

The Town of Chester Hazard Mitigation Plan Update (2016)



Adopted by the Chester Select Board on December 12, 2016

The Chester Hazard Mitigation Committee

and

Pioneer Valley Planning Commission

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Acknowledgements

The Chester Select Board extends special thanks to the Chester Hazard Mitigation Planning Committee as follows:

Rosanne McClafin, Chester Highway Department Administrator

John Murray, Chester Highway Superintendent

Pat Carlino, Town Administrator

Jill Moretz, Manager, Chester Electric

Daniel Ilnick, Chester Chief of Police

Rich Small, EMD and Fire Chief

Susan Kucharski, Director, Council on Aging

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1: PLANNING PROCESS

Introduction

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

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

Preparing, and updating a hazard mitigation plan every five years, can save the community money and facilitate post-disaster funding. Costly repairs or replacement of buildings and infrastructure, as well as the high cost of providing emergency services and rescue/recovery operations, can be avoided or significantly lessened if a community implements the mitigation measures detailed in the plan.

FEMA requires that a community adopt a pre-disaster mitigation plan as a condition for mitigation funding. For example, the Hazard Mitigation Grant Program (HMGP), the Flood Mitigation Assistance Program (FMA), and the Pre-Disaster Mitigation Program are programs with this requirement.

Hazard Mitigation Committee

Updating the Town of Chester's Hazard Mitigation plan involved a seven-member committee:

- Rosanne McClaffin, Chester Highway Department Administrator
- John Murray, Chester Highway Superintendent
- Pat Carlino, Town Administrator
- Jill Moretz, Manager, Chester Electric
- Daniel Ilnicki, Chester Chief of Police
- Rich Small, EMD and Fire Chief
- Susan Kucharski, Director, Council on Aging

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

- Reviewing and incorporating existing plans and other information including changes in development in the last five years since the Town's first Hazard Mitigation planning process
- Updating the natural hazards that may impact the community from the previous plan

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

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

Committee Meetings

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

April 11, 2016

Work group meeting included hazard mitigation planning overview, identify and organizing of the planning team, identifying critical facilities, and an initial discussion of hazard identification and risk assessment.

April 25, 2016

Work group revisited critical facilities list, discussed existing hazard mitigation strategies, and list of future mitigation strategies to be implemented. Work group reviewed revised vulnerability assessment, reviewed map of location of critical facilities and natural hazards, prioritized the identified mitigation strategies, defined plan implementation process and discussed public outreach process.

May 16, 2016

Work group reviewed list of current mitigation strategies undertaken by the Town and draft of prioritized list of mitigation strategies, based on conversation at previous meeting.

May 27, 2016

Work group continued tasks remaining from previous meeting, including reviewing and refining proposed 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.

Participation by Stakeholders

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

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

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

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

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

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

For the update of this Hazard Mitigation Plan, PVPC provided feedback from WRHSAC on regional mitigation activities and natural hazards pertaining to Chester. This was the method through which WRHSAC was engaged in the planning process.

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

PVPC staff included a summary article on the status of Hazard Mitigation planning in the region in the quarterly Regional Reporter that is mailed to area Chambers of Commerce, all member municipalities, area colleges and universities and other key stakeholders in the region. In this way, businesses, educational institutions and other key stakeholders were educated about and informed of Chester's hazard mitigation planning work.

Agencies that have the authority to regulate development

The Chester Planning Board is the primary Town agency responsible for regulating development in town. Feedback to the Planning Board was ensured through the participation of the Town Administrator on the Hazard Mitigation Committee. In addition, the Pioneer Valley Planning Commission, as a regional planning authority, works with all agencies that regulate development in Chester, including the municipal entities listed above and state agencies, such as Department of Conservation and Recreation and MassDOT. This regular involvement ensured that during the development of the Chester Hazard Mitigation Plan, the operational policies and any mitigation strategies or identified hazards from these entities were incorporated into the Hazard Mitigation Plan.

Capability Assessment Summary: Existing Authorities Policies, Programs, & Resources and Ability to Expand on & Improve Existing Policies & Programs

The local Hazard Committee, with assistance provided by the PVPC, used the FEMA Capability Assessment worksheet to document and assess Chester's existing hazard mitigation capabilities. A discussion of existing capabilities based on the worksheet is included in Chapter 5.

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

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

Participation by the Public, Businesses, and Neighboring Communities

Two public planning sessions were held as part of the update of the Chester plan – on April 25, 2016 and June 27, 2016. Both meetings occurred after the Hazard Mitigation Committee had provided input on hazards and mitigation strategies relevant to the community. Notice of both public meetings was posted at Chester Town Hall in compliance with the Commonwealth of Massachusetts’ open meeting law. Public meeting agendas and notices can be found in Appendix B.

On April 14, 2016, the Pioneer Valley Planning Commission sent a press release to relevant media outlets to announce that there would be a first public outreach meeting about the plan on April 25, 2016. This release was sent to those media identified by the Hazard Mitigation Committee as most relevant to the development of the plan. Media organizations are listed in the appendix.

On May 20 and June 20, 2016 PVPC sent out a press release indicating that a second public outreach meeting would take place on June 27, 2016. A list of media organizations that were sent the second press release is included in Appendix B, which are the television stations, radio stations, and newspapers located in western Massachusetts, northern Connecticut, and southern Vermont. The screen capture of PVPC’s website showing the link to the press release can be found in Appendix B. The release also indicated that hard copies were available at PVPC’s offices and at Chester Town Hall, and that all residents, businesses and other concerned parties of Chester were encouraged to comment on the plan by e-mailing or calling staff contacts at PVPC or the Town.

The Hazard Mitigation Committee determined that the most effective outreach strategy for engaging with the public, businesses and neighboring communities was through the media, and so this was the outreach strategy employed for reaching out to all three groups of stakeholders. The press release indicated that residents of Chester were invited to attend the event, which was also intended to include representatives of businesses in Chester and residents of neighboring communities.

Businesses and neighboring communities were also provided with an opportunity to provide feedback through the Pioneer Valley Planning Commission. PVPC is regularly involved in land use, transportation, and environmental planning initiatives in Chester and surrounding communities. Regular feedback received from these other initiatives was incorporated into the hazard mitigation planning process. Neighboring communities that were provided with an opportunity to comment included municipalities that directly border Chester, which are: Blandford, Huntington, Worthington, Middlefield, and Becket.

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

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

Select Board Meeting

In 2013, the Select Board agreed to begin the process of developing a Hazard Mitigation Plan. Once the plan was provisionally approved by FEMA, the Select Board held a public hearing on the plan and then adopted it.

2: LOCAL PROFILE

Community Setting

Covering about 37 square miles in the foothills of the Berkshires, the Town of Chester is located in northwestern Hampden County in western Massachusetts. Chester is a town nestled within a beautiful landscape, and home to several lovingly restored historic homes and shops, attractive parks, and the wild and scenic Westfield River.

Chester is bordered by the Towns of Huntington to the east, Worthington and Middlefield to the north, Becket to the west and Blandford to the south. The Town falls within the purview of the Pioneer Valley Planning Commission and is one of the Highland communities. It is located 30 miles southeast of Pittsfield, 30 miles northwest of Springfield, 115 miles west of Boston, 70 miles from Albany, New York, and 140 miles from New York City.

As late as the 1930s, Chester was home to a number of flourishing industries, among them a granite quarry, a stone processing shed, an emery mill (General Abrasives Treibacher, Inc.), and the Cortland Grinding Wheels Company. Most of these no longer exist. However, the Bannish Lumber Company, established 25 years ago, does still provide employment and revenue in the Town. Although the mills' significance to the community's recent economy is negligible, the physical development of the mill areas has had a long-lasting impact on the configuration of the village settlement.

The Middle Branch of the Westfield River is the location where the early industrial and village development occurred. The first 10 keystone bridges built for use by the railroads in 1839 are the historic Keystone Arch Bridges at the Cheater/Middlefield border. These bridges are being restored by the Friends of the Keystone Arches and adventurous tourists can hike them today.

Today, industry in Chester has declined leaving behind a rural bedroom community with a small residential tax base and a few small businesses. The upper Westfield River Valley and surrounding hills are attracting second-home owners in addition to artists, craftspeople and small home-based businesses. Except for small industrial and commercial sections on Route 20 and another commercial section in the northwest area, Chester is mostly single family homes.

The Town has capitalized on its picturesque location at the foothills of the Berkshires and is home to both full-time and seasonal residents, and attracts artisans, sightseers, and sportspeople. Chester's Miniature Theatre is both a local and regional attraction during the summer months. The restored Boston and Albany Railroad Station has become a regional attraction as well.

Chester is also a part of the Jacob's Ladder Trail area that stretches from Russell to Lee along the Route 20 corridor, and connects it to the Berkshire region. This area has been recognized as unspoiled by commercial franchises, flashy signs, and grid development even today. The Jacob's Ladder Trail Committee proposes allowing economic growth to occur while limiting the negative impact of such development on the scenic and historic character of the communities Chester, Huntington, Russell, Becket, and Lee, through local controls utilizing land use planning tools.

Development

Zoning

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

Chester has four base zoning districts and two 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. These districts are described below.

R-Residential: Areas of town which are best suited for low-density residential development.

AR-Agricultural-Residential: Areas of town which are best suited for low-density residential development; land uses and activities in keeping with the Town's rural character, primarily but not limited to farm and forest uses.

B-Mixed Use Village Business: An area which reflects the historic character of the Town and serves as the focus for many municipal services and most commercial development.

I-Industrial: Areas of Town where industrial development would be appropriate.

Flood Plain and Westfield River Protection:

Chester's Overlay Districts further regulate land use within the community. These include:

FWR-Flood plain and Westfield River Protection Overlay District: Areas abutting the Westfield River encompassing floodplain areas or within 100 feet of the river bank.

Route 20 Commercial Overlay District: Allows commercial development along Route 20, subject to Special Permit.

The Zoning Bylaw establishes a Commercial Site Plan Approval procedure for all business, industrial, and commercial buildings within the Mixed Use Village Business district. Site Plan Approval allows the Planning Board the ability to review development proposals to ensure that the basic safety and welfare of the people of Chester are protected.

Current Development Trends

Chester's landscape is characterized by steep slopes—which make development very difficult, a village center and two main ridgetops with roads. Twenty-one percent of Chester's land is permanently protected, and a total of 47% has some kind of protection. The land is 90% forestland and all developed areas of the community, residential and commercial, are directly adjacent to these forested areas and/or interspersed with trees that connect to the forested areas. The only undeveloped, unforested areas are the estimated 4% of wetlands and water and the 4% used for agriculture. The final approximately 2% encompasses the town's residential and commercial areas.

As of the 2014, this small community is home to approximately 1,528 residents (a 0% increase since 2010) and 698 housing units (a 0% increase since 2000).¹ Development happens very slowly in Chester. The Town is working to promote development in places where infrastructure exists to support it.

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

National Flood Insurance Program Status

Chester is a participating member of the National Flood Insurance Program, and had the following NFIP policy and claim statistics as of 1/13/2016.

- Flood Insurance Maps (FIRMs) are used for flood insurance purposes and are on file with the Town Administrator.
- FIRMs have been effective since October 16, 1984, with a recent update on July 16, 2013.
- There are 60 in-force policies in effect in Chester for a total of \$8,845,900 worth of flood insurance coverage.
- As of January 13, 2016, there were a total of 11 NFIP loss claims in Chester for which a total \$57,189 was paid.
- There are 2 homes defined as "Repetitive Loss Properties" under the NFIP within Chester.

