of western Massachusetts, Granby is unlikely to be adversely affected by anything other than a major, extended drought. As a result, the impact of a drought would be "minor," with only minor property damage, disruption on quality of life, or the need to dig a new deeper well.

Additionally, farmers could be impacted economically, by the extended lack of water. On September 21, 2016, the United States Department of Agriculture (USDA) designated 11

<sup>4</sup> National Drought Mitigation Center – <http://drought.unl.edu>

counties including Hampshire County as primary natural disaster areas. Eligible farmers in these 11 counties and the three contiguous counties are eligible for low-interest emergency loans through the USDA. Farmers have eight months to apply for the loans, which are intended to help mitigate their operations losses. The state of Massachusetts has also established an Emergency Drought Loan Fund that impacted farmers can access.

### **Vulnerability**

Based on the above assessment, Granby has a “low” vulnerability in regards to drought.

While a drought would require water saving measures to be implemented, there would be no foreseeable damage to structures or loss of life resulting from the hazard.

## **Extreme Temperatures**

---

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

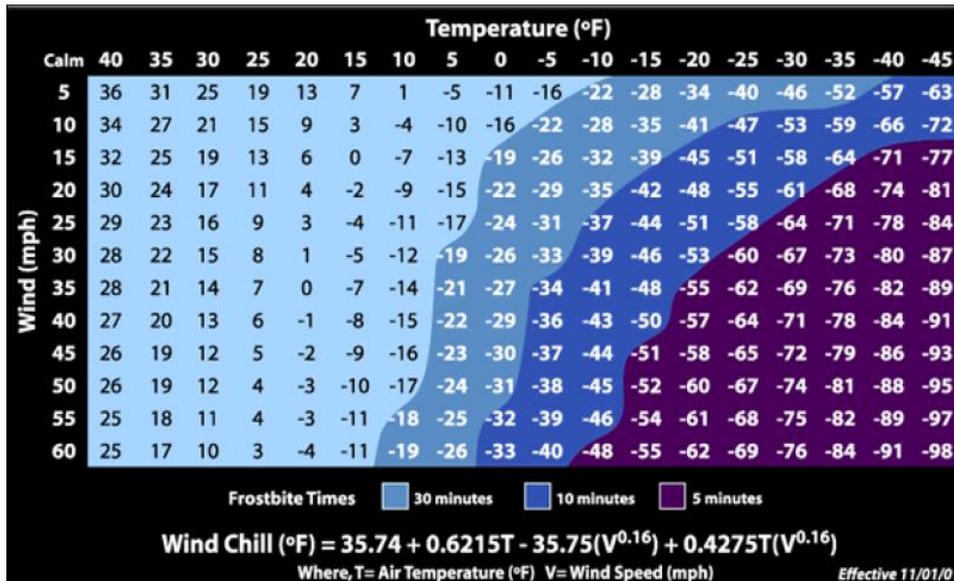
### **Location**

Extreme temperatures would affect the whole community resulting in a "large" location of occurrence, or more than 50 percent of total land area affected.

### **Extent**

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

### Wind Chills



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

### Heat Index

		80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
Relative Humidity (%)	40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
	45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
	50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
	55	81	84	86	89	93	97	101	106	112	117	124	130	137			
	60	82	84	88	91	95	100	105	110	116	123	129	137				
	65	82	85	89	93	98	103	108	114	121	128	136					
	70	83	86	90	95	100	105	112	119	126	134						
	75	84	88	92	97	103	109	116	124	132							
	80	84	89	94	100	106	113	121	129								
	85	85	90	96	102	110	117	126	135								
	90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127											
100	87	95	103	112	121	132											

Category	Heat Index	Health Hazards
Extreme Danger	130 °F – Higher	Heat Stroke or Sunstroke is likely with continued exposure.
Danger	105 °F – 129 °F	Sunstroke, muscle cramps, and/or heat exhaustion possible with prolonged exposure and/or physical activity.
Extreme Caution	90 °F – 105 °F	Sunstroke, muscle cramps, and/or heat exhaustions possible with prolonged exposure and/or physical activity.
Caution	80 °F – 90 °F	Fatigue possible with prolonged exposure and/or physical activity.

## Previous Occurrences

Using the NOAA National Centers for Environmental Information data base--one day of extreme cold/wind chill was recorded in the last 365 days, and no incidents of extreme heat have been recorded in Hampshire County in the last year.

The following are some of the lowest temperatures recorded in parts of Massachusetts for the period from 1895 to present<sup>5</sup>:

- Taunton- -35°F
- Coldbrook -35°F
- Chester- -35°F

The following are some of the highest temperatures recorded for the period from 1895 to present<sup>6</sup>:

- Chester, MA - 107°F
- New Bedford, MA - 107°F

## Probability of Future Events

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

## Impact

Extreme cold and extreme heat are dangerous situations that can result in health emergencies for susceptible people, such as those without shelter or who are stranded or who live in homes that are poorly insulated or without heat or air conditioning or some other way to stay cool. The impact of extreme temperatures, the impact of extreme heat or cold in Granby is considered to be "minor," with no property damage and very limited affect on humans.

## Vulnerability

Granby's vulnerability from extreme heat and cold is considered to be "Very Low."

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

---

<sup>5</sup> <https://www.ncdc.noaa.gov/extremes/scec/records>

<sup>6</sup> <https://www.ncdc.noaa.gov/extremes/scec/records>

## **Other Hazards**

---

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

DRAFT

## 4: CRITICAL FACILITIES

### Facility Classification

---

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

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

The Critical Facilities List for the Town of 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 three categories:

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

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

### Category 1 – Emergency Response Services

---

The Town has identified the emergency response facilities as the highest priority in regards to protection from natural hazards:

#### Emergency Operations Center

Primary: Town Hall- 10 West State Street

Alternate: Public Safety Complex- 259 East State Street

#### Fire Station

Public Safety Complex - 259 East State Street

#### Police Station

Public Safety Complex- 259 East State Street

## **Highway Garage**

Highway Department Garage- 15 Crescent Street

## **Water Department**

The town does not supply water to any of the Residents. There are some residences on New Ludlow Road and come on Amherst Road (Route 116) that get water supply from South Hadley.

