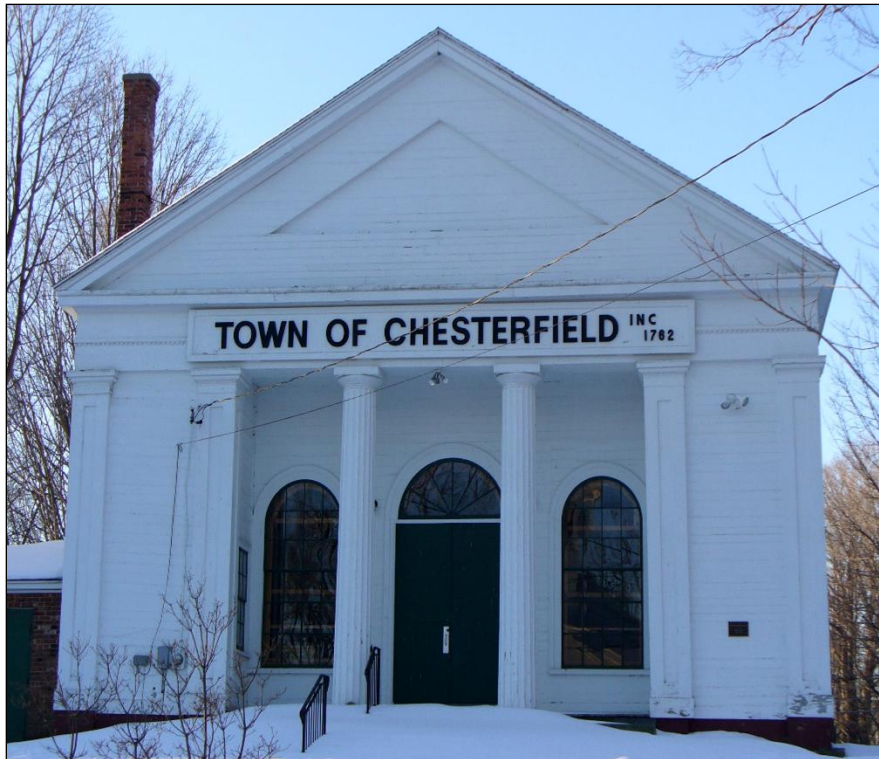


# **THE TOWN OF CHESTERFIELD, MA HAZARD MITIGATION PLAN UPDATE**



*Chesterfield Town Hall, Source: PVPC*

**Adopted by the Chesterfield Board of Selectmen on August 22, 2016**

**Prepared by:  
The Chesterfield Hazard Mitigation Planning Committee  
and  
The Pioneer Valley Planning Commission**

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# 1 - PLANNING PROCESS

## Introduction

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

Preparing a 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 Workgroup

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In 2016, the Town of Chesterfield completed an update of their 2008 Hazard Mitigation Plan, in collaboration with the Pioneer Valley Planning Commission. All portions of the plan were reviewed and updated as necessary. Planning for hazard mitigation in Chesterfield involved a seven-member workgroup:

- Larry Holmberg, Emergency Management Director, Chair
- Matt Smith, Highway Department
- David A. Hewes, Fire Chief
- Aimee Wallace, Police Department
- Roger A. Fuller, Board of Selectmen
- Judy Terry, Planning Board

- Sherrill Redmon, Conservation Commission
- John Follett, Conservation Commission

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

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

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

The action items represent a multi-faceted approach to addressing natural hazards in the Town and will be undertaken as resources become available and will be integrated into ongoing planning activities. As part of the review and adoption process, the Committee approved the action items that were in keeping with the goals and criteria established by the Town and assigned appropriate bodies within the Town to implement them within a five-year framework.

### **Workgroup Meetings**

Meetings of the Hazard Mitigation Planning Workgroup, all of which took place at Chesterfield Town Offices, were held on the dates listed below. Agendas for each meeting are included in Appendix B. Meetings held in 2015 and 2016 included a review of the entire Hazard Mitigation Plan and updates to the document. After the January 2016 meeting, the plan was submitted to MEMA for initial review, and then to FEMA for final review and approval.

#### **October 21, 2015**

The workgroup meeting included review of Hazard Mitigation Planning process, Planning Process chapter, Local Profile chapter, and hazard identification analysis.

#### **November 19, 2015**

The workgroup meeting included review of the critical facilities/hazard map, critical

facilities chapter, an assessment of existing mitigation strategies, and initial discussion of new mitigation strategies.

**December 17, 2015**

The workgroup meeting included a review of updates made to the plan thus far and conducted continued discussion of new mitigation strategies.

**January 27, 2016**

The workgroup meeting reviewed updates to the overall plan and finalized proposed mitigation strategies.

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 as necessary.

**Participation by Public and Neighboring Communities**

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Two public planning sessions were held as part of the development of Chesterfield plan – on November 19, 2015, and January 27, 2016. Both meetings occurred after the Hazard Mitigation Workgroup had provided input on hazards and mitigation strategies relevant to the community. Notice of both public meetings was posted at Chesterfield Town Offices in compliance with the Commonwealth of Massachusetts’ open meeting law. Public meeting agendas and notices may be found in Appendix B.

On January 13, 2016, the Pioneer Valley Planning Commission sent a press release to all area media outlets to inform the public that a draft of the Chesterfield Hazard Mitigation Plan had been placed on PVPC’s website ([www.pvpc.org](http://www.pvpc.org)). The release also indicated that hard copies were available at PVPC’s offices and at Chesterfield Town Offices, and that all residents, businesses and other concerned parties of Chesterfield and adjacent communities were encouraged to comment on the plan by e-mailing or calling staff contacts at PVPC or the Town of Chesterfield directly.

Citizens from adjacent municipalities were encouraged to comment on Chesterfield’s plan by e-mailing or calling staff contacts at PVPC or the Town of Chesterfield. The Pioneer Valley Planning Commission’s regional scope ensured that residents and government officials throughout the Pioneer Valley saw the press release and request for comments.

The press release and a screen shot of PVPC’s website showing the link to the press release can be found in Appendix B.

Public participation will be a critical component of the Hazard Mitigation Plan maintenance process. The Hazard Mitigation Workgroup will hold all meetings in accordance with Massachusetts open meeting laws.

### **Strategies for Ongoing Public Involvement**

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The Chesterfield Local Emergency Planning Committee, under the direction of the Emergency Management Director, will hold an annual review of Chesterfield's Pre-Disaster Mitigation (PDM) Plan. This meeting will be held at the Chesterfield Town Offices and will focus on the LEPC's planning activities.

In addition to these annual meetings, the Town of Chesterfield website ([www.townofchesterfieldma.com/](http://www.townofchesterfieldma.com/)) will contain a tab for the Town's Pre-Disaster Mitigation Plan, where a copy of the Plan will be posted. During LEPC annual review meetings, the Emergency Management Director will make attendees aware of the presence of the PDM plan on the town's website.

### **Select Board Meeting**

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In 2013, the Select Board agreed to begin the process of developing a Revised Hazard Mitigation Plan. Once the plan has been provisionally approved by FEMA, the Select Board will hold a public hearing on the plan for consideration and adoption.

## 2 – LOCAL PROFILE

### **Community Setting**

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Chesterfield is a rural town in western Massachusetts located 8 miles from Northampton and 40 miles northwest of Springfield. The Town was settled around 1755 and incorporated in 1762. The Town center, established after the American Revolution, has well-preserved Federal Period houses along Main Road. Chesterfield's main villages - the Town center, Bisbeeville, West Chesterfield, Sugar Hill and Bofat - were settled in 1762. The economy was mainly supported by agricultural practices and water-powered industries until the mid 1900s.

Throughout this period of growth in Chesterfield, several villages outside of the current town center were established. West Chesterfield is located near the East Branch of the Westfield River; Sugar Hill is where the first town meeting was held; and Bisbeeville and Bofat are located on the eastern side of town. These village sites were chosen along the rivers and brooks for their proximity to water-powered mills. Although the decline in industrialization forced certain mills to deteriorate, generations of residents have preserved and renovated historic houses and buildings through the years, adding to Chesterfield's character. In more recent years, generations of families are still residing in these villages and new families moving to Chesterfield have built houses on old family farms, occasionally building on forested lots. With the majority of residents commuting to work outside of town, there has been very little industrial development. A small industrial infrastructure, the preservation of historic sites, and the continuation of agriculture as a way of life sustain this distinctive, rural nature that citizens of Chesterfield have shaped over time.

### **Government**

Chesterfield is governed by an Open Town Meeting form of government in which all registered voters may participate. Acting as the legislative branch, the Town Meeting enacts bylaws (both general and zoning), appropriates the operating budget, and makes other important decisions about the town's resources and services. An elected three-member Board of Selectmen act as the town's chief executive officers, and a variety of elected or appointed volunteer committees and town officials are responsible for budget preparation, policy development, town bylaws, and state codes and regulations, among other advisory responsibilities.

### **Population Characteristics**

There are 1,222 Chesterfield residents in approximately 511 households, according to the 2010 U.S. Census, a 1.7% increase over the 2000 U.S. Census. The estimated median household income as of 2014 is \$56,146 (2009-2014 American Community Survey), with approximately 9.8% of residents living at or below the U.S. poverty level.



## **Development Patterns and Trends**

Chesterfield's landscape is characterized by rolling hills with two main valleys. The land is nearly 90% woodland or wetland. The Chesterfield Gorge, a 60-acre preserve owned by the Trustees of Reservations, features a 30-foot drop near the headwaters of the Westfield River, a federally designated National Wild and Scenic River. The Commonwealth of Massachusetts is one of the largest landowners in Chesterfield, owning approximately 28% (5,577 acres, according to MassGIS Oliver) of the total land area. The Commonwealth of Massachusetts also recently (2015) acquired land along Bofat Hill Road (114.28 acres).

Historically, Chesterfield's rocky terrain was better suited for grazing than tillage, while a wood industry was also prominent. Numerous mills, including sawmills, tanneries, gristmills, and cloth dressing mills, were introduced and in operation throughout the early 19th century. Residents took advantage of the natural water resources available to power their equipment in the mills and build their economy. The rural character of Chesterfield is sustained today through continued agricultural uses, a new commuting population, and a regenerated forest over much of the historic pastureland.

With the great recession of 2008, and Chesterfield's relatively rural location, there has not been any significant development in the last 5 years since the Town first created a Hazard Mitigation Plan. There have been no new subdivisions and no new industrial development.

## **Economy**

As of 2014, the median household income in the Town of Chesterfield was approximately \$56,146. The 2010 median house value was \$254,200 (2010 Census). According to 2014 American Community Survey estimates, Chesterfield has 424 people over the age of 16, 290 of which are considered to be in the labor force. Many of the town's employed population commute to work. The majority of people are in industries such as management/business, the sciences and arts, service industry positions, health care, and construction/repair.

The economy is influenced by small wood product and lumber businesses in the region, though the majority of residents commute to work outside of town.

## **Zoning and Planning**

Several factors have played, and will continue to play, an important role in the development of Chesterfield. These include:

- Availability of land for future development
- Current road network
- Physical factors: steep slopes, poor soil conditions, land set aside for conservation, and the Westfield River and its tributaries and floodplains
- Availability (or lack) of resources such as public water, sanitary sewers, high-speed internet

- Economic development opportunities

Chesterfield has three base zoning districts and four overlay districts. The base districts define the allowed uses and dimensional requirements in all parts of the Town, while the overlay districts provide for additional restrictions in certain areas. Overlay districts include the Floodplain and Westfield River Protection district; the Water Supply Protection District; and the Wireless Communication Overlay District. There are no delineated business, commercial, or industrial zoning districts in town.

Zoning and other land use regulations constitute a town's "blueprint" for its future. Zoning is the primary land use tool that the Town may use to manage development and direct growth to suitable and desired areas while also protecting critical resources and ensuring that development is not placed in areas with high risk for natural hazards.

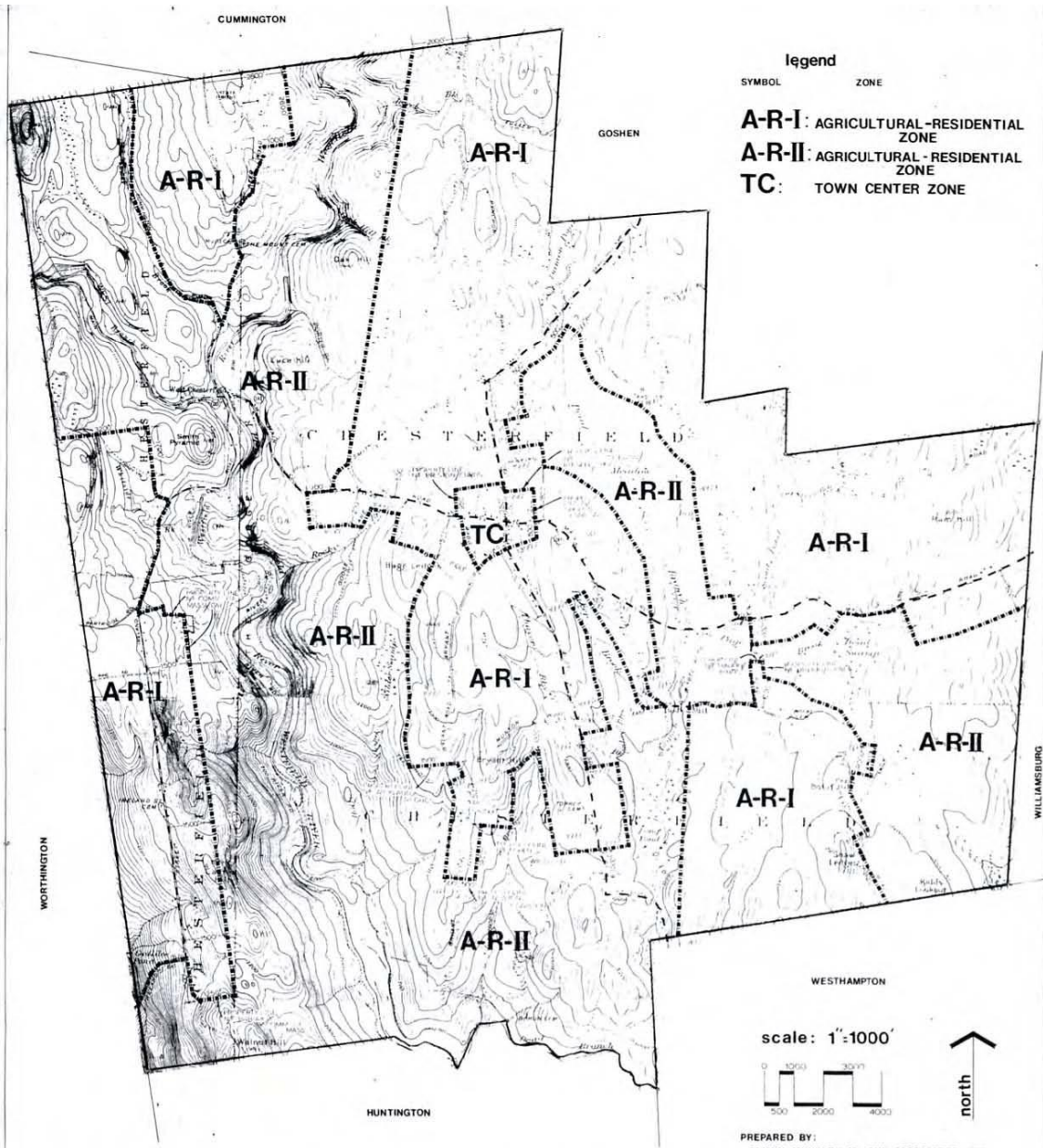
## **Climate**

Chesterfield, MA is located in north central Hampshire County, and receives an average annual rainfall of 49 inches; the U.S. average is 37 inches. Snowfall averages 73 inches, while the average city in the U.S. receives 25 inches. The number of days in Chesterfield with any measurable precipitation is 126. On average, there are 190 sunny days per year in Chesterfield. The July high is around 79 degrees Fahrenheit, while the January low is 12 degrees. The comfort index, which is based on humidity during the hot months, is a 53 out of 100, where higher is more comfortable. The US average on the comfort index is 44.