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

¹ U.S. Census Bureau, 2010-2014 American Community Survey.

Infrastructure

Chester's geography has been a major factor in the development of its industry and in turn, its infrastructure. With a history as a mill town, most of the Town's infrastructure has been concentrated around the branches of the Westfield River. Today, these same areas are becoming increasingly important tourist destinations for cultural and recreational activities.

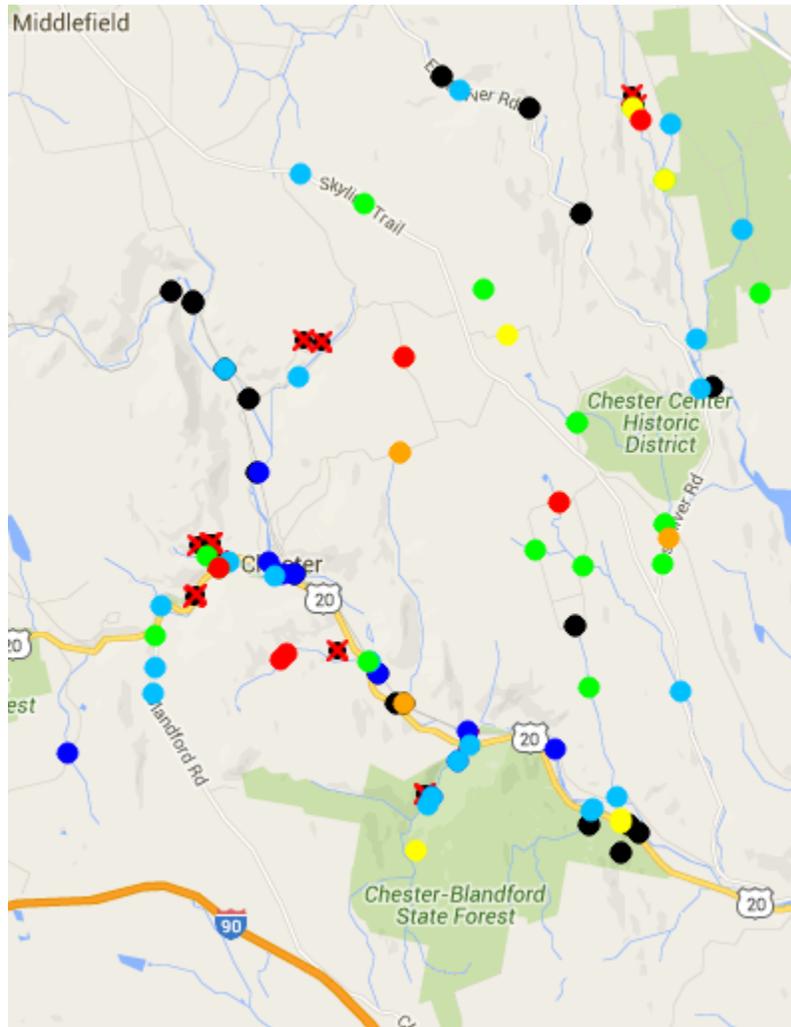
Roads and Highways

Route 20 is the major roadway through Chester, entering at the Huntington border in the southeastern corner, and running east-west along the southern portion of Town into Becket. Route 112 is another major roadway adjacent to the Town; it intersects with Route 20 just to the southeast of the Town's border with Huntington. In addition, the Massachusetts Turnpike (I-90) passes just to the south of the Town.

Chester has approximately 66 miles of roadway and nearly 12,000 acres of steep slopes keeping much of the backland open space protected from development due to inaccessibility. Most new development has been along existing road frontage.

Culverts

There are approximately 30-35 culverts located throughout Chester, according to the North Atlantic Aquatic Connectivity Collaborative's Stream Continuity Project. This project conducts field investigations of road-stream crossings to assess wildlife connectivity and provide recommendations and prioritization strategies for improving aquatic connectivity. The graphic below shows the location and assessment of culverts in Chester as of 2015. This information is useful to hazard mitigation in that culverts that are barriers to aquatic passage may also be too small or blocked to handle large storm events. The Town of Chester is currently (as of spring 2016) conducting an inventory and assessment of its culverts as part of a larger pavement inventory underway with the Pioneer Valley Planning Commission.



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

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

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

Rail

A rail line runs through Chester and once served the industries that were located in the Town. The rail system, currently owned by CSX, still exists as a through station for the transportation of goods from Springfield to New York.

Public Transportation

Chester is not served by public transit.

Water Supply

The Chester municipal water supply is served by two reservoirs: Austin Brook Reservoir and Horn Pond. Horn Pond serves as Chester's primary, or back-up, water supply, depending on the time of year. Horn Pond has a safe yield of 0.2 MGD safe yield and a 41 million gallon storage capacity. The Chester water system serves approximately 260 households, roughly 43 percent of the Chester population. The remaining 57 percent of Chester households draw water from private wells.

As emergency back-up supplies, there are two 24,000 gallon tanks available from a private owner on Chester Hill. This could be used for fire suppression or drinking water. For fire suppression purposes, there are also .5 million gallons available at Middlefield Pond.

Sewer Service

There is no sewer service in Chester. Residents and businesses owners rely on individual on-site septic systems. The closest municipal sewage treatment plant, located in Huntington, currently operates at approximately 40% of capacity. Previous plans to connect to that plant are now abandoned. Chester's Westfield River Protection district prohibits wastewater treatment facilities, including residential package treatment plants, from discharging directly to the West and Middle Branches of the Westfield River.

Much of the undeveloped land presents limitations for adequate septic systems under the current Title-V Code; however, revisions of the code (effective January, 2004) have relaxed percolation rates and now permit development on land that was once considered constrained to development. The lack of sewer service in Town may no longer be a deterrent to development.

Energy

Chester has a municipally owned electric distribution system. Therefore any poles or lines that are damaged in natural hazards need to be replaced by the town. The Town's electric supply is especially vulnerable along Route 20, as those lines bring power into town. The Town worked with the state on a tree-trimming program but the extent of it was diminished by endangered species regulations related to bat habitat.

Approximately 28 homes are located outside the municipally owned electric distribution system.

There is one solar field in Chester that is connected to municipally owned lines.

There are no gas lines in Chester. Homes are heated through on-site oil, propane, or other heating systems.

Schools

Public schools serving Chester include Chester Elementary and the Gateway Regional Middle and High School, located in Huntington. The Chester Elementary School is located at 325 Middlefield Road, which is adjacent to but outside of the 100-year flood plain.

Natural Resources

The following in the Natural Resources section include excerpts from the Chester Open Space and Recreation Plan (2003).

A combination of steep, rocky, forested hills adjoining the West and Main Branches of the Westfield River with some rolling open farmland above the valley characterize the natural landscape. The river is a significant feature of the landscape carving its way through rocky hillsides and the valleys to create many of the Town's scenic vistas. The recreational opportunities provided by the river range from whitewater boating to swimming, fishing, hiking and cross-country skiing and bird watching. The banks of the river nurture a wide variety of flora and fauna. Also along the banks are rich gravel resources that are an asset, but also an issue of concern as their mining could endanger land along the river and the aesthetic qualities of the surrounding area.

Glacially scoured hills, rough rocky terrain, outcroppings of steep bedrock cliffs and deep forests are typical features of the landscape. Pastures and open fields are decreasing as fewer people pursue farming.

The historic village center provides a contrast to the natural landscape while it has shaped its evolution and location in the Town. The historic buildings characterize the cultural landscape as the mill buildings characterize Chester's part in the industrial age. Preserving the historic integrity of these places and adding to their vibrancy is important to maintaining the Town's character.

Rivers and Streams

The Westfield River corridor encompasses many valuable features and resources including:

- One of Massachusetts' best cold water fisheries including naturally reproducing trout populations along some segments;
- The largest uncontrolled river in the state (West Branch of the Westfield River);
- Exciting and challenging whitewater canoeing, including the course for the Westfield River Whitewater Canoe Race, the oldest continuously run whitewater race in the United States;
- Outstanding historic resources including ten stone arch railroad bridges and five historic villages;

- The highest waterfall in Hampshire County, Glendale Falls, and other beautiful falls including Shaker Mill Falls and Center Pond Brook Falls;
- Unique scenic geologic features such as the Chesterfield Gorge, gorges in Gardner State Park and on Shaker mill Brook, and the spectacular Windsor Jams;
- One of the largest roadless wilderness areas remaining in Massachusetts;
- Habitat for over 100 rare and endangered species; and,
- Excellent water quality, suitable for drinking on the Middle Branch.

Both the Middle Branch and West Branch of the Westfield River pass through Chester. They are fast-flowing rocky streams with a water purity classification of A and B. Class B is characterized as suitable for bathing and recreational purposes, acceptable for public water supply, excellent for fish and wildlife habitat with an aesthetic aspect. The Middle Branch exceeds fishable, swimmable standards for the state and is classified as Class A, suitable for public drinking water supply.

These upper branches have the coveted “Wild and Scenic” designation from the federal government. The Westfield is the first river in Massachusetts to be recognized in this way. According to the National Wild and Scenic Rivers Act:

“...selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations. The Congress declares that the established national policy of dam and other construction at appropriate sections of the rivers of the United States needs to be complemented by a policy that would preserve other selected rivers or sections thereof in their free-flowing condition to protect the water quality of such rivers and to fulfill other vital national conservation purposes.”

The Westfield River in Chester is protected by an overlay district, the Westfield River Protection and Floodplain Overlay District; that increases oversight of development and also limits some kinds of development. In addition, protection comes from the Commonwealth’s Rivers Protection and Wetlands Protection Acts.

There are numerous small brooks and ponds in the Town as well as an aquifer located within the Town. In addition to the many unnamed tributaries in Town, other significant rivers and streams in Chester include:

Streams and Brooks in Chester	
Kinne Brook	Moss Meadow Brook
Austin Brook	Blair Brook
Sanderson Brook	Griffin Brook
Winchell Brook	Day Brook
Otis Wait Brook	Smith Brook

Roaring Brook	Cook Brook
Abbott Brook	Mica Mill Brook

Lakes and Ponds

Littleville Lake was formed in 1965 when a flood control/water reservoir dam was constructed by the Army Corp of Engineers. The lake and dam are located mostly in Chester with public boating access and parking provided in Huntington. Littleville Lake is a Class A water which provides emergency water supply for the Springfield water system while reducing flooding along the Westfield and Connecticut Rivers.

The MA Division of Fisheries and Wildlife stocks both Littleville Lake and the Westfield River with trout each spring providing fisherman a favorite destination. In addition, each spring, water released at Littleville Lake is coordinated with that from nearby Knightville Dam to provide flows for the annual Westfield River Wildwater Canoe Races.

Aside from the many unnamed ponds and occasional swamps in Town, the Round Hill Pond located in the Chester State Wildlife Management Area contributes to the Town's 388 acres of surface waters.

Reservoirs

The Chester municipal water supply is served by two reservoirs: Austin Brook Reservoir and Horn Pond. Austin Brook Reservoir is the primary water supply for the Town of Chester. The watershed is approximately 1.23 square miles with 78 percent located in the adjacent Town of Becket. Austin Brook Reservoir has a safe yield of 115,000 gallons per day (MGD), depending on the time of year, and a 1.1 million-gallon storage capacity. Horn Pond serves as Chester's secondary, or back-up, water supply. The approximately ½ square mile watershed to Horn Pond is located entirely in the Town of Becket, approximately 3.15 miles west of Austin Brook Reservoir, nestled between Bancroft and Captain Whitney Roads. Horn Pond has a safe yield of 0.2 MGD safe yield and a 41 million gallon storage capacity. The Chester water system serves approximately 260 households in the lower section of town, roughly 50 percent of the Chester population (approximately 450 people). The remaining households in Chester draw water from private wells.

