The Town of Huntington
Municipal Vulnerability Preparedness (MVP) - Hazard Mitigation Plan (HMP) 2022 Update

Prepared by:
Pioneer Valley Planning Commission

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- Josh Ellinger, Fire Chief
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- Jennifer Peloquin, Administrative Assistant to the Select Board
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- Mimi Kaplan, Senior Planner
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- Emily Tully, Senior Planner II
- Patty Gambarini, Chief Environmental Planner

TABLE OF CONTENTS

1: INTRODUCTION AND PLANNING PROCESS

Purpose

The Town of Huntington prepared this Municipal Vulnerability Preparedness and Hazard Mitigation Plan (MVP-HMP) to create an action plan to increase resilience to natural hazards and climate change within the community and the region. This plan was also prepared in order to meet the requirements of 44 CFR § 201.6 pertaining to local hazard mitigation plans. A local government must have a mitigation plan approved pursuant to this section in order to apply for and receive mitigation project grants under all other mitigation grant programs. In accordance with 44 CFR § 201.6 the local mitigation plan is the representation of Huntington's commitment to reduce risks from natural hazards, serving as a guide for decision makers as they commit resources to reducing the effects of natural hazards. The MVP-HMP was also prepared to meet requirements of the Municipal Vulnerability Preparedness (MVP) Planning Grant, which enables Huntington to integrate local effects of climate change into their hazard mitigation action plan. By completing the Community Resilience Building (CRB) process, Huntington will be an MVP community eligible for MVP Action Grants to adapt to the impacts of climate change on the community.

The Huntington MVP-HMP was adopted by the Select Board on DATE to update and replace The Town of Huntington Hazard Mitigation Plan from 2016.

What is a Hazard Mitigation Plan?

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. Hazard mitigation planning uses a multi-step process with the participation of a wide range of stakeholders to define local hazards, assess vulnerabilities and risks, review current mitigation measures and develop priority action items.

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

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

Planning efforts, like the one undertaken by the Town of Huntington and the Pioneer Valley Planning Commission, make mitigation a proactive process. Pre-disaster planning emphasizes actions that can be taken

before a natural disaster occurs. Future property damage and loss of life can be reduced or prevented by a mitigation program that addresses the unique geography, demography, economy, and land use of a community within the context of each of the specific potential natural hazards that may threaten a community.

Preparing, and updating a hazard mitigation plan every five years, can save the community money and facilitate post-disaster funding. Costly repairs or replacement of buildings and infrastructure, as well as the high cost of providing emergency services and rescue/recovery operations, can be avoided or significantly lessened if a community implements the mitigation measures detailed in the plan. For every dollar spent on federal hazard mitigation grants, an average of six dollars are saved (FEMA, 2018a). There are many additional benefits of mitigation planning. HMPs increase public awareness of natural hazards that may affect the community. They help state, local, and tribal governments to collaborate and combine hazard risk reduction with other community goals and plans.

Once an HMP is completed, hazard mitigation funding is available to address the community's top mitigation priorities through the Federal Emergency Management Agency (FEMA). FEMA requires that a community adopt a hazard mitigation plan as a condition for mitigation funding. For example, the Hazard Mitigation Grant Program (HMGP), Building Resilient Infrastructure and Communities (BRIC), and the Flood Mitigation Assistance Program (FMA) are programs with this requirement.

What is a Municipal Vulnerability Preparedness Plan?

A Municipal Vulnerability Preparedness (MVP) Plan identifies priority action items to address vulnerabilities and utilize strengths in preparation for climate change. In 2017, the Massachusetts Executive Office of Energy and Environmental Affairs (EEA) initiated the state's MVP grant program to help communities become more resilient to the impacts of climate change. The program has two grant phases:

1. The first phase of grants are Planning Grants, which fund the vulnerability analyses, engagement, and planning processes. Towns convene a team of municipal staff, engage stakeholders in a Community Resilience Building (CRB) Workshop, and engage community members in developing the plan. Communities that complete the Planning Grant program and prepare an MVP plan are eligible for the second phase of MVP grant funding and receive increased standing for other state grants.

2. The second phase of the MVP program are Action Grants, which fund the implementation of priority climate adaptation actions described in the MVP plan. Action grants are competitive, however they are less competitive than some similar grants awarded at the national level.

Community Resilience Building Workshop
The Community Resilience Building Workshop was developed by the Nature Conservancy and provides a process for developing resilience action plans with stakeholder input. The process has been successfully implemented in over 350 communities.

The Community Resilience Building Workshop's central objectives are to:

- Define top local natural and climate-related hazards of concern
- Identify existing and future strengths and vulnerabilities
- Develop prioritized actions for the Community
- Identify immediate opportunities to collaboratively advance actions to increase resilience

Each step in the process (below) is rich in information and dialogue and results in actionable plans and strong collaboration.

MVP-HMP Report Layout

The report presents the results of the planning process, which was informed by input received from the Core Team and during the CRB Workshop and Public Listening Sessions. This report is organized as follows:

Chapter 1: Project introduction and overview; summary of planning process
Chapter 2: Hazard mitigation and climate adaptation goals
Chapter 3: Community profile; societal, economic, infrastructural, and environmental features; land use and development, critical facilities, and vulnerable populations
Chapter 4: Detailed assessment of the Town's vulnerability and strengths by hazard type. The hazard types include flooding, wind-related risks (such as hurricanes, tropical storms, tornadoes, nor'easters, and severe thunderstorms), winter storms, geological hazards (such as earthquakes and landslides), brush fires, extreme temperatures, and drought. Each profile also describes the hazards' historic occurrences and impact, frequency, level of risk, and climate change projections.
Chapter 5: Summary of the Town's existing mitigation capabilities and mitigation measures
Chapter 6: An action plan for next steps
Chapter 7: Plan adoption, maintenance, and implementation

Combining Hazard Mitigation and Municipal Vulnerability Preparedness Planning in Huntington

The Town of Huntington received an MVP Planning Grant and a FEMA Grant to simultaneously prepare an MVP plan in conjunction with an HMP plan. This combined approach enabled Huntington to consider the impacts of climate change in addition to historic hazard events as part of its planning process. Also, many of the required steps of the MVP process satisfy FEMA requirements for updating an HMP. For example, an MVP requires convening a Core Team and hosting a CRB Workshop and Public Listening Session, which are not required specifically by FEMA, but do meet the public input requirements of the hazard mitigation planning process. Figure 1.1 below shows the overlaps between the two processes, as well as some of the unique features of each.

The Town prepared this joint MVP-HMP in accordance with FEMA guidelines for hazard mitigation planning (Title 44 Code of Regulations (CFR) 201.6) and with the Massachusetts Executive Office of Energy & Environmental Affairs' (EOEEA) requirements for MVP plans. This approach followed the state's lead in adopting the first-ever Massachusetts State Hazard Mitigation and Climate Adaptation Plan (EEA and EOPSS, 2018). By completing a joint MVP-HMP, Huntington was able to fulfill the requirements and enhance the impact of both processes.

Figure 1.1: Comparison of the MVP and HMP Process

Planning Process Summary

Facilitating discussion among stakeholders about creating a safer, more resilient community is an important aspect of the natural hazard and climate change impact mitigation planning processes. The involvement of a variety of stakeholders in identifying mitigation strategies helps reflect the Town's values and priorities and builds greater community support and success in implementing actions that reduce risk. The planning and outreach strategy used to develop this MVP-HMP collected input from three categories of stakeholders:

1. The Core Team, which includes representation from municipal and local leadership
2. Local, regional, and state-level stakeholders who could be vulnerable to, or provide strength against, natural hazards and climate change
3. Residents, business owners, and all those who are interested in the Town's future

Core Team

The Town of Huntington convened the Core Team to act as a steering committee for the development of the MVP-HMP. A kickoff meeting was held on October 28, 2021 to discuss the project overview and Core Team roles and responsibilities, and plan for the CRB workshop. More information on this meeting is included in Appendix C. The Core Team also provided regular input through email and interviews. The Core Team played an important role in identifying critical infrastructure, involving key stakeholders, and assessing the Town's capacity to mitigate hazards alongside ongoing operations. Members of the Core Team are listed in Table 1.1.

Table 1.1: Huntington MVP/HMP Core Team

Name	Title
Jennifer Peloquin	Administrative Assistant to the Select Board
Karon Hathaway	Member, Select Board
Helena Alves	Chair, Conservation Commission
Kathleen Peterson	Director, Council on Aging and Member, Board of Health
Josh Ellinger	Fire Chief
Charles Dazelle	Highway Superintendent
Linda Hamlin	Chair, Planning Board

The Core Team and Pioneer Valley Planning Commission (PVPC) suggested or made available reports, maps, and other pertinent information related to natural hazards and climate change impacts in Huntington. These included:

- Hazard Mitigation Plan (PVPC, 2016)
- Open Space and Recreation Plan (Town of Huntington, 2004)
- Huntington Community Development Plan (Feiden Associates, 2003)
- Massachusetts Climate Change Projections (NECASC, 2018)
- Massachusetts Climate Change Adaptation Report (EEA, 2011)
- Massachusetts State Hazard Mitigation and Climate Change Adaptation (EEA and EOPSS, 2018)
- Local Mitigation Planning Handbook, May 2017 (FEMA, 2017a)
- Storm Event Database, National Center for Environmental Information (NOAA, 2020)
- Decennial Census (US Census Bureau, 2010 and 2020)
- American Community Survey, 5-year estimates (US Census Bureau, 2015-2019)

Core Team Meetings

Meetings of the Core Team took place at the Huntington Town Hall except for one meeting which was held virtually over Zoom. Meetings were held on the dates listed below, and agendas for these meetings are included in Appendix C.

October 28, 2021
Work group meeting included hazard mitigation planning and Municipal Vulnerability Preparedness program overview, an initial discussion of hazards, and discussion of participants to invite to the CRB workshop.

November 29, 2021
Work group reviewed the hazards that are likely to impact the Town and conducted the risk assessment. The group also chose the four top hazards for the CRB workshop and identified critical facilities in town.

January 19, 2022
Work group continued to review hazards that have impacted the town, updated the critical facilities and vulnerable populations in Town, and began the capabilities assessment.

March 15, 2022
Work group completed the capabilities assessment and assessed the status of the previous mitigation strategies.

April 26, 2022
Work group identified and prioritized new mitigation strategies to implement, as well as the responsible party, estimated cost and timeline of each strategy.

Sign-in sheets for each meeting can be found in Appendix C. 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.

Stakeholder Involvement: Community Resilience Building (CRB) Workshops and Public Listening Sessions

The Town held the CRB workshops over three consecutive weeks during February 2022 on the following dates: February 8th, 15th and 22nd. While the initial plan was to hold the workshop in person on February 8, due to the Covid-19 pandemic and specifically the surge in cases of the Omicron variant, PVPC and the core team made the decision to hold the workshops virtually over Zoom. The workshops were organized around the topic areas of infrastructure, environment, and society. Stakeholders with subject matter expertise and local knowledge and experience were invited to attend, including town staff and board members, public officials, local and regional organizations, neighboring communities, media organizations, environmental and social service organizations, and local businesses. Leadership from neighboring communities of Westhampton, Russell, Montgomery, Chester, and Chesterfield Massachusetts were also invited to participate in the workshops.

During the workshop, PVPC provided information about the MVP program and climate change and natural hazards and impacts, including the top four hazards impacting Huntington. Participants generated a list of infrastructural, societal, and environmental features in town that are vulnerable to these climate change hazards or provide strength and resilience in the face of these hazards. Participants also identified and prioritized key actions that would improve the Town's resilience to natural and climate-related hazards.

A full list of community representatives who were invited and those who participated in the process are presented in Appendix C, along with the materials from the workshop. The broad representation of local and regional entities that participated in these webinars ensures that the MVP-HMP aligns with the operational policies and hazard mitigation strategies at different levels of government and implementation. A summary of key participants is included below.

- Municipal/Regional School District staff members from the Department of Public Works, Police Department, Library, and Gateway Regional School District, and Chester's Town Administrator.

- Members of boards and commissions, including the Select Board, Zoning Board, Board of Health, Council on Aging, Cultural Council, North Hall Advisory Board, Historical Commission, Conservation Commission, and Agricultural Commission.
- Representatives from local groups and businesses, including Pioneer Valley Planning Commission, Lions Club, It Takes a Village, Westfield River Wild and Scenic committee, Eversource, and Rockhouse Ridge Farm.
- Representatives from State and Federal agencies, including the MVP Regional Coordinator, MassWildlife, and US Army Corps of Engineers.
- Member of the House of Representatives - MA State Rep. Natalie Blais

Regional Stakeholder Involvement

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 Huntington as part of its regional planning efforts, which include the following:

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

All of these PVPC initiatives considered the impact of natural hazards on the region and strategies for reducing their impact to people and property through hazard mitigation activities. The facilitation of the Huntington 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 Huntington was updating its Hazard Mitigation plan. Meetings of WRHSAC regularly involve discussion about how to improve emergency preparedness in Western Massachusetts, and hazard mitigation activities are included in this discussion.

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

In addition, PVPC staff regularly present to their Executive Committee and Commission (representatives from the 43 cities and towns that comprise the Pioneer Valley, when new projects are launched and when funding

opportunities are available). As a result, all the communities in the region were informed of Huntington's Hazard Mitigation Plan update process and encouraged to comment.

Public Listening Sessions

Two public meetings were held as part of the MVP-HMP Update – on February 2, 2022 and May 25, 2022. Both meetings occurred after the Core Team had provided input on hazards and town vulnerabilities. The first meeting preceded the CRB workshop, and the second public meeting took place after the CRB workshop and met the requirement for the MVP public listening session. Notice of both public meetings was posted at Huntington Town Hall in compliance with the Commonwealth of Massachusetts' open meeting law. Public meeting notices can be found in Appendix C.

Notice of the public meetings was sent to Emergency Management Directors of neighboring towns via email as well as to local media outlets. On January 18, 2022, the Pioneer Valley Planning Commission sent press releases to both the Westfield News Penny Saver and the Country Journal, the relevant news sources for this part of the region. The press release indicated that residents of Huntington were invited to attend the event, as well as representatives of businesses in Huntington and residents of neighboring communities. A copy of the press release and emails can be found in Appendix C. A reporter from the Westfield News attended the public meeting on February 2.

The public meetings/listening session included presentations by PVPC about the hazard mitigation planning process and MVP program, climate change and natural hazards in Huntington, local strengths and vulnerabilities, existing mitigation measures, and priority action items for future climate adaptation. A public comment period was provided for any attendees to share thoughts, concerns, comments and questions. Four members of the public attended the first public meeting, and there was one attendee at the second public meeting. More information about the public meeting and listening session, including a summary of responses, is available in Appendix C.

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 Huntington and surrounding communities. Regular feedback received from these other initiatives were incorporated into the hazard mitigation planning process. Neighboring communities that were provided with an opportunity to comment included municipalities that directly border Huntington, which are: Chesterfield, Westhampton, Southampton, Montgomery, Russell, Blandford, Chester and Worthington.

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 MVP/Hazard Mitigation Plan maintenance process. The Core Team will hold all future meetings in accordance with Massachusetts open meeting law. In addition, the public will be invited to provide comments through e-mail. The comments will be reviewed by the Core Team and incorporated as appropriate.

Agencies that have the authority to regulate development

The Huntington Planning Board is the primary Town agency responsible for regulating development in town. Participation of a planning board member on the Core Team ensured feedback to the Planning Board. A member of the Zoning Board of Appeals was also on the Core Team. In addition, the Pioneer Valley Planning Commission, as a regional planning authority, works with all agencies that regulate development in Huntington, including the municipal entities listed above and state agencies, such as Department of

Conservation and Recreation and MassDOT. This regular involvement ensured that the operational policies and any mitigation strategies or identified hazards from these entities were incorporated into the MVP-HMP.

Plan Adoption

In 2021, the Select Board agreed to begin the process of updating the town's Hazard Mitigation Plan. Once the plan was provisionally approved by FEMA, the Select Board held a public hearing on the plan on ____ and voted to adopt the plan.

2: HAZARD MITIGATION AND CLIMATE ADAPTATION GOALS

The Town of Huntington's Core Team convened to discuss, review, and endorse the following hazard mitigation and climate adaptation goals for the MVP-HMP.

The Town of Huntington aims to minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to flooding, severe snowstorm and ice storms, severe thunderstorms, hurricanes, tornadoes, brushfires, earthquakes, dam failures, drought, and global health crises through the following avenues:

Protection: Develop programs, strategies, and actions to protect the following Town assets from natural hazards and climate change impacts:

- Residents, with an emphasis on supporting the elderly, young, and low-income populations
- Cultural and historic resources
- Critical infrastructure
- Utilities, including electric power, water, and wastewater
- Public facilities and services
- Homes and businesses
- Open space and other environmental features
- Future development

Planning: Incorporate climate adaptation and hazard mitigation measures into local plans, bylaws, regulations, and practices to protect critical infrastructure and property and to encourage resilient development, based on up-to-date information on climate change projections and emerging risks.

Nature-based Solutions: Investigate, design, and implement hazard mitigation and climate adaptation measures that employ nature-based solutions and protect the natural environment.

Coordination: Collaborate in hazard mitigation planning and climate adaptation with utility providers, local businesses, institutions, non-profits, surrounding communities, and state, regional and federal agencies.

Capacity: Increase the capacity for all Town departments, committees, and boards to respond to climate change impacts and natural hazard events with adequate data, guidance, staff, training, and equipment.

Public Outreach: Increase awareness and provide resources for hazard mitigation and climate resilience to businesses and residents through outreach and education.

Funding: Identify and seek funding for measures to mitigate or eliminate each known significant hazard area and reduce the impacts of climate change.

3: LOCAL PROFILE

Community Setting

Geography

Huntington is a rural community comprised of 26.9 square miles (approximately 17,200 acres) located in the hilltowns of Western Massachusetts. Huntington is located in southwestern Hampshire County and is bordered by the towns of Chesterfield, Westhampton, Southampton, Montgomery, Russell, Blandford, Chester and Worthington. Huntington lies 17 miles west of the Springfield metropolitan area.

The hilltowns are a cluster of rural towns in the foothills of the Berkshires, on the western border of the Pioneer Valley. Huntington has the largest population among the hilltowns in the region, and is also that area's regional center. The Westfield River runs through the center of the town and into Huntington's historic town center.

Growth and Development

Huntington was originally incorporated as the Town of Norwich in 1775 and was the first community in Hampshire County to have service from the newly constructed railroad. The railroad brought a boom of manufacturing, but not enough to compete with industry in neighboring communities. A downtown was established, which has remained characteristically rural and quaint to this day. Huntington's downtown hosts the largest developed commercial center, which includes several restaurants and small markets and the only medical service in the southern hilltowns.

Huntington's growth was initiated first by farmers, then by industry following the railroad, and more recently, residential development. But the town's topography, soils, and physiography (lakes, rivers, wetlands and watershed areas) shape and constrain these land use patterns. This rural, mainly residential community, with its scenic landscape and downtown, and vast opportunities for outdoor recreation, has experienced steady population growth in recent years. But due to limited access to interstates or other regional highways, Huntington still retains its "hilltown" character.

Although there is no industry in Huntington, outdoor recreation has become a prolific piece of the town's economy. The land surrounding Littleville Dam and Lake on the pristine Westfield River provide excellent hiking, mountain biking, hunting, snowmobiling, and horseback riding. Littleville Lake provides a boat ramp for smaller watercraft and is a popular spot for fishing. Knightville Wildlife Management Area covers over ten miles of undeveloped river valley land, and offers hiking, mountain biking, cross-country skiing, hunting and fishing. Norwich Pond is surrounded by cottages as well as the YMCA Camp Norwich. There is not public swimming access but there is a public boat ramp.

Population Characteristics

According to the U.S. Census Bureau 2020 data, there are 2,094 residents (a 3.9 % decrease since 2010) and a total of 1,113 housing units in Huntington. (US Decennial Census). The median age is 47.7, with children under 18 making up approximately 16.0% of the population, and adults 65 and older making up approximately 18.0% of the population. The median household income is $63,618 and 8.9% of households in town live below the poverty line (American Community Survey 2015-2019). There is an Environmental Justice (EJ) block group in

Huntington based on income criteria, which is located in the far southern area of the Town.[1] This population is mostly white but has a minority population of 5.2%. This EJ block group has a population of 593 individuals in 311 households, according to 2019 ACS data.

Table 3.1: Huntington Population Demographics

Huntington Population Demographics		
	Population	2,094
	Under Age 18	16.0%
65+	Over Age 65	18.0%
	Bachelor's degree or higher	28.8%
	Median household income	$63,618
	Poverty Rate	8.9%
	With a Disability	12.7%
	Occupied Housing Units	921
	Renter-Occupancy Rate	17.7%

US Census Bureau, 2020 Census and 2015-2019 American Community Survey

Infrastructure Features

Huntington's infrastructure reflects its small but growing population and rugged terrain. Huntington's town center is located near the intersection of Route 112 and Route 20, in the southwestern corner of town. This is also near the convergence of two branches of the Westfield River, providing for scenic bridge and river views within the downtown and along both state routes. Route 66 intersects Route 112 north of the center of Huntington, and connects to Westhampton. Almost all other paved roads in town intersect with one of these three Routes. There are many bridges in town, with six located on Route 112 alone, an evacuation route.