## **Emergency Fuel Stations**

Highway Department- 15 Crescent Street (only Diesel)

Cumberland Farms- West State Street (Gasoline)

Ambler Energy provides home heating fuel for use as diesel in emergency scenario

## **Emergency Electrical Power Facility**

1 generator at Granby High School

1 portable generator and 1 stationary generator at Highway Garage

1 generator at New Elementary School

1 generator at Public Safety Building

## **Emergency Shelters**

Granby Junior & Senior High School- 385 East State Street

East Meadow School- 393 East State Street

MacDuffie School- 256 State Street

## **Dry Hydrants, Fire Ponds, and Water Sources**

28 locations in Granby recognized by the Fire department. There is some concern that fire ponds are drying up. Fire trucks are pulling up much instead of water. Also concern that some of the fire hydrants aren't maintained properly. There are also underground water cisterns that the fire department could pull from as a last resort.

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 Easten St.
27. Aldrich Lake – Aldrich St.
28. Pond – Kendall St. at Lavoies on Stony Brook

### **Helicopter Landing Sites**

Dufresne Park  
Granby Jr./Sr. High School

### **Communications**

There are two cell towers in Granby on Route 202

### **Primary Evacuation Routes**

Route 202  
Route 116  
Amherst St.  
School St.  
Chicopee St.  
West. St.  
New Ludlow Road

### **Bridges Located on Evacuation Routes**

Route 202 crossing Stony Brook (Owned by MassHighway)  
Amherst Street crossing Batchelor Brook (Owned by Town)  
School Street crossing Batchelor Brook (Owned by Town)

## **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.

### **Problem Culverts**

Culvert on Amherst Street over Aldrich Lake  
Culvert at Dufresne Park Dam  
Culvert on Batchelor Street before MacDonald Avenue

### **Category 3 – Facilities/Populations to Protect**

---

The following populations and facilities may require special attention during a hazard event.

#### **Hospitals**

Holyoke Medical Center- Holyoke, MA

#### **Special Needs Population**

Nursing Home – None

Group Home – Several throughout town. Addresses withheld for privacy reasons.

Neighborhoods with language barriers – None

#### **Elderly Housing/Assisted Living**

Phins Hill

#### **Recreation Areas**

Granby Free Public Library- 297- East State Street

Dufresne Park

Granby Senior Center- 10 West State Street

Brown-Ellison Park

Holyoke Range State Park

Metacomet-Monadnock Trail

#### **Daycares**

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
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
Strycharz, Ann M.- 158 Kendall Street	7

#### **Places of Worship**

Church of Christ- 235 State Street

Immaculate Heart of Mary- 256 State Street

Living Gate- Taylor Street

Baptist Church- West State Street

### **Historic Buildings/Sites**

Kellogg Hall  
Dinosaur Museum- DCR Facility

### **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- Pleasant Street

### **Schools**

Granby Junior & Senior High School- 385 East State Street  
East Meadow School- 393 East State Street  
MacDuffie School- 256 State Street

### **Employment Centers**

Granby Junior & Senior High School- 385 East State Street  
East Meadow Elementary School- 393 East State Street  
All Power- 43 West State Street  
MassWest- 50 West State Street  
MacDuffie School-256 State Street  
Public Safety Complex- 259 East State Street

### **Camps**

Chicopee Sportsmen Club  
Dufresne Park  
Sites along the Metacomet-Monadnock Trail- Access on by foot

## **Category 4 – Potential Resources**

---

### **Food/Water**

Breezy Acres Farm- 25 Pleasant Street  
Cumberland Farms- North State Pleasant Street  
Union Mart- 362 E State Street  
Red Fire Farm – 7 Carver Street  
Dave’s Natural Garden- 35 Amherst Street  
The Early Mug- DPW has an agreement for food during weather events

### **Hospitals/Medical Supplies**

Holyoke Medical Center – 575 Beech Street, Holyoke  
Cooley Dickinson – 30 Locust Street, Northampton  
Bay State – 759 Chestnut Street, Springfield

Mercy Medical Center-271 Carew Street, Springfield  
Healthsouth Hospital Of Western Massachusetts (About 7 Miles; Ludlow)  
Granby Ambulance- 259 State Street  
Center Pharmacy- 242 State Street  
CVS-West State Street  
Raymond Center (Urgent Care)- South Hadley  
Multiple Veterinarian Hospitals in town as a last resort.

### **Gas**

Cumberland Farms Inc- 74 West State Street  
Getty Service Station- 30 West State Street

### **Heating Oil**

Amber Energy Inc- 650 New Ludlow Road, South Hadley  
Mass Heating and Cooling- 56 Morgan Street

### **Building Materials Suppliers**

Northeast Fasteners- 254 Taylor Street

### **Heavy & Small Equipment Suppliers**

All Power- 43 West State Street

### **Gravel Pits/Asphalt Plants**

Greg Orlin- East State Street  
Ondrick Construction Pit - 240 Chicopee Street  
Lane Construction - 17 New Ludlow Road  
John S. Lane- Amherst Street

**Critical Facilities and Evacuation Routes Potentially Affected by Hazard Areas**

<b>Hazard Type</b>	<b>Hazard Area</b>	<b>Critical Facilities Affected</b>	<b>Evacuation Routes Affected</b>
Flooding	East State Street (Route 202); Near Ingraham Brook; Meadow Glen Drive; Carver Street	Town Hall; Fire Public Safety Complex; Granby High School	Route 202, New Ludlow Road,
Severe Snowstorms/Ice Storms	West Street; East State Street (Route 202)	Town Hall; Fire Station; Police Station; Granby High School	Route 202
Severe Thunderstorms/ Wind/Tornado/ Microburst	Whole Town	Areas impacted by flooding, older structures and energy and communication infrastructure not built to withstand high winds	Potentially All
Hurricanes	Whole Town	Areas impacted by flooding, older structures and energy and communication infrastructure not built to withstand high winds	Potentially All
Wildfire/Brushfire	Forested Areas; Harris Street	None. Critical facilities located in the less forested areas of town	Route 116
Earthquakes	Whole Town	Older buildings built before seismic standards. Public Safety Complex and Library have the best chance of surviving	All routes have bridges or culverts that could be damaged
Dam Failures	Aldrich Lake Dam	No critical facilities are in the Aldrich Lake Dam or Forge Pond Dam's Inundation Zone	Route 202, Chicopee Street
Drought	Whole Town	All of the municipal buildings could be impacted because they rely on wells for their watersource	None