Austin Brook Reservoir is divided into two pools. The lower pool serves as the main storage reservoir. Above it, a smaller pool is separated from the lower pool by a stone wall and weir. Austin Brook flows into the upper pool through a second stonewall and weir. Both the lower and upper stone walls and weirs are breached on both sides. Sedimentation in the upper pool has significantly limited the pool depth to 1 to 2 feet. This sedimentation is caused by the surge-prone nature of the shallow Austin Brook. Austin Brook Reservoir ranges in depth from 4 to 20 feet with the depth of the intake at approximately 12 feet.

Water from Horn Pond flows by gravity through a pipe conduit to Austin Brook for use if the water level in the Austin Brook reservoir drops below a prescribed level. Otherwise, the water

from Horn Pond is diverted below the Austin Brook reservoir dam where it joins the steady overflow from the reservoir.

Forests

Interrupted by development along roadsides and in the village center, Chester is predominantly a forested landscape (90%). Hardwoods consist predominantly of oak, maple, and birch. Hemlock and white pine intermix with hardwoods in much of the forest. Some of this land is under Chapter 61 protection that requires owners to file management plans with the Commonwealth and the local Conservation Commission, thereby providing a significant check on forestry operations.

The economic value and greater value of the forest resources to the community as a whole extends beyond lumbering and sale of forest species. Trees that are not harvested for their commercial application provide flood mitigation and water supply filtration, which benefits residents and businesses alike. In addition to these public health benefits, forest resources also provide significant wildlife habitat. The extensive forestland in the hills and along riparian corridors provides vital resources for wildlife.

Without forested areas, floodwaters from heavy storms would runoff more rapidly, raising flood waters and assuring more property and crop damage. Other environmental impacts such as air quality degradation, reduction of visual buffers from adjacent uses and elimination of habitat could ensue as well. Deforested areas can also cause erosion from runoff, sending sediment onto farmland and other properties and potentially causing greater damage to homes and businesses during major storm events. Erosion can cause streams and rivers to fill with silt, resulting in oxygen deprivation to water plants and animal species. This can ultimately eliminate food sources for migratory birds and land animals.

Wetlands

Wetlands include rivers, ponds, swamps, wet meadows, beaver ponds, and land within the FEMA-defined 100-year flood area. Wetland areas are home to frogs, fish, freshwater clams and mussels, beaver, muskrats, great blue herons, waterfowl, bitterns, and several other species. Wetlands filter toxins improving water quality, provide shellfish and wildlife habitat, and store water. Common wetland plants in Chester include red maple, water lily, arrowheads, cattails, sedges, and many species of ferns.

There are approximately 944 acres of wetlands in Chester, much of which are wooded. If open waters are included in this accounting, the total acreage of wetlands in Chester rises to over 1,300 acres, over 5% of the total area. It is important to note that much of the wetland areas in Town have not yet been identified by MassGIS or USGS maps and must be identified in the field by wetland scientists.

Identified wetland habitats in Town occur primarily along the streams and rivers as well as in lands adjacent to major ponds. The most extensive isolated wetland areas are located in the northeastern corner of Town, east of Meadow Brook and north of Skunk Brook.

Wetlands that border rivers and streams are called bordering vegetated wetlands (BVW) and are offered protection by the Massachusetts Wetlands Protection Act and the Rivers Protection Act. Developments within the wetland or the buffer zone are reviewed by the local conservation commission and occur only at their discretion.

State law does not protect non-BVW, called isolated wetlands, unless they are certified vernal pools. Because Chester currently has no local wetlands bylaw, protection of these critical natural areas is not guaranteed. Historically, and for practical reasons, both wetlands and floodplain development in the Town has been limited.

3: HAZARD IDENTIFICATION AND ANALYSIS

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

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

Natural Hazard Analysis Methodology

This chapter examines the hazards in the Massachusetts State Hazard Mitigation Plan which are identified as likely to affect Chester. 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 Chester are: floods, severe snowstorms/ice storms, hurricanes, severe thunderstorms / wind / tornadoes, wildfire/brushfire, earthquakes, dam failure / levee breach, and drought. Many of these hazards result in similar impacts to a community. For example, hurricanes, tornadoes and severe snowstorms may cause wind-related damage.

Location

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

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

Extent

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

Previous Occurrences

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

Probability of Future Events

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

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

Impact

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

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

Vulnerability

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

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

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

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

Flooding

Hazard Description

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

- 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.

Because of Chester’s location amid steep slopes and mountains, floodplains can become quickly inundated in heavy rains. Dams located upstream also have an impact on flooding levels; in 2011 the release of upstream dams had a detrimental impact on flooding in downtown Chester.

Location

There are approximately 1300 acres of land within the FEMA mapped 100-year floodplain within the Town of Chester. According to the Community Information System (CIS) of FEMA, there were 49 structures located within the Special Flood Hazard Area (SFHA) in Chester as of January 16, 2016, the most current records in the CIS for the Town of Chester. Utilizing the Town’s median home value of \$199,600 (American Community Survey 2014 estimate), a preliminary damage assessment was generated. For the estimated number of people living in the floodplain, an average household size of 2.692 people was used.

Based on these locations, flash flooding has a “medium” location of occurrence, with less than 50% percent of land area affected.

Extent

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

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

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

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

Previous Occurrences

The most recent large flood event to occur in Chester was Tropical Storm Irene in August 2011. Recreational ponds and privately owned dams upstream were uncoordinated in their releases, resulting in heavy flooding in town. Sidewalks were washed out, bridges were damaged (including the water lines spanning them), and campgrounds had to be evacuated. In addition, the Route 8 and Route 20 intersection was flooded as well as the sidewalk and two water lines on Route 20 were flooded. Route 20 had to be rebuilt.

In 2003, there was significant flooding on Main Street, Middlefield Road, Riverfront Road, Old State Road, Maple Avenue, Maple Street, and Andrews Avenue.

On February 24-25 2016, 2.32" inches of rain fell in a single overnight storm event. Flooding occurred on Abbot Road, Johnson Hill Road, Cooper Street, Prospect Street, Middlefield Street, and Soisalo Road. Several dirt roads washed out and a state of emergency was declared.

Probability of Future Events

Based on previous occurrences, the probability of flooding in Chester is "low," with a 1 to 10 percent probability in any given year. Flooding frequencies for the various floodplains in Chester are defined by FEMA as the following:

- 10-year floodplain – 10 percent chance of flooding in any given year

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

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

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

Impact

A total of 191 structures are located within the SFHA in Chester, totaling approximately \$38,123,600 of damage, and 514 people impacted. The damage estimate is a rough estimate and likely reflects a worst-case, 100% loss scenario. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate. There are 49 properties in the SFHA as of January 2016, with 11 additional policies outside the zone for a total coverage in town of \$8,845,900. There have been 11 claims since 1978. There are two repetitive loss properties in Chester. These properties experienced losses during the 2005 floods as well as during Tropical Storm Irene in 2011.

The impact of a flood event could have a critical impact on Chester, dependent on event severity and precise location. This is due to the location of the downtown area in proximity to the Westfield River as well as the presence of upstream dams.

Vulnerability

Based on the above analysis, Chester faces a vulnerability of "1 - High" from flash and 100-year flooding.

Because of Chester's historical development patterns, most of the town's critical facilities are located within areas prone to flooding. These include both the primary and back-up emergency operations center, town hall, the fire station, police station, and numerous shelters. Damage to these facilities could impede the town's ability to operate. Additionally, two of the town's main evacuation routes—Route 20 and Middlefield Road—parallel the West Branch of the Westfield River and could flood during a major storm event, prohibiting evacuation efforts.

Severe Snowstorms / Ice Storms

Hazard Description

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

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

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

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

Location

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

Extent

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

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

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

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

Previous Occurrences

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

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

Winter Storms Producing Over 10 inches of Snow in the Pioneer Valley, 1958-2015			
Date	NESIS Value	NESIS 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>

The most significant snow/ice event to impact Chester occurred in 2008, when the town lost power for four days due to 1.5" of ice. The elementary school opened as an emergency operations center during the event, and radio towers lost power. The radio towers have since been outfitted with generators, but a remaining problem is trees that are weak or diseased falling on power lines. The town is served by one main power line along Route 20; when that is damaged, the entire town is left without power.

In the winter of 2015 there was also a significant amount of snow with several power outages due to the reliance on one single line into town.

Probability of Future Events

Based upon the availability of records for Hampden County, the likelihood that a severe snow storm will hit Chester in any given year is "moderate," or a 10 to 40 percent probability in any given year.

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

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

Impact

The impact of an event would be "critical," with more than 25% percent of property damaged in the affected area damaged. To approximate the potential impact to property and people that could be affected by this hazard, the total assessed value of all residential, commercial, and industrial property in town, \$114,123,843 (Massachusetts Department of Revenue, 2014) is used.

An estimated 20 percent of damage would occur to 10 percent of structures, resulting in a total of \$2,282,477 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, Chester faces a "2 - High" vulnerability from severe snow storms and ice storms.

The entire is vulnerable to the impacts of severe snow and ice. The town's energy and communication infrastructure are most vulnerable. Historically, snow and ice have downed trees and power lines along Route 20 causing town-wide power outages, because the entire town receives power through one transmission line along Route 20. Additionally, ice buildup on roadways can make winter travel challenging.

Hurricanes / Tropical Storms

Hazard Description

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

Location

Because of the hazard's regional nature, all of Chester is at risk from hurricanes and tropical storms, meaning the location of occurrence is "large," with over 50 percent of land area affected. Ridgetops are more susceptible to wind damage.

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 Chester are shown in the following table.

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

Source: National Hurricane Center, 2012

Tropical Storm Irene had the most significant recent impact on Chester, resulting in significant and damaging flooding in the center of town in 2011.

Probability of Future Events

Chester’s location in western Massachusetts reduces the risk of extremely high winds that are associated with hurricanes, although it can experience some high wind events. Based upon past occurrences, it is reasonable to say that there is a “low” probability of hurricanes or tropical storms, or a 1 to 10 percent probability in any given year.

Impact

A description of the damages that could occur due to a hurricane is described by the Saffir-Simpson scale, as shown below. The Town of Chester faces a “critical” impact from hurricanes, with more than 25% percent of property in the affected area damaged.

To approximate the potential impact to property and people that could be affected by this hazard, the total assessed value of all residential, commercial, and industrial property in town, \$114,123,843 (Massachusetts Department of Revenue, 2014) is used. Wind damage of 5 percent with 10 percent of structures damaged would result in an estimated \$570,619 of damage. Estimated flood damage to 10 percent of the structures with 20 percent damage to

each structure would result in \$2,282,476 of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

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		

Vulnerability

Based on the above analysis, Chester faces a "3 - Medium" vulnerability from hurricanes and tropical storms.

The entire town would be vulnerable to the impacts of a hurricane. Areas prone to flooding, which include most of the town's critical facilities, would be particularly vulnerable. Additionally, high winds could impact the town's energy infrastructure.

