THE TOWN OF PLAINFIELD
HAZARD MITIGATION PLAN

Adopted by the Plainfield Board of Selectmen on _____

The Plainfield Hazard Mitigation Committee

and

Pioneer Valley Planning Commission

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Acknowledgements

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

Howard Bronstein, Select Board Chair

Mert Taylor, JR, Highway Superintendent and Emergency Management Director

Peter Lapointe, Planning Board

Judy Williams, Conservation Commission Chair

Dave Alvord, Assistant Fire Department Chief, Building Committee Member

David Kramer, Financial Committee Chair

The Plainfield Select Board offers thanks to the Massachusetts Emergency Management Agency (MEMA) for developing the Massachusetts Hazard Mitigation Plan which served as a model for this plan update. In addition, special thanks are extended to the staff of the Pioneer Valley Planning Commission for professional services, process facilitation and preparation of this document.

The Pioneer Valley Planning Commission

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Cover Photo: LOCATION; PVPC

INSERT SIGNED ADOPTION CERTIFICATE

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

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

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

HAZARD MITIGATION COMMITTEE

Creating the Town of Plainfield's Hazard Mitigation plan involved a 6-member committee:

- Howard Bronstein, Select Board Chair
- Mert Taylor, JR, Highway Superintendent and Emergency Management Director
- Peter Lapointe, Planning Board
- Judy Williams, Conservation Commission Chair
- Dave Alvord, Assistant Fire Department Chief
- David Kramer, Financial Committee Chair

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

- Reviewing and incorporating existing plans and other information including historical development patterns

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

The key product of this Hazard Mitigation Plan 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 Plainfield Town Hall, were held on the dates listed below. Agendas for these meetings are included in Appendix B.

August 15, 2018
Work group meeting included hazard mitigation planning overview, identifying and organizing the planning team, a discussion of the public outreach process and an initial discussion of hazard identification and risk assessment.

September 26, 2018
Work group revisited critical facilities list and map, and began the FEMA Capability Assessment.

October 10, 2018
Work group completed the FEMA Capability Assessment and worked to identify vulnerabilities associated with each natural hazard. Identified current mitigation strategies undertaken by the town and ways to improve their effectiveness.

January 16, 2019
Work group identified new mitigation strategies the town should pursue to lessen its vulnerabilities to hazards. These strategies were then prioritized.

February 20, 2019
The work group discussed the mechanisms for keeping this plan up to date over its five year implementation time frame.

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

PARTICIPATION BY STAKEHOLDERS

A variety of stakeholders were provided with an opportunity to be involved in the update of the Plainfield 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, 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 Plainfield 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.
- Actively participating in the Executive Office of Energy and Environmental Affairs' Municipal Vulnerability Preparedness (MVP) program.

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 Plainfield 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). WHRSAC, 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 Plainfield was updating its Hazard Mitigation plan. Meetings of WRHSAC regularly involve discussion about how to improve emergency preparedness in western Massachusetts, and hazard mitigation activities are included in this discussion.

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

AGENCIES THAT HAVE THE AUTHORITY TO REGULATE DEVELOPMENT

The Plainfield Planning Board is the primary Town agency responsible for regulating development in town. Feedback to the Planning Board was ensured through the participation of Peter Lapointe (member of the Planning Board) on the Hazard Mitigation Committee. Additionally, the first public meeting was held as a joint session with the regularly scheduled Planning Board meeting, so members of the Planning Board were present to share their thoughts on the hazards and the potential actions that could be taken to mitigate them.

As a regional planning authority, the Pioneer Valley Planning Commission works with all agencies that regulate development in Plainfield, 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 Plainfield Hazard Mitigation Plan, the operational policies and any mitigation strategies or identified hazards from these entities were incorporated into the Hazard Mitigation Plan.

PARTICIPATION BY THE PUBLIC, BUSINESSES, AND NEIGHBORING COMMUNITIES

Two public planning sessions were held as part of the development of the Plainfield plan – on October 10, 2018 and February 13, 2019. Both meetings occurred after the Hazard Mitigation Committee had provided input on hazards and mitigation strategies relevant to the community. The first public meeting was held as a joint session with the regularly scheduled Planning Board meeting. The second public meeting was held in concert with the Municipal Vulnerability Planning Process Public Listening Session, as the purpose of both meetings was to discuss the planning processes of the HMP and MVP, present findings, and solicit feedback on proposed mitigation and resilience strategies. Notice of both public meetings was posted at Plainfield Town Hall in compliance with the Commonwealth of Massachusetts' open meeting law. Public meeting agendas and notices can be found in Appendix B.

The Hazard Mitigation Committee determined that the most effective outreach strategies for engaging with the public, businesses and neighboring communities was word of mouth and through local media, and so these strategies were employed for reaching out to all three groups of stakeholders. The press release indicated that residents of Plainfield were invited to attend the event, which was also intended to include representatives of businesses in Plainfield and residents of neighboring communities. While the Hazard Mitigation Committee was confident that a well-advertised HMP public meeting would draw a representative and broad audience, it also recognized the benefits of pairing the public meeting with a regularly scheduled Planning Board Meeting to be sensitive to local residents and volunteers competing time commitments. For this reason, the first public meeting, which included a presentation and

discussion about the hazard mitigation process and plan, was held at the beginning of regularly scheduled Planning Board meeting.

Businesses and neighboring communities were also provided with an opportunity to provide feedback through the Pioneer Valley Planning Commission. PVPC is regularly involved in land use, transportation, and environmental planning initiatives in Plainfield and surrounding communities. Regular feedback received from these other initiatives was incorporated into the hazard mitigation planning process. Neighboring communities of Hawley, Savoy, Ashfield, Cummington, and Windsor that directly border Plainfield were provided with an opportunity to comment. These communities were invited to attend the public meetings and to view the draft plan and via press releases sent to news outlets serving those towns. Additionally, an email was sent to the Selectboard, Town Administrator and Emergency Management Director in each Town where contact information was available inviting them to Plainfield's Public Meetings.

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

Public Meeting #1 – July 23, 2018

On August 29, 2018, 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 October 10, 2018. This release was sent to those media identified by the Hazard Mitigation Committee as most relevant to the development of the plan. This meeting took place in the town hall auditorium as a joint session with the Plainfield Planning Board.

General concerns that surfaced at this meeting were:

- Power outages and communication
    - To report downed power lines or power outages, residents call the electric company on a land line or cell phone, if they have service. However, there is no backup power to the local phone lines after 4 hours of a power outage. The master Verizon box on South Central Street isn't connected to generator power. Also, many peoples' land line phones are plug-in cordless handsets, so they still need power
- Extreme temperatures
    - We see more severe cold weather and many residents have unreliable heating systems
    - Recent weather patterns have brought several deep frost cycles in the winter - whereas the freeze-frost cycle used to be annual, now it happens many times per year. This erratic pattern weakens tree species, leading to greater mortality. It is also harder on roads when freeze-frost cycles increase in frequency, thereby increasing DWP operating costs.
- Flood
    - Road crossings – the hazard is damage to the road infrastructure from problem culverts including Meadow Brook under Pleasant St and Gloyd St, River Road, Jones Road

    - Increase in summer rains leads to more frequent dirt road washouts, requiring regrading a second time during the winter season, when previously regrading was only required in the spring after snow melted. This leads to increased DPW operating costs.
    - Over-saturation can also cause trees to shut down, weakening their ability to be resilient to other stressors when there is too much water
- Insects and invasive species
    - Fewer deep freezes in winter leads to increased tick populations
    - Emerald Ash Borer is nearby, will affect Plainfield's forests soon
    - Wooly Adelgid was knocked back a few winters ago, but it will be back
- Increased risk of large wildfire on West Mountain. There is a lot of oak up there. The last fire was in 1950s, and they brought in bulldozers from Route 9 to cut a fire line.
    - Mass Audubon may be interested in doing forest management
    - See Ch. 48 State Slash law requiring land owners to distribute "slash" (unmarketable part of a tree harvest) to reduce fire risk, or any other bylaws (or incentives) that require property owners to manage their fire risk
- Aging population
    - Large percentage of residents are over 50, and winter hazards become more and more dangerous as people get older
    - "Old Yankees like to be heard, NOT herded" – A van service sponsored and serviced by the Hilltown CDC and volunteers is available for any senior or disabled person from any Hilltown. The service is used by some members of the elder population, but it isn't a popular option.
    - The local Fire Chief knows who needs to be checked on in case of an emergency, but this information is not written down

- Low tax base – Mass Audubon holds vast quantities of land and is not a tax payer, whereas Eversource is the largest tax payer in Plainfield.

Ideas for potential actions:

- Replace culverts and bridges on high gradient streams to accommodate increased flows.
- Create a list of people/residences in town without land lines and/or without good cell service
- Provide cheap corded landlines to those with a phone connection living in cell phone dead zones or without cell phones
- Create an elder-friendly town – currently working with the Hilltown Consortium on this effort
- Make a list of individuals who need assistance/to be checked in on in case of emergency, or power outage
- Neighbor-to-neighbor pods – intergenerational groups that can keep an eye on each other and help when needed

<u>Public Meeting #2-February 13, 2019</u>

On January 23, 2019, PVPC sent out a press release indicating that a second public outreach meeting would take place on February 13, 2019 and also to inform the public that a draft of the Plainfield Hazard Mitigation Plan would be posted on PVPC's website in advance of the meeting. The release also indicated that hard copies would be available at PVPC's offices and at Plainfield Town Hall, and that all residents, businesses and other concerned parties of Plainfield were encouraged to comment on the plan by e-mailing or calling staff contacts at PVPC or the Town. The meeting took place during a regularly scheduled meeting of the Plainfield Energy Committee. In general, participants agreed with the risk assessment and mitigation strategies selected during this planning process.

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 2018, the Select Board agreed to apply for funding through the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA) under the Municipal Vulnerability Preparedness (MVP) grant program to begin the process of developing a Hazard Mitigation Plan as part of and alongside the MVP planning process. Throughout the planning process, the Select Board was briefed on progress by the Chair of the Select Board, who was also the local project leader for the HMP and MVP planning processes. Once the HMP was provisionally approved by FEMA, the Select Board held a public hearing on the plan and then adopted it.

2: LOCAL PROFILE

COMMUNITY SETTING

Plainfield is an isolated hill town located in the Berkshire Highlands at the far northwestern corner of Hampshire County. Plainfield is bordered by Hawley and Ashfield in Franklin County to the north and east, respectively, by Cummington in Hampshire County on the south, and Windsor and Savoy of Berkshire County on the west and northwest. Plainfield is about 42 miles northwest of Springfield, 24 miles east of Pittsfield, and 127 miles west of Boston. Its 21.1 square-miles are characterized by sloping terrain, extensive forest cover, a network of waterways, narrow roads, and sparse development.

In its heyday as an agricultural community, Plainfield's residents raised sheep and produced leather for tanning. Numerous mills dotted the landscape in the 1800's, including grist and saw mills, a tannery, and factories that produced a variety of items, including broom handles and woolen cloth along the Mill River alone. The population in town peaked at 814 in 1850, after which the agricultural revenues dwindled due to increasing globalization and declining prices of imported leather and mutton. Today,

active agriculture accounts for less than 10% of total land use in town, but Plainfield's population of 648 (2010 Census) is as high as it has been in over 150 years (Town of Plainfield, 2013).

Today, many of Plainfield's residents commute beyond town borders to work each day. Otherwise, the character of Plainfield remains much the same from decade to decade with subtle changes recognizable to its long-term residents. The town is served by two major roads leading to a small New England village center, and town business is accomplished by limited staff and generous volunteer boards. Civic, social, and religious activities take place in the church, municipal buildings, and the playground located in or near the town center. Today's local businesses - a small convenience store, auto repair garages, tire shop and trucking company, to name a few - cater to the daily needs of those living a remote, rural lifestyle.

Natural resources in Plainfield including ponds, streams and wildlife habitat are one of the most frequently cited reasons for Plainfield residents to make the place home, and many have been protected from degradation and development. At more than 1,600 feet above sea level, Plainfield has an abundance of high points overlooking the valleys and streams which serve as the headwaters of the Westfield River and Deerfield rivers. The peak of West Mountain within the Mass Audubon West Mountain Wildlife Sanctuary reaches 2065 feet above sea level, the highest point in Hampshire County. The peace and tranquility of Plainfield's rolling hills are important characteristics that contribute to the quality of life experienced here. Although there is a need to develop a larger tax base to generate revenue to better support the delivery of municipal services, the residents of Plainfield very much want the character of their community to remain much as it is today.

POPULATION CHARACTERISTICS

According to the U.S. Census, there are 594 residents and a total of 347 housing units. The median household income is $37,250 with 8 percent of residents living in poverty (American Community Survey 2012-2016). The median age in Plainfield is 52.7 and 22.4% of the population was over the age of 65 in 2016 (down from 23.6% in 2010). While the largest share (18%) of Plainfield's residents falls within the 45-54 years of age, the next largest group is between the ages of 65-74 years. These growing elderly populations are some of the most vulnerable to the impact of natural hazards.

DEVELOPMENT

Plainfield's pattern of development has been greatly influenced by the town's physical characteristic and its productive farming soils. Great swaths of forest punctuated by fields, farms, and the occasional single family home along the roads are typical sights in Plainfield, where most of the land remains undeveloped and wooded. According to the 2013 Plainfield Master Plan, the town is 85% forested while only 2.3% of the land is used for residential and commercial purposes. Route 116 is the central artery for most activity in town, with roughly 41% of total agricultural land and 48% of all residential properties located within one half mile of the roadway (MassGIS, 2018). Some commercial enterprises operate in the town center and other home-based businesses exist in residences throughout town.

A substantial proportion of the land in Plainfield is protected from development. Roughly 26 percent of the town – more than 3,500 acres mainly in the northern and western part of town – is under permanent protection through either state or non-profit ownership. This includes over 600 acres of permanently protected farmland through the state's Agricultural Preservation Restriction (APR) program. Another 3,877 acres are under temporary protection through Chapter 61, 61A, and 61B. There are no subdivisions or other large developments under review in Plainfield. The primary type of development is Approval Not Required (ANR) residential lot development, in terms of creating new parcels of land. More permits are issued for construction on existing parcels than for ANR plans for new parcels. As of 2019, the Planning board is actively working on a proposed zoning amendment to enhance potential for commercial development throughout the town.

While Plainfield has not experienced an influx of suburban residential subdivision development, the ease of Approval Not Required (ANR) building can be seen in the flow of development occurring on subdivided lots to the south and east of town center. Most of the new development is occurring along existing paved roads, or in areas with good access to a paved road.

ZONING

The Plainfield Zoning Bylaw, last updated in July, 2016, establishes only one zoning district (Rural, Residential, and Agricultural) and one overlay zone. The Rural Residential/Agricultural district permits residential (single-family dwellings and mulita-family dwellings that have lot acreage of at least 3 acres per household) and agricultural uses by right as well as riding stables, bed and breakfasts, and small in-home occupations, and most businesses use a special permit. The maximum height of any building is 35 feet. The town's one overlay zone is the Solar Photovoltaic Overlay District, identifies designated location(s) where certain large-scale solar photovoltaic installations up to 1.5 acres in area are allowed by right following site plan review. This district currently only exists on Assessor Map 15C as Parcel 19 – installations in any other part of town or of greater than 1.5 acres would require a special permit. There is an ongoing conflict between land preservation and solar development in Plainfield and other Hilltowns. The solar bylaw currently in place requires a special permit, but doesn't specifically address environmental concerns. Large-scale solar projects have been limited to locations in the center of town where they can access the necessary 3 phase power lines that run from the electrical substation. Currently, the need for 3 phase power in town is limited, so further development enabling more solar projects is not expected. As new development pressures build in the future, the solar bylaw should be revisited with open space conservation and forest preservation in mind.

As there is no FEMA Special Flood Hazard Area (SFHA) in Plainfield, the town does not have a floodplain or river protection district. Although appropriate zoning is all relevant to protecting the health and safety of the Town residents, Plainfield's overlay districts is specifically relevant to natural hazard mitigation.

NATIONAL FLOOD INSURANCE PROGRAM STATUS

Plainfield has not been identified by FEMA as a flood-prone community – no part of the town has been mapped by FEMA as a 100-year flood plain or SFHA. Therefore, Plainfield is not a participating member of the National Flood Insurance Program. If flooding becomes an issue in Plainfield, it can engage in FEMA's NFIP Emergency Program, which is the initial phase of a community's participation in the NFIP and was designed to provide a limited amount of flood insurance. A community participating in the Emergency Program either does not have an identified and mapped flood hazard or has been provided with an FHBM, and the community is required to adopt limited floodplain management standards to control future use of its floodplains.

INFRASTRUCTURE

Plainfield's infrastructure reflects its traditionally rural character and steep, rugged terrain.

ROADS AND HIGHWAYS

Plainfield has 52 miles of road maintained by the town, and roughly half of those are unpaved. The main road through the center of Town is the two-lane State Route 116, which runs easterly to South Deerfield and Amherst and westerly to Adams in Berkshire County. The road extends for 7 miles between the Ashfield and Savoy Town lines, and is under jurisdiction of the town. Route 116, running east-west through town, and Central Street, running north and south connecting Route 116 to Route 9, are the critical routes of travel for emergencies and any mutual aid.

Drivers frequently rely on Route 116 to access Route 9, using Cummington Road/Shaw Road as a cut through. The latter is maintained in segments by the three towns that it passes through, often resulting in inconsistencies with the level of maintenance safety from one segment to the next. The Cummington section of Cummington Road to Shaw Rd. with access to Route 9 was paved in the fall of 2018, resulting in significant improvements to overall safety and accessibility. Furthermore, a new road superintendent in Cummington has led to a better maintained road year-round. While improvements and repairs to this road will be an ongoing need, abutting property owners may resist any work being done lest the improved roadway attract more drivers and at higher speeds. While there is no inter-town agreement for maintenance, towns regularly communicate and provide assistance during weather emergencies if a neighboring town is in need.

The section of Route 116 in Plainfield is relatively narrow as it winds around and over rolling hills, and sees the lowest average traffic volume of any other section along the road's entire length. The segment that runs through the center of town was last paved in the early 1990s, and today the road is no longer appropriately crowned. Water collects in the tire track depressions causing hydroplaning conditions, and runoff no longer funnels to storm drains but rather off onto intersecting roads or properties.

Because of the heavy snow and strong winds regularly experienced in Plainfield, segments of roadway throughout town that are exposed to open lands such as pasture, fields, or large yards are highly vulnerable to snowdrifts. Snow fences are needed, but they would need to be roughly 10 feet high. This type of installment would create a large maintenance burden on the town highway department, and

would be unlikely to garner support from property owners whose views may be obstructed by the fences.

The twenty-six miles of dirt roads are seasonally vulnerable to a number of natural hazards. Driving rains create gullies that make dirt roads impassable until the highway department can come to make repairs, while temperature fluctuations during snow season create difficult plowing conditions resulting in some roads remaining snow-covered for longer stretches of time.

PUBLIC TRANSPORTATION

There is no public transportation in town. The only public transportation ever offered was through the Franklin County Regional Transportation Authority which contracted with the town to provide demand response service one day per week to Senior Citizens for shopping and medical visits in Northampton, but this service was discontinued due to lack of ridership.

DRINKING WATER AND SEWER SERVICE

There is no public water supply system in Plainfield, and all residents rely on private, individual on-site wells. The Town has no plans to develop a public water system in the near future.

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

COMMUNICATIONS AND UTILITIES

Plainfield is served by three primary communication and utility service providers: Verizon, Eversource, and Plainfield Broadband.

- Eversource provides electricity to the town, and owns most of the approximately 980 utility poles in Plainfield, with the remaining pole owned by either Verizon or the town.
- Verizon provides land line phone service and has, historically, offered DSL service to Plainfield telephone customers. However, over the last several years, Verizon has been retiring copper phone service in many if its densely populated service areas, and has stopped offering DSL service to new customers in Plainfield. Many believe that these trends suggest that Verizon will soon end DSL and landline phone service entirely in areas like Plainfield where alternative voice services are available to consumers through wireless providers.
- After nearly a decade of effort to bring high-speed Internet to the town, the town's municipal light plant (MLP) Plainfield Broadband is finally underway in creating a town-owned fiber-optic network to serve every Plainfield residence and business. High speed internet service is expected to be available throughout town by the end of 2019.
  Plainfield Broadband has contracted with Westfield Gas + Electric (WG+E) to design, engineer, and construct the network, and is working with neighboring towns — including Ashfield, Cummington, and Windsor — to regionalize future network operations.

While the majority of Plainfield's broadband network "plant" will be fiber-optic cables running throughout town, the network also requires a "hub" to house the switches and other electronics that connect the network to the Internet. The "hub" will be built adjacent to the town's Public Safety Complex. Early project designs considered the possibilities of installing underground infrastructure so cables would not be affected by weather, but it was determined that a town-wide underground build would be cost-prohibitive, due to the prevalence of stone ledge and the complexities of securing right of ways on private property.

NATURAL RESOURCES

The Town of Plainfield is comprised of a land area of 21.1 square miles, or approximately 13,650 acres. Geologically it is part of the Berkshire Uplands, a region characterized by rounded hills with 300 to 400 feet of local relief formed by major streams cutting steep-sided valleys 1,200 to 1,400 feet deep into the upland surface. Similar to other Berkshire Hilltowns, Plainfield experiences a wide seasonal variation in temperatures.

Plainfield's landscape is marked by rolling hills separated by streams that mainly flow southeast toward the Connecticut River Valley. These streams include Bartlett Brook, Mill Brook, Meadow Brook, Billings Brook, and North Branch Swift River. Most of the town lies in the Westfield River watershed (East Branch), with a smaller northwestern portion located in the Deerfield River watershed. The East Branch of the Westfield River is part of the National Wild and Scenic River Designation.

Plainfield's climate and open spaces provide ample recreational resources to its residents and its many visitors. The mountainous vistas and thickly tree lined routes draw the annual autumn "leaf-peeping" crowd. The winter months are icy and bitter with snowfalls gathering between 50 to over 100 inches yearly. The heavy snowfall finds both Plainfield residents and out-of-town visitors utilizing the cross-country skiing and snowmobiling areas creating a small, but consistent climate-dependent tourist industry.

The Northeast Regional Climate Center CLIMOD 2 presents daily or monthly 30-year (1981-2010) NCDC climate normal from participating weather stations across the Northeast US. The closest station to Plainfield with sufficient data is in Worthington, which reports an annual total precipitation normal of 52.97 inches and an average annual snowfall of 79.7 inches (NRCC, 2018).

NOWData (NOAA Online Weather Data) provides access to climate data for each National Weather Service forecast area in the Northeast. Products include climate normals, daily almanac, first/last dates, graphs, and daily and monthly summaries of temperature, precipitation, snowfall, snow depth and degree days. Mean annual days of snow cover of an inch or more are 19, and frost-free days' number between 96 and 146 depending on the station of measurement[1].

[1] Worthington is the closest NRCC NOW station for which Monthly Total Snowfall data were available.

Once a snow cover accumulates, with a maximum depth achieved mid-February, it usually remains until spring thaw. Flash run-off conditions in the spring coupled with heavy precipitation in the summer months have created serious flooding and erosion problems in past years, especially on the many sloped dirt roads throughout town. These types of flash warming events are likely to become more frequent with the changing weather patterns brought on by climate change. Residents say the town has two seasons: winter and road repair.