There are approximately 12 miles of dirt roads in Town. These were identified in the CRB workshop as a vulnerability due to erosion during extreme precipitation events and more frequent freeze/thaw cycles. There was concern expressed about poor condition and impassability of dirt roads during mud seasons, which are becoming longer and occurring more frequently. There was also concern expressed about the erosion during heavy rainfall from dirt roads, especially those with steep grades, impacting water quality of nearby streams. There were over 10 problematic culverts (undersized and/or in poor shape) identified by the highway department and by CRB workshop participants that contribute to localized flooding.

The Franklin Regional Transit Authority (FRTA) runs a shuttle in Huntington and the surrounding towns for senior citizens. The shuttle van operates Monday through Friday and provides access to medical appointments and shopping in Westfield. The shuttle is available on demand; it does not run continuously. There is a rail line that

[1] https://www.mass.gov/service-details/environmental-justice-policy

belongs to CSX railroad that extends along the southern edge of town and through the town center, paralleling Route 20. Both freight trains and the Amtrak passenger rail (running between Springfield and Albany) run on these tracks. There have been issues with sparks from the trains starting wildfires, and there were also concerns raised at the workshop about herbicide spraying along the lines.

All of the drinking water in Huntington comes from groundwater sources. About one-third of households in town (311 households) are served by public wells #1 and 2, which are located just west of the Town center along Route 20, and the remainder rely on private wells. There is also a private water system at Norwich Hill (not residential). Water quantity is generally not a problem except possibly in some very small, localized areas. A large portion of Huntington is located upon a high yield sand and gravel aquifer in the outwash plain adjacent to the Westfield River. The drinking water wells have adequate capacity, quality, and quantity to serve the foreseeable future, however there was discussion at the workshop about the location of the wells near a busy road, and the resulting potential for contamination. The wells are also adjacent to the railroad lines, which pose an additional threat of contamination in the event of an accident and spill of toxic materials. An additional aquifer is located north of Huntington center which provides the water for Gateway Regional Schools and can be used as back-up supply for the Town. There is also a publicly accessible well on route 66, the Nebbs well, which is currently unavailable for use due to high coliform counts. There was a need expressed at the workshop to access funding to remediate the contamination, and upgrade the well to ensure that can it be used as a backup water supply by town residents in the future.

Most households in Huntington rely on private septic systems – only about one quarter of households (236 households) are connected into town sewer lines. There are sewer facilities within Huntington's downtown, located south of Montgomery road on the west side of the river, and these facilities service the center of Town as well as the Gateway Regional School.

There are three dams in Huntington, two of which are owned and managed by the US Army Corps of Engineers (Littleville Dam and Knightville Dam). There is a dam on Norwich Pond which was had been privately owned in the past, but which recent research indicates is now owned by the Commonwealth of Massachusetts due to the status of Norwich Pond as a "Great Pond." There was concern expressed at the workshop about the condition and maintenance of the Norwich Pond dam, and the need to communicate with the state about the dam's hazard level and the need for regular inspections and maintenance. It has been listed as non-jurisdictional, however many workshop participants suggested that it may need to be rated as a significant or high hazard dam as there would be significant damage to property and possibly lives downstream if it were to fail.

Societal and Economic Features

As mentioned above, Huntington is the hub of the southern hilltown region, and offers a number of social services as well as commercial establishments. The Town has a public library, a Council on Aging/Senior Center, and a medical clinic. There are youth sports leagues, a local school of dance, a local business association, four active churches, a food pantry and a parental support organization (It Takes a Village), among other social services and organizations. Participants at the CRB workshop noted that the Town has a very strong sense of community and informal neighbor-to-neighbor networks, as well as resources such as those mentioned above that can respond and provide outreach during emergencies. Approximately 18% of the residents of Huntington are 65 years of age or older. The Council on Aging is very active, and publishes and distributes a regular newsletter.

There are regular community events held every year downtown or at North Hall, as well as events that draw visitors such as the whitewater canoe races on the Westfield River. While there are a small number of restaurants and stores in town, it was noted during the workshop that there are many empty storefronts and

that it can be difficult for businesses to survive and thrive in Huntington. This has been especially challenging due to the Covid-19 pandemic restrictions.

Huntington is part of the Gateway Regional School district, which serves students in Huntington, Russell, Blandford, Chester, Montgomery, and Middlefield. All but one of the district's schools is located within Huntington. The schools in Huntington include the Littleville Elementary School, Gateway Regional Middle School and Gateway Regional High School.

There is a reverse 911 system for emergency communications. The town also has an emergency siren, however it is not as dependable as electronic warning systems as it must be manually activated. There is also a school alert system through Gateway Regional. There was discussion at the workshop about improving the town's ability to communicate information about natural hazards and emergency response to both new and current residents.

Environmental Features

The majority of the Town is forested, with some cleared areas of pastureland, as well as residential areas and the downtown commercial area. Huntington's most significant natural resource is the Westfield River and the large wildlife areas and parks within town limits. The Westfield River watershed encompasses 97% of the town's land. However, this historically rural town has been shaped by several of its other natural resources as well.

The three branches of the Westfield River (East, Middle and West) and major tributaries were instrumental in the development of Huntington and also its character. The river is classified as a Class B waterway, suitable for boating, fishing, and swimming. Portions of the river have National Wild and Scenic River designation and additional portions may be nominated. The east branch of the Westfield River runs for about five miles along Route 112 downstream of the Knightville Dam, which controls the flow. It has long stretches of low banks and considerable numbers of homes in the floodplain area. The west branch has low banks and a wide flood plain for its entire course through Huntington. There has been considerable residential and commercial development within the floodplain. There is no dam on the west branch, and there is a regular problem with ice jams causing flooding along a few sections of this branch of the river. The middle branch of the Westfield River runs south through the center of town, with the flow controlled by the Littleville Dam.

Norwich Pond, located in the north-eastern portion of town, and Littleville Lake, running along Huntington's western border, are valuable aesthetic and recreational resources. Norwich Pond is a 122-acre spring-fed lake (Great Pond) located a little over a mile north of Route 66. Pond Brook runs from Norwich Pond and enters the Westfield River below the Knightville Dam. Littleville Lake was formed by the Littleville Dam, located on the middle branch of the Westfield River. There are numerous others small brooks and ponds in Huntington which contribute to the Town's 300 acres of surface waters. These include Sykes Brook, Pittsinger Brook, Florida Brook, Tucker Brook, Roaring Brook, and scattered perennial ponds.

Approximately 14,432 acres of Huntington is forested, the primary land cover. Much of the forest is hardwood, consisting of red and white oak, red and sugar maple, cherry, ash, and birch. The majority conifers are white pine and hemlock, with some spots of cedar, red pine, and, rarely, spruce. There are also a few hundred acres of cropland, pastureland, and open land, providing additional vegetation types and habitat opportunities. Gardner State Park is located along the East Branch of the Westfield River on Route 112 just south of Route 66. It is a 32-acre tract of forest with a long waterfront. There are also two wildlife management areas located within Huntington – Hiram H. Fox and Knightville Dam Wildlife Management Areas.

According to BioMap2, which uses data from the Natural Heritage and Endangered Species Program and the Nature Conservancy to identify critical habitats and intact ecosystems in the state, Huntington contains 6,278 acres of core habitat land and 10,007 acres of critical natural landscape. There are four certified vernal pools according to MassGIS. There are seven exemplary or priority natural community cores, including two Forest Cores, three Wetland Cores, and twelve Aquatic Cores. There have been six plants observed in Huntington that are either endangered, threatened or of special concern. In addition, the following types of animal species have been observed that are either endangered, threatened, or of special concern: Two bird species, one fish species, one mussel, five insect species, one reptile and one amphibian.

Issues of environmental concern discussed at the CRB workshop include threats to rivers and streams from erosion from dirt roads during heavy rainfall, development and forestry on steep slopes in Town that increase runoff, erosion, and sedimentation of waterways, and general lack of protection from zoning regulations for sensitive ecosystems in the Town. Workshop participants suggested a need for additional regulatory control of driveway permits as well as stormwater management review for development projects. There is concern about increasing amounts of invasive species that threaten the health of native forest and wetland species and ecosystems, as well as increasing numbers of disease vectors such as ticks.

Zoning

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

The Huntington Zoning Bylaw establishes eight base zones, and two overlay zones:

Four residential zones – Residence 25, Residence 45, Residence 90, Residence 135;

One conservation zone – State or Federal Preserve

Two commercial (business) zones – Business, Central Business;

One industrial zone – Industrial;

Two overlay zones –Floodplain, Aquifer.

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

Floodplain Overlay - The floodplain overlay applies to those areas within the boundary of the one-hundred-year flood that are considered hazardous according to FEMA. It limits some uses for preventing potential flood damage.

Aquifer Protection District - The purpose of this overlay district is to protect and preserve Huntington's groundwater resources from potentially damaging pollution, or environmental degradation, by

regulating certain uses within the district. The regulations stipulate specific prohibited and restricted uses, regulate drainage, and detail site plan requirements and special permit procedures.

The Zoning Bylaw also establishes a Site Plan/Special Permit Approval procedure for specific uses and structures within Huntington. This review allows the Special Permit Granting Authority the ability to review development to ensure that the basic safety and welfare of the people of Huntington are protected, and includes several specific evaluation criteria that are relevant to natural hazards.

Recent and Potential Development

Today, the majority of Huntington's 26.9 square miles is undeveloped and features steep topography and rolling woodland. Residential land use is also a prolific land use, especially along the busier through-roads. According to the 2002 Open Space and Recreation Plan, agricultural land encompasses approximately 568 acres. Open public land and outdoor recreation land is listed as 169 acres, while land for industrial and commercial uses constitutes approximately 37 and 35 acres respectively. Open water in the Town of Huntington comprises over 300 acres. Currently, development in Huntington is encouraged by existing zoning and other land use regulations to occur in areas where the environmental conditions and existing public utilities support such development.

There have been some minor changes in development in Huntington since the previous HMP was approved in 2016 that may have affected the Town's vulnerability to natural hazards. There have been 18 lots subdivided on Goss Hill Road that vary in size from 7 to 24 acres each. A house has been built on one lot and the others are currently vacant. Sykes Brook, a tributary to the Westfield River, runs though the parcels on the west side of the road. A small area on either side of the brook is in the 100-year floodplain, so parts of the properties are vulnerable to flooding. Goss Hill Road was also mentioned as being vulnerable to localized flooding due to undersized culverts; the addition of asphalt driveways and other impermeable pavement will increase the amount of stormwater runoff and thus the risk of localized flooding. Goss Hill Road was also mentioned as being vulnerable to snow and ice hazards due to high elevation and steep grades – with more people living and driving on the road, the risk of accidents in the winter also rises. There are also five recently subdivided lots on County Road near the intersection of Kennedy Road, an area that could be vulnerable to localized flooding, as well snow and ice hazards due to high elevation and steep grades.

Critical Facilities

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

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

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

- Facilities needed for emergency response in the event of a hazard event.
- Facilities that are not needed for emergency response, but are considered essential to the everyday operation of the town

- Facilities or institutions that include special populations that would need additional attention in the event of a hazard event.
- Facilities that have potential supplies and resources needed for response.

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.

Table 3.2: Critical Facilities in Huntington

Critical Facilities		
Feature Type	Name	Address
Category 1: Emergency Response Services		
Safety and Security		
Fire/Police/Emergency Response	Highway Facility/Primary EOC	7 Mill Street
	Huntington Fire Department/Alternate EOC	8 Russell Road
	Huntington Fire Station #2	48 Searle Road
	Huntington Police Department	24 Russell Road
	Hilltown Community Ambulance	1 Bromley Rd
	Helicopter Landing Sites	Gateway School Complex
		Alternates: Knox's Field/Field corner of Allen Coit and Pond Brook Rd
Emergency Shelter	Gateway Middle/High School	12 Littleville Road
Cooling/Warming Center	Stanton Hall	
	Emergency Management Trailer (Traffic emergencies)	7 Mill Street
Emergency Fuel	Highway Dept.	7 Mill Street
Emergency Electrical Power	BOH – 1 Generator Fire Department – 2 portable generators on trucks (1 automatic); 1 at each station (automatic) Highway Department – 2 generators (1 automatic) Sewer Plant – 1 generator (automatic) Town Hall/Stanton Hall – 1 generator (automatic)	
Energy		
Electricity	Eversource	
Electric Generation	Eversource	
Natural Gas	Eversource	
Communications		
Cell Tower	AT&T, Verizon, Sprint, T-Mobile, First Net	1 on Westwood Drive 1 on Lyman Road

Critical Facilities		
Wired Telephone Service	Verizon Substation	East Main Street
Public Service/Safety Communication Towers	Radio Towers	Fire Stations 1 and 2
Transportation		
Public Transportation	Franklin Regional Transit Authority – rides for Seniors	
Evacuation Routes	Primary Evacuation Routes Bridges on evacuation routes	Route 20, Route 112, Route 66 Six bridges on Route 112
Critical Needs		
Potable Water	Public Well (2)	Gateway School Complex
	Public Well (2)	Route 20/Laurel Road
	Water Tank	Blandford Hill Road
Non-Potable Water Sources	Fire Department has a list but it is not publicized	Numerous locations along the river and throughout the community
Wastewater	Sewer Treatment Plant	Bridge Street
Dams	Knightville Dam Littleville Dam Norwich Pond Dam	
Category 2: Non-Emergency Response Facilities		
Transfer Station	Huntington Transfer Station	7 Mill St
Bridges/Culverts	Location of Problematic Culverts (frequent flooding)	Goss Hill Road Nagler Cross Road Barr Hill Road Kimball Road Sampson Road County Road Bean Hill Road Church Road Laurel Road
Category 3: Potential Resources		
Food and Water		
Food/Grocery	Huntington Country Store	70 Worthington Road
	B & D Variety Store	22 East Main Street
	Moltenbrey's Market	44 Worthington Road
Gas Station	Cumberland Farms	Russell (none in Huntington)
Healthcare		
Hospitals	Baystate Noble	115 W Silver St., Westfield, MA
	Baystate Springfield	759 Chestnut Street, Springfield, MA
	Mercy Medical Center	271 Carew St. Springfield, MA
	Holyoke Medical Center	575 Beech St., Holyoke, MA
	Cooley Dickson Hospital	30 Locust St., Northampton, MA
	Berkshire Medical Center	725 North St., Pittsfield, MA

Critical Facilities		
	Fairview Hospital	29 Lewis Ave., Great Barrington, MA
Health Services	Hilltown Community Health Center	73 Russell Road
Regional Facilities and Services		
Building Material Suppliers	Gateway Farm and Pet	59 Russell Road
Heavy Material Suppliers	Hilltown Sand and Gravel	87 Worthington Road
	Down to Earth Excavating	3 Goss Hill Road
Gravel Pits	Charles McDonald's	Sampson Road
	Hilltown Sand and Gravel	
Category 4: Populations and Facilities to Protect		
Housing		
Multifamily Housing	Apartment Units	4 Main Street, 6 Blandford hill Road, 27-31 Basket Street, 25 Russell Road, Pine Street, 1 Basket Street
Housing for Elderly/Disabled	Charles E. Hamblin Court	2 Hamblin Court, off East Main Street (Rte. 112)
Major Employment Centers		
	Gateway Middle/High School	12 Littleville Road
	Littleville Elementary	4 Littleville Road
	Health Center	73 Russell Road
Education		
Schools	Gateway Middle/High School	12 Littleville Road
	Littleville Elementary School	4 Littleville Road
	HCDC Preschool	9 Russell Road
Community and Cultural Organizations/Assets		
Places of Worship	Huntington Evangelical Church	17 and 22 Russell Road
	First Congregational Church	6 Searle Road
	Pioneer Valley Assembly	63 Old Chester Road
	Fare-thee-well Wholeness Center	153 Pond Brook Road
Community Organizations	It Takes a Village (parent support org) and Village Closet donation center	2 East Main Street
	Huntington Food Pantry	Pioneer Valley Assembly of God Church, 63 Old Chester Rd
	Huntington Library	7 East Main Street
	Huntington Post Office	16 Russell Road
Natural Resource Assets		
	Huntington State Forest	Sampson Road
	Gardner State Park	Route 112
	Knightville Dam and Wildlife Management Area	Knightville Dam Road

Critical Facilities		
	Littleville Dam and Lake	Off Goss Hill Road
	Westfield River	
Historical Buildings/Sites	Huntington Town Hall Huntington Historical Society's Schoolhouse Museum Stanton Hall/ Second Congregational Church St. Thomas Catholic Church Norwich Bridge, Norwich Hill Cemetery North Hall Ellis Cemetery World War I Monument Robert Cross Bridge Knightville Dam St. Thomas Cemetery	

Table 3.3: Critical Facilities and Evacuation Routes Potentially Affected by Hazards

Critical Facilities and Evacuation Routes Potentially Affected by Hazard Areas			
Hazard Type	**Hazard Area**	**Critical Facilities Affected**	**Evacuation Routes Affected**
Flooding (100-year)	Old Chester Road		
	Upper Russell and Russell Road	EOC, Fire Station, Police Station, Town Hall, City of Springfield Water Pumping Station	Route 20
	Main Street	Post Office	Route 112
	Bridge Street	Sewer Treatment Plant	
Flooding	Rocky Brook Drive	Culverts	
	Arnold Drive		
	Worthington Road Water Treatment Plant -Laurel Rd.		Route 112
Severe Snowstorms/Ice Storms	Goss Hill Road, Nagler Cross Road, Bean Hill Road, Barr Hill Road, Old Church Road.	Energy and Communication Infrastructure	
	Harlo Clark Road, County Road, Pond Brook Road, Pisgah Road		Route 66
	Searles Road, Tucker Road, Sampson Road Gorham Road		
Severe Thunderstorms, which cause wind damage	Whole town/ Norwich Hill (particularly susceptible)	Energy and Communication Infrastructure	
Hurricanes	Whole town	Energy and Communication Infrastructure	
Tornadoes/Microburst	Whole town	Depends where touches down	Depends where touches down
Wildfire/Brushfire	Knightville Dam Basin/CSX Railroad	None	Route 20
Earthquakes	Whole Town	Older buildings not constructed to earthquake standards.	Route 112 (Has numerous bridges)
Dam Failures	Littleville Lake Dam Inundation Zone Knightville Dam Inundation Zone Norwich Lake Dam	Gateway Regional Middle/High School, Emergency Shelter, Town Hall, 20 Historic Structures, 13 Business	Route 20, Route 112, Route 66 (Massassoit)
Drought	Whole Town	None	None

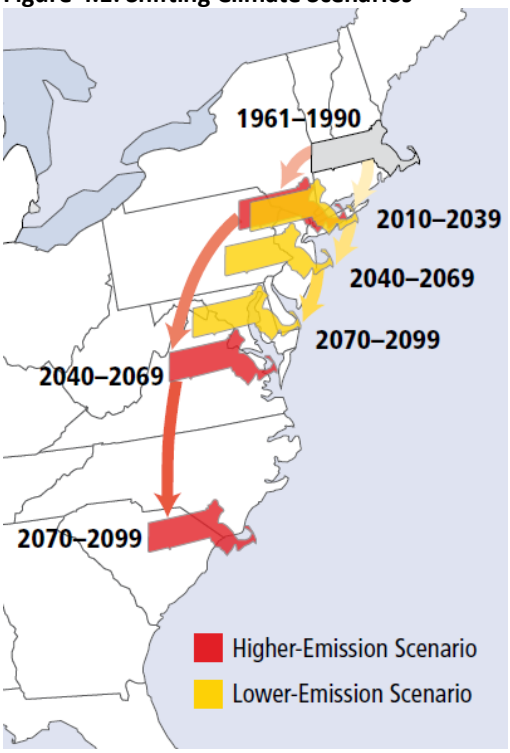
4: HAZARD IDENTIFICATION AND ANALYSIS

The following section includes a summary of hazards that have affected or could affect Huntington. Historical research, conversations with local officials and emergency management personnel, available hazard mapping and other weather-related databases were used to develop this list. Each hazard profile contains information on the areas vulnerable to the hazard, documentation of historic events, a risk and vulnerability assessment, and related climate change projections. The risk and vulnerability assessment examines both the frequency and severity of hazards and their potential impact to the Town of Huntington. Each hazard risk and vulnerability assessment use previous occurrences and climate projections to identify high risk areas and the likelihood that a hazard will occur. The vulnerability analysis takes into consideration various factors in the community, including existing and future buildings, infrastructure, and critical facilities. In some cases, an estimate of the potential dollar loss to vulnerable structures is available. Land uses and development trends were also considered as part of the flood vulnerability assessment.

Impacts of Climate Change

Climate change is impacting communities around the world, and residents of Massachusetts are seeing these changes and their impacts almost every day. At current rates of greenhouse gas accumulation and temperature increases, the climate of Massachusetts is projected to become similar to that of present-day New Jersey or Virginia by 2040-2069, depending on future GHG emissions. These possible scenarios are shown in Figure 4.1 below.