Severe Thunderstorms / Wind / Tornadoes

Hazard Description

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

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

According to the National Weather Service, microbursts are downdrafts in thunderstorms.³ 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.

Location

As per the Massachusetts Hazard Mitigation Plan, the entire town is at risk of high winds, severe thunderstorms, and tornadoes. However, the actual area that would be affected by these hazards is "small," or less than 10 percent of total land area.

³ <http://www.srh.noaa.gov/ama/?n=microbursts>, accessed Feb. 18, 2016

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 damage often correlates with hail size.

Hail Extent

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

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

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

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

Source: <http://www.myforecast.com/bin/climate.m?city=570337&metric=false>

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

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

Previous Occurrences

Because thunderstorms and wind affect the town regularly on an annual basis, there are not significant records available for these events. As per the Massachusetts Hazard Mitigation Plan, there are approximately 10 to 30 days of thunderstorm activity in the state each year. Most occur in the late afternoon and evening hours, when the heating is the greatest. 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 the towns of West Springfield, Westfield, Springfield, Monson, Wilbraham, Brimfield, Sturbridge, and Southbridge. The tornado and related storm killed 3 people and resulted in hundreds of injuries across the state. Nine incidents of tornado activity (F3 or less) have occurred in Hampshire County since 1954 and no known tornado has touched down in Chester.

On average, since 1993, there have been between 5-6 severe thunderstorms per year (defined as with winds over 50 miles per hour) in the region around Chester. There are no known recent microburst incidents.

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 Hampden County to determine the Tornado Index Value as shown in the table below.

Tornado Index for Hampden County	
Hampden County	138.23
Massachusetts	87.60
United States	136.45

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

Based upon the available historical record, the estimated probability of a tornado in Chester is "low," or between 1 and 10 percent in any given year. As per the Massachusetts Hazard Mitigation Plan, there are approximately 10 to 30 days of thunderstorm activity in the state each year. Thus, there is a "high" probability (40 to 70 percent chance in any given year) of a severe thunderstorm or winds affecting the town.

Impact

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

To approximate the potential impact to property and people that could be affected by severe weather, tornado, or wind, the total assessed value of all property in town, \$114,123,843 is used (Massachusetts Department of Revenue, 2014). In a tornado, an estimated 20 percent of damage would occur to 1 percent of structures, resulting in a total of \$228,247 worth of damage. In a thunderstorm, an estimated 10 percent of damage would occur to 1 percent of structures, resulting in a total of \$114,123. 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, Chester has a vulnerability of "2 - High" from severe thunderstorms, and a "5 – Very Low" vulnerability from tornadoes and severe winds.

The entire town would be vulnerable to the destruction cause by severe thunderstorms, wind and tornadoes. The vulnerabilities associated with flooding could be present if substantial rain

accompanies severe thunderstorms. Additionally high winds could impact the town's communication and energy infrastructure. This type of damage from flooding or wind could impede the town's ability to operate or respond to disasters.

Wildfire / Brushfire

Hazard Description

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

FEMA has classifications for 3 different classes of wildfires:

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

Location

In Chester, 62 percent of the land is forested (24.8 square miles), and is therefore at risk of fire. The location of occurrence is "large," with between 10 and 50 percent of land area affected.

Extent

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

A large wildfire could damage almost all of the town's land mass in a short period of time. However, Massachusetts receives more than 40 inches of rain per year and much of the landscape is fragmented, and together these two traits make wildfires uncommon in Massachusetts. Nevertheless, in drought conditions, a brushfire or wildfire would be a matter of concern. A large wildfire could damage a large swath of Chester's landscape, including vital watershed lands, in a short period of time.

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

Previous Occurrences

During the past 100 years, there have not been many wildfires 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 Litiha Springs Watershed

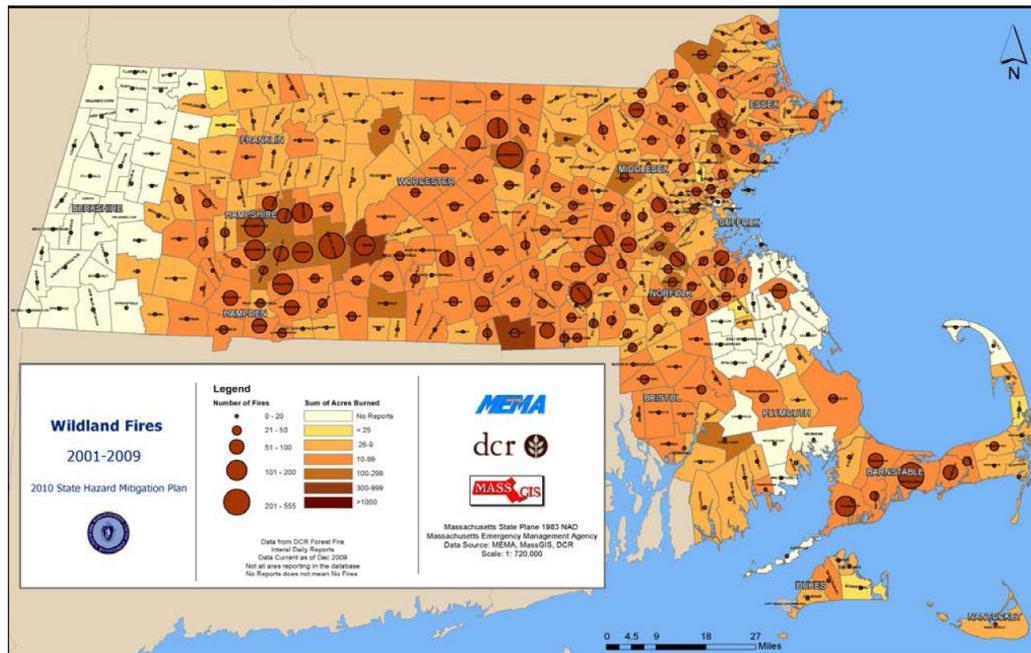
- 2001 – Ware, 400 acres burned
- 2010 – Russell, 320 acres burned on Mt. Tekoa
- 2012 – Eastern Hampden County, dry conditions and wind gusts created a brush fire in Brimfield, and burned 50 acres

Total “Other” Fire Incidents (Including Wildfire/Brushfire) in Chester	
2009	0
2010	5
2011	1
2012	1
2013	4

Source: Massachusetts Fire Incidence Reporting System, County Profiles, 2013 Fire Data Analysis

Brush fires are more common in Chester, mainly along the railroad tracks. In years with drier conditions, volunteer town firefighters can be called numerous times to quell brush fires after trains pass through.

Wildland Fires in Massachusetts, 2001-2009



Source: Massachusetts Hazard Mitigation Plan

Probability of Future Events

In accordance with the Massachusetts Hazard Mitigation Plan, the Hazard Mitigation Committee found it is difficult to predict the likelihood of wildfires in a probabilistic manner because the

number of variables involved. However, given the proximity of previous wildfires, and their proximity to the town, the likelihood of a future wildfire is determined to be “high,” or between a 40 and 70 percent probability in any given year.

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

Impact

Chester faces a “critical” impact from wildfires, with extensive damage anticipated in such an event due to the large amount of forested area and the role forestry plays in the local economy. To approximate the potential impact to property and people that could be affected by this hazard, the total assessed value of all property in town, \$114,123,960 is used.

An estimated 100 percent of damage would occur to 1 percent of structures, resulting in a total of \$1,141,239 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, Chester faces a "2 - High" vulnerability from wildfire and brushfires.

More than half of the land in Chester is forested and therefore at risk of wildfires. The local hazard mitigation committee has identified the land on the northern bank of the Western Branch of the Westfield River in the southeast corner of the town as the most prone to wildfires. Three of the town’s evacuation routes (Route 20, Middlefield Road and Skyline Trail) travel through this section of town and could be deemed impassable depending on the location of a burn. The town’s critical facilities are not located within the area of town that has been identified as most prone to wildfires. They could, however, still be impacted by wildfires if burns happened outside of this identified area.

Earthquakes

Hazard Description

An earthquake is a sudden, rapid shaking of the ground that is caused by the breaking and shifting of rock beneath the Earth's surface. Earthquakes can occur suddenly, without warning, at any time of the year. New England experiences an average of 30 to 40 earthquakes each year although most are not noticed by people.⁴ 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.⁵

Location

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

Extent

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

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

⁴ Northeast States Emergency Consortium Web site: www.nesec.org/hazards/earthquakes.cfm.

⁵ Federal Emergency Management Agency Web site: www.fema.gov/hazards/earthquakes/quake.shtm.

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

Source: US Federal Emergency Management Agency

Previous Occurrences

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

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

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

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

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

Probability of Future Events

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

Earthquake Index for Hampden County	
Hampden County	0.24
Massachusetts	0.70
United States	1.81

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

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

Impact

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

To approximate the potential impact to property and people that could be affected by this hazard, the total assessed value of all property in town, \$114,123,843 is used.

An estimated 10 percent of damage would occur to 10 percent of structures, resulting in a total of \$1,141,238 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Vulnerability

Based on this analysis, Chester maintains a "5 – Very Low" vulnerability from earthquakes.

Older buildings are particularly vulnerable to earthquakes because their construction pre-dates building codes that included strong seismic considerations. At this time, the hazard mitigation committee, does not have the information necessary to determine which critical facility structures might be most vulnerable to the impacts of an earthquake. There are eight bridges along Route 20 that could be damaged if an earthquake were to occur. Collapsed bridges could hamper evacuation efforts and cause pockets of isolated populations.

Dam Failure

Hazard Description

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

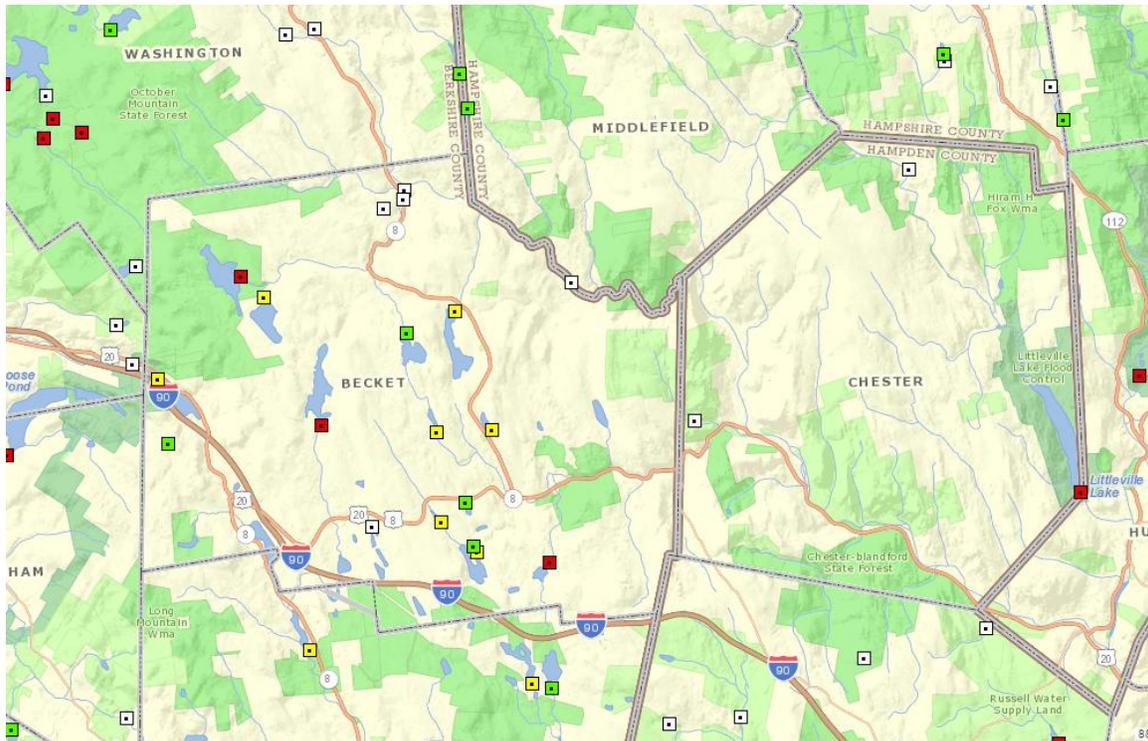
Many dams in Massachusetts were built during the 19th century without the benefit of modern engineering design and construction oversight. Dams of this age can fail because of structural problems due to age and/or lack of proper maintenance, as well as from structural damage caused by an earthquake or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

The Massachusetts Department of Conservation and Recreation Office of Dam Safety is the agency responsible for regulating dams in the state (M.G.L. Chapter 253, Section 44 and the implementing regulations 302 CMR 10.00). To be regulated, these dams are in excess of 6 feet in height (regardless of storage capacity) and have more than 15 acre feet of storage capacity (regardless of height). Dam safety regulations enacted in 2005 transferred significant responsibilities for dams from the State of Massachusetts to dam owners, including the responsibility to conduct dam inspections. No dams in Chester are large enough in size or capacity to be regulated.

