



The Town of Brimfield, Massachusetts Hazard Mitigation Plan 2023 Update

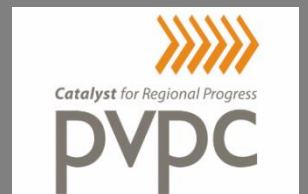
Adopted by the Brimfield Board of Selectmen on [date]

Prepared by:

The Brimfield MVP/HMP Committee

and

The Pioneer Valley Planning Commission



Acknowledgements

The Brimfield Board of Selectmen extends special thanks to the Brimfield MVP/HMP Committee as follows:

- Theresa Cofske, Administrative Assistant to the Select Board
- Sean Connor, Emergency Management Director
- William Beaudry, Police Chief
- Pat Plasse, Conservation Commission and Planning Board Clerk
- Eva Pittsinger, Senior Center Director
- Zach Lemiux, Highway Surveyor
- Dan Contois, Fire Chief
- Jamie Terry, Board of Health Title V Agent and Food Inspector

The Brimfield Board of Selectmen offers thanks to the Massachusetts Emergency Management Agency (MEMA) for developing the Commonwealth of Massachusetts State Hazard Mitigation and Climate Adaptation Plan (<https://www.mass.gov/service-details/massachusetts-integrated-state-hazard-mitigation-and-climate-adaptation-plan>) which served as a model for this plan. In addition, special thanks are extended to the staff of the Pioneer Valley Planning Commission for professional services, process facilitation and preparation of this document.

The Pioneer Valley Planning Commission

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Chapter 1: Introduction and Planning Process

Introduction

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

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

Preparing a local natural hazard mitigation plan before a disaster occurs can save the community money and facilitate post-disaster funding. Costly repairs or replacement of buildings and infrastructure, as well as the high cost of providing emergency services and rescue/recovery operations, can be avoided or significantly lessened if a community implements the mitigation measures detailed in the plan. FEMA requires that a community adopt a Hazard Mitigation Plan as a condition for mitigation funding. For example, the Hazard Mitigation Grant Program (HMGP), the Flood Mitigation Assistance Program (FMA), and the Building Resilient Infrastructure and Communities Program (BRIC) are programs with this requirement.

Planning Process

The hazard mitigation planning process for the Town of Brimfield 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
- Adopting and implementing the final updated Hazard Mitigation Plan

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

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.

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graph LR; A[1. Engage Community] --> B[2. Identify Hazards]; B --> C[3. Assess Vulnerabilities and Strengths]; C --> D[4. Develop & Prioritize Actions]; D --> E[5. Take Action!]
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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 Brimfield

The Town of Brimfield 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 Brimfield 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, Brimfield 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 Brimfield convened the Core Team to act as a steering committee for the development of the MVP-HMP. A kickoff meeting was held on September 14, 2022 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: Brimfield MVP/HMP Core Team

Name	Title
Theresa Cofske	Administrative Assistant to the Select Board
Sean Connor	Emergency Management Director
William Beaudry	Police Chief
Pat Plasse	Conservation Commission and Planning Board Clerk
Eva Pittsinger	Senior Center Director
Zach Lemiux	Highway Surveyor
Dan Contois	Fire Chief
Jamie Terry	Board of Health Title V Agent and Food Inspector

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 Brimfield. These were used to provide planning guidance, demographic data, and data on natural hazards and climate change projections and impacts in Brimfield. These included:

- Hazard Mitigation Plan (PVPC, 2011)
- Open Space and Resource Protection Chapter from Community Development Plan (Town of Brimfield, 2004)
- Brimfield Community Development Plan, (Town of Brimfield, 2004)
- Massachusetts Climate Change Projections (NECASC, 2018)
- Massachusetts State Hazard Mitigation and Climate Adaptation Plan (EEA and EOPSS, 2018)
- ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan (EEA, EOPSS, and MEMA, 2023)
- 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, 2017 – 2021)

Core Team Meetings

Meetings of the Core Team took place at the Brimfield Town hall. Meetings were held on the dates listed below, and agendas for these meetings are included in Appendix C.

September 14, 2022

The Core Team 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.

September 28, 2022

The Core Team reviewed the hazards that are likely to impact the Town, conducted the risk assessment, and identified critical facilities in town. The work group also developed an outreach and engagement plan for the workshops and public meetings, and finalized the workshop stakeholder list.

July 20, 2023

The Core Team continued to review hazards that have impacted the town, finished updating the critical facilities and vulnerable populations in Town, and began the capabilities assessment.

August 22, 2023

The Core Team completed the capabilities assessment, assessed the status of the previous mitigation strategies, and identified and prioritized new mitigation strategies to implement.

Sign-in sheets for each meeting can be found in Appendix C. While not all members of the Core Team 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 on the following dates: April 7th, April 12th, and May 24th. The workshops were held in person and were organized around the topic areas of infrastructure, environment, and society. The workshop on April 7th focused on societal features and was held at the Senior Center. The April 12th workshop was focused on infrastructure features and was held at the Town Hall, and the May 24th workshop focused on environmental features and was held outdoors at the Brimfield Winery. 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 Monson, Wales, Palmer, Warren, and Sturbridge, 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, Senior Center, and the Administrative Assistant to the Select Board.
- Members of boards and commissions, including the Select Board, Zoning Board, Board of Health, Council on Aging, Historical Commission, Conservation Commission, Trail Committee, and Agricultural Commission.
- Representatives from local groups and businesses, including Pioneer Valley Planning Commission,
- Representatives from State and Federal agencies, including the MVP Regional Coordinator,
- Member of the MA State Senate – Aide to MA State Senator Ryan Fattman