Figure 4.1: Shifting Climate Scenarios



Source: NECIA 2006

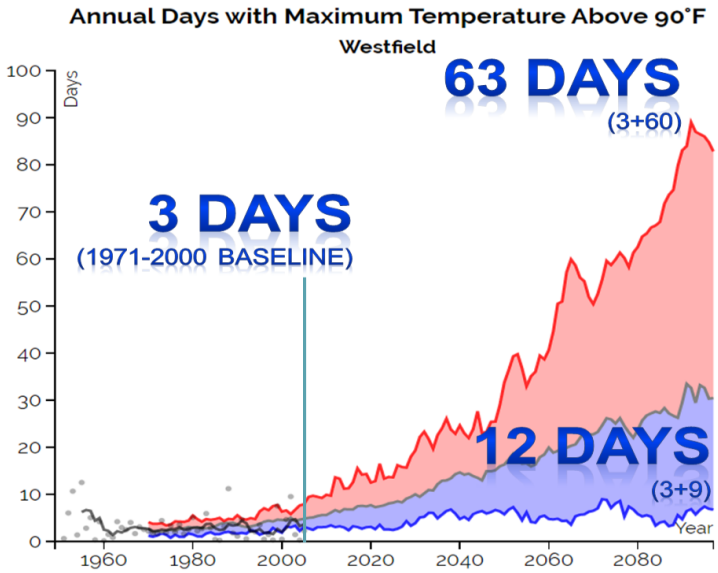
Climate projections from the Northeast Climate Science Center at the University of Massachusetts show with more certainty than ever that these changes can be expected to continue. Projections are based on simulations from the latest generation of climate models from the Intergovernmental Panel on Climate Change and scenarios of future GHG emissions, and are downscaled to the watershed and county level across the Commonwealth of Massachusetts.[2]

Huntington lies primarily within the Westfield River Basin, where projections show that by the end of this century, communities could see more than 9 inches of additional rainfall annually over a 1971-2000 baseline of 50.7 inches per year. Winter is expected to experience the greatest seasonal increase both in total precipitation and the frequency of heavy downpours, or days receiving precipitation over one inch. Despite this increase in precipitation, especially large precipitation events, primarily in winter and spring, projections also indicate that there could be an increase in consecutive days without rain during the summer and fall.

With regards to temperatures, projections show that annual average and maximum temperatures will continue to rise. Even a very small rise in average temperatures can cause major changes in other factors, including impacts on species and ecosystem health and the relative proportion of precipitation that falls as rain or snow. In addition to an increase in average temperatures, there is projected to be a significant increase in the number of extreme heat days, meaning days with the temperature above 90°F. This is considered a threshold as heat-related illnesses and mortality show a marked increase at temperatures above 90°F. Projections indicate a possible 2,000% (60 day) increase in 90-degree days per year by the end of the century from a baseline average of three days per year. The graph in Figure 4.2 below from resilientma.org shows these projections for increases in extreme heat days in the Westfield River basin. Heat waves can lead to illness and death, particularly among vulnerable individuals such as the elderly, the very young, and those with existing health risk factors.

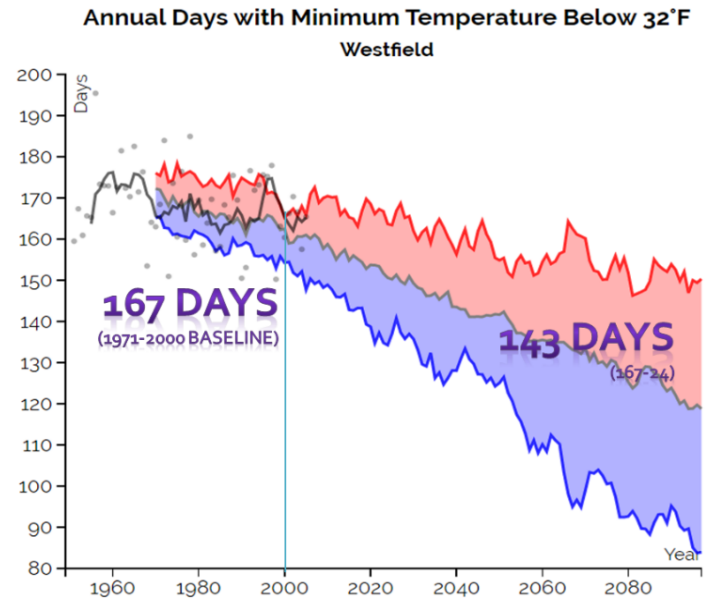
[2] https://resilientma.org/datagrapher

Figure 4.2: Projections for annual days above 90°F



There are also significant temperature changes projected for the winter. The days below freezing are projected to decrease from a baseline average of 167 days to possibly only 143 days by the end of the century. Figure 4.3 below shows these projections. These warmer winter temperatures will have a number of impacts on the town, including the following: More rain, sleet, and ice and less snow in winter; more freezing and thawing of roads, and longer mud season impacting dirt roads especially; impacts on winter tourism and activities that rely on snow, such as snowmobiling and skiing; impacts on agricultural operations that rely on cold weather such as maple sugaring; stress on native species that are adapted to freezing weather, and more beneficial for many invasive species as well as disease vectors such as ticks; and less snowpack to replenish groundwater.

Figure 4.3 Projections for days below 32 degrees F



Finally, projections indicate an increase in the frequency and magnitude of extreme weather. This could come in the form of tropical storms, or other high intensity wind and rain events. Here, too, the greatest changes are expected to occur in the spring and winter.

Federally Declared Disasters in Massachusetts

Tracking historic hazards and federally declared disasters that occur in Massachusetts, and more specifically Hampshire County, helps planners understand the possible extent and frequency of hazards. Historically, Massachusetts has experienced multiple types of hazards, including flooding, blizzards, and hurricanes. Since 2000, there have been 29 storms in Massachusetts that resulted in federal disaster declarations. Eighteen disaster declarations have occurred in Hampshire County (two were related to the Covid-19 Pandemic). Federally declared disasters present additional FEMA grant opportunities for regional recovery and mitigation projects. The hazard profiles included in this chapter contain more information about federally declared disasters.

Vulnerability and Risk

To understand risk, one must first understand vulnerability. Vulnerability is determined by the amount of exposure, sensitivity, and adaptative capacity of an asset in the social, natural, and built environment and is the predisposition to being negatively affected by a natural hazard. The degree of exposure is influenced by the location of the asset and the severity of the event. Sensitivity refers to the impact of a natural hazard due to the existing conditions or characteristics of the assets. For example, a building with an older roof may be more sensitive to wind damage and may lose its ability to function or keep rain out of the building. Adaptive capacity is the ability of a system, service, or asset to adapt or prepare for an anticipated hazard or climate impact.

Risk, or the possible adverse outcome, is determined through the consideration of vulnerability, the severity of an event, and the probability of that event occurring. In some instances, risk can be calculated in dollar amount or other metrics. In other cases, risk can be conveyed through the consequence and follow-on impacts. The consequence may be the amount of damage, length of service disruption, and the loss of life or number of injuries. Follow-on impacts could include public health concerns and environmental damage.

Massachusetts State Hazard Mitigation and Climate Adaptation Plans

The 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan (SHMCAP; EEA and EOPSS) identified the natural hazards that can occur in the state along with the climate change interaction for each, and the representative climate change impacts. The one hazard without a climate change interaction is earthquakes. These are shown in Table 4.4 below from the SHMCAP.

Table 4.4: Natural Hazards and Climate Change Interactions

Primary Climate Change Interaction	Natural Hazard	Other Climate Change Interactions	Representative Climate Change Impacts
 Changes in Precipitation	Inland Flooding	Extreme Weather	Flash flooding, urban flooding, drainage system impacts (natural and human-made), lack of groundwater recharge, impacts to drinking water supply, public health impacts from mold and worsened indoor air quality, vector-borne diseases from stagnant water, episodic drought, changes in snow-rain ratios, changes in extent and duration of snow cover, degradation of stream channels and wetland
	Drought	Rising Temperatures, Extreme Weather	
	Landslide	Rising Temperatures, Extreme Weather	
 Sea Level Rise	Coastal Flooding	Extreme Weather	Increase in tidal and coastal floods, storm surge, coastal erosion, marsh migration, inundation of coastal and marine ecosystems, loss and subsidence of wetlands
	Coastal Erosion	Changes in Precipitation, Extreme Precipitation	
	Tsunami	Rising Temperatures	
 Rising Temperatures	Average/Extreme Temperatures	N/A	Shifting in seasons (longer summer, early spring, including earlier timing of spring peak flow), increase in length of growing season, increase of invasive species, ecosystem stress, energy brownouts from higher energy demands, more intense heat waves, public health impacts from high heat exposure and poor outdoor air quality, drying of streams and wetlands, eutrophication of lakes and ponds
	Wildfires	Changes in Precipitation	
	Invasive Species	Changes in Precipitation, Extreme Weather	
 Extreme Weather	Hurricanes/Tropical Storms	Rising Temperatures, Changes in Precipitation	Increase in frequency and intensity of extreme weather events, resulting in greater damage to natural resources, property, and infrastructure, as well as increased potential for loss of life
	Severe Winter Storm / Nor'easter	Rising Temperatures, Changes in Precipitation	
	Tornadoes	Rising Temperatures, Changes in Precipitation	
	Other Severe Weather (Including Strong Wind and Extreme Precipitation)	Rising Temperatures, Changes in Precipitation	
Non-Climate-Influenced Hazards	Earthquake	Not Applicable	There is no established correlation between climate change and this hazard

Source: State Hazard Mitigation and Climate Adaptation Plan, 2018

Not all hazards included in the 2018 State Hazard Mitigation and Climate Adaptation Plan apply to the Town of Huntington. Given Huntington's inland location, coastal hazards and tsunamis would not affect the Town. The core team did not include landslides in their natural hazard inventory, as they have not previously occurred in the town. The plan also does not include invasive species as a natural hazard, although they are identified as a vulnerability. It is assumed that the entire Town of Huntington and its

critical facilities are exposed to earthquakes, high wind events, hurricanes, winter storms, snow and ice, temperature extremes, and drought, to a similar extent. Flood risk from riverine flooding is elevated in the vicinity of flood zones.

Natural Hazard Analysis Methodology

This chapter examines the hazards in the Massachusetts State Hazard Mitigation and Climate Adaptation Plan which are identified as likely to affect Huntington. The hazard profiles were updated with information from the 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan (SHMCAP; EEA and EOPSS, 2018) and additional research and assessment conducted by the project team. The Core Team, CRB Workshop, and Listening Session results provided local accounts of each hazard. 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 Huntington are the following:

- Flooding (100-year and localized),
- Severe snowstorms/ice storms,
- Hurricanes, severe thunderstorms / wind / tornadoes,
- Wildfire,
- Earthquakes,
- Dam failure,
- Drought, and
- Extreme temperatures

Many of these hazards result in similar impacts to a community. For example, hurricanes, tornadoes and severe snowstorms may all cause wind-related damage.

Location

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

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

Extent

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

Previous Occurrences

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

Probability of Future Events

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

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

Impact

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

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

Vulnerability

Sectors Assessed:

A number of key sectors were evaluated as part of the risk assessment for each of the hazards profiled in the sections below. These sectors are introduced here and are included in the hazard profiles where appropriate and where sufficient data allowed.

Vulnerability Assessment Methodology

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

Total value of all property in Huntington (2022): $291,993,260

Median value of an owner-occupied home in Huntington (2020): $222,600

Average household size: 2.41 persons (across roughly 900 households)

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

Populations

Vulnerability of populations is influenced by three factors: exposure or contact with the hazard; sensitivity or degree to which people or communities are affected by the exposure to the hazard; and capacity to adapt or the ability of communities, institutions, or people to adjust and respond to and recover from potential hazards. The major health impacts from natural hazards and climate change include:

- Heat-related illnesses and death from an increase in extreme temperatures and poor air quality (SHMCAP, 2018).
- Increases in food and waterborne illnesses and other infectious diseases from altering geographic and seasonal distributions of existing vectors and vector-borne diseases (SHMCAP, 2018).
- Injuries and accidental premature death associated with extreme weather events. Extreme weather events can result in acute health impacts, such as injuries and accidental premature death during an event (e.g., drowning during floods). In addition, health impacts can also occur during disaster preparation and post-event cleanup. Other impacts include damage to property, destruction of assets, loss of infrastructure and public services, social and economic impacts, environmental degradation, and other factors (SHMCAP, 2018).
- Exacerbation of chronic diseases (SHMCAP, 2018).
- Mental health and stress-related disorders ranging from minimal stress and distress symptoms to clinical disorders such as anxiety, depression, post-traumatic stress, and suicidality. Specific groups of people who are at higher risk for distress and other adverse mental health consequences from exposure to climate-related or weather-related disasters include children, the elderly, women (especially pregnant and post-partum women), people with preexisting mental illness, the economically disadvantaged, the homeless, and

first responders. Populations living in areas most susceptible to specific climate change events are at increased risk for adverse mental health outcomes (SHMCAP, 2018).

In most natural hazard events, the vulnerability of a population is largely dependent on local preparedness and availability of human resources for social services staffing and supplies distribution. While this plan does not aim to recommend specific emergency preparedness and response activities, it should be noted that preparing for emergencies by training a large group of public and professional responders to ensure continuity of operations during a hazard event can be a critical tool for mitigating the overall impacts of any hazard event.

Built Environment

The built environment sector includes all buildings in Huntington including critical facilities owned by the municipality and critical infrastructure sectors that provide or link to key lifeline services, social welfare, and economic development. Assessments were based on assessor's data of the total value of all property in Huntington ($291,993,260 in March 2022 according to MassGIS data), along with the median value of a home in Huntington, which is $222,600 based on median value of owner-occupied housing units, 2020 American Community Survey (ACS). According to the 2020 ACS, the average household size in Huntington is 2.41 persons, and there are approximately 900 households. The critical facilities assessed were derived from the critical facilities inventory as updated by the Town Core Team. The facility types include emergency response services and non-emergency critical infrastructure including transportation facilities, water infrastructure, etc.

Natural Resources and Environment

The natural resources and environment sector includes land-based assets in the city. It also includes key habitats and natural landscapes documented in Huntington's BioMap 2 (Conserving the Biodiversity of Massachusetts in a Changing World) and Areas of Critical Environmental Concern, as well as species identified in the State's Wildlife Action Plan as being present in Huntington.

Economy

Economic impacts include economic loss resulting from damage to critical facilities, the built environment, municipal resources, natural resources, and other sectors. Many sectors of the economy are dependent on the integrity of natural resources. For example, if a major recreation area is damaged beyond repair by a storm, that property will no longer attract tourists and the local economy may experience a loss of revenue from tourism and recreation. Other impacts include loss of businesses that do not return after a major catastrophic event and the loss of property tax revenue that could result from a major loss of homes and/or businesses from a disaster.

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

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

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

Table 4.2: Hazard Identification and Risk Analysis for Huntington

Hazard Identification and Risk Analysis				
Type of Hazard	**Location of Occurrence**	**Probability of Future Events**	**Impact**	**Hazard Risk Index Rating**
Flooding	100 year: Large Localized: Medium	100 year: low Localized: Very High	100 year: Critical Localized: Limited	100-year: 2-High Localized: 1- Very High
Severe Snowstorms/Ice Storms	Large	Very High	Limited	1-Very High
Hurricanes	Large	Moderate	Limited/Critical	2-High
Severe Thunderstorms/ Winds/Tornadoes/ Microbursts	Severe Thunderstorms/ Winds: Large Tornadoes/ Microbursts: Small	Severe Thunderstorms/ Winds: High Tornadoes/ Microbursts: Low	Severe Thunderstorms/ Winds: Limited Tornadoes/ Microbursts: Critical	Severe Thunderstorms/ Winds: 2-High Tornadoes/ Microbursts: 4-Low
Wildfire/Brushfire	Large	Moderate	Limited	4-Low
Earthquakes	Large	Very Low	Catastrophic	4- Low
Dam Failures	Large	Very Low/Low	Catastrophic	1-Very High
Drought	Large	Low	Minor	3- Medium
Extreme Temperatures	Large	Low/moderate	Minor	3-Medium

Top Hazards as Defined in the CRB Workshop

Core team members identified the top four hazards/climate change impacts that Huntington faces, as required for the CRB Workshop. Extensive discussion led to the selection of the following:


Extreme Precipitation/Flooding


Severe Snow and Ice Storms


Drought/Extreme Heat


Severe Storms/Hurricanes

The workshop was designed to bring stakeholders together to brainstorm action items that will result in a more climate resilient future while also supporting the Town's unique features and characteristics. Concerns related to hazardous events such as flooding, severe storms, and snow and ice storms were topics of discussion. Workshop participants cited multiple areas throughout town that experience localized flooding during extreme precipitation events, as well as from ice jams that occur every winter on the Westfield River. Localized flooding is due to culverts unable to handle the additional flow, as well as increased residential development along steep paved and dirt roads that reduce infiltration and redirect stormwater into roadways. They also discussed erosion from dirt roads impacting waterways and road salt possibly impacting drinking water quality. Workshop participants discussed possible improvements to these issues and vulnerabilities.

Workshop participants discussed concerns about the Norwich Pond Dam, which while rated as non-jurisdictional by the state, could cause major damage to many homes and properties if it were to fail, according to many participants. There has been uncertainty about the dam ownership and maintenance responsibility.

There was also discussion about ensuring vulnerable populations have needed supplies if isolated due to flooding or during power outages from severe storms. The primary emergency shelter is Gateway Regional High School, with Stanton Hall also used as a heating/cooling center. Both of these buildings are in the 100-year floodplain, and the need for an alternative sheltering location was identified. It was also brought up that oftentimes residents prefer to stay in their homes rather than go to a shelter. Strategies to support residents sheltering in their homes, such as obtaining funding to upgrade and maintain the Nebs public well (that residents could use during power outages) and to start a community firewood bank were discussed, as well as investigating shelter options in the Norwich Hill area.

Flooding

Hazard Description

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

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

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

The major floods recorded in Western Massachusetts during the 20th century have been the result of rainfall alone, or rainfall combined with snowmelt. Huntington has experienced many flooding events over the last decade. Generally, these small floods have had minor impacts, temporarily impacting roads and residents' yards. However, there have also been some more significant flooding events that have caused damage to homes and properties, and required evacuations. These are detailed on p. 33.

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

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

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

Localized or stormwater flooding occurs during a precipitation event where the rate of rainfall is greater than the capacity of the stormwater management system. This may be due to undersized culverts, poor drainage, topography, high amounts of impervious surfaces, or debris that causes the stormwater system to function below its design standard. In these cases, the stormwater management system becomes overwhelmed, causing water to inundate roadways and properties. In addition, successive storms can saturate the ground, resulting in additional runoff and flooding. The Town has assessed road/stream crossings in order to identify priorities for repair and replacement. Many culverts are undersized and structurally deficient, and in need of replacement. A list of locations with problematic culverts that are prone to flooding is below.

Most stormwater systems in Massachusetts are aging and have been designed with rainfall data that is no longer accurate. Figure 4.5 shows how rainfall during design storms has already increased from 1961 to 2015, especially for the larger 24-hour, 100-year event. These rainfall amounts will continue to increase with climate change, and the Town will need to improve stormwater systems and also increase areas of filtration in order to reduce impacts from localized flooding. Installing green infrastructure or low impact development improvements will help reduce demand on the existing stormwater system by increasing infiltration on-site. Rain gardens, bioswales and pervious pavement are examples of possible strategies. Upsizing culverts with new rainfall data will also be necessary.

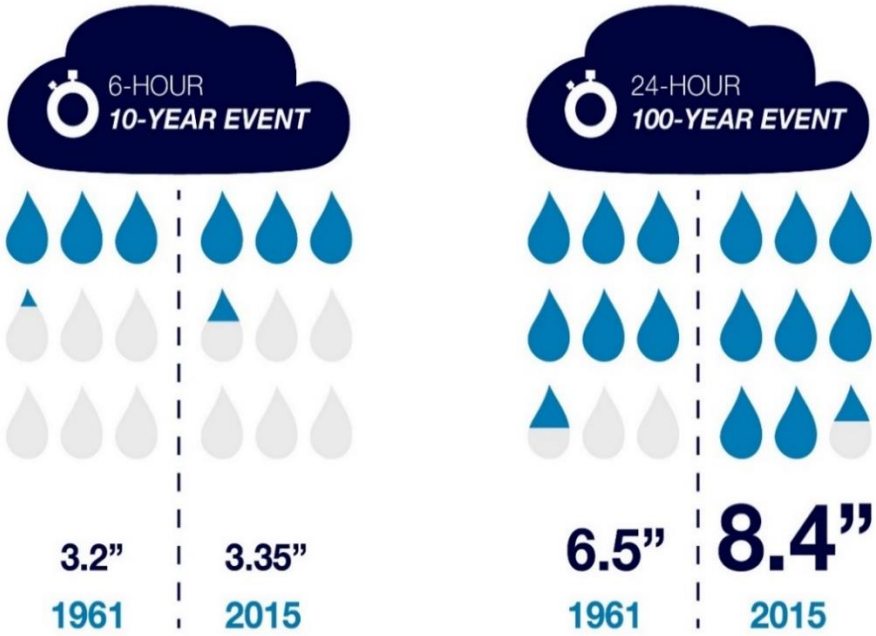


Figure 4.5 Stormwater Design Standards (Source: NOAA TP-40, 1961 and NOAA Atlas Volume 10, 2015)

Location

FEMA Flood Zones

FEMA Flood Insurance Rate Maps (FIRM) designate areas likely to experience flooding. The FIRM delineates both the special flood hazard areas and the risk premium zones under the NFIP. This includes high risk areas that have a one percent chance of being flooded in any year (often referred to as the "100-year floodplain"), which under the NFIP, is linked to mandatory purchase requirements for federally backed mortgage loans. These flood hazard areas within the 100-year floodplain are identified as Special Flood Hazard Areas (SFHAs). The FIRM also identifies moderate to low-risk areas, defined as the area with a 0.2 percent chance of flooding in any year (often referred to as the "500-year floodplain"). The definitions of these flood zones are provided below.