Since 1948, incidents of extreme rainfall events (large amounts of rain in a short period of time) in the U.S. have increased 30 percent. However, New England states have experienced a far greater increase than the national average. In Massachusetts, the increase is 81 percent; upstream on the Connecticut River, New Hampshire is up 115 percent and Vermont is up 84 percent. (Source: Environment America Research & Policy Center, 2012). Extreme rainfall is a cause of flooding, which is a major concern of this plan. In the last five years, there has also been an increased occurrence of tornadoes and large storms that generate strong wind gusts in the Pioneer Valley region.

## **Land Use Summary**

The vast majority of Chesterfield's 20,007 acres is undeveloped and protected forest and water, totaling nearly 18,830 acres (Mass Audubon *Losing Ground* Report, 2015). Developed land comprises only 321 acres, or 2%, of Chesterfield's land area. Open land such as agricultural and low-vegetation areas comprises 878 acres, or 4%.



# CHESTERFIELD ZONING MAP

THIS IS TO CERTIFY THAT THIS IS THE ZONING MAP OF THE TOWN OF CHESTERFIELD, MA. REFERRED TO IN THE ZONING BY-LAW OF THE TOWN OF CHESTERFIELD, MA, WHICH WAS ADOPTED BY SPECIAL TOWN MEETING ON \_\_\_\_\_

ATTEST A TRUE COPY  
TOWN CLERK

DATE: JUNE 5, 1978

PLANNING BOARD:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

PREPARED BY:  
ALMER HUNTLEY JR. AND ASSOCIATES, INC.  
SURVEYORS ENGINEERS PLANNERS  
125 PLEASANT STREET NORTHAMPTON, MA

## **Infrastructure**

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Chesterfield's geography has been a major factor in the development of its infrastructure. Rolling hills with two main valleys surrounded by large wetland systems have helped shape and guide local land use patterns. These geographic characteristics have also limited the expansion of development beyond those lots that have frontage on the main roadways in town.

### **Roads and Highways**

The principal highway in Chesterfield is State Route 143, traveling east-west across the Town, which connects with the cross-state Worcester Turnpike (State Route 9) in the neighboring Town of Williamsburg. Chesterfield's town center is at the intersection of Route 143 (or Main Road), North Road, and South Street.

### **Rail**

There is no passenger or freight rail service in Chesterfield.

### **Public Transportation**

Chesterfield is a member of the Franklin Regional Transit Authority (FRTA), which provides paratransit services for the elderly and disabled through the Town of Goshen and the Council on Aging.

### **Schools**

Public schools in Chesterfield include the New Hingham Regional Elementary School, serving both Chesterfield and Goshen, and the Hampshire Regional High School in Westhampton, serving the communities of Chesterfield, Goshen, Southampton, Westhampton, and Williamsburg.

### **Water and Sewer**

Chesterfield does not have a public water supply and relies on numerous private, on-site wells located throughout the community, including six wells for non-community water systems. Chesterfield does not have a public sewer system or any publicly-owned wastewater treatment plants in the town. All residences and businesses are served by on-site septic systems.

### **Energy**

Chesterfield does not have a municipal energy source. There is no large-scale solar generation or natural gas distribution infrastructure in town.

### **Communications**

Chesterfield is mainly served by DSL internet through telephone lines. There are some areas of town with no internet. Cell phone coverage is limited in areas around the Westfield River. The three municipal buildings have high-speed internet.

## **Natural Resources**

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*Information in the following section includes excerpts from the Chesterfield Open Space and Recreation Plan (2003):*

Chesterfield is characterized by smooth ridge tops and gently rolling hills, with stronger relief occurring along the East Branch of the Westfield River running north/south through the western part of town. The Dead Branch of the Westfield River meanders over gentler land on the eastern side of town and is associated with large tracts of wetlands.

Dramatic wooded slopes distinguish the Chesterfield landscape from the nearby foothills of the Connecticut River Valley. Occasional hilltop pasturelands open up distant western views towards the rolling forested expanse of the Berkshire Highlands. Historic sites and buildings are concentrated in three main villages, and old mills, cemeteries, and historic houses pepper the landscape as reminders of the history of European settlement on the land. Chesterfield has continued its tradition of working forests and farmlands. A combination of low-density dwellings, reforested landscapes and protected lands has sustained the rural character of the town.

However, the majority of residents today lead a modern life of commuting to nearby towns for employment. Furthermore, given today's economic climate, forestry and agriculture are becoming less profitable. Forests and fields throughout the town are likely places for continued residential growth.

### **Watersheds**

Chesterfield's plentiful water resources include numerous rivers and streams, extensive wetlands, and several ponds. The abundance of water resources is also reflected in the reliable availability of groundwater for private and public wells. Chesterfield sits within two separate watersheds: the Westfield River watershed and the Connecticut River watershed. The majority of the town is situated in the Westfield River watershed. Ten miles of the Westfield River run north/south through Chesterfield. Due to a large ridge along the eastern border of Town, 734 acres of Chesterfield is within the Connecticut River watershed.

## **Rivers and Streams**

The Westfield River is the main water course that flows through Chesterfield and was the first river to be designated a National Wild and Scenic River in Massachusetts. The watersheds in Chesterfield eventually flow into either the Westfield River or the Connecticut River. Land surrounding the Westfield River is an important natural riparian corridor, providing habitat for more than ninety state-protected rare species and preventing erosion along riverbanks.

The ultimate confluence of Chesterfield's numerous streams, brooks, and rivers is the Connecticut River by way of the triple-branched Westfield River (once called the Agawam River). The Westfield River begins approximately 13 miles northwest of Chesterfield in the Town of Savoy and flows southeast through Windsor, Cummington, Chesterfield, and beyond. The river enters at the northern town line bordering Cummington and flows south along the western side of Chesterfield, crossing Route 143 west of the town center. The Westfield River continues south into Huntington, where it eventually merges with the Middle and West Branches before its confluence with the Connecticut River.

## **Lakes and Ponds**

Several ponds and wetland areas within the town include:

- Damon Pond, located off Damon Pond Road at the Goshen and Chesterfield border;
- Scout Pond, located off Main Road to the east of the main entrance to the Boy Scouts property on Sugar Hill Road;
- Long Pond, located off South Street and linked with the Dead Branch Brook; and
- Little Galilee Pond, located on the border of South Worthington and Chesterfield.

Other water resources include Dead Branch Brook, Tower Brook, Whiteside Brook, Baker Brook, Thayer Brook, Page Brook, Roberts Meadow Brook, West Branch Bronson Brook, Rocky Brook, Branch Shop Brook, Holly Brook, Chauncey Branch, West Falls Branch, Wilder Swamp, and Dead Swamp.

## **Wetlands**

In Chesterfield, 680 acres are characterized as wetland. Wetlands exist along many of the brooks, streams, and rivers throughout Chesterfield. Wetlands provide viable habitat, nesting, food, and water for a variety of species. In addition, wetlands also mitigate the effects of floods by containing excess water and blunting water velocity. Wetlands can also be found at higher elevations where bedrock is close to the surface, but in Chesterfield the majority is located along the brooks and Westfield River.

Bordering vegetated wetlands are wetlands found bordering these brooks and rivers. Within a 100' buffer zone beyond the wetland edge, development is controlled and requires an Order of Conditions from the Conservation Commission according to the provisions of the Wetlands Protection Act. The objective of the Wetlands Protection Act, as amended by the 1996 Rivers Protection Act, is to preserve the quality of water, maintain quality and quantity of drinking water, provide recharge through infiltration of water into the ground, retain the natural flood storage capacity, sustain fisheries, and protect viable wildlife habitat.

Several of Chesterfield's wetlands are large enough to appear on Geographic Information System (GIS) or United States Geological Survey (USGS) maps; however, there are many smaller wetlands that also exist in town. These types of wetlands are typically identified in the field by soil scientists or wetland experts through recognition of wetland vegetation and soil types. Wetlands not shown on maps may be under protection of the Massachusetts Wetland Protection Act, and are identified on a site-by-site basis.

Wetlands not associated with brooks or rivers are called "isolated wetlands." Vernal pools are examples of these and fill with water only during the wet seasons, providing habitat for salamanders, frogs, and other threatened species. There are numerous vernal pools found scattered throughout Chesterfield, but they are not protected by state laws unless they are certified, are over a quarter acre in size, or within another water resource area.

### **Beaver Dams**

Beaver activity has been increasing over the past decade. Several wetland areas have been flooded by beaver dam construction. As a result, their vegetation has changed from forested wetland to marshy habitat. Sometimes beaver activity is detrimental to property, causing problems for local land owners (*e.g.*, flooding of wells, septic systems, lawns, out-buildings, and roadways). Problems with beaver dams impact Fuller Road as well as other areas in Chesterfield. Affected individuals must contact the Board of Health and Conservation Commission for advice and permission to alleviate the beaver problem.

### **Aquifers**

Each resident receives drinking water through private wells, which are ultimately dependent on ground water within the two watersheds. A public water supply is located only at the New Hingham Elementary School, and at the First Congregational Church. There are no designated aquifer recharge areas or surface water reservoirs that the town relies on for water supply. However, there is a water protection zoning district along Bisbee Road, and a water supply protection area in the southeastern part of town, within the Connecticut River watershed, for the City of Northampton.

## **Forests**

Chesterfield is unique for the vast acreage of forest that paints the landscape. Most of Chesterfield is covered with second- and third-growth floodplain and northern hardwood forests. The main forest type is northern hardwood forest, also known as “transition forest”, with eastern hemlock as the dominant canopy tree. The understory consists primarily of striped maple, hobblebush, nannyberry, and mountain laurel. Spring wildflowers such as trillium, lady's slipper, cowslip, meadowsweet, and various ferns carpet the forest floor. Smith Pyramid and Chesterfield Gorge are popular places to explore this type of forest. Page Brook, located where Dead Swamp runs into Dead Branch, has a transition forest of hemlock, yellow birch, and maple along its stream banks.

Floodplain forests, which occur where forty or more square miles of watershed drain into the lower reaches of a river, are one of the rarest natural communities, and can be found along the Westfield River. The state-protected Gilbert Bliss State Forest includes the largest floodplain forest in Chesterfield. This large and continuous block of forest provides recreational opportunities for hikers, cross-country skiers, hunters, and snowmobilers.

## **Development in Hazard Areas**

Some hazards identified in this plan are regional risks and, as such, all new development falls into the hazard area. The exception to this is flooding. According to the Community Information System (CIS) of FEMA, there was 1 structure (and one NFIP policy) located within the Special Flood Hazard Area (SFHA) in Chesterfield as of January 2016. There are two other policies in Chesterfield outside of the SFHA. Flood policies in town total \$505,500. There has been one flood claim since 1978, totaling \$10,525. There are no repetitive loss properties in Chesterfield. The local Hazard Mitigation committee considered new development in Chesterfield since the last Hazard mitigation plan was approved, and has determined that no new development has changed the Town's vulnerability to natural hazards.

## **National Flood Insurance Program (NFIP)**

The National Flood Insurance Program produces maps that identify floodways across America. Chesterfield is a participating member of the National Flood Insurance Program, and had the following NFIP policy and claim statistics as of January 2016:

- Flood Insurance Maps (FIRMs) are used for flood insurance purposes and are on file with the Chesterfield Town Clerk.
- FIRMs have been effective since August 15, 1989 with the current map in effect since August 15, 1989.



- Chesterfield has three in-force policies in effect for a total of \$505,500 worth of insurance.

There has been one flood claim since 1978, totaling \$10,525.

- As of 2016, there are no Repetitive Loss Properties in Chesterfield.
- The Town will maintain compliance with the NFIP throughout the next 5-year Hazard Mitigation Planning cycle by monitoring its Flood Plain Overlay District.

## 3 – HAZARD IDENTIFICATION & RISK ASSESSMENT

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

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

### **Natural Hazard Analysis Methodology**

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This chapter examines the hazards in the Massachusetts State Hazard Mitigation Plan that are identified as likely to affect Chesterfield. 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 Chesterfield are: floods, severe snowstorms/ice storms, hurricanes, severe thunderstorms / wind / tornadoes, wildfire/brushfire, earthquakes, dam failure, drought, and extreme temperatures. 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 wildfires. Classifications are based on the area that would potentially be affected by the hazard, on the following scale:

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

### Extent

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, duration, and speed of onset.

### Previous Occurrences

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

### Probability of Future Events

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

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

## Impact

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

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

## Vulnerability

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

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

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

## Hazard Identification and Analysis for Chesterfield

Type of Hazard	Location of Occurrence	Probability of Future Events	Impact	Vulnerability
Floods	Low	Moderate	Limited	4 – Low Risk
Severe snowstorms / Ice storms	Large	High	Critical	1 – Highest risk
Hurricanes	Large	Moderate	Critical	3 – Medium risk
Severe thunderstorms / wind	Large	Moderate	Critical	2 – High risk
Tornadoes	Medium	Low	Critical	4 – Low risk
Wildfires / brushfires	Small	Low	Minor	4 - Low risk
Earthquakes	Large	Low	Critical	4 – Low risk
Dam failures	Medium	Very Low	Critical	5 – Lowest risk
Drought	Large	Low	Minor	5 – Lowest risk
Extreme Temperatures	Large	High	Minor	4 – Low risk

*Source: Adapted from FEMA Local Hazard Mitigation Planning Handbook (March 2013) Worksheet 5.1; Town of Holden Beach North Carolina Community-Based Hazard Mitigation Plan, July 15, 2003 and the Massachusetts Emergency Management Agency (MEMA).*

## Floods

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### Hazard Description

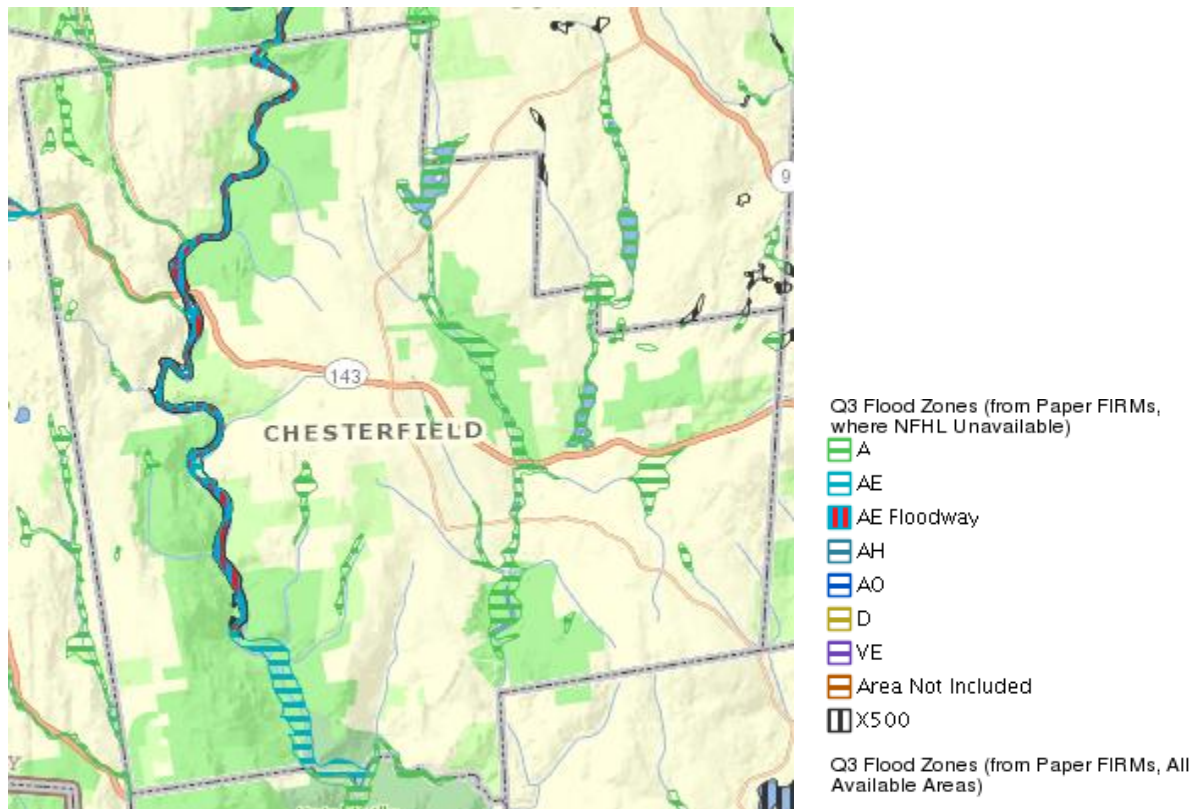
There are three major types of storms that can generate flooding in Chesterfield:

- 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.