A list of all participants at the CRB Workshops is below:

April 7, 2023 (Societal):

- Theresa Cofske, Select Board Administrator
- Debra Fagerstrom, Town Clerk
- Geord Adams, Select Board Vice Chair
- William Beaudry, Police Chief
- Zachary Lemieux, Highway Superintendent
- Eva Pittsinger, Director, Senior Center
- Elizabeth Sutton, Brimfield Age Friendly and Disability Commission
- Amanda Hellyar, Senator Fattman's Office
- Maria Thomson, Brimfield Agricultural Commission
- Mimi Kaplan, PVPC
- Kyle Finnell, PVPC
- Erica Larner, PVPC

April 12, 2023 (infrastructure)

- Theresa Cofske, Select Board Administrator
- Geord Adams, Select Board Vice Chair
- William Beaudry, Police Chief
- Don Contois, Fire Chief
- Rebecca Wells, Library Director
- Amanda Hellyar, Senator Fattman's Office
- Maria Thomson, Brimfield Agricultural Commission
- Andrew Smith, MVP Regional Coordinator
- Mimi Kaplan, PVPC
- Kyle Finnell, PVPC
- Erica Larner, PVPC

May 24, 2023 (Environmental)

- Theresa Cofske, Select Board Administrator
- William Beaudry, Police Chief
- Zachary Lemieux, Highway Superintendent
- Sean Connor, Emergency Management Director
- Rebecca Wells, Library Director
- Pat Plasse, Conservation and Planning Departments
- Amanda Hellyar, Senator Fattman's Office
- Dan Wilder, Norcross Wildlife Sanctuary
- Laney Wilder, Opacum Land Trust
- Robert Corry, Historical Commission
- Roger DeBruyn, Conservation Commission Chair
- Don Moriarty, Owner, Brimfield Flea Market "Heart-O-The Mart" Field
- Julia Fearing, Brimfield resident

- Harrison Meitzler, Brimfield resident
- Kyle Finnell, PVPC
- Becky Basch, PVPC

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 Brimfield 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 Brimfield Hazard Mitigation Plan by PVPC ensured that the information from these plans was incorporated into the Hazard Mitigation Planning process.

In addition, the Pioneer Valley Planning Commission is actively involved in the Western Region Homeland Security Advisory Council (WRHSAC). WRHSAC, which includes representatives from Western Massachusetts municipalities, Fire Departments, Public Works Departments, Police Departments, area hospitals and regional transit from throughout the four counties of Western Massachusetts, is responsible for allocating emergency preparedness funding from the US Department of Homeland Security. The representatives of these disciplines who serve on the WRHSAC are charged with sharing the information discussed at meetings with their colleagues at their regular meetings. PVPC attends all WRHSAC meetings and all WRHSAC members are aware of the fact that Brimfield 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 Brimfield. 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 Brimfield'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 July 31, 2023 and December 5, 2023. Both meetings occurred after the Core Team had provided input on hazards and town vulnerabilities. Both meetings took place after the CRB workshops, and the second public meeting took place after the draft plan was finished, and also met the requirement for the MVP public listening session. Notice of both public meetings was posted at Brimfield 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 July 5, 2023, the Pioneer Valley Planning Commission sent press releases to the Journal Reminder, The Springfield Republican, the Hampshire Gazette, The Reminder, WWLP News and Western Mass News, the relevant news sources for this part of the region. The press release indicated that residents of Brimfield were invited to attend the event, as well as representatives of businesses in Brimfield and residents of neighboring communities. A copy of the press release and emails can be found in Appendix C.

Businesses, academic institutions, non-profits, community groups, and neighboring communities were invited to attend the public meetings to provide input. The businesses, academic institutions, and non-profit organizations listed below were invited to the HMP/MVP public listening sessions (the complete list can be found in the Appendix). There were 14 attendees at the July 31st meeting, including Town staff.

- Brimfield Flea Market Show Promoters (22 businesses in total)
- Village Green Campground
- Quinebaug Cove Campground
- CSX Railroad
- Pioneer Cannabis Company
- Riverrock Farm
- Cooks Orchard
- Central Mass South Chamber of Commerce
- Brimfield State Forest
- Norcross Wildlife Sanctuary
- Opacum Land Trust
- Hitchcock Academy
- Tantasqua Regional School District
- Boy Scouts Troop 7
- State Senator Ryan Fattman
- State Representative Todd Smola
- Brimfield Housing Authority

Neighboring communities that were provided with an opportunity to attend the meetings and comment included municipalities that directly border Brimfield, which are: Palmer, Monson,

Wales, Holland, Sturbridge, and Warren. These communities and many of the institutions mentioned above are provided opportunities to provide feedback as well as through the Pioneer Valley Planning Commission PVPC is regularly involved in land use, transportation, and environmental planning initiatives in Brimfield and surrounding communities. Regular feedback received from these other initiatives were incorporated into the hazard mitigation planning process.

The public meetings/listening session included presentations by PVPC about the hazard mitigation planning process and MVP program, climate change and natural hazards in Brimfield, 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. There were ___ attendees at the first public meeting and ___ attendees as the second public meeting. PVPC staff took notes and recorded all public comments at both public meetings, and these were discussed by the Core Team. The comments informed the action items in particular and were incorporated into the plan. More information about the public meeting and listening session, including a summary of responses, is available in Appendix C.

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 Brimfield Planning Board is the primary Town agency responsible for regulating development in town. Participation of the Planning Board Clerk on the Core Team ensured feedback to the Planning Board. 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.