In Huntington, there are several floodplain areas – primarily along the three tributaries (middle, east, west) of the Westfield River. There are some smaller 500-year floodplains mapped as well, in several low-lying areas throughout Huntington. According to 2022 GIS data, there are approximately 13,608 acres of land within the FEMA mapped 100-year floodplain, and 4,094 acres of land within the 500-year floodplain within the Town of Huntington. This includes 6,868 acres of watershed land in Knightville owned by the Army Corps of Engineers that are within the 100-year floodplain, and 2,289 acres within the 500-year floodplain. There are 199 structures located within the SFHA in Huntington.

Areas prone to flooding in a 100-year flood scenario include:

- Old Chester Road
- Upper Russell and Russell Road (Route 20)
- Laurel Road
- Main Street
- Bridge Street
- Littleville Road

National Flood Insurance Program

The National Flood Insurance Program has produced maps that identify floodplains across America. Huntington is a participating member of the National Flood Insurance Program, and has the following NFIP policy and claim statistics as of 12/3/2021:

- Flood Insurance Maps (FIRMs) are used for flood insurance purposes and are on file.
- FIRMs have been effective since July 15, 1978 with no updates since then. New FIRMs are being developed for the Westfield River Watershed, and are anticipated to be released in 2023. With the new rate maps, there will likely be an increase in areas designated as 100-year floodplain and requiring flood insurance for structures located within these floodplains.
- There are 20 policies in effect in Huntington for a total of $4,062,400 worth of flood insurance coverage. There are 18 policies in force for single family dwellings, and 2 policies in force for 2-4 family dwellings.
- As of December 3, 2021, there have been a total of 10 NFIP loss claims in Huntington for which a total $100,995 was paid. There have not been any losses claimed since the previous HMP.
- There are no structures defined as "Repetitive Loss Properties" under the NFIP within Huntington.

The Flood Insurance Rate Maps in Hampshire County are scheduled to be updated by FEMA in the next couple of years. When these maps are updated, the Town of Huntington will adjust its zoning to accommodate changes to the location of floodplains.

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

Flood Insurance Rate Map Zone Definitions

Zone A (1% annual chance or 100-year flood zone): Zone A is the flood insurance rate zone corresponding to the 100-year floodplains that are determined in the Flood Insurance Study (FIS) by approximate methods. Detailed hydraulic analyses are not performed for such areas, therefore, no BFEs (base flood elevations) or depths are shown within this zone. Mandatory flood insurance purchase requirements apply.

Zone AE and A1-A30 (1% annual chance or 100-year flood zone): Zones AE and A1-A30 are the flood insurance rate zones that correspond to the 100-year floodplains that are determined in the FIS by detailed methods. In most instances, BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone. Mandatory flood insurance purchase requirements apply.

Zone X (0.2% annual chance or 500-year flood zone): Zone X is the flood insurance rate zone that corresponds to the 500-year floodplains that are determined in the Flood Insurance Study (FIS) by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no BFEs or depths are shown within this zone.

Source: https://www.fema.gov/flood-zones

Localized Flooding

In addition to the floodplains mapped by FEMA for the 100-year and 500-year flood, Huntington often experiences localized flooding at isolated locations due to drainage issues or problem culverts. The core team members and the participants of the CRB workshops identified many areas of the town that have experienced localized flooding, with a list of these locations below. There are also areas with no record of previous flood incidents that could be affected in the future by heavy rain and runoff. Additionally, some culverts in town are impacted by beavers, so localized flooding can potentially occur at any culvert crossing.

Areas prone to localized flooding due to undersized or blocked culverts include:

- Goss Hill Road
- Nagler Cross Road
- Barr Hill Road
- Kimball Road
- Sampson Road
- County Road
- Bean Hill Road
- Church Road
- Laurel Road – Water Treatment Plant

CRB workshop participants expressed concern that the large number of dirt roads in Huntington exacerbates the impact of localized flooding due to increased runoff and erosion during large rainstorms. Additional houses are being built along dirt roads, which is a trend that is likely to continue. This additional impermeable pavement results in less area for rainfall and runoff to infiltrate, and the resulting increased runoff and erosion can overwhelm the capacity of nearby culverts. This is already occurring in some areas. Many of these dirt roads are steep, which exacerbates these issues. Workshop participants noted that erosion from dirt roads during heavy rainfall events is especially problematic because the sediment blocks drainage areas and can wash into nearby streams, reducing water quality.

Based on these locations, flooding (100-year) has a “large” location of occurrence, with more than 50% percent of the land area affected and localized flooding has a “small” location of occurrence with less than 10% of land area affected.

Extent

Water levels in Huntington’s rivers, streams, and wetlands rise and fall seasonally and during high rainfall events. High water levels are typical in spring, due to snowmelt and ground thaw. This is the period when flood hazards are normally expected. Low water levels occur in summer due to high evaporation and plant uptake (transpiration). At any time, heavy rainfall may create conditions that raise water levels in rivers and streams above bank full stage, which then overflow adjacent lands. Table 4.3 below shows the historical flooding crests, or highest recorded water levels, for the West Branch of the Westfield River from the Huntington gauge.

The West Branch of the Westfield River’s flood stage in Huntington is 9 feet, a height which it has reached 23 times at the gauge in Huntington since 1938. The river’s moderate stage is 11 feet, a height which has been reached 11 times in since 1938. Finally, the river reached its Major Flood Stage of 13

feet 4 times in recorded history. The highest recorded crest was 17.6 feet on 8/28/2011, and the river has reached flood stage or higher 6 times since 2008[3]. The increased amount of strong precipitation events and overall increase in rainfall resulting from climate change will likely result in more flooding in Huntington.

West Branch Westfield River Flood Categories	(Feet)
Major Flood Stage:	13
Moderate Flood Stage:	11
Flood Stage:	9
Action Stage:	8

The National Weather Service maintains water level gauges on the Westfield River in Westfield, downstream of Russell, to monitor flooding. The NWS has various flooding classifications based on water level. These classifications and their definitions are below:

Action Stage - the stage which, when reached by a rising stream, represents the level where the NWS or a partner/user needs to take some type of mitigation action in preparation for possible significant hydrologic activity. The type of action taken varies for each gauge location. Gauge data should be closely monitored by any affected people if the stage is above action stage.

Flood Stage, or Minor Flooding is defined to have minimal or no property damage, but possibly some public threat. A Flood Advisory product is issued to advise the public of flood events that are expected not to exceed the minor flood category.

Moderate Flood Stage is defined to have some inundation of structures and roads near the stream. Some evacuations of people and/or transfer of property to higher elevations may be necessary. A Flood Warning is issued if moderate flooding is expected during the event.

3 https://water.weather.gov/ahps2/river.php?wfo=box&wfoid=18682&riverid=207824&pt%5B%5D=all&pt%5B%5D=153437&allpoints=153437&data%5B%5D=stage&data%5B%5D=vol&data%5B%5D=crests&data%5B%5D=lowflow&data%5B%5D=lowimpacts&data%5B%5D=lowwater

Table 4.3: Historical Crests for the West Branch of the Westfield River

Historical Crests for the West Branch of the Westfield River							
Rank	**Date**	**Height**	**Stage**	**Rank**	**Date**	**Height**	**Stage**
1	08/28/2011	17.6	Major flooding	18	03/22/1999	9.6	Minor flooding
2	09/21/1938	15.5	Major flooding	19	09/29/2011	9.53	Minor flooding
3	08/19/1955	15.27	Major flooding	20	03/08/2008	9.3	Minor flooding
4	10/09/2005	14.33	Major flooding	21	12/12/2008	9.3	Minor flooding
5	03/18/1936	12.95	Moderate Flood	22	11/03/2018	9.13	Minor flooding
6	04/16/2007	12.87	Moderate Flood	23	06/30/1972	9.08	Minor flooding
7	03/21/1980	12.49	Moderate Flood	24	10/24/1990	8.96	Action stage
8	12/31/1949	11.93	Moderate Flood	25	06/06/1992	8.91	Action stage
9	10/20/1990	11.32	Moderate Flood	26	09/18/2004	8.82	Action stage
10	11/26/1951	11.17	Moderate Flood	27	03/29/1993	8.71	Action stage
11	04/04/1987	11.08	Moderate Flood	28	08/10/1976	8.65	Action stage
12	04/03/2005	10.93	Minor flooding	29	04/19/1983	8.63	Action stage
13	05/29/1984	10.78	Minor flooding	30	09/27/1985	8.61	Action stage
14	10/15/1956	10.47	Minor flooding	31	06/06/1982	8.43	Action stage
15	02/20/1981	9.73	Minor flooding	32	12/17/2000	8.32	Action stage
16	12/21/1974	9.69	Minor flooding	33	03/13/1977	8.32	Action stage
17	09/07/2011	9.65	Minor flooding	34	01/09/1978	8.23	Action stage
18	03/22/1999	9.6	Minor flooding	35	06/07/2000	8.22	Action stage

Source: National Weather Service[4]

Major Flood Stage is defined to have extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations are necessary. A Flood Warning is issued if major flooding is expected during the event. For the Westfield River, a Major Flood Stage reading on the Westfield hydrograph would indicate a major threatening event from Montgomery through Huntington down to West Springfield and Agawam.

Previous Occurrences

Huntington has experienced many flooding events over the last few decades. Generally, these small floods have had minor impacts, temporarily impacting roads and residents' yards. However, there have been more significant events that caused damage and required evacuation. In 1987, the Knightville Dam, located on the east branch of the Westfield River, overflowed. Heavy rains fell on a deep snowpack causing rapid melting and run-off and water flowed over its spillway scouring a channel down to bedrock. While the dam prevented more significant flooding from occurring, there was some flood damage, and residents had to evacuate from the area below the dam down to the Route 112 bridge.

[4] NWS, 2020. https://water.weather.gov/ahps2/river.php?wfo=box&wfoid=18682&riverid=205004&pt%5B%5D=145908&allpoints=145908%2C146659&data%5B%5D=impacts&data%5B%5D=stage&data%5B%5D=crests

There was town-wide flooding in 2005 (when water rose 16 feet in 5.5 hours and people had to be rescued from the Knightville Basin and evacuated from their homes), 2006, and 2007 caused significant damage. Flooding that impacted the town in 2007 was very costly due to the necessary road repairs. The Town suffered over $100,000 in damage with some parts of town isolated and some rescues necessary. Two culverts were lost, with repair costs surpassing $90,000.

More recently, in 2011 Hurricane Irene caused widespread flooding in Huntington. Areas that flooded included Old Chester Road, Upper Russell Road, Route 20, Main Street and Federal Street. The CSX railroad had to shut down operations. Contributing to the flooding was the overtopping of several dams in the Sherwood Forest neighborhood in Becket, and that additional floodwater also took out a number of beaver dams, which increased the flow.

Ice jams occur in winter and early spring, when chunks of ice block the flow of a river, and can cause flooding. According to the USACE Ice Jam Database, there were 233 reported ice jams in Massachusetts between 1920 and 2020, with twelve occurring in Huntington and Knightville (part of Huntington).[5] These occurred on the west branch of the Westfield River and on Sykes Brook, and are listed below in Table 3. However, there are also many unreported ice jams. According to Huntington Police Chief Garriepy, ice jams occur every early spring on the west branch of the Westfield River near the Russell town line, and this has caused road flooding a number of times. There has also been flooding on Old Chester Road and Cook Hill Road from ice jams on the west branch of the Westfield River, as well as flooding on Rocky Brook Drive from ice jams on the east branch of the river, and along Route 20 where the three branches of the river come together.

Table 4.4: Reported Ice Jams in Huntington

Reported Ice Jams in Huntington		
Location	**River**	**Jam date**
Huntington	West Branch Westfield River	1/06/2014
Huntington	West Branch Westfield River	1/22/1999
Knightville	Sykes Brook	2/03/1973
Huntington	West Branch Westfield River	12/01/1965
Knightville	Sykes Brook	2/13/1966
Knightville	Sykes Brook	2/25/1965
Knightville	Sykes Brook	1/21/1964
Knightville	Sykes Brook	3/06/1959
Huntington	West Branch Westfield River	1/23/1957
Knightville	Sykes Brook	1/24/1957
Knightville	Sykes Brook	3/09/1942
Huntington	West Branch Westfield River	2/08/1941

USACE Ice Jams Database: https://icejam.sec.usace.army.mil/ords/f?p=101:2::::RP:IR_STATE:MA

[5] https://icejam.sec.usace.army.mil/ords/f?p=101:2::::RP:IR_STATE:MA

Probability of Future Events

Based on previous occurrences, the probability of 100-year flooding in Huntington is "low," with a 1 to 10 percent probability in any given year and the probability of localized flooding is “very high” with a 70 to 100 percent chance of flooding. Flooding frequencies for the various floodplains in Huntington are defined by FEMA as the following:

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

In actuality, flooding occurs more frequently than this because the current FEMA-defined flood zones are based on historical patterns of rainfall intensity and frequency, and do not take into account the impacts that climate change will have on Huntington. In future years, it is likely that the currently designated 10-year, 25-year, 100-year and 500-year floodplains will flood more frequently due to climate change. As mentioned earlier, climate change will increase the frequency and intensity of all storms that can cause flooding. In particular, climate projections indicate that extreme one-day rainfall events will continue to increase, and will be a major cause of flooding. Currently, floods are the costliest natural hazard in the United States, and climate change will only increase this damage.

Impact

The impact of a 100-year flood event would be critical in Huntington. This equates to approximately 25 percent or more of property in affected areas damaged.

To approximate the potential impact to property and people that could be affected by this hazard, the total value of property in town, $291,993,260, is used (Town Assessor’s data). An estimate 25 percent of damage would occur to 25 percent of structures resulting in a total of $18,249,578 worth of damage. The cost repairing or replacing the roads, bridges, utilities and contents of structures is not included in this estimate.

The impact of stormwater or localized flooding in Huntington would be “limited.” This equates to approximately 10 percent or more of property in 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, $291,993,260, is used. An estimated 10 percent of damage would occur to 10 percent of structures, resulting in a total of $2,919,932 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Vulnerability

Based on the above analysis, Huntington faces a vulnerability of "2- High” from 100-year flooding and a “1-Very High” from localized flooding.

While Huntington’s zoning now prohibits or discourages development in the floodplains, much of the town’s historic development occurred in areas prone to flooding. Many of the town’s critical facilities, including the fire station, highway garage, schools, regional health center, water treatment facility,

sewer treatment plant and numerous municipal building are located in flood prone areas and are vulnerable. Depending on the severity and location of flooding, the town's ability to operate could be severely compromised. With the forthcoming revised FEMA flood maps, even more structures and critical facilities may be located in floodplains.

Severe Snowstorms / Ice Storms

Hazard Description

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

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

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

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

Location

The entire town of Huntington is susceptible to severe snowstorms and ice 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.

Areas susceptible to critical snow and ice hazard due to high elevation and steep grades include:

- Goss Hill Road
- Nagler Cross Road
- Bean Hill Road
- Barr Hill Road
- Harlow Clark Road
- County Road
- Pond Brook Road
- Right of Way off Pisgah (owned by the state, but town is currently maintaining it)

Areas that are susceptible to snow drifts include:

- Pisgah Road
- Searles Road
- Pond Brook Road
- County Road
- Tucker Road

- Sampson Road
- Gorham Road
- Goss Hill Road

Extent

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

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

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

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

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.

Large snowstorms, blizzards and ice storms in Massachusetts can range from an inconvenience to extreme events that cause significant impacts and require a large-scale, coordinated response. A list of previous federal disaster declarations during winter weather is shown in Table 4.5 below.

Table 4.5: Federal Disaster Declarations for Winter Weather Affecting Hampshire County

Disaster Name and Date of Event	Disaster Number	Type of Assistance	Counties Under Declaration
Snowstorm December 6-7, 2003	EM-3191	FEMA Public Assistance	Middlesex, Essex, Suffolk, Norfolk, Bristol, Plymouth, Barnstable, Berkshire, **Hampshire,** Hampden, Franklin, Berkshire
Snowstorm January 22 - 23, 2005	EM-3201	FEMA Public Assistance	**All** 14 Massachusetts Counties
Severe Winter Storm and Flooding December 11-18, 2008	DR-1813	FEMA Public Assistance; FEMA Hazard Mitigation Grant Program	**All** 14 Massachusetts Counties
Severe Winter Storm December 11-18, 2008	EM-3296	None	Middlesex, Essex, Suffolk, Bristol, Berkshire, **Hampshire,** Hampden, Franklin, Berkshire
Severe Winter Storm and Snowstorm January 11-12, 2011	DR-1959	FEMA Public Assistance Grant	Middlesex, Essex, Suffolk, Norfolk, **Hampshire**, Hampden, Berkshire
Snowstorm October 29-30, 2011	DR-4051	FEMA Public Assistance	Middlesex, Worcester, **Hampshire**, Hampden, Franklin, Berkshire
Severe Winter Storm, Snowstorm, and Flooding February 8-9, 2013	DR-4110	FEMA Public Assistance	**All** 14 Massachusetts Counties

The Hazard Mitigation Committee identified the following as storms that have impacted Huntington in recent history:

- October 29-30, 2011- Heavy snowfall that fell before trees had lost their leaves caused major power outages across Western Massachusetts. Parts of Huntington were without power for days.
- Winter of 2014- Repeated large snowfalls made snow clearing difficult.
- Winters of 2017 and 2021 – Large snowfalls made snow clearing difficult.

Based on data available from the National Oceanic and Atmospheric Administration, there are 14 winter storms in the Pioneer Valley between 2010 and 2021 that have registered on the NESIS scale and resulted in snowfalls of at least 10 inches. These storms are listed in the table below in order of their NESIS severity.

Winter Storms Producing Over 10 inches of Snow in the Pioneer Valley, 2010 -2021			
Date	**NESIS Value**	**NASIS Category**	**NESIS Classification**
2/23/2010	5.46	3	Major
1/29/2015	5.42	3	Major
1/9/2011	5.31	3	Major
2/11/2014	5.28	3	Major
3/12/2017	5.03	3	Major

Winter Storms Producing Over 10 inches of Snow in the Pioneer Valley, 2010 -2021			
1/31/2021	4.93	3	Major
2/7/2013	4.35	3	Major
3/5/2018	3.45	2	Significant
3/4/2013	3.05	2	Significant
1/25/2015	2.62	2	Significant
3/11/2018	3.16	2	Significant
10/29/2011	1.75	1	Notable
1/3/2018	1.65	1	Notable
2/8/2015	1.32	1	Notable

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

Probability of Future Events

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

Impact

The impact of an event would be “limited,” with between 10 and 25 percent of property in the affected area damaged. To approximate the potential impact to property and people that could be affected by this hazard, the total value of all property in town, $291,993,260, is used.

An estimated 25 percent of damage would occur to 10 percent of structures, resulting in a total of $7,299,831 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Vulnerability

Based on the above assessment, Huntington faces a "1-Very High" vulnerability from severe snowstorms and ice storms. Based on local knowledge and expertise of the Core Team, ice storms are expected to cause greater damage than severe snow.

The entire town is vulnerable to the impacts of severe snow and ice. The town’s energy and communication infrastructure could be vulnerable to heavy snow or ice, which has been known to cause power outages across the region. Ice buildup on roadways and the steep grades and winding nature of rural roads in town can decrease visibility in a snow event, making winter travel difficult.

Hurricanes / Tropical Storms

Hazard Description

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

Location

Because of the hazard's regional nature, all of Huntington is at risk from hurricanes and tropical storms, meaning the location of occurrence is "large," with over 50 percent of land area affected. Ridge tops are more susceptible to wind damage. (See flooding location for areas that could be most impacted by the flooding from rainfall.)

Extent

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

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

Source: National Hurricane Center, 2012

Previous Occurrences

Hurricanes that have affected Huntington and the rest of the Pioneer Valley are shown in the following table.

Major Hurricanes and Tropical Storms Affecting Huntington		
Hurricane/Storm Name	**Year**	**Saffir/Simpson Category (when reached MA)**
Great Hurricane of 1938	1938	3

Great Atlantic Hurricane	1944	1
Carol	1954	3
Edna	1954	1
Diane	1955	Tropical Storm
Donna	1960	Unclear, 1 or 2
Groundhog Day Gale	1976	Not Applicable
Gloria	1985	1
Bob	1991	2
Floyd	1999	Tropical Storm
Irene	2011	Tropical Storm
Sandy	2012	Super Storm
Henri	2021	Tropical Storm

Source: National Hurricane Center, 2021

While Hurricane Able (1952) and Hurricane Doria (1971) both tracked directly through Huntington, they did not cause any significant damage to Huntington and thus are not listed in the above table. The Great Hurricane of 1938, cause widespread wind and flooding damage across New England and Huntington. Most recently, in 2011 Hurricane Irene caused significant flooding in Huntington.

Probability of Future Events

Huntington's location in Western Massachusetts reduces the risk of extremely high winds that are associated with hurricanes and tropical storms, although the Town can experience some high wind events. Based upon past occurrences, it is reasonable to say that there is a "moderate" probability of hurricanes or tropical storms, or a 10 to 40 percent probability in any given year.