Location

Chester has three dams located within its boundaries. The location of occurrence for a dam failure has been determined to be "medium," with 10 to 50 percent of land area affected, but this is mainly due to dams located upstream of Chester outside of municipal boundaries.

Dam name/ date built	ID	Owner	Hazard Risk
Chester Water Works Dam	MA02644	Town of Chester	Non-jurisdictional
Chester-Blandford S.F. Dam	MA02529	DCR - Dept. of Conservation & Recreation- MassParks	Non-jurisdictional
Ideal Lodge Dam	MA02645	No Record for Privately Owned Non-Jurisdictional Dam	Non-jurisdictional



Dams in Chester and Neighboring Towns, 2016 (Source: MassGIS Oliver)

Dams (by Hazard Code)

■ High Hazard

■ Significant Hazard

■ Low Hazard

■ N/A

Extent

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

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

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

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

Previous Occurrences

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

Probability of Future Events

As Chester's dams age, and if maintenance is deferred, the likelihood of a dam failure will increase. The probability of future dam failures is "moderate" with a 10 to 40 percent chance of a dam failing in any given year, but this is due to dams outside of Chester's borders. In 2011 the large amount of flooding experienced in Chester during Tropical Storm Irene was due to the release of privately owned dams in Becket and upstream of Chester.

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

Impact

An impact from a dam failure event could range from "limited" to "catastrophic," with approximately 20 percent of property in the affected area damaged or destroyed. To approximate the potential impact to property and people that could be affected by this hazard, the total assessed value of all property in town, \$114,123,960 is used. An estimated 20 percent of damage would occur to 20 percent of structures, resulting in a total of \$4,564,958 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Vulnerability

Based on this analysis, Chester has a "3 – Medium" vulnerability from dam or levee failure.

Chester's population and critical facilities are not extremely vulnerable to the dam failures in Chester. If dams in the communities upstream were to fail, Chester could experience flooding along its rivers and streams.

Drought

Hazard Description

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

Location

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

Extent

The severity of a drought would determine the scale of the event and would vary among town residents depending on whether the residents’ water supply is derived from surface or groundwater. Massachusetts’ wells are permitted according to their ability to meet demand for 180 days at maximum capacity with no recharge; if these conditions extended beyond the thresholds that determine supply capacity the damage from a drought could be widespread due to depleted groundwater supplies. The U.S. Drought Monitor also records information on historical drought occurrence. Data is only found at the state level. The U.S. Drought Monitor categorizes drought on a D0-D4 scale as shown below.

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

Previous Occurrences

In Massachusetts, six major droughts have occurred statewide since 1930.⁶ 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 in the state since 2000, based on the US Drought Monitor:

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

Source: U.S. Drought Monitor

In recent years, Chester has not been significantly impacted by any droughts in the state, though drought conditions in the summer of 2016 resulted in watering restrictions.

Probability of Future Events

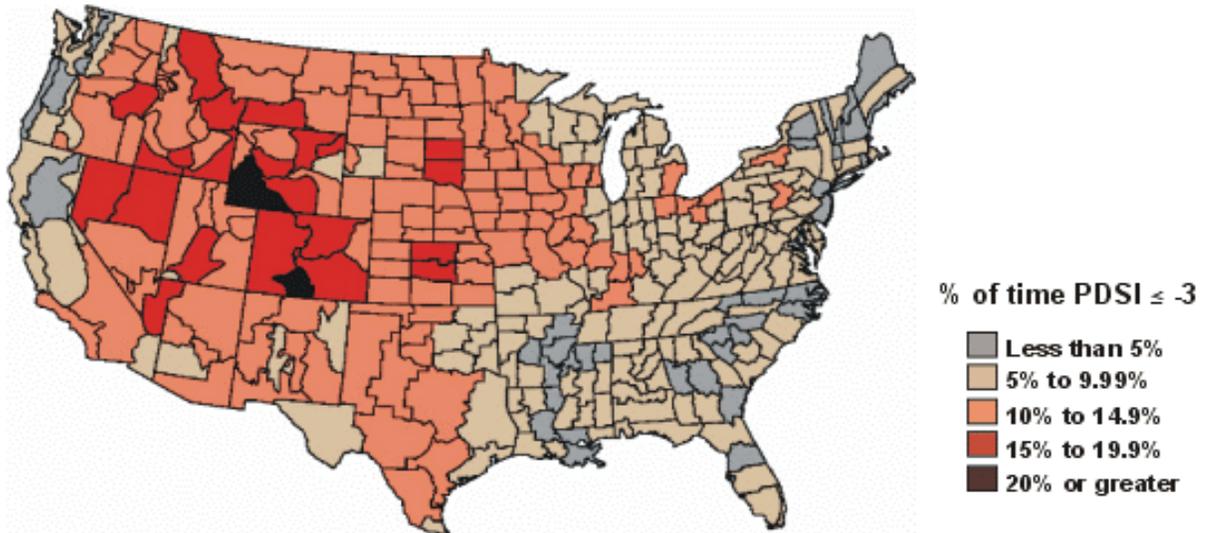
In Chester, as in the rest of the state, drought has a "low" probability of future occurrence, or between 1 and 10 percent in any given year.

Based on past events and current criteria outlined in the Massachusetts Drought Management Plan, it appears that western Massachusetts may be more vulnerable than eastern Massachusetts to severe drought conditions. However, many factors, such as water supply sources, population, economic factors (i.e., agriculture based economy), and infrastructure, may affect the severity and length of a drought event. When evaluating the region's risk for drought

⁶ US Geological Survey Water-Supply Paper 2375. "National Water Summary 1989 – Floods and Droughts: Massachusetts." Prepared by S. William Wandle, Jr., US Geological Survey.

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.⁷

Palmer Drought Severity Index 1895–1995 Percent of time in severe and extreme drought



Impact

Due to the water richness of western Massachusetts, Chester is unlikely to be adversely affected by anything other than a major, extended drought. The impacts of a major drought are categorized by the U.S. Drought Monitor to include:

- Slowing or loss of crops and pastures
- Water shortages or restrictions
- Low water levels in streams, reservoirs and wells

As a result, the impact of a drought would be “minor,” with only minor property damage or disruption on quality of life.

However, such droughts are likely to be more frequent due to weather extremes caused by climate change. Chester’s main water supply is two reservoirs, which over a prolonged drought could lower or experience water quality issues due to low levels. Chester has an existing agreement with a local owner of a private water supply for emergency water but a prolonged drought where water must be purchased from other sources, or where reservoir water needs to be more extensively treated due to quality issues, could be expensive for the town.

⁷ National Drought Mitigation Center – <http://drought.unl.edu>

Vulnerability

Based on the above assessment, Chester has a vulnerability of "2 - High" from drought. There would be no foreseeable damage to structures or loss of life resulting from drought. The town's water supply could be extremely vulnerable to prolonged and frequent droughts.

Extreme Temperatures

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

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

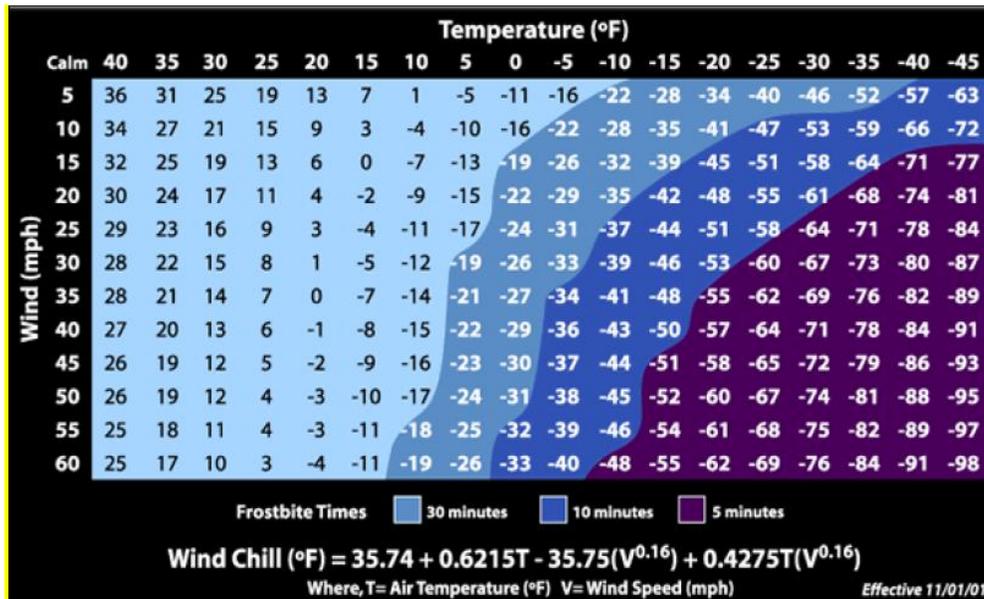
Criteria for issuing alerts for Massachusetts are provided on National Weather Service web pages: <http://www.erh.noaa.gov/box/warningcriteria.shtml>.

Extent

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 impact the whole community.

Wind Chills



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

Heat Index

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

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

Previous Occurrences

As of 2015, the National Climatic Data Center (<http://www.ncdc.noaa.gov/extremes/scec/records>) identifies Chester as holding both the highest and the lowest temperature extremes recorded in the state of Massachusetts:

- 107°F on August 2, 1975
- -35°F on January 12, 1981

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 Chester is considered to be "minor," with no property damage and very limited affect on humans. Chester officials do not find residents to be in much need of assistance during extreme temperature events, owing to the culture of self-reliance in the hill town. Current issues mainly involve the freezing of water service pipes connecting houses to the water main. However, town officials note that over 60 percent of the town is projected to be age 60 or over by 2050, which may lead to greater needs among residents during extreme temperature events.

Vulnerability

Chester's vulnerability from extreme heat and cold is considered to be, "4 - Low."