Chapter 2: Hazard Mitigation and Climate Adaptation Goals

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

The Town of Brimfield 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:

- | | |
|---|--|
| <ul style="list-style-type: none">• 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 | <ul style="list-style-type: none">• 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.

Chapter 3: Local Profile

Geography

Brimfield is a small, rural town located in the southeastern corner of Hampden County in western Massachusetts. Comprised of five villages – Brimfield Center, East and West Brimfield, Fentonville, and Dingley Dell – Brimfield is a residential community of approximately 3,694 residents.

Brimfield is located approximately midway between Worcester and Springfield. Route 20 bisects the Town (east to west), and crosses Route 19 (north to south) at the Town Center. Most residential development is clustered around the Town Center and around the Town's major water bodies, Sherman Pond and Little Alum Pond. Commercial development is limited and is located primarily in the Town Center and along Route 20. Bordering communities are Monson, Wales, Holland, Sturbridge, Warren, and Palmer.

Brimfield is characterized by lakes, streams, and gentle, rolling landscapes. Steerage Rock, located on the ridge of Mount Waddaquaddock, was an important landmark during colonial times on the Bay Path Trail, which connected Boston with towns along the Connecticut River Valley.

Brimfield is divided north to south by the borders of two major watersheds. The Chicopee River Watershed drains a large area of land in the western section of the Town. The Quinebaug River Watershed, which encompasses most of Brimfield's land area, drains the central and eastern sections of the Town.

The total land area of Brimfield is approximately 22,588 acres. The majority of its land is undeveloped (82%) and consists mainly of large contiguous areas of native forestland.

Growth and Development







Brimfield was the third town to be settled in Hampden County and was originally founded as a plantation, adjoining Springfield in 1701. In 1731 it was established as an independent town, covering an area which today is made up of Monson, Wales, and Holland. Though predominantly a farming community, industry during the colonial period included the manufacturing of pottery, bricks, and wool clothing. Throughout the 19th century, manufacturing activity increased, as grist mills, sawmills, and even a distillery were introduced into the community. During the early 1900s, agricultural operations declined and the Town began evolving into a residential community.

Today, Brimfield is host to the largest antique show and flea market in all of New England. Nationally renowned, this market is held three times a year on expansive grounds along Route 20. The Brimfield Antique and Collectable Show regularly attracts several thousand antique dealers and tens of thousands of buyers from around the world. There is no doubt that this tri-annual event has shaped the identity of the Town.

Population Characteristics

According to the U.S. Census Bureau 2020 data, there are 3,694 residents in Brimfield and a total of 1,670 housing units. The median age is 46.2, with children under 18 making up 21.9% of the population and adults 65 and older making up 20.6% of the population. The median household income is \$75,577 and 6.2% of households in town live below the poverty line (American

Community Survey 2020 five-year estimates). There are no Environmental Justice (EJ) block groups in Brimfield, according to the 2020 Census data and Massachusetts Executive Office of Energy and Environmental Affairs (EEA). Table 3.1 below provides additional demographic data for the Town of Brimfield.

Table 3.1: Brimfield Population Demographics		
	Population	3,694
	Below Age 18	21.9%
65+	Above Age 65	20.6%
	Bachelor's degree or higher	28.5%
	Median household income	\$75,577
	Poverty Rate	6.2%
	With a Disability	14.1%
	Owner-Occupancy Rate	86.7%
	Renter-Occupancy Rate	13.3%

U.S. Census 2020 American Community Survey 5-year Estimates

Infrastructure Features

Brimfield's history and geography have been major factors in the development of the Town's infrastructure. As a primarily rural town, nestled among the hills and streams of the area, local land use patterns have not required significant transportation networks or other public infrastructure.

Roads and Highways

The major artery running through town is Route 20, which was the main highway connecting Boston and Western Massachusetts prior to the construction of the Massachusetts Turnpike. While Route 20 runs East-West through the Town, State Route 19 runs North-South, with the two main roads crossing at the Brimfield Town Center.

The Massachusetts Turnpike (I-90) crosses both northern corners of the Town. Exits are in Sturbridge, 7 miles to the east, and Palmer, 8 miles to the west. Auto travel to Worcester and Springfield takes approximately 30 minutes, to Hartford one hour, and to Boston 90 minutes.

Rail

The CSX rail line runs through the northeastern corner of Brimfield's town limits. It is a well-used line, accommodating over thirty trains per day, both freight and passenger rail. It makes no stop in Brimfield.

Water and Sewer Service

The Town of Brimfield does not provide municipal water service to residents. Residential and commercial development is supplied through private deep well systems. There are currently no plans to establish a municipal water supply system in the Town. A water system at the Elementary School that services the school, highway garage and Public Safety Complex was installed in 2020. A separate system to provide water to the Town Hall and the Library is currently in the works.

The Town of Brimfield does not provide municipal sewer service to residential or commercial development. All sewage disposal and treatment are provided by private septic systems. There are currently no plans to establish a public sewer system and treatment facility in Brimfield.

Environmental Features

Brimfield's scenic rural landscape is often cited by residents as one of the main reasons they chose to live in the Town. Due to limited development, the natural beauty of the Town's landscape has remained unspoiled for centuries. A mixture of river valleys and wooded hills create the Town's unique landscape character. Large parcels of open space lands, both public and privately owned, have maintained the Town's rural character. Working farms and pastureland are scattered throughout the Town and reflect Brimfield's history as an agricultural community.