The Floodplain Map for the Town of Chesterfield shows the 100-year and 500-year flood zones identified by FEMA flood maps. The 100-year flood zone is the area that will be covered by water as a result of a flood that has a one percent chance of occurring in any given year. Likewise, the 500-year flood has a 0.2 percent chance of occurring in any given year. In Chesterfield, there are several floodplain areas – primarily along the Westfield River in the western side of Town, and along the Dead Branch Brook, east of the town center. In addition, there are some smaller floodplains mapped in low-lying areas throughout Chesterfield, like Wilder Swamp and Dead Swamp, as well as along Tower Brook and West Falls Branch, two tributaries flowing into the Westfield. Furthermore, there are some level stretches along Dead Branch Brook that could potentially flood very wide, especially around Long Pond and Fisk Meadow.

**FIGURE: Chesterfield FEMA 100-year and 500-year Flood Zones**



Source: MassGIS FEMA FIRM Maps 1980

## Location

The percentage of the town impacted by flooding is estimated to be “low,” or from 10 percent to 50 percent, though there is potential for annual flood incidents in Chesterfield. There are approximately 1,058 acres of land within the FEMA mapped 100-year floodplain and 63 acres of land within the 500-year floodplain within the Town of Chesterfield.

## 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 Chesterfield and surrounding areas in western Massachusetts is 53 inches.

### **Previous Occurrences**

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The major floods recorded in Western Massachusetts during the 20th century have been the result of rainfall alone or rainfall combined with snowmelt. Flooding along the Westfield River was historically a problem in Chesterfield. Over the years, floods have destroyed several of the mills along the river, but flooding does not currently threaten homes due to land protection along the river.

Various parts of Chesterfield have had issues with localized flooding, described below:

#### Route 143 (Main Road), 1 Mile west of the Williamsburg/Chesterfield Town Line

Approximately two structures<sup>1</sup> could be affected by a flood incident. This area is within a FEMA mapped 100-year flood zone, and there is a past record of flooding in this area. There is an annual potential for flooding in the floodplain from both spring runoff and heavy summer/fall rains, in addition to potential for damage to the Main Road (Route 143) surface area.

#### Willicutt Road

There are 8 structures located in this area that have been affected or could be affected by a flood incident. This area is not within a FEMA mapped 100-year flood zone. In 2003, heavy rains caused flooding in this area; one structure was affected with minor damage. There is potential for flooding due to heavy rains and runoff, in addition to potential for damage to the road surface.

#### Fuller Road

There are 9 structures located in this area that have been affected or could be affected by a flood incident. This area is not within a FEMA mapped 100-year flood zone. In 2003, heavy

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<sup>1</sup> Determined through the use of aerial photography from MassGIS



rains caused flooding in this area; one structure was affected with minor damage. There is potential for flooding due to heavy rains and runoff, in addition to potential for damage to the road surface.

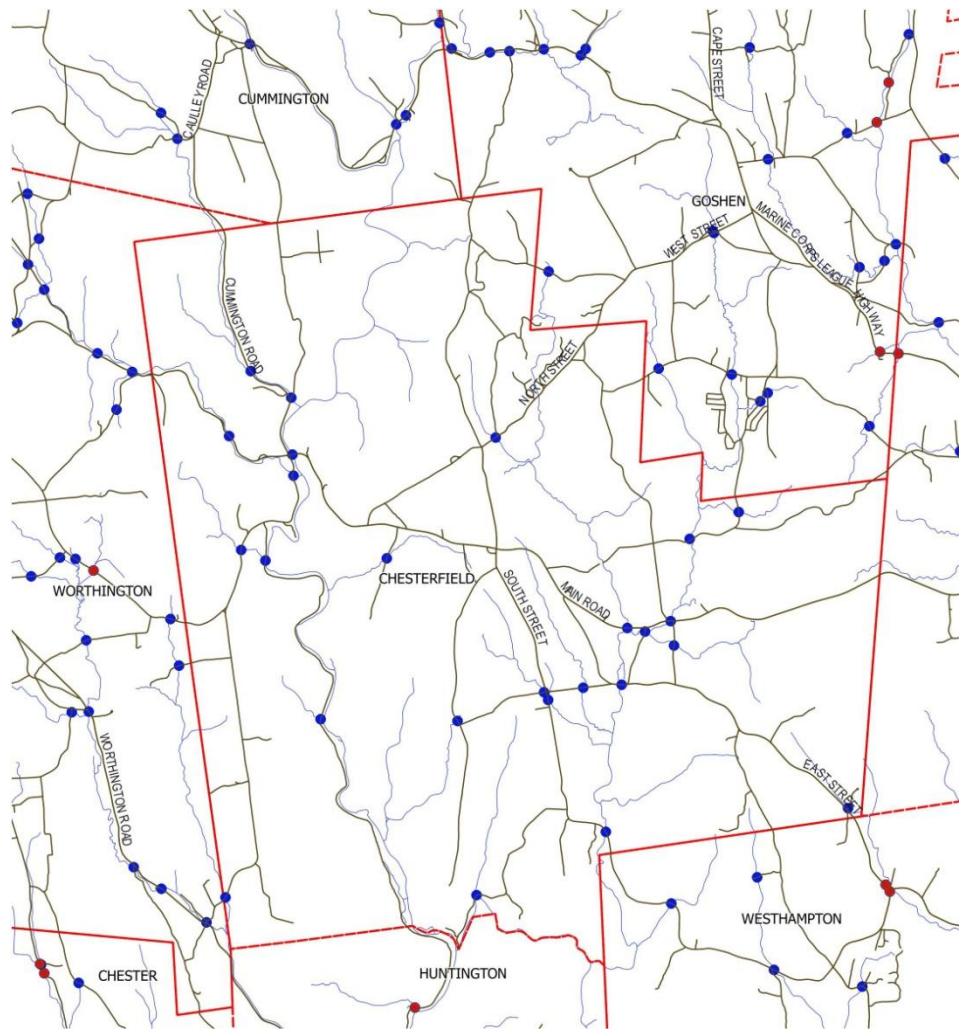
#### Main Road, West Chesterfield to Worthington Town Line

In 2005, an unusual weather system stalled over northern portions of Worthington and western portions of Cummington. This storm dropped several inches of rain in this isolated area in a relatively short span of time (2-3 hours). This rain event caused the water level in West Branch Brook a.k.a. Stevens Brook, which meanders along Main Road from the town line to the Westfield River, to rise very quickly and high enough where evacuations were ordered for several houses along the stream. Fortunately, only minor structural damage to one structure was noted during follow-up inspections. While a similar storm has not happened since, a re-occurrence is possible.

#### Undersized Culverts

Undersized culverts on South Street, Damon Pond Road, and Monson Road experience flooding in high-rainfall events. Most recently, these areas experienced flooding during Tropical Storm Irene in 2011.

The map below identifies the locations of all culverts in the Town of Chesterfield, which were assessed in the summer of 2015 by the Westfield River Wild & Scenic Committee as part of the North Atlantic Aquatic Connectivity Collaborative's stream continuity project ([www.streamcontinuity.org](http://www.streamcontinuity.org)). This culvert assessment program represents a significant resource/capability for the town, as future design or replacement of culverts that experience repetitive flooding can take this assessment data into account and create ecological and economic co-benefits.



## Chesterfield Culverts

- Stream Continuity Culverts 2011
- Top 5 % Ecologically Sensitive Culverts
- Major Roads
- Streams

### Chesterfield Culvert Road Crossings

Source: University of Massachusetts Stream Continuity Project 2011 <<https://streamcontinuity.org/index.htm>>

## Tropical Storm Irene

The large amounts of rainfall produced by Tropical Storm Irene in 2011 resulted in flooding on Cummington Road (1000' feet north of Route 143) due to the Westfield River. Bofat Hill Road also flooded. The Westfield River Bridge was also close to washing away, threatening to cut off a substantial portion of the town and the ability of residents to commute to their jobs.

## **Probability of Future Events**

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Based upon previous data, it is likely that there is a “moderate” chance of flooding, with a 10 to 40 percent probability in the next year. Now that most of the land along the river is protected and undeveloped, flooding has less potential to damage structures and is, therefore, less of a concern for the town. Along the brooks and rivers of Chesterfield, much of the land is subjected to flooding, not just wetlands. Areas within the flood plain that are disturbed, developed, or filled could alter the water-holding capacity, which essentially sends flooding further beyond the boundary lines, damaging buildings, roads and potentially redirecting the course of the rivers and streams. Chesterfield’s zoning bylaw includes a flood plain district for this reason.

## **Impact**

The impact to the town from floods is estimated to be “limited,” with more than 10 percent but less than 25 percent of property in affected areas damaged or destroyed. Utilizing the Town’s median home value of \$254,200, flooding could result in approximately \$14,336,880 to \$71,684,400 of damage. Given the current estimated household size of 2.69 people, approximately 272 people would be affected by a 100-year flood. In addition, the cost of repairing or replacing the roads, bridges, utilities, and contents of structures is significant, but cannot be estimated with sufficient accuracy for this plan.

## **Vulnerability**

Based on the above analysis, Chesterfield faces a vulnerability of “4 – low risk” from flooding.

## **Severe Snowstorms/Ice Storms**

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### **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 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.

### **Location**

The entire Town of Chesterfield is susceptible to severe snowstorms, making the location of occurrence from this hazard “large.” Because these storms occur regionally, they would impact the entire town.

### **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 was not used for the October 2008 ice storm, but 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 Index, or “SPIA Index” – Copyright, February, 2009**

ICE DAMAGE INDEX	* AVERAGE NWS ICE AMOUNT (in inches) *Revised-October, 2011	WIND (mph)	DAMAGE AND IMPACT DESCRIPTIONS
<b>0</b>	< 0.25	< 15	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
<b>1</b>	0.10 – 0.25	15 - 25	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
	0.25 – 0.50	> 15	
<b>2</b>	0.10 – 0.25	25 - 35	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
	0.25 – 0.50	15 - 25	
	0.50 – 0.75	< 15	
<b>3</b>	0.10 – 0.25	> = 35	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days.
	0.25 – 0.50	25 - 35	
	0.50 – 0.75	15 - 25	
	0.75 – 1.00	< 15	
<b>4</b>	0.25 – 0.50	> = 35	Prolonged & widespread utility interruptions with extensive damage to main distribution feeder lines & some high voltage transmission lines/structures. Outages lasting 5 – 10 days.
	0.50 – 0.75	25 - 35	
	0.75 – 1.00	15 - 25	
	1.00 – 1.50	< 15	
<b>5</b>	0.50 – 0.75	> = 35	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.
	0.75 – 1.00	> = 25	
	1.00 – 1.50	> = 15	
	> 1.50	Any	

(Categories of damage are based upon combinations of precipitation totals, temperatures and wind speeds/directions.)

**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 snowfalls 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. Note that during the last 10 years (since 2005), there have been 21 storms (16 of which occurred since 2011) that merited a “notable” rating or greater, whereas there were only 10 rated storms during the decade 1958 to 1968, and 13 rated storms between 1978 and 2003.

In Chesterfield, an ice storm in December 2008 caused significant damage and disruptions for a full week. One inch of ice and high winds led to impassable roads, which meant all emergency

response was conducted on foot. Power was lost for an entire week, and there were numerous tree falls on houses.

The October 2011 snowstorm resulted in 30” of snow in Chesterfield. In part due to the previous 2008 ice storm, and the fact that most of the trees were already defoliated for winter (unlike areas in the Connecticut River valley below), there were fewer instances of tree falls. The largest disruption was due to road clearing. Power was not lost.



Winter Storms Producing Over 10 inches of Snow in the Pioneer Valley, 1958-2015			
Date	NESIS Value	NASIS Category	NESIS Classification
1958-02-14	6.25	4	Crippling
1958-03-18	3.51	2	Significant
1960-03-02	8.77	4	Crippling
1960-12-11	4.53	3	Major
1961-01-18	4.04	3	Major
1961-02-02	7.06	4	Crippling
1964-01-11	6.91	4	Crippling
1966-01-29	5.93	3	Major
1966-12-23	3.81	2	Significant
1967-02-05	3.50	2	Significant
1969-02-08	3.51	2	Significant
1969-02-22	4.29	3	Major
1969-12-25	6.29	4	Crippling
1972-02-18	4.77	3	Major
1978-01-19	6.53	4	Crippling
1978-02-05	5.78	3	Major
1982-04-06	3.35	2	Significant
1983-02-10	6.25	4	Crippling
1987-01-21	5.40	3	Major
1993-03-12	13.20	5	Extreme
1994-02-08	5.39	3	Major
1995-02-02	1.43	1	Notable
1996-01-06	11.78	5	Extreme
1997-03-31	2.29	1	Notable
2000-01-24	2.52	2	Significant
2000-12-30	2.37	1	Notable
2003-02-15	7.50	4	Crippling
2005-01-21	6.80	4	Crippling
2006-02-12	4.10	3	Major
2007-02-12	5.63	3	Major
2007-03-15	2.54	2	Significant
2009-03-01	1.59	1	Notable
2010-02-23	5.46	3	Major
2010-12-24	4.92	3	Major
2011-01-09	5.31	3	Major
2011-01-26	2.17	1	Notable
2011-02-01	5.30	3	Major
2011-10-29	1.75	1	Notable
2013-02-07	4.35	3	Major
2013-03-04	3.05	2	Significant
2013-12-13	2.95	2	Significant
2013-12-30	3.31	2	Significant
2014-02-11	5.28	3	Major
2014-11-26	1.56	1	Notable
2014-12-09	1.49	1	Notable
2015-01-25	2.62	2	Significant
2015-01-29	5.42	3	Major
2015-02-08	1.32	1	Notable

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

## **Probability of Future Events**

Based upon the availability of records for Hampshire County, the likelihood that a severe snowstorm will hit Chesterfield is “high,” or between 40 and 70 percent.

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 to the town is estimated to be “critical,” with more than 25 percent of property in affected areas 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, \$143,368,800 is used. An estimated 20 percent of damage would occur to at least 25 percent of structures, resulting in a total of \$7,168,440 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, Chesterfield’s vulnerability from snowstorms and ice storms is “1 – Highest Risk.”

## **Hurricanes**

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### **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 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**

Chesterfield's location in Western Massachusetts reduces the risk of extremely high winds that are associated with hurricanes. The town has experienced small blocks of downed timber and uprooting of trees onto structures. The location of occurrence is "large," from 40 percent to 70 percent of the town affected.

### **Extent**

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

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

Source: National Hurricane Center, 2012

### Previous Occurrences

Hurricanes that have affected the Pioneer Valley are shown in the following table (“Super Storm Sandy” in 2012 was not considered a hurricane or tropical storm, as it did not meet the meteorological criteria for having a warmer temperature at its core; nonetheless, the storm was significant in Chesterfield.)

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

### **Probability of Future Events**

Chesterfield'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. The probability of future events is estimated to be "moderate," or between 10 and 40 percent 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. The impact of hurricanes to the Town is estimated to be "critical," with more than 25 percent and up to 50 percent of property in the affected area damaged or destroyed.

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		

In the event of a tropical storm or hurricane, the greatest risk to Chesterfield will be flooding of the Westfield River, which has, historically, been a problem in the Town. Wind damage will be limited, but widely spread, perhaps including downed power and communications lines; the town's transportation infrastructure and evacuation routes could also be impacted.