## 5: MITIGATION CAPABILITIES & STRATEGIES

One of the steps of this Hazard Mitigation Plan update process is to evaluate all of the Town's existing policies and practices related to natural hazards and identify potential gaps in protection. Granby's local Hazard Mitigation Committee worked with PVPC to complete the FEMA Capability Assessment worksheet, included in Appendix E.

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

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

After reviewing existing policies and the hazard identification and assessment, the Town Hazard Mitigation Committee developed a set of hazard mitigation strategies it would like to implement.

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

### Goal Statement

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

## **Overview of Mitigation Strategies by Hazard**

---

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

### **Flooding**

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

### **Severe Snowstorms / Ice Storms**

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

The Town's current mitigation tools and strategies focus on preparedness, with many regulations and standards established based on safety during storm events. To the extent that some of the damages from a winter storm can be caused by flooding, flood protection mitigation measures also assist with severe snowstorms and ice storms. The Town has adopted the State Building Code, which ensures minimum snow load requirements for roofs on new buildings.

### **Hurricanes**

Hurricanes provide the most lead warning time of all identified hazards, 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 cause 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. Flood protection measures can thus also be considered hurricane mitigation measures. The high winds that often accompany hurricanes can also damage buildings and infrastructure, similar to tornadoes and other strong wind events.

### **Severe Thunderstorms / Winds / Tornadoes/ Microbursts**

Most damage from tornadoes and severe thunderstorms come 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, making strict adherence to building codes a primary mitigation strategy. In addition, current land development regulations, such as restrictions on the height of telecommunications towers, can also help prevent wind damages.

### **Wildfires / Brushfires**

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

### **Earthquakes**

Although there are five mapped seismological faults in Massachusetts, there is no discernible pattern of previous earthquakes along these faults nor is there a reliable way to predict future earthquakes along these faults or in any other areas of the state. Consequently, earthquakes are arguably the most difficult natural hazard for which to plan. Most buildings and structures in the state were constructed without specific earthquake resistant design features. In addition, earthquakes precipitate several potential devastating secondary effects such as building collapse, utility pipeline rupture, water contamination, and extended power outages. Therefore, many of the mitigation efforts for other natural hazards identified in this plan may be applicable during the Town's recovery from an earthquake.

### **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 nowhere to flow. 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.

### **Drought**

Although Massachusetts does not face extreme droughts like many other places in the country, it is susceptible to dry spells and drought. The primary mitigation strategy currently in place is to require subdivisions to provide an environmental review that assesses the impact that the development will have on groundwater.

## Existing Mitigation Capabilities

The Town of Granby had numerous policies, plans, practices, programs and regulations in place, prior to the update to this plan, that were serving to mitigate the impact of natural hazards in the Town of Granby. These various initiatives are summarized, described and assessed on the following pages and have been evaluated in the “Effectiveness” column. For a status report of completed strategies that were identified in our 2009 Hazard Mitigation plan, see the table of “Completed and Deleted Mitigation Strategies” later in this section, as well as the completed FEMA Capability Assessment worksheet included in Appendix E.

Existing Mitigation Capabilities				
Strategy	Action Type	Description	Hazards Mitigated	Effectiveness / Improvements
Flood Control Structure	Capital	There are five dams in Granby.	Flooding	Somewhat effective. Need to ensure that dam owners realize that it is their responsibility to inspect their dams
Culvert Replacement	Capital	Have replaced culverts that were too small.	Flooding	Very effective. Costly to do, so seeking grant funding for additional replacements.
Floodplain Protection District	Regulation	Areas delineated as part of the 100-year floodplain are protected by strict use regulations	Flooding	Very Effective. No Changes.
Water Supply Protection District	Regulation	Overlay district to protect groundwater resources by regulating certain uses.	Flooding/ Drought	Very Effective. Consider updating for clarity using state model form DEP
Open Space Community Development	Regulation	Provides regulations for cluster subdivision development by special permit. Allows protection of contiguous open space.	Flooding/ Drought	Somewhat Effective. No changes
Earth Removal	Regulation	Requires special permit approval for earth removal	Flooding	Somewhat Effective. Consider creating more performance-based evaluations.
Site Plan Approval	Regulation	Specific requirements for new construction to be integrated into the existing environment.	Flooding/ Drought	Somewhat Effective.

**Existing Mitigation Capabilities**

Strategy	Action Type	Description	Hazards Mitigated	Effectiveness / Improvements
Subdivision Rules and Regulations	Regulation	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;	Flooding	Effective. No Changes.
Open Space and Recreation Plan	Planning Document	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.	Flooding/ Drought	Effective at inventorying sensitive resource areas. Need to work toward implementation of the plan.
National Flood Insurance Program Participation	Program	There are 15 homeowners with flood insurance policies.	Flooding	Effective. No changes.
State Building Code	Regulation	The town of Granby has adopted the Massachusetts State Building Code.	Severe Snow/ Ice Storms/ Hurricanes/ Severe Wind/ Tornadoes/ Microbursts/ Earthquakes	Effective. No changes.
Backup Electric Power	Operational	Shelters have backup power and there are two mobile generators.	Severe Snow/Ice Storms	Very Effective. No changes.
Tree Management	Operational	List of dangerous trees is created annually by National Grid.	Severe Snow/ Ice Storms	Very effective. Could encourage National Grid to work on backlog of requests.
Granby Design Handbook	Regulation	Utilities must be placed underground where feasible.	Severe Snow/ Ice Storms/ Hurricanes/ Severe Wind/ Tornadoes/ Microbursts	Effective. No changes.