Climate change projections for the commonwealth of Massachusetts are based on simulations from the latest generation of climate models included in the Coupled Model Intercomparison Project Phase 5 (CMIP5). The statewide projections have been statistically downscaled to produce county- and watershed-level information for daily precipitation, and maximum and minimum temperature. The values cited below are based on the 10-90th percentiles across 28 emissions projections, bracketing the most likely climate change scenarios. Relative to a 1971 - 2000 observed value annual average precipitation of 47 inches for the Westfield River watershed, the model projects an annual increase of between 2-13% by 2050, with winter precipitation increasing more than other seasons by up to 21%.

TOPOGRAPHY AND SOILS

Bedrock in Plainfield is overlain by superficial, primarily glacial deposits composed mostly of unstratisfied glacial till. The known resources of sand and gravel are small. Some gravel is present in the stream terrace deposits along the major brooks. Deposits of gneiss are located at Hallockville Pond, and an abandoned manganese mine exists just west of Prospect Street is.

Plainfield's soils were formed by the most recent glacier and the weathering processes that have occurred since that glacier. If it was not for the upper six inches of topsoil, life as we know it would not exist in Plainfield. Plainfield is mainly composed of the following soil groups:

Plainfield is comprised predominately of five soil types, all of which have developed from glacial till deposited during the advance and retreat of the Pleistocene glaciers when the ice formed and melted. These soils are all relatively shallow and stony. Permeability of soils is good but due to the shallow depth to hardpan or bedrock, drainage generally is only moderate.

Each of the following five soils deposited throughout Plainfield are described below:

1. Berkshire-Marlow Association – These soils are composed of deep, well drained Berkshire and Marlow soils. The Berkshire soils are stony and typically on the steeper and higher parts of slopes. The Marlow soils are typically on the lower and less steep slopes or on concave areas. This unit consists of about 55% Berkshire, 30% Marlow and 15% other soils.
2. Lyman-Tunbridge Association – This association of soils includes shallow, somewhat excessively drained Lyman soils and moderately deep, well drained Tunbridge soils. These soils form in very stony, shallow and moderately deep glacial till on moderately steep slopes. The Tunbridge soils are typically on flat areas between the Lyman soils and bedrock outcrops. Bedrock outcrops and many stones and boulders are prominent features. This unit consist of about 45% Lyman, 45% Tunbridge and 10% other soils.

3. Peru-Marlow Association – This association contains deep, moderately well drained Peru soils and deep, well drained marlow soils. These gently sloping and moderately sloping soils are on the sides and tops of hills and mountains. The Peru soils are typically on the lower parts of slopes or in convex areas. Stones and boulder approximately 3 to 20 feet apart are prominent features. This unit consists of about 60% Peru, 20% Marlow and 20% other soils.
4. Pillsbury Association – This unit consists of very deep, poorly drained soils and very deep, very poorly drained mineral soils in depressions or pockets. These soils developed in compact glacial till derived from schistose rocks. These soils have a loam or fine sandy loam surface and subsoil. They are underlain at a depth of about 15 to 30 inches from the surface by a hardpan. Stones and boulders 5 to 20 feet apart are prominent features of the landscape.
5. Tunbridge-Lyman Association – This association is composed of moderately deep, well drained Tunbridge soils and shallow, somewhat excessively drained Lyman soils. The Tunbridge soils are typically on the flatter parts of slopes between rock outcrops and the Lyman soils are on the upper parts of slopes or on convex areas.

RIVERS AND STREAMS

Plainfield is situated between two watersheds (8-digit hydrologic unit scale), both of which drain to the Lower Connecticut River Basin (a higher-level hydrologic unit). Most of the town lies in the Westfield River watershed (East Brach), with a smaller northwestern portion located in the Deerfield River watershed. The landscape is marked by rolling hills separated by streams that mainly flow southeast toward the Connecticut River Valley. These streams include Bartlett Brook, Mill Brook, Meadow Brook, Billings Brook, and North Branch Swift River.

The principle larger ponds including Crooked Pond (30 acres), Plainfield Pond (57 acres), Hallockville Pond (25 acres) are all located in the northwest corner of town. The Ashfield Rod and Gun Club Pond (10 acres) lies close to the border of Hawley in the northeast part of town. Plainfield Pond drains into Hallockville Pond (both are located near Hawley State Forest), which eventually empties into the Deerfield River. Crooked Pond, which lies only a short distance from Plainfield Pond, drains into Windsor Pond which in turn empties into the Westfield River. Plainfield and Hallockville Ponds are part of the Deerfield watershed, while Crooked Pond is part of the Westfield watershed.

TABLE 1. RIVERS AND STREAMS IN PLAINFIELD

Name DEP 2014 Assessment Unit ID	Watershed	Size	Description	Class
Meadow Brook MA32-11	Westfield	4.6 miles	Headwaters, outlet of unnamed pond in Plainfield, south of Route 116, to confluence with Westfield River, Cummington.	B
Mill Brook MA32-49	Westfield	6 miles	Headwaters, south of Hawley Street, Plainfield to mouth at confluence with Westfield River,	Cold water

			Cummington.	
North Branch Swift River MA32-54	Westfield	6.9 miles	Headwaters, outlet small unnamed pond west of Grant Street, Plainfield to mouth at confluence with Swift River, Cummington	Cold water
Swift River MA32-12	Westfield	11.503 miles	Source, southwest of Hawley center to confluence with Westfield River at village of Swift River, Cummington.	B
BARTLETT BROOK MA32-50	Westfield	2 miles	Headwaters (perennial portion), between Mountain and Prospect streets, Plainfield to mouth at confluence with Westfield River, Cummington.	Cold water
Westfield River MA32-04	Westfield	33.156 miles	Confluence of Drowned Land Brook and Center Brook in Savoy to confluence with Middle Branch Westfield River, Huntington.	B

Source: MA DEP
N/A Not available

According to state and Federal laws, waters must be maintained at the standards for their current classification. Local communities must strive to upgrade waters to the best possible classification, Class A (Class A waters are waters which can be used as a public water supply). Meadow Brook, the Swift River, and the Westfield River in Plainfield all have Class B status in the segments described in Table 1 above. These are suitable as cold-water fisheries and for recreational purposes, fishing, boating, and swimming, but are not water supplies. Class C waters should be suitable for aquatic life and recreational uses where contact with the water is incidental, such as boating and fishing, but may not be suitable for swimming, diving or water skiing. There are no known Class C waters in Plainfield.

Inland waters are also subcategorized as to fishery type (cold water fishery, warm water fishery or aquatic life) based on their natural capacity to support these resources. The Mill Brook, North Branch Swift River, and Bartlett Brook are all classified as cold water fisheries.

AQUIFERS

An aquifer is an underground pocket of water, sometimes several miles in length, into which water from the surface filters down. This filtering often takes place through more than 100 feet of soil and removes many impurities from the ground water as it descends.

According to the MassGIS Aquifer Dataset, there is one small low-yield aquifer in the southeastern corner of Plainfield that crosses over the Cummington town line, though detailed aquifer studies have not yet been conducted. (Plainfield, 2013)

Plainfield has an abundance of sub-surface drinking water accessed by its residents via private wells. Private wells and springs throughout the town depend on ground water recharge for a direct supply of water to Plainfield's households. Access to this resource has never been significantly compromised, although few private residences with very shallow wells were impacted during the drought of 2016.

Some residents have expressed concern over groundwater contamination from previous land uses such as farms and dumps, and from the increasing use of salt for winter road maintenance.

FORESTS

Plainfield's forests host a diversity of plant life. According to the 2007 Open Space and Recreation Plan, Plainfield is approximately 84 percent forested. The forest type in Plainfield is Hemlock-Northern Hardwood Forest, which prefers high elevations with cool temperatures and moist soils. The dominant tree species include: red spruce, Eastern hemlock, sugar maple, yellow birch and American beech. Understory tree species include: red maple, striped maple, white ash, red oak, Eastern white pine, black cherry, mountain ash and shadbush.

Areas of highest elevation in Town are subject to extreme ice and wind damage. While tree species in these upper elevations in Plainfield haven't suffered yet from these elements, red spruce and mountain ash are alpine species that won't tolerate some extreme weather conditions including extended warming, which may occur more frequently in Plainfield as a result of climate change. Another immediate threat to Plainfield's forests is the Emerald Ash Borer that has already been discovered in surrounding communities (Dalton). It may only be a matter of time before Plainfield's ash trees are affected.

CONSERVATION LAND

Plainfield contains a significant amount of protected open space and recreational land. Conservation land, or land under permanent protection from development, accounted for 3,538 acres (26 percent) of Plainfield's overall land area in 2018, while 3,877 acres (28 percent) has temporary protection from development under the Commonwealth's Chapter 61 program, and another 22 acres is partially protected[2].

According to MassGIS, Plainfield has a total of 4,342 permanently protected acres:

- Agricultural Preservation Restrictions (APR) – 617 acres
- Commonwealth of Massachusetts Division of State Parks and Recreation (DCR) – 1,459 acres
- Commonwealth of Massachusetts Department of Fish and Game – 22 acres
- Conservation (Franklin Land Trust) – 106
- Conservation Restrictions – 608 acres
- Massachusetts Audubon Society – 1,510 acres (excludes Conservation Restriction)
- Recreation/Town of Plainfield – 20 acres

And a total of 3,899 of partially protected acres:

[2] Email with Cathy Hall, Town Assessor, 2018

- Chapter 61, 61A, 61B – 3,877 acres
- Town-owned – 22 acres (MassGIS, 2018)

Note: APR and CR have perpetual legal protection under article 97; land enrolled under Chapter 61 must be re-enrolled every year for Chapter 61A and B, and every ten years for Chapter 61.

PERMANENTLY PROTECTED PUBLIC LAND AND NONPROFIT PARCELS

In 1986, The Massachusetts Audubon society purchased land on West Mountain and formed the West Mountain Wildlife Sanctuary which has grown to encompass 1,527 acres. Representing 11% of Plainfield's acreage, the sanctuary is slightly larger than the total state forest and reservation holdings at 1,380 acres. Although West Mountain Wildlife Sanctuary is open to the public for hiking and passive outdoor recreation, access is a problem as there are no designated parking areas and trailhead signage is minimal at best in most areas. Many respondents to the July 2007 Open Space and Recreation Survey noted it was very important to them that the public have greater access to the sanctuary and that the Audubon Society be more proactive about working with the community to make this happen.

STATE LAND

There are approximately 1,332 acres of state land in Plainfield, including two state forests and one state reservation. Dubuque Memorial State Forest, composed of two stretches of land formerly designated as Dubuque State Forest and Hawley State Forest, covers 1,110 acres, and Deer Hill Reservation covers 204 acres. Dubuque Memorial State Forest is in the northern section of town and extends into the Town of Hawley. Plainfield Pond and Crooked Pond are accessible from the state forest. Deer Hill Reservation is located in the southwest corner of town and extends into Cummington where it abuts Route 9. The University of Massachusetts owns a 16.7 acre parcel of forested land off West Street along the border of the Town of Windsor.

NON-PROFIT PARCELS

Mass Audubon Society - The Massachusetts Audubon society owns 1,527 acres of land on West Mountain called the West Mountain Wildlife Sanctuary. Representing 11% of Plainfield's acreage, the sanctuary is slightly larger than the total state forest and reservation holdings. Although West Mountain Wildlife Sanctuary is open to the public for hiking and passive outdoor recreation, access is a problem as there are no designated parking areas and trailhead signage is minimal at best in most areas.

TEMPORARY OR PARTIALLY PROTECTED LAND

PRIVATE PARCELS

The Ashfield Rod and Gun Club owns 75.4 acres of land off North Street along the border of Hawley including Gun Club Pond.

CHAPTER 61 LANDS

The Massachusetts Chapter 61 tax abatement programs offer landowners a reduction in their property taxes, in return for signing a contract promising that the predominant use of the land will not change during an agreed upon time (ten years for Chapter 61 and Chapter 61B, one year for Chapter 61A).

- The Chapter 61 program helps lower the expenses of maintaining actively managed forestland.
- The Chapter 61A program helps farmers by reducing their taxes while they farm their land.
- Chapter 61B program lowers property taxes in exchange for landowners keeping their land in open space for ten years.

One of the benefits to the community of the Chapter 61 programs is that they provide a mechanism for protecting land from development. When a parcel which has been enrolled in one of the Chapter 61 programs is put up for sale, the Town is provided a one hundred and twenty (120) day waiting period during which it can exercise its right of first refusal to purchase the property. Taking advantage of the right of first refusal is valuable if you have the ability to protect private land when it becomes available for sale. Identifying key parcels and building partnerships with local land trusts and landowners can be an effective planning process resulting in land protection. The right of refusal is transferable.

Most of the private conservation parcels in Town are enrolled in the Commonwealth's Chapter 61, 61A, or 61B programs; considered a temporary protection. In September 2018, just over 3,877 acres in Plainfield are enrolled in the Commonwealth's Chapter 61 program, an increase of 498 acres since 2007. Of those parcels enrolled in the program, 64 percent are enrolled in the Ch. 61 forestry program, 25 percent are enrolled in the 61A agricultural program, and 11 percent take advantage of the 61B recreation and open space program. Table 2 provides a breakdown of Chapter land enrollment.

TABLE 2. CHAPTER LAND ENROLLMENT

	Total Acres	% of Total Chapter Land	# of Parcels	# of Owners
Chapter 61	2,490	64	75	42
Chapter 61A	975	25	32	18
Chapter 61B	412.4	10	22	13
Total	3,877	100%	129	73

Source: Plainfield Assessor, October, 2018
Note: 4 of the landowners have parcels that have acreage in both 61A and 61B

All other open space in Plainfield is privately owned, the majority of which is not permanently protected. Thus, the emphasis within Plainfield is the selective acquisition or preservation of open space character, future access to the East Branch of the Westfield River, habitat improvement and open space preservation through landowner education and voluntary deed restrictions.

3: HAZARD IDENTIFICATION AND ANALYSIS

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

The Hazard Mitigation Plan Planning Committee referred to the 2013 Massachusetts Hazard Mitigation list of hazards as a starting point for determining the relevant hazards in Plainfield. Table 3 below illustrates a comparison between the relevant hazards in the state plan and in Plainfield's plan.

TABLE 3. COMPARISON OF HAZARD IDENTIFIED IN THE 2018 MASSACHUSETTS HMP AND THE PLAINFIELD HMP

2018 Massachusetts Hazard Mitigation Plan	Town of Plainfield Relevance
Inland Flooding Flood	Inland flooding, including ice jam and dam failure, is relevant in Plainfield
Tsunami	Not relevant to Plainfield
Severe Winter Storm	Severe Winter Storm, including snow, blizzards, and Nor'Easters, are relevant in Plainfield
Drought	Drought is relevant in Plainfield
Average / Extreme Temperatures	Average / Extreme Temperatures are relevant in Plainfield
Tornadoes	Tornadoes and microbursts are relevant in Plainfield
Landslide	Landslides are not a concern in Plainfield
Wildfire	Wildfire is relevant in Plainfield
Other Severe Weather	All severe weather, including high wind and thunderstorms, is relevant in Plainfield
Coastal Flooding	Not relevant to Plainfield
Invasive Species	Invasive Species are relevant in Plainfield, but considered under other hazards
Earthquake	Earthquakes are relevant in Plainfield
Coastal Erosion	Not relevant to Plainfield
Hurricanes /Tropical Storms	Hurricanes and tropical storms are relevant in Plainfield

For the purposes of this planning effort, the Planning Committees chose to group some hazards together, based on the similarity of hazard events, their typical concurrence or their impacts, consideration of how hazards have been grouped in Federal Emergency Management Agency (FEMA) guidance documents (FEMA 386-2, "Understanding Your Risks, Identifying Hazards and Estimating Losses; FEMA's "MultiHazard Identification and Risk Assessment – The Cornerstone of the National Mitigation Strategy"; FEMA's Local Mitigation Planning Handbook).

The "Flood" hazard includes riverine flooding, flash flooding, and ice jam flooding. Inclusion of the various forms of flooding under a general "Flood" hazard is consistent with the approach used in FEMA's "Multi-Hazard Identification and Risk Assessment" guidance.

The “Severe Weather” hazard includes windstorms and a variety of other influencing weather conditions including thunderstorms, hail, lightning, and tornadoes. Tropical disturbances (hurricanes, tropical storms and tropical depressions) are often identified as a type of severe storm. For the purpose of this HMP update, “Severe Weather” includes thunderstorms, hail, lightning, tornadoes, hurricanes, tropical storms, and Nor’Easters.

The “Severe Winter Weather” hazard includes heavy snowfall, blizzards, freezing rain/sleet, and ice storms.

Due to the location and context of the Town, coastal erosion, landslides, major urban fires and tsunamis were determined to not be a threat.

NATURAL HAZARD ANALYSIS METHODOLOGY

This chapter examines the hazards in the Massachusetts State Hazard Mitigation Plan which are identified as likely to affect Plainfield. 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 Plainfield are: flood (including ice jam), severe snowstorms/ice storms, hurricanes/tropical storms, severe thunderstorms / wind / tornadoes, wildfire/brushfire, earthquakes, dam failure, 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.

Between 1954 and 2018, the Commonwealth of Massachusetts was included in 48 FEMA natural hazard-related declared disasters (DR) or emergencies (EM) classified as one or a combination of the following hazards: Tornado, Hurricane, Flood, Fishing Losses, Fire, Coastal Storm, Snow, Severe Storm(s), Severe Ice Storm, and Other. Generally, these disasters cover a wide region of the State and often impact many counties. Of those declarations, Hampshire County has been included in 20 declarations (FEMA 2018).

TABLE 4. FEMA DECLARED NATURAL HAZARD EVENTS IN HAMPSHIRE COUNTY 1954-2018

FEMA Declaration Number	Dates of Event	Event Type	Counties Included
Hurricane Gloria Dr-751	9/27/1985	Hurricane Gloria	13 MA counties including Hampshire
Severe Storms & Flooding Dr-790	3/30/1987	Severe Storms & Flooding	8 MA counties including Hampshire
Blizzards, High Winds & Record Snowfall Em-3103	3/13/1993	Blizzards, High Winds & Record Snowfall	14 MA counties including Hampshire
Blizzard Of 96 Dr-1090	1/7/1996	Blizzard Of 96	14 MA counties including Hampshire
Snow Em-3165	3/5/2001	Snow	7 MA counties including Hampshire
Snow Em-3175	2/17/2003	Snow	14 MA counties including Hampshire
Snow Em-3191	12/6/2003	Snow	12 MA counties including Hampshire
Record and/or Near Record Snow Em-3201	1/22/2005	Record and/or Near Record Snow	14 MA counties including Hampshire
Hurricane Katrina Evacuation Em-3252	8/29/2005	Hurricane Katrina Evacuation	14 MA counties including Hampshire
Severe Storms And Flooding Dr-1614	10/7/2005	Severe Storms And Flooding	11 MA counties including Hampshire
Severe Storms And Inland And Coastal Flooding Dr-1701	4/15/2007	Severe Storms And Inland And Coastal Flooding	8 MA counties including Hampshire
Severe Winter Storm Em-3296	12/11/2008	Severe Winter Storm	9 MA counties including Hampshire

FEMA Declaration Number	Dates of Event	Event Type	Counties Included
Severe Winter Storm And Flooding Dr-1813	12/11/2008	Severe Winter Storm And Flooding	7 MA counties including Hampshire
Severe Winter Storm And Snowstorm Dr-1959	1/11/2011	Severe Winter Storm And Snowstorm	7 MA counties including Hampshire
Hurricane Irene Em-3330	8/26/2011	Hurricane Irene	MA counties including Hampshire
Tropical Storm Irene Dr-4028	8/27/2011	Tropical Storm Irene	9 MA counties including Hampshire
Severe Storm Em-3343	10/29/2011	Severe Storm	8 MA counties including Hampshire
Severe Storm And Snowstorm Dr-4051	10/29/2011	Severe Storm And Snowstorm	6 MA counties including Hampshire
Hurricane Sandy Em-3350	10/27/2012	Hurricane Sandy	14 MA counties including Hampshire
Severe Winter Storm, Snowstorm, And Flooding Dr-4110	2/8/2013	Severe Winter Storm, Snowstorm, And Flooding	14 MA counties including Hampshire

Source: FEMA, 2018 https://www.fema.gov/media-library/assets/documents/28318

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

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

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

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

VULNERABILITY

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

Hazard Index Ratings	
Rating Number	Meaning
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.

TABLE 5. HAZARD IDENTIFICATION AND RISK ANALYSIS

Type of Hazard	Location of Occurrence	Probability of Future Events	Impact	Hazard Risk Index Rating
Dam Failures	Small	Low	Minor	Low
Drought	Large	Low	Minor	Low
Earthquakes	Large	Very Low	Critical	Very Low
Extreme Temperature	Large	Moderate	Limited	Medium (based on temperature fluctuations)
Flood	Small	Low – Moderate or Major Flood High – Minor Flood	Minor - Limited	Low – Moderate or Major Flood Very High – Minor Flood
Hurricane / Tropical Storms	Large	High	Limited	Medium
Severe Thunderstorms / Wind / Tornadoes / Microbursts	Medium	Very High – Thunderstorm	Limited	High
Severe Winter Storm / Nor'Easter	Large	Very High	Critical	Very High
Wildfire / Brushfire	Large	Moderate	Critical	Moderate

Greater variation and extremes in local atmospheric temperatures due to global changes in climate are among the natural hazards that this plan anticipates. Plainfield is likely to experience more instances of extreme and sustained heat and cold. And, because warmer air holds more moisture, higher temperatures will also bring wetter winters, more severe storms, and more frequent flooding. Locally, there will also be more single-day records highs, and more total days with highs above 90 degrees, and more heat waves with 3 or more days above 90 degrees. More extreme temperatures throughout Western Massachusetts and New England mean that there will be more floods, droughts, and tornadoes. There will also be more Atlantic hurricanes and nor'easters. The sections below will provide more detail on each of these hazards and potential impacts of climate change.

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 rise above

the top of (overtop) and erode the material components of the dam. Often dam or levee breeches 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 (Mass DCR)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.

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.

According to the Dam Incident Notification (DIN) system maintained by the National Performance of Dam Program (NPDP), there are 76 dams in Hampshire County. Of the 76 dams, there are 18 classified as low hazard (Class A), 35 classified as significant hazard (Class B), 18 classified as high hazard (Class C), and five have an unknown classification. One of these dams, the Crooked Pond Dam, is located in Plainfield and classified as a significant hazard dam (NPDP 2018).