Water Resources

Brimfield's plentiful water resources include numerous rivers and streams, several water bodies, and wetlands. The abundance of water resources is also reflected in the reliable availability of groundwater for private and public wells and also in the number of former water-driven mills. The Town's three major water bodies are Sherman Pond, Little Alum Pond, and the Brimfield Reservoir.

Brimfield possesses two major rivers and numerous streams and brooks. The Quaboag, one of the principal rivers of Massachusetts, forms the boundary between Brimfield and Palmer. A narrow valley bounds this stretch of the river on the Brimfield side which rises steeply to provide scenic views to the houses which increasingly line the road running just under the hillside.

The Quinebaug River cuts through the southeast corner of Brimfield. The Quinebaug River was dammed in 1960 to create the East Brimfield Reservoir, a flood control project of the U.S. Army Corps of Engineers. Brimfield's major streams and brooks include: Mill Stream, Tufts Brook, Turkey Brook, Penny Brook, Bottle Brook, West Brook, East Brook, Mill Brook, Wales Brook, Mountain Brook, Treats Brook.

Brimfield also contains several large wetlands and numerous smaller wetlands scattered throughout the Town.

Forests

Native woodlands are the principal vegetation type in Brimfield. Woodlands cover 17,803 acres of Brimfield, approximately 80 percent of the Town's land area. Types of woodlands in Brimfield include hardwood forests, coniferous forests, and mixed woods. Brimfield's woodlands provide habitat for numerous wildlife species and a form of sustainable economic development through timber harvesting.

Societal Features

Brimfield is primarily a residential bedroom community to both Springfield and Worcester, as it is mid-way between the two cities. According to US Census data, the mean travel time to work in 2020 was 37.8 minutes, which is the approximate travel time to both Springfield and Worcester. Most likely more Brimfield residents work remotely from home since the COVID pandemic than previously, but there are only a small number of businesses in Brimfield that employ residents. As mentioned earlier, the primary business in Brimfield is the Brimfield Antique and Collectibles Show, which is generally held in May, July, and September, and draws thousands of antiques dealers and buyers from around the world. The Antiques Show provides the opportunity for some ancillary lodging and dining businesses that operate seasonally. Other businesses in Town include three restaurants open year-round, a bar, and a bank.

Brimfield is part of the Tantasqua Regional School District that also includes the towns of Sturbridge, Wales, Holland, and Brookfield. Brimfield has its own elementary school, and middle and high school students attend the regional school which is located in the Fiskdale section of Sturbridge.

The Town has an active Council on Aging with a variety of activities and services for seniors. The Brimfield Athletic Association offers youth basketball, baseball, softball, and soccer, as well as a variety of recreational activities and events throughout the year.

The Town has a Code Red system in place for emergency communications. The Brimfield Elementary School serves as an Emergency Shelter for the Town, and has a generator to provide light and heat/cooling during power outages.

Developmental Patterns

Several factors have played, and will continue to play, an important role in the development of Brimfield. These include: the existing development pattern and availability of land for future development; the present road network; physical factors such as steep slopes, poor soil conditions, land set aside for conservation, the Quinebaug and Quaboag Rivers, their tributaries and floodplains; and the feasibility of private wells and septic systems. These factors have an impact, both individually and cumulatively, on where and how development occurs.

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

In its current zoning, Brimfield has four base zoning districts and one overlay district. The base districts define the allowed uses and dimensional requirements in all parts of the Town, while the overlay districts provide for additional restrictions in certain areas. The base districts include (1) Residential; (2) Agricultural-Residential; (3) Business; and (4) Industrial.

In addition, the Town utilizes a Floodplain overlay district. This district is designated for areas within the 100-year floodplain. It includes strict regulations about what type of development is permitted and other relevant restrictions.

The Zoning Bylaw also establishes a Site Plan Approval procedure for most business, industrial, and commercial buildings within the Town. Site Plan Review allows the Planning Board the ability to review the development proposal to ensure that the basic safety and welfare of the people of Brimfield are protected.

Current Development Trends

Today, this small community is home to approximately 3,694 residents. The majority of Brimfield's 22,588 acres is undeveloped land, totaling nearly 18,569 acres. Residential land totaling approximately 1,601 acres and agricultural land totaling approximately 1,586 acres account for the majority of the remaining Town area.

Currently, development in Brimfield is somewhat encouraged by existing zoning to seek areas where the environmental conditions support such development. Although the Town's existing zoning limits development in areas preserved for conservation, or in flood hazard areas, it does permit medium to high-density suburban development throughout much of its current open land. Another, perhaps more significant constraint dictating development in Brimfield is the feasibility of an on-site private well and septic treatment. Brimfield will continue to depend on individual wells and independent septic systems for the foreseeable future.

Recent and potential development

In the past five years there has been limited development in Brimfield. There have been ___ permits issued for residential construction, and five new commercial developments: A heavy equipment garage, a production building at a granite countertop facility, an outdoor equipment repair business, a cannabis growing facility and a cannabis dispensary. There are no residential subdivisions in Town currently, and none are being planned. There are no major commercial developments being planned.

Development in hazard-prone areas

None of the above-mentioned new developments are located in hazard-prone areas. Following a thorough hazard vulnerability and risk assessment completed as part of this plan update process, which included mapping critical infrastructure, reviewing past hazards and analyzing new development as well as regulatory changes, the committee has determined that the development that has taken place since the previous HMP has not increased the Town's vulnerability to natural hazards.

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 Brimfield has been identified utilizing a Critical Facilities List provided by the State Hazard Mitigation Officer. Brimfield’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.