Climate Change Impacts

According to the NOAA, a review of existing studies, including studies conducted as recently as 2020, lead to the conclusion that "it is likely that greenhouse warming will cause hurricanes in the coming century to be more intense globally and have higher rainfall rates than present-day hurricanes". The NOAA further concludes that "it is likely that climate warming will cause Atlantic hurricanes in the coming century to have higher rainfall rates than present-day hurricanes, and medium confidence that they will be more intense (higher peak winds and lower central pressures) on average." (NOAA, https://www.gfdl.noaa.gov/global-warming-and-hurricanes/)

Impact

A description of the damages that could occur due to a hurricane is described by the Saffir-Simpson scale, as shown in the table 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 (Texas, 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 (Florida, 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 (Gulf Coast, 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 (Florida, 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 (Bahamas and Florida, 1992).	157+

The Town of Huntington faces a “Limited” impact from hurricanes, with between 10 and 25 percent of property in the affected area damaged.

To approximate the potential impact to property and people that could be affected by this hazard, the total value of all property in town, $291,993,260 is used. Wind damage of 10 percent affecting 5 percent of structures would result in an estimated $1,459,966 of damage. Estimated flood damage to 10 percent of the structures with 20 percent damage to each structure would result in $5,839,865 of

damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Vulnerability

Based on the above analysis, Huntington faces a "2-High" vulnerability from hurricanes and tropical storms.

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

Severe Thunderstorms / Wind / Tornadoes/Microbursts

Hazard Description

A thunderstorm is a storm with lightning and thunder produced by cumulonimbus clouds, 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 are sudden downdrafts of air that hit the ground and disperse outwards. Microbursts most commonly occur during strong thunderstorms. The scale and suddenness of microbursts make them difficult to predict with certainty, but it is possible to forecast the conditions that make microbursts much more likely. The high winds associated with microbursts can knock over full-grown trees, damage buildings and are especially problematic for aircrafts.

Location

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

Extent

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

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

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

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

Source: National Weather Service

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	Teacup
4.00	Grapefruit
4.50	Softball

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

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 State Hazard Mitigation and Climate Adaptation Plan, there are approximately 10 to 30 days of thunderstorm activity in the state each year. Most events occur in the late afternoon and evening hours, when the warm air at the ground level rises to meet the cooler air in the atmosphere, causing instability. The most common months are June, July, and August, but the Great Barrington, MA tornado (1995) occurred in May and the Windsor Locks, CT tornado (1979) occurred in October.

Within Massachusetts, tornadoes have occurred most frequently in Worcester County and in communities west of Worcester. In 2011, a tornado ranked F3 (Severe Damage) on the Fujita Scale of Tornado Intensity, blew through the towns of West Springfield, Westfield, Springfield, Monson, Brimfield, Sturbridge, and Southbridge. The tornado and related storm killed 3 people and resulted in hundreds of injuries across the state. Nine incidents of tornado activity (F3 or less) have occurred in Hampshire County since 1954 and no known tornadoes have touched down in Huntington.

On average, since 1993, there have been between 5-6 severe thunderstorms per year (defined as with winds over 50 miles per hour) in the region around Huntington. In 2008 there was a micro-burst along Bromley Road in Huntington. A possible tornado occurred in September 2021, in which multiples trees were blown down, including one that crushed a car.

According to the Core Team, power outages due to high wind events and branches falling on wires have become more frequent in town. Bromley Road in particular has frequent outages. Generally, these outages last for a few hours, and not for more than a day. The longest outage was about 2 days during the October snowstorm in 2011. Recently Eversource changed circuits and replaced wires to address these frequent outages, and is undertaking large scale trimming of branches on about 800 trees.

Probability of Future Events

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

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

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

Based upon the available historical record, the estimated probability of a tornado or microburst in Huntington is "very low," or less than 1 percent in any given year. As per the Massachusetts State Hazard Mitigation and Climate Adaptation Plan, there are approximately 10 to 30 days of thunderstorm activity in the state each year. Thus, there is a “moderate” probability (10 percent to 40 percent change in any given year) of a severe thunderstorm or winds affecting the town.

Climate Change Impacts

There is evidence that rising temperatures will increase convective available potential energy (CAPE) which is one of the two ingredients needed for severe thunderstorms. The other is strong wind shear. It is projected that by warming the surface and putting more evaporation in the air CAPE will increase providing more raw fuel to produce rain and hail, and vertical wind shear, resulting in an increased amount of severe thunderstorm activity (NASA, 2021).

Impact

Overall, the Town of Huntington faces a “limited” impact from severe thunderstorms or winds, with 10 percent or more of the town affected and a “critical” impact from tornadoes and microburst, with 10 to 40 percent of the town affected. The potential for locally catastrophic damage is a factor in any severe weather event. In Huntington, 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 12, Design Wind Speed Codes, because most of the town’s housing was built before the first edition of the Massachusetts State Building Code went into effect on January 1, 1975.

To approximate the potential impact to property and people that could be affected by severe weather, tornado, or wind, the total value of all property in town, $291,993,260 is used. An estimated 100 percent of damage would occur to 1 percent of structures, resulting in a total of $2,919,932 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Vulnerability

Based on the above assessment, Huntington has a vulnerability of "2-High" from severe thunderstorms and wind, and a “4-low” vulnerability from tornadoes and microbursts.

The entire town would be vulnerable to the destruction caused by severe thunderstorms, wind and tornadoes. The vulnerabilities associated with flooding could be present if substantial rain accompanies severe thunderstorms. Additionally high winds could impact the town’s communication and energy infrastructure and old buildings.

Wildfire / Brushfire

Hazard Description

Wildfires are typically larger fires, involving full-sized trees as well as meadows and scrublands. Brushfires are uncontrolled fires that occur in meadows and scrublands, but do not involve full-sized trees. Both wildfires and brushfires can consume homes, other buildings and/or agricultural resources. Typical causes of brushfires and wildfires are lightning strikes, human activity or an "intentional burn," as in the case of a prescribed fire. Fires in neighboring Russell and Montgomery on Mt. Tekoa have likely been caused by sparks from trains igniting dry vegetation nearby.

FEMA has classifications for 3 different classes of wildfires:

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

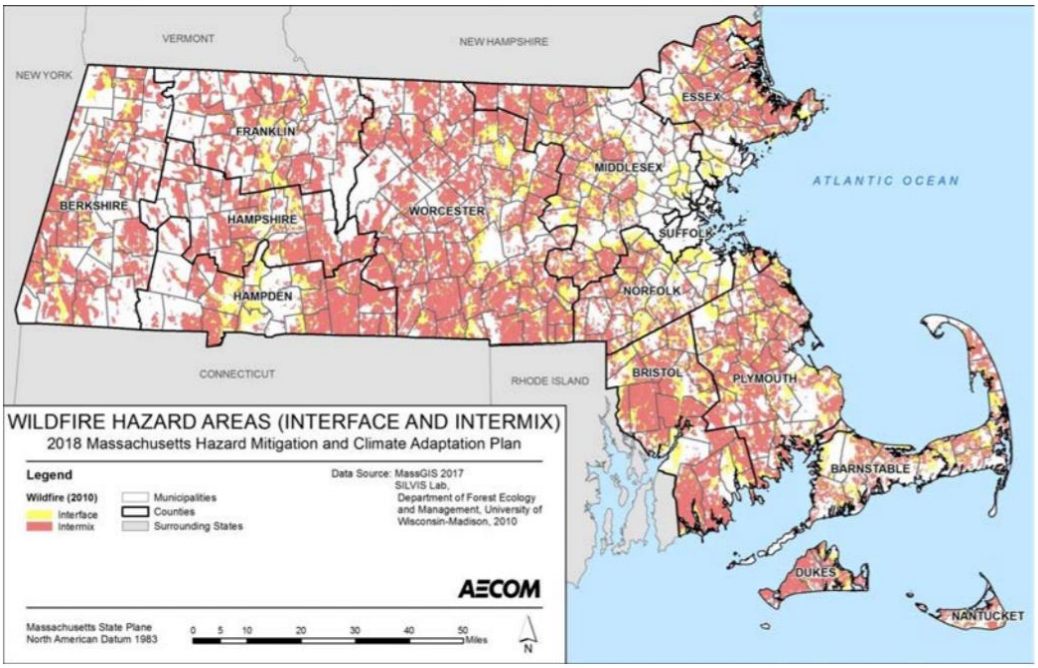
Location

The State Hazard Mitigation and Climate Adaptation Plan (EEA and EOPPS, 2018) states:

> Portions of the Commonwealth susceptible to wildfire, particularly at the urban-wildland interface…, are defined as 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 500 hectares (approximately 202 acres) that is more than 75 percent vegetated."

Figure 4.6 below shows wildland-urban interface and hazard areas in the state. Much of the southern half of Huntington is in a wildfire hazard area. The areas of Huntington most vulnerable to brush fire are primarily heavily wooded areas and forests directly adjacent to developed areas. Approximately 84% of Huntington is forested and therefore at risk of fire, as well as developed areas adjacent to forest. The location of occurrence is "large," with more than 50 percent of land area affected.

Figure 4.6: Wildland-Urban Interface and Hazard Areas in Massachusetts



Source: Massachusetts State Hazard Mitigation and Climate Adaptation Plan

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 Huntington, 84 percent of the land 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 Massachusetts. Nevertheless, in drought conditions, a brushfire or wildfire would be a matter of concern. A large wildfire could damage a significant swath of Huntington's landscape. Based on major wildfires that have occurred in Western Massachusetts, it is estimated that such a fire would likely destroy around 50 to 500 acres of forested area.

Previous Occurrences

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

- 1995 – Russell, 500 acres burned on Mt. Tekoa
- 1999 – Russell, 1200 acres burned on Mt. Tekoa
- 2000 – South Hadley, 310 acres burned over 14 days in the Lithia Springs Watershed
- 2001 – Ware, 400 acres burned
- 2010 – Russell, 320 acres burned on Mt. Tekoa
- 2012 – Eastern Hampden County, dry conditions and wind gusts created a brush fire in Brimfield, and burned 50 acres
- 2016 –Montgomery, 60 acres burned on Mt. Tekoa

- 2019 – Russell and Montgomery, 200 acres burned on Mt. Tekoa

Three wildfires have occurred in Huntington in recent history. In 2001, a wildfire burned for one day in town. More recent events include the Pisgah Fire (2015), which burned 60-70 acres of land and the Knightville Fire (2015), which burned less than 5 acres of land. Sparks from trains grinding on tracks has been an issue lately as in dry conditions, they can spark fires. Chester, a neighboring town has also recently identified this is an issue, and it is also likely that it was the cause of the most recent wildfire on Mt. Tekoa.

The following fire incidents have been reported in Huntington in the past. This data includes structural fires, brush fires, car fires, etc.

Total Fire Incidents in Huntington	
2009	11
2010	14
2011	16
2012	20
2013	11
2014	6
2015	25
2016	0
2017	10
2018	7
2019	5

Source: Massachusetts Fire Incidence Reporting System, County Profiles, 2019 Fire Data Analysis

According to the Fire Department there have been 10 unauthorized burns a year on average for the past three years. There were 176 burn permits issued in 2021, and there will likely be as many or more permits issued for 2022. Since the Covid-19 pandemic began the permitting process has been done through email, which has resulted in more people applying for permits since they do not have to apply in person at certain times, according to the Fire Chief. The Fire Department also emails the burning safety regulations with the permission to burn. According to the Fire Chief, this process has resulted in decreased reports of illegal burning during the open burning season. Most brush fires have been outside of the burning season of January 15th to May 1st.[6]

Probability of Future Events

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

[6] Personal communication with Josh Ellinger, Fire Chief on 3/27/2022

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

Huntington faces a "limited" impact from wildfires, with minimal damage anticipated in such an event. To approximate the potential impact to property and people that could be affected by this hazard, the total value of all property in town, $291,993,260 is used.

An estimated 100 percent of damage would occur to 1 percent of structures, resulting in a total of $2,919,932 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Vulnerability

Based on the above assessment, Huntington faces a "4-low" vulnerability from wildfire and brushfires.

Given that 84% of Huntington is forested, the entire town is vulnerable to wildfires. Depending on where the burn was to happen different critical facilities or evacuation routes, as well as residents, could be impacted.

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.[7] 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.[8]

Location

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

Extent

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

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

Source: US Geological Survey

[7] Northeast States Emergency Consortium Web site: *www.nesec.org/hazards/earthquakes.cfm.*

[8] Federal Emergency Management Agency Web site: *www.fema.gov/hazards/earthquakes/quake.shtm.*

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

Source: US Federal Emergency Management Agency

Previous Occurrences

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

Largest Earthquakes in region 1924 – 2021		
Location	**Date**	**Magnitude**
Ossipee, NH	December 20, 1940	5.5
Ossipee, NH	December 24, 1940	5.5
Dover-Foxcroft, ME	December 28, 1947	4.5
Kingston, RI	June 10, 1951	4.6
Portland, ME	April 26, 1957	4.7
Middlebury, VT	April 10, 1962	4.2
Near NH Quebec Border, NH	June 15, 1973	4.8

West of Laconia, NH	Jan. 19, 1982	4.5
Plattsburg, NY	April 20, 2002	5.1
Bar Harbor, NH	October 3, 2006	4.2
Hollis Center, ME	October 16, 2012	4.6
New Bedford, MA	November 8, 2020	3.6

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

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

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

Probability of Future Events

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

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

Based upon existing records, there is a “very low” frequency of earthquakes in Huntington, 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.

Huntington faces a “critical” impact from earthquakes, with more than 25% of property expected to be 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, $291,993,260 is used. An estimated 50% percent of damage would occur to 25 percent of structures, resulting in a total of $36,499,157 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, Huntington maintains a "4- Low" vulnerability from earthquakes.

Older buildings are particularly vulnerable to earthquakes because their construction pre-dates building codes that included strong seismic consideration. A loss of historic buildings could represent a loss of Huntington’s history and culture and a loss of the critical facilities in town could impede the town’s ability to operate. The town’s identified evacuation routes contain bridges, which may not be able to function if a strong earthquake were to hit.

Dam Failure

Hazard Description

Dams and levees and their associated impoundments provide many benefits to a community, such as water supply, recreation, hydroelectric power generation, and flood control. However, they also pose a potential risk to lives and property. Dam or levee failure is not a common occurrence, but dams do represent a potentially disastrous hazard. When a dam or levee fails, the potential energy of the stored water behind the dam is released rapidly. Most dam or levee failures occur when floodwaters above overtop and erode the material components of the dam. Often dam or levee breaches lead to catastrophic consequences as the water rushes in a torrent downstream to flood 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. There are three dams located within Huntington's boundaries. Two of the dams, Littleville and Knightville Dams, were built by the US Army Corps of Engineers to reduce the risk of flood damages to cities downstream and along the main stem of the Connecticut River, including Springfield and Hartford. Knightville Dam was completed in 1941 and provides flood protection, and Littleville Dam was completed in 1965 for flood control as well as backup drinking water supply for the City of Springfield. The Dam also created Littleville Lake, which is used for boating and fishing.[9]

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

Location

There are three dams located within Huntington's boundaries, and one beyond Town boundaries in Becket that can significantly affect Huntington. The location of occurrence for a dam failure has been determined to be "Large," with more than 50 percent of land area affected.

Table 4.6: Dams in or affecting Huntington

Dam	Hazard Level	Owner	Condition
Littleville Dam	High Hazard	USACE	Unknown
Knightville Dam	High Hazard	USACE	Unknown
Norwich Pond Dam	Non-Jurisdictional	Possibly State (Dam on Great Pond), Previously private	Unknown
Robin Hood Lake Dam, Becket	Significant	Private	Fair

[9] https://www.nae.usace.army.mil/Missions/Civil-Works/Flood-Risk-Management/Massachusetts

Extent

Dam or levee breaches can lead to catastrophic consequences when floodwaters inundate areas downstream. The number of casualties and the amount of property damage will depend upon the timing of the warning provided to downstream residents, the number of people living or working in the inundation area, and the number of structures in the inundation area.

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

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

As of February 2017, all dams classified as a high hazard potential or a significant hazard potential are required to have an Emergency Action Plan (EAP) (DCR, 2019a). This plan must be updated annually and submitted to the DCR Commissioner and the Massachusetts Emergency Management Agency. The plan should also be retained by the dam owner and the City or Town in which the dam is located. Guidelines and a template were established by the Office of Dam Safety to ensure that all EAPs follow the proper format.

Both Littleville and Knightville Dams are owned and managed by the US Army Corps of Engineers (USACE), a federal agency. Federal records for both dams provide the following information on dam safety and risk management:

- The EAP for Littleville Dam was last revised on 9/20/2019, and the most recent EAP exercise date was 9/20/2018. Huntington town officials were involved with the exercise. Emergency contacts were last updated on 8/12/2020. The most recent inspection date was 11/01/2017, and the inspection frequency is every 5 years.
- The EAP for the Knightville Dam was last revised 07/01/2013, and the most recent EAP exercise date was 9/20/2018. Huntington town officials were involved with the exercise. Emergency contacts were last updated on 8/12/2020. The most recent inspection date was 05/14/2018, and the inspection frequency is every 5 years.

According to Police Chief Garriepy, the USACE communicates regularly about impending storms and large rainfall events, and also provides inundation maps annually (these are also available online). While the inspection reports are considered classified and the condition of the dams is unknown, there is regular maintenance of the dams, including extensive repairs in 2020.

The Norwich Pond Dam was previously owned by the Massassoit Paper Company, and until recently was still believed to be privately owned, with the owners unknown. However, title research conducted with District Local Technical Assistance through PVPC in 2010 concluded that the dam is the property of the Commonwealth of Massachusetts, due to the lake's status as a Great Pond. According to the Core

Team, the dam is maintained by one of the nearby property owners, however the condition of the dam is unknown. While the hazard rating is not listed, it is likely significant or high as there would be major damage below the dam if it failed. This would include damage to Gateway Regional High School, Route 112, and many homes, possibly affecting the entire area from Knightville to the center of town. There are also a number of beaver dams below the Norwich Pond Dam that would add to flooding if the dam were to fail.

The Robin Hood Lake Dam in Becket would also affect Huntington if it were to fail. There was flooding and damage in Huntington in 2011 when the waters overtopped the dam due to rainfall from Hurricane Irene, and took out a number of beaver dams as well. The dam is on the West Branch of Walker Brook and is owned by the Sherwood Forest Neighbors Association.

Previous Occurrences

To date, there have been no dam or levee failures in Huntington. However, in addition to the flooding that overtopped Robin Hood Dam as mentioned above, there was also a flood in Huntington and communities south in 1987, when waters overtopped the Knightville Dam and flowed over its spillway.

Probability of Future Events

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

As described in the Massachusetts State Hazard Mitigation and Climate Adaptation 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. Due to projected increases in precipitation and severe storms from climate change, the probability of design failures of dams may increase as well.

Climate change may indirectly affect dam breaches for a variety of reasons. Dams are typically designed based on historic water flows and known hydrology. Climate change projections indicate that the frequency, intensity, and amount of precipitation will increase in New England. This anticipated increase in precipitation may push dams over capacity, placing additional stress on dam infrastructure. Therefore, continuing and enhancing dam monitoring will be crucial to maintaining safe dam conditions. There are several mechanisms in place to manage increased volume in water bodies, such as slowly releasing impounded water at scheduled intervals. It is advised that these controlled events are monitored closely as they can add additional stress on the dam infrastructure.

Impact

The impact from a dam failure in Huntington is ranked as “catastrophic,” with more than 50 percent of property in the affected area damaged or destroyed. To approximate the potential impact to property and people that could be affected by this hazard, the total value of all property in town, $291,993,260 is used. An estimated 100 percent of damage would occur to 10 percent of structures, resulting in a total of $29,199,326 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, Huntington has a "1- Very High" vulnerability from dam or levee failure.

If the Littleville Dam were to fail, there could be serious damage to the town of Huntington. Approximately 100 homes, the Gateway Regional Middle School and High School, Littleville Elementary School, Town Hall, 20 historic structures, 13 business and major transportation facilities (Route 20 and Route 112) are all located in the dam’s inundation zone. The Littleville Dam also functions as a back-up water supply for the town of Springfield, thus a failure could impact that city’s water supply. There would also be serious damage to the Town of Huntington if the Knightville Dam were to fail. The US Army Corps of Engineers has conducted risk assessments for both the Littleville and Knightville dams. Tables 4.7 and 4.8 below show the number of people at risk during both the daytime and nighttime, the economic cost, and the buildings at risk (for Knightville only) for various water level and breach scenarios.