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

Other Hazards

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

4: CRITICAL FACILITIES

Facility Classification

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

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

The Critical Facilities List for the Town of Chester has been identified utilizing a Critical Facilities List provided by the State Hazard Mitigation Officer. Chester's Hazard Mitigation Committee has broken up this list of facilities into four 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.
- Facilities that may have resources that could be drawn upon in response to a disaster

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

Category 1 – Emergency Response Services

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

1. Emergency Operations Center

Primary: Chester Town Hall- 15 Middlefield Road
Alternate: Chester Fire Station, 30 Route 20

2. Fire Station

Chester Fire Department – 30 Route 20
Chester Fire Department, Secondary Station – Bromly Road (tanker and brush trucks)

3. Police Station

Chester Police Department – Basement of Town Hall- 15 Middlefield Road

4. **Highway Garage**
Chester Highway Department – 2 Town Road
5. **Water Department**
Department of Public Works – 2 Town Road
6. **Emergency Fuel Stations**
Diesel – Town Garage-2 Town Road
Gasoline – Town Garage- 2 Town Road
7. **Emergency Electrical Power Facility**
2 Town Road
Stationary Generators – Town Hall, Fire Department, DPW
Mobile Generators – DPW and access to others through MEMA
8. **Emergency Shelters**
Chester Town Hall- 15 Middlefield Road
Chester Elementary School- 325 Middlefield Road
9. **Dry Hydrants, Fire Ponds, and Water Sources**
Austin Brook Reservoir (water supply)
Horn Pond (water supply)
Chester Mountain Water (water supply, privately owned), Middlefield
Numerous locations in Chester- see critical facilities map at the back of plan
10. **Utilities**
Chester Municipal Electric Light Department
Eversource
11. **Water**
Department of Public Works
12. **Helicopter Landing Sites**
Emery Street
Route 20 (Willander Field)
Skyline Road
13. **Communications**
Firetower in area of 625-627 Skyline Trail, FAA off Abbott Hill Rd. (primary beacon)
Radio towers: Town Hall, Fire Station, Holcomb Road at Fire Tower
State police radio tower – Holcomb Road
Verizon switching station located near Huntington library

Cell towers: Old State Road, Route 20, Pine Hill Road, Sylvester Hamilton Road (AT&T)

14. Primary Evacuation Routes

- Route 1- Route 20 west towards Becket
- Route 2- Route 20 east towards Huntington
- Route 3- Middlefield Road towards Middlefield
- Route 4- Blandford Road towards Blandford
- Route 5 – Skyline Trail
- Route 6 – Bromley Road

15. Bridges Located on Evacuation Routes

- Walker Brook – Blandford Road
- Sanderson Brook – Route 20
- Main Street Bridge
- Maple Street

16. Water Treatment Plant

- Reservoir Road

Category 2 – Non Emergency Response Facilities

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

- 1. Transfer Station or Landfill**
Chester Transfer Station- Emery Street
- 2. Fuel Station**
Wheeler Oil
- 3. Post Office**

Category 3 – Facilities/Populations to Protect

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

- 1. Special Needs Population**
Senior Center at Town Hall
- 2. Elderly Housing/Assisted Living**
School Street (privately owned)
- 3. Recreation Areas**
- 4. Schools**
Chester Elementary School- Middlefield Road

5. Places of Worship

United Church of Christ- 334 Skyline Trail
Second Congregational Church- 1 Middlefield Road
Chester Baptist Church – 18 Middlefield Road

6. Historic Buildings/Sites

Old Chester Jail – 220 Rte 20
North Chester Chapel – 4 N. Chester Rd.
Train Station – 10 Prospect St. (privately owned but important to downtown)
Masonic Hall – 221 Rte 20
Historic Cemetery Vault – Pine Hill (bottom of hill)
Keystone Arches

7. Apartment Complexes

Chester Commons- School Street

8. Employment Centers

Scattered throughout downtown (Town Hall, DPW, Chester Elementary School)

9. Camps

Walker Island Family Camping- 27 Route 20

10. Mobile Home Parks

Rice’s Trailer Park- 220 Middlefield Road

12. Daycare/Nursery

Middlefield Street

Category 4 – Regional Resources

1. Hospitals

Baystate Medical Center, Springfield
Noble Hospital, Westfield
Berkshire Medical Center, Pittsfield
Cooley-Dickinson Hospital, Northampton

2. Shelters

Gateway Regional High School

5: MITIGATION CAPABILITIES & STRATEGIES

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

Goal Statement

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

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

Chester has most of the no cost or low cost hazard mitigation capabilities in place. Land use zoning, subdivision regulations and an array of specific policies and regulations include hazard mitigation best practices, such as limitations on development in floodplains, stormwater management, tree maintenance, etc. Chester also has appropriate staff dedicated to hazard mitigation-related work for a community its size, including a Town Administrator, a professionally run Department of Public Works, a Building Inspector and a Tree Warden.

In terms of plans, Chester adopted a Master Plan in 2006, has a Local Emergency Operations Plan, Transportation Plan, and is currently developing a Stormwater Management Plan. These capabilities deployed for hazard mitigation as appropriate. The town also has very committed and dedicated volunteers who serve on Boards and Committees and in volunteer positions. The town collaborates closely with surrounding communities and is party to Mutual Aid agreements through the MEMA, such as for fire protection in the event of a wildfire or brushfire. Chester is also an active member community of the Pioneer Valley Planning Commission (PVPC) and can take advantage of no cost local technical assistance as needed provided by the professional planning staff at the PVPC.

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

Other improvements identified through this plan update process that would support hazard mitigation include the update and adoption of an Open Space and Recreation Plan; a Capital Improvements Plan; and revisions to the zoning and subdivision regulations to restrict and better floodproof any development in the floodplain.

After reviewing existing policies and the hazard identification and assessment, the Town Hazard Mitigation Committee developed a set of hazard mitigation strategies for implementation.

Overview of Mitigation Capabilities by Hazard

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

Flooding

The key factors in flooding are the water capacity of water bodies and waterways, the regulation of waterways by flood control structures, and the preservation of flood storage areas and wetlands. As more land is developed, more flood storage is demanded of the town's water bodies and waterways. The town currently addresses this problem with a variety of mitigation tools and strategies. Flood-related regulations and strategies are included in the town's general bylaws, zoning bylaw, and subdivision regulations. Development is allowed in floodplains by special permit, and development plans must show how the proposal is designed to minimize flood damage and not create increased flood hazards. There is currently a part-time floodplain administrator. Potential improvements to these regulations include considering restricting further new development by adopting a "floodplain conservancy" overlay district, or requiring more stringent requirements to new development such as elevation. Development pressures in Chester are low, however, so such regulations would only have limited on-the-ground impact.

Infrastructure like dams and culverts are in place to manage the flow of water. An inventory of all culverts, stormwater drains, and catch basins is underway in 2016 and will assess the condition of these assets and develop a prioritized plan for maintenance or replacement. The Highway Department otherwise monitors road infrastructure to assist in drainage.

The Local Emergency Operations Plan addresses flooding and severe storms. In addition, the town participates MEMA's debris management program after storm events.

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. In Chester, this primarily includes tree trimming, as the town is vulnerable to town-wide power outages due to the main electric line running along Route 20, which is heavily forested. Tree trimming also provides the benefit of allowing for greater melting of snow/ice along roads, and results in less blocked culverts due to falling debris.

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

To the extent that some of the damages from a winter storm can be caused by flooding, flood protection mitigation measures also assist with severe snowstorms and ice storms. The town has adopted the State Building Code, which ensures minimum snow load requirements for roofs on new buildings.

Hurricanes

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

The flooding associated with hurricanes can be a major source of damage to buildings, infrastructure and a potential threat to human lives. Flood protection measures can thus also be considered hurricane mitigation measures. The high winds that often accompany hurricanes can also damage buildings and infrastructure, similar to tornadoes and other strong wind events.

In the event that flooding or winds caused prolonged disruption in Chester, the town utilizes MEMA for assistance in continuity of operations. The town also has a transportation plan that assesses the condition of roadways in the context of emergency situations.

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. In addition, current land development regulations, such as restrictions on the height of telecommunications towers, can also help prevent wind damages.

Wildfires / Brushfires

Wildfire and brushfire mitigation strategies involve educating people about how to prevent fires from starting, as well as controlling burns within the town. In Chester, the majority of fires occur along the railroad tracks. Greater coordination with CSX is a potential solution to prevent and minimize damage from brush fires associated with trains.

Earthquakes

Although there are five mapped seismological faults in Massachusetts, there is no discernible pattern of previous earthquakes along these faults nor is there a reliable way to predict future earthquakes along these faults or in any other areas of the state. Consequently, earthquakes are arguably the most difficult natural hazard for which to plan. Most buildings and structures in the state were constructed without specific earthquake resistant design features. In addition, earthquakes precipitate several potential devastating secondary effects such as building collapse, utility pipeline rupture, water

contamination, and extended power outages. Therefore, many of the mitigation efforts for other natural hazards identified in this plan may be applicable during the town's recovery from an earthquake.

Dam Failure

Dam failure is a highly infrequent occurrence, but a severe incident could prove catastrophic. In addition, dam failure most often coincides with flooding, so its impacts can be multiplied, as the additional water has nowhere to flow. The only mitigation measures currently in place are the state regulations governing the construction, inspection, and maintenance of dams. This is managed through the Office of Dam Safety at the Department of Conservation and Recreation.

There are a number of privately owned dams upstream of Chester that are currently not operated (water releases, etc.) with any coordination with the town. Uncoordinated dam releases during storm events has proven in the past to negatively impact downtown Chester.

Drought

Although Massachusetts does not face extreme droughts like many other places in the country, it is susceptible to dry spells and drought. The primary mitigation strategy currently in place is to require subdivisions to provide an environmental review that assesses the impact that the development will have on groundwater. The town of Chester has an existing agreement with the owner of a backup private water supply in the event that water becomes scarce. The town also advises residents of water restrictions during dry spells.

Extreme Temperatures

While extremely cold or hot temperatures are easy to predict, there are few mitigation measures necessary in Chester other than planned shelters for vulnerable populations. The town of Chester occasionally provides cooling centers during extreme heat events.

The Town of Chester has few rental properties, which can be subject to damage due to extreme temperatures due to less direct oversight by owners. Most residents in Chester are aware of the precautions necessary to maintain properties during extreme cold.

Other General Capabilities

The Town of Chester has existing site plan review requirements, subdivision regulations, and zoning ordinance that addresses natural hazard implications of development. The planning board also takes natural hazards into consideration when reviewing site plans and projects such as solar installations and wireless towers. The town has a building inspector, an emergency manager, and a Reverse 911 system. But due to the low amount of development in town, other capabilities such as existing mutual aid agreements, partnerships, and coordination among town departments result in more frequent mitigation outcomes. For example, emergency managers and the town Council on Aging have coordinated to target outreach to older residents about resources available during natural disasters. The town also participates in the Western Regional Homeland Security Advisory Council and shares resources with MEMA when appropriate.

2007 Mitigation Action Status

The Hazard Mitigation Committee reviewed the mitigation actions prioritized in the 2007 plan. The table below is a summary of the strategies from the 2007 plan and a brief description regarding the status of the action item. Some of the mitigation strategies that have not been completed will be forwarded into the 2016 action strategy. Others may be deleted due to the need to update the strategy's language.