Critical Facilities		
Feature Type	Name	Address (If Known)
<i>Category 1: Emergency Response Services</i>		
Emergency Operations Center – Primary	Public Safety Complex	34 A Wales Road (Route 19)
Emergency Operations Center – Secondary	Brimfield Elementary School	22 Wales Road
Fire Station	Brimfield Fire Department	34A Wales Road
Police Station	Brimfield Police Department	34A Wales Road
Highway Department	Highway Department	34B Wales Road
Emergency Fuel	Highway Department	34B Wales Road
Emergency Electrical Power – Generators	Brimfield Elementary	22 Wales Road
	Police/Fire Department	34A Wales Road
	Highway Department	34B Wales Road
Portable Generators	Highway Department	
	All Fire Trucks	
Emergency Shelters	Brimfield Elementary	22 Wales Road
	Town Hall Great Room	21 Main Street
	St. Christopher’s Church	20 East Main Street
	First Congregational Church	20 Main Street
	Hitchcock Free Academy	2 Brookfield Road (Route 20)
Water Sources (non-potable)	Dean Pond	Dean Pond Road
	Woodman Pond	Dearth Hill Road
	Dearth Hill Pond	86 Dearth Hill Road

Critical Facilities		
	Mill Pond	
	Lake Sherman Pond	Brookfield Road
	Little Alum Pond	Little Alum Pond Road
	East Brimfield Reservoir	Main Street (Route 20_
Helicopter Landing Sites	Elementary School Parking Lot	N42 06.9 W 072 11.9
	Open Field – Dunhamtown Palmer Road	N42 08.5 W 072 16.2
	Chenney’s Orchard	N42 09.2 W 072 08.2
	Cemetery Roadway	N42 06.3 W072 07.4
Communications	Cell Tower	Dearth Hill Rd
	Cell Tower	Champeaux Rd
	Cell Tower	Devils Lane
	Town/State radio tower on Steerage Rock	Route 20
Transfer Station	Located in Wales	60 Hollow Road, Wales
Primary Evacuation Routes	Route 20	Palmer Rd, Main St, Sturbridge Rd.
	Route 19	Warren Rd, Wales Rd
	Local Roads Used for Evacuation	Apple Road
		Brookfield Road
		Dunhamtown Palmer Road
		East Brimfield Road
		Holland Road
		Monson Road
		Dunhamtown Brimfield Road
		Little Alum Road
		St. Clair Road
Bridges on Evacuation Routes	Route 20 Mill Brook crossing	(Sturbridge Road)
	Route 20 Elbow Brook crossing	(Palmer Road)
	Route 19 Mill Brook crossing	(Wales Road)
<i>Category 2: Non-Emergency Response Facilities</i>		
Problem Culverts	Brookfield Rd at lake Sherman, north end of lake	North End of Lake Sherman
	Brookfield Rd in area of #231	#231 Brookfield Rd
	Dix Hill Rd	
	Dunhamtown Brimfield Rd.	#1024 Dunhamtown Brimfield Rd
	Dunhamtown Brimfield Rd.	Intersection with Dunhamtown Palmer
	Hastings Lane	

Critical Facilities		
Dams	Little Alum Dam	Little Alum Road
	Mill Lane Dam (aka Wheeler Pond Dam)	Mill Lane Road
	Dean Pond Dam	Dean Pond Road
	W.D. Cheney Dam	Off Southbridge Rd Ext.
	Woodman Pond Dam	Dearth Hill Road
	Dearth Hill Road Dam	86 Dearth Hill Road
Category 3: Facilities/Populations to Protect		
Elderly Housing	Meadowbrook Acres Retirement Village (Mobile Homes)	Lower Palmer Rd/Route 20
	Colonial Park	20 Colonial Park
Public Buildings	Public Library	25 Main Street
	Post Office	1 Main Street
	Senior Center/Congregational Church	20 Main Street
	Town Hall/Town Hall Annex	21 Main Street
Schools	Brimfield Elementary	22 Wales Road
Churches	St. Christopher's Church	20 East Main Street
	First Congregational Church	20 Main Street
	Bethany Charismatic Church	167 Dunhamtown Palmer Rd
	Friendship Baptist	9 East Brimfield-Holland Rd
	Kingdom Hall Jehovah's Witness	133 Old Palmer Rd
Apartment Complexes		
	Colonial Park	Main Street
Employment Centers	Viant, Inc.	68 Mill Lane
	Brimfield Elementary	22 Wales Road
Historic Buildings/Sites	Town Common, Town Center Historic District	
Campgrounds	Village Green Family Campground	228 Sturbridge Road
	Quinebaug Cove Campground	49 E. Brimfield-Holland Road
Category 4: Potential Resources		
Food/Water	Stop and Shop	100 Charlton Rd, Sturbridge
	Big Y Supermarket	1180 Thorndike St., Palmer
	Adams Market	115 Main Street, Monson
	Village Food Mart	43 Somers Road, Hampden
	Cumberland Farms	3 Main St, Brimfield
	County Line Farms	341 Sturbridge Rd., Brimfield
Ambulance Service	Action Ambulance Service	34 Wales Road
Hospitals/Medical Supplies	UMass Memorial Health - Harrington Hospital	100 South Street, Southbridge
	Baystate Wing Hospital	40 Wright Street, Palmer

Critical Facilities		
	UMass Memorial	55 Lake Ave, Worcester
	Baystate Medical Center	759 Chestnut St., Springfield
Gas/Diesel	Cumberland Farms	3 Main Street, Brimfield
	Cumberland Farms	506 Mains Street, Sturbridge
	Sturbridge Gas	173 Main Street, Sturbridge
	Shah Food and Fuel	1239 Park Street, Palmer
Building Materials Suppliers	County Line Hardware	341 Sturbridge Road
Heavy & Small Equipment Suppliers	Hilltop Equipment LLC	15 Five Bridge Road
Gravel Pits	Caron's Family Farm	160 Palmer Road