For most hurricanes or severe wind events, the town has experienced small blocks of downed timber and uprooting of trees onto structures. Using a total value of all structures in town of \$143,368,800, and an estimated wind damage of 5 percent to all structures with 10 percent damage to each structure, an estimated \$716,844 damage would occur. Estimated flood damage to 10 percent of the structures with 20 percent damage to each structure would result in \$2,867,376 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, Chesterfield faces a vulnerability of “3 – Medium Risk” from hurricanes.

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

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### **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.

According to the National Weather Service, microbursts are downdrafts in thunderstorms (<http://www.srh.noaa.gov/ama/?n=microbursts>, accessed Feb. 18, 2016). Wind speeds up to 150 miles per hour are possible in microbursts, though their impact area may be less than 2.5 miles in diameter.

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



## Location

As per the previous Chesterfield Hazard Mitigation Plan, the town is at some risk of high winds, severe thunderstorms, and tornadoes, though Worcester County and areas just to the west have been dubbed “tornado alley” and have seen the majority of the state’s tornado activity. The location of occurrence for thunderstorm/severe wind hazards is “large,” or more than 50 percent of the town affected. The location of occurrence for tornadoes is “medium,” or 10 to 50 percent of the town affected.

## Extent

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

**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>

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

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

**Previous Occurrences**

Microbursts and tornadoes are not uncommon in the region, and they are expected to become more frequent and more violent as the earth’s atmosphere warms, due to predictions of climate change from global warming. In the last fifty years, one known tornado has touched down in Chesterfield, and there have been several high-wind storms and hail events. There have been nine (9) incidents of tornado activity (F3 or less) in Hampshire County from 1954 to 2006.

Thunderstorms and high winds affect Chesterfield fairly regularly. While municipal records of storms are not kept, the National Weather Service compiles such data on a statewide basis, which is included in the Massachusetts Hazard Mitigation Plan. According to the most recent update of this plan, there are approximately 10 to 30 days of thunderstorm activity in the state each year.

There are typically 1 to 3 tornadoes somewhere in southern New England per year. Most occur in the late afternoon and evening hours, when the heating is the greatest. The most common

months are June, July, and August, but the Great Barrington, MA tornado (1995) occurred in May and the Windsor Locks, CT tornado (1979) occurred in October.

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

A microburst incident occurred in 2005 in the Damon Pond area, resulting in structural damage to one house caused by destruction of several large white pine trees adjacent to the house. A microburst also occurred in 2006 on East Street that resulted in tree damage.

### 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. Hampshire County has a higher tornado index value than Massachusetts as a whole.

Tornado Index for Hampshire County	
<b>Hampshire County</b>	125.73
<b>Massachusetts</b>	87.60
<b>United States</b>	136.45

Source: USA.com

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

As per the Massachusetts Hazard Mitigation Plan, there are approximately 10 to 30 days of thunderstorm activity in the state each year. State thunderstorm data is the best data available for thunderstorms in Chesterfield.

Based upon the available historical record, it is reasonable to estimate that there is a “moderate” occurrence of severe thunderstorms and wind, and “low” occurrence of tornadoes affecting the town in any given year.

## **Impact**

The potential for locally catastrophic damage is a factor in any tornado, severe thunderstorm, or wind event. 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; however, most buildings in the Town of Chesterfield 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.

Like earthquakes, the location and extent of potential damaging impacts of a tornado are completely unpredictable. Most damage from tornadoes comes from high winds that can fell trees and electrical wires, generate hurtling debris and, possibly, hail.

The estimated impact from a severe thunderstorm, wind, or tornado is "critical," with over 25% percent but less than 50% of property in the affected area damaged or destroyed.

Using a total value of \$143,368,800 of all structures in Chesterfield, and an estimated 25 percent of structures damaged each by 20 percent, yields a total damage of \$7,168,440. This estimate does not include building contents, land values or damages to utilities.

## **Vulnerability**

Based on the above assessment, Chesterfield's vulnerability to severe thunderstorms and wind is "2 – High Risk." Chesterfield's vulnerability to tornadoes is "4 – Low Risk."

## **Wildfire / Brushfire**

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### **Hazard Description**

Wildland fires 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 wildland fires 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 wildland fires:

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

### **Location**

Hampshire County has approximately 252,000 acres of forested land, which accounts for 71 percent of total land area. Forest fires are therefore a potentially significant issue. In Chesterfield, approximately 88 percent of the town's total land area is in forest, and is therefore at risk of fire. However, due to various factors including climate, response times, etc., the location of occurrence for wildfires/brushfires is deemed "small."

### **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.

Much of Chesterfield's acreage is forested and is therefore at risk of fire. Certain forested areas of Chesterfield are remote and rugged, which would make fighting a wildfire difficult. However, Hampshire County receives more than 49 inches of annual rainfall, which makes wildfires uncommon in the county. Nevertheless, in drought conditions a brushfire or wildfire would be a matter of concern.

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

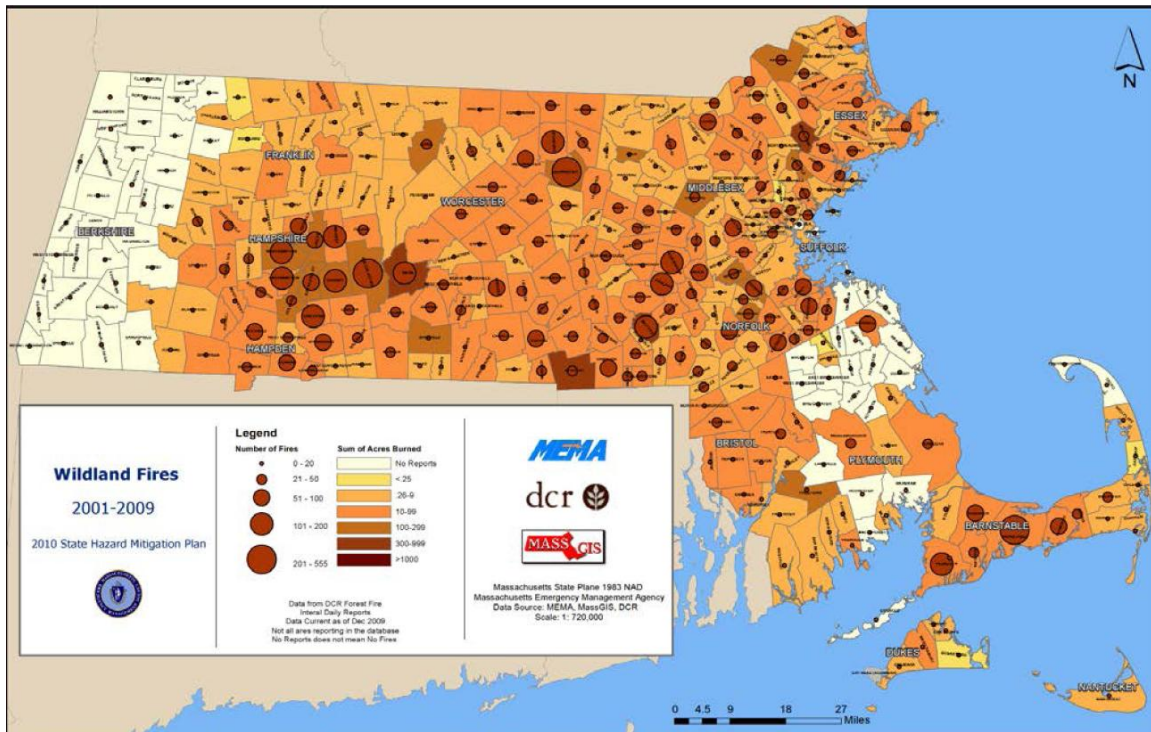
## Previous Occurrences

Chesterfield is protected by an all-volunteer fire department. While wildland fires have not been a significant problem in Chesterfield, there is always a possibility that changing land use patterns and weather conditions will increase a community's vulnerability. On average, there are about five brush fires per year in Chesterfield as reported by the Fire Chief, and in 2013 (year of latest available data) there were 21 fires in the Town as identified in the Fire Incident Reporting System, though none of them were severe weather or natural disaster related. Burn permits for the Town are issued from the Chesterfield Fire Department.

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 Lithia Springs Watershed
- 2001 – Ware, 400 acres burned
- 2010 – Russell, 320 acres burned on Mt. Tekoa
- 2012 – Eastern Hampden County, dry conditions and wind gusts created a brush fire in Brimfield, and burned 50 acres

## Wildland Fires in Massachusetts, 2001-2009



Source: Massachusetts Hazard Mitigation Plan

### Probability of Future Events

In accordance with the Massachusetts Hazard Mitigation Plan, the Town Hazard Mitigation Workgroup 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 Hazard Mitigation Workgroup identified the likelihood of a future wildfire to be “low,” or between 1 to 10 percent 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 could promote high-elevation wildfires, releasing stores of carbon and further contributing to the buildup of greenhouse gases. Forest response to increased atmospheric carbon dioxide—the so-called “fertilization effect”—could also contribute to more tree growth and thus more fuel for fires, but the effects of carbon dioxide on mature forests are still largely unknown.

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

## **Impact**

The estimated impact from wildfires was determined to be “minor,” with minor property damage and minimal disruption to quality of life for town residents. Using a total value of \$143,368,800 of all structures in Chesterfield, and an estimated one percent of structures damaged each by 50 percent, an estimated damage due to wildfires is \$716,844. This estimate does not include building contents, land values or damages to utilities.

## **Vulnerability**

Based on the above assessment, Chesterfield faces a vulnerability of “4 – Low Risk” from wildfires.



## Earthquakes

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### 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>2</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>3</sup>

### Location

Because of the regional nature of the hazard, the entire town is susceptible to earthquakes. This means that the location of occurrence of this hazard is "large," with more than 50 percent of the town 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 an earthquake that causes almost complete destruction.

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

<sup>3</sup> Federal Emergency Management Agency Web site: [www.fema.gov/hazards/earthquakes/quake.shtm](http://www.fema.gov/hazards/earthquakes/quake.shtm).

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

Modified Mercalli Intensity Scale 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: U.S. Federal Emergency Management Agency

## Previous Occurrences

No historical earthquake events that had recorded magnitudes of 3.5 or above have been found in or near the Town of Chesterfield or in Hampshire County. There are fault lines running through the New England area, and in the below table are documented earthquake events over the last 300+ years. The below earthquakes had little to no impact on Chesterfield.

Largest Earthquakes to Affect Chesterfield Since 1924		
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

New England States Record of Historic Earthquakes		
State	Years of Record	Number Of Earthquakes
Connecticut	1668 - 2007	137
Maine	1766 - 2007	544
Massachusetts	1668 - 2007	355
New Hampshire	1638 - 2007	360
Rhode Island	1776 - 2007	38
Vermont	1843 - 2007	73
New York	1840 - 2007	755
Total Number of Earthquakes within the New England states between 1638 and 2007 is 2,262		

Source: Northeast States Emergency Consortium

## 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 and 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 for Chesterfield, as shown in the table below.

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

Based upon existing records, the probability of future earthquakes is “low,” or 1 to 10 percent probability 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.

The impact to the town from a significant earthquake is considered “critical,” with more than 25 percent of property in affected areas damaged or destroyed.

Structures in Chesterfield are mostly of wood frame construction. Assuming a total value of all structures in town of \$143,368,800, an estimated loss of at least 25 percent of structures in town, and a 100 percent loss of those structures, an earthquake would result in \$35,842,200 worth of damage. The costs of repairing or replacing roads, bridges, power lines, telephone lines, or the contents of the structures are not included in this estimate.

## Vulnerability

Based on the above analysis, Chesterfield’s vulnerability from an earthquake is “4 – Low Risk.”

## Dam Failure

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### Hazard Description

Dams 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 failure is not a common occurrence, but dams do represent a potentially disastrous hazard. When a dam fails, the potential energy of the stored water behind the dam is released rapidly. Most dam failures occur when floodwaters above overtop and erode the material components of the dam. Often dam 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). Dams not meeting those criteria are considered “non jurisdictional.” 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

DCR identifies seven (7) dams in Chesterfield. Below is the latest dam inspection and ownership data for Chesterfield as provided by the Office of Dam Safety in the fall of 2015:

Dam Name	Primary Owner	Hazard Potential	Date of Most Recent Formal Phase I Assessment	Condition	Dam Purpose	Regulatory Authority
Bisbee Mill Dam #1 (off Bisbee Road)	No Record for Privately Owned Non-Jurisdictional Dam	N/A				Non-Jurisdictional
Bisbee Mill Dam #2	No Record for Privately Owned Non-Jurisdictional Dam	N/A				Non-Jurisdictional
Bisbee Mill Pond Dike	No Record for Privately Owned Non-Jurisdictional Dam	N/A				Non-Jurisdictional
Damon Pond Dam	Lake Damon Corporation	Low Hazard	10/31/2009	Fair	Recreation	Office of Dam Safety
Healey's Pond Dam	No Record for Privately Owned Non-Jurisdictional Dam	N/A				Non-Jurisdictional
Little Galilee Pond Dam (Ireland Street)	No Record for Privately Owned Non-Jurisdictional Dam	N/A				Non-Jurisdictional
Oleksak Farm Pond (Bryant Street)	No Record for Privately Owned Non-Jurisdictional Dam	N/A				Non-Jurisdictional
Scout Pond Dam	Western Massachusetts Council, Inc., Boy Scouts of America	Low Hazard	8/3/2009	Satisfactory	Recreation	Office of Dam Safety
Donovan's Pond Dam (Ireland Street)	* not listed with DCR, checking on why					

The location of occurrence of this hazard is determined to be “medium,” with 10 to 50 percent of the town affected.

## Extent

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

## Dam Failure

The Massachusetts Department of Conservation and Recreation (MA DCR) was the agency responsible for regulating dams in the state (M.G.L. Chapter 253, Section 44 and the implementing regulations 302 CMR 10.00). Until 2002, DCR was also responsible for conducting dam inspections but state law was then changed to place the responsibility and cost for inspections on the owners of the dams. The Office of Dam Safety, under DCR, is the regulating agency for non-federal and non-private dams.

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.

The inspection schedule for dams is as follows:

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

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

While there are no significant concerns with dams presently in Chesterfield, the integrity of one dam on Damon Pond Road is at risk due to an adjacent failing culvert. The impact of a dam

failure due to culvert collapse would be the flooding of the town's primary ambulance and mutual aid route, rendering the route impassible for several days. It is also important to consider and plan for the potential critical failure of dams upstream in Cummington, Worthington, or Goshen – although none of these upstream dams are of high hazard.

### **Previous Occurrences**

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

### **Probability of Future Events**

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 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.

The likelihood of a dam failure in Chesterfield is considered to be "very low," with a less than 1 percent chance of a dam failing in any given year.

### **Impact**

The impact from a dam failure is estimated to be "critical," with more than 25% of property in the affected area damaged or destroyed and a shutdown of facilities for more than 1 week.

### **Vulnerability**

Based on this analysis, Chesterfield faces a vulnerability of "5 — Lowest Risk" from dam failure.



## **Drought**

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### **Hazard Description**

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

### **Location**

Because of this hazard's regional nature, a drought would impact the entire Town. This means that the location of occurrence is "large," with more than 50 percent of the Town affected.

### **Extent**

The severity of a drought would determine the scale of the event and would vary among Town residents based on the sources of their private wells.

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

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

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

### Previous Occurrences

In Massachusetts, six major droughts have occurred statewide since 1930.<sup>4</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:

<sup>4</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.

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

Source: US Drought Monitor

Chesterfield has not been impacted by previous droughts in the state.

### Probability of Future Events

In Chesterfield, as in the rest of the state, the probability of a future event is “low,” with between a 1 and 10 percent chance of occurring in any given year. Chesterfield has no recent history (50 years+) of severe drought conditions impacting the community.

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.