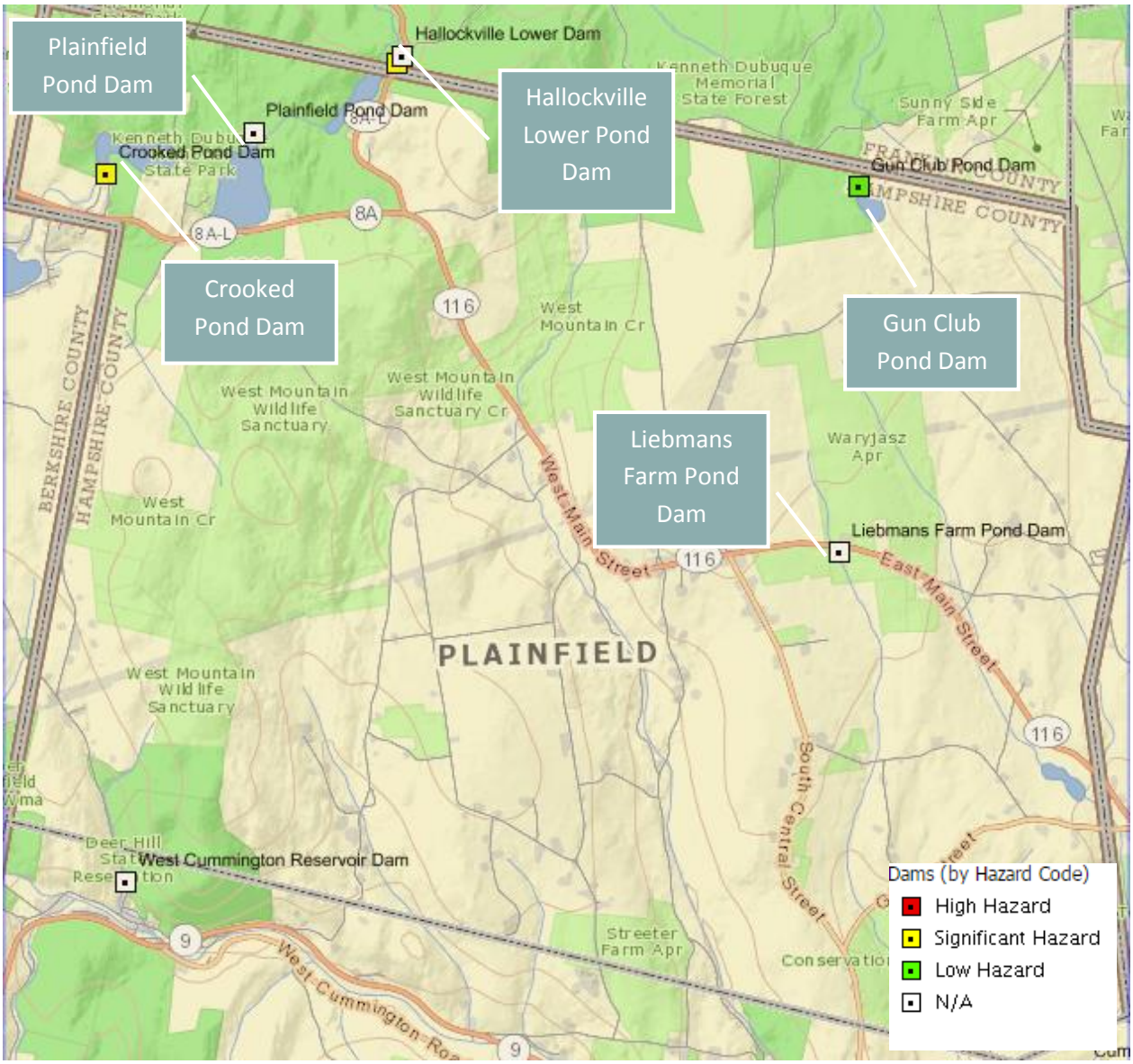
LOCATION

According to Mass DCR's Office of Dam Safety, Plainfield has 3 jurisdictional dams (for which a hazard classification has been established) and two unclassified dams located within its boundaries, as shown in Table 6 and Figure 1 below. The location of occurrence for a dam failure has been determined to be "small," with less than 10 percent of land area affected.

TABLE 6. DAMS IN PLAINFIELD			
Dam	**Hazard Level**	**Purpose**	**Condition**
Crooked Pond Dam	Significant	Recreation	Satisfactory
Plainfield Pond Dam	N/A	Recreation	Poor
Gun Club Pond Dam	Low	Recreation	Poor
Liebman's Farm Pond Dam	N/A	Unknown	Unknown
Hallockville Pond Dam	Significant – although it sits in Hawley just north of Plainfield border	Unknown	Unknown

Source: Mass GIS Oliver

FIGURE 1. DAMS IN PLAINFIELD



Source: MassGIS Oliver, 2018

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

On February 10, 2017 Massachusetts Dam Safety Regulations were modified to require owners of Significant Hazard Dams to prepare Emergency Action Plans (EAP) for their dams. All EAPs shall be updated annually and in accordance with Department of Conservation & Recreation (DCR), Office of Dam Safety (ODS) guidelines. The Plainfield Emergency Manager has a hard copy of the Crooked Pond EAP.

PREVIOUS OCCURRENCES

Based on the best available resources, there have been no significant dam failures in Plainfield. However, the town has experienced a series of beaver dam breaks, including one after Hurricane Irene in 2011, primarily impacting River Road in the Mill River floodplain.

PROBABILITY OF FUTURE EVENTS

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

As described in the Massachusetts Hazard Mitigation Plan, dams are designed partly based on assumptions about a river's flow behavior, expressed as hydrographs. Changes in weather patterns can have significant effects on the hydrograph used for the design of a dam. If the hygrograph 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 would likely be “minor” with less than 10 percent of property in the affected area damaged or destroyed. Many of the dams in Plainfield are on the border with surrounding towns and their failure would have a greater impact to neighboring communities. To approximate the potential impact to property and people that could be affected by this hazard, the total value of all property in town, $58,677,900 is used. An estimated 20 percent of damage would occur to 10 percent of structures, resulting in a total of $1,173,558 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

A basic vulnerability assessment was done for the inundation area below the Crooked Pond Dam, which is the one dam in Plainfield categorized as a significant risk. The EAP Impacted Infrastructure Summary indicates select properties on Access Rd. #5 and West Main St. could potentially experience flooding from a dam failure. Other residential properties in Windsor would also likely flood. Furthermore, Access Rd. #5 and West Main St. would have to be closed due to overtopping.

VULNERABILITY

The vulnerabilities associated with dam failure would vary depending on which dam were to fail. There are homes located on two West Main St. spurs that extend north of SR 116/8A/West Main St. beneath the Crooked Pond Dam. If that dam were to fail, 3 or more structures that sit at or below the elevation of the dam could be impacted. If the Hallockville Pond Dam were to fail, a segment of SR 8A in Hawley that is part of a Plainfield evacuation route, would be inundated.

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

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. Residents in Plainfield rely on private wells in order to get water for their everyday activities. Many of the private wells in town are considered shallow and can experience reduced water levels in the summer.

EXTENT

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

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

PREVIOUS OCCURRENCES

Hampshire County has never been included in any FEMA declared drought -related disasters (DR) or emergencies (EM), but the region has experienced several substantial droughts over the past century. In

Massachusetts, seven major droughts have occurred statewide since 1930 (State HMP, 2018).[3] They range in severity and length, from one to eight years. In many of these droughts, water-supply systems were found to be inadequate. Water was piped into urban areas, and water-supply systems were modified to permit withdrawals at lower water levels.

Beginning in 1960 and lasting through 1969 in western Massachusetts, Massachusetts experienced the most significant drought on record (USGS, 2004). The drought had significant impacts on both water supplies and agriculture throughout the state.

The next long-term event began in March 2015, when Massachusetts began experiencing widespread abnormally dry conditions. During the summer of 2016, Plainfield, the Pioneer Valley and the state were in the midst of a drought, with many parts of the state experiencing D3 (extreme drought) conditions. By October, 2016, rainfall remained below normal in Western Massachusetts, and the Massachusetts Executive Office of Energy and Environmental Affairs expanded an existing Drought Warning in other parts of the state to include the Connecticut River region. The U.S. Drought Monitor placed much of western Hampshire County in an Extreme Drought (D3) designation through the month of October. The exception was the Worthington to Plainfield area, which was under a Severe Drought (D2) designation through October.

The Massachusetts Department of Environmental Protection (DEP) indicated mandatory non-essential outdoor water use restrictions were in place for numerous communities within central and eastern MA. Other communities in the Commonwealth had voluntary water restrictions in place. Across the Connecticut River Valley in MA and CT, rivers and streams remained quite low. At the end of October, many USGS groundwater wells across southern New England were at below to well below normal levels (MA 2013 HMP).

Less-severe droughts have also impacted the state, and the following table indicates previous occurrences of drought in the state from 2000 to 2016, based on the US Drought Monitor and 2018 MA State Hazard Mitigation and Climate Adaptation Plan:

TABLE 7. ANNUAL DROUGHT STATUS IN MASSACHUSETTS, 2000-2016

Year	Maximum Severity	Year	Maximum Severity
2000	No drought	2009	D0 conditions in 44% of the state
2001	D2 conditions in 21% of the state	2010	D1 conditions in 27% of the state
2002	D2 conditions in 99% of the state	2011	D0 conditions in 0.01% of the state
2003	No drought	2012	D2 conditions in 51% of the state
2004	D0 conditions in 44% of the state	2013	D1 conditions in 60% of the state

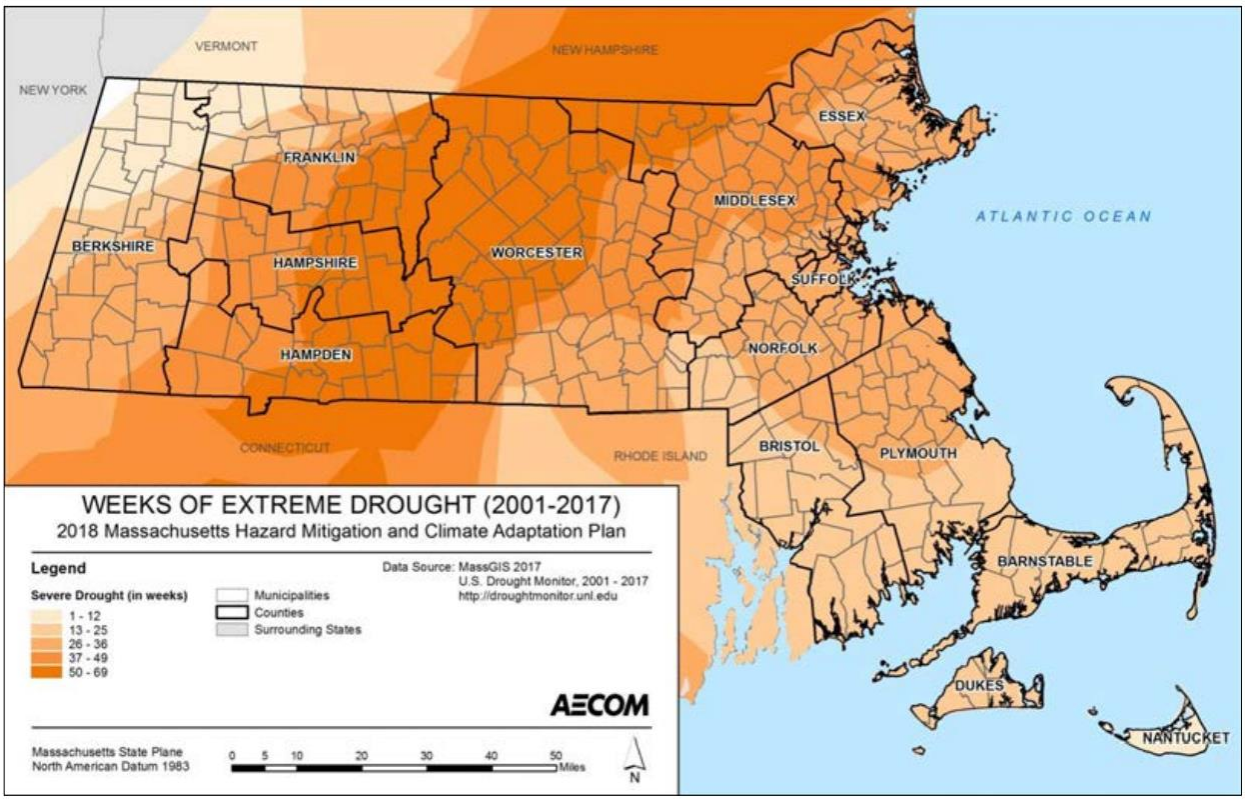
[3] US Geological Survey Water-Supply Paper 2375. "National Water Summary 1989 – Floods and Droughts: Massachusetts." Prepared by S. William Wandle, Jr., US Geological Survey.

2005	D1 conditions in 7% of the state	2014	D1 conditions in 54% of the state
2006	D0 conditions in 98% of the state	2015	D1 conditions in 100% of the state
2007	D1 conditions in 71% of the state	2016	D3 conditions in 52% of the state
2008	D0 conditions in 57% of the state		

Source: US Drought Monitor

The Massachusetts Drought Management Plan (DMP) assesses drought conditions by region and watershed throughout the state. Figure 2 below shows that some parts of Plainfield experienced up to 49 weeks of Severe Drought between 2001 and 2017 – presumable these weeks occurred during the drought of 2016.

FIGURE 2. WEEKS OF SEVERE DROUGHT (2001-2017)



Source: U.S. Drought Monitor, 2017

According to participants at the Plainfield Municipal Vulnerability Preparedness workshop in 2018, some residents needed to have new wells dug on their property after the 2016 summer drought. Because of the drought, their shallow wells had gone dry and required deeper wells in order to access the ground water. These wells were scattered across the town.

To date, Plainfield has not been impacted significantly by any other droughts or threats to its water supply.

PROBABILITY OF FUTURE EVENTS

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.

The drought hazard is likely to evolve in response to climate change. While total annual precipitation is projected to increase over the next century, seasonal variations are likely to include more severe and unpredictable dry spells. More intense rain events occurring over shorter time periods will result in saturated soils that are unable to absorb the same amount of water if rainfall were spread out, thereby reducing groundwater recharge, even in undeveloped and rural areas. These effects will be compounded by projected reduction in snowpack, which otherwise serves as a significant water source during the spring melt to reduce the impact of sporadic precipitation. Also, the snowpack is melting faster than previous recorded eras, resulting in a reduced period in which the melt can recharge groundwater and the amount of water naturally available during the spring growing period. Finally, rising temperatures will increase evaporation, aggravating drought conditions.

In Plainfield, 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.

IMPACT

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

While the direct health and safety impacts of a drought would be minor, secondary impacts could be more severe. Farmers could be impacted economically, by the extended lack of water. On September 21, 2016, the United States Department of Agriculture (USDA) designated 11 counties including Hampshire County as primary natural disaster areas. Eligible farmers in these 11 counties and the three contiguous counties are eligible for low-interest emergency loans through the USDA. Farmers have eight months to apply for the loans, which are intended to help mitigate their operations losses. The state of Massachusetts has also established an Emergency Drought Loan Fund that impacted farmers can access.

Finally, drought may increase the probability of a wildfire occurring. The prolonged lack of precipitation dries out soil and vegetation, which becomes increasingly prone to ignition as long as the drought persists.

VULNERABILITY

While a drought would require water saving measures to be implemented, there would be no foreseeable damage to structures or loss of life resulting from the hazard. The agricultural sector is most vulnerable to the impacts of drought. Residents relying on groundwater as a sole source of drinking

water are more vulnerable to droughts than those on a public supply. Finally, drought conditions can reduce local firefighting capabilities, increasing the risk of damage from structure and wildfire.

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

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

Although it is well documented that the zone of greatest seismic activity in the United States is along the Pacific Coast in Alaska and California, a number of damaging earthquakes have occurred in New England. In fact, New Englanders feel an average of six earthquakes each year. In Massachusetts, municipalities along the coastline in the northeastern part of the state are most vulnerable to earthquake activity, whereas there are very few earthquakes in western Massachusetts. However, the shaking from earthquakes in eastern New York State can affect western Massachusetts, so even Plainfield has some measure of earthquake hazard.

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.

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[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.*

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.

The intensity of an earthquake is measured using the Modified Mercalli Scale. This scale quantifies the effects of an earthquake on the Earth's surface, humans, objects of nature, and man-made structures on a scale of I through XII, with I denoting a weak earthquake and XII denoting an earthquake that causes almost complete destruction.

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

Modified Mercalli Intensity Scale for and Effects			
Scale	**Intensity**	**Description Of Effects**	**Corresponding Richter Scale Magnitude**
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: Federal Emergency Management Agency

PREVIOUS OCCURRENCES

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

TABLE 8. LARGEST EARTHQUAKES IN PIONEER VALLEY 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, 2018, www.nesec.org/hazards/earthquakes.cfm

TABLE 9. 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

Source: Northeast States Emergency Consortium, 2018 website: www.nesec.org/hazards/earthquakes.cfm

In addition to the earthquakes from within the state, Massachusetts also has been strongly affected by a number of earthquakes that were centered outside of its state boundaries. Most recently, the magnitude 5.8 earthquake on August 23, 2011 centered at Mineral, VA was felt throughout Massachusetts, but no damage was reported.

Between 1954 and 20017, Hampshire County was not included in any FEMA earthquake -related disasters (DR) or emergencies (EM). No known seismic events have impacted Plainfield between 1950 and 2018. Please note that not all events that have occurred in the town are included due to the extent of documentation and the fact that not all sources may have been identified or researched.

PROBABILITY OF FUTURE EVENTS

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

TABLE 10. EARTHQUAKE INDEX FOR HAMPSHIRE COUNTY

Hampshire County	0.17
Massachusetts	0.70
United States	1.81

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

IMPACT

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

The impact of an earthquake in Plainfield would be “catastrophic.” To approximate the potential impact to property and people that could be affected by this hazard, the total value of all property in town, $58,677,900 is used.

An estimated 100 percent of damage would occur to 25 percent of structures, resulting in a total of $14,669,475 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, Plainfield's vulnerability to earthquakes is "Very Low".

Older buildings are particularly vulnerable to earthquakes because their construction pre-dates building codes that included strong seismic consideration. The town has a number of historical buildings that could be damaged or destroyed if a large enough earthquake were to happen. A loss of these historic buildings could represent a loss of Plainfield's history and culture. There have been no studies done to determine how Plainfield's critical infrastructure, such as the Town Hall, would fair in an earthquake. The town's Public Safety Complex was built recently and would likely withstand an earthquake with little or no damage.

There are many ways in which Plainfield structures, infrastructure, and individuals would be vulnerable to earthquakes. Road closures could isolate populations and keep people from getting to work, and loss of utilities could impact populations that suffered no direct damage from the earthquake itself. Following a severe earthquake, damage to roadways, bridges or underpasses that serve as evacuation routes would limit access to emergency services and hospitals.

EXTREME TEMPERATURES

What constitutes “extreme cold” or “extreme heat” can vary across different geographies, based on what the population of a particular place is accustomed to. According to the Massachusetts State Hazard Mitigation and Climate Adaptation Plan, extreme heat for Massachusetts is usually defined as a period of 3 or more consecutive days above 90 degrees Fahrenheit (°F), but more generally as a prolonged period of excessively hot weather, which may be accompanied by high humidity. Extreme cold is also considered relative to the normal climatic lows in a region.

More broadly, extreme temperatures can be defined as those that are far outside the normal ranges. The average highs and lows of the hottest and coolest months in the neighboring town of Ashfield, the closest site for which data was available, are provided in Table 11 below.

TABLE 11. ANNUAL AVERAGE HIGH AND LOW TEMPERATURES

	July (Hottest Month)	January (Coldest Month)
Average High (°F)	79	30
Average Low (°F)	54	9

Source: U.S. Climate Data, 2018

Extreme cold events are when temperatures drop well below normal in an area. Generally, extreme cold temperatures are characterized by the ambient air temperature dropping to or below 0 degrees Fahrenheit (ºF) (National Weather Service [NWS] 2015). When winter temperatures drop significantly below normal, staying warm and safe can become a challenge. Extremely cold temperatures may accompany or follow a winter storm, which may also cause power failures and icy roads. Many homes will be too cold, either due to a power failure or because the heating system is not adequate for the weather. Extensive exposure to extreme cold temperatures can cause frostbite or hypothermia and can become life-threatening.

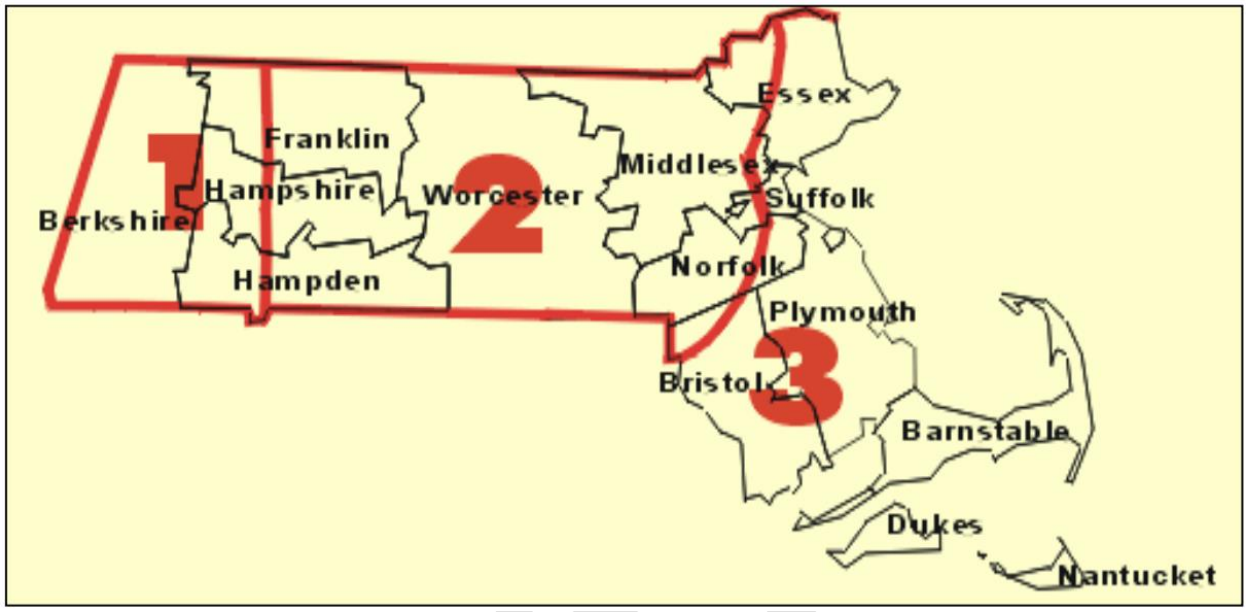
Extreme heat is defined by the Center for Disease Control (CDC) as temperatures which hover 10 degrees or more above the average high temperature for a region and that last for several weeks (CDC 2016). Heat waves cause more fatalities in the U.S. than the total of all other meteorological events combined. Since 1979, more than 9,000 Americans have died from heat-related ailments (EPA, 2016). In Massachusetts, a heat wave is defined as 3 or more days of temperatures of 90°F or above and is often accompanied by high humidity. The designation implies an extended period of unusually high atmosphere-related heat stress, which forces affected populations to make temporary modifications in lifestyle to avoid adverse health consequences (MA HMCAP, 2018).

LOCATION

NOAA divides Massachusetts up into three climate divisions - Western, Central, and Coastal – and average annual temperatures vary slightly over the divisions. Another distinction between the divisions is that extreme temperature events occur more frequently and vary more in the inland regions where

temperatures are not moderated by the Atlantic Ocean. Plainfield falls squarely in the Western Division, with annual average temperatures of around 46°F.