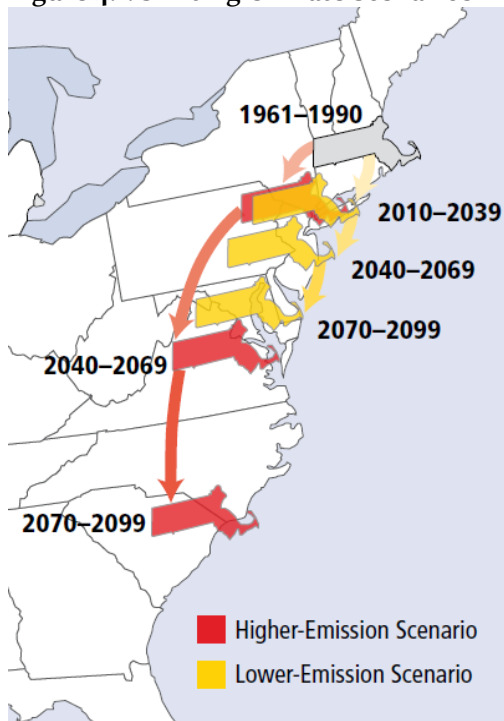
Chapter 4: Hazard Identification and Analysis

The following section includes a summary of hazards that have affected or could affect Brimfield. 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 on the Town of Brimfield. 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

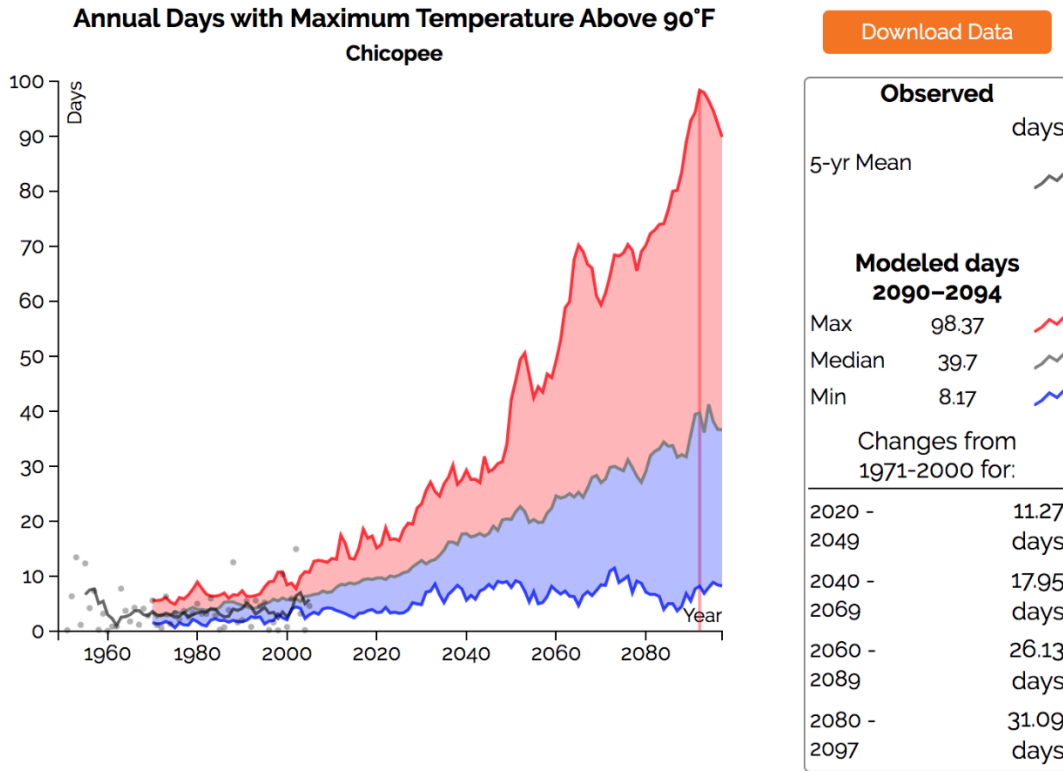
Climate projections from the Northeast Climate Science Center at the University of Massachusetts show with more certainty than ever that these changes can be expected to continue. Projections are based on simulations from the latest generation of climate models from the Intergovernmental Panel on Climate Change and scenarios of future GHG emissions, and are downscaled to the watershed and county level across the Commonwealth of Massachusetts.¹

Brimfield lies within both the Chicopee River and Quinebaug River Basins, 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 approximately 47 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 Chicopee 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.