Table 4.7: Littleville Dam Risk Assessment

Risk Scenario	Pool Elevation in Feet	People at risk - Daytime	People at Risk - Nighttime	Economic Cost
Security Scenario - Breach	535.5	5,559	8,177	$374,282,207
Top of Storage Pool - Breach	575.4	13,967	16,669	$1,013,100,944
Maximum High Pool - Breach	594.5	19,131	21,505	$2,459,995,965
Maximum High Pool – Non- Breach	594.5	14,587	16,988	$1,372,772,947
Normal High Pool - Breach	520.8	3,876	5,606	$212,538,541
Normal Low Pool - Breach	517.7	3,385	4,923	$180,272,962

Source: https://nid.sec.usace.army.mil/#/dams/system/550340/risk

Table 4.8: Knightville Dam Risk Assessment

Risk Scenario	Pool Elevation in Feet	People at risk - Daytime	People at Risk - Nighttime	Buildings at Risk	Economic Cost
Security Scenario - Breach	546.2	2,462	3,626	1,007	$178,416,785
Top of Storage Pool - Breach	609.4	12,783	17,120	5,242	$2,403,736,928

Maximum High Pool - Breach	629.4	24,056	28,400	8,100	$3,435,296,348
Maximum High Pool – Non- Breach	629.4	20,092	22,329	6,087	$1,425,369,520
Normal High Pool - Breach	515.3	152	260	94	$4,977,689

Source: https://nid.sec.usace.army.mil/#/dams/system/550426/risk

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. Climate change is increasing the frequency and length of droughts, and although this impact is seen more significantly in the western US, it is impacting Massachusetts as well. Changes in precipitation patterns will result in longer periods of dry days in the summer and fall, as well as increased rainfall events that result in increased runoff and reduced infiltration of rainwater and replenishment of groundwater.

Location

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

Extent

The severity of a drought would determine the scale of the event and would vary among town residents depending on whether the residents' water supply is derived from a private well or the public water system. Zone II wellhead protection areas for public water supplies are defined as an area of an aquifer that "contributes water to a well under the most severe pumping and recharge conditions that can be realistically anticipated (180 days of pumping at safe yield, with no recharge from precipitation)."[10] 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. The U.S. Drought Monitor categorizes drought on a D0-D4 scale as shown below.

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

[10] https://www.mass.gov/info-details/massgis-data-massdep-wellhead-protection-areas-zone-ii-zone-i-iwpa#:~:text=As%20stated%20in%20310%20CMR,with%20no%20recharge%20from%20precipitation).

D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies

Source: https://droughtmonitor.unl.edu/About/AbouttheData/DroughtClassification.aspx

Previous Occurrences

In Massachusetts, five major droughts have occurred statewide since 1930, as well as seven less severe droughts.[11] They range in severity and length, from three to eight years. In many of these droughts, water-supply systems were found to be inadequate. Water was piped into urban areas, and water-supply systems were modified to permit withdrawals at lower water levels. The following table indicates previous occurrences of drought since 2000, based on the US Drought Monitor:

Annual Drought Classification Status in Massachusetts	
Year	**Maximum Severity**
2000	No drought
2001	D2 conditions in 21% of state
2002	D2 conditions in 99% of state
2003	No drought
2004	D0 conditions in 44% of state
2005	D1 conditions in 7% of state
2006	D0 conditions in 98% of state
2007	D1 conditions in 71% of state
2008	D0 conditions in 57% of state
2009	D0 conditions in 44% of state
2010	D1 conditions in 27% of state
2011	D0 conditions in 0.01% of state
2012	D2 conditions in 51% of state
2013	D1 conditions in 60%, D0 in 99.9% of state
2014	D1 conditions in 26%, D0 in 99.99% of state
2015	D1 conditions in 72%, D0 in 100 % of state
2016	D3 conditions in 52%, D2 in 90%, D1 in 98%, D0 in 100% of state
2017	D3 conditions in 9%, D2 in 69%, D1 in 98%, D0 in 99% of state
2018	D1 conditions in 36%, D0 in 85% of state
2019	D0 in 85% of state
2020	D3 conditions in 37%, D2 in 83%, D1 in 96%, D0 in 100% of state

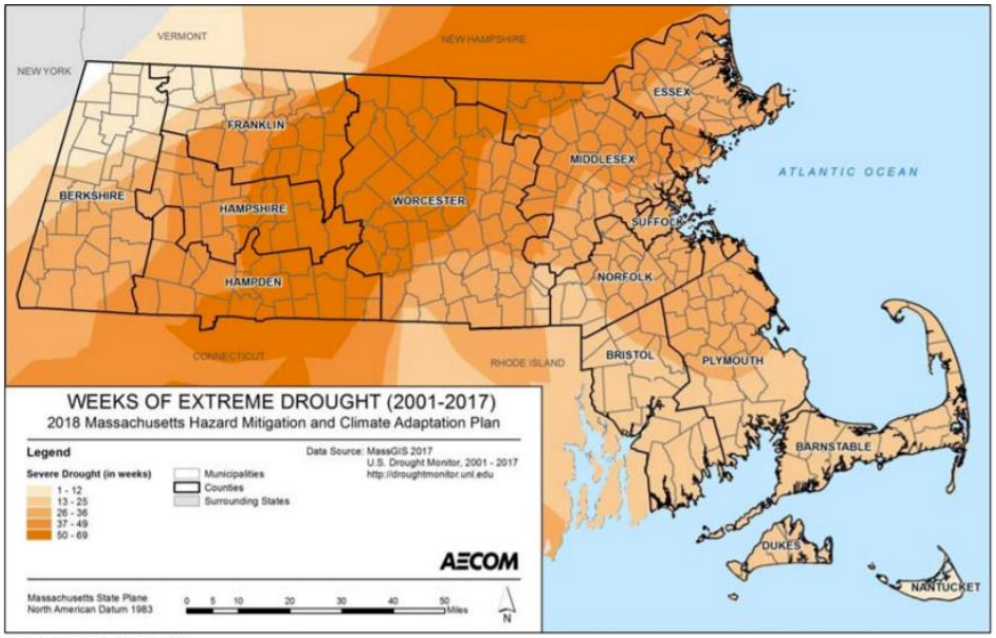
Source: US Drought Monitor

Huntington has had limited experience with severe drought conditions in the past, although this is changing as drought conditions related to climate change become more frequent. According to the Massachusetts SHMCAP, between 2001 and 2017 the Town experienced up to 69 weeks of Severe Drought and 14 weeks of Extreme Drought, almost as many weeks as any other municipality in the State as classified by the U.S. Drought Monitor. As can be seen in the two figures below, much of

[11] Massachusetts Drought Management Plan, 2019. Massachusetts Executive Office of Energy and Environmental Affairs and Massachusetts Emergency Management Agency.

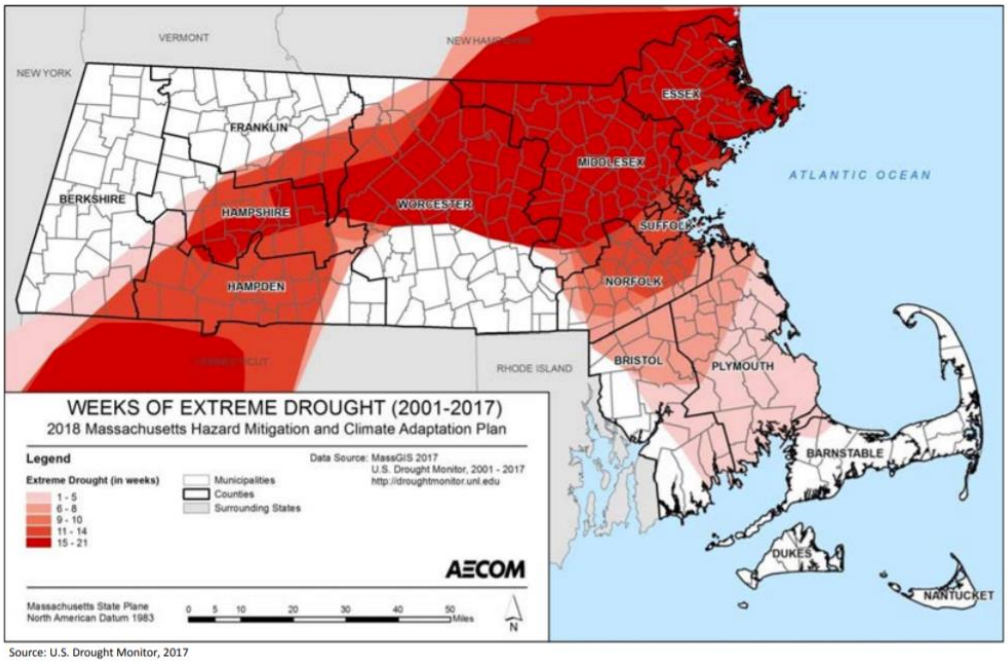
Hampshire County, including Huntington, experienced both severe and extreme drought conditions between 2001 and 2017. Huntington experienced extreme drought conditions again in 2020.

Figure 4.7: Weeks of Severe Drought in Massachusetts (2001-2017)



Source: U.S. Drought Monitor, 2017

Figure 4.8: Weeks of Extreme Drought in Massachusetts (2001-2017)



Source: U.S. Drought Monitor, 2017

Huntington has not been significantly impacted by these recent droughts, or by the drought in 2020. However, there have been a small number of cases of shallow wells running low. One homeowner had to drill a deeper well in 2020 when their shallow well ran dry, according to the Huntington Board of Health. With about two-thirds of the town relying on private wells for drinking water, occurrences such as this one are likely to increase in the future as the risk of drought increases due to climate change.

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, and infrastructure, may affect the severity and length of a drought event. Due to climate change, projected higher average temperatures combined with the likelihood of increased consecutive days without precipitation in summer and fall, the probability of droughts will increase.

In Huntington, a severe drought has a "very low" probability of future occurrence, or less than 1 percent in any given year.

Impact

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

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

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

Vulnerability

Based on the above assessment, Huntington has a vulnerability of "4-Low” from drought.
While such a drought would require water saving measures to be implemented, there would be no foreseeable damage to structures or loss of life resulting from the hazard.

Extreme Temperatures

Hazard Description

Massachusetts has four clearly defined seasons. Extreme temperatures are considered outliers, or temperatures that fall outside the typical range for each season. Extreme temperatures can last from an afternoon to a few days. Day and nighttime temperature fluctuations also factor into the overall effects of temperature. For example, when the temperature does not cool off at night during an extreme heat wave, the risk of heat related illnesses is intensified.

Extreme Cold

Extreme cold does not have a threshold temperature, but rather is defined as prolonged periods of excessively cold weather. This may vary by region based on average temperatures in the region. In Massachusetts, where temperatures regularly go below freezing during winter months, the community is often used to these temperatures. However, this does not lessen the risk. Extremely cold temperatures can create dangerous conditions for homeless populations, stranded travelers, and residents without sufficient insulation or heat in their homes. The homeless, the elderly, and people with disabilities are often most vulnerable. In Huntington, 18.1% of the population is over 65 years old and 12% of the population has a disability (American Community Survey, 2019). Cold weather events can also have significant health impacts such as frostbite and hypothermia. Furthermore, power outages during cold weather may result in inappropriate use of combustion heaters, cooking appliances, and generators in poorly ventilated areas, which can lead to increased risk of carbon monoxide poisoning. During extreme cold, pipes may freeze and burst in many buildings with unreinforced masonry.

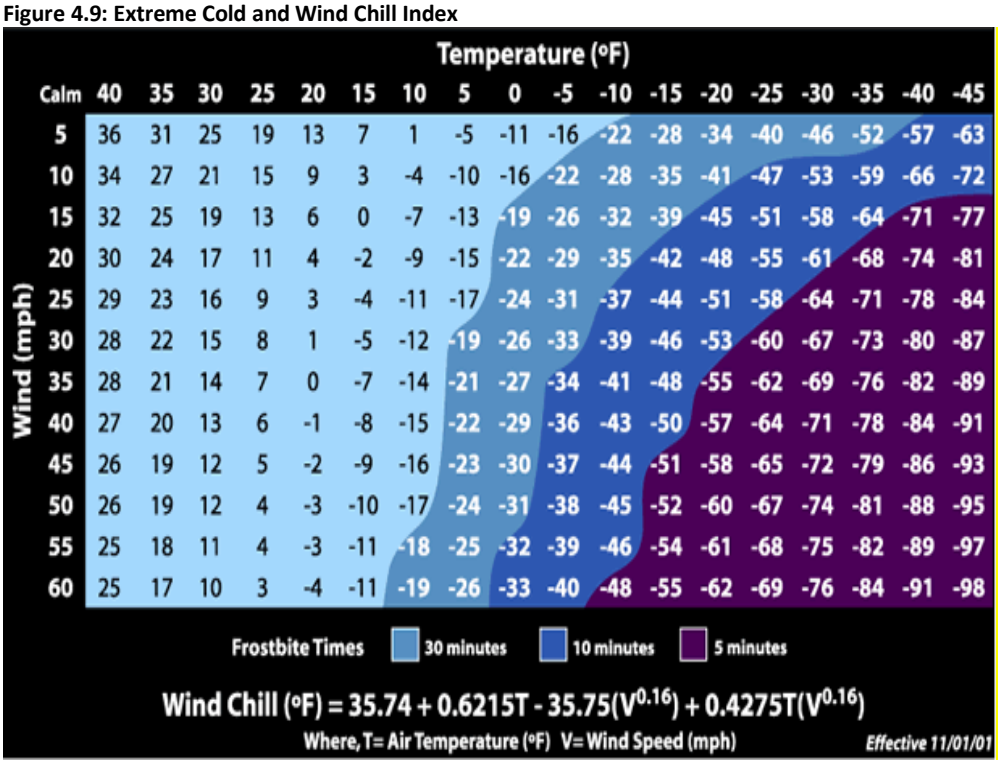
Extent

Extremely cold temperatures are measured using the Wind Chill Temperature Index provided by the National Weather Service (NWS). The updated index was implemented in 2001 and helps explain the impact of cold temperatures on unexposed skin. Figure 4.9 below provides more information. According to NOAA's National Centers for Environmental Information Storm Events Database records data for extreme cold events, between 2000 and September 2020, Massachusetts experienced 20 extreme cold and wind chill events. None of these events were reported for Hampshire County, however.[12]

12

https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28Z%29+Extreme+Cold%2FWind+Chill&beginDate_mm=11&beginDate_dd=01&beginDate_yyyy=1999&endDate_mm=11&endDate_dd=30&endDate_yyyy=2021&county=ALL&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=25%2CMASSACHUSETTS

Figure 4.9: Extreme Cold and Wind Chill Index



Extreme Heat

Extreme heat is when the maximum temperature reaches above 90°F during the day. Projected heat days and heat waves can have an increased impact in areas with a greater amount of impervious surface, such as buildings, roads, parking lots, and driveways. These can become "heat islands" as dark asphalt and roofs store the heat from the sun. Impacts from heat stress can exacerbate pre-existing respiratory and cardiovascular conditions.

Extent

Source: National Weather Service[13]The NWS issues a Heat Advisory when the Heat Index (Figure 4.10) is forecast to reach 100-104˚ F for two or more hours (NOAA, n.d.). The NWS issues an Excessive Heat Warning if the Heat Index is forecast to reach 105˚+F for two or more hours. Heat waves cause more fatalities in the U.S. than the total of all other meteorological events combined. From 1979-2012, excessive heat exposure caused in excess of 8,000 deaths in the United States (MEMA and DCR, 2013). During this period, more people in this country died from extreme heat than from hurricanes, lightning, tornadoes, floods, and earthquakes combined.

[13] NWS, 2020. https://water.weather.gov/ahps2/river.php?wfo=box&wfoid=18682&riverid=205004&pt%5B%5D=145908&allpoints=145908%2C146659&data%5B%5D=impacts&data%5B%5D=stage&data%5B%5D=crests

Figure 4.10: 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.

Source: NOAA, n.d.

Because most heat-related deaths occur during the summer, people should be aware of who is at greatest risk and what actions can be taken to prevent a heat-related illness or death. According to the Centers for Disease Control and Prevention, the populations most vulnerable to extreme heat impacts include the following:

- People over the age of 65
- Children under the age of five
- Individuals with pre-existing medical conditions that impair heat tolerance
- Individuals without proper cooling
- Individuals with respiratory conditions
- Individuals that overexert themselves during extreme heat events

Location

Because of this hazard's regional nature, extreme temperatures would impact the entire town, resulting in a "large" location of occurrence, or more than 50 percent of total land area affected.

Previous Occurrences

NOAA's National Centers for Environmental Information Storm Events Database provides data on excessive heat. Between 2000 and 2021, Massachusetts experienced 16 heat or excessive heat days, which did not result in any injury or property damage. None of these events were reported for Hampshire County.[14] Extreme temperatures are classified as medium frequency events. As defined by the 2013 State

14

https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28Z%29+Excessive+Heat&beginD

Hazard Mitigation and Climate Adaptation Plan, these events occur from once in 5 years to once in 50 years or have a chance of occurrence of 2% to 20% per year. According to the 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan, between four and five heat waves (3 or more consecutive days of 90˚+F temperatures) occur annually in Massachusetts.

July is the hottest month in Huntington, and average daytime high temperature in July is around 82°F (NEIC, 2021). The Town of Huntington does not collect data on heat occurrences, but residents noted past experiences with and concerns about extreme heat events in the Town. There has been some use of Stanton Hall by residents as a cooling center during heat waves. The fact that many Huntington residents do not have air conditioning was discussed during the CRB workshop. While there may not have been a great need for it in the past with the few days per year over 90 degrees, as the occurrence of those high heat days increases, the need for air conditioning will increase, as will the need for of a cooling center for residents without air conditioning.

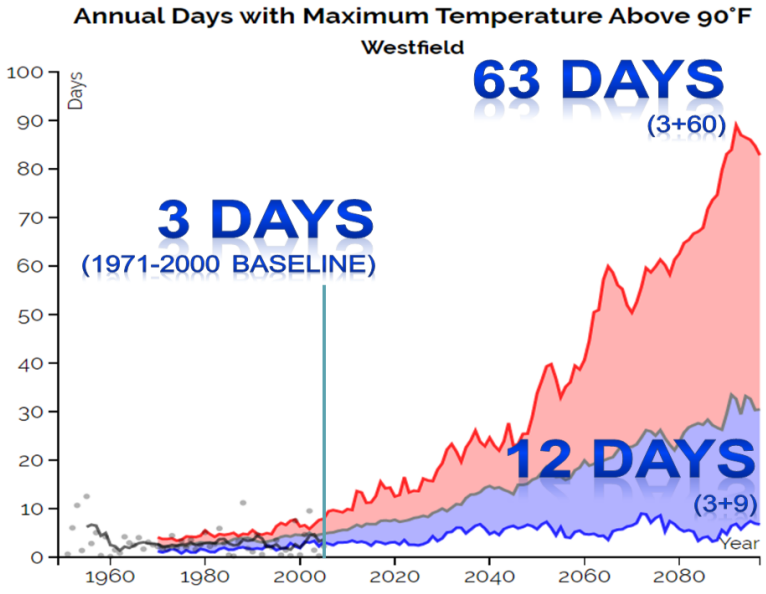
Probability of Future Events

The baseline (1971-2000) average temperature for the Westfield River Basin was 45 degrees, and in 2021 it was approximately 47 degrees. By the end of the century, it is predicted to rise between 4.2 and 11.2 degrees, depending on greenhouse gas emissions. Both the average temperature and number of extreme heat days are predicted to increase in future climate conditions.

As mentioned earlier in this chapter, the number of days annually above 90 degrees in the Westfield River Basin is projected to rise dramatically, as shown in Figure 4.11 below. Projections indicate an increase of up to 60 more days of above 90 degrees per year by the end of the century from a baseline average of three days per year. As discussed earlier, at temperatures over 90°F, heat-related illnesses and mortality show a marked increase. Heat waves with multiple days over 90°F can be especially dangerous for vulnerable individuals. Higher temperatures can also exacerbate air pollution, which can lead to negative health impacts such as asthma and other respiratory problems.

ate_mm=11&beginDate_dd=01&beginDate_yyyy=1999&endDate_mm=11&endDate_dd=30&endDate_yyyy=2021&

Figure 4.11: Extreme Heat Projections



Source: NECIA 2018

Increased temperatures can lead to a longer growing season, which can benefit certain kinds of agriculture. However, increased temperatures can negatively affect the growing of certain crops and can also negatively impact maple sugaring, which is produced in Huntington. Warmer average temperatures and a longer growing season can also result in a longer pollen season, as well as an increase in vector-borne diseases and populations of invasive species. Finally, increased temperatures can have negative impacts on native plants and on pollinators that rely on plants flowering at particular times.

Impact

Huntington's largest concern during heat waves is likely to be older adults (over 65) that make up 18% of the population and are more likely to have pre-existing health conditions. In addition, children under five years old make up 5.3% of the population. There are also individuals with medical conditions who are vulnerable to extreme heat, and even young adults and healthy individuals can succumb to heat if they participate in strenuous physical activities during hot weather. Some behaviors that put people at greater risk include drinking alcohol, taking part in strenuous outdoor physical activities in hot weather, and taking medications that impair the body's ability to regulate its temperature or that inhibit perspiration (MEMA and DCR, 2013; ACS 2014-2018).

Vulnerability

Based on the above assessment, Huntington has a vulnerability of "3-Medium" from extreme temperatures. While extreme temperatures that can result in illness or loss of life have been relatively rare in Huntington, the probability of such events is increasing.

5: EXISTING MITIGATION CAPABILITIES AND 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. The Town of Huntington is already undertaking measures to mitigate local hazards. Chapter 5 documents the Town's current operations and discusses potential improvements.