FIGURE 3. CLIMATE DIVISIONS OF MASSACHUSETTS



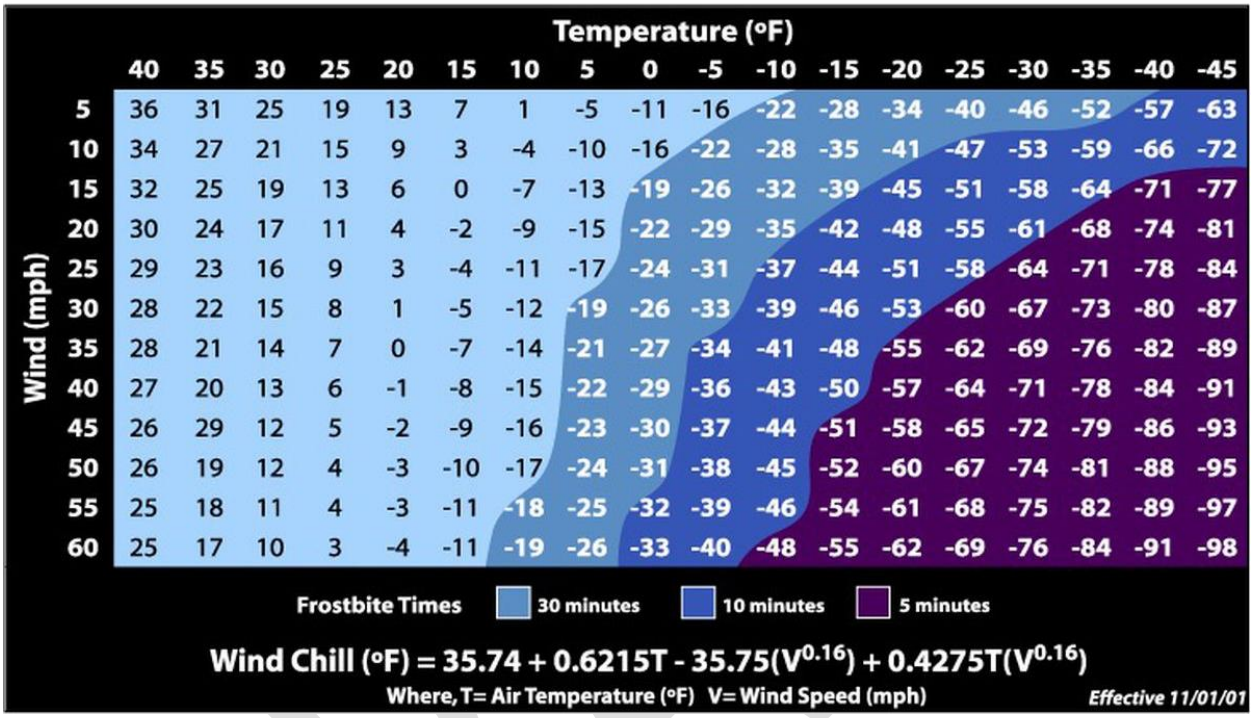
Source: NOAA, n.d.

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

EXTENT

The extent (severity or magnitude) of extreme cold temperatures are generally measured through the Wind Chill Temperature (WCT) 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 –25ºF or lower for at least three hours. The WCT is presented in Figure 4.

FIGURE 4. NWS WIND CHILL INDEX



Source: NWS 2018

The NWS Heat Index is used to measure extremely hot temperatures, combining 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°F for 2 or more hours, and an Excessive Heat Warning if the Heat Index is forecast to reach 105°F or higher for 2 or more hours. The chart in Figure 5 indicates the relationship between heat index and relative humidity and illustrates the adverse effects that prolonged exposure to heat and humidity can have on an individual.

FIGURE 5. NWS HEAT INDEX CHART

Relative Humidity (%) \ Temperature (°F)	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.

Source: National Weather Service (NWS), Heat Index, 2018

According to recent downscaled climate projections for Massachusetts, high, low, and average temperatures in Hampshire County and the Westfield River basin are likely to increase significantly over the next century as a result of climate change (resilient MA, 2018). This gradual change will put long-term stress on a variety of social and natural systems, and will exacerbate the influence of discrete events.

PREVIOUS OCCURRENCES

The Midwest Regional Climate Center (MRCC) operates the MRCC's Application Tools Environment (cliMATE) which provides access to climate data and value-added tools. This application can be used to look up information that includes raw climate data, rankings of climate information, thresholds, growing season tool, maps, graphs, etc. The maximum and minimum temperatures and the maximum average and minimum average for the stations closest to Plainfield were queried for information between 1950 and 2018. Based on the cli-MATE application, the closest station with sufficient and current data is in Savoy. Based on the data provided by MRCC, Figure 6 presents the extreme cold (minimum) and hot (maximum) temperature records for from 1950 to 2018.

FIGURE 6. MRCC TEMPERATURE EXTREMES IN PLAINFIELD STUDY AREA						
Name	**Begin**	**End**	**Max (°F)**	**Max Date**	**Min (°F)**	**Min Date**
Savoy	1999	2017	92	July 8, 2010	-16	Jan 14 and 15, 2004

Source: MRCC, 2018. SAVOY (MA), USC00197230

The following are the lowest temperatures recorded in parts of Massachusetts for the period from 1895 to present[6]:

- Taunton: -35°F, January 5, 1904
- Coldbrook: -35°F, February 15, 1943
- Chester: -35°F, January 12, 1981

The highest temperature recorded for the period from 1895 to present[7] was 107°F in Chester, MA, on August 2, 1975.

Since 1994, there have been 33 cold weather events within the Commonwealth, ranging from Cold/Wind Chill to Extreme Cold/Wind Chill events. In February 2015, a series of snowstorms piled up to 60 inches in some areas in 3 weeks and caused recurrent blizzards across eastern Massachusetts. Temperature gauges across the Commonwealth measured extreme cold, with wind chills as low as -31°F. Four indirect fatalities occurred as a result of this event: two adults died shoveling snow and two adults were hit by snowplows. In February 2016, one cold weather event broke records throughout the state. Extreme cold/wind chill events were declared in 16 climate zones across the Commonwealth (MASHMCAP, 2018).

According to the NOAA's Storm Events Database, there were 43 warm weather events (ranging from Record Warmth/Heat to Excessive Heat events) in Massachusetts between 1995 and 2018, the most recent of which occurred in July 2013. Whenever the heat index values meet or exceed locally or regionally established heat or excessive heat warning thresholds, an event is reported in the database. In 2012, Massachusetts temperatures broke 27 heat records. Most of these records were broken between June 20 and June 22, 2012, during the first major heat wave of the summer to hit Massachusetts and the East Coast. In July 2013, a long period of hot and humid weather occurred throughout New England. One fatality occurred on July 6, when a postal worker collapsed as the Heat Index reached 100°F (MASHMCAP, 2018). None of these events was known to impact individuals in Plainfield.

[6] https://www.ncdc.noaa.gov/extremes/scec/records

[7] https://www.ncdc.noaa.gov/extremes/scec/records

Between 1954 and 2017, Hampshire County was not included in any FEMA declared extreme temperature -related disasters (DR) or emergencies (EM).

PROBABILITY OF FUTURE EVENTS

The probability of future extreme heat and extreme cold is considered to be "moderate," or between 10 and 40 percent in any given year.

IMPACT

Extensive exposure to extreme cold temperatures can cause frostbite or hypothermia and can become life-threatening. Extreme cold and extreme heat are dangerous situations that can result in health emergencies for susceptible people, such as those without shelter or who are stranded or who live in homes that are poorly insulated or without heat or air conditioning or some other way to stay cool. Power outages may also result in inappropriate use of combustion heaters, cooking appliances, and generators in indoor or poorly ventilated areas, leading to increased risk of carbon monoxide poisoning.

Extreme heat events can also contribute to a worsening of air quality, as high temperatures increase the production of ozone from aerosols such as volatile organic compounds. Weather patterns that bring high temperatures can also transport particulate matter air pollutants from other areas of the continent. Additionally, atmospheric inversions and low wind speeds allow polluted air to remain in one location for a prolonged period of time (UCI, 2017).

The impact of extreme temperatures, or the impact of extreme heat or cold in Plainfield, is considered to be "limited," with little to no property damage but minor impacts on human health for some vulnerable populations. Furthermore, the increase in temperature fluctuations projected and now seen as a result of climate change may result in more frequent infrastructure maintenance requirements to address repetitive freeze-thaw damage to dirt roads, deterioration of asphalt roads, and thermal expansion of bridges.

VULNERABILITY

Anticipated increases in extreme local temperatures is directly related to many of the previously described vulnerabilities, as well as increasing the risk of heat-related disease and injury, especially among senior citizens and residents unable to afford air conditioning.

Extreme temperature can have a significant impact to human health, commercial/agricultural businesses and primary and secondary effects on infrastructure (e.g., burst pipes and power failure).

Structures and infrastructure within the town are not at risk for damage due to extreme temperatures, but populations that are not prepared to contend with these temperature extremes could be most vulnerable. Furthermore, secondary impacts of this hazard include extreme temperature fluctuations, which have serious implications for transportation infrastructure life-span and maintenance needs.

Plainfield's vulnerability from extreme heat and cold, and associated impacts of extreme temperature fluctuations, is considered to be “Medium.”

FLOOD

HAZARD DESCRIPTION

Plainfield is susceptible to inland flooding which is the result of moderate precipitation over several days, intense precipitation over a short period, or melting snowpack (U.S. Climate Resilience Toolkit, 2017). Common types of inland flooding are described in the following subsections.

RIVERINE FLOODING

Riverine flooding often occurs after heavy rain. Areas with high slopes and minimal soil cover are particularly susceptible to flash flooding caused by rapid runoff that occurs in heavy precipitation events and in combination with spring snowmelt, which can contribute to riverine flooding. Frozen ground conditions can also contribute to low rainfall infiltration and high runoff events that may result in riverine flooding.

URBAN DRAINAGE FLOODING

Urban drainage flooding is caused by increased water runoff due to high density development and drainage systems that are not capable of conveying high flows. Drainage systems are designed to remove surface water from developed areas as quickly as possible to prevent localized flooding on streets and other urban areas. They make use of a closed conveyance system that channels water away from a developed area to surrounding streams, bypassing natural processes of water infiltration into the ground, groundwater storage, and evapotranspiration (plant water uptake and respiration). Since drainage systems reduce the amount of time the surface water takes to reach surrounding streams, flooding can occur more quickly and reach greater depths than if there were no urban development at all.

GROUND FAILURES

Flooding and flood-related erosion can result from various types of ground failures, which include mud floods and mudflows, and to a much lesser degree, fluvial erosion.

Mud floods are floods that carry large amounts of sediment, which can at times exceed 50 percent of the mass of the flood, and often occur in drainage channels and adjacent to mountainous areas. Mudflows are a specific type of landslide that contains large amounts of water and can carry debris as large as boulders. Both mudflows and mud floods result from rain falling on exposed terrain, such as terrain impacted by wildfires or logging. Mud floods and mudflows can lead to large sediment deposits in drainage channels. In addition to causing damage, these events can exacerbate subsequent flooding by filling in rivers and streams.

Fluvial erosion occurs when the river undercuts a bank, usually on the outside bend of a channel, causing the riverbank to slough and collapse. Fluvial erosion can also include scouring and downcutting

of the stream bottom, especially problematic around bridge piers and abutments. In hillier terrain where streams may lack a floodplain, fluvial erosion may cause more property damage than inundation, and can often occur in areas that are not part of the 100- or 500-year floodplain.

ICE JAM

Ice jams occur when ice accumulates and acts as a natural dam to restrict the flow of a waterway. There are two types of ice jams: a freeze-up jam and a breakup jam. A freeze-up jam usually occurs in early winter to midwinter during extremely cold weather when the entire width of a river channel may freeze. This type of jam can act as a dam and begin to back up the flowing water behind it. Breakup jams, conversely, form because of the breakup of the river ice as temperatures warm and in combination with snow melt or heavy rains, causing large pieces of ice to move downstream, potentially piling up at culverts, around bridge abutments, and at curves in river channels. Ice jams may build up to a thickness great enough to raise the water level and cause flooding upstream of the obstruction. The Ice Engineering Group at the U.S. Army Corps of Engineers (USACE) Cold Regions Research and Engineering Laboratory maintains a national Ice Jam Database which currently consists of more than 18,000 records from across the nation.

ADDITIONAL CAUSES OF FLOODING

Additional causes of flooding include beaver dams or levee failure. Beaver dams obstruct the flow of water and cause water levels to rise. Significant downstream flooding can occur if beaver dams break.

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

- *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.

FLOODPLAINS

A floodplain is the relatively flat, lowland area adjacent to a river, lake or stream. Floodplains serve an important function, acting like large "sponges" to absorb and slowly release floodwaters back to surface waters and groundwater. Over time, sediments that are deposited in floodplains develop into fertile, productive farmland like that found in the Connecticut River valley. In the past, floodplain areas were also often seen as prime locations for development. Industries were located on the banks of rivers for access to hydropower. Residential and commercial development occurred in floodplains because of

their scenic qualities and proximity to the water. Although periodic flooding of a floodplain area is a natural occurrence, past and current development and alteration of these areas will result in flooding that is a costly and frequent hazard.

LOCATION

Human development within historic floodplains and flood-prone areas has resulted in increased potential risks to public safety and infrastructure. Such development has occurred for centuries along rivers in Massachusetts, resulting in reduced natural flood storage capacity and increased exposure to flood risks. A historic mill town, Plainfield has a long history of development commercial activity occurring along the banks of its rivers and streams. While there are no FEMA-mapped floodplain areas in Plainfield, various parts of the town have issues with localized flooding, described below:

- Minor shoulder washouts
    - Route 116 at the Ashfield/Plainfield town line
    - In the vicinity of the Prospect/116 intersection
    - South end of West St. near the Plainfield/Cummington line
    - South end of Prospect St. near Plainfield/Cummington line
    - West Hill Rd. on the hill between River Rd. and Vining St.
    - South St on the hill 1/3 mile south of the Gloyd St. intersection
    - Gloyd St. on hills west and east of the South St. intersection
- Dirt roads that that regularly washout along their edges/ditches are:
    - Mountain St. near the dead end and near Prospect St. intersection
    - Summit St. near Prospect St. intersection and near Bluff St. intersection
    - Upper Liberty along most of its length
- Water ponding
    - 116 near Prospect St.
    - near Rte. 8A mainly when the drains are plugged by leaves/snow/ice

According to the Town of Plainfield Highway Superintendent, this frequency and intensity of rain events has increased over the last few years. The washouts listed above occurred as a result of the frequent and intense downpours the summer of 2018.

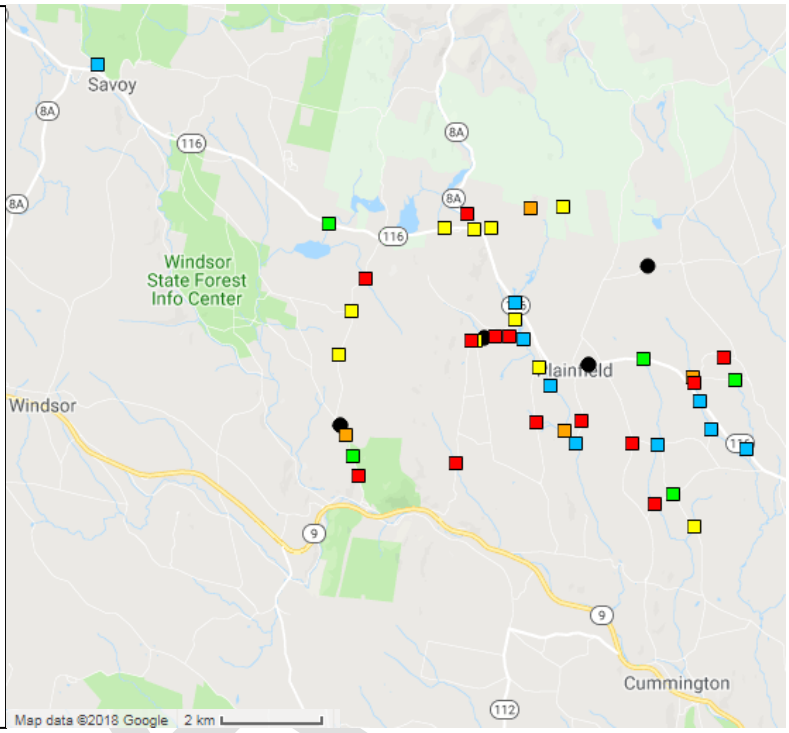
In addition to the above, HMP Committee Members noted that all of River Road is vulnerable to flooding and subject to slump and settling because of its proximity to Mill Brook, and West Hill Road Bridge regularly overtops/gets washed out.

The shoulder washout issue in the vicinity of the Prospect St./116 intersection seems to have been resolved after some work we have done there recently. Ponding in front of the Highway Garage on Rt. 116 has been an issue historically, but recent work in this area has reduced the amount of water ponding and the related hydroplaning concerns.

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

FIGURE 7. CULVERTS AND STREAM CROSSINGS IN PLAINFIELD

The colored circles on the map represent surveyed NAACC crossings and colored squares represent UMass crossings color coded as follows:
No barrier: blue
Insignificant barrier: blue green
Minor barrier: green
Moderate barrier: yellow
Significant barrier: orange
Severe barrier: red
Black circles are unsurveyed crossings that have been assigned xy crossing codes by using Geographic Information System (GIS) software.



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

Culverts of particular concern for flooding include:

1) Mill Brook crossing under Prospect St. near Rte. 116 intersection--the culvert is too small to handle both intense downpours and long term rain events. Mill Brook has overflowed over Prospect St. at this location multiple times, washing out the shoulders on a couple occasions.
2) Mill Brook crossing under West Hill Rd. at River Rd. intersection. This location has overflowed, but only during high precipitation events such as Hurricane Irene in August, 2011 and the heavy rainstorm in October 2005 that dropped 8.70 inches of rain in a single day (recorded at the Worthington NWS NOW station.)
3) Meadow Brook crossing under Gloyd Rd. near South Central St. intersection. This location has also overflowed multiple times during both intense downpours and long term rain events.

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

EXTENT

NWS’s Northeast River Forecast Center forecasts and classifies inland flooding in Massachusetts as minor, moderate, or severe based upon the types of impacts that occur.

- **Minor flooding** is considered "disruptive" flooding that causes impacts such as road closures and flooding of recreational areas and farmland.
- **Moderate flooding** can involve land with structures becoming inundated.
- **Major flooding** is a widespread, life-threatening event. River forecasts are made at many locations in the state containing USGS river gauges with established flood elevations and levels that correspond to each of the degrees of flooding.

The main factors affecting damage from flooding are depth and velocity. As flood flows increase in depth and speed, they can cause more damage. High velocity movement of shallow floods can cause as much damage as deep flooding with slow velocity.

Flood flows in Massachusetts are measured at numerous USGS stream gauges. After a flood occurs, the USGS will typically determine the recurrence interval of the event using data from a gauge's period of historical record. FEMA Flood Insurance Rate Map boundaries are also convenient tools for assessing vulnerability and risk in flood-prone communities.

The 100-Year Flood

A flood that has a 1 percent chance of being equaled or exceeded each year is commonly referred to as the 100-year flood, a term used by most federal and state agencies. The area that becomes inundated as a result of a 1 percent annual probability of occurrence (the base flood or 100-year flood) is called the 100-year floodplain or the Special Flood Hazard Area (SFHA), which is used as the regulatory boundary by many agencies.

The 500-Year Flood

A flood that has a 0.2 percent chance of being equaled or exceeded each year is referred to as a "500-year flood."

The boundaries of the 1 percent annual chance (100-year) and the 0.2 percent annual chance (500-year) floodplains are shown on FEMA's Flood Insurance Rate Maps (FIRMs), which are the principal tools for identifying the extent and location of the flood hazard in most communities. These maps, however, are based on previous flood events, and therefore do not reflect projected changes in precipitation events, and increased temperature, which will impact flood risk.

PREVIOUS OCCURRENCES

Flooding in the Pioneer Valley is often the direct result of frequent weather events, such as nor'easters, tropical storms, hurricanes, heavy rains, and snowmelt. Rainfall events are the most frequent drivers of riverine flooding in the region, and in Plainfield. The state receives approximately 48 inches of rain per year on average, with average monthly rainfall between 3 and 4 inches in all regions of the state. However, heavy rainfall events occur regularly. As a result, riverine flooding affects the majority of the communities in the Commonwealth. The observed average annual precipitation for Plainfield and surrounding areas in the Westfield River watershed is 48 inches. Relative to an observed value 1971 -

2000 average of 47 inches, the total annual precipitation in this watershed will increase by 2-13% by 2050, and winter precipitation will increase by up to 21% (resilient MA, 2018).

Between 1954 and 2018, Hampshire County was included in 5 FEMA declared flood-related disasters (DR) or emergencies (EM) classified as one or a combination of the following hazards: severe storms, flooding, and inland and coastal flooding (See Table 4). Plainfield may not have been impacted by all of these events. According to the USACE Ice Jam Database, there were 220 reported ice jams in Massachusetts between 1920 and 2017, though none appear to have been located in Plainfield (USACE, 2018).

The major floods recorded in Plainfield have been the result of rainfall alone or rainfall combined with snowmelt. Known flood events, including FEMA disaster declarations, which have impacted Plainfield between 1950 and 2018 are identified in Table 12. Detailed information on damages and impacts are included when available. Please note that not all events that have occurred in the town are included due to the extent of documentation and the fact that not all sources may have been identified or researched. Loss and impact information could vary depending on the source. Therefore, the accuracy of monetary figures discussed is based only on the available information identified during research for this plan.

TABLE 12. FLOOD EVENTS IN PLAINFIELD, 1950-2018

Dates of Event	Event Type	FEMA Declaration Number (if applicable)	Losses/Impacts
March 30 - April 13, 1987	Severe storms & flooding, DR-790	Yes	A pair of spring storms occurring within a few days of one another in March and April 1987 combined with snowmelt to produce record flooding in Massachusetts, Maine, and New Hampshire. The events brought over 8 inches of rainfall to some areas of Massachusetts and combined with already high river conditions to produce major flooding in the Connecticut and Merrimack River basins. In addition, several of the Corps of Engineers dams recorded record pool levels (NOAA, date unknown). This March-April 1987 event resulted in a federal disaster declaration (FEMA-DR-790).
April 2007	Severe storms and inland and coastal flooding, DR-1701	Yes	An intense coastal storm (April 15-16, 2007) brought wet snow, sleet, and rain to parts of western Massachusetts. Rainfall totals ranged between three and six includes and lead to minor flooding across the affected areas. Heavy rain and snowmelt also led to minor flooding of small streams and creeks in parts of the Commonwealth as well. This event resulted in a federal disaster declaration (DR-1701). Those counties included in this disaster received over $8 million in public assistance from FEMA. The storm was primarily a rain event due to warmer temperatures; however, higher elevations experienced significant snow and ice accumulations.
August 27-29, 2011	Tropical Storm / Hurricane Irene EM-3330 DR-4028	Yes	Tropical Storm Irene (August 27-29, 2011) produced significant amounts of rain, storm surge, inland and coastal flooding, and wind damage across southern New England and much of the east coast of the U.S. In Massachusetts, rainfall totals ranged between 0.03 inches (Nantucket Memorial Airport) to 9.92 inches (Conway, MA). These heavy rains caused flooding throughout the Commonwealth and a presidential disaster was declared (DR-4028).

Dates of Event	Event Type	FEMA Declaration Number (if applicable)	Losses/Impacts
			In Southern New England, the minimum surface pressure recorded was 976.9mb taken at Barnes Municipal Airport in Westfield, Massachusetts. The highest sustained wind speed on land was 38 knots (44 mph) recorded on the Automated Surface Observing Systems at both Barnstable Municipal Airport in Hyannis, MA (KHYA) and Logan International Airport in Boston, MA (KBOS). Rainfall amounts ranged from nearly zero (0.03 at Nantucket Memorial Airport - ACK) to nearly 10 inches (9.92 in Conway, MA). This rainfall contributed to significant flooding in northwestern Massachusetts where mainstem rivers and their tributaries reached levels not seen since 1987, and in some cases (The Connecticut River at Montague) since 1938. The Deerfield River at West Deerfield set a new flood of record at 23.8 feet, the previous record was 17.71 feet set in April of 1987. The Westfield River reached its highest level since 1980. Tropical Storm Irene was closely followed by the remnants of Tropical Storm Lee, which brought additional heavy rain to Massachusetts and extended flooding. Severe river erosion occurred in northwestern Massachusetts, closing State Route 2. Landslides were also triggered by the heavy rain and wet soil in this area of steep slopes containing layers of glacial lake clay. The Commonwealth received over $31 million in individual and public assistance from FEMA. In Plainfield, flood waters overtopped the culvert on River Road.
October 27 - November 8, 2012	Hurricane Sandy, EM-3350	Yes	Sandy, a hybrid storm with both tropical and extra-tropical characteristics, brought high winds and coastal flooding to southern New England. Easterly winds gusted to 50 to 60 mph for interior southern New England.