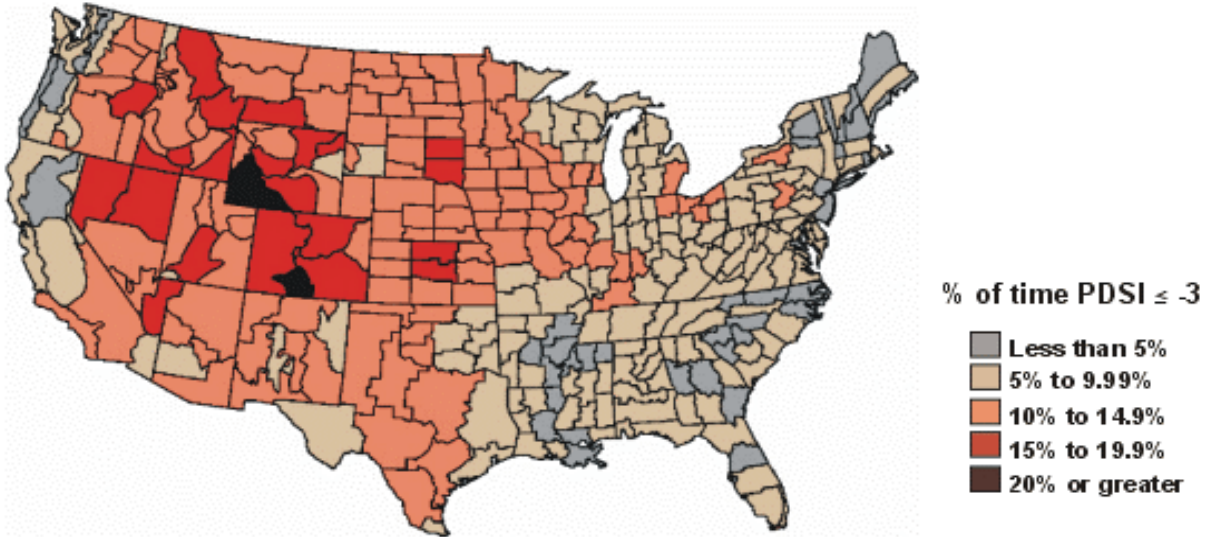
When evaluating the region’s risk for drought on a national level, utilizing a measure called the Palmer Drought Severity Index, Massachusetts is historically in the lowest percentile for severity and risk of drought.<sup>5</sup> However, global warming and climate change may have an effect on drought risk in the region. With the projected temperature increases, some scientists think that the global hydrological cycle will also intensify. This would cause, among other impacts, the potential for more severe, longer-lasting droughts.

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

# Palmer Drought Severity Index

1895–1995

Percent of time in severe and extreme drought



## Impact

The impact of a drought is considered to be “minor,” with only minor property damage and minimal disruption to quality of life to town residents. Due to the water richness of western Massachusetts, Chesterfield is unlikely to be adversely affected by anything other than a major, extended drought. While such a drought would require water saving measures to be implemented, there would be no foreseeable damage to structures or loss of life resulting from the hazard.

## Vulnerability

Based on the above assessment, Chesterfield’s vulnerability from drought is “5 – Lowest Risk.”

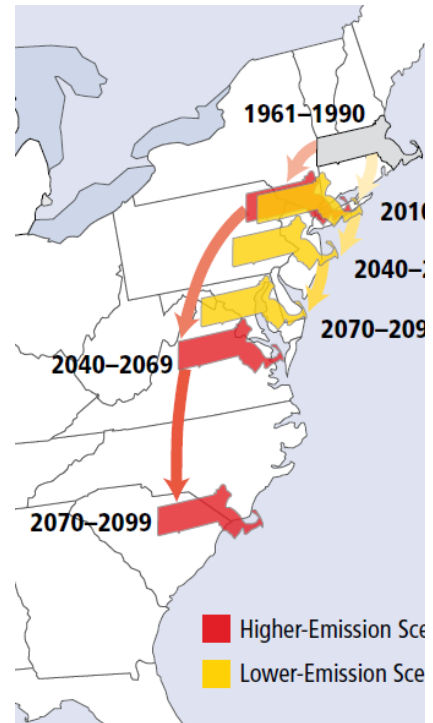
## Extreme Temperatures

### Hazard Description

Greater variation and extremes in local atmospheric temperatures due to global changes in climate are now among the natural hazards that this plan anticipates. Chesterfield 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.

### Anticipated Climatic Variation

In Western Massachusetts, annual precipitation is expected to increase by 14% by the end of the 21st century. However, most of this precipitation increase will come during the winter months – as much as 30% more than today – while summertime precipitation will actually decrease slightly. Also, most of the added winter precipitation is expected to be in the form of rain, rather than snow. This will mean a continuation of the current regional trend of a decreasing snowfall totals, as well as the number of days with snow cover on the ground, but more precipitation overall. The increased amount of strong precipitation events and overall increase in rainfall, combined with the aging stormwater infrastructure in the region, will likely result in more flooding in the region.



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

### Anticipated Climatic Variations for Massachusetts Due to Climate Change

Category	Current (1961-1990 avg.)	Predicted Change 2040-2069	Predicted Change 2070-2099
Average Annual Temperature (°F)	46°	50° to 51°	51° to 56°
Average Winter Temperature (°F)	23°	25.5° to 27°	31° to 35°

Average Summer Temperature (°F)	68°	69.5° to 71.5°	74° to 82°
Days over 90 °F	5 to 20 days	-	30 to 60 days
Days over 100 °F	0 to 2 days	-	3 to 28 days
Annual Precipitation	41 inches	43 to 44 inches	44 to 47 inches
Winter Precipitation	8 inches	8.5 to 9 inches	9 to 10.4 inches
Summer Precipitation	11 inches	10.9 to 10.7 inches	10.9 to 11 inches

Sources: Massachusetts Climate Adaptation Report 2011, NECIA

As per the Massachusetts Hazard Mitigation Plan, extreme cold is a dangerous situation 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. There is no universal definition for extreme temperatures, with the term relative to local weather conditions. For Massachusetts, extreme temperatures can be defined as those that are far outside the normal ranges. The average temperatures for Massachusetts are:

Winter (Dec-Feb) Average = 27.51°F

Summer (Jun-Aug) Average = 68.15°F

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

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

## Location

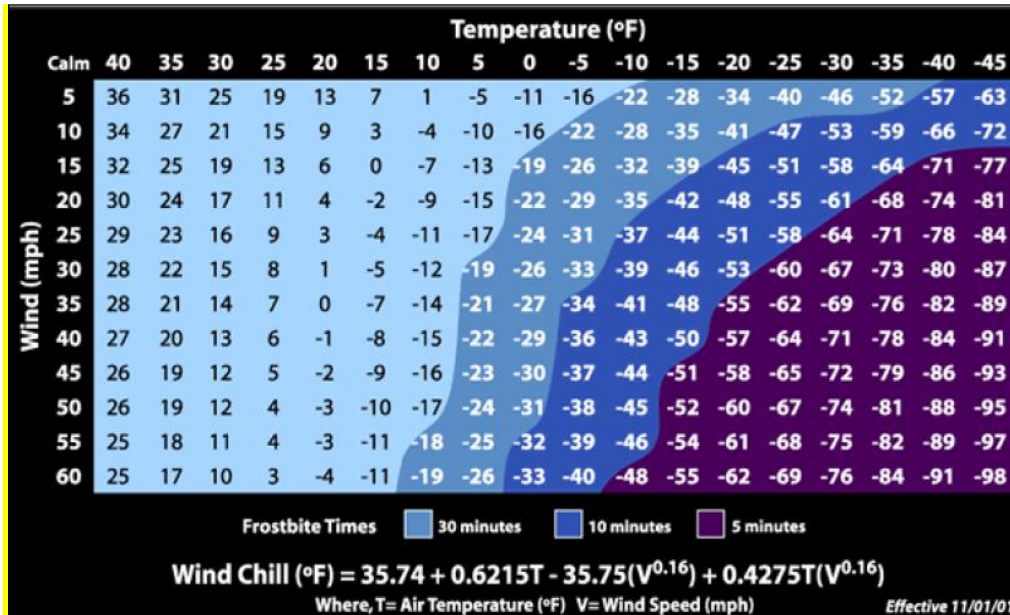
Any instances of extreme temperatures that have occurred in the past occurred throughout Chesterfield. Extreme cold or heat does not usually require the opening of comfort stations, though plans are in place if they are needed.

## Extent

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

Extreme temperatures would affect the whole community.

## Wind Chills



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

## *Heat Index*

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

### Previous Occurrences

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

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

In 2015, the Chesterfield Office of Emergency Management weather station recorded a temperature of -11°F.

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

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

In the summer of 2015, the Chesterfield Office of Emergency Management recorded a temperature of 96°F.



Extreme heat usually requires the opening of shelters on a few occasions per year. In the winters of 2014 and 2015, warming centers were opened for extremely cold temperatures due to the “polar vortex.”

### **Probability of Future Events**

The probability of future extreme heat and extreme cold is considered to be "high," or between 40 and 70 percent in any given year.

### **Impact**

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

### **Vulnerability**

Chesterfield’s vulnerability from extreme heat and cold is considered to be, "4 - Low Risk."

## **Other Hazards**

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

## 4: CRITICAL FACILITIES

### Facility Classification

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

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

The Critical Facilities List for the Town of Chesterfield has been identified utilizing a Critical Facilities List provided by the State Hazard Mitigation Officer. Chesterfield's Hazard Mitigation Workgroup 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

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

- 1. Emergency Operations Center**  
Davenport Town Offices – 422 Main Road  
Alternate EOC – Chesterfield Fire Station, 5 North Road
- 2. Fire Station**  
Chesterfield Fire Department – 5 North Road
- 3. Police Station**  
Davenport Town Offices/Police Department – 422 Main Road

**4. Highway Garage**

Town Highway Garage –164 Main Road

**5. Town Offices**

Chesterfield Town Offices/Police Department – 422 Main Road

**6. Mass Care Shelters and Reception Centers**

Mass Care Shelters:

New Hingham Regional Elementary School (primary shelter, shared with Goshen) – 30 Smith Road (capacity = 750)

Church of Christ – Main Road (Route 143) (capacity = 200)

Chesterfield Scout Reservation – 27 Sugar Hill Road (capacity = 400)

Reception Centers:

Chesterfield Community Center – 400 Main Road (capacity = 160)

**7. Primary Evacuation Routes**

Route 1 - East from center of town along Route 143 to Williamsburg

Route 2 - Southeast Area - East Street into Westhampton

Route 3 - South from center of town along South St to Westhampton

Route 4 - North from the center of town along North Road then right onto Damon Pond Road to Goshen

Route 5 - West from center of town along Route 143 to Worthington

Route 6 - North from Route 143 and West Chesterfield village along Cummington Road to Cummington

Route 7 - South from West Chesterfield village along Ireland Street to Worthington either via Partridge Road or Ireland Street

**8. Bridges Located on Evacuation Routes**

See Table 4-1 following “Category 3” and Critical Facilities Map at the back of plan

**Category 2 – Non Emergency Response Facilities**

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

**1. Hospitals**

Cooley Dickenson Hospital – 30 Locust Street, Northampton

**2. Water Supply**

New Hingham Regional Elementary School – 30 Smith Road

**3. Dry Hydrants - Fire Ponds - Water Sources**

Damon Pond  
Bisbee Pond Hydrant – East Street  
Dry hydrant on Route 143 – West Branch Brook (out of service as of 1/27/16)  
Numerous locations in Chesterfield, see Critical Facilities Map at back of Plan

**4. Transfer Station**

Chesterfield Transfer Station – Willicutt Road

**5. Communications**

Communication Tower (cell & microwave) – Shaw Ledges (Bofat Hill Road)  
Telephone Crossboxes:  
Verizon Switching Station – 2 Bryant Street

**6. Alternate Transportation Pickup Points**

First Congregational Church of Chesterfield (also known as United Church of Christ) –  
43 Main Road

**7. Transportation Resources**

Airport: Worthington Airstrip – Route 112, Worthington for emergency use only  
Helicopter Landing Sites: New Hingham Field – Ireland Street  
Judd’s Field – Bryant Street  
Ambulance (Primary): Highland Ambulance, Williams Drive, Goshen  
Ambulance (Secondary): Pioneer Valley Ambulance, Northampton  
Towing: Liebenow’s Garage, Old Route 9, Cummington  
Cichy’s Garage, 5 Main Street, Williamsburg

**8. Mortuary Facilities**

Child’s Funeral Home, 14 Kinsley Avenue, Haydenville  
Williamsburg Funeral Home, S. Main Street, Haydenville

**9. Emergency Food Storage/Goods Warehousing**

Chesterfield Town Hall – 405 Main Road, dry goods only  
New Hingham Regional Elementary School – 30 Smith Road

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

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The third category contains people and facilities that need to be protected in event of a disaster.

**1. Special Institutions**

Chesterfield Community Center – 400 Main Street

Father Freel Camp – Soaker Road  
Chesterfield Scout Reservation – 27 Sugar Hill Road

**2. Schools**

New Hingham Regional Elementary School – 30 Smith Road

**3. Daycare or Nursery**

Davenport Daycare at Hilltown CDC – 397 Main Road  
“Bonnie’s Program” – 30 Smith Road

**4. Historic Buildings/Sites**

The Town of Chesterfield has 218 locations designated as a National Historic Landmark, a National Registry of Historic Places Property, or a National Registry of Historic Places Area/District. A comprehensive list of these properties is available at the Massachusetts Cultural Resource Information System (<http://mhc-macris.net/macrisdisclaimer.htm>).

**5. Large Employment Centers**

Davenport Town Offices – 422 Main Road  
Hilltown Community Development Center – 397 Main Road  
Chesterfield Products – 11 Bofat Hill Road

**6. EPA Tier II Hazardous Materials Facilities**

Verizon Chesterfield Dial OFC (MA823307) – 2 Bryant Street

**Category 4 – Potential Resources**

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All resources for services and supplies related to food/water, hospitals/medical supplies, heating fuel, gas, building materials suppliers, heavy & small equipment suppliers, and gravel pits, are procured through existing town contracts with suppliers. Emergency animal services are supplied through the Hampshire Emergency Animal Response Team.

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

Hazard Type	Hazard Area	Critical Facilities Affected	Evacuation Routes Affected
Flooding (100-year Flood)	100-year Floodplain along East Branch of the Westfield River	Bridge at the intersection of Main Road (Route 143)/Cummington Road in West Chesterfield	Main Road (Route 143)
	100-year Floodplain Areas along Tower Brook	Culvert at the intersection of Tower Brook/Cummington Road in West Chesterfield  Bridge at the intersection of Tower Brook/Mount Road in West Chesterfield	None  None
	100-year Floodplain along West Falls Branch	Bridge and Dry Hydrant at the intersection of West Falls Branch/Main Road (Route 143) in West Chesterfield  Bridge at the intersection of West Falls Branch/Ireland Street in West Chesterfield	Main Road (Route 143)  None
	100-year Floodplain along Damon Pond	Culvert and Dry Hydrant at the intersection of Dead Branch/Damon Pond Road in Northeast Chesterfield	Damon Pond Road
	100-year Floodplain around Dead Swamp	2 beaver dams Located off Route 143 (Main Road), 1 mile west of the Williamsburg/Chesterfield Town Line	Main Road (Route 143)
	100-year Floodplain west of Soaker Road	Box culvert on Soaker Road	None
	100-year Floodplain associated with Scout Pond	Bridge just north of Scout Pond on Old Chesterfield Road	None
	100-year Floodplain along Dead Branch	Bridge at the intersection of Dead Branch/Main Road (Route 143)	Main Road (Route 143)

		<p>Bridge at the intersection of Dead Branch/Bisbee Road</p> <p>Bridge and Dry Hydrant at the intersection of Dead Branch/East Street</p> <p>3 Low Hazard Dams along Dead Branch</p>	<p>None</p> <p>None</p> <p>None</p>
Ice		<p>Bridge on East Street between Bisbee Road and Stage Road</p>	<p>Route 143 (main evacuation route)</p> <p>North Road/Damon Pond Road corridor (route to EMS provider)</p>

## 5: MITIGATION STRATEGIES

One of the steps of this Hazard Mitigation Plan is to evaluate all of the Town's existing policies and practices related to natural hazards and identify potential gaps in protection. After reviewing these policies and the hazard identification and assessment, the Town Hazard Mitigation Workgroup developed a set of hazard mitigation strategies it would like to implement.