**Existing Mitigation Capabilities**

Strategy	Action Type	Description	Hazards Mitigated	Effectiveness / Improvements
Use Regulations-Prohibited Uses	Regulation	Mobile homes/ trailers are prohibited in all zone districts in town.	Hurricanes/ Severe Wind/ Tornadoes/ Microbursts	Effective. No changes.
Site Plan Approval	Regulation	Special granting authority can request Fire Department inspection/review of any plan.	Wildfire/ Brushfire	Effective. No changes.
Burn Permits	Regulation	Residents must obtain burn permits, and personnel provide information on safe burn practices.	Wildfire/Brushfire	Somewhat Effective.
Public Education/ Outreach	Operational	The Fire Department has an ongoing educational program in the schools.	Wildfire/Brushfire	Effective. No changes.
New Dam Construction Permits	Regulation	State law requires a permit for the construction of any dam/	Dam Failure	Effective. No changes.
Dam Inspections	Regulation	DCR has an inspection schedule that is based on the hazard rating of the dam (Low, medium, high hazard)	Dam Failure	Ineffective-responsibility of inspections falls to dam owners who may not have money to comply. Identify sources for funding for dam safety inspections.

## Completed and Deleted Mitigation Strategies

The Town has implemented several mitigation strategies that were identified in the previous version of this plan. In addition, the Town has decided not to pursue several mitigation strategies identified in the previous version of its Hazard Mitigation Plan. These completed and deleted strategies are described below.

Status of 2009 Prioritization Action Strategy				
Priority	Mitigation Action	Responsible Department/ Board	Proposed Completion Date	2016 Status
1	Seek funding from HMGP for top-priority local projects. Alert MassHighway to repair top priority problem culverts that are their responsibility.	EMD/Highway Dept	2013	Improving Culverts as necessary using Chap 90 funding. Communicate with MassDOT regularly
2	Ensure dam owners realize their responsibility to inspect and maintain their dams.	EMD/Highway Dept	2011	Complete. Majority of the dams left in town are under control of state or town.
3	Collaborate with PVPC to identify sources of funding for dam safety inspections.	EMD/Highway Dept	2011	Complete. Town paid for dam inspections on dams under their jurisdiction. No funding to inspect private dams.
4	Consider revising water supply protection district definitions for clarification---using DEP's model language	Planning Board	2011	Not Complete. Committee feels no longer relevant
	Consider creating more performance-based evaluations for earth removal and site plan 5review.	Planning Board	2011	Not Complete. Committee feels no longer relevant.
6	Work to implement relevant goals of Granby's Community Development plan, and pending Master Plan—inventorying of natural resources etc.	Planning Board	2013	Master Plan completed and now being implemented.
7	The Town should evaluate whether or not to become a part of FEMA's Community Rating System	EMD, Selectboard	2013	Not complete. Not cost effective given Granby's resources and flooding risk.
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	Fixed the repetitive outages issue through work at the substation and on interconnects through town. Subdivisions requiring undergrounding of utilities.
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	Generators in new Constructions (Public Safety Complex and schools) are adequate. Also have multiple mobile generators.

10	Participate in the creation of a regional debris management plan.	Highway Dept, EMD, Select Board	2010	No. No movement on the regional level. Pull forward.
11	Create water conservation guidelines to use as an educational tool for Town residents.	Highway Dept	2011	Not complete. Pull forward.

DRAFT

## **Prioritized Implementation Plan**

---

Several of the action items previously identified in the 2009 Hazard Mitigation Plan are currently continuing, either because they require more time to secure funding or their construction process is ongoing. In addition, the Hazard Mitigation Committee identified several new strategies that are also being pursued. These new strategies are based on experience with currently implemented strategies, as well as the hazard identification and risk assessment in this plan.

### **Prioritization Methodology**

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

- **Application to multiple hazards** – Strategies are given a higher priority if they assist in the mitigation of several natural hazards.
- **Time required for completion** – Projects that are faster to implement, either due to the nature of the permitting process or other regulatory procedures, or because of the time it takes to secure funding, are given higher priority.
- **Estimated benefit** – Strategies which would provide the highest degree of reduction in loss of property and life are given a higher priority. This estimate is based on the Hazard Identification and Analysis Chapter, particularly with regard to how much of each hazard’s impact would be mitigated.
- **Cost effectiveness** – in order to maximize the effect of mitigation efforts using limited funds, priority is given to low-cost strategies. For example, regular tree maintenance is a relatively low-cost operational strategy that can significantly reduce the length of time of power outages during a winter storm. Strategies that have identified potential funding streams, such as the Hazard Mitigation Grant Program, are also given higher priority.
- **Eligibility Under Hazard Mitigation Grant Program** – The Hazard Mitigation Grant Program (HMGP) provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. Funding is made available through FEMA by the Massachusetts Emergency Management Agency. Municipalities apply for grants to fund specific mitigation projects under MEMA requirements

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

- **Low** – Strategies that would not have a significant benefit to property or people, address only one or two hazards, or would require funding and time resources that are impractical

- **Medium** – Strategies that would have some benefit to people and property and are somewhat cost effective at reducing damage to property and people
- **High** – Strategies that provide mitigation of several hazards and have a large benefit that warrants their cost and time to complete
- **Very High** – extremely beneficial projects that will greatly contribute to mitigation of multiple hazards and the protection of people and property. These projects are also given a numeric ranking within the category.

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

### Cost Estimates

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

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

Cost estimates take into account the following resources:

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

### Project Timeline

The following chart is a completed list of projects recommended by the Committee. The following action plan identifies Responsibility, Funding and a Time Frame for the mitigation projects recommended. The actions will begin as soon as the plan is approved and the community is eligible for funding, unless otherwise stated, and will be completed as noted in the implementation date column in the table below (called "Timeframe" in table).