Sources: MA 2013 HMP, NOAA Storm Events Database, 2018

PROBABILITY OF FUTURE EVENTS

While there have only been 5 federally declared flood-related disasters in Hampshire County from 1954-2018, floods of lesser magnitude occur at a much higher frequency; in the last 7.5 years alone (2010 to halfway through 2018), the National Oceanic and Atmospheric Administration (NOAA) Storm Events Database reports that there were 21 flood events in Hampshire County, which is an average of nearly 3 floods per year.

Based on previous occurrences, the probability of moderate or major flooding in Plainfield is "Low," with a 1 to 10 percent probability in any given year and the probability of minor localized flooding is “Very High” with a 70 to 100 percent probability 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.

IMPACT

The impact of a flood event in Plainfield would fall between “minor” and “limited,” dependent on event severity and precise location. This equates to approximately 10 percent or more of property in the affected 10 percent of total town area damaged. Using the assessed value of all structures in town, $58,677,900, the total property damage, based on the damage to individual flooding locations discussed in the "location" section, is $586,779. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate, but would likely comprise most of the damages related to a flood event in Plainfield.

VULNERABILITY

Plainfield is fortunate that its critical facilities are not near streams/rivers, therefore not at risk from flood waters. The flood locations at West Hill Rd. and Prospect St., if overflowed and washed out during a high end event, could greatly hamper evacuation efforts for residents on those roads and side streets off them.

Based on the above analysis, Plainfield faces a vulnerability of "1-Very High" risk from localized flooding and a “4-Low” risk from moderate or major floods.

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 the intensity and severity of flood-inducing weather events. Based off of data from the Massachusetts Climate Change Clearinghouse[8], the average annual precipitation amounts are expected to increase by an additional 1.83 inches by the middle of the century (2050) and by an additional 4.45 inches by the end of the century. Additionally, by the end of the century, Plainfield and the rest of the Westfield River Watershed is projected to see the number of days in a year with precipitation events greater than 1 inch increase by .5 days a year.

[8] http://resilientma.org/datagrapher/?c=Temp/basin/pcpn_1/ANN/Westfield/&c=Temp/basin/pcpn/ANN/Westfield/

HURRICANES / TROPICAL STORMS

HAZARD DESCRIPTION

Hurricanes and tropical storms 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). The primary damaging forces associated with these storms are high-level sustained winds and heavy precipitation. Tropical cyclones (tropical depressions, tropical storms, and hurricanes) form over the warm, moist waters of the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico, and are classified into one of three categories:

- A tropical depression is declared when there is a low-pressure center in the tropics with sustained winds of 25 to 33 mph.
- A tropical storm is a named event defined as having sustained winds from 34 to 73 mph.
- If sustained winds reach 74 mph or greater, the storm becomes a hurricane. The Saffir-Simpson scale ranks hurricanes based on sustained wind speeds—from Category 1 (74 to 95 mph) to Category 5 (156 mph or more). Category 3, 4, and 5 hurricanes are considered "major" hurricanes. Hurricanes are categorized based on sustained winds; wind gusts associated with hurricanes may exceed the sustained winds and cause more severe localized damage (NOAA, n.d.[b]).

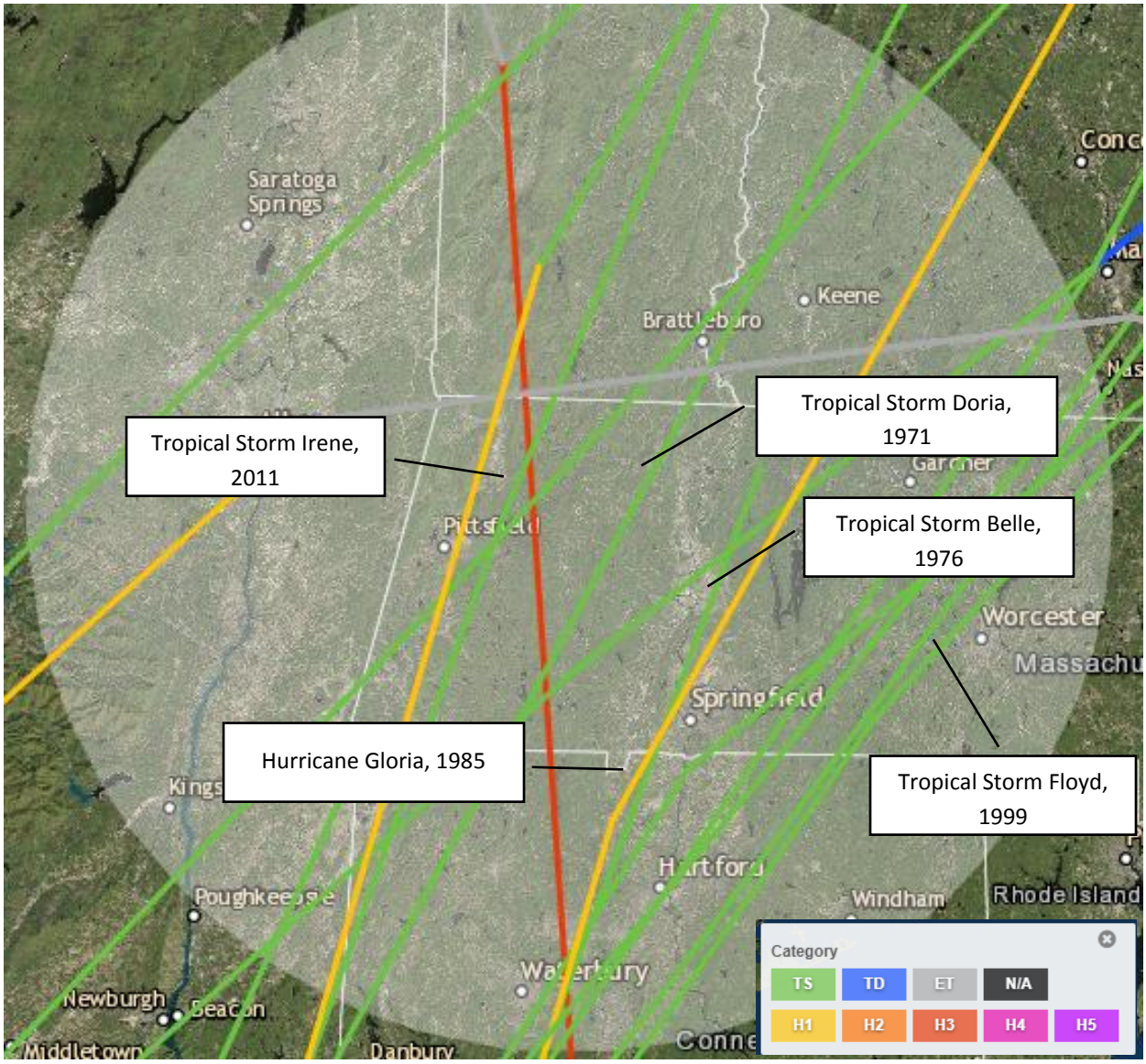
Hurricanes are violent rainstorms with strong winds that can reach speeds of up to 200 miles per hour and which generate large amounts of precipitation. Hurricanes generally occur between June and November and can result in flooding and wind damage to structures and above-ground utilities.

LOCATION

Because of the hazard's regional nature, all of Plainfield is at risk from hurricanes and tropical storms. While some locations in town are more susceptible to damage from a hurricane or tropical storm than others, the location of occurrence in Plainfield is "large," with over 50 percent of land area affected by the event in some way. Ridgetops are more susceptible to wind damage and flood-prone areas are susceptible to flooding from heavy rains that usually accompany hurricane.

NOAA's Historical Hurricane Tracks tool is a public interactive mapping application that displays Atlantic Basin and East-Central Pacific Basin tropical cyclone data. This interactive tool catalogs tropical cyclones that have occurred from 1859 and 2017 (earliest and latest dates available from data source). Between 1859 and 2017, 16 tropical cyclones of a tropical storm strength or higher tracked within 65 nautical miles of Plainfield. Figure 8 displays the tropical storm and hurricane tracks that occurred with 65 nautical miles of Plainfield between 1859 and 2017. For reference, labels are provided for those storms that occurred within the last 50 years.

FIGURE 8. HISTORICAL HURRICANE AND TROPICAL STORM TRACKS WITHIN 65 NAUTICAL MILES OF PLAINFIELD



Source: NOAA National Hurricane Center, 2018

EXTENT

As a 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.

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

Hurricane Damage Classifications			
Storm Category	**Damage Level**	**Description of Damages**	**Wind Speed (MPH)**
1	MINIMAL Very dangerous winds will produce some damage	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
2	MODERATE Extremely dangerous winds will cause extensive damage	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
3	EXTENSIVE Devastating damage will occur	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
4	EXTREME Catastrophic damage will occur	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
5	CATASTROPHIC Catastrophic damage will occur	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+

Source: National Hurricane Center, 2012

PREVIOUS OCCURRENCES

Between 1954 and 2017, Hampshire County was included in 5 FEMA declared severe Hurricane/Tropical Storm-related disasters (DR) or emergencies (EM) classified as one or a combination of the following hazards: hurricane and tropical storm (See Table 4). Plainfield may not have been impacted by all of these events.

According to NOAA's Historical Hurricane Tracks tool, there have been 16 hurricanes or tropical storms in recorded history that tracked within 65 nautical miles of Plainfield. They are shown in the following table.

These hurricanes and tropical storms did not cause any significant damage to Plainfield.

TABLE 13. MAJOR HURRICANES AND TROPICAL STORMS AFFECTING PLAINFIELD

Hurricane/Storm Name	Year	Saffir/Simpson Category (when reached study area)
Unnamed	1878	Tropical Storm
Unnamed	1863	Tropical Storm
Unnamed	1874	Tropical Storm
Unnamed	1878	H1
Unnamed	1893	H1
Unnamed	1893	H1
Great Hurricane of 1938	1938	H3
Unnamed	1949	Tropical Storm
Able	1952	Tropical Storm
Brenda	1960	Tropical Storm
Unnamed	1961	Tropical Storm
Doria	1971	Tropical Storm
Belle	1976	Tropical Storm
Gloria	1985	H1
Floyd	1999	Tropical Storm
Irene	2011	Tropical Storm

Source: National Hurricane Center, 2018

The Great Hurricane of 1938 holds the record for bring the most powerful and deadliest Hurricane to hit New England. It is believed that the Hurricane killed 682 people and destroyed almost 60,000 homes as

it moved across New England. There is no local history or knowledge of how the storm directly impacted Plainfield. More recently, Hurricane Irene, which didn't track directly through Plainfield, dropped a significant amount of rain in Plainfield and caused road washouts and erosion.

Known hurricane and tropical storm events, including FEMA disaster declarations, which have impacted Plainfield between 1950 and 2018 are identified in Table 14. Detailed information on damages and impacts are included when available. Please note that not all events that have occurred in the town are included due to the extent of documentation and the fact that not all sources may have been identified or researched. Loss and impact information could vary depending on the source. Therefore, the accuracy of monetary figures discussed is based only on the available information identified during research for this plan.

TABLE 14. HURRICANE/ TROPICAL STORM EVENTS IN PLAINFIELD, 1950-2018

Dates of Event	Event Type	FEMA Declaration Number (if applicable)	Losses/Impacts
August 27-29, 2011	Tropical Storm / Hurricane Irene EM-3330 DR-4028	Yes	Tropical Storm Irene (August 27-29, 2011) produced significant amounts of rain, storm surge, inland and coastal flooding, and wind damage across southern New England and much of the east coast of the U.S. In Massachusetts, rainfall totals ranged between 0.03 inches (Nantucket Memorial Airport) to 9.92 inches (Conway, MA). These heavy rains caused flooding throughout the Commonwealth and a presidential disaster was declared (DR-4028). In Southern New England, the minimum surface pressure recorded was 976.9mb taken at Barnes Municipal Airport in Westfield, Massachusetts. The highest sustained wind speed on land was 38 knots (44 mph) recorded on the Automated Surface Observing Systems at both Barnstable Municipal Airport in Hyannis, MA (KHYA) and Logan International Airport in Boston, MA (KBOS). Rainfall amounts ranged from nearly zero (0.03 at Nantucket Memorial Airport - ACK) to nearly 10 inches (9.92 in Conway, MA). This rainfall contributed to significant flooding in northwestern Massachusetts where mainstem rivers and their tributaries reached levels not seen since 1987, and in some cases (The Connecticut River at Montague) since 1938. The Deerfield River at West Deerfield set a new flood of record at 23.8 feet, the previous record was 17.71 feet set in April of 1987. The Westfield River reached its highest level since 1980. Tropical Storm Irene was closely followed by the remnants of Tropical Storm Lee, which brought additional heavy rain to Massachusetts and extended flooding. Severe river erosion occurred in northwestern Massachusetts, closing State Route 2. Landslides were also triggered by the heavy rain and wet soil in this area of steep slopes containing layers of glacial lake clay. The Commonwealth received over $31 million in individual and public assistance from FEMA.
October 27 - November 8, 2012	Hurricane Sandy, EM-3350	Yes	Sandy, a hybrid storm with both tropical and extra-tropical characteristics, brought high winds and coastal flooding to southern New England. Easterly winds gusted to 50 to 60 mph for interior southern New England. No damages were reported in Plainfield.

Sources: MA 2013 HMP, NOAA Storm Events Database, 2018

PROBABILITY OF FUTURE EVENTS

Plainfield'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. Furthermore, the intensity of tropical storms and hurricanes is likely to increase as a result of climate change. Based upon past occurrences, it is reasonable to say that there is a "high" probability of hurricanes or tropical storms, or a 40 to 70 percent probability in any given year.

IMPACT

The location and path of a system can also be a major factor in the severity of storm impact. The Town of Plainfield faces a “limited” impact from hurricanes, with 10 percent or more of property in the affected area damaged.

To approximate the potential impact to property and people that could be affected by this hazard, the total value of all property in town, $58,677,900 is used. Wind damage of 5 percent with 10 percent of structures damaged would result in estimated $293,389 of damage. Estimated flood damage to 10 percent of the structures with 20 percent damage to each structure would result in $1,173,558 of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

VULNERABILITY

The entire town would be vulnerable to the impact of a hurricane. Hurricanes and tropical storms can result in power outages and road closures that impact emergency response. Heavy rains can lead to contamination of well water, septic system failure, and overburdened stormwater systems. Areas prone to flooding are particularly vulnerable. Additionally, high winds could impact the town’s communication and energy infrastructure, and damage older buildings.

Based on the above analysis, Plainfield faces a “Medium” vulnerability from hurricanes and tropical storms.

SEVERE THUNDERSTORMS / WIND / TORNADOES/ MICROBURSTS

HAZARD DESCRIPTION

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

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

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

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

LOCATION

As per the Massachusetts Hazard Mitigation Plan, the entire Town is at risk of high winds, severe thunderstorms, and tornadoes. However, the actual area that would be affected by these hazards is "Medium," or between 10 and 50 percent of total land area. According to the 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan, the area at greatest risk for a tornado touchdown runs from central to northeastern Massachusetts.

EXTENT

An average thunderstorm is 15 miles across and lasts 30 minutes; severe thunderstorms can be much larger and longer. Massachusetts experiences between 20 and 30 thunderstorm days each year. Thunderstorms can cause hail, wind, and flooding.

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

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

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

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

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

Source: http://www.spc.noaa.gov/misc/tables/hailsize.htm

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

TABLE 15. RAINFALL RECORDS FOR PLAINFIELD, MA

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

Source: http://myforecast.co/bin/climate.m?city=571549&metric=false

PREVIOUS OCCURRENCES

Because thunderstorms and wind affect the town regularly on an annual basis, there are not significant records available for these events. As per the Massachusetts Hazard Mitigation Plan, there are approximately 20 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. Southern New England typically

experiences 10-15 days per year with severe thunderstorms (with winds over 50 miles per hour) (MSHMCAP, 2018).

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

Most recently, on February 25, 2017, an EF1 tornado touched down in Conway and Goshen, Massachusetts. The tornado damaged dozens of homes, hundreds of trees and left 75% of the residents without power. This was the first tornado in Massachusetts to touch down in February since record keeping stated in the 1950s.

No microbursts have ever been officially reported in Plainfield, although some residents recall incidents of large trees being blown down quickly in discreet areas.

Between 1954 and 2017, Hampshire County was included in 6 FEMA declared severe thunderstorm, wind, tornado, and microburst -related disasters (DR) or emergencies (EM) including one or a combination of the following hazards description in the event classification: severe storms and high winds (See Table 4). Plainfield may not have been impacted by all of these events.

Known severe thunderstorm, wind, tornado, and microburst events, including FEMA disaster declarations, which have impacted Plainfield between 1950 and 2018 are identified in Table 16. Detailed information on damages and impacts are included when available. Please note that not all events that have occurred in the town are included due to the extent of documentation and the fact that not all sources may have been identified or researched. Loss and impact information could vary depending on the source. Therefore, the accuracy of monetary figures discussed is based only on the available information identified during research for this plan.

TABLE 16. SEVERE THUNDERSTORM, WIND, TORNADO, AND MICROBURST EVENTS IN PLAINFIELD, 1950-2018

Dates of Event	Event Type	FEMA Declaration Number (if applicable)	Losses/Impacts
March 30 - April 13, 1987	Severe storms & flooding, DR-790	Yes	A pair of spring storms occurring within a few days of one another in March and April 1987 combined with snowmelt to produce record flooding in Massachusetts, Maine, and New Hampshire. The events brought over 8 inches of rainfall to some areas of Massachusetts and combined with already high river conditions to produce major flooding in the Connecticut and Merrimack River basins. In addition, several of the Corps of Engineers dams recorded record pool levels (NOAA, date unknown). This March-April 1987 event resulted in a

Dates of Event	Event Type	FEMA Declaration Number (if applicable)	Losses/Impacts
			federal disaster declaration (FEMA-DR-790).
April 15-16, 2007	Severe storms and inland and coastal flooding, DR-1701	Yes	An intense coastal storm brought wet snow, sleet, and rain to parts of western Massachusetts. Rainfall totals ranged between three and six includes and lead to minor flooding across the affected areas. Heavy rain and snowmelt also led to minor flooding of small streams and creeks in parts of the Commonwealth as well. Those counties included in this disaster received over $8 million in public assistance from FEMA. The storm was primarily a rain event due to warmer temperatures; however, higher elevations experienced significant snow and ice accumulations.
July 16, 2010	Thunderstorm Wind	N/A	A cold front brought showers and thunderstorms in southern New England. In Plainfield, winds reached 50 mph. Large tree limbs were downed at a campground off Route 116. $5,000 in damages was reported.
July 17, 2010	Thunderstorm Wind	N/A	Severe thunderstorms produced damaging winds and large hail in parts of western Massachusetts. In Plainfield, winds reached 50 mph. Wires were downed on River Road. $30,000 in damages was reported.
July 21, 2010	Thunderstorm Wind	N/A	Severe thunderstorms across southern New England produced substantial wind damage and one storm produced an intermittent track F1 tornado that moved through northwestern Connecticut. In Plainfield, winds reached 50 mph. A tree and several large limbs were downed by thunderstorm winds. $3,000 in damages was reported.
November 17, 2010	Strong Wind	N/A	A cold front moved through Southern New England bringing strong winds, resulting in downed trees and wires. A tree and wires were downed on West Hill Road in Plainfield. $5,000 in damages reported.
August 21, 2011	Thunderstorm Wind	N/A	Isolated thunderstorms spread across western Massachusetts, one of which produced severe thunderstorm winds that resulted in tree damage in Plainfield, MA. Multiple trees fell across Route 116, resulting in the road being closed. $15,000 in damages reported.
May 29, 2013	Thunderstorm Wind	N/A	A few severe thunderstorms formed in western Massachusetts during the evening and produced damaging winds. Thunderstorm winds downed trees on wires in Plainfield and Cummington. $15,000 in damages reported.
October 23, 2016	High Wind	N/A	Numerous trees and wires were reported downed in western Hampshire County. A tree was down on West Street in Plainfield as early as 6 AM EDT.
May 31, 2017	Thunderstorm Wind	N/A	A line of thunderstorms moved into Western Massachusetts during the late afternoon and evening of the 31st. There were numerous reports of hail, some of it an inch in diameter or larger. At 515 PM EST, strong winds were reported that blew down multiple large trees and damaged the roof of a building on Prospect Street in Plainfield. $20,000 in damages reported.

Sources: MA 2013 HMP, NOAA Storm Events Database, 2018

PROBABILITY OF FUTURE EVENTS

One measure of tornado activity is the tornado index value. It is calculated based on historical tornado events data using USA.com algorithms. It is an indicator of the tornado level in a region. A higher

tornado index value means a higher chance of tornado events. Data was used for Hampshire County to determine the Tornado Index Value as shown in the table below.

TABLE 17. TORNADO INDEX FOR HAMPSHIRE COUNTY

Hampshire County	125.73
Massachusetts	87.60
United States	136.45

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

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

Based on previous occurrences, there is a “Very High” probability (70 to 100 percent chance in any given year) of a severe thunderstorm or winds affecting the town.

The New England Climate Adaptation Science Center (NE CASC) data support the trend of a slightly increased frequency of high-intensity rainfall events, defined in this case as days with above 2 inches of precipitation. Based on available projections for future rainfall events, the probability of future thunderstorm events is anticipated to increase.

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

IMPACT

The potential for locally catastrophic damage is a factor in any severe weather event. In Plainfield, 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. Large hail commonly accompanies a tornado, and can damage cars and buildings as well as cause serious injuries for individuals without shelter.

To approximate the potential impact to property and people that could be affected by severe weather, tornado, or wind, the total value of all residential property in town, $58,677,900 is used. An estimated 100 percent of damage would occur to 1 percent of structures, resulting in a total of $5,867,790 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Overall, the Town of Plainfield faces a “Limited” impact from severe thunderstorms, winds, microbursts or tornadoes, with between 10 and 25 percent of the town affected.

VULNERABILITY

The entire town would be vulnerable to the destruction caused by severe thunderstorms, wind, microbursts and tornadoes. The most common problem associated with severe weather is loss of utilities. Downed trees from severe wind storms can create serious impacts on power and aboveground communication lines. Water and sewer systems may not function if power is lost. The vulnerabilities associated with flooding could be present if substantial rain accompanies severe thunderstorms. Additionally, severe wind may damage older buildings. With the notable exception of the Public Safety Complex, many of the town’s critical facilities are older and designed to withstand lower wind speeds, meaning they are more vulnerable to damage from high wind events, microbursts of tornadoes.

Sometimes, wind gusts of only 40 to 45 mph can cause scattered power outages from downed trees and wires. This is especially true after periods of prolonged drought or excessive rainfall, since both are situations that can weaken the root systems and make them more susceptible to the winds’ effects. Roads may become impassable due to downed trees or roadway flooding resulting from a severe wind or thunderstorm.

Based on the above assessment, Plainfield has a “high” vulnerability from severe thunderstorms, winds, microbursts and tornadoes.

SEVERE WINTER STORM / NOR’EASTER

HAZARD DESCRIPTION

Severe winter storms include ice storms, nor’easters, heavy snow, blowing snow, and other extreme forms of winter precipitation.

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

Nor’easters are among winter’s most ferocious storms. They are characterized by a large counter-clockwise wind circulation around a low-pressure center, and are known for producing heavy snow, high winds, and rain. These storms occur most often in late fall and early winter.