The Town of Huntington had numerous policies, plans, practices, programs and regulations in place, prior to the creation of this plan, that were serving to mitigate the impact of natural hazards in the Town of Huntington. These various initiatives are summarized, described and assessed on the following pages and have been evaluated in the "Effectiveness" column. These mitigation capabilities include land use zoning, subdivision regulations, specific policies and regulations, and operational strategies that include hazard mitigation best practices, such as limitations on development in floodplains and wetlands, stormwater management, tree maintenance, etc. Huntington has staff that can address hazard mitigation-related work, including an Administrative Assistant to the Select Board, a Highway Department, a Building Inspector and a Tree Warden, although these positions would be more effective if they had more hours and funding. The Town also has a number of very committed and dedicated volunteers who serve on Boards and Committees and in other volunteer roles. The Town collaborates closely with surrounding communities and is party to Mutual Aid agreements through the MEMA. Huntington is also an active member community of the Pioneer Valley Planning Commission (PVPC) and can take advantage of a limited number of hours of no cost local technical assistance as provided by the professional planning staff at the PVPC.

FEMA's *Local Mitigation Planning Handbook* categorizes hazard mitigation capabilities into four types (Planning and Regulatory, Administrative and Technical, Financial, and Education and Outreach). As this chapter will demonstrate, Huntington uses many of these tools, and the Town's existing capabilities are displayed in Table 5-1 below as well as in Appendix E.

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. Flooding is also caused by ice jams on the Westfield River. The Town currently addresses this problem with a variety of mitigation tools and strategies, which are outlined in Table 5.1. Flood-related regulations and strategies are included in the Town's general bylaws, zoning bylaw, and subdivision regulations. The regulating committees need to ensure that these regulations are being properly enforced as new development comes into town, and additional regulations for driveways are being considered.

Relevant mitigations goals are included in other town plans, including the Community Development Plan and the Open Space and Recreation Plan. Both plans identify goals and actions to promote natural resource preservation in Town, including areas in the floodplain, wetlands, groundwater recharge areas, farms and open space, rivers, streams and brooks. Infrastructure like dams and culverts are in place to manage the flow of water. Infrastructure such as dams and culverts are in place to manage the flow of water. The Town regularly maintains culverts but needs to replace those in poor condition and

which are undersized. Changes to current strategies and recommendations for future mitigations that address flooding include the following:

- Prioritize culvert replacements, and design, permit and install the priority replacements. Seek funding from HMGP/MVP/DER for priority culvert replacement projects
- Conduct fluvial geomorphologic assessment of streams near roadways resulting in road washouts or streambank erosion
- The Town should evaluate whether to become part of FEMA's Community Rating System.
- Install bioswales or other green infrastructure stormwater management to address erosion before it impacts roads and culverts (e.g. Route 66, County Road, other steep roads).
- Install rain garden and/or green roof on fire station in Norwich Hills area and stabilize slope where eroding.
- Review/revise bylaws to mitigate impacts on stormwater/erosion from conversion of forested land to residential development. Investigate development of local stormwater permit review bylaw and review process, and system to provide for additional/more detailed review of driveway permits.
- Public education and outreach regarding maintenance of septic systems, water quality impacts of failed systems, and potential tax breaks / low interest loans for septic system repairs and replacement
- Coordinate with USACE on outreach to public regarding where to go during flooding events, as well as floodplain management information (Silver Jackets Program). Communicate with USACE about ice jam mitigation measures - impacts from measures used and possible alternatives.

Severe Snowstorms / Ice Storms

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

The Town's current mitigation tools and strategies focus on preparedness, with many regulations and standards established based on safety during storm events. These current mitigation strategies are outlined in Table 5.1. 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.

The Town has improved the electrical resiliency of its emergency facilities in case of power loss from hazards such as snowstorms by investing in generators. The Town also coordinates with Eversource on tree trimming and improving the resiliency of the energy grid that serves emergency services and critical facilities.

Hurricanes/Tropical Storms AND Severe Thunderstorms / Winds / Tornadoes

Hurricanes, severe thunderstorms, and tornadoes all generate high winds that can fell trees, down electrical wires, and generate hurtling debris. This common characteristic means that the same set of mitigation strategies applies equally to all four hazards. For example, current land development regulations, such as restrictions on the height of telecommunications towers, can help prevent wind damages from all four types of hazards. In addition to wind damage, hurricanes can generate significant flooding that damages buildings, infrastructure and threatens human lives.

Because one of the primary impacts of hurricanes and severe thunderstorms is intense rainfall that generates flooding, all of the flood mitigation strategies discussed above are also mitigation strategies for hurricanes and severe thunderstorms.

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.

For new or recently built structures, the primary protection against wind-related damage is construction that adheres to the State Building Code, which, when followed, results in buildings that withstand high winds. 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.

Mobile Home Parks are prohibited as a new use in all districts. However, all regulations and legal protections given to victims of fires or other natural disasters must be followed, and such regulations are located in MGL Chapter 40A.

Wildfires / Brushfires

Although not uncommon, the vast majority of brushfires in Huntington are small and quickly contained. However, as with any illegal fire or brushfire, there is always the risk that a small brushfire could grow into a larger, more dangerous wildfire, especially if conditions are right. Therefore, it is important to take steps to prevent wildfires and brushfires from turning into natural disasters.
Wildfire and brushfire mitigation strategies involve educating people about how to prevent fires from starting, as well as controlling burns within the Town. The Town of Huntington has a number of operational capabilities to manage brushfires which are included in Table 5.1.

Burn Permits: The Town of Huntington allows open burning under the guidelines of the Department of Environmental Protection. Open Burning is authorized from January 15 to May 1. Burning is permitted between the hours of 10 a.m. and 4 p.m. The Officer in Charge of the Fire Department will determine if burning will be allowed at the beginning of the shift and can suspend burning if weather conditions change.

Regulatory Measures: The Fire Chief, along with the Planning Board, is involved in the review of the preliminary and definitive plans for all subdivisions, which must account for each home being within 300 feet of a hydrant. Furthermore, the procedures for the submission of special permits require that the fire department be an active participant in the review of proposed site plan. This involves verifying that proficient water supplies exist and that access routes to and from a given subdivision adequately meet public safety needs.

Future Mitigation Measures: The Town will continue with its existing program of management and prevention, and the Fire Department will also work on collaborating with the Council on Aging to

provide smoke alarms and fire safety education to seniors. In addition, the Fire Department will increase the amount of educational programs at Gateway Regional School.

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.

State and local building inspectors are guided by regulations put forth in the Massachusetts State Building Code. The first edition of the Massachusetts State Building Code went into effect on January 1, 1975 and included specific earthquake resistant design standards. These seismic requirements for new construction have been revised and updated over the years and are part of the current, 9th edition of the Massachusetts State Building Code. Given that most structures in Huntington were built before 1975, many buildings and structures do not have specific earthquake resistant design featurese. The town should evaluate older structures classified as local critical facilities and determine if they are earthquake resistant as per 9th Edition of the State Building Code, and seek funding to make them so if they are not.

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. State law requires a permit for the construction of any dam to ensure dams are adequately designed. A permit must be obtained from the DCR before construction can begin. All local approvals or permits also must be obtained.

The Town of Huntington has effective communication with the US Army Corps of Engineers regarding the maintenance, inspections, and EAPs for the Knightville and Littleville dams. A mitigation strategy the Town plans to pursue is to communicate with DCR about responsibility for the Norwich Pond dam, and to discuss reviewing its hazard and jurisdictional level.

Drought

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

The town wells and most private wells in Huntington are deep enough to withstand the impacts of drought conditions. 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. A mitigation strategy the Town plans to pursue is to seek funding to upgrade and maintain the Nebbs public well, which can then be used when residents lack access to their own drinking water due to power outages or to drought.

Table 5.1: Existing Mitigation Capabilities and Mitigation Measures in Huntington

Existing Mitigation Capabilities and Mitigation Measures				
Strategy	**Action Type**	**Description**	**Hazards Mitigated**	**Effectiveness / Improvements**
Flood Control Structures	Capital Construction	Three functioning dams in town.	Flooding	Mostly effective. Two Army Corps dams are inspected and maintained regularly. Condition and responsibility for Norwich Pond Dam maintenance needs to be clarified.
Culvert Replacement	Capital Construction	Priority list of necessary culvert replacements and other construction projects to effectively manage flooding	Flooding	Somewhat Effective. Need to actively seek funding for replacement.
Floodplain District	Zoning By-law	Overlay district to protect areas delineated as part of the 100-year floodplain by regulating uses and special permit requirements.	Flooding	Mostly effective. Consider increased the FPOD to the 500-year floodplain to accommodate the anticipated impacts of climate change.
Aquifer Protection District	Zoning By-law	District to protect groundwater resources by regulating certain uses, drainage, and other requirements within recharge area of aquifer.	Flooding/Drought	Effective. No Changes.
Open Space Communities	Zoning By-law	Provides regulations for cluster subdivision development by special permit. Allows protection of contiguous open space.	Flooding/Drought	Effective. No Changes.
Common Driveway	Zoning By-law	Provides for minor residential development without additional roads, thereby lessening environmental impact (limit 2 driveways).	Flooding/ Severe Snow/ Ice/Drought	Effective. No Changes.

Existing Mitigation Capabilities and Mitigation Measures				
Strategy	**Action Type**	**Description**	**Hazards Mitigated**	**Effectiveness / Improvements**
Earth Removal	Zoning By-law	Rigorous requirements for special permit approval for large-scale earth removal, restricting location and regulating drainage, vegetation, etc.	Flooding/Drought	Effective. No Changes.
Special Permit	Zoning By-law	Some uses require special permit approval, and must meet environmental standards.	Flooding	Effective. No Changes.
Wireless Communications Facilities	Zoning By-law	Structures are required to be as minimally invasive as possible to the environment, and regulations call for a "fall zone radius" as a further precaution.	Severe Snow/Ice/ Severe Thunderstorms/Wind/ Tornadoes/Microbursts/ Earthquakes	Effective. No Changes.
Manufactured Home Regulations	Zoning By-law	Mobile/ manufactured home parks are prohibited throughout town. A special permit is required for individual manufactured homes to be allowed in residential districts.	Flooding/Severe Thunderstorms/Wind/ Tornadoes/Microbursts	Effective. No Changes.
Preliminary Plan	Subdivision Regulations	The Fire Chief, along with the Planning Board and all regulatory boards are involved in the review of the preliminary plan.	Wildfire/Brushfire	Effective. No Changes.
Definitive Plan	Subdivision Regulations	100-year floodplain, wetlands, water bodies, conservation areas, drainage patterns, proposed septic or sewer and water supply must all be shown.	Flooding/Drought	Effective. No Changes.
Definitive Plan	Subdivision Regulations	The Fire Chief, along with the Planning Board is involved in the review of the definitive plan. Plan must account for each home being within 300 feet of a hydrant.	Wildfire/Brushfire	Effective. No Changes.

Existing Mitigation Capabilities and Mitigation Measures				
Strategy	**Action Type**	**Description**	**Hazards Mitigated**	**Effectiveness / Improvements**
Additional Requirements	Subdivision Regulations	Hydrology Study and Drainage Calculation; Sanitary Sewer Study; Water Study; Environmental Impact Statement; Development Impact Statement; Wetlands Protection; Erosion/Sediment Control Plan	Flooding/Drought	Effective. No Changes.
Additional Requirements	Subdivision Regulations	Special Water Protection District – all proposals reviewed to ensure the development is safe from flooding.	Flooding	Effective. No Changes.
Design Standards	Subdivision Regulations	Protection of natural features – minimize impact on surroundings.	Flooding	Effective. No Changes.
Design Standards	Subdivision Regulation	Utilities must be placed underground at the time of construction.	Severe Snow/Ice/Severe Thunderstorms/Wind/ Tornadoes/Microbursts	Effective. No Changes.
Design Standards	Subdivision Regulation	Street grade regulations (maximum ranges from 5 to 10% depending on the street category); minimum sight distances at intersections; guardrails can be required	Severe Snow/Ice	Effective. No Changes.
Huntington Community Development Plan (2003)	Planning Document	The CD Plan identifies key goals and actions to promote 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	Somewhat effective but outdated. Need to work to implement goals and strategies.

Existing Mitigation Capabilities and Mitigation Measures				
Strategy	**Action Type**	**Description**	**Hazards Mitigated**	**Effectiveness / Improvements**
Open Space and Recreation Plan	Planning Document	The Town has a wealth of open space and recreation areas that provide flood storage, heat island mitigation and native species habitat, among other resilience co-benefits. The OSRP aims to maintain, promote use, and increase the number of these spaces.	Flooding/Extreme Heat	Somewhat effective. Needs to be updated with a focus on climate resilience.
Comprehensive Emergency Management Plan	Planning Document	Organizes emergency information, includes supply inventories, and outlines detailed steps for increasing emergency response capacity when disasters occur.	Flooding, Severe Snow/Ice/Severe Thunderstorms/Wind/ Tornadoes/Microbursts/ Earthquakes	Effective but outdated. In the process of being updated and also digitized.
National Flood Insurance Program Participation	Operational Strategy	As of 12/2021 there were 20 policies in force in Huntington	Flooding	Effective. Consider participating in FEMA's CRS program.
State Building Code	Regulation	The town has adopted the state building code	Severe Snow/Ice/Severe Thunderstorms/Wind/ Tornadoes/Microbursts/ Earthquakes	Effective. No Changes.
Backup Electric Power	Operational Strategy	Emergency shelter, Stanton Hall (cooling/warming center) have generators, Highway Dept, Fire Stations and WWTP all have generators. Also six portable generators	Severe Snow/Ice	Effective. No changes.
Warning system – Reverse 911, outdoor siren	Operational Strategy	Emergency management can use Reverse 911 system to send messages to targeted areas or the whole town in emergency situations.	Flooding, Dam Failure, Wildfire/Brushfire/Severe Snow/Ice	Mostly Effective. Reverse 911 is well used. Emergency siren must be manually activated and would not be dependable for time-sensitive emergencies.

Existing Mitigation Capabilities and Mitigation Measures				
Strategy	**Action Type**	**Description**	**Hazards Mitigated**	**Effectiveness / Improvements**
Tree Management	Operational Strategy	List of dangerous trees created annually for Eversource. Town also hires out for trimming.	Severe Snow/Ice/Severe Thunderstorms/Wind/ Tornadoes/Microbursts	Effective. No Changes.
Burn Permit	Operational Strategy	Residents must obtain burn permits between January 15th and May 1st, and personnel provide information on safe burn practices.	Wildfire/Brushfire	Mostly Effective.
Public Education/Outreach	Education	The Fire Department conducts educational program in the schools.	Wildfire/Brushfire	Somewhat effective. Ensure fire education is done yearly for all elementary grades. Obtain funding for smoke detector and fire education program for seniors.
New Dam Construction Permits	Operational Strategy	State law requires a permit for the construction of any dam.	Dam Failure	Effective – would ensure any new dams are adequately designed. No Changes.
Dam Inspections	Regulation	DCR has an inspection schedule that is based on the hazard rating of the dam (not inspecting Norwich Lake Dam-non-jurisdictional). USACE inspects federal dams in Huntington.	Dam Failure	Somewhat Effective. Confirm state ownership of Norwich Lake Dam and communicate about rating and inspections, clarify responsibility.

6: HAZARD MITIGATION AND CLIMATE ADAPTATION STRATEGIES

STATUS OF 2016 ACTION STRATEGIES

The Core Team reviewed the mitigation actions from the 2016 Hazard Mitigation Plan to determine which actions had been completed, and which to keep in the updated plan if not completed. There was some progress made although the town was not able to implement some of the mitigation strategies identified in the previous plan. Limited staffing hampered the town's ability to pursue grant funding for capital improvement projects, like culvert replacements, as well as other items such as building inspections. Table 6.1 contains a summary of each of the mitigation actions from the 2016 plan, and indicates the status of each action and whether it will be moved forward into the 2022 update.

Table 6.1: Summary of 2016 Mitigation Actions

Summary of 2016 HMP Mitigation Action and Current Status							
Action Name	**Description**	**Hazards Addressed**	**Priority**	**Estimated Cost**	**Time Frame as of 2016 HMP**	**Mitigation Action Status as of March 2022**	**Keep Mitigation Action in 2022 Plan?**
Culvert Replacements	Seek funding from HMGP for top priority culvert replacement projects	Flooding	**1**	High	2021	Not completed	Keep
Back-up power at shelter	Purchase permanent generators for town's shelters	All Hazards	**2**	Medium	2019	Completed	No
Dam Inspections	Work with the state to identify Norwich Pond Dam owners in order to get dam inspected.	Dam Failure	**3**	Low	2021	Partially completed - Revise	Town has determined that the State is the owner of the dam – need to communicate with State about inspection and jurisdictional status
Aquifer Protection Overlay Update	Update and add definitions for the Aquifer Protection District to be consistent with the definitions in MassDEP model bylaw	Flooding/Drought	**4**	Low	2018	Not completed	Keep

Summary of 2016 HMP Mitigation Action and Current Status							
Action Name	**Description**	**Hazards Addressed**	**Priority**	**Estimated Cost**	**Time Frame as of 2016 HMP**	**Mitigation Action Status as of March 2022**	**Keep Mitigation Action in 2022 Plan?**
FEMA Community Rating System	The Town should evaluate whether to become part of FEMA's Community Rating System.	Flooding	**5**	Low	2018	Not completed	Keep
Building Inspections	Evaluate older structures categorized as critical facilities to determine if they are earthquake resistant and seek funding to make them so if they are not	Earthquake	**6**	Inspections: Low Retrofits: High	Inspections: 2018 Retrofits: 2021+	Not completed	Keep
Community Development Plan	Work to implement relevant goals and policies in Huntington's Community Development Plan	All Hazards	**7**	High	2021	Not completed	Keep
Performance-based Evaluations for Development	Consider instituting performance-based evaluations for some development regulated by special permits – require subsequent reviews of how development is performing based on specific criteria (e.g. amount of stormwater runoff)	All Hazards	**8**	Low	2021	Not completed	Keep
Regional Disaster Debris Management Plan	Consider participation in a regional disaster debris management plan	All Hazards	**9**	Medium	Timeframe would be dependent on available funding and regional coordination	Not completed	Keep

Identification of Hazard Mitigation and Climate Adaptation Strategies

The Town developed a list of priority hazard mitigation and climate adaptation strategies through a multi-faceted approach. Strategies were discussed and developed upon review of the:

- Community profile, including the Town's strengths and vulnerabilities
- Hazard and climate change risk assessment
- Existing mitigation measures and the capacity of the Town to respond to extreme events
- Updates from the previous HMP
- Input from stakeholders

Stakeholders were engaged through Core Team meetings, the CRB Workshop, expert interviews, and the Public Listening session. The full list of action items from the CRB Workshop are available in Appendix C and were integrated into the final list of action items vetted by the Core Team. Table 6.1 below represents the Town's high and medium priority action items. Each of these action items was analyzed for its overall benefit, estimated cost, timeframe, and implementation responsibility, which informed prioritization. A description of each prioritization category is included below.

Mitigation Action and Description - A brief description of each mitigation measure identified in this plan.

Primary Responsibility/Oversight – Most mitigation measures will require a multi-department approach where several Town departments share responsibility. The designation of implementation responsibility in the table was assigned based on general knowledge of the responsibilities of each municipal department. The lead department for each action item is bolded. Some action items may require collaboration with State departments or private entities. Section 7 specifically addresses regional collaboration.

Priority – Designation of high, medium, or low priority was based on overall potential benefits. A High Priority action is very likely to have political and public support and necessary maintenance can occur following the project. A Medium Priority action may have political and public support and necessary maintenance had potential to occur following the project. A Low Priority action may not have political and public support for implementation or the necessary maintenance support following the project.

Estimated Cost – Approximate implementation costs are provided as an estimate for all mitigation measures. All cost data would need to be updated at the time of design and construction.

Potential Funding Source – Identification of sources of funding for each mitigation action, including grant programs, state or federal agencies, private organization, planning commission, town funding, or other source.

Time Frame for Completion – The time frames represented below are assigned based on the length of time necessary to complete the project. The timeframe is noted in years.

Prioritization Methodology

The Huntington Core Team reviewed and prioritized a list of previously identified and new mitigation strategies using the following criteria:

- **Application to multiple hazards** – Strategies are given a higher priority if they assist in the mitigation of several natural hazards.

- **Time required for completion** – Projects that are faster to implement, either due to the nature of the permitting process or other regulatory procedures, or because of the time it takes to secure funding, are given higher priority.

- **Estimated benefit** – Strategies which would provide the highest degree of reduction in loss of property and life are given a higher priority. This estimate is based on the Hazard Identification and Analysis Chapter, particularly with regard to how much of each hazard's impact would be mitigated.

- **Cost effectiveness** – in order to maximize the effect of mitigation efforts using limited funds, priority is given to low-cost strategies. For example, regular tree maintenance is a relatively low-cost operational strategy that can significantly reduce the length of time of power outages during a winter storm. Strategies that have identified potential funding streams, such as the Hazard Mitigation Grant Program, are also given higher priority.

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 $50,000
- **Medium** – cost between $50,000 – $100,000
- **High** – cost over $100,000

Cost estimates take into account the following resources:

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

Project Timeline

Table 6.1 below is a completed list of mitigation strategies 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 by the date as noted in the "Timeframe for Completion" column in Table 6.1 below.