### 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 / severe wind, hurricanes, tornadoes, wildfires/brushfires, earthquakes, dam failures, drought, and extreme temperatures.

For the extent of this analysis, the committee reviewed the following town documents:

- Zoning Bylaws
- Subdivision Rules and Regulations
- Comprehensive Emergency Management Plan
- Town Open Space and Recreation Plan



## **Overview of Chesterfield’s Mitigation Capabilities**

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An overview of the town’s capabilities underlying mitigation strategies for each of the hazards identified in this plan is as follows:

Chesterfield has many no cost or low cost hazard mitigation capabilities in place. These capabilities are deployed for hazard mitigation as appropriate. 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. Chesterfield also has appropriate staff dedicated to hazard mitigation-related work for a community of its size, including a Town Administrator, an Emergency Management Director, a professionally run Highway Department, a Building Inspector, and a Tree Warden. Chesterfield has recommended plans in place, including a Master Plan, and a Capitol Improvements Plan. The Town also has paid department staff and numerous volunteer committees and boards. Committees that support natural hazard mitigation capabilities include the Westfield Wild & Scenic Committee, which focuses on land protection related to the Westfield River watershed; the Emergency Planning Committee, which focuses on disaster planning and response coordination; the Conservation Commission; and the Capital Improvement Planning Committee, which prepares the immediate and 5-year Capital Improvement Budget. The Town’s ability to expand upon and improve the above capabilities is limited by volunteer availability and the Town’s budget restraints, but includes the potential to increase collaboration with state and federal landowners in Town as mitigation issues warrant.

The Town collaborates closely with surrounding communities and is party to Mutual Aid agreements through the MEMA. Chesterfield is also an active member community of the Hampshire Council of Governments and the Pioneer Valley Planning Commission (PVPC). Chesterfield can take advantage of no cost local technical assistance provided by the professional planning staff at the PVPC as needed for certain mitigation planning activities.

### **Capabilities by Hazard**

#### **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. First, land subject to flooding near the Westfield River is predominantly protected from development through fee-ownership or conservation restriction. Flood-related regulations and strategies are included in the town’s general bylaws, zoning by-law (including the Floodplain Protection District), and subdivision regulations. Infrastructure like dams and culverts are in place to manage the flow of water. The Town currently coordinates with the Westfield Wild & Scenic Committee on their project to inventory and assess all culverts in the

Westfield River watershed, including those in Chesterfield, for wildlife passage and general condition, which serves as a source of information about local culverts.

### **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. This occurs through the Emergency Planning Committee. 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. Tree trimming is also regularly carried out by the Town for municipally-owned trees and by Eversource for trees in the electric right-of-way.

### **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 can do significant damage – both due to flooding and severe wind.

The flooding associated with hurricanes can be a major source of damage to buildings, infrastructure and a potential threat to human lives. 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**

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. However, most of Chesterfield's building stock was built prior to current building codes, making structures in the town vulnerable to tornado damage. 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 through the issuance of permits.

## **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 – and in Chesterfield – 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. It 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 Massachusetts Department of Conservation and Recreation.

The Office of Dam Safety considers the following types of dams as “non-jurisdictional,” or not requiring inspections (registration may still be required):

- Any barrier not in excess of six feet in height, regardless of storage capacity, or
- Any barrier with storage capacity not in excess of 15 acre feet, regardless of height, or
- Any barrier with low hazard potential classification in the use of agriculture, or
- Any structure used to temporarily divert water on land in agricultural use (agricultural exemptions are found in 302 CMR 10.03 – Department of Conservation and Recreation).

Dams that are considered jurisdictional are required to be inspected according to their hazard potential. Hazard potentials are based on the potential consequences of a dam failure (loss of life and damage to property) and are not related to the current condition of the dam.

- High Hazard: Inspections required every two years
- Significant Hazard: Inspections required every five years
- Low Hazard: Inspections required every ten years

The completion of required inspections is the legal and financial responsibility of the dam owner.

### **Drought**

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

### **Extreme Temperatures**

Extreme temperatures are likely to become more common due to climate change. The impacts of extreme temperatures are often emergency response-related, such as the provision of heating or cooling centers during extreme temperature events. Other mitigation measures include increasing awareness of extreme temperature risk to health and properties and assisting vulnerable populations in extreme temperature events. Chesterfield already has partnerships in place with the Council on Aging to identify vulnerable residents.

## Existing Mitigation Capabilities

The Town of Chesterfield has a list of existing mitigation strategies that were in place prior to the development of the first Hazard Mitigation Plan in 2007, as well as a set of prioritized mitigation strategies to be pursued in the future. Strategies that were previously completed prior to 2007, or completed between 2007 and 2013, are listed below and noted under the “effectiveness” column. Strategies that were completed since the last version of the plan are listed in bold.

As part of the development of this plan update in 2015, the Hazard Mitigation Workgroup evaluated each mitigation strategy to determine its effectiveness and whether any improvements could be made.

Action Item Description	Hazards Mitigated	Area Covered	Effectiveness	Potential Changes
Work with neighboring communities to establish a Community Emergency Response Team (CERT).	All	Town wide	Not effective. Established regional medical reserve corps among 7 communities instead.	None.
Identify existing shelters that are earthquake resistant as well as outside of floodplain and inundation areas. Disseminate this information to appropriate Town departments.	All	Town wide	Effective	None. Complete.
Inventory supplies at existing shelters and develop a needs list and storage requirements. Establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster.	All	Regional	Very effective	Update to inventory supplies as needed as supplies are used.

Action Item Description	Hazards Mitigated	Area Covered	Effectiveness	Potential Changes
Examine current notification system including feasibility of Reverse 911. Develop a preliminary project proposal and cost estimate.	All	Town wide	Very effective	None.
Collect, periodically update, and disseminate information on which local radio stations provide emergency information, what to include in a 'home survival kit,' how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to follow during a natural disaster.	All	Town wide / Regional	Effective	Radio stations do this on their own. Add sheltering-in-place information and re-release online and as brochures. Continue other outreach online.
Implement standards in the Subdivision Rules and Regulations to require temporary and permanent erosion control measures for streams and surface water bodies.	Flooding	Town wide	Somewhat effective	None. Revised in 2008. Complete.
Add more specific requirements to address flood related issues in the Special Permit and Site Plan Approval provisions in the Chesterfield Zoning Bylaw including topographic change, removal of cover vegetation, risk of erosion or siltation and increased stormwater runoff.	Flooding	Town wide	Effective	Not much development in floodplain. Complete.
In regards to the Chesterfield Open Space and Recreation Plan, (OSRP) consider updating and implementing the Five-Year Action Plan strategies, particularly those dealing with protection of forests and farmland.	Flooding	Town wide	Somewhat effective	Update OSRP.
The Town should evaluate whether to become a part of FEMA's Community Rating System.	Flooding	Flood zones	Not (cost) effective	None.

Action Item Description	Hazards Mitigated	Area Covered	Effectiveness	Potential Changes
Participate in the creation of a Regional Debris Management Plan.	Flooding Severe Snow/Ice Hurricanes Tornadoes	Town wide	Not yet determined	None. Process is underway. Franklin County has created an accepted template that will be available for use by the end of 2016.
Identify all Pre-FIRM structures throughout Town that need to be elevated above the base-flood elevation.	Flooding	Flood plain	Somewhat effective	None.
Develop a priority list and seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town.	Flooding	Flood zones	Somewhat effective	Set up system to document culvert problems (both physical damage and financial cost).
Develop a plan for providing access to water, information, shelter, and food stores to people in remote locations in town in the event of a severe winter storm.	Severe Snow/Ice	Town wide	Effective	An informal plan exists. Fire Dept., EMD, Police, and Council on Aging are involved. Formalize plan. Fire Department to go door-to-door to identify vulnerable residents.
Develop and distribute an educational pamphlet on fire safety and prevention.	Wildfires / Brushfires	Town wide	Effective	None. Complete.
Consider amending the Subdivision Rules and Regulations Required Improvements section to include fire suppression provisions for new residential developments.	Wildfires / Brushfires	Town wide	Not effective. Too expensive to justify.	None.

Action Item Description	Hazards Mitigated	Area Covered	Effectiveness	Potential Changes
Evaluate all Mass Care Shelters and Reception Centers to determine if they are earthquake resistant.	Earthquakes	Town wide	Not effective. Shelters built prior to current earthquake standards.	None.
Ensure that all identified shelters have sufficient back-up utility service in the event of primary power failure.	Earthquakes	Town wide	Effective	Create a maintenance plan for back-up utility service (for any town-run shelters).
Identify sources of funding for dam safety inspections.	Dam Failure	Town wide	Effective	Explore if there is available funding, particularly loans for town-owned dams.
Prepare a Water Conservation Plan for the Town.	Drought	Town wide	Not effective	None.



## Deleted Mitigation Strategies

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Several mitigation strategies listed in the 2007 version of the Chesterfield Hazard Mitigation Plan have been removed in this 5-year update. Strategies were deleted for one of two reasons: 1) they have been determined as no longer useful for mitigating a hazard. 2) They have been determined to be over generalized and in need of being replaced by a more specific mitigation strategy.

Description	Hazards Mitigated	Responsible Agency	Reason for Deletion
Work with neighboring communities to establish a Community Emergency Response Team (CERT).	All	EMD	Little interest from neighboring towns and a regional medical reserve corps has already been established.
Identify existing shelters that are earthquake resistant as well as outside of floodplain and inundation areas. Disseminate this information to appropriate Town departments.	All	EMD	No need because shelters not built to standards.
Inventory supplies at existing shelters and develop a needs list and storage requirements. Establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster.	All	EMD Hampshire Regional EPC	To be revised. Original strategy completed through Western Regional Homeland Security Council.
Examine current notification system including feasibility of Reverse 911. Develop a preliminary project proposal and cost estimate.	All	EMD	Complete. Reverse 911 adopted.

Description	Hazards Mitigated	Responsible Agency	Reason for Deletion
Collect, periodically update, and disseminate information on which local radio stations provide emergency information, what to include in a 'home survival kit,' how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to follow during a natural disaster.	All	EMD Board of Health	To be revised.
Implement standards in the Subdivision Rules and Regulations to require temporary and permanent erosion control measures for streams and surface water bodies.	Flooding	Planning Board	Complete.
Add more specific requirements to address flood related issues in the Special Permit and Site Plan Approval provisions in the Chesterfield Zoning Bylaw including topographic change, removal of cover vegetation, risk of erosion or siltation and increased stormwater runoff.	Flooding	Planning Board	Complete. Should be revised only as development patterns change and warrant.
The Town should evaluate whether to become a part of FEMA's Community Rating System.	Flooding	EMD PVPC	Not cost effective.
Develop a priority list and seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town.	Flooding	Highway Dept.	To be revised.

Description	Hazards Mitigated	Responsible Agency	Reason for Deletion
Develop a plan for providing access to water, information, shelter, and food stores to people in remote locations in Town in the event of a severe winter storm.	Severe Snow / Ice	EMD (lead)	To be revised.
Develop and distribute an educational pamphlet on fire safety and prevention.	Wildfires / Brushfires	Fire Dept.	Complete.
Consider amending the Subdivision Rules and Regulations Required Improvements section to include fire suppression provisions for new residential developments.	Wildfires / Brushfires	Planning Dept. Fire Dept.	Too expensive to be feasible for developers.
Evaluate all Mass Care Shelters and Reception Centers to determine if they are earthquake resistant.	Earthquakes	EMD	Not effective. Shelters may have been built before newest earthquake standards.
Ensure that all identified shelters have sufficient back-up utility service in the event of primary power failure.	Earthquakes	EMD / Selectboard	To be revised.
Prepare a Water Conservation Plan for the Town.	Drought	Chesterfield EMD	Severe drought risk too low.
Identify all pre-FIRM structures throughout town that need to be elevated above the base-flood elevation.	Floods	No action to date.	Not much development in floodplain.
Develop a maintenance plan for back-up utility service for shelters.	No action taken.	All	Plan for back-up shelters is responsibility of shelter facility owners.
Identify sources of funding for dam safety inspections, including loans for communities that own dams.	No action taken.	Dam Failure	Loans already exist for municipally owned dams.

## **Previously Identified and New Strategies**

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Several of the action items previously identified in the 2007 Hazard Mitigation Plan are currently continuing, because either they require more time to secure funding or their construction process is ongoing. In addition, the Hazard Mitigation Workgroup 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**

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The Chesterfield Hazard Mitigation Planning Workgroup 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

### **Cost Estimates**

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

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

Cost estimates take into account the following resources:

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

### **Project Timeline**

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

## Mitigation Capabilities and Strategies to be Implemented by Chesterfield

Type	Description	Status	Hazards Mitigated	Responsible Agency	Priority	Cost	Funding Source	Timeframe
Capability	Inventory supplies at existing shelters as supplies are used.	Western Regional Homeland Security Council has conducted surveys at existing shelters and developed a needs list and purchased regional sheltering equipment.  The Hampshire Regional Emergency Planning Committee (HREPC) conducts an annual survey of shelter supplies owned by towns, colleges, and regional agencies,	All	EMD	Medium	Low	Local	Ongoing. Inventory takes 1 week to execute.
Capability	Collect, periodically update, and disseminate information on natural hazard preparation (including home survival kit, preparing homes for flooding/high winds, sheltering in place, and evacuation procedures) online and in brochures.	Radio stations are already disseminating this information. Information to be updated based on new procedures or communication outlets.	All	EMD (lead) Police Dept. Fire Dept.	Medium	Low	Local funding  Grant funding	Ongoing. Task takes 1 month to complete.
Strategy	Set up a system to document impacts (damage, costs) of undersized culverts throughout town.	List of undersized culverts has been started.	Flooding Hurricanes	Highway Dept.	Medium	Low	Local funding	6 months to complete task

## Mitigation Capabilities and Strategies to be Implemented by Chesterfield

Type	Description	Status	Hazards Mitigated	Responsible Agency	Priority	Cost	Funding Source	Timeframe
Capability	Seek funding through Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts.	No action to date.	Flooding Hurricanes	EMD Highway Dept.	Medium	High	HMGP, Local funding, State grants	3 months to complete application
Strategy	Formalize the plan for providing access to water, information, shelter, and food stores to people in remote locations in Town in the event of a severe winter storm.	Plan has been started. Council on Aging and Highway Department need to be engaged.	Severe Snowstorms	EMD	Low	Low	Local funding	1 year to complete
Strategy	Develop a plan that identifies hazardous trees (with GPS) and outlines a maintenance plan to prevent structural or electrical damage in the event of a snow or ice storm.	This has been explored with WMECo previously, but did not move forward. Eversource does this for trees in their right-of-way, but it is unclear if they are doing enhanced tree trimming.	Severe snowstorm Ice storm	Tree Warden  Eversource	Medium	Low	Local funding	12 months to develop
Strategy	Replace the culvert on Damon Pond Road, which threatens the integrity of associated dam.	State has assessed the culvert in conjunction with dam inspection. Culvert could take out dam and result in blocking primary ambulance and mutual aid route.	Flooding Dam Failure	Highway Dept.	Medium	High	Local funding  State grants	5 years to identify/obtain funding, 6 mo. to complete work

## Mitigation Capabilities and Strategies to be Implemented by Chesterfield

Type	Description	Status	Hazards Mitigated	Responsible Agency	Priority	Cost	Funding Source	Timeframe
Capability	Appoint committee and revise Open Space and Recreation Plan. (OSRP)	OSRP is expired.	All	Selectboard	Medium	Low	Local funding State grants	1 year to complete



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

### Plan Adoption

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Upon completion of the draft Hazard Mitigation Plan, a public engagement event was held on January 27, 2016, to request comments. No comments from the public were submitted. 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

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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 Sections 5 and 6 of this plan will be notified of their responsibilities immediately following approval. The Town's Hazard Mitigation Workgroup will oversee the implementation of the plan.