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 Plainfield is susceptible to severe winter storms. 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. Plainfield’s rolling topography creates some steep grades, sometimes making plowing difficult and causing snow and ice hazards. Many of the farms and open meadows and fields throughout town create snow drifts along main roads, creating dangerous or impassible driving conditions.

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

- Rt. 116 west out of town, 'Barber Hill' starting past Williams home. Significant elevation climb and temperature change occur along this roadway segment.
- In general, Rt. 116 west of Rt. 8A always has more snow and ice then rest of town (due to the elevation change).

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

- Rt. 116-East Main St. the fields below Sienkewicz's house (last one heading east from the center of town) and the 'potato' fields east of the highway garage
- Central St. south of the Taylor's (fields)
- Summit St. before Governor St.
- West Hill Rd. before Pilgrim home

EXTENT

Since 2005, the RSI has become the descriptor of choice for measuring winter events that impact the six climactic regions in the eastern two-thirds of the U.S. The RSI ranks snowstorm impacts on a scale system from 1 to 5 as depicted in the table below. The RSI is similar to the scale used to measure

tornadoes (Fujita) or hurricanes (Saffir-Simpson), with the added benefit of considering population as a variable. The RSI is based on three factors: the spatial extent of the storm, the amount of snowfall, and population (NOAA, n.d.). As a regional index, the RSI incorporates region-specific parameters and thresholds for calculating a storm's category. Snowfall thresholds in Massachusetts (in the Northeast region) are 4, 10, 20, and 30 inches of snowfall, while thresholds in the Southeast U.S. are 2, 5, 10, and 15 inches.

Regional Snowfall Index Categories, Corresponding RSI Values, and Description		
Category	**RSI Value**	**Description**
1	1—3	Notable
2	3—6	Significant
3	6—10	Major
4	10—18	Crippling
5	18.0+	Extreme

Source: NCDC, n.d.

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

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

Northeast Snowfall Impact Scale Categories		
Category	**NESIS Value**	**Description**
1	1—2.499	Notable
2	2.5—3.99	Significant
3	4—5.99	Major

4	6—9.99	Crippling
5	10.0+	Extreme

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

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

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

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

PREVIOUS OCCURRENCES

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

There is significant overlap between winter weather disasters and other types of disaster, such as flooding. Based on data available from the National Oceanic and Atmospheric Administration, there were 64 winter storms in the Pioneer Valley since 1958 that have registered on the NESIS scale, 5 of which occurred during the winter of 2018. Of these, approximately 35 storms resulted in snow falls of at least 10 inches in the Pioneer Valley. It should be noted that 4 class 3 “major” snow events occurred between 2013-2016. These storms are listed in the table on the next page, in order of their NESIS severity.

Table 18. Winter Storms Producing Over 10 inches of Snow in the Pioneer Valley, 1958-2013			
Date	**NESIS Value**	**NASIS Category**	**NESIS Classification**
3/12/1993	13.2	5	Extreme
3/2/1960	8.77	4	Crippling
2/15/2003	7.5	4	Crippling
2/2/1961	7.06	4	Crippling
1/21/2005	6.8	4	Crippling
1/19/1978	6.53	4	Crippling
12/25/1969	6.29	4	Crippling
2/14/1958	6.25	4	Crippling
2/10/1983	6.25	4	Crippling
2/5/1978	5.78	3	Major
2/23/2010	5.46	3	Major
1/29/2015	5.42	3	Major
2/8/1994	5.39	3	Major
1/9/2011	5.31	3	Major
2/11/2014	5.28	3	Major
2/18/1972	4.77	3	Major
12/11/1960	4.53	3	Major
2/7/2013	4.35	3	Major
2/22/1969	4.29	3	Major
1/18/1961	4.04	3	Major
2/8/1969	3.51	2	Significant
2/5/1967	3.5	2	Significant
4/6/1982	3.35	2	Significant
3/4/2013	3.05	2	Significant
1/25/2015	2.62	2	Significant
3/15/2007	2.54	2	Significant
3/5/2018	3.45	2	Significant
3/11/2018	3.16	2	Significant
3/31/1997	2.29	1	Notable
10/29/2011	1.75	1	Notable
2/2/1995	1.43	1	Notable
2/8/2015	1.32	1	Notable
1/25/1987	1.19	1	Notable
3/12/2017	5.03	3	Major
1/3/2018	1.65	1	Notable

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

Between 1954 and 2017, Hampshire County was included in 10 FEMA declared severe winter storm-related disasters (DR) or emergencies (EM) classified as one or a combination of the following hazards: blizzard, severe winter storm, snowstorm, record snowfall, and snow (See Table 4). Plainfield may not have been impacted by all of these events. It should be noted that because population is used as a criteria for FEMA declarations, the storms that rank higher will be those that impact densely populated areas and regions such as Boston and other large cities and, as such, might not necessarily reflect the storms that impact lightly populated areas like Hampshire County. For example, one of the most famous storms in the Commonwealth in modern history was the Blizzard of '78, which dropped over two feet of snow in the Boston area during 65 mph winds that created enormous drifts and stranded hundreds of people on local highways. The storm hit the snow-weary city that was still digging out of a similar two-foot snowstorm 17 days earlier. Although Hampshire received snow from this storm, it was not listed in the declaration.

The October Snow Storm in 2011, which caused major damages and disruptions across New England, also impacted Plainfield. Most residents of the town were without electric for over a week. Given the prevalence of private wells, this also meant the most residents were without access to water. While this was a severe storm paired with trees sill in full foliage, most winter storms that hit Plainfield are manageable and simply more of a nuisance.

In recent history, there has been no loss of life from snow or ice storms, but each year there are incidences of property damage and personal injuries. There currently isn't good local data on ice storms in Plainfield. According to the state hazard mitigation plan, there were 20 ice storms in Hampshire County between 1971 and 2012. This equates to a major ice storms every two years. The 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan indicates that ice storms of lesser magnitudes occur on at least an annual basis. Areas located in higher elevation are more likely to experience ice storms. Well-known as the most serious storms to impact Pioneer Valley communities in recent history was the Ice Storm of December 11, 2008. The storm created widespread downed trees and power outages all across New York State, Massachusetts and New Hampshire. Over one million customers were without electricity, with 800,000 without power three days later and some without power weeks later. Living conditions were acerbated by extremely cold temperatures in the days following the event.

Known severe snowstorm and ice storm events, including FEMA disaster declarations, which have impacted Plainfield between 1950 and 2018 are identified in Table 19. Detailed information on damages and impacts are included when available. Please note that not all events that have occurred in the town are included due to the extent of documentation and the fact that not all sources may have been identified or researched. Loss and impact information could vary depending on the source. Therefore, the accuracy of monetary figures discussed is based only on the available information identified during research for this plan.

TABLE 19. SEVERE SNOWSTORM AND ICE STORM EVENTS IN PLAINFIELD, 1950-2018			
Dates of Event	**Event Type**	**FEMA Declaration Number (if applicable)**	**Losses/Impacts**
March 13-17, 1993	Blizzards, high winds & record snowfall, EM-3103	Yes	The March 13-17, 1993 storm brought high winds and heavy snow to Massachusetts. Snowfall was 20 to 30 inches over the Berkshires, including 30 inches at both Florida and Peru. Blizzard conditions existed for a 3 to 6 hour period during the afternoon of March 13. The snow was a dry enough to minimize accumulation on trees and wires, minimizing widespread power outages. The storm's occurrence on the weekend mitigated traffic issues. This storm impacted the entire eastern third of the country and resulted in a federal disaster declaration (FEMA EM-3103).
January 7 - 13, 1996	Blizzard of 96 , DR-1090	Yes	This storm was one of the most significant winter storms to hit southern New England in the past 20 years. It brought record snowfalls of more than 20 inches in Hampshire County and more than 30 inches in the Berkshires. Strong to gale-force northeast winds were also associated with this event. MEMA reported damage claims of approximately $32 million from 350 communities, mostly for the cost of snow removal. This event resulted in a FEMA disaster declaration (FEMA DR-1090).
March5-6, 2001	Heavy Snow, EM-3165	Yes	A major winter storm impacted Massachusetts with near blizzard conditions, high winds, and coastal flooding. It brought over two feet of snow across the interior and caused power outages to approximately 80,000 people. Businesses and schools were closed for several days. There were numerous reports of downed trees and wires during the height of the storm. After the storm, the weight of the snow caused several roof collapses throughout the Commonwealth. The highest snowfall totals were reported from the east slopes of the Berkshires across Worcester County and into northeast Massachusetts. This event resulted in a FEMA emergency declaration (FEMA EM-3165). Those counties included in the declaration received over $21 million in public assistance grants from FEMA.
February 17-18, 2003	Winter Storm, EM-3175	Yes	A major winter storm struck southern New England, bringing heavy snow and strong winds, with snowfall totals of one to two feet. The highest totals were around two feet and were reported in the east slopes of the Berkshires into northern Worcester County. This event resulted in a FEMA emergency declaration (FEMA EM-3175). Those counties included in the declaration received over $28 million in public assistance grants from FEMA.
December 6-7, 2003	Winter Storm, EM-3191	Yes	A major winter storm brought 1 to 3 feet of snow and strong winds to southern New England. In Massachusetts, snowfall amounts averaged between one and two feet across the Commonwealth. This event resulted in a FEMA emergency declaration (FEMA EM-3191). Those counties included in the declaration received over $35 million in public assistance grants from FEMA.
January 22-23, 2005	Blizzard (Record and/or near record snow), EM-3201	Yes	A major winter storm brought heavy snow, high winds, and coastal flooding to southern New England. Near-blizzard conditions were reported and brought between one and three feet of snow and produced wind gusts of up to 65 mph. This event resulted in a FEMA emergency declaration (FEMA EM-3201). Those counties included in the disaster received over $49 million in public assistance from FEMA.
December 11, 2008	Severe Winter Storm And	Yes	A major ice storm and significant precipitation affected much of New England (December 11 through 12). The hardest hit areas were the

Dates of Event	Event Type	FEMA Declaration Number (if applicable)	Losses/Impacts
	Flooding DR-1813		Worcester Hills in central Massachusetts and the east slopes of the Berkshires in western Massachusetts. At least half an inch of ice accreted on many exposed surfaces. The ice downed many trees, branches, and power lines, which resulted in widespread power outages. More than 300,000 people were without power in the Commonwealth. There was one death in Massachusetts associated with this storm. This event resulted in a federal disaster declaration (FEMA-DR-1813). Those counties included in the disaster received over $51 million in public assistance from FEMA.
January 11-12, 2011	Severe winter storm and snowstorm, DR-1959	Yes	A developing nor'easter coastal storm brought up to two feet of snow across Massachusetts in a 24-hour period. Strong winds, combined with heavy snow, produced numerous downed trees and wires and resulted in power outages to 100,000 homes statewide. Hampshire County had approximately $75,000 in property damage. This event resulted in a federal disaster declaration (FEMA DR-1959) for the following counties: Berkshire, Essex, Hampden, Hampshire, Middlesex, Norfolk, and Suffolk. Those counties received over $25 million in public assistance grants.
October 29-30, 2011	Severe storm and snowstorm, DR-4051	Yes	A rare October nor'easter brought heavy snow to portions of southern New England on October 29. Up to 31 inches of snow was reported in Plainfield, Massachusetts. The accumulation of the heavy, wet snow on foliated trees and power lines resulted in widespread tree damage and power outages across central and western Massachusetts. At the peak, approximately 665,000 customers in Massachusetts were without power. Seventy-seven shelters were opened and housed over 2,000 residents. Six fatalities occurred during and in the aftermath of the storm. This event resulted in a federal emergency declaration (FEMA EM-3343) for the following counties: Berkshire, Essex, Franklin, Hampden, Hampshire, Middlesex, Norfolk, and Worcester. $50,000 in damages was reported in Hampshire County.
November 1, 2011	Severe storm, EM-3343	Yes	*See DR-4051 above*
October 27, 2016	Winter Weather	N/A	Several inches of wet snow fell across southern New England. An average of four to five inches of snow fell in western Hampshire County, with a maximum report of 5.5 inches in Plainfield. Most trees still had leaves at this time, allowing the snow to cause a significant amount of tree damage. The damage was most pronounced in the Connecticut River Valley in western Massachusetts.
December 11, 2016	Heavy Snow	N/A	Up to 6 to 7 inches of snow was reported in the slopes of the Berkshires, in the higher terrain of northwest Hampshire and western Franklin Counties. Snowfall totals of 6 to 7 inches were reported in Plainfield. A report of 6.9 inches was received via amateur radio and 6.1 inches by a CoCoRAHS observer.
December 29, 2016	Heavy Snow	N/A	3 to 6 inches of snow was common in western and central Massachusetts, with 5 to 7 inches in the slopes of the Berkshires. Numerous reports (amateur radio, social media, CoCoRaHS, and Cooperative Observer) indicated around 6 inches of snowfall in the towns of western Hampshire County. These included 5.9 inches in Worthington, 6.0 inches in Goshen, 6.0 inches in Huntington, and 6.2 inches in Plainfield. Strong winds occurred behind the storm during the overnight hours, causing scattered tree and power line damage,

Dates of Event	Event Type	FEMA Declaration Number (if applicable)	Losses/Impacts
			with gusts mainly in the 30-50 mph range.
March 2, 2018	Winter Storm	N/A	This storm brought heavy snow to northwest Massachusetts, heavy rain and strong winds to central and eastern Massachusetts, and coastal flooding to the coastline. Snowfall from one inch to twelve inches fell on Western Hampshire County, with the twelve inches reported in Plainfield.

Sources: MA 2013 HMP, NOAA Storm Events Database, 2018

PROBABILITY OF FUTURE EVENTS

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

Extreme weather events—including extreme precipitation and snowfall levels—are anticipated to occur more frequently as climate change occurs. However, as temperatures throughout the year increase, it is possible that nor’easter events may become more concentrated in the coldest winter months when atmospheric temperatures are still low enough to result in snowfall rather than rain.

IMPACT

The impact of severe winter storm event would be “Critical,” with 25 percent or more of property in the affected area damaged, multiple injuries possible, and a complete shutdown of facilities for more than one week. This magnitude of impacts was seen during the ice storm of 2008. To approximate the potential impact to property and people that could be affected by this hazard, the total value of all residential property in town, $58,677,900, is used.

An estimated 20 percent of damage would occur to 25 percent of structures, resulting in a total of $2,933,895 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

VULNERABILITY

Winter storms are considered deceptive killers because most deaths and other impacts or losses are indirectly related to the storm. They generally bring strong winds which create blizzard conditions with blinding wind-driven snow, drifting snow, and extreme cold temperatures with dangerous wind chill. Injuries and deaths may occur due to traffic accidents on icy roads, heart attacks while shoveling snow, or hypothermia from prolonged exposure to cold. Heavy snow can paralyze a region or town, shutting down transportation, stopping the flow of supplies, and disrupting medical and emergency services. Accumulations of snow can cause buildings to collapse and knock down trees and power lines. Rural

populations especially may become isolated by downed trees, blocked roadways, and power outages. Residents may be displaced or require temporary to long-term sheltering.

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

Based on the above assessment, Plainfield faces a "Very High" vulnerability from severe winter storms.

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, forests 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 lightening
- *Crown fires* move quickly by jumping along the tops of trees. A crown fire may spread rapidly, especially under windy conditions.

LOCATION

In Massachusetts, the DCR Bureau of Forest Fire Control has been the state agency responsible for providing aid, assistance, and advice to the Commonwealth's cities and towns since 1911. The Bureau provides assistance and cooperation with fire departments, local law enforcement agencies, the Commonwealth's county and statewide civil defense agencies, and mutual aid assistance organizations.

Early detection of wildfires is a key part of the Bureau's overall effort. Early detection is achieved by trained Bureau observers who staff the statewide network of 42 operating fire towers. During periods of high fire danger, the Bureau conducts county-based fire patrols in forested areas. These patrols assist cities and towns in prevention efforts and allow for the quick deployment of mobile equipment for suppression of fires during their initial stage.

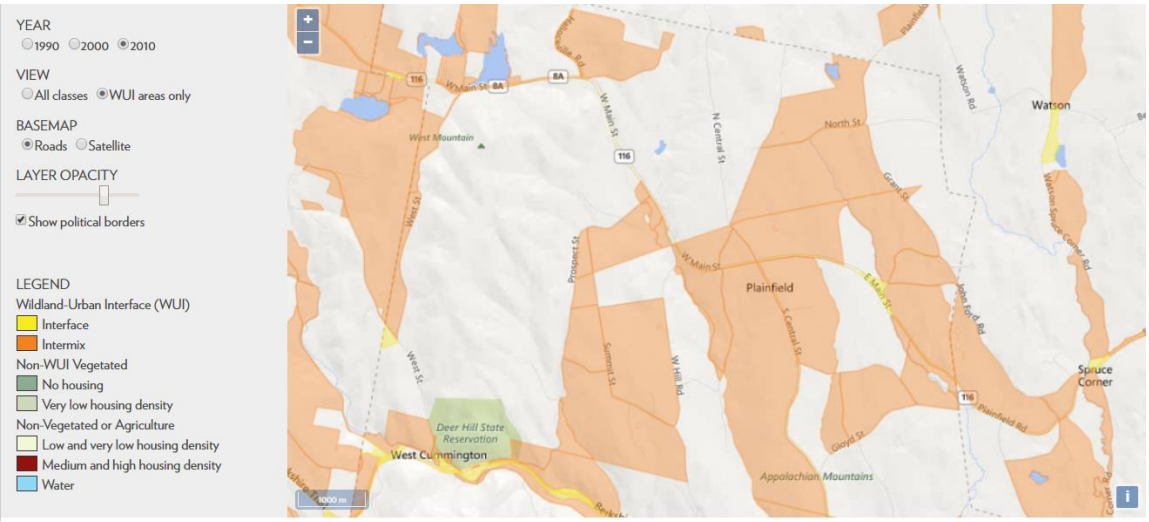
Plainfield also benefits from mutual aid agreements with other regional, state and federal agencies. The DCR Bureau of Forest Fire Control is a member of the Northeastern Forest Fire Protection Commission, a

commission organized in 1949 between the New England states, New York, and four eastern Canadian Provinces to provide resources and assistance in the event of large wildfire activity. Massachusetts DCR also has a longstanding cooperative agreement with the USDA Forest Service for both providing qualified wildfire fighters for assistance throughout the United States or receiving federal assistance within the Commonwealth. Furthermore, all municipalities in Hampshire County are served by the Hampshire County Fire Defense Association, a regional collaboration that offers training and other resources to local fire safety professionals and volunteers.

The fire problem varies from region to region throughout the U.S. This often is a result of climate, poverty, education, demographics, and other causal factors. The ecosystems that are most susceptible to the hazard are those with the most flammable vegetative fuels including pitch pine, scrub oak, and oak forests. Plainfield is covered mostly by a Hemlock-Northern Hardwood Forest with species that prefer high elevations with cool temperatures and moist soils and are less prone to wildfire.

Some portions of Plainfield are more susceptible to wildfire. The SILVIS Lab at the University of Wisconsin-Madison Department of Forest Ecology and Management classifies exposure to wildlife hazard as “interface” or “intermix.” A wildland-urban interface area defines the conditions where highly flammable vegetation is adjacent to developed areas. Interface communities are those in the vicinity of contiguous vegetation, with more than one house per 40 acres and less than 50 percent vegetation, and within 1.5 miles of an area of more than 202 acres that is more than 75 percent vegetated. Intermix communities are defined as areas where housing and vegetation intermingle and where the area includes more than 50 percent vegetation and has a housing density greater than one house per approximately 6.5 acres. The greatest potential for significant damage to life and property from fire exists in areas designated as wildland-urban interface areas. Plainfield has large swaths of land classified both as Interface, primarily in the eastern half of town, and small areas of Intermix, as shown in Figure 9 below (SILVIS, 2017).

FIGURE 9. WILDLAND-URBAN INTERFACE 2010



Source: SILVIS, 2017

There are a number of areas in Plainfield with a higher potential for damage from fire according to local officials. The center of town is home to the town hall, church, and multiple private homes all closely built together. A fire that got a good start from a lightning strike or some other source in this area could create a firestorm that would be difficult to stop. Any unoccupied structures in disrepair in town also pose a fire issue.

Mass Audubon/West Mountain range is continuous with State forest along the town's northern border – none of these tracts are regularly logged, so they have higher fuel loads. Tall grass and scrub brush at the old potato farm may be a fire hazard in the right conditions.

The woods and fields that are located in and around the center of town are also a higher fire risk area. The 2008 ice storms damaged trees and brought down major tree limbs, filling local woodlands with debris that would dry out quickly in a drought, resulting in large amount of highly flammable fuel. This, combined with the high winds common at the town's elevation (1500'-2000' above sea level), could be a real problem - if a fire were ignited under these conditions, it would likely spread quickly[9].

Approximately 18 square miles of Plainfield (84 percent) is forested and therefore at some risk of wildfire[10]. Therefore, the location of occurrence is "large," with more than 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.

In Plainfield, 84 percent of the town's 13,620 acres is forested, and is therefore at risk of fire. A large wildfire could damage almost all of the town's land mass in a short period of time. However, Massachusetts receives more than 40 inches of rain per year and much of the landscape is fragmented, and together these two traits make wildfires uncommon in the state. Nevertheless, in drought conditions, a brushfire or wildfire would be a matter of concern. A large wildfire could damage a large swath of Plainfield's landscape in a short period of time. The amount of forested land in Plainfield could render emergency personnel unable to counter the fire due to limited access routes and rugged terrain.

PREVIOUS OCCURRENCES

Few wildfires have been recorded in the past 100 years in the Pioneer Valley, and none has ever resulted in a FEMA disaster declaration.

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[9] Email from Dave Alvord, Plainfield Assistant Fire Chief, 2018

[10] MassGIS Land Use Data Layer, 2005.

The largest fire of memory in Plainfield occurred in the fall of 1956. According to local resident Ed Moran, the fire started on West St. very near the Cummington town line. It moved into forest land heading east and north, moving towards West Mountain (now Audubon property), the highest point in Plainfield and Hampshire County. It became a raging forest fire burning hundreds of acres. Ed and his peers were pulled out of school to help fight the fire. Prisoners from the Monroe, MA prison camp were also allegedly sent to assist state foresters in the fight to stop the fire. Ed recounted that the fire was only quelled by 'borrowing' two huge bulldozers and clearing the path for what would later become Rt. 9 down in West Cummington. These vehicles were able to cut a fireline around the fire to finally stop it. Hundreds of feet of firehose were lost in the forest in the fight to stop the fire. Plainfield's Fire Department, just created in 1953, was ill-equipped to fight such a fire without significant mutual aid.[11]

While there have been no other major fires on record in Plainfield, several have occurred during the past 20 years, as shown in the list below:

:

- 1995 – Russell, 500 acres burned on Mt. Tekoa
- 2000 – South Hadley, 310 acres burned over 14 days in the Litihia Springs Watershed
- 2001 – Ware, 400 acres burned
- 2010 – Russell, 320 acres burned on Mt. Tekoa
- 2012 – Eastern Hampden County, dry conditions and wind gusts created a brush fire in Brimfield, and burned 50 acres
- 2016 - Montgomery, 60 acres burned on Mt. Tekoa (MA HMP, 2013)

As a point of reference, the total number of any type of fire incidence in Plainfield for the last five available years is provided below. These include structural and vehicle fires – none of the reported incidents were classified as “other,” which would include brush fires.

TABLE 20. TOTAL FIRE INCIDENTS IN PLAINFIELD

Year	# of Incidents
2011	1
2012	0
2013	2
2014	0
2015	2

Source: Massachusetts Fire Incidence Reporting System, County Profiles, 2015 Fire Data Analysis

[11] Account from Ed Morann as recorded by David Alvord in an email to Emily Slotnick, 2/1/2019.