New and Continuing Mitigation Strategies to be Implemented								
Status	Action Type	Description	Hazards Addressed	Responsibility/ Oversight	Priority	Estimated Cost	Funding Source	Time Frame
New	Structure and Infrastructure	Fix Forge Pond Dam based on information from last inspection. (Mainly vegetative and encroachment clearing.)	Dam Failure, Flooding	EMD, Highway Superintendent	High	High	Town Funds, HMGP	1-3 Years
New	Education and Awareness Projects	Encourage residents to sign up for the reserve 911. (Have sign-up sheets at community events.)	All Hazards	EMD, Fire	High	Low	Staff Time	6-12 months
New	Local Plan and Regulations	Complete a comprehensive Stormwater Management Plan	Flooding, Hurricanes, Severe Thunderstorms	Planning Board, Highway Superintendent	High	Medium	Staff Time	1-2 Years
New	Structure and Infrastructure	Evaluate Key Water Holes in town to determine if water can be pulled from them during fire response. (Work to remedy)	Wildfire	Fire	High	Low (inventory) High (Fix)	Staff Time (Inventory) Town funds (fix)	6-12 months (inventory) 1-5 years (fix)
New	Education and Awareness	Revive the Town's Local Emergency Planning Committee with the objective of helping to implement a number of the action items in this plan.	All Hazards	EMD	High	Low	Staff Time	6-12 months
Pulled Forward	Education and Awareness	Create water conservation guidelines to use as an educational tool for Town residents.	Drought	Conservation Commission, Board of Health, Highway Department	Medium	Low	Staff Time	1-2 years
New	Structure and Infrastructure	Complete second half of Harris Street road reconstruction. (Include better drainage and ice buildup designs).	Flooding, Snowstorms, Ice	Highway Superintendent	Medium	High	Chapter 90	1-2 Years

**New and Continuing Mitigation Strategies to be Implemented**

Status	Action Type	Description	Hazards Addressed	Responsibility/ Oversight	Priority	Estimated Cost	Funding Source	Time Frame
New	Education and Awareness	Research and purchase emergency management technology (Ex. Upgrade IMC to include fire and find a software that does pre-incident plans)	All Hazards	EMD, Fire, Police	Medium	Low	Emergency Management Funds	6-12 months
New	Education and Awareness	Disseminate information and survival kits to residents (Include tips on how to mitigate hazards on personal property.)	All Hazards	EMD, Fire, Police, Highway Superintendent	Medium	Low	Emergency Management Funds	1-2 Years
New	Structure and Infrastructure	Inventory and assess culverts and bridges on evacuation routes. Repair as necessary	Flooding, Hurricanes, Severe Thunderstorms	Highway Superintendent	Medium	Low (inventory) High (Fix)	Staff Time, Chapter 90, HMGP	Ongoing
New	Structure and Infrastructure	Assess resiliency of municipal telephone infrastructure and how residents would access 911 services in the case of an outage.	All Hazards	EMD	Medium	Low	Staff Time	1-2 Years
New	Structure and Infrastructure	Replace problem culverts.	Flooding, Hurricane, Severe Thunderstorms	Highway Superintendent	Low	Low (inventory) High (Fix)	Chapter 90, Town Funds, HMGP	Ongoing
New	Structure and Infrastructure	If areas continue to be snow drift prone, install snow fences.	Snowstorms	EMD, Highway Superintendent	Low	Medium	Town Funds, HMGP	3-5 Years
New	Local Plans and Regulation	Consider adopting a Driveway Regulations By-law that limits steep inclines and sharp turns	Snowstorms, Ice, Wildfires	Planning Board	Low	Low	Staff Time	2-3 Years
Pulled Forward	Local Plans and Regulations	Participate in the creation of a Regional Debris Management Plan	All Hazards	EMD	Low	Low	Staff Time	3-5 Years

## 6: PLAN REVIEW, EVALUATION, IMPLEMENTATION, AND ADOPTION

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

### Plan Implementation

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

### Incorporation with Other Planning Documents

---

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

- **Granby Comprehensive Emergency Management Plan** (particularly the Critical Infrastructure Section) – the Critical Infrastructure section was used to identify those infrastructure components in Granby that have been identified as crucial to the function of the Granby; also, this resource was used to identify special needs populations as well as potential emergency shortcomings.
- **Granby Open Space, Recreation Plan** this Plan was used to identify the natural context within which the Granby mitigation planning would take place. This proved useful insofar as it identified water bodies, rivers, streams, infrastructure components (i.e. water and sewer, or the lack thereof), as well as population trends. This was incorporated to ensure that the town's mitigation efforts would be sensitive to the surrounding environment.
- **Granby Zoning Ordinance** – Granby's Zoning was used to gather identify those actions that the town is already taking that are reducing the potential impacts of a natural hazard (i.e. floodplain regulations) to avoid duplicating existing successful efforts.
- **Granby Master Plan**- Granby's Master Plan was reviewed to complete the community profile sections and inform the committee's work on selecting strategies that also align with the vision for the town.
- **Massachusetts' State Hazard Mitigation Plan** - This plan was used to insure that the town's HMP was consistent with the State's Plan.

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

In addition to integrating existing plans into the update of this Hazard Mitigation Plan, the existing Hazard Mitigation plan and its contents and recommendations, is being integrated into the Town of Granby's Master Planning process.

## **Plan Monitoring and Evaluation**

---

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

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

### *Plan Mission and Goal*

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

### *Hazard Identification and Risk Assessment*

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

### *Existing Mitigation Strategies*

- Are the current strategies effectively mitigating the effect of any recent hazard events?
- Has there been any damage to property since the plan was last reviewed?

- How could the existing mitigation strategies be improved upon to reduce the impact from recent occurrences of hazards? If there are improvements, these should be incorporated into the plan.