ACTION NUMBER	MITIGATION ACTION	RESPONSIBLE DEPARTMENT/BOARD	PROPOSED COMPLETION DATE	2016 STATUS	EFFECTIVENESS
1	Stream bank stabilization for portions of the Westfield river that flow through the community.	Chester Select Board, Hazard Mitigation committee, EMD	2010	Banks and bridges along Rte 20 and Old State Road have been reinforced.	Effective. Debris collecting under Main Street bridge due to past storms is now main concern.
2	Identify, prioritize and replace undersized culverts throughout Town.	Select Board, Highway Department	2011	Inventory is part of proposed PAVER study with PVPC.	Not effective because not yet complete.
3	Establish an alternate interconnection point for the Light Department at the Chester/Huntington town line on Old State Highway. This would involve extending the Town's three-phase power line from the Post Office on Route 20 to the interconnection point.	Chester Electric Light Department with Eversource	2008	No action yet taken on post office line. Interconnection point put in by private solar field where town still owns the power lines.	Not effective because not yet complete.
4	Develop a Preliminary Project Proposal and Cost Estimate for Updating Current 911 System including Feasibility of Reverse 911	Board of Selectmen, EMD	2009	Complete and implemented.	Effective.
5	Work with the railroads to know when they plan to grind the tracks as this produces the greatest risk of wildfires. Have firefighters on alert at these times.	Fire Department	2008	Regular train activity is the main problem with brush fires, and they have fire crews on board. Train companies notify town if brush clearing is taking place.	Not effective. Regular train travel also causes brush fires. Revise strategy.
6	Identify existing shelters that are earthquake, winter storm, and high wind resistant as well as outside	Building Inspector, EMD	On-going	Emergency housing agreement with Westfield State University is in process.	Effective. Plans in place or in progress. Delete strategy.

ACTION NUMBER	MITIGATION ACTION	RESPONSIBLE DEPARTMENT/BOARD	PROPOSED COMPLETION DATE	2016 STATUS	EFFECTIVENESS
	floodplain and dam inundation areas. Upgrade as needed.			Local backup shelter is Gateway Regional High School.	
7	Evaluate the EOCs to determine if they are disaster resistant and make necessary upgrades if they are found to be deficient.	Building Inspector, Board of Selectmen, Planning Board, EMD		Complete.	Effective.
8	Inventory supplies at existing shelters and develop a needs list and storage requirements	Emergency Management Planning Committee, School Facilities Manager	2008	Opted not to do inventories as food is stored with regional emergency services organizations and shelters have no food storage. Food and cots available through mutual aid agreements. Delete strategy.	Not effective. Supplies inventoried and stored regionally. Delete.
9	Establish a Community Emergency Response Team (CERT) with neighboring communities.	Board of Selectmen, Police & Fire Departments, EMD	On-going	Mutual aid agreements in place for primary services.	Not effective due to size of community. Delete.
10	Identify and upgrade structures to create additional shelters in remote locations in Town.	EMD	2008	Complete. All potential shelter opportunities identified. Added North Chester Church.	Effective.
11	Conduct inspection of existing back-up generators and upgrade if needed to ensure that all identified shelters have sufficient back-up utility service in the event of primary power failure.	Building Inspector, EMD	2009	Identified which locations have access to MEMA's mutual aid generators. Complete.	Effective.
12	Develop and distribute an educational pamphlet on Fire Safety and Prevention to all town residents. (SAFE PROGRAM)	Fire Department	On-going	Pamphlet goes to students. Complete.	Effective.
13	Provide training to public safety staff/first responders in how to handle hazardous substance releases.	Fire Department	On-going	Ongoing training addresses natural and man-made hazards. Complete.	Effective.
14	Collect, update, and disseminate information on local radio/TV stations	EMD	2008	Utilize EMS for local emergency information	Not effective. Have media contacts instead. Delete strategy.

ACTION NUMBER	MITIGATION ACTION	RESPONSIBLE DEPARTMENT/BOARD	PROPOSED COMPLETION DATE	2016 STATUS	EFFECTIVENESS
	emergency information			through list of media contacts.	
15	Implement Standards in the Subdivision Rules and Regulations to require temporary and permanent erosion control measures.	Planning Board	2008	Complete	Effective.
16	Revise the Subdivision Rules and Regulations Required Improvements section to include the construction of an underground water tank(s) (10,000 gal. minimum) in new subdivisions for fire suppression purposes.	Fire Department, Planning Board	2008	No action taken.	Not cost effective. Delete.
17	Amend the Special Permit and Site Plan Approval Provisions in the Chester Zoning Bylaw by adding more specific Requirements to Address Flood Related Issues	Conservation Commission, Planning Board	2008	No action taken.	Not effective due to lack of significant development in Chester.
18	Add flood prevention and mitigation to the purpose section of the Subdivision Rules and Regulations.	Planning Board	2008	No action taken.	Effective in the event of a subdivision, of which there are very few in Chester.
19	Ensure that the Development Impact Statement identifies impacts of the proposed development could have on the potential for flooding, and include mitigation measures, if deemed necessary by the Planning Board.	Planning Board	2008	No action taken. Per existing subdivision regulations, proposed developments in floodplains must show how the proposal is designed to minimize flood damage and provide base flood elevation data.	Not adopted so not effective, but also would not be effective due to lack of development. Revise subdivision regulation requirements that proposed developments must show potential impacts on flooding and mitigation measures if deemed necessary by the Planning Board.
20	Add specific impacts to address in the Special Permit process including topographic change, removal of cover vegetation, risk of erosion or siltation and increased stormwater runoff.	Planning Board	2008	No action taken.	Not adopted so not effective, but also would not have been effective in ensuring time period due to lack of development. Revise special permit criteria in Section 6.5.6 to include these impacts.

ACTION NUMBER	MITIGATION ACTION	RESPONSIBLE DEPARTMENT/BOARD	PROPOSED COMPLETION DATE	2016 STATUS	EFFECTIVENESS
21	In regards to the Chester Open Space and Recreation Plan, implement the Five-Year Action Plan strategies, particularly those dealing with protection of forests and farmland.	Planning Board	2008	No action taken. OSRP no longer in effect.	Continue to pursue conservation opportunities as they arise. Consider revising the OSRP.
22	Develop and implement a Beaver Management Strategy	Planning Board	2008	Ongoing as needed. Two areas of concern currently being addressed by town.	Delete. Strategy not needed. Address beaver dams on an as-needed basis.
23	Create schedule of required dam inspections, send letters of notification to private dam owners at both one year and six months prior to required inspection dates, determine if inspections have been completed, require copies of inspection reports be provided to the town, and initiate appropriate legal actions if inspections are not completed as required.	Board of Selectmen	On-going	No action taken.	Not effective because not yet complete. Identify owners of dams of significant importance and contact regarding dam inspection and maintenance requirements. Work to develop plan for coordinated dam releases during high rainfall events.
24	Prepare and implement a Water Conservation Plan.	Board of Selectmen, Conservation Commission	2009	No action taken.	Not effective because not complete and no droughts during ensuing time period. Add emphasis on targeted outreach.
25	Identify all Pre-FIRM Structures throughout Town that need to be Elevated above the Base-Flood Elevation	Building Inspector, Fire Department	2010	No action taken.	Not cost effective. Delete.
26	In the Zoning regulations for Telecommunication Facilities, add safety and prevention of wind-related damage as a stated purpose.	Planning Board	2008	No action taken.	Not effective because not implemented.

Prioritized Implementation Plan

Several of the action items previously identified in the 2007 Hazard Mitigation Plan are currently continuing, either because they require more time to secure funding or their construction process is ongoing. In addition, the Hazard Mitigation Committee identified several new strategies that are also being pursued. These new strategies are based on experience with currently implemented strategies, as well as the hazard identification and risk assessment in this plan.

Prioritization Methodology

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

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

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

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

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

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

Cost Estimates

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

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

Cost estimates take into account the following resources:

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

Project Timeline

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

New and Continuing Mitigation Strategies to be Implemented							
Strategy Description	Status	Hazards Addressed	Responsibility /Oversight	Priority	Estimated Cost	Funding Source	Time Frame
Prioritize roads for paving, trap rock, and culvert replacement. Include East River Road, Johnson Hill, Abbott Hill, Maynard Street, Cooper Drive, Prospect Street, Round Hill Road for paving prioritization due to washouts. Assess the culvert on Old State Road and apply stream continuity standards in upgrade plans.	Not started.	Flooding Hurricanes Severe Snow and Ice Storms	DPW	High	High	Chapter 90 Town Funds HMP grants	6 mo.
Work with Mass Wildlife and MassDOT to resume tree trimming along Rte 20 to prevent power outages.	Tree trimming in 2015 stopped due to bat habitat concerns.	Hurricanes / Severe Wind Tornadoes Severe Snow and Ice Storms	Chester Municipal Electric Light Dept. (CMELD)	High	High	MassDOT	6 mo.
Develop a plan and seek implementation funding for tree trimming along the town's main arteries, including Skyline and Middlefield Roads, as well as other areas of concentrated population.	Not started.	Hurricanes / Severe Wind Tornadoes Severe Snow and Ice Storms	DPW CMELD	High	Medium	MassDOT Town funds HMP grants	1-2 years

New and Continuing Mitigation Strategies to be Implemented							
Strategy Description	Status	Hazards Addressed	Responsibility /Oversight	Priority	Estimated Cost	Funding Source	Time Frame
Work with U.S. Army Corps of Engineers to re-establish flow in Westfield River under Main Street bridge that is being blocked by storm debris.	Not started. Debris from Hurricane Hugo, Tropical Storm Irene, and winter storms of 2015 adding to significant build-up of debris.	Flooding Hurricanes	Conservation Commission Westfield Wild & Scenic Committee	Medium	High	USACE MassDEP Ecological Restoration Westfield River protection funds	6 mo.
Set up partnership with CSX and other towns to prevent brush fires along tracks. Consider strategies such as placing rocks or removing leaves and brush along tracks.	Not started	Brush / wild fires	Fire Dept. Board of Selectmen	High	Low	CSX Town funds	6 mo. to 1 year
Coordinate with dam owners on waterways in and upstream of Chester to develop a plan or memorandum of understanding for coordinated dam releases in high rain events.	Not started. Uncoordinated dam releases during T.S. Irene led to severe flooding in Chester.	Flooding Hurricanes Dam Failure	Board of Selectmen	High	Low	Staff time	1-2 years
Identify, prioritize, and replace undersized culverts throughout town.	Inventory to be integrated into PVPC PASER study, in process in 2016.	Flooding	DPW	Medium	Low	Staff time	6 mo. – 1 year
Extend the Town's three-phase power line from the post office on Rte 20 to the interconnection point in order to provide better service and more capacity.	Not started	Severe Winds Tornadoes Hurricanes	Chester Municipal Electric Light	High	High	CMELD HMPD	1 year

New and Continuing Mitigation Strategies to be Implemented							
Strategy Description	Status	Hazards Addressed	Responsibility /Oversight	Priority	Estimated Cost	Funding Source	Time Frame
Implement the Five-Year Action Plan strategies in the Chester Open Space and Recreation Plan in regards to the protection of forests and floodplains.	Implemented as opportunities arise	Flooding Wild fire / brush fire	Town administrator Conservation Commission	Low	High	LAND grants DWSP grants	1-5 years
Investigate water system for leaks.	Not started	Drought	DPW / Water Department	Medium	Medium	Local funds HMGP MassDEP Water Conservation Grants (if re-funded)	1-2 years
Develop water conservation plan, including plan for targeted public outreach.	Not started	Drought	DPW / Water Department Board of Selectmen	Low	Medium	SWMI grants Town funds	1 year
In the Zoning regulations for Telecommunication Facilities, add safety and prevention of wind-related damage as a stated purpose.	Not started	Flooding	Planning Board	Low	Low	Staff time	1 year