Illegal brushfires are not common in Plainfield, and most of them are small and quickly contained. According to the Plainfield Fire Department, there are approximately 3 to 4 unauthorized burns (or brushfires) per year. As a point of comparison, the Plainfield Fire Department issues approximately 30-40 burn permits during the burn season each year.

Fortunately, there have been no large wildfires in the past 5 years in Plainfield. Those that have occurred in the past 20 years have largely been agricultural field fires.

Between 1954 and 20017, Hampshire County was not included in any FEMA declared wildfire or brushfire -related disasters (DR) or emergencies (EM). No known wildfire and brushfire events have impacted Plainfield between 1950 and 2018 other than those identified in the sections above. Please note that not all events that have occurred in the town are included due to the extent of documentation and the fact that not all sources may have been identified or researched. Loss and impact information could vary depending on the source.

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 frequency of previous wildfires and their proximity to the Town, paired with the rising threat of drought associated with climate change, the likelihood of a future wildfire is determined to be “moderate,” or between a 10 and 40 percent probability in any given year.

Climate scenarios project summer temperature increases between 2ºC and 5ºC 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

To approximate the potential impact to property and people that could be affected by this hazard, the total value of all property in town, $58,677,900 is used.

An estimated 100 percent of damage would occur to 25 percent of structures, resulting in a total of $14,669,475 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

The impact from a wildfire or brushfire in Plainfield would be “critical,” with multiple injuries possible and damage to more than 25% of property in the affected area anticipated in such an event.

VULNERABILITY

While a significant portion of Plainfield is forested, most of the heavily forested land is conservation lands, either permanently or temporarily protected from development. While critical facilities and personal property are mostly on parcels with cleared defensible space between the structure and forest, many of them are older buildings that may be more vulnerable.

Wildfires can also generate a range of secondary effects that may cause more widespread and prolonged damage than the fire itself. These secondary hazards include:

- Contamination of reservoirs
- Destruction of power, gas, water, broadband, and oil transmission lines
- Contributing to flooding – wildfires strip slopes of vegetation and increase the imperviousness of soils, exposing them to greater amounts of runoff.
- Landslides due to weakened soils causing slope failures
- Water quality impacts in downstream water bodies

Based on the above assessment, Plainfield faces a "Moderate" vulnerability from wildfire and brushfires.

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, 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 Plainfield has been identified utilizing a Critical Facilities List provided by the State Hazard Mitigation Officer. Plainfield's Hazard Mitigation Committee has broken up this list of facilities into three categories:

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

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

CATEGORY 1 – EMERGENCY RESPONSE SERVICES

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

Emergency Operations Center

Primary: Public Safety Complex, 38 North Central St.

Alternate: Plainfield DPW, 184 East Main St./SR 116

Fire Station

Plainfield Fire Department, Public Safety Complex, 38 North Central St.

Police Station

Plainfield Police Station, Hathaway Hall, 315 Main Street/SR 116

Highway Garage

DPW/Highway Garage Storage Facility, 315 Main Street

Water Department

The town does not supply water to any of the Residents.

Emergency Fuel Stations

The town has a 1,000 gallon tank of diesel fuel and a 500 gallon tank of gasoline at the highway garage at 315 Main Street/SR 116. These tanks are refilled once per month in the summer, and every two weeks during the winter to ensure that fuel is available during times of emergency.

The closest commercial gas station is in Ashfield.

Emergency Electrical Power Facility

Eversource owns and operates a substation at 46 Union Street off of North Central Street.

There are 38-40 private homes in Plainfield which generate electricity through solar panels, however that energy is fed back into the grid and not stored for emergency purposes (unless the homeowner has battery storage on-site). In 2019, Nexamp will begin generating solar electricity from a ground-mount solar array on North Union Street. Energy will be available for purchase by community members, though it is unknown if there will be any battery storage with this facility to serve as an emergency energy source.

A number of homes in Plainfield are equipped with standby generators. Local officials suggest that residential back-up power has been installed at a number of homes in the past 5-10 years, but there has been no tracking of how many systems have been installed or at which properties. Having an understanding of the capacity and distribution of private, residential emergency power systems could help local officials design and promote neighborhood-scale emergency operations or temporary sheltering plans which would rely on neighbors helping each other in times of need.

Additionally, the town has a new standby 60kw propane generator at the Public Safety Complex. A previous generator at the Safety Complex served as emergency power for 6-7 days before needing to be refueled during the October snow storm of 2011. The town also has two portable 5 kw generators on military trailers for emergency use. The Highway Garage, Town Hall, and Police Station are wired with hookups for those portable generators.

Emergency Shelters

The Plainfield Public Safety Complex at 38 North Central Street has the supplies and backup power source needed to shelter residents. Swift River Rehab is equipped with backup power and has independent water source, and therefore could be an overflow facility for emergency shelter if an MOA was established.

Alternate: Town Hall, 304 Main St.

Dry Hydrants, Fire Ponds, and Water Sources

There are four dry hydrants in town, three of which are functional: at town hall across the street from highway garage, and at the Swift River Rehab center. Another hydrant across the street from town hall was built in the 1990s during the reconstruction of Route 116, but is not in use today. All of these hydrants are pond fed. The Fire Department can draw directly from these hydrants with the fire engine for unpressurized water, or can use one of their three gasoline-powered portable pumps (one of which is a floating pump). Swift River also has 2-3 pressurized hydrants that serve to operate their emergency fire sprinkler system.

Brooks/ponds serve as surface water supplies that can be used. Plainfield Pond is easily accessible for use as an emergency water source for fire suppression. Crooked Pond isn't as easy to get at, but is also a resource, and Hallockville Pond is only accessible through the Town of Hawley. Finally, Mill brook is accessible in several locations, including Prospect Street, West Hill Road, and River Street.

Helicopter Landing Sites

Privately owned property at the intersection of Broome Street and South Central Street. A formal agreement between the Town and this property owner may be useful.

The recommended area for a helicopter landing site is 90' x 90'. Within these parameters, the privately owned field at 3 South Central Street across from the post office, or the ball field right behind safety complex (38 North Central Street) could be used. A formal agreement between the town and the land owner may be appropriate.

Communications

The primary interface for middle line of broadband (coming online in 2019), 315 Main Street

Cell Towers: The closest cell tower is in Cummington. The spottiness of cell coverage in town is a real challenge for residents. Most Plainfield residents have Verizon and AT&T as cell carriers, but neither offers perfect coverage. Residents are hopeful that service will be drastically improved in 2019 when the new broadband network comes online.

MA State Police owns and operates a communications tower at 46 Union Street. Because of this tower, the Plainfield Safety Complex serves as the backup facility for the state police dispatch service to the hilltowns whenever the primary dispatch center, located at the State Police barracks in Northampton, is compromised.

The State Police tower is also used by Eversource and has a repeater that serves local emergency radios. Town officials report this repeater provides radio to radio connection to and from most parts of town, but not all.

Primary Evacuation Routes

Many of the primary evacuation routes in Plainfield have steep slopes and/or dangerous windy/winding segments.

- East Main Street (SR 116), eastbound to SR 112 in Ashfield has a gentle decline as it nears the Ashfield town line. It is plowed and maintained by the town.
- West Main Street (SR 116), westbound towards Savoy is winding and has one particularly steep section that trucks struggle with.
- West Main Street (SR 116) westbound to Hallockville Road/ West Hawley Road (SR 8a) northbound to SR 2. SR 8a is maintained and plowed by the town, and has a dangerous winding and step section in Hawley.
- South Central Street (becomes Plainfield Rd. in Cummington) southbound towards SR 9, which is town-maintained and plowed. South Central Street has steep slopes in the Cummington section before intersecting with SR9.

Bridges Located on Evacuation Routes

East Main Street (SR 116), eastbound to SR 112 in Ashfield, a newly constructed bridge crosses over the Swift River near Spruce Corner Road.

West Main Street (SR 116) towards Savoy

West Main Street (SR 116) westbound to Hallockville Road/ West Hawley Road (SR 8a) northbound to SR 2. Several bridges exist on SR 8a in Hawley, and multiple road segments along this route were completely washed out during flooding from hurricane Irene in 2011. This is not a safe evacuation route during flood conditions.

South Central Street (becomes Plainfield Rd. in Cummington) southbound towards SR 9 has a bridge over the Westfield River. The most recent upgrades to this bridge occurred in the mid-1990's.

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 Plainfield.

Municipal Buildings

Town Hall, 304 Main St.

Town Office, 344 Main St.

Highway Garage, 184 E. Main St.

Town Library, 312 Main St.

Problem Culverts

See Past and Potential Hazards/Critical Facilities Map (Appendix D)

CATEGORY 3 – FACILITIES/POPULATIONS TO PROTECT

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

Hospitals

Berkshire Medical Center, Pittsfield

Baystate Noble Hospital, Westfield

Cooley-Dickenson, Northampton

Franklin Baystate, Greenfield (owned and affiliated with Baystate Medical Center, the Level-1 trauma center in Springfield)

Level 1 Trauma Centers via helicopter

Baystate Medical Center- Springfield

Albany Medical Center- Albany, NY

Special Needs Population

Populations with special needs are fairly dispersed through town, except for a concentration of resident patients at the Swift River Rehab center.

One of the strengths of being a small town though is neighbors often know when someone is particularly vulnerable and needs to be checked on during a power outage or weather emergency. During power outages, town EMT's check on elderly people who live alone.

However, Plainfield's population is constantly changing, and keeping track of those in need is challenging for emergency service providers. The Fire Department does not have a comprehensive list of individuals that require extra support during a power outage or other natural hazard-related impact. The Council on Aging is currently working to compile such a list to ensure those residents are provided with the care and services needed during an emergency. Eversource sends the Town's Emergency Manager a list of people who are on respirators or other electrical lifesaving equipment as these residences are a priority for emergency response during power outages, although no such residents exist in Plainfield at this time. Furthermore,

HIPAA laws prohibit public distribution of this list, so the COA members have been unable to aquire the information.

Elderly Housing/Assisted Living

No housing or assisted living communities in town that are age restricted. General population is aging and the elderly live in private homes dispersed throughout the community.

Recreation Areas

Plainfield Pond – swimming, fishing, kayaking

No formal access points on brooks or streams or other ponds.

Historic Mill Sites on Mill River – these sites belong to the Plainfield Historical Society. Visitors are instructed to call the Historical Society in order to be permitted access and a tour, though these sites are regularly frequented by users without permission.

Town baseball field and playground behind Public Safety Complex

No marked trails in the 250 acres of state forest in Plainfield, but many trails in the Hawley section of state forest. Many people use the old state forestry roads, which are no longer maintained, for recreation. Plainfield town officials noted that the State may soon invest in repairs to existing roads through Dubuque State Forest in Plainfield, expanding recreational and emergency access to this valuable public resource.

More than 2,000 acres of Audubon property with at least one blazed trail and other non-blazed trails.

Town Hall is used for COA lunches two times per month, as well as Alcoholics Anonymous meetings

Town Library, occasional programs

Daycares

No official day cares

Places of Worship

Plainfield Congregational church, 356 West Main St., seating capacity 200, no generator.

Historic Buildings/Sites

Historic District- Town Center

Apartment Complexes

No apartment complexes in town.

Schools

There are no schools in Plainfield. Plainfield is part of the Mohawk Trail Regional School District. Elementary students go to school at the Sanderson Academy in Ashfield, while students in grades 7-12 attend Mohawk High School on SR 112 in Buckland, MA. In addition, high school students can attend Smith Vocational Technical High School in Northampton, MA or if they want to pursue a program that Smith doesn't offer and another regional vocational school does, a student is permitted to attend that other school.

Employment Centers

Highway Department/DPW Garage

Swift River Rehab

Town Offices are open in mornings, most Mondays-Thursdays.

Formerly a large-scale potato farm next to the Highway Garage, but no longer in operation. This property was purchased in 2018, and the new owner may have plans to conduct some commercial enterprise.

Camps

Earth Dance – The main building at 252 Prospect Street and the lodge or housing facility on 262 Prospect Street often hold large groups on the weekends.

Peppermint Park Campground, 169 Grant St., Plainfield, offers camping for trailers and tent sites, with some campers staying for the entirety of the summer.

CATEGORY 4 – POTENTIAL RESOURCES

Food/Water

For many years, Plainfield Mall/Green Mountain Variety had a limited supply of drinks/water and canned foods, but as of writing this store has been closed for many months. Everyone in town travels to Pittsfield, Northampton, or Greenfield to shop. Other locations with limited supplies include the Creamery in Cummington, a grocery store in Savoy, and Neighbors grocery in Ashfield. The closest supermarket is in Adams.

Because of the distance they need to travel, most Plainfield residents have a well-stocked pantry and a full tank of gas. Town Emergency Management keeps some non-perishable foods in a storage room in Public Safety Complex, but only limited non-perishables.

Hospitals/Medical Supplies

Hilltown Community Health Center, Huntington

Hilltown Community Health Center, Worthington

MedExpress Urgent Care, Pittsfield

Baystate Urgent Care, Northampton

Veterinary Emergency Specialty Hospital, South Deerfield

Berkshire Veterinary Hospital, Pittsfield

Williamsburg Animal Clinic and Family Veterinary Center, Williamsburg (both private practices with normal hours)

Gas

There are no commercial outlets to get gas or diesel in Plainfield. The closest gas and diesel stations are at Neighbors in Ashfield and Friendly Fred in Windsor. The town has no agreements in place with neighboring municipalities to supply gas to residents during an emergency.

Heating Oil

O'Connell Oil, Northampton, and Pittsfield

Sandri Energy, Greenfield

George Propane, Inc., Goshen

Whiting Energy, Northampton (contract server for the town, and supplies all town fuel)**Building Materials Suppliers**

L P Adams Co in Dalton; more options in Pittsfield including Home Depot

Cummington Supply, Cummington

Heavy & Small Equipment Suppliers

Pittsfield Lawn and Tractor, Pittsfield

West County Equipment Rentals in Shelburne falls

Bacon's Equipment, Williamsburg

Multiple Town residents have large equipment that could be used in time of need

Gravel Pits/Asphalt Plants

Sugarledge Stone Quarry Inc, West Hill Rd., Cummington on Plainfield line

George D. Judd & Sons LLC, Goshen

Meehan Construction Co Inc, Westhampton

Critical Facilities and Evacuation Routes Potentially Affected by Hazard Areas			
Hazard Type	**Hazard Area**	**Critical Facilities Affected**	**Evacuation Routes Affected**
Dam Failure	Select properties and roadways south of Crooked Pond Dam.	None.	West Main St. near Access Rd. #5.
Drought	Whole Town	If severe enough, all critical facilities could be impacted because they rely on well water.	None.
Flooding	Select roadway and culvert locations	None.	Only in the instance of a Dam Failure. See description above.
Hurricanes	Whole Town	Same as flooding and high winds depending on extent of winds and flooding.	
Severe Snowstorms/ Ice Storms	Whole Town for ice storms, more of a threat to infrastructure	All critical facilities could be impacted if loss of power. (Some buildings have propane generators that could sustain energy for a week.)	All evacuation routes. (Steep slopes could cause ice issues and downed trees could block roads.)
Severe Thunderstorms/ Wind/Tornado/ Microburst	Whole Town (Especially areas at higher elevations)	Most of the town's critical facilities are located at a higher elevation that could be impacted by wind. The fire house and public safety complex are more protected, and the newer building is designed to sustain wind better than other municipal buildings in town.	If downed trees, all evacuation routes could be impacted.
Wildfire/Brushfire	Whole Town during a drought; Mass Audubon/West Mountain range is continuous with State forest along the town's northern border – none of these tracts are regularly logged, so they have higher fuel loads. Also tall grass and scrub brush at old potato	All town facilities located around the center of town, including the Town Offices, Town Hall, and Police Department, would be affected if a fire occurred in the triangle between Union and North Central streets.	Unlikely

Critical Facilities and Evacuation Routes Potentially Affected by Hazard Areas			
Hazard Type	**Hazard Area**	**Critical Facilities Affected**	**Evacuation Routes Affected**
	farm may be a fire hazard. Another area of concern is the triangle between Union and North Central streets, where there are dense woods and several old houses.		

5: MITIGATION CAPABILITIES & STRATEGIES

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

Plainfield 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. Plainfield has appropriate staff dedicated to hazard mitigation-related work for a community its size, including a Town Select Board, Emergency Management Director, a professionally run Highway Department, a Building Inspector, and a Tree Warden. In addition to Town staff, Plainfield has an experienced Planning Board which reviews all proposed developments and assures that buildings are built to the current zoning requirements.

Plainfield has some recommended plans in place, including a Master Plan and an Open Space and Recreation Plan, although these plans need to be updated and adopted and should be supplemented by a Capitol Improvements Plan. 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. Plainfield is also an active member community of the Pioneer Valley Planning Commission (PVPC) and can take advantage of no cost local technical assistance provided by the professional planning staff at the PVPC, as needed. Plainfield deploys its existing capabilities for hazard mitigation as appropriate.

Plainfield's most obvious hazard mitigation need is for state and federal funds to implement prioritized actions. While Plainfield is a well-managed fiscally sound Town, it is not a wealthy community and much of its land value is held by private conservation interests that do not contribute to the town's tax base. Plainfield has very limited financial resources to invest in costly hazard mitigation measures. Plainfield is, however, committed to locally matching all HMGP grants received.

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

Based on the findings of the risk assessment, public outreach, and a review of previous town plans and reports, the Town of Plainfield has developed the following goals to serve as a framework for mitigating the hazards identified in this plan.

PLAINFIELD'S HAZARD MITIGATION PLAN GOALS

- Minimize loss of life, injury, and damage to property, the economy, and the environment from natural hazards
- Build and enhance local mitigation capabilities to ensure individual safety, reduce damage to public buildings and infrastructure and ensure continuity of emergency services
- Maintain Plainfield's natural, cultural, and historic resources that contribute to the town's character and protect the community from natural hazards

OVERVIEW OF MITIGATION STRATEGIES BY HAZARD

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

DAM FAILURE

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

DROUGHT

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

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.

EXTREME TEMPERATURES

Extreme temperatures often compound the negative impacts of other natural hazards. Severe weather events of all kinds are the most severe secondary hazards associated with extreme temperatures. Heat events contribute to the formation of ground-level ozone, a respiratory irritant that can exacerbate

asthma and result in an increase in emergency department visits. In the winter, severe storms often knock out power which is, in many cases, a primary residential heat source. That scenario significantly increase the health and safety risk to humans sheltering from extreme cold temperatures.. Therefore, many of the mitigation efforts for other natural hazards identified in this plan may be applicable to help mitigate the impacts of extreme temperatures.

FLOODING

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

HURRICANE / TROPICAL STORM

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

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

SEVERE THUNDERSTORM / WIND / TORNADO / MICROBURSTS

Most damage from tornadoes and severe thunderstorms come from high winds that can fell trees and electrical wires, generate hurtling debris and, possibly, hail. According to the Institute for Business and Home Safety, the wind speeds in most tornadoes are at or below design speeds that are used in current building codes, making strict adherence to building codes a primary mitigation strategy. In addition, current land development regulations, such as restrictions on the height of telecommunications towers, can also help prevent wind damages.

SEVERE WINTER STORM / NOR'EASTER

Winter storms can be especially challenging for emergency management personnel. The Massachusetts Emergency Management Agency (MEMA) serves as the primary coordinating entity in the statewide management of all types of winter storms and monitors the National Weather Service (NWS) alerting systems during periods when winter storms are expected. Even though the storm has usually been

forecast, there is no certain way for predicting its length, size or severity. Therefore, mitigation strategies must focus on preparedness prior to a severe snow/ice storm.

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

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.

EXISTING MITIGATION CAPABILITIES

The Town of Plainfield had numerous policies, plans, practices, programs and regulations in place, prior to the update to this plan, that were serving to mitigate the impact of natural hazards in the Town of Plainfield. These various initiatives are summarized, described and assessed on the following pages and have been evaluated in the "Effectiveness" column. Existing capabilities are also described in the completed FEMA Capability Assessment worksheet included in Appendix E.

EXISTING MITIGATION CAPABILITIES				
STRATEGY	**ACTION TYPE**	**DESCRIPTION**	**HAZARDS MITIGATED**	**EFFECTIVENESS / IMPROVEMENTS**
Maintain Flood Control Structures	Capital	There are five dams in Plainfield.	Flooding	Somewhat effective. Need to ensure that dam owners realize that it is their responsibility to inspect their dams
Culvert Replacement	Capital	Highway department has replaced culverts in some locations to improve flow capacity and wildlife passage.	Flooding	Very effective. Costly to do, so seeking grant funding for additional replacements.
Site Plan Approval	Regulatory	Specific requirements for new construction to be integrated into the existing environment in conformance with zoning ordinances or bylaws.	Flooding/ Drought	Effective. New bylaw will include provisions for stormwater management during site plan review requiring a "net zero" impact, whereby no additional runoff will be created by development. The amendment would regulate stormwater as a performance parameter of development, rather than simply requiring that a developer prove that a "consideration of drainage" has been made. This initiative is part of an ongoing zoning update. Continue update Zoning Bylaw to include stormwater guidelines.
Subdivision Ordinance	Regulatory	CA sheets indicate that you have a subdivision ordinance, not recently updated. What does it require?	Flooding	The town allegedly has a SD ordinance developed out of language used by a neighboring town and adopted in the 1970s in response to a development proposal. No record of the bylaw currently exists on file. The town currently has no plan to do a subdivision

EXISTING MITIGATION CAPABILITIES				
STRATEGY	**ACTION TYPE**	**DESCRIPTION**	**HAZARDS MITIGATED**	**EFFECTIVENESS / IMPROVEMENTS**
				bylaw, because there is no pressure currently for subdivision. However, upcoming broadband distribution and the availability of new technologies for septic systems and solid waste treatment, coupled with the impacts of climate change and potential migration from urban areas to cooler Hilltown climes may create a development threat in the future, at which point a subdivision bylaw should be considered.
2014 Open Space and Recreation Plan	Planning Document	Inventories natural features and promotes natural resource preservation in the town, including areas in the floodplain; such as wetlands, groundwater recharge areas, farms and open space, rivers, streams and brooks.	Flooding/ Drought	Effective at inventorying sensitive resource areas. Need to update plan and work toward implementing recommendations.
State Building Code	Regulation	The town of Plainfield has adopted the Massachusetts State Building Code.	All Hazards	Effective. No changes.
Backup Electric Power	Operational	The Public Safety Complex (designated emergency shelter) is equipped with a 60kw propane generator. The town also has two portable 5 kw generators on military trailers for emergency use. The Highway Garage, Town Hall, and Police Station are wired with hookups for those portable generators.	Severe Snow/Ice Storms	Effective. Permanent generators should be installed at all Town facilities.
Tree Management	Operational	Eversource trims trees, and the tree warden does some maintenance. Eversource has cut down 900 trees in last year (2017-2018) and continues an aggressive trimming program for trees along power lines.	Severe Snow/ Ice Storms	Effective. No changes.
Use Regulations-	Regulatory	Collection, treatment, storage, burial, incineration or	Hurricanes/ Severe	Effective. No changes.