*Proposed Mitigation Strategies*

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

*Review of the Plan and Integration with Other Planning Documents*

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

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

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

# 7: APPENDICES

## Appendix A - Technical Resources

---

### 1) Agencies

Massachusetts Emergency Management Agency (MEMA).....	508/820-2000
Hazard Mitigation Section .....	617/626-1356
Federal Emergency Management Agency (FEMA) .....	617/223-4175
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 (SRPED).....	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) – .....	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 and Maintenance(DC.....	617/727-4050
University of Massachusetts/Amherst.....	413/545-0111
Natural Resources Conservation Services (NRCS).....	413/253-4350
MA Historical Commission.....	617/727-8470
U.S. Army Corps of Engineers.....	978/318-8502
Northeast States Emergency Consortium, Inc. (NESEC).....	781/224-9876
National Oceanic and Atmospheric Administration: National Weather Service.....	508/824-5116
US Department of the Interior: US Fish and Wildlife Service .....	413/253-8200

US Geological Survey.....508/490-5000

## 2) Mitigation Funding Resources

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

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

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

### 3) Internet Resources

Sponsor	Internet Address	Summary of Contents
Natural Hazards Research Center, U. of Colorado	<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.tornadoject.com/">http://www.tornadoject.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.iix.com/ndcmap.html">http://www.iaa.iix.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 – Documentation of the Planning Process**

---

### **Granby Hazard Mitigation Committee Meeting #1 Agenda**

**February 23, 2017 3:30pm**

1. Introductions/Administrative
  - a. affirm local Hazard Committee membership
2. Overview of Hazard Mitigation Planning Process
  - a. Background on Hazard Mitigation Planning
  - b. Planning process and requirements
    - i. 3-5 committee meetings
    - ii. 2 public outreach meetings
    - iii. MEMA / FEMA review and conditional approval
    - iv. Select Board adoption
    - v. FEMA final approval
  - c. Schedule for committee and public outreach meetings
3. Begin Review of Base Plan

**Granby Hazard Mitigation Committee  
Meeting #2 Agenda**

**March 8, 2017 @ 3:30pm**

1. Continue Edits to the Town Profile
2. Complete Hazard Identification and Risk Assessment
3. Begin Critical Infrastructure Identification

Planning process and requirements

1. 3-5 committee meetings
2. 2 public outreach meetings
3. MEMA / FEMA review and conditional approval
4. Selectboard adoption

DRAFT

**Granby Hazard Mitigation Committee  
Meeting #3 Agenda**

**March 16, 2016 @ 3:30pm**

1. Finalize Hazard Identification and Risk Assessment
2. Identification of Critical Infrastructure (Chapter 4)
  - a. Review and Edit Map
3. FEMA Capability Assessment

Planning process and requirements

- a. 3-5 committee meetings
- b. 2 public outreach meetings
- c. MEMA / FEMA review and conditional approval
- d. Selectboard adoption
- e. FEMA final approval

DRAFT

**Granby Hazard Mitigation Committee  
Meeting #4 Agenda**

**March 30, 2017 @ 3:30pm**

1. Administrative: Hours worked thus far outside of meetings
2. Review Action Plan from Previous Plan
3. Identify and Prioritize Mitigation Strategies for Action Plan
4. Review Chapter 6

DRAFT



#### **MEDIA RELEASE**

**CONTACT:** Ashley Eaton, PVPC Planner, (413) 781-6045 or [aeaton@pvpc.org](mailto:aeaton@pvpc.org)

**FOR IMMEDIATE RELEASE**  
March 6, 2017

#### **Town of Granby Schedules Public Engagement Event For Hazard Mitigation Plan**

Granby residents, business owners, stakeholders and representatives from surrounding communities are invited to provide comments on the development of the Town of Granby's Hazard Mitigation Plan Update on Monday, March 13, 2017 at 7:00 p.m. at the Old Carnegie Library-Upper Floor, 1 Library Lane. All members of the public are welcome to attend the event. Local businesses, residents of neighboring communities, and municipal officials of neighboring communities are also encouraged to attend and provide their feedback.

The meeting will include an introduction to the Hazard Mitigation planning process, a summary of existing mitigation initiatives, and an overview of past hazards in the Town. Municipal officials and PVPC staff will be available to answer questions and listen to comments.

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

For more information, please contact PVPC's Ashley Eaton at [aeaton@pvpc.org](mailto:aeaton@pvpc.org) or (413) 781-6045.

**TOWN OF GRANBY  
NOTICE OF MEETINGS OF TOWN DEPARTMENT AND ALL TOWN BOARDS  
AS REQUIRED BY CHAPTER 39, SECTION 23 M.G.L.**

**NAME OF DEPARTMENT, BOARD OR COMMISSION & GENERAL PURPOSE OF MEETING**

Planning Board  
\_\_\_\_\_

**DATE OF MEETING:**  
**March 13, 2017**

**TIME: 6:00 PM**

**PLACE: One Library Lane-Old Carnegie Library**  
**ROOM: Meeting Room**  
**FLOOR: Top Floor**  
Glen Sexton, Chair

**DATE OF NOTICE:**  
**03-09-17**

**CLERK OF BOARD/ OR BOARD MEMBER**

Timestamp all copies in Town Clerk's Office-leave three copies to Clerk, (two for posting)  
- Keep a copy for your Records.

**LISTINGS OF TOPICS**

Please check if Action will be taken or Information

	<b><u>Action</u></b>	<b><u>Information</u></b>
<b>ADMINISTRATIVE DUTIES:</b>	X	X
<ul style="list-style-type: none"> <li>• Approve Bills</li> <li>• Approve Minutes</li> <li>• Budget</li> </ul>		

**NEW BUSINESS:**

6:00 PM Discussion-New Business at Château Harmony  
6:15 PM Hearing to consider the application of the Town of Granby, 250 State St., Granby, MA for a Special Permit as required under the following sections of the Granby Zoning Bylaw:

- Section 5.57(2) Illumination - for an internally illuminated sign in excess of nine (9) square feet
- Section 5.595(1) Special Situations - for a sign of a larger size than is permitted

The applicants propose to erect a new sign at the Granby Elementary School - East Meadow School located at 393 East State Street (Assessor's Map 9, Parcel B-13) which is located within the Residential Single Family and Professional Office Overlay Zoning Districts.