### Incorporation with Other Planning Documents

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

- *Chesterfield Comprehensive Emergency Management Plan* (particularly the Critical Infrastructure Section) – the Critical Infrastructure section was used to identify those infrastructure components in Chesterfield that have been identified as crucial to the function of the Town; also, this resource was used to identify special needs populations as well as potential emergency shortcomings.
- *Subdivision Rules and Regulations Governing the Subdivision of Land* – Town of Chesterfield, original document June 4, 1963, amended July 8, 2008
- *Chesterfield Zoning Bylaw* - The Town's Zoning Bylaw was used to 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.

- *State of Massachusetts -Hazard Mitigation Plan* - This plan was used to insure that the Town's Pre-Disaster Mitigation Plan 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 Working Group will review whether any of these plans are in the process of being updated. If so, the Hazard Mitigation Working Group 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. As the Town of Chesterfield creates new and updates existing planning documents, this plan and its implementation strategies will be incorporated as applicable. This process will be ongoing and part of the standard practice of reviewing other plans to ensure consistency between plans.

## **Plan Monitoring and Evaluation**

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The Town's Emergency Management Director or his/her designee will call meetings of all responsible parties to review plan progress on an annual basis in each of the following years: 2017, 2018, 2019, 2020, 2021 and as needed (*i.e.*, following a natural disaster). 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 entail the following actions:

- Review events of the year to discuss and evaluate major issues, effectiveness of current mitigation, and possible mitigation for future events.
- Assess how the mitigation strategies of the plan can be integrated with other Town plans and operational procedures, including the Zoning Bylaw and Emergency Management Plan.
- Review and evaluate progress toward implementation of the current mitigation plan based on reports from responsible parties.
- Amend the current plan to improve mitigation practices.

Following these discussions, it is anticipated that the Workgroup 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

Workgroup will review and update the Hazard Mitigation Plan every five years. The next updated plan will be submitted to MEMA and FEMA in the spring of 2021.

# 7: APPENDICES

## Appendix A – Technical Resources

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### 1) Agencies

Massachusetts Emergency Management Agency (MEMA).....	508/820-2000
Hazard Mitigation Section .....	617/626-1356
Federal Emergency Management Agency (FEMA) .....	617/223-4175
MA Regional Planning Commissions: Berkshire Regional Planning Commission (BRPC).....	413/442-1521
Cape Cod Commission (CCC).....	508/362-3828
Central Massachusetts Regional Planning Commission (CMRPC).....	508/693-3453
Franklin Regional Council of Governments (FRCOG).....	413/774-3167
Martha’s Vineyard Commission (MVC).....	508/693-3453
Merrimack Valley Planning Commission (MVPC).....	978/374-0519
Metropolitan Area Planning Council (MAPC).....	617/451-2770
Montachusett Regional Planning Commission (MRPC).....	978/345-7376
Nantucket Planning and Economic Development Commission (NP&EDC).....	508/228-7236
Northern Middlesex Council of Governments (NMCOG).....	978/454-8021
Old Colony Planning Council (OCPC).....	508/583-1833
Pioneer Valley Planning Commission (PVPC).....	413/781-6045
Southeastern Regional Planning and Economic Development District (SRPEDD).....	508/823-1803
MA Board of Building Regulations & Standards (BBRS).....	617/227-1754
MA Coastal Zone Management (CZM).....	617/626-1200
DCR Water Supply Protection.....	617/626-1379
DCR Waterways.....	617/626-1371
DCR Office of Dam Safety.....	508/792-7716
DFW Riverways.....	617/626-1540
DEP Wetlands and Waterways.....	617/292-5500
MA Dept. of Housing & Community Development.....	617/573-1100
Woods Hole Oceanographic Institute.....	508/457-2180
UMass-Amherst Cooperative Extension.....	413/545-4800
National Fire Protection Association (NFPA).....	617/770-3000
New England Disaster Recovery Information X-Change (NEDRIX – an association of private companies & industries involved in disaster recovery planning).....	781/485-0279
MA Board of Library Commissioners.....	617/725-1860
MA Highway Department, District.....	413/582-0599
MA Division of Marine Fisheries.....	617/626-1520
MA Division of Capital & Asset Management (DCAM).....	617/727-4050
Massachusetts Association of Regional Planning Agencies (MARPA).....	413/781-6045
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

U.S. Department of Commerce: National Oceanic and Atmospheric Administration: National Weather Service; Tauton, MA .....508/824-5116  
 U.S. Department of the Interior: US Fish and Wildlife Service.....413/253-8200  
 U.S. Geological Survey .....508/490-5000

**2) Mitigation Funding Resources**

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

<sup>‡</sup> 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.

<sup>†</sup> 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) Websites

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
National Lightning Safety Institute	<a href="http://lightningsafety.com/">http://lightningsafety.com/</a>	Information and listing of appropriate publications regarding lightning safety.
NASA Optical Transient Detector	<a href="http://www.ghcc.msfc.nasa.gov/otd.html">http://www.ghcc.msfc.nasa.gov/otd.html</a>	Space-based sensor of lightning strikes
LLNL Geologic & Atmospheric Hazards	<a href="http://www.ep.es.llnl.gov/wwwep/g hp.html">http://www.ep.es.llnl.gov/wwwep/g hp.html</a>	General hazard information developed for the Dept. of Energy.

The Tornado Project Online	<a href="http://www.tornadoroject.com/">http://www.tornadoroject.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**

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### *Hazard Mitigation Committee*

The Chesterfield Emergency Planning Committee oversaw the local Hazard Mitigation Planning process. The committee held four meetings between October 2015 and January 2016 to review and update the 2010 plan. Local knowledge, updates and revisions were incorporated into the plan by PVPC staff.

The agendas for these meetings are below:

### **Chesterfield Emergency Planning Committee**

#### **Meeting Notice**

The Chesterfield Emergency Planning Committee will meet:

Date: Wednesday, October 21, 2015  
Time: 6:30 pm  
Location: Davenport Town Offices  
422 Main Road  
Chesterfield, MA

#### **Agenda**

1. Begin updating Chesterfield's *Natural Hazards Mitigation Plan*
2. Other business not reasonably foreseen

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



## **Chesterfield Emergency Planning Committee Meeting Notice**

Date: Thursday, November 19, 2015  
6:30 pm

Location: Davenport Town Offices  
422 Main Road Chesterfield, MA

### **Agenda**

1. Public Outreach Session
2. Minutes of the October 21, 2015 meeting
3. Continued updating Chesterfield's *Natural Hazards Mitigation Plan*
4. Other business not reasonably foreseen

These are public meetings.

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

## **Chesterfield Emergency Planning Committee Meeting Notice**

Date: Thursday, December 17, 2015  
6:30 pm

Location: Davenport Town Offices  
422 Main Road Chesterfield, MA

### **Agenda**

1. Minutes of the November 19, 2015 meeting
2. Continued updating Chesterfield's *Natural Hazards Mitigation Plan*

### 3. Other business not reasonably foreseen

These are public meetings.

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

## **Chesterfield Emergency Planning Committee Meeting Notice**

Date: Wednesday, January 27, 2016

6:30 pm

Location: Davenport Town Offices

422 Main Road Chesterfield, MA

### **Agenda**

1. Open public outreach portion of the meeting.
2. Minutes of the December 17, 2015 meeting
3. Continued updating Chesterfield's *Natural Hazards Mitigation Plan*
4. Other business not reasonably foreseen

These are public meetings.

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

### ***Public Meetings and Outreach***

PVPC staff facilitated two public meetings to present the planning process, the hazards and vulnerabilities identified by the committee, and the mitigation strategies and their status. The agendas and sign in sheets for these meetings and the public slide presentation available at these meetings and the posting notice from the Town of Chesterfield website are found below. The media releases from PVPC are also included, which invited members of the surrounding communities to participate in the public engagement events and provide feedback.

One member from the public attended the November 19, 2015 and January 27, 2015 meetings (highlighted below).

Chesterfield Hazard Mitigation Plan Update

11/19/15 6:30-8:30 pm

Sign-in

Roger Fuller	Select Board	rfuller@rdunclaw.com
Matt Smith	Highway Superintendent	chesterfieldhighwaydept@ verizon.net

<del>BILL ROBERTSON</del>	<del>APPRX ST</del>	<del>WM. A ROBERTSON @</del> VERIZON .NET
Sherill Redmon	Con Comm	sredmon@smith.edu
Aimee Wallace	Police Dept.	awallacepd@gmail.com
Judy TERRY	PLANNING Board	terrijudy@aol
Larry Holmberg	E.M.D	<del>EMD</del> chesterfield @ hotmail.com

Chesterfield Hazard Mitigation Plan Update  
 Sign-in 1/27/16 6:30-8:30 pm

<u>Name</u>	<u>Affiliation</u>	<u>Email</u>
John Fuller	Conservation Commission	conservationcommission@townofchesterfieldma.com
Amee Wallace	Police Dept.	Awallacepd@gmail.com
Sherrill Redman	Cons. Comm.	sredman@smith.edu
Dee Anne	Comm. of Heat Comm	emmadecanne@gmail.com
SCOTT DAUPHINAZ	FIRE DEPT	
Matt Smith	Highway	chesterfieldhighwaydept@verizon.net
Roger Fuller	select Board	rfuller@rrwindu.com
Judy Terry	PLANNING Board	terrijudy@aol.
Larry Holmberg	EMP.	Lholmberg@crocker.com
BILL ROBERTSON	RES.	WM: B. ROBERTSON @ JEFFERSON MET

**Chesterfield Calendar**  
 Today: [←](#) [→](#) **November 2015** [Print](#) [Week](#) [Month](#) [Agenda](#)

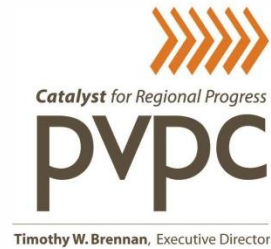
Sun	Mon	Tue	Wed	Thu	Fri	Sat
Nov 1	2	3	4	5	6	7
	12:30pm Chesterfield Senior Housing Co 4pm Selectmen (4pm) 6:30pm Tax Collector (6:30pm - 8:30pm) 7pm Police Department (7pm) 7pm Town Clerk (7:00 pm) 7pm Building Inspector Weekly hours <a href="#">+3 more</a>		9:30am Assistant Assessor (9:30 am - 3 6pm Chesterfield/Goshen School Comm 7pm Recreation Committee			
8	6:30pm Hampshire Regional School Com 6:30pm Tax Collector (6:30pm - 8:30pm) 7pm Police Department (7pm) 7pm Town Clerk (7:00 pm) 7pm Building Inspector Weekly hours 7pm Assessors (7pm) <a href="#">-2 more</a>	10	11	12	13	14
15	10am Northern Hilltown Consortium of 4pm Selectmen (4pm) 6:30pm Tax Collector (6:30pm - 8:30pm) 7pm Police Department (7pm) 7pm Town Clerk (7:00 pm) 7pm Building Inspector Weekly hours <a href="#">-2 more</a>	6pm Senior Housing Committee 7:30pm Chesterfield Finance Committee 9pm FRANKLIN	9:30am Assistant Assessor (9:30 am - 3 6pm FRANKLIN	6:30pm Emergency Planning Committee	20	21
22	10am Council on Aging 6:30pm Tax Collector (6:30pm - 8:30pm) 7pm Police Department (7pm) 7pm Town Clerk (7:00 pm) 7pm Building Inspector Weekly hours 7pm Assessors (7pm) 7:15pm Board of Health (7:15 pm)	24	9:30am Assist	<b>Emergency Planning Committee</b> <b>When</b> Thu, November 19, 2015, 6:30pm – 7:30pm <b>Where</b> Davenport Town Office, 422 main Rd, Chesterfield (map) <b>Description</b> Chesterfield Emergency Planning Committee Meeting Notice <b>Date:</b> Thursday, November 19, 2015 <b>Location:</b> Davenport Town Offices 422 Main Road Chesterfield, MA <b>Agenda</b> 1. Public Outreach Session 2. Minutes of the October 21, 2015 meeting 3. Continued updating Chesterfield's Natural Hazards Mitigation Plan 4. Other business not reasonably foreseen These are public meetings. For further information contact: Larry Holmberg, Chair, at 415-296-4247 <a href="#">more details: copy to my calendar</a>	27	28
29	4pm Selectmen (4pm) 6:30pm Tax Collector (6:30pm - 8:30pm) 7pm Police Department (7pm) 7pm Town Clerk (7:00 pm) 7pm Building Inspector Weekly hours 7pm Assessors (7pm)	7:45am FRANKLIN/HAMPSHIRE REGIONAL 7pm Chesterfield Senior Housing Comm 6pm Chester	9:30am Assist		4	5

Events shown in time zone: Eastern Time [Google Calendar](#)

**Chesterfield Calendar**  
 Today: [←](#) [→](#) **January 2016** [Print](#) [Week](#) [Month](#) [Agenda](#)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
Jan 1	2	3	4	5	6	7
	6:30pm Emergency Planning Committee 4pm Selectmen (4pm) 6:30pm Tax Collector (6:30pm - 8:30pm) 7pm Police Department (7pm) 7pm Town Clerk (7:00 pm) 7pm Building Inspector Weekly hours 7pm Assessors (7pm)		9:30am Assistant Assessor (9:30 am - 3			
3	9:30am Chesterfield Senior Housing Com 11:30am Northern Hilltown Council on A 6:30pm Tax Collector (6:30pm - 8:30pm) 7pm Police Department (7pm) 7pm Town Clerk (7:00 pm) <a href="#">-4 more</a>	6:30pm Finance Commi				
10	2pm International Potluck and James Ki 4pm Selectmen (4pm) 6:30pm Tax Collector (6:30pm - 8:30pm) 6:30pm Library Trustees 7pm Police Department (7pm) 7pm Town Clerk (7:00 pm) <a href="#">-3 more</a>	11				
17	7:30pm Conservation Commission(7:30p					
24	11am Council on Aging 4pm Selectmen (4pm) 6:30pm Tax Collector (6:30pm - 8:30pm) 7pm Police Department (7pm) 7pm Town Clerk (7:00 pm) <a href="#">-3 more</a>	25				
31	12:30pm Chesterfield Senior Housing Co 6:30pm Hampshire Regional High Schoo 6:30pm Tax Collector (6:30pm - 8:30pm) 6:30pm Capital Planning Committee 7pm Police Department (7pm) <a href="#">-4 more</a>	8am Franklin Hampshir				

Events shown in time zone: Eastern Time [Google Calendar](#)



#### MEDIA RELEASE

CONTACT: Jaimye Bartak, PVPC Senior Planner, (413) 781-6045 or [jbartak@pvpc.org](mailto:jbartak@pvpc.org)  
Larry Holmberg, Emergency Management Director (EMD) Town of Chesterfield  
(413) 529-1700 or [lholmberg@crocker.com](mailto:lholmberg@crocker.com)

FOR IMMEDIATE RELEASE  
November 5, 2015

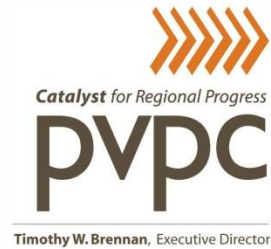
#### **Town of Chesterfield to Hold Public Engagement Event for Hazard Mitigation Plan**

Chesterfield residents, businesses, and surrounding community representatives are invited to provide comments on the update of the Town of Chesterfield Hazard Mitigation Plan on Thursday, November 19 at 6:30 pm at Davenport Town Offices, 422 Main Road. The plan is being updated by the Town with assistance from the Pioneer Valley Planning Commission and is funded by the Federal Emergency Management Agency (FEMA) and the Massachusetts Emergency Management Agency (MEMA). All members of the public, representatives from surrounding communities and other interested parties are welcome to attend the event.

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

This planning effort is being undertaken to help the Town of Chesterfield 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 Jaimye Bartak at [jbartak@pvpc.org](mailto:jbartak@pvpc.org) or (413) 781-6045.