EXISTING MITIGATION CAPABILITIES				
STRATEGY	**ACTION TYPE**	**DESCRIPTION**	**HAZARDS MITIGATED**	**EFFECTIVENESS / IMPROVEMENTS**
Prohibited Uses		disposal of hazardous or radioactive waste is prohibited in all zone districts in town.	Wind/ Tornadoes/ Microbursts	
Site Plan Approval	Regulation	Large scale solar photovoltaic installation project summaries, electrical schematics, and site plans are reviewed by the local fire chief. All special permit applications are sent to Fire Department for review.	Wildfire/ Brushfire	Effective. No changes. Revisit solar bylaw with open space conservation and forest preservation in mind.
Burn Permits	Regulation	Residents must obtain burn permits, and personnel provide information on safe burn practices.	Wildfire/Brushfire	Effective. No changes.
New Dam Construction Permits	Regulation	State law requires a permit for the construction of any dam/	Dam Failure	Effective. No changes.
Dam Inspections	Regulation	DCR has an inspection schedule that is based on the hazard rating of the dam (Low, medium, high hazard)	Dam Failure	Ineffective-responsibility of inspections falls to dam owners who may not have money to comply. Identify sources for funding for dam safety inspections.
Social Media Policy	Regulatory	Permits Town departments to utilize social media to enhance communications with its residents and various stakeholders in support of Town goals and objectives. Police and Fire Departments also have policies which include safeguards for HIPPA laws and guidelines for conduct on social media by town staff.	All Hazards	Effective. No changes.

PRIORITIZED IMPLEMENTATION PLAN

The Hazard Mitigation Committee identified several strategies that are currently being pursued, and other strategies that will require additional resources to implement. Strategies are based on previous experience, as well as the hazard identification and risk assessment in this plan.

PRIORITIZATION METHODOLOGY

The Plainfield Hazard Mitigation Planning Committee reviewed and prioritized a list of 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.

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 $25,000
- **Medium** – cost between $25,000 – $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).

TABLE 21. MITIGATION STRATEGIES TO BE IMPLEMENTED

Action Type	Description	Hazards Addressed	Responsibility/ Oversight	Priority	Estimated Cost	Funding Source	Time Frame
Education and Awareness	Encourage residents to sign up for the reverse 911 Blackboard Connect. (Have sign-up sheets at community events.)	All hazards	EMD, Fire, Plainfield Cares		Low	Staff Time	6-12 months
Education and Awareness	Educate dam owners about their responsibility to inspect and maintain their dams. Identify funding sources for dam safety inspections.	Dam failure	EMD, Fire		Low	Staff Time	Short
Education and Awareness	Disseminate information and survival kits to residents (Include tips on how to mitigate hazards on personal property.)	All hazards	EMD, Fire, Police, Highway Superintendent		Low	Emergency Management Funds	1-2 Years
Education and Awareness	Survey residents to create a list of those who rely on landlines. Evaluate opportunities to secure communication alternatives for those residents during power outages.	Hurricane/tropical storm, severe thunderstorm/ wind/ tornado/ microbursts, severe winter storm/ Nor'easters	EMD, Fire, Police, Plainfield Cares, COA		Low	Staff/Volunteer Time	1-2 Years
Education and Awareness	Make a list of particularly vulnerable individuals who need assistance/to be checked in on in case of emergency, or power outage. Share information between COA, Highway Superintendent, Fire Department and Emergency Management Director.	Extreme temperatures, flooding, hurricane/tropical storm, severe thunderstorm/ wind/ tornado/ microbursts, severe winter storm/ Nor'easters	EMD, Fire, Police, COA, Plainfield Cares		Low	Staff/Volunteer Time	1-2 Years
Education and Awareness	New community campaign to create Neighbor-to-neighbor pods, or intergenerational groups that can keep an eye on each other and help when needed	Extreme temperatures, flooding, hurricane/tropical storm, severe thunderstorm/ wind/ tornado/ microbursts, severe winter storm/ Nor'easters	HMP committee, COA, Plainfield Cares		Low	Staff/Volunteer Time	Short

Action Type	Description	Hazards Addressed	Responsibility/ Oversight	Priority	Estimated Cost	Funding Source	Time Frame
Education and Awareness / Natural Resources Protection	Create water conservation guidelines to use as an educational tool for Town residents.	Drought	Conservation Commission, Board of Health, Highway Department		Low	Staff Time	Short
Natural Resources Protection	Work with Mass Audubon to create or review a forest management plan for 1,527 acres (West Mountain Wildlife Sanctuary). Incorporate strategies to deal with future conditions presented by climate change, as well as strategies to improve public access, parking areas, and trail signage.	Wildfire	Conservation Commission, Mass Audubon, Tree warden, Select Board, Planning Board, Fire Department		Low-Medium	Massachusetts Forest Stewardship Program (MFSP), Staff/Volunteer Time	Short - Long
Natural Systems Protection	Acquire or help preserve open space to maintain town character, ensure future public access to the East Branch of the Westfield River, and improve wildlife habitat. At a minimum, pursue landowner education and voluntary deed restrictions to protect natural resources.	Extreme temperatures, flood, drought,	Conservation Commission, Select Board, Historical Commission		Low-Medium	Grants from MA Division of Conservation Services (DCS)	Short - Long
Natural Systems Protection	Update the Plainfield Open Space and Recreation Plan, incorporating goals and priorities from the HMP and MVP planning processes, and work toward implementing recommendations.	Drought, flood, hurricane, severe thunderstorms, severe winter storms	Conservation Commission, Select Board		Medium	DCS Conservation Assistance for Small Communities Grant, DLTA	Short
Structure and Infrastructure	Upgrade stream crossings, bridges, and culverts by pro-actively replacing underperforming culverts to accommodate floods and promote wildlife passage. Seek grant funding for additional replacements.	Flood, Hurricane, Severe thunderstorms	Highway Superintendent		Low (inventory) High (Fix)	Chapter 90, Town Funds, HMA, MVP Action Grant	Ongoing
Structure and Infrastructure	Consider rebuilding vulnerable dirt roadways with new materials, sub drains, and technologies to avoid repeated maintenance needs, or consider paving certain segments of dirt road.	Flood, Severe thunderstorms	Highway Superintendent, Select Board		High	Chapter 90, Town Funds, HMA	Long

Action Type	Description	Hazards Addressed	Responsibility/ Oversight	Priority	Estimated Cost	Funding Source	Time Frame
Structure and Infrastructure	Improve backup power resources for Town buildings. Install permanent backup power at all town buildings. At a minimum, add portable generator hookup to town office/library/municipal headquarters. Priority is permanent standby generator at highway garage, then installing a hookup at town offices.	Flood, Hurricane, Severe thunderstorms, Severe winter storms	EMD, Fire, Police, Highway Superintendent, Select Board		Medium-High	Town Funds, HMGP	Short Term
Local Plans and Regulations	Update site plan review approval bylaw to include stormwater guidelines.	Flood, Hurricane, Severe thunderstorms	Planning Board		Low	Staff/Volunteer Time	Ongoing
Local Plans and Regulations	Work with Hilltown COA Consortium to create an elder-friendly town.	All Hazards	Town just filed for a DLTA grant to look at elder-friendly facilities		Low	DLTA, MVP Action Grant, Staff/Volunteer Time,	Short Term
Local Plans and Regulations	Update the Plainfield Natural Hazard Mitigation Plan and submit to MEMA and FEMA for review and approval every 5 years.	All Hazards	Select Board		Medium	Staff/Volunteer Time, HMA	Short
Local Plans and Regulations	Create a Plainfield asset management plan – conduct a comprehensive inventory and database of town-owned property to track vulnerability, condition, and prioritize improvements. plan would include equipment, infrastructure, and facilities.	Dam failure, earthquakes, extreme temperatures, flooding, hurricane/tropical storm, severe thunderstorm/ wind/ tornado/ microbursts, severe winter storm/ Nor'easters	Building Committee, FD, PD, HD,		Medium	Staff/Volunteer Time, HMA, MVP Action Grant	3-5 Years
Structure and Infrastructure	If areas continue to be snow drift prone, plant natural barriers – create a vegetative border within the right of way but no closer than 20 feet from the road shoulder. Plant pollinator and habitat friendly species	Snowstorms	EMD, Highway Superintendent	Low	Medium	Town Funds, HMGP	3-5 Years
Local Plans and Regulations	Participate in the creation of a Regional Debris Management Plan	All Hazards	EMD	Low	Low	Staff Time	3-5 Years

Action Type	Description	Hazards Addressed	Responsibility/ Oversight	Priority	Estimated Cost	Funding Source	Time Frame
Local Plans and Regulations	Establish a Hazard Mitigation or Emergency Management Subcommittee to the Town Select Board.	All Hazards	EMD, Select Board	Medium	Low	Volunteer Time	
Local Plans and Regulations	Create tree bylaw to encourage private landowners to plant certain things along roadway frontage – see PVPC's model bylaw. Consider requiring vegetative buffers for all new development or redevelopment, and investigate policy structures to encourage agricultural landowners with significant roadway frontage to install living snow fences to reduce snow drifts and improve habitat availability for pollinator species.	Severe winter storm	Tree Alliance, Conservation Commission, Agricultural Commission, Highway Superintendent			USFS, MassDOT, USDA Conservation Reserve Program (CRP)	

Notes: "All Hazards" indicates the following hazards profiled in this plan: Dam failure, drought, earthquakes, extreme temperatures, flooding, hurricane/tropical storm, severe thunderstorm/ wind/ tornado/ microbursts, severe winter storm/ Nor'easters, and wildfires/ brushfires

Acronyms and Abbreviations:

COA	Plainfield Council on Aging
DPW	Department of Public Works
DLTA	District Local Technical Assistance
FEMA	Federal Emergency Management Agency
FPA	Floodplain Administrator
HMA	Hazard Mitigation Assistance
N/A	Not applicable
NFIP	National Flood Insurance Program
MEMA	Massachusetts Office of Emergency Management

Timeline:

Short	1 to 5 years
Long	5 years or greater
OG	On-going program
DOF	Depending on funding

Costs:

Where actual project costs have been reasonably estimated:

Low	< $10,000
Medium	$10,000 to $100,000
High	> $100,000

Where actual project costs cannot reasonably be established at this time:

Low	Possible to fund under existing budget. Project is part of, or can be part of an existing on-going program.
Medium	Could budget for under existing work plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
High	Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed project.

Mitigation Category:

- Local Plans and Regulations (LPR) – These actions include government authorities, policies, or codes that influence the way land and buildings are being developed and built.

- Structure and Infrastructure Project (SIP) - These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This action could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.
- Natural Systems Protection (NSP) – These actions minimize damage and losses and also preserve or restore the functions of natural systems.
- Education and Awareness Programs (EAP) – These actions inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady and Firewise Communities

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 February 13, 2019 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:

- **Plainfield Municipal Vulnerability Preparedness Summary of Findings Report** – this report was developed alongside the Plainfield HMP. Results of the MVP workshop documented in the Summary of Findings Report were incorporated into the Local Profile, Hazard Identification and Analysis, and Mitigation Strategy section of this HMP.
- **Crooked Pond Dam Emergency Action Plan** – this plan was reviewed to complete the Dam Failure hazard profile, and to identify critical facilities and evacuation routes that would be impacted in the event of a failure.
- **Plainfield Comprehensive Emergency Management Plan** – this resource identifies critical infrastructure that is crucial to the town's functions, special needs populations, as well as potential emergency shortcomings.
- **Plainfield Open Space, Recreation Plan** this Plan was used to identify the natural context within which the Plainfield mitigation planning would take place. This proved useful insofar as it identified water bodies, rivers, streams, infrastructure components (i.e. water and sewer, or the lack thereof), as well as population trends. This was incorporated to ensure that the town's mitigation efforts would be sensitive to the surrounding environment.

- **Plainfield Zoning Ordinance** – Plainfield'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. site plan regulations) to avoid duplicating existing successful efforts.

- **Plainfield Master Plan-** Plainfield's Master Plan was reviewed to complete the community profile sections and inform the committee's work on selecting strategies that also align with the vision for the town.

- **Massachusetts' State Hazard Mitigation and Climate Adaptation 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 will be 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 has any recently completed mitigation strategy affected the Town's vulnerability and impact from hazards that have occurred since the strategy was completed?
- Should the criteria for prioritizing the proposed mitigation strategies be altered in any way?
- Should the priority given to individual mitigation strategies be changed, based on any recent changes to financial and staffing resources, or recent hazard events?

Review of the Plan and Integration with Other Planning Documents

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

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

Public participation will be a critical component of the Hazard Mitigation Plan maintenance process. The Hazard Mitigation Committee will hold all meetings in accordance with Massachusetts open meeting laws and the public invited to attend. The public will be notified of any changes to the Plan via the

meeting notices board at Town Hall, and copies of the revised Plan will be made available to the public at Town Hall.

7: APPENDICES

APPENDIX A - TECHNICAL RESOURCES

1) AGENCIES

Agency	Phone Number
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	(413) 442-1521
Cape Cod Commission	(508) 362-3828
Central Massachusetts Regional Planning Commission	(508) 693-3453
Franklin Regional Council of Governments	(413) 774-3167
Martha's Vineyard Commission	(508) 693-3453
Merrimack Valley Planning Commission	(978) 374-0519
Metropolitan Area Planning Council	(617) 451-2770
Montachusett Regional Planning Commission	(978) 345-7376
Nantucket Planning and Economic Development Commission	(508) 228-7236
Northern Middlesex Council of Governments	(978) 454-8021
Old Colony Planning Council	(508) 583-1833
Pioneer Valley Planning Commission	(413) 781-6045
Southeastern Regional Planning and Economic Development District	(508) 823-1803
MA Board of Building Regulations & Standards	(617) 227-1754
MA Coastal Zone Management	(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	(617) 770-3000
New England Disaster Recovery Information X-Change	(781) 485-0279
MA Highway Dept, District 2	(413) 582-0599
MA Division of Marine Fisheries	(617) 626-1520
MA Division of Capital & Asset Management and Maintenance	(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.	(781) 224-9876
NOAA: 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

Source	Agency
404 Hazard Mitigation Grant Program (HMGP)	MA Emergency Management Agency
406 Public Assistance and Hazard Mitigation	MA Emergency Management Agency
Community Development Block Grant (CDBG)	Dept. Housing + Community Dev, 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	MA Emergency Management Agency
Flood Plain Management Services	US Army Corps of Engineers
Mitigation Assistance Planning (MAP)	MA Emergency Management Agency
Mutual Aid for Public Work	Western Massachusetts Regional Homeland Security Advisory
National Flood Insurance Program (NFIP) †	MA Emergency Management Agency
Power of Prevention Grant by NESEC‡	MA Emergency Management Agency
Roadway Repair & Maintenance Program	Massachusetts Highway Department
Section 14 Emergency Stream Bank Erosion & Shoreline Protection	US Army Corps of Engineers
Section 103 Beach Erosion	US Army Corps of Engineers
Section 205 Flood Damage Reduction	US Army Corps of Engineers
Section 208 Snagging and Clearing	US Army Corps of Engineers
Shoreline Protection Program	MA Department of Conservation and Recreation
Various Forest and Lands Programs	MA Department of Environmental Protection
Wetlands Programs	MA Department of Environmental Protection
Municipal Vulnerability Preparedness Planning and Action Grants	MA Executive Office of Energy and the Environment

† 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.

‡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.

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/dis aster/	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/g eog/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.tornadoroject.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.iiaa.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

Insert:

- **Meeting agendas**
- **Press Releases**
- **Notices of Meetings**
- **Sign in sheets**

APPENDIX C – LIST OF ACRONYMS

Acronym	Meaning
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
CEMP	Comprehensive Emergency Management Plan
EMA	Emergency Management Agency
RACES	Radio Amateur Civil Emergency Service
WMECO	Western Massachusetts Electric Company
HAZMAT	Hazardous Materials

APPENDIX D – PAST AND POTENTIAL HAZARDS/CRITICAL FACILITIES MAP

Worksheet 4.1 Capability Assessment Worksheet

Jurisdiction: __Plainfield, Massachusetts_____

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

PLANNING AND REGULATORY

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

Plans	Yes/No Yr	Does the plan address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Comprehensive/Master Plan	No	PVPC assisted with a Land Use Chapter in 2013, but the rest of the plan was never finished
Capital Improvements Plan	No	Items are listed during the budgeting process, separating out capital, operating, and salary costs May consider creating a 10 year plan that will include a schedule for replacing equipment
Economic Development Plan	No	Planning Board is working to revamp zoning code to increase business uses by right, and to improve other bylaws to increase economic development opportunities. Broadband access in 2019 will attract more cottage industries.
Local Emergency Operations Plan	Yes	Have a Comprehensive Emergency Management Plan, maintained as a printed file in a large binder at the Highway Garage, which needs to be updated. Town staff noted that MEMA maintains a digital copy of the plan.
Continuity of Operations Plan	Yes	Included in the CEMP
Transportation Plan	No	Town participates in Franklin Regional Transit Authority's meetings
Stormwater Management Plan	No	No Plan or Stormwater Bylaw – new stormwater requirements for the Site Plan Review process are currently under consideration as part of a Zoning Bylaw amendment. Proposed bylaw amendment would require developers to include "net zero" impact design to 300yr storm scenario, meaning that developers would have to prove that the drainage system can handle a 300yr precipitation event with the same amount of runoff from

		the site as would have occurred before development occurred, ensuring that no additional flow is created.
Community Wildfire Protection Plan	No	Fire Department does wildfire training and has a SOG. There is a lot of state forest in the town, so the state may have a plan.
Other special plans (e.g. brownfields, redevelopment, disaster recovery, coastal zone management, climate change adaptation)	Yes	Had an Open Space and Recreation Plan that was approved through 2014.

Building Code, Permitting, and Inspections	**Y/N**	**Are codes adequately enforced?**
Building Code	Yes	Version/Year: Massachusetts State Building Code, 9th edition.
Building Code Effectiveness Grading Schedule (BCEGS) Score (Insurance Services Office, Inc., https://www.isomitigation.com/bcegs/)	Yes	No
Fire Department ISO Rating	Yes	Rating: 9. Working towards lowering the score which will lower insurance rates and indicates reduced risk.
Site plan review requirements	Yes	Site plan review is in place and adequately enforced by the ZBA and PB when triggered. It is currently under review and in the process of being revised to include stormwater guidelines.
Other: Special Permit Process	Yes	

Land Use Planning & Ordinances	**Y/N**	**Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced?**
Zoning Ordinance	Yes	Zoning ordinance in place and administered effectively by the Planning Board. It was last revised in 2016 for solar, and is now under review to revise the Site Plan Review, non-conforming use, and business use sections.
Subdivision ordinance	Yes	Not updated recently. Doesn't consider hazards or development patterns to minimize them.
Floodplain ordinance	No	No NFIP floodplain in town, so no floodplain ordinance is required
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	No	If future groundwater shortages become a risk, consider creating a Water Supply Protection Overlay district to protect

		groundwater resources by regulating certain uses. Currently most wells in town are deep wells.
Flood insurance rate maps	Yes	N/A – Not a NFIP community
Acquisition of land use for open space and public recreation uses	No	Town owns very little land for open space and recreation use. Much of Plainfield's land is owned by the state, non-profit organizations or land trusts. It is not a Community Preservation Act community, but it has purchased property in the past for town facilities.

How can these capabilities be expanded and improved to reduce risk?
Having a master plan, capital improvements plans and an up-to-date open space and recreation plan could be beneficial in helping the town consider their future needs and goals and the ways they will achieve them. These plans could also integrate likely hazards into them and reinforce the actions needs to mitigate them. The town Zoning Bylaw could have more definitive section on Stormwater control. There is also great potential for residential conversion to cottage industries, so the currently proposed zoning change will have increased requirements as a project expands in scope. For instance, a development of 5,000 sq ft generating 100 or more vehicle trips per day would require a transportation study.

ADMINISTRATIVE & TECHNICAL

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

Administration	**Y/N**	**Describe capability** **Is coordination effective?**
Planning Board	Yes	Planning board adequately skilled
Mitigation Planning Committee	Yes	Ad-hoc committee. Meet when needed.
Maintenance programs to reduce risk (e.g. tree trimming, clearing drainage systems)	Yes	Highway department does routine mowing to reduce wildfire risk, keeps road ditches clear to prevent flood damage, pushes snow banks away from the road before a major snow storm, and puts salt on the road after the first 1" of snow has fallen. Eversource trims trees, and the tree warden does some maintenance.
Mutual aid agreements	Yes	Fire and DPW are part of a state-wide mutual aid agreement. Police part of a region-wide mutual aid agreement which is very effective.

Staff	**Y/N** **FT/PT**	**Is staffing adequate to enforce regulations?** **Is staff trained on hazards and mitigation?** **Is coordination between agencies and staff effective?**
Chief Building Official	Yes (PT)	
Floodplain Administrator	No	
Emergency Manager	Yes (PT)	Also the Highway Superintendent
Community Planner	No	Can obtain free technical assistance from planners through Pioneer Valley Planning Commission membership
Civil Engineer	No	
GIS Coordinator	No	Volunteer chair of the Planning Board has some GIS capabilities, and is making improvements to the town website. Can obtain free technical assistance from GIS analysts through Pioneer Valley Planning Commission membership
Other	--	--

Technical	**Y/N**	**Describe capability** **Has capability been used to assess/mitigate risk in the past?**

Warning systems/services (Reverse 911, outdoor warning signals)	Yes	Reverse 911/CodeRed has been used and is effective. Also have an outdoor siren on top of the old fire house, though this hasn't been tested and may not be functional. The town owns 2 large electronic signs used by the Highway and Fire departments for major events to indicate road closures, detours, etc.
Hazard data and information	Yes	Limited to data available through this HMA and State HMP
Grant writing	Yes	This capability is limited to volunteers and the fire chief in some instances.
HAZUS analysis	No	
Other	--	--

How can these capabilities be expanded and improved to reduce risk?
The town could benefit from a subscription to Backboard Connect which provides communication tools for crisis management and community building. This program could help to deliver emergency notifications and broaden the reach of messaging. A Town-wide push to sign people up for Code Red could be beneficial.

FINANCIAL

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

Funding Resource	**Access Eligibility Y/N**	**Has the funding resource been used in the past and for what type of activities? Could the resource be used to fund future mitigation actions?**
Capital Improvements Project funding	Yes/No	No dedicated fund, although money is set aside in the general budget every year for capital improvements.
Authority to levy taxes for specific purposes	Yes	With limitations at the state level. Very limited appetite to raise taxes
Fees for water, sewer, gas or electric services	No	The town does not provide any of these services.
Impact fees for new development	Yes	--
Storm water utility fee	No	--
Incur debt through general obligation bonds and/or special tax bonds	Yes	Have bonded $1.3M to fund broadband, approved 2014
Community development block grants	Yes	Works with PVPC to apply for competitive CDBG funding through the state. Potential for mitigation is unknown.
Other federal funding programs	Yes	Fire Department has been awarded grants through federal programs.

State funding programs	Yes	Chapter 90 Road Funds, Mass Works, Small Bridge program grants, Public Health funding, DER Culvert Program, MVP Action Grants (will be eligible in 2019)
Other: Philanthropic gifts	Yes	From private donors. One example was the addition to the Town Library.

How can these capabilities be expanded and improved to reduce risk?
The town will complete the state's new Municipal Vulnerability Preparedness certification and gain access to MVP Action grant monies, which are to be spent directly on mitigating and preparing for extreme weather in our changing climate.

EDUCATION & OUTREACH

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

Program/Organization	**Y/N**	**Describe program/organization and how it relates to disaster resilience and mitigation**
Local citizens groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Yes	Council on Aging, Conservation Commission, Volunteer Fire Department, The Nature Conservancy
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	No	--
Natural disaster or safety related school programs	Unknown	Because part of a regional school system and the physical schools are outside of the town, committee is unaware of the trainings that may or may not happen in schools.
StormReady certification	No	
Firewise Communities certification	No	
Public-private partnership initiatives addressing disaster-related issues	No	
Other	--	--

How can these capabilities be expanded and improved to reduce risk?
The town could benefit from a regional coalition with neighboring municipalities to promote an education campaign about hazard mitigation and household preparedness.

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