New and Continuing Mitigation Strategies to be Implemented							
Strategy Description	Status	Hazards Addressed	Responsibility /Oversight	Priority	Estimated Cost	Funding Source	Time Frame
Add specific impacts to address in the Special Permit process including topographic change, removal of cover vegetation, risk of erosion or siltation and increased stormwater runoff.	Not started	Flooding	Planning Board	Low	Low	Staff time	1 year
Amend the Special Permit and Site Plan Approval Provisions in the Chester Zoning Bylaw by adding more specific requirements to address flood related Issues.	Not started	Flooding	Planning Board	Low	Low	Staff time	1 year
Add flood prevention and mitigation to the purpose section of the Subdivision Rules and Regulations.	Not started	Flooding	Planning Board	Low	Low	Staff time	1 year
Ensure that the Development Impact Statement identifies impacts of the proposed development could have on the potential for flooding, and include mitigation measures, if deemed necessary by the Planning Board.	Not started	Flooding	Planning Board	Low	Low	Staff time	1 year

6: PLAN REVIEW, EVALUATION, IMPLEMENTATION, AND ADOPTION

Upon completion of the draft Hazard Mitigation Plan, a public meeting was held by the Town staff and the Pioneer Valley Planning Commission on June 27, 2016, to present and request comments from town officials and residents. The Hazard Mitigation Plan was then submitted to the Massachusetts Emergency Management Agency (MEMA) and the Federal Emergency Management Agency for their review. Upon receiving conditional approval of the plan by FEMA, the plan was presented to the Town's Select Board and adopted.

Plan Implementation

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

Incorporation with Other Planning Documents

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

- ***Chester Comprehensive Emergency Management Plan*** (particularly the Critical Infrastructure Section) – the Critical Infrastructure section was used to identify those infrastructure components in Chester that have been identified as crucial to the function of the Chester; also, this resource was used to identify special needs populations as well as potential emergency shortcomings.
- ***Chester Open Space, Recreation Plan*** this Plan was used to identify the natural context within which the Chester mitigation planning would take place. This proved useful insofar as it identified water bodies, rivers, streams, infrastructure components (i.e. water and sewer, or the lack thereof), as well as population trends. This was incorporated to ensure that the City's mitigation efforts would be sensitive to the surrounding environment. The town's Open Space and Recreation Plan is no longer in effect, however, and stands to be updated.
- ***Chester Zoning Ordinance*** – Chester's Zoning was used to gather identify those actions that the town is already taking that are reducing the potential impacts of a natural hazard (i.e. floodplain regulations) to avoid duplicating existing successful efforts.
- ***Massachusetts' State Hazard Mitigation Plan*** - This plan was used to insure that the town's HMP was consistent with the State's Plan.

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

Plan Monitoring and Evaluation

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

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

Plan Mission and Goal

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

Hazard Identification and Risk Assessment

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

Existing Mitigation Strategies

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

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

Proposed Mitigation Strategies

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

Review of the Plan and Integration with Other Planning Documents

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

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

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

COMMONWEALTH OF MASSACHUSETTS

Town of Chester

15 Middlefield Rd, Chester MA 01011

Board of Selectmen

Telephone (413) 354-7760 Fax (413) 354-2268

e-mail: selectmen@comcast.net

CERTIFICATE OF ADOPTION

Town of Chester, MASSACHUSETTS

A RESOLUTION ADOPTING THE TOWN OF CHESTER HAZARD MITIGATION PLAN UPDATE

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

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

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

WHEREAS, a duly-noticed public meeting was held by the Board of Selectmen on June 6, 2016, for the public and municipality to review prior to consideration of this resolution; and

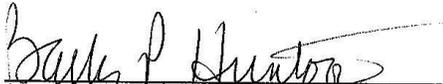
WHEREAS, the Town of Chester authorizes responsible departments and/or agencies to execute their responsibilities demonstrated in the plan, and

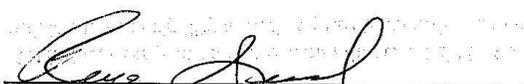
NOW, THEREFORE BE IT RESOLVED that the Town of Chester Board of Selectmen formally approves and adopts the Town of Chester Hazard Mitigation Plan Update, in accordance with M.G.L. c. 40.

ADOPTED AND SIGNED this 12th day of December, 2016.

TOWN OF CHESTER BOARD OF SELECTMEN


John Baldasaro, Chairman


Barbara Huntoon, Vice Chairman


Rene Senecal, Clerk

7: APPENDICES

Appendix A - Technical Resources

1) Agencies

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

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

2) Mitigation Funding Resources

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

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

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

3) Internet Resources

Sponsor	Internet Address	Summary of Contents
Natural Hazards Research Center, U. of Colorado	http://www.colorado.edu/litbase/hazards/	Searchable database of references and links to many disaster-related websites.
Atlantic Hurricane Tracking Data by Year	http://wxp.eas.purdue.edu/hurricane	Hurricane track maps for each year, 1886 – 1996
National Emergency Management Association	http://nemaweb.org	Association of state emergency management directors; list of mitigation projects.
NASA – Goddard Space Flight Center “Disaster Finder:	http://www.gsfc.nasa.gov/ndrd/disaster/	Searchable database of sites that encompass a wide range of natural disasters.
NASA Natural Disaster Reference Database	http://ltpwww.gsfc.nasa.gov/ndrd/main/html	Searchable database of worldwide natural disasters.
U.S. State & Local Gateway	http://www.statelocal.gov/	General information through the federal-state partnership.
National Weather Service	http://nws.noaa.gov/	Central page for National Weather Warnings, updated every 60 seconds.
USGS Real Time Hydrologic Data	http://h20.usgs.gov/public/realtime.html	Provisional hydrological data
Dartmouth Flood Observatory	http://www.dartmouth.edu/artsci/geog/floods/	Observations of flooding situations.
FEMA, National Flood Insurance Program, Community Status Book	http://www.fema.gov/fema/csb.html	Searchable site for access of Community Status Books
Florida State University Atlantic Hurricane Site	http://www.met.fsu.edu/explores/tropical.html	Tracking and NWS warnings for Atlantic Hurricanes and other links
The Tornado Project Online	http://www.tornadoject.com/	Information on tornadoes, including details of recent impacts.
National Severe Storms Laboratory	http://www.nssl.uoknor.edu/	Information about and tracking of severe storms.
Independent Insurance Agents of America IIAA Natural Disaster Risk Map	http://www.iaa.iix.com/ndcmap.html	A multi-disaster risk map.
Earth Satellite Corporation	http://www.earthsat.com/	Flood risk maps searchable by state.
USDA Forest Service Web	http://www.fs.fed.us/land	Information on forest fires and land management.

Appendix B – Documentation of the Planning Process

Chester Hazard Mitigation Committee Meeting Agenda

**Chester Town Hall
April 11, 2016, 3 p.m. – 5 p.m.**

1. Introductions/Administrative
 - a. Affirm local Hazard Committee membership
 - b. Review in-kind match and reporting procedure
2. Overview of Hazard Mitigation Planning Process
 - a. Background on Hazard Mitigation Planning
 - b. Planning process and requirements
 - i. 3-5 committee meetings
 - ii. 2 public outreach meetings
 - iii. MEMA / FEMA review and conditional approval
 - iv. Select Board adoption
 - v. FEMA final approval
 - c. Schedule for committee and public outreach meetings
3. Review of Chapter 1: Planning Process
4. Review of Chapter 2: Local Profile
5. Review of Chapter 3: Hazard Identification and Risk Assessment

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

**Chester Town Hall
April 25, 2016, 3 p.m. – 5 p.m.**

1. Review of updates made to plan since last meeting
2. Continuation of completion of Capabilities Worksheet
3. Review of Chapter 4: Critical Facilities
4. Review of Chapter 5: Hazard Mitigation Strategies (if time allows)

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

**Chester Town Hall
May 16, 2016, 3 p.m. – 5 p.m.**

1. Review of updates made to plan since last meeting
2. Review of Chapter 5: Hazard Mitigation Strategies
3. Review of Chapter 6: Plan Implementation

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

**Chester Town Hall
June 27, 2016, 3 p.m. – 5 p.m.**

1. Continue updating Chapter 5: Hazard Mitigation Strategies
2. Review of all changes made in full plan

MEDIA RELEASE / NOTICE

CONTACT: Jaimye Bartak, PVPC Senior Planner, (413) 781-6045 or jbartak@pvpc.org
Patricia Carlino, Town Administrator, (413) 354-7760 or
selectmen@comcast.net

FOR IMMEDIATE RELEASE

April 14, 2016

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

Chester residents, businesses, and surrounding community representatives are invited to provide comments on the Town of Chester Hazard Mitigation Plan on Monday, April 25, 2016, at 6 pm at the Town Hall Meeting Room. The meeting is being held in conjunction with the Selectmen meeting scheduled that evening. The hazard mitigation 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.

This planning effort is being undertaken to help the Town of Chester 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.

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

For more information, please contact PVPC's Jaimye Bartak at jbartak@pvpc.org or (413) 781-6045.

**Chester Hazard Mitigation Plan Update
Public Engagement Event #1**

**Chester Town Hall Meeting Room
April 25, 2016, 6 p.m.**

1. Overview and benefits of hazard mitigation
2. Plan development process
3. Identified hazards and vulnerability assessment
4. Next steps, questions, and discussion

MEDIA RELEASE / NOTICE

CONTACT: Jaimye Bartak, PVPC Senior Planner, (413) 781-6045 or jbartak@pvpc.org
Patricia Carlino, Town Administrator, (413) 354-7760 or
selectmen@comcast.net

FOR IMMEDIATE RELEASE
June 20, 2016

Town of Chester to Hold Second Public Engagement Event for Hazard Mitigation Plan

Chester residents, businesses, and surrounding community representatives are invited to provide comments on the Town of Chester Hazard Mitigation Plan on Monday, June 27, 2016, at 6 pm at the Chester Train Station. The meeting is being held in conjunction with the Selectmen meeting scheduled that evening. The hazard mitigation 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.

This planning effort is being undertaken to help the Town of Chester 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.

The meeting will include a review of the hazard mitigation planning process and a discussion of proposed mitigation strategies to address natural hazards in Chester. Municipal officials and PVPC staff will be available to answer questions and listen to comments and input on the impacts of natural hazards on the Town.

For more information, please contact PVPC's Jaimye Bartak at jbartak@pvpc.org or (413) 781-6045.

**Chester Hazard Mitigation Plan Update
Public Engagement Event #2**

**Chester Town Hall
June 27, 2016, 6 p.m.**

1. Overview and benefits of hazard mitigation
2. Plan development process
3. Vulnerability identification and assessment
4. Proposed hazard mitigation strategies
5. Next steps and questions/discussion

Media Organizations Sent Press Releases

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

WHMP-FM	15 Hampton Avenue	Northampton	MA	01060
Wilbraham-Hampden Times	2341 Boston Road	Wilbraham	MA	01095
Worcester Telegram & Gazette	20 Franklin Street	Worcester	MA	01615
WRNX/WHYN/WPKR Radio	1331 Main Street	Springfield	MA	01103
WWLP-TV 22	PO Box 2210	Springfield	MA	01102

Appendix C – List of Acronyms

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