**MEDIA RELEASE**

CONTACT: Jaimye Bartak, PVPC Senior Planner, (413) 781-6045 or [jbartak@pvpc.org](mailto:jbartak@pvpc.org)  
Larry Holmberg, Emergency Management Director (EMD) Town of Chesterfield  
(413) 529-1700 or [lhholmberg@crocker.com](mailto:lhholmberg@crocker.com)

FOR IMMEDIATE RELEASE  
January 14, 2016

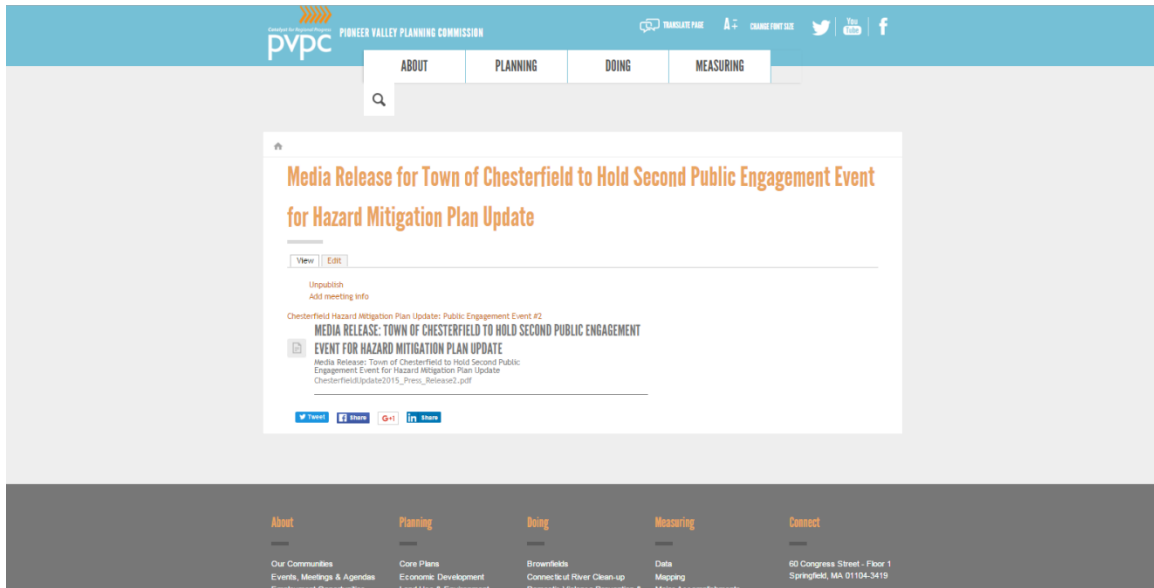
**Town of Chesterfield to Hold Second Public Engagement Event for  
Hazard Mitigation Plan Update**

Chesterfield residents, businesses, and surrounding community representatives are invited to provide comments on the updated draft version of the Town of Chesterfield Hazard Mitigation Plan on Wednesday, January 27, 2016, at 6:30 pm at Davenport Town Offices, 422 Main Road. The plan is being updated by the Town with assistance from the Pioneer Valley Planning Commission and is funded by the Federal Emergency Management Agency (FEMA) and the Massachusetts Emergency Management Agency (MEMA). All members of the public, representatives from surrounding communities and other interested parties are welcome to attend the event.

The meeting will follow up on the first public engagement event on November 5, 2015, when an overview of the hazard mitigation planning process and a discussion of existing mitigation initiatives addressing natural hazards in Chesterfield took place. This second meeting will present further progress made on the plan since then, including new proposed mitigation strategies and next steps. Municipal officials and PVPC staff will be available to answer questions and listen to comments on the draft plan. The draft plan is available on PVPC's website ([www.pvpc.org](http://www.pvpc.org)) and the Town of Chesterfield's website.

This planning effort is being undertaken to help the Town of Chesterfield 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 Jaimye Bartak at [jbartak@pvpc.org](mailto:jbartak@pvpc.org) or (413) 781-6045.



(Note: Technical issues with the website at the time required posting the media release as a download.)



Media organizations to which the press releases were sent:

<b>Media Organization</b>	<b>Address</b>	<b>Town</b>	<b>State</b>	<b>Zip</b>
African American Point of View	688 Boston Road	Springfield	MA	01119
Agawam Advertiser News	23 Southwick Street	Feeding Hills	MA	01030
Amherst Bulletin	115 Conz Street	Northampton	MA	01060
Belchertown Sentinel	1 Main Street	Belchertown	MA	01007
Berkshire Eagle	75 South Church Street	Pittsfield	MA	01202
Brattleboro Reformer	62 Black Mountain Rd.	Brattleboro	VT	05301
CBS 3 Springfield	One Monarch Place	Springfield	MA	01144
Chicopee Register	380 Union Street	West Springfield	MA	01089
CommonWealth Magazine	18 Tremont Street	Boston	MA	02108
Country Journal	5 Main Street	Huntington	MA	01050
Daily Hampshire Gazette	115 Conz Street	Northampton	MA	01060
El Sol Latino	P.O. Box 572	Amherst	MA	01004
Going Green	PO Box 1367	Greenfield	MA	01302
Hilltown Families	P.O. Box 98	West Chesterfield	MA	01084
Holyoke Sun	138 College Street	South Hadley	MA	01075
Journal Register	24 Water Street	Palmer	MA	01069
La Voz Hispana	133 Maple Street #201	Springfield	MA	01105
Ludlow Register	24 Water Street	Palmer	MA	01069
Massachusetts Municipal Association	One Winthrop Street	Boston	MA	02110
Quaboag Current Recorder	80 Main Street 14 Hope Street	Ware Greenfield	MA MA	01082 01302
Reminder	280 N. Main Street	East Longmeadow	MA	01028
Southwick Suffield News	23 Southwick Street	Feeding Hills	MA	01030
State House News Service	State House	Boston	MA	02133
Tantasqua Town Common	80 Main Street	Ware	MA	01082
The Longmeadow News	62 School Street	Westfield	MA	01085
The Republican	1860 Main Street	Springfield	MA	01102
The Westfield News	62 School Street	Westfield	MA	01085
Town Reminder	138 College Street	South Hadley	MA	01075
Urban Compass	83 Girard Avenue	Hartford	CT	06105
Valley Advocate	115 Conz Street	Northampton	MA	01061
Vocero Hispano	335 Chandler Street	Worcester	MA	01602
WAMC Northeast Public Radio	1215 Wilbraham Road	Springfield	MA	01119
Ware River News	80 Main Street	Ware	MA	01082
West Springfield Record	P.O. Box 357	West Springfield	MA	01098
WFCR-Public Radio	131 County Circle	Amherst	MA	01003
WGBY-Public TV	44 Hampden Street	Springfield	MA	01103
WGGB ABC40/FOX 6 News	1300 Liberty Street	Springfield	MA	01104
WHMP-FM	15 Hampton Avenue	Northampton	MA	01060
Wilbraham-Hampden Times	2341 Boston Road	Wilbraham	MA	01095
Worcester Telegram & Gazette	20 Franklin Street	Worcester	MA	01615
WRNX/WHYN/WPKR Radio	1331 Main Street	Springfield	MA	01103
WWLP-TV 22	PO Box 2210	Springfield	MA	01102

### Chesterfield Hazard Mitigation Plan Update

November 19, 2015

### Agenda

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

### What is Hazard Mitigation?

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

**Examples:**

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

### Mitigation and Preparedness

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

### Benefits of Hazard Mitigation

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


### Components of a Hazard Mitigation Plan

**Questions considered:**

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

### Overview of Planning Process

- 3-5 Hazard Mitigation Committee meetings plus multiple consultations and reviews



### Hazard Assessment

Hazard Identification and Analysis Worksheet for Chesterfield

Type of Hazard	Location of Occurrence	Probability of Future Occurrence	Impact	Vulnerability
Floods	Var.	Medium	High	High
Severe winter storms / ice storms	High	High	High	High
Wildfires	High	Medium	High	High
Severe thunderstorms	High	Medium	High	High
Tornadoes	Medium	Low	High	High
Volcanic eruptions	Small	Low	High	High
Earthquakes	High	Low	High	High
Sea level rise	Medium	Low	High	High
Energy transportation	High	High	High	High

### Critical Infrastructure Inventory

An inventory of critical infrastructure in the Town was conducted, which included:

- Emergency service buildings
- Town offices
- Water, sewer, and road infrastructure
- Communications towers
- Emergency shelters

Other structures identified include elderly housing and assisted living residences, schools and places of worship.

### Critical Infrastructure Affected by Hazards

Asset Name	Asset Use	Asset Location	Asset Status
Water Main	Water supply	Highway 101	Good
Water Main	Water supply	Highway 101	Good
Water Main	Water supply	Highway 101	Good
Water Main	Water supply	Highway 101	Good
Water Main	Water supply	Highway 101	Good
Water Main	Water supply	Highway 101	Good
Water Main	Water supply	Highway 101	Good
Water Main	Water supply	Highway 101	Good
Water Main	Water supply	Highway 101	Good
Water Main	Water supply	Highway 101	Good

### Overview of Planning Process (continued)

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

### Chesterfield Hazard Mitigation Plan

Public Outreach Event #2  
January 27, 2016

### Agenda

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

### What is Hazard Mitigation?

According to FEMA:

"Any sustained action taken to reduce or eliminate long-term risk to people and property from natural hazards such as flooding, storms, high winds, hurricanes, wildfires, earthquakes, etc."

### Benefits of Hazard Mitigation

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

### Overview of a Hazard Mitigation Plan

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

**Key plan components:**

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

### Hazard Identification and Analysis

Type of hazard	Location of occurrence	Frequency of occurrence	Impact	Vulnerability
Flood	Low	Medium	High	A - Low risk
Severe weather / ice storms	High	High	High	1 - High risk
Wildfires	High	Medium	High	3 - Medium risk
Severe weather (tornado / hail)	High	Medium	High	3 - High risk
Tornadoes	Medium	Low	High	A - Low risk
SEVERE WINDS	Small	Low	High	A - Low risk
Disruption	High	Low	High	A - Low risk
Disruption	Medium	Variable	High	3 - High risk
Blizzard	High	Low	High	3 - High risk
Extreme Temperature	High	High	High	A - Low risk

Existing and New Mitigation Strategies

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

Existing and New Mitigation Strategies

- ❑ Inventory supplies at existing shelters as supplies are used.
- ❑ Collect, periodically update, and disseminate information on natural hazard preparation
- ❑ Set up a system to document impacts (damage, costs) of undersized culverts throughout town.
- ❑ Seek funding through Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts.
- ❑ Replace the culvert on Damon Pond Road, which threatens the integrity of associated dam.

Existing and New Mitigation Strategies

- ❑ Develop redundant system for data storage, data retrieval, and communications in event that central servers are incapacitated.
- ❑ Formalize the plan for providing access to water, information, shelter, and food stores to people in remote locations in Town in the event of a severe winter storm.
- ❑ Develop a plan that identifies hazardous trees (with GPS) and outlines a maintenance plan to prevent structural or electrical damage in the event of a snow or ice storm.
- ❑ Revise Open Space and Recreation Plan. (OSRP)

Next Steps in Planning Process

- ❑ Plan available for public review at [www.pvpc.org](http://www.pvpc.org), comments from public to be incorporated
- ❑ Plan to be submitted for review by MEMA and FEMA
- ❑ Comments from MEMA and FEMA addressed
- ❑ Plan to be adopted by Chesterfield Selectboard
- ❑ Plan in effect for next 5 years

Question and Comments

Contact information:

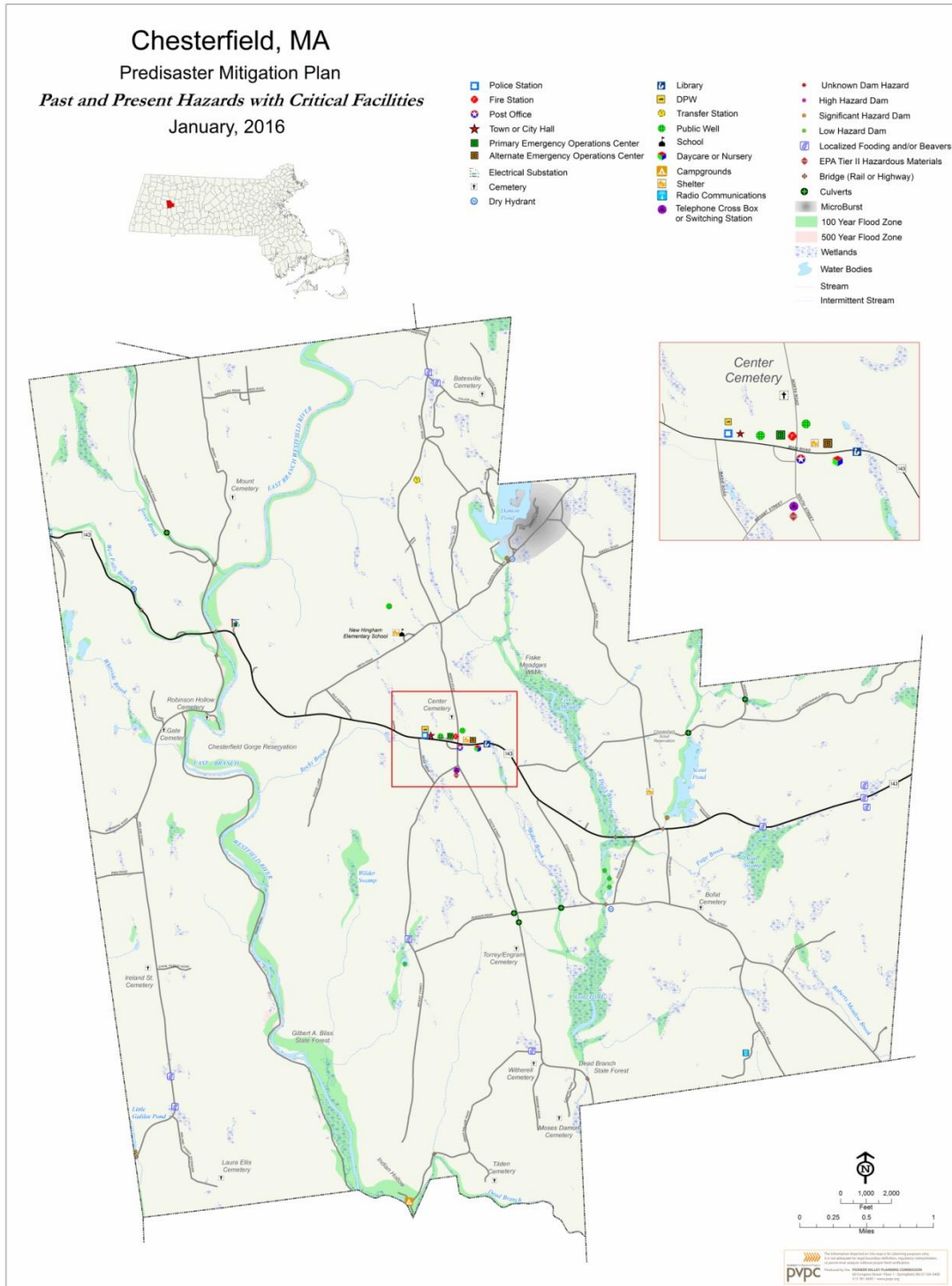
Jaimye Bartak  
Pioneer Valley Planning Commission  
E-mail: [jbartak@pvpc.org](mailto:jbartak@pvpc.org)  
Phone: 413-781-6045

## **Appendix C: List of Acronyms**

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

# Appendix D: Critical Facilities Map





Chesterfield Select Board  
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Ph: (413) 296 - 4771 Fax: (413) 296 - 4394  
townadmin@townofchesterfieldma.com

*Patricia Colson-Montgomery, Chair  
Roger A. Fuller, Clerk  
Robert W. Recos*

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

WHEREAS, the Town of Chesterfield directed the Emergency Planning Committee to prepare the Chesterfield Hazard Mitigation Plan Update; and


WHEREAS, public planning meetings were held on November 19, 2015 and January 27, 2016 regarding the review of the Chesterfield Hazard Mitigation Plan Update; and

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

WHEREAS, the Federal Emergency Management Agency has conditionally approved the Town's updated Hazard Mitigation Plan.

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

ADOPTED AND SIGNED this August 22, 2016

  
Select Board, Chair  
Town of Chesterfield

ATTEST