7:00 PM Hazard Mitigation Hearing  
7:30 PM 6:30 PM Proposed Bylaw Changes

**Old Business and Information**

Discussion of property line setbacks to signage in the professional business overlay district  
Discussion of business estate lots  
Duplexes  
Sewer/Water Infrastructure  
Master Plan Update  
Westover Metropolitan District Commission (WMDC)  
Building Commissioner

**AJOURNMENT:**



Catalyst for Regional Progress

**PVPC**

Timothy W. Brennan, Executive Director

## MEDIA RELEASE

CONTACT: Ashley Eaton, PVPC Planner, (413) 781-6045 or [aeaton@pvpc.org](mailto:aeaton@pvpc.org)

FOR IMMEDIATE RELEASE  
March 24, 2017

### **Town of Granby to Hold Second Public Engagement Event for Hazard Mitigation Plan Update**

Granby residents, businesses, and surrounding community residents and representatives are invited to provide comments on the Town of Granby Hazard Mitigation Plan Update on Monday, April 3, 2017, at 6:30pm in the large room at Granby Senior Center/Town Office on 10-B West State Street.

The purpose of the 2016 Hazard Mitigation Plan Update is to identify and assess Granby's natural hazard risks and determine how to best minimize and manage them. A mitigation action is any action taken to reduce or eliminate the long-term risk to human life and property from hazards. Public participation and input is essential!

The meeting will include a discussion of existing mitigation initiatives addressing natural hazards in Granby, and the strategies as currently proposed by the committee. Municipal staff and PVPC staff will be available to answer questions and listen to comments on the draft plan. The meeting provides an opportunity for you to share your opinions and participate in the mitigation planning process. A draft of the plan will be available for review on the PVPC website.

The plan is being updated by the Town with assistance from the Pioneer Valley Planning Commission and is funded by the Federal Emergency Management Agency (FEMA) and the Massachusetts Emergency Management Agency (MEMA).

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

For more information, please contact PVPC's Ashley Eaton at [aeaton@pvpc.org](mailto:aeaton@pvpc.org) or (413) 781-6045.

**TOWN OF GRANBY  
NOTICE OF MEETINGS OF TOWN DEPARTMENT AND ALL TOWN BOARDS  
AS REQUIRED BY CHAPTER 39, SECTION 23 M.G.L.**

**NAME OF DEPARTMENT, BOARD OR COMMISSION & GENERAL PURPOSE OF MEETING**

\_\_\_\_\_  
**BOARD OF SELECTMEN**  
\_\_\_\_\_

**MONDAY**

**DATE OF MEETING:**

**April 3, 2017**

**TIME: 6:00 PM**

**PLACE: 10-B West State Street-Senior Center**  
**ROOM: Large**  
**FLOOR: 1st**

**DATE OF NOTICE:**

**03/30/2017**

*Mark L. Paul, Esq.*  
\_\_\_\_\_

**CLERK OF BOARD/ OR BOARD MEMBER**

Timestamp all copies in Town Clerk's Office-leave three copies to Clerk, (two for posting)

- Keep a copy for your Records.

**AGENDA:**

**Action**  
**X**

**Information**  
**X**

**CALL TO ORDER:**

**PLEDGE OF ALLEGIANCE:**

**CITIZEN PARTICIPATION:**

**MINUTES:**

**OLD BUSINESS:**

**TOWN ADMINISTRATOR:**

**APPOINTMENTS:**

6:00 PM SCHOOL COMMITTEE/FINANCE COMMITTEE FY-18 BUDGET  
6:35 PM AUXILIARY POLICE  
6:40 PM TOWN MODERATOR  
7:00 PM HAZARD MITIGATION HEARING

**NEW BUSINESS AND INFORMATION:**

1 Accept Departmental Reports  
2 Approve and Sign Maintenance Warrant-  
3 Affirm Appointments  
4 Approve and Sign Underride Ballot Question  
5 Approve and Sign Dufresne Park Rental Applications  
6 Sewer Connection-81 Pleasant Street  
7 Finance Committee  
8 Approve and Sign STM/ATM/Election Warrants  
9 Approve and Sign S.H./G Household Hazardous Waste Day Agreement

**ANY OTHER BUSINESS:**

**EXECUTIVE SESSION:**

**ADJOURNMENT:**

Granby Hazard Mitigation Committee Meeting #1- Sign In

Date: February 23, 2016 at 3:30

Location: Granby Senior Center- Large Room (1<sup>st</sup> Floor)

Name	Position	Email
CHRISTOPHER MINSIN	Town Administrator	CHRISTOPHER.MINSIN@TOWN.GRANBY-CT.GOV
DAVID DEMONIER	Highway Superintendent	daved@granbyme.org
Wenda LUFF	Conservation	wendaluff@gmail.com

**Granby Hazard Mitigation Committee Meeting #2- Sign In**

Location: Granby Senior Center Large Room (1<sup>st</sup> Floor)

Date: March 8, 2017

Name	Position
CHRISTOPHER MAZUR	Town Administrator
James Trompke	Planning Board
Wenda LUFF	Conservation Commission
John Mitchell	Fire Chief
DAVE DESROSIERS	Highway Superintendent

Granby Hazard Mitigation Committee Meeting #3- Sign In

Location: Granby Senior Center- Large Room (1<sup>st</sup> Floor)

Date: March 16, 2017 @ 3:30pm

Name	Position
CHRISTOPHER MARTIN	Town Administrator
Alan Wishart	Police Chief
John Mitchell	Fire Chief
Wendy Luff	Conservation Commission
DAVID DELMONTE	DPW



## Appendix C – List of Acronyms

---

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



## Appendix E - Capability Assessment Worksheet

### Worksheet 4.1

### Capability Assessment Worksheet

**Jurisdiction:** Granby, Massachusetts

Local mitigation capabilities are existing authorities, policies, programs, and resources that reduce hazard impacts or that could be used to implement hazard mitigation activities. Please complete the tables and questions in the worksheet as completely as possible. Complete one worksheet for each jurisdiction.

#### Planning and Regulatory

Planning and regulatory capabilities are the plans, policies, codes, and ordinances that prevent and reduce the impacts of hazards. Please indicate which of the following your jurisdiction has in place.