Table 6.1: Priority Hazard Mitigation and Climate Adaptation Strategies

2022 Mitigation Strategies							
Action Name	**Description**	**Hazards Addressed**	**Primary Responsibility/ Oversight**	**Priority**	**Estimated Cost**	**Potential Funding Source(s)**	**Time Frame for Completion**
Culvert Replacements	Prioritize culvert replacements, and design, permit and install the priority replacements. Seek funding for priority culvert replacement projects.	Flooding	Highway/Emergency Management Director (EMD)	High	High	HMGP, BRIC, MVP, DER	Prioritization: 2023 Culvert replacements: 2025
Dam Inspections	Communicate with State regarding ownership, inspections, and maintenance of Norwich Pond Dam and its jurisdictional status based on potential impacts to Routes 66 and 112, downstream bridges and homes.	Dam Failure	Select Board/EMD	High	Low	Staff/Volunteer Time	2022-2023
Green Infrastructure for Stormwater Management	Install bioswales or other green infrastructure stormwater management to address erosion before it impacts roads and culverts (Route 66, County Road, other steep roads including dirt roads).	Flooding	Highway/Con. Comm.	High	Medium-High	MVP, BRIC	2025
Slope stabilization and rain garden at Norwich Hills Fire Station	Install rain garden and/or green roof on fire station in Norwich Hills area and stabilize slope where eroding.	Flooding	Fire Dept, Con. Comm.	High	Medium-High	MVP	2023-2024
Secure funding for Nebs Well upgrade and maintenance	Investigate potential grants/loans to fund upgrades and maintenance to Nebs well as source of emergency drinking water that could be used during power outages.	Hurricanes/Windstorms/Severe Winter Storms/Drought	Board of Health (BOH)	High	Medium	Clean water revolving fund, BRIC, HMGP	2024
Outreach and education for septic system repair and replacement	Public education and outreach regarding maintenance of septic systems, water quality impacts of failed systems, and potential tax breaks / low interest loans for septic system repairs and replacement	Flooding	BOH	High	Low	Town funding, Hilltown CDC, MassDEP	2024-2025

2022 Mitigation Strategies							
Action Name	**Description**	**Hazards Addressed**	**Primary Responsibility/ Oversight**	**Priority**	**Estimated Cost**	**Potential Funding Source(s)**	**Time Frame for Completion**
Form OSRP Committee to update OSRP, address environmental issues, goals	Revitalize open space committee to update OSRP with a focus on climate change resiliency. Committee would address related issues like tree management, coordination with Westfield Wild and Scenic on invasive species removal, land conservation for wildlife connectivity, and possible grants.	Flooding/Drought/Extreme Temps	Select Board, Open Space Committee, Con Comm	High	Low	Staff/volunteer time; DLTA funding (PVPC)	2023
Bylaw review and possible development of additional bylaws to protect town natural resources	Review bylaws and consider adoption of additional protective bylaws for wetlands, coldwater fisheries, stormwater management and erosion control. Explore model bylaws related to lawn and garden care and roadside maintenance practices that are protective of resources.	Flooding/Drought/Extreme Temps	Planning Board/ Con Comm	High	Low	Staff/volunteer time, DLTA (PVPC), Land use planning grant (EEA)	2025
Assessment of road washouts and streambank erosion of adjacent road/stream areas in Town	Perform fluvial geomorphologic assessment of streams near roadways resulting in road washouts or streambank erosion	Flooding	Highway, Con Comm	High	Medium	MVP, BRIC, HMGP	2024
Assess town communications, including media preferences; develop improved communication plan re. hazard mitigation/prep	Assess communication channels in town and develop improved communications plan for emergencies/disaster mitigation and preparation information, including coordinating reverse 911 alerts with Gateway alert system. As part of this effort, survey residents about media sources they use.	All Hazards	EMD/Select Board	High	Low	Town funding, Staff/volunteer time	2025
Increase outreach on emergency preparation and resources	Develop new resident welcome package with emergency contacts, supplies, and information on local resources, possibly with partner organizations. Provide information at library, COA health fair, transfer station, coordinate with Gateway to send information home with students.	All Hazards	EMD/Council on Aging (COA)/All Boards	High	Low	Town funding, Staff/volunteer time	2024

2022 Mitigation Strategies							
Action Name	**Description**	**Hazards Addressed**	**Primary Responsibility/ Oversight**	**Priority**	**Estimated Cost**	**Potential Funding Source(s)**	**Time Frame for Completion**
Improve resources for sheltering in place during emergencies	Increase support for residents' ability to shelter in place through checklists, coordination with organizations for supply deliveries, access to potable water available without electricity (e.g. Nebs well when repaired) and firewood (investigate DCR firewood banks).	Hurricanes/Strong storms/Winter storms	EMD/Fire/Police/ BOH	High	Low	MVP, DCR, BRIC, HMGP	2023
Pursue economic development strategies, and interest in regional hilltowns grantwriter to expand funding opportunities	Explore economic development strategies, including opportunities for eco/outdoor tourism and strategies for downtown revitalization. Increase publicity for events. Explore a regional services agreement for shared Hilltowns grant writer, focusing on sustainable funding sources.	All hazards	Planning Board/Select Board	High	Low - Medium	Staff/volunteer time, PVPC	2025
FEMA Community Rating System	The Town should evaluate whether to become part of FEMA's Community Rating System.	Flooding	Conservation Commission (Con. Comm)/Select Board/EMD	Medium	Low	Staff/Volunteer Time	2024
Building Inspections	Evaluate older structures categorized as critical facilities to determine if they are earthquake resistant and seek funding to make them so if they are not	Earthquake	Building Inspector	Medium	Inspections: Low Retrofits: High	Inspections: Staff Time Retrofits: HMGP/Capital Improvement Funds	Inspections: 2023 Retrofits: 2025+
Community Development Plan	Work to implement relevant goals and policies in Huntington's Community Development Plan	All Hazards	Planning Board	Medium	High	Town Funding, Various grant sources	2025
Bylaw Review and possible development of stormwater bylaw and review process	Review/revise bylaws to mitigate impacts on stormwater/erosion from conversion of forested land to residential development. Investigate development of local stormwater permit review bylaw and review process, and system to provide for additional/more detailed review of driveway permits.	Flooding	Highway, Planning, Con. Comm.	Medium	Low	Staff/volunteer time, DLTA (PVPC), Land use planning grant (EEA)	2024

2022 Mitigation Strategies							
Action Name	**Description**	**Hazards Addressed**	**Primary Responsibility/ Oversight**	**Priority**	**Estimated Cost**	**Potential Funding Source(s)**	**Time Frame for Completion**
Coordination with USACE – outreach on flooding and floodplain management, ice jam mitigation measures	Coordinate with US Army Corps (USACE) on outreach to public regarding where to go during flooding events, as well as floodplain management information (Silver Jackets Program). Communicate with USACE about ice jam mitigation measures - impacts from measures used and possible alternatives.	Flooding	EMD	Medium	Low	Staff/volunteer time, USACE	2024
Outreach, education and testing for salt, other contaminant impacts on private well water quality	Provide outreach and education to private well owners about water quality impacts from road salt and chemical contamination. Increase participation in MassDOT testing of private wells for road salt and mitigation measures.	Severe Winter Storms	BOH	Medium	Low	Town funding, MassDOT, MassDEP	2024-2025
Pursue funding and development of greenway/river walk	Pursue development of and funding for a greenway/extended river walk behind Town Hall with information kiosk and benches.	Flooding/Extreme temps	Open Space Committee	Medium	High	PARC grant (DCS), MassTrails (DCR)	2025
Restore riparian areas and provide public education about streambank erosion and buffers	Coordinate with Westfield Wild & Scenic River Committee on grant opportunities for restoration of disturbed and/or eroding riparian areas with native and pollinator-friendly plant species, and public outreach and education on streambank erosion control and importance of stream buffers.	Flooding/Extreme Temps	Con Comm	Medium	Medium-High	DES, MassWildlife, EPA	2024
Assess Beaver Dams in Town	Conduct assessment of beaver dams and beaver controls throughout Town - locations, threats, which are abandoned and/or beneficial for flood storage, and potential maintenance for abandoned beaver dams.	Flooding	Cons Comm	Medium	Medium	MassWildlife, HMGP	2024
Identify and remove invasive species, provide public education	Work with Westfield Wild & Scenic River Committee for assistance with identification and removal of invasive species. Coordinate with school and library on education about invasive species. Coordinate with Gateway on HS volunteer programs for invasive removal.	Extreme temps	Cons Comm, Open Space Committee, Gateway RSD	Medium	Low	Staff/volunteer time/Westfield Wild and Scenic	Ongoing

2022 Mitigation Strategies							
Action Name	**Description**	**Hazards Addressed**	**Primary Responsibility/ Oversight**	**Priority**	**Estimated Cost**	**Potential Funding Source(s)**	**Time Frame for Completion**
Identify and certify vernal pools, provide public education	Coordinate with library and schools on education about vernal pools and wetlands, coordinate with GHS on HS volunteer program for vernal pool certification.	Flooding/Drought/Extreme temps	Cons Comm, Library and Gateway RSD	Medium	Low	Staff/volunteer time	2024-2025
Increase File of Life distribution and 911 registration	Use outreach opportunities to distribute File of Life more widely to vulnerable residents, and to have them register with 911 dispatch.	All Hazards	COA/Police	Medium	Low	Staff/volunteer time	2023
Investigate strategies to provide economic/regulatory support for town businesses	Provide informational material on best areas for businesses to locate in regard to wetlands, other bylaw considerations. Assess bylaws for barriers to small business operation.	All hazards	Planning Board/Cons Comm	Medium	Low	Town funding, Staff/volunteer time, PVPC (LTA or DLTA funding)	2024
Performance-based Evaluations for Development	Consider instituting performance-based evaluations for some development regulated by special permits – require subsequent reviews of how development is performing based on specific criteria (e.g. amount of stormwater runoff)	All Hazards	Planning Board	Low	Low	Staff/Volunteer Time, PVPC (Use LTA hours or DLTA funding)	Ongoing
Regional Debris Management Plan	Consider participation in a regional debris management plan	All Hazards	SelectBoard/EMD/Highway	Low	Medium	Staff/Volunteer time	2025
Aquifer Protection Overlay Update	Update and add definitions for the Aquifer Protection District to be consistent with the definitions in MassDEP model bylaw	Flooding/Drought	Planning Board	Low	Low	Staff/Volunteer Time, PVPC (Use LTA hours or DLTA funding)	2025
Coordination with MassDOT and Rep. Blais on traffic safety measures	Increase coordination with MassDOT regarding traffic rerouting from Mass Turnpike. Discuss options for safe winter transportation for students within 1.5 miles of school with legislators	Severe Winter Storms/Hurricanes/Strong Storms	Highway/Select Board	Low	Low	Staff/volunteer time	2025

2022 Mitigation Strategies							
Action Name	**Description**	**Hazards Addressed**	**Primary Responsibility/ Oversight**	**Priority**	**Estimated Cost**	**Potential Funding Source(s)**	**Time Frame for Completion**
Research, education and outreach on forestry and forest development BMPs	Coordinate with DCR and Army Corps about forestry practices. Conduct study on upper watershed cutting plans - amount, location, practices used. Provide public access, education and outreach regarding forestry BMPs. Investigate grants for planting trees as wind breaks.	Flooding/Drought/Extreme temps/Strong storms	Open Space Committee	Low	Low	Staff/volunteer time/USACE	2026
Provide resources on preventing and remediating basement flooding	Provide outreach and resources to residents with basement flooding issues about residential stormwater management strategies (e.g., green infrastructure, low impact development, retrofits - landscape design classes at library), resources and programs to remediate basement flooding and subsequent mold and air quality issues.	Flooding	BOH/Building Commissioner	Low	Low	MVP	2026

Regional Partnerships

Mitigating natural hazards is not strictly a local issue. The infrastructure systems that serve communities are often complex systems of storm drains, roadways, pump stations, dams, and other facilities owned and operated by a wide variety of state agencies, including Massachusetts Department of Transportation (MassDOT), Massachusetts Emergency Management Association (MEMA), and the Department of Conservation and Recreation (DCR), as well as sometimes federal agencies. In the case of Huntington, the Huntington State Forest is owned and maintained by DCR, and the Littleville and Knightville dams are owned and maintained by the US Army Corps of Engineers. The planning, construction, operation, and maintenance of these facilities and structures are integral to the hazard mitigation and climate adaptation efforts of communities. The Town will strive to share and obtain vulnerability data in coordination with these agencies. These agencies also operate with the same budgetary and staffing constraints as communities. Similarly to municipalities, they must make decisions about numerous competing priorities. In order to implement many of the mitigation measures identified by the Town, all parties will need to work together towards a mutually beneficial solution.

Potential Funding Sources

The identification of funding sources is the initial step in seeking funds and may vary depending on numerous factors. These factors include, but are not limited to, if a mitigation measure is conceptual or has been studied, evaluated, or designed. In most cases, the measure will require a combination of funding sources. The funding sources identified are not a guarantee that a specific project will be eligible for, or receive, funding. Upon adoption of this plan, the local representatives responsible for implementation should begin to explore potential funding sources in more detail.

Traditional funding sources within the Town of Huntington, such as funding from the operating and capital budgets, may be able to cover some of the costs associated with the action items detailed in Table 7-1. State revolving funds and other no- or low-interest loans may also be of interest. There is a great variety of funding available for Massachusetts municipalities, both through the state and federal governments. A full list of funding opportunities can be found on the Community Grant Finder webpage. The Community Grant finder provides a streamlined interface where municipalities can easily learn about grant opportunities. Specific funding options related to action items developed by Huntington are listed in Table 6.2 below.

Table 6.2: Potential Funding Sources

Category	Agency/Grant	Description	Limitations & Stipulations
Community Development	MassWorks Infrastructure Program	Provides grants to communities to help them prepare for success and contribute to the long-term strength and sustainability of the Commonwealth.	None
Dam Repair and Removal	Dam and Seawall Program, EEA	Provides funding for repair or removal of dams	None

Table 6.2: Potential Funding Sources

Category	Agency/Grant	Description	Limitations & Stipulations
Dam Removal	Division of Ecological Restoration (DER)	Provides funding to remove dams and restore river processes.	Must provide a high enough ecological benefit
Emergency Management and Planning	Flood Mitigation Assistance Grant Program (FMA)	Implement cost-effective measures that reduce or eliminate the long-term risk of flood damage.	For buildings and other structures insured under the National Flood Insurance Program (NFIP).
Emergency Management and Planning	Hazard Mitigation Grant Program (HMGP)	Provides funding after a disaster to significantly reduce or permanently eliminate future risk to lives and property from natural hazards.	None
Emergency Management and Planning	Building Resilient Infrastructure & Communities (BRIC)	Provides funds for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event, with a focus on infrastructure projects and "community lifelines." Replaced FEMA's Pre-Disaster Mitigation (PDM) Program.	None
Emergency Management and Planning	MEMA Citizen Corps Program (CCP) Grant	Supports local Community Emergency Response Teams (CERT) and Volunteers in Police Service (VIPS) in preparing for all-hazards. Can be used for planning activities, equipment, training, and exercises.	None
Energy	DOER	The DOER provides grant funding for clean energy-related programs.	None
Energy	Green Communities Designation and Grant Program	Provides a road map along with financial and technical support to municipalities that pledge to cut municipal energy and meet other criteria.	None
Environment	Community Forest Grant Program	Funding to establish community forests.	None
Environment, Flood Mitigation	Culvert Replacement Municipal Assistance Grant Program	Grant to replace undersized, perched, and/or degraded culverts located in an area of high ecological value.	None
Environment	US Forest Service Community Forest Grant Program	Funding to acquire private forest land threatened by conversion and establish community forests.	None
Environment	Conservation Assistance Grant Program	Provides funding for property appraisals, OSRPs, other land conservation planning.	Towns with 6,000 residents or fewer

Table 6.2: Potential Funding Sources

Category	Agency/Grant	Description	Limitations & Stipulations
Environment	604b Grant Program	Water quality assessment and management planning.	None
Environment	Land Use Planning Grants	Support effort to plan, regulate, and act to conserve and develop land consistent with the Massachusetts' Sustainable Development Principles.	None
Environment	LAND Grant Program (DCS)	Helps cities and towns acquire land for conservation and passive recreation.	Municipality must have an approved OSRP
Environment	Federal Land & Water Conservation Fund (DCS)	Funding for the acquisition, development, and renovation of parks, trails, and conservation areas.	Municipality must have an approved OSRP
Environment	MassTrails Program	Trail protection, construction, and stewardship projects.	None
Environment	Municipal Vulnerability Preparedness (MVP) Program	Provides support to implement climate change resiliency priority projects.	None
Environment	Natural Resource Damages Program	Funding for restoration projects. Funding comes from settlements, so it is does not follow a set schedule.	None
Public Safety	Emergency Management Performance Grant (EMPG)	Reimbursable grant program to assist local emergency management departments to build and maintain an all-hazards emergency preparedness system.	Reimbursable
Public Safety	Public Assistance Program	The state reimburses governments and other applicants for disaster related costs.	75% reimbursable
Public Works & Transportation	Chapter 90 Program	Reimbursable grants on approved projects.	None
Public Works & Transportation	Community Transit Grant Program	Funding to meet the transportation and mobility needs of seniors and people with disabilities.	Depends on project type
Public Works & Transportation	Municipal Small Bridge Program	Funding for small bridge replacement, preservation, and rehab projects.	Bridges with spans between 10' and 20'
Transportation	Transportation Alternatives (TA)	Funding for smaller-scale transportation projects such as pedestrian and bicycle facilities, recreational trails, safe routes to school projects, community improvements such as historic preservation and vegetation management, and environmental mitigation related to stormwater and habitat connectivity.	None

7: PLAN ADOPTION, IMPLEMENTATION, AND MAINTENANCE

Plan Adoption

Upon completion of the draft MVP and Hazard Mitigation Plan Update, a public meeting was held on May 25, 2022 to receive comments. The Hazard Mitigation Plan was 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 will be the responsibility of the Core Team. Implementation will begin upon its formal adoption by the Huntington Select Board and approval by MEMA and FEMA. The Core Team will be responsible for tracking the implementation of the plan over the 5-year period until the next HMP update, and will follow the plan maintenance plan described below. The Core Team will use the Table 7.1 as a guide for taking action to mitigate hazards and vulnerabilities, and improve the Town's resilience. The time frame, responsible department, and funding mechanisms in Table 7.1 present an implementation plan for the Core Team. The Core Team will follow the implementation plan and be held accountable through the tracking mechanisms explained below. The 2022 MVP-HMP will also inform future planning and budgeting processes.

Plan Maintenance, Monitoring and Evaluation

FEMA's initial approval of this plan is valid for five years. During that time, the Town will continue to track progress, document hazards, and identify future mitigation efforts. This will be achieved through meetings and actions of the Core Team as well as continued public participation.

Meetings: The Core Team, coordinated by the Administrative Assistant to the Select Board, will meet once per year to monitor plan implementation. The composition of the Core Team may change slightly but will likely include representatives from the Fire Department, Highway Department, Planning Board, Board of Health, Council on Aging, and the Conservation Commission. These meetings will provide an opportunity for regular implementation updates and to identify capital planning needs related to hazard mitigation.

Continuing Public Participation: Public participation will be a critical component of the Plan maintenance process. The adopted plan will be posted on the Town's website with a mechanism for citizen feedback, such as an e-mail address, for questions and comments. The Town will encourage local participation whenever possible during the next five-year planning and implementation cycle. The Core Team will also incorporate engagement into the implementation of the priority action items. All updates to the plan, including implementation progress, will be placed on the Town's website. The Core Team will hold all meetings in accordance with Massachusetts open meeting law and the public is 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.

Integration of the Plan with Other Planning Initiatives: 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:

- *Huntington Comprehensive Emergency Management Plan, being revised for 2022*
- *Huntington Zoning Ordinance and Subdivision Regulations, last amended 2015*
- *Huntington Community Development Plan, 2003*
- *Huntington Open Space and Recreation Plan, 2002*
- *Massachusetts' State Hazard Mitigation and Climate Adaptation Plan, 2018*

Upon approval of the Town of Huntington's 2022 MVP-HMP by FEMA and adoption by the Select Board, the Core Team will make the plan available to all departments and boards with an implementation responsibility. 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, and the Core Team will initiate a discussion with those various departments regarding how the plan can be integrated into their ongoing work.

Appropriate sections of the MVP-HMP will be integrated into other plans, policies and documents as those are updated and renewed, including the writing of, or updates to, the Town's Community Development Plan, Open Space Plan, Comprehensive Emergency Management Plan, and Capital Improvement Program. Coordination with the Pioneer Valley Planning Commission and adjacent communities, local organizations, businesses, watershed groups, and state agencies will be required for successful implementation and continued updating.

Process of Updating

By maintaining the 2022 MVP-HMP as described above, the Town will have a competitive application when applying to FEMA for funding to update the plan. Once the resources have been secured to update the plan, the Core Team will determine whether to undertake the update on its own or hire a consultant. If the Core Team decides to update the plan itself, the group will need to review the current FEMA hazard mitigation plan guidelines for any change in the requirements. The update to the Town of Huntington's 2022 MVP-HMP will be forwarded to MEMA for review and to FEMA for ultimate approval. If the Town decides to hire a consultant, the Core Team will reach out to consultants while also applying to FEMA for funding to update the plan. The Town will begin this process in four years in order to avoid a lapse in its approved plan status and grant eligibility when the current plan expires at the end of year five.

8: LIST OF REFERENCES AND RESOURCES

Appendix A – References and Resources

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