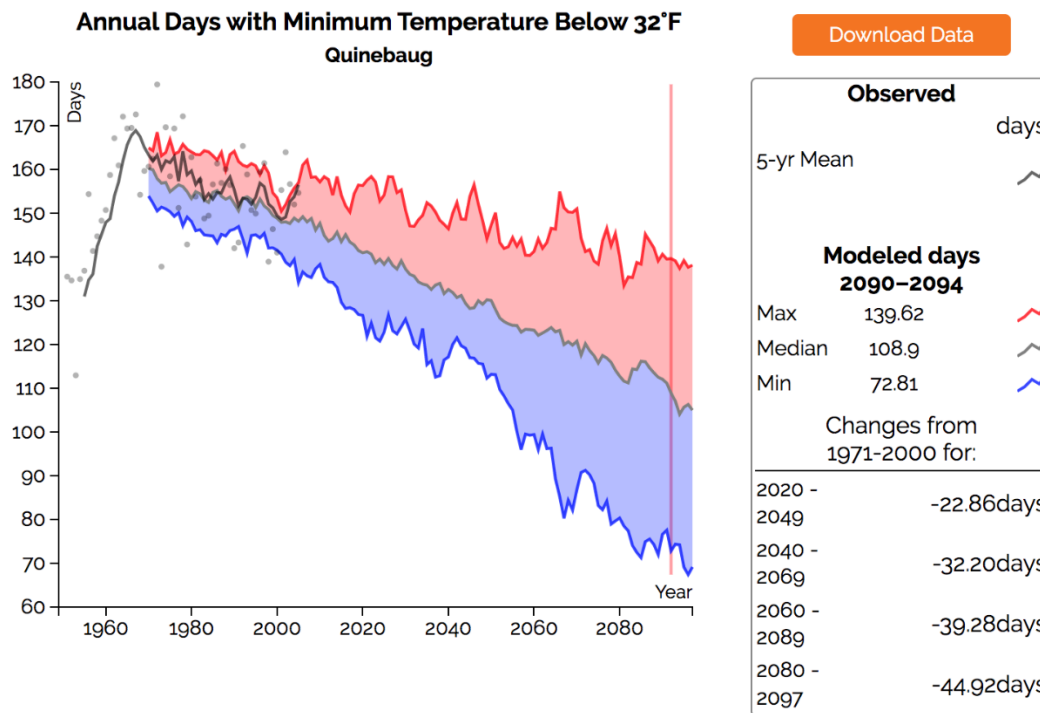
¹ <https://resilientma.org/datagrapher>

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 155 days in the Quinebaug River Basin to possibly only 72 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 annual days below 32°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 Hampden 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 Hampden 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 adaptive 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 amounts 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 Plan

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.

The 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan ([ResilientMass Plan](#)) is an update to the 2018 plan and was released in October 2023. Some of the updates to the 2018 plan include the addition of changes in groundwater to the natural hazard assessment, incorporation of updated climate and hazard information and data, and the inclusion of new data and mapping regarding environmental justice and other priority populations.

Table 4.1: Natural Hazards and Climate Change Interactions

Primary Climate Change Interaction	Natural Hazard	Other Climate Change Interactions	Representative Climate Change Impacts
 <p>Changes in Precipitation</p>	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	
 <p>Sea Level Rise</p>	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	
 <p>Rising Temperatures</p>	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	
 <p>Extreme Weather</p>	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

Not all hazards included in the 2018 or 2023 SHMCAP apply to the Town of Brimfield. Given Brimfield’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 Brimfield 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.

The 2023 SHMCAP adds Changes in Groundwater as a hazard, as mentioned above. It also breaks down the impacts of hazards by consequences to humans, to the economy, and to the natural environment. The chart below from the ResilientMass Plan illustrates how the risk assessment in the plan rated the magnitude of the impacts from very high to very low (for the state as a whole).

Table 5.1-4. Magnitude of Consequences

	<i>Human</i>	<i>Economic</i>	<i>Natural Environment</i>
Average/Extreme Temperatures	Very high	Medium	Very high
Changes in Groundwater	High	Medium	High
Coastal Erosion	High	Medium	High
Coastal Flooding	High	High	High
Drought	High	High	High
Earthquakes	High	Medium	Low
Flooding from Precipitation	Very high	High	Medium
- <i>Dam Overtopping</i>	High	Medium	Low
Hurricanes/Tropical Cyclones	Very high	High	Medium
Invasive Species	Medium	High	Very high
Landslides/Mudflows	High	Low	Medium
Other Severe Weather	High	Low	Low
Severe Winter Storms	Very high	Low	Low
Tornadoes	High	Medium	Medium
Tsunamis	Very high	High	Very high
Wildfires	High	Medium	Medium

ResilientMass Plan 2023

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 Brimfield. The hazard profiles were updated with information from the 2018 and 2023 Massachusetts SHMCAPs 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 Brimfield 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 wildfires. Classifications are based on the area that would potentially be affected by the hazard, on the following scale:

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

Extent of Impacts, Magnitude of Multiple Impacts of Given Natural Hazard	
Extent of 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.

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 Brimfield, 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 residential structures in Brimfield (\$378,658,900 according to October 2023 data from the Brimfield Assessors Office), along with the median value of a home in Brimfield, which was \$350,000 in September, 2023.

According to the 2021 ACS, the average household size in Brimfield is 2.5 persons, and there are approximately 1,500 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.

Vulnerability Assessment Methodology

In order to determine estimated losses due to natural hazards in Brimfield, 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 structures in Brimfield (2023): \$378,658,900

Median value of an owner-occupied home in Brimfield (2023): \$350,000

Average household size: 2.5 persons (across roughly 1,500 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.

Natural Resources and Environment

The natural resources and environment sector includes land-based assets in the Town. It also includes key habitats and natural landscapes documented in Brimfield'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 Brimfield.

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.

Hazard Index Rating

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 (highest risk) through 5 (lowest risk). The ranking is qualitative and is based, in part, on local knowledge of past experiences with each type of hazard. The size and impacts of a natural hazard can be unpredictable. 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 below shows the hazard risk rankings the Core Team identified for Brimfield based on these four criteria. 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.