Plans	Yes/No Yr	Does the plan address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Comprehensive/Master Plan	Yes	Currently updating the land use chapter.
Capital Improvements Plan	Yes	Try to get 5 year budget needs from each department, not always received. Hasn't considered mitigation projects.
Economic Development Plan	No	
Local Emergency Operations Plan	Yes	Last updated in 2015. Departments need finalized copies.
Continuity of Operations Plan	No	
Transportation Plan	No	Transportation Chapter in the Master Plan Projects in the RTP
Stormwater Management Plan	Yes	Erosion Control and Sediment Plan. Tighe and Bond doing some work around the MS4 permit/
Community Wildfire Protection Plan	No	
Other special plans (e.g. brownfields, redevelopment, disaster recovery, coastal zone management, climate change adaptation)	Yes	Open Space and Recreation Plan, Municipal Energy Reduction Plan

Building Code, Permitting, and Inspections	Y/N	Are codes adequately enforced?
Building Code	Yes	Version/Year: Massachusetts State Building Code, 8 <sup>th</sup> edition. Additionally have adopted the stretch code, which requires homes to be built to higher energy efficiency standards.
Building Code Effectiveness Grading Schedule (BCEGS) Score	Yes	Score: 6 (State Score)

Fire Department ISO Rating	Yes	Rating: 7
Site plan review requirements	Yes	Site plan review is in place and adequately enforced when triggered.

Land Use Planning & Ordinances	Y/N	Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced?
Zoning Ordinance	Yes	Zoning ordinance updated 2-3 years ago. Administered effectively by the Planning Board. PVPC planner provides assistance through the Planning Board Assistance program.
Subdivision ordinance	Yes	Not updated recently. Doesn't consider hazards or development patterns to minimize them.
Floodplain ordinance	Yes	Floodplain overlay district. Administered through the Conservation Commission
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	Yes	Erosion and sediment control plan
Flood insurance rate maps	Yes	Paper maps on files are from 1980. Need to be updated.
Acquisition of land use for open space and public recreation uses	Yes	Yes. OSRP prioritizes. Most recent land acquired to the town was donated. Finding funding to acquire land is a challenge
Other		

How can these capabilities be expanded and improved to reduce risk?
Better coordination on a Capital Improvement Planning process could help multiple department meet their needs while potentially tackling projects that will mitigate the impacts of hazards. Pursue Community Preservation Act approval (long term goal) in order to fund some of the goals in the Open Space and Recreation Plan, which are also likely to help mitigate hazards.

## Administrative & Technical

Identify whether your community has the following administrative and technical capabilities. These include staff and their skills and tools that can be used for mitigation planning and to implement specific mitigation actions. For smaller jurisdictions without local staff resources, if there are public resources at the next higher level of government that provide technical assistance, indicate so in your comments.

Administration	Y/N	Describe capability Is coordination effective?
Planning Board	Yes	Planning board adequately skilled
Mitigation Planning Committee	Yes	Ad-hoc committee. Meet when needed.
Maintenance programs to reduce risk (e.g. tree trimming, clearing drainage systems)	Yes	DPW does tree trimming, cleans drainage, mows areas, cleans culverts, pretreats road before snow storms
Mutual aid agreements	Yes	With fire and DPW part of a state-wide mutual aid agreement. Police part of a region-wide mutual aid agreement.

Staff	Y/N FT/PT	Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?
Chief Building Official	Yes (PT)	
Floodplain Administrator	No	Conservation Commission oversees.
Emergency Manager	Yes (PT)	EMD tasks are part of the Town Administrator's job.
Community Planner	No	Contract in place with PVPC through Planning Board Assistance Program
Civil Engineer	Yes (FT)	Yes.
GIS Coordinator	No	DPW is expanding its capabilities
Other	Yes	DPW, Fire, Police- Full time staffed departments.

Technical	Y/N	Describe capability Has capability been used to assess/mitigate risk in the past?
Warning systems/services (Reverse 911, outdoor warning signals)	Yes	Reserve 911 calls, emails and texts residents that have signed up. Approximately 1/3 of the town has enrolled.
Hazard data and information	Yes	
Grant writing	No	
Hazus analysis	No	
Other	No	

### How can these capabilities be expanded and improved to reduce risk?

Emergency notification system is currently limited, because residents have to know to sign themselves up. Could be a town-wide push to get people enrolled.

## Financial

Identify whether your jurisdiction has access to or is eligible to use the following funding resources for hazard mitigation.

<b>Funding Resource</b>	<b>Access Eligibility Y/N</b>	<b>Has the funding resource been used in the past and for what type of activities? Could the resource be used to fund future mitigation actions?</b>
Capital Improvements Project funding	Yes	Currently funded through the General Fund, Chapter 90
Authority to levy taxes for specific purposes	Yes	With limitations at the state level. Historically taxes not well supported in the Town.
Fees for water, sewer, gas or electric services	No	
Impact fees for new development	No.	
Storm water utility fee	No.	Not popular.
Incur debt through general obligation bonds and/or special tax bonds	Yes.	
Community development block grants	Yes.	Works with PVPC to apply for competitive CDBG funding through the state
Other federal funding programs		FEMA reimbursements
State funding programs		Chapter 90 Road Funds, Green Communities Energy Efficiency work. Various federal and state funding for specific projects.
Other		

<b>How can these capabilities be expanded and improved to reduce risk?</b>

## Education & Outreach

Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information.

Program/Organization	Y/N	Describe program/organization and how it relates to disaster resilience and mitigation
Local citizens groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Yes	Kestrel Land Trust, North American Family Camping Association, Girl Scouts, Boy Scouts
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	Yes	Fire safety in schools and to seniors. Preparedness information on Town website from time to time
Natural disaster or safety related school programs	Yes	-fire safety in schools
StormReady certification	No	
Firewise Communities certification	No	
Public-private partnership initiatives addressing disaster-related issues	No	
Other		

<b>How can these capabilities be expanded and improved to reduce risk?</b>
--

DRAFT