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

Table 4.2: Hazard Profiling and Risk Index Worksheet

Type of Hazard	Location	Extent/Impact	Previous Occurrences	Probability of Future Events	Hazard Risk Index Rating
Flooding (localized)	Medium	Minor	Yes(extensive)	Very High	1
Flooding (100-year)	Large	Limited	Yes	Low	2
Severe Snow/Ice Storms	Large	Limited	Yes	Very High	1
Wildfire/Brushfire	Small	Minor	Yes	High	3
Tornado/Microburst	Small/Medium	Catastrophic	Yes	Moderate	1
Hurricanes/Severe Wind	Large	Minor	Yes (minimal)	Very Low	4
Earthquake	Large	Catastrophic	No	Very Low	4
Dam Failure	Small	Minor	No	Very Low	5
Drought	Small	Minor	Yes	Low	4
Extreme Temperatures	Large	Minor	Yes	Very High	3

The following is a description of natural disasters and the areas affected by them, that have in the past or could in the future affect the Town of Brimfield.

Flooding

There are three major types of storms that bring precipitation to Brimfield. Continental storms that originate from the west continually move across the region. These storms are typically low-pressure systems that may be slow-moving frontal systems or more intense, fast-moving storms. Precipitation from coastal storms, also known as nor’easters, that travel into New England from the south constitute the second major storm type. In the late summer or early fall, the most severe type of these coastal storms, hurricanes, may reach Massachusetts and result in significant amounts of rainfall. The third type of storm is the result of local convective action. Thunderstorms that form on warm, humid summer days can cause locally significant rainfall.

Floods can be classified as either flash floods, which are the product of heavy, localized precipitation in a short time period over a given location or general floods, which are caused by precipitation over a longer time period in a particular river basin. There are several local factors that determine the severity

of a flooding event, including: stream and river basin topography, precipitation and weather patterns, recent soil moisture conditions, amount of impervious surface area, and the degree of vegetative clearing. Furthermore, flooding can be influenced by larger, global climate events. Global warming and climate change have the potential to shift current rainfall and storm patterns. Increased precipitation is a realistic result of global warming, and could potentially increase the frequency and intensity of flooding in the region. Currently, floods occur and are one of the most frequent and costly natural hazards in the United States.

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).

In contrast, general flooding events may last for several days. 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).

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. In addition to damage of buildings directly in the floodplain, development can result in a loss of natural flood storage capacity and can increase the water levels in water bodies. Flood levels may then increase, causing damage to structures not normally in the flood path.

The Floodplain Map for the Town of Brimfield shows the 100-year and 500-year flood zones identified by FEMA flood maps. The 100-year flood zone is the area that will be covered by water as a result of a flood that has a one percent chance of occurring in any given year. Likewise, the 500-year flood has a 0.2 percent chance of occurring in any given year. In Brimfield, the main concentration of floodplain is within the southeastern corner of town – around the East Brimfield Reservoir and Pork Barrel and Green Ponds, following the Quinebaug River. An arm of this floodplain also stretches northeasterly toward the town center, following along Mill Brook. The other major floodplain area is around the Quaboag River on the western border of town. Other smaller 100-

year floodplains exist, including the area along East Brook, Sherman Brook, and Sherman Pond, as well as along Wales Brook, and along Hollow Brook.

Most of the floodways in Brimfield are narrow, fewer than 400 feet wide, because the town's hilly topography and rocky terrain do not permit the formation of broad floodplains. However, the major floodplain area around the Quinebaug River, especially near Pork Barrel Pond and Green Pond in the southeastern corner of town, is much wider.

Most of the major floods recorded in Western Massachusetts during the 20th century have been the result of rainfall alone or rainfall combined with snowmelt. Brimfield has experienced many flooding events over the last decade. However, generally these small floods have had minor impacts, temporarily impacting roads and residents' yards, as well as resulting in flooded basements.

As described above, flooding can happen on a range of scales. For the purposes of this analysis, the hazard has been broken into two separate types – Flooding (100-year) and Flooding (localized). Risk and vulnerability assessment for these separate types of flooding are analyzed below.

Flooding (100-year base flood)

There are approximately 127 structures within the FEMA mapped 100-year floodplain and 69 structures within the 500-year floodplain within the Town of Brimfield. All structures within the 100-year floodplain are also considered to be in the Special Flood Hazard Area (SFHA). The assessed value of all of the structures within the SFHA is \$27,524,400, and the assessed value for all structures within the 500-year floodplain is \$15,185,500. At this time the Town of Brimfield has no repetitive loss properties as defined by FEMA's NFIP.

Location

The areas subject to riverine flooding include Washington Road, Dunhamtown Palmer Road, East Hill Road, Cubles Drive, Five Bridge Road, Brookfield Road, and Old Palmer Road.

Flooding (localized)

In addition to the floodplains mapped by FEMA for the 100-year and 500-year flood, Brimfield often experiences localized flooding at isolated locations due to drainage problems, or problem culverts.

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.

Location

The locations prone to localized flooding include Dunhamtown Palmer Road, Cubles Drive, Brookfield Road at #231 and #1024, Hastings Lane, East Hill Road, and Hall Road.

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. Locations with problematic culverts that are prone to flooding are listed in the Critical Facilities table on p. 21.

Most of the flood hazard areas listed here were identified due to known past occurrences in the respective area. There are many areas with no record of previous flood incidents that could be affected in the future by heavy rain and runoff. Additionally, a number of culverts are also impacted by beavers, so localized flooding at those culvert crossings could be significantly worse if the beaver dams gave way.

Extent

Water levels in Brimfield'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. The average annual precipitation for Brimfield and surrounding areas in Western Massachusetts is 47 inches.

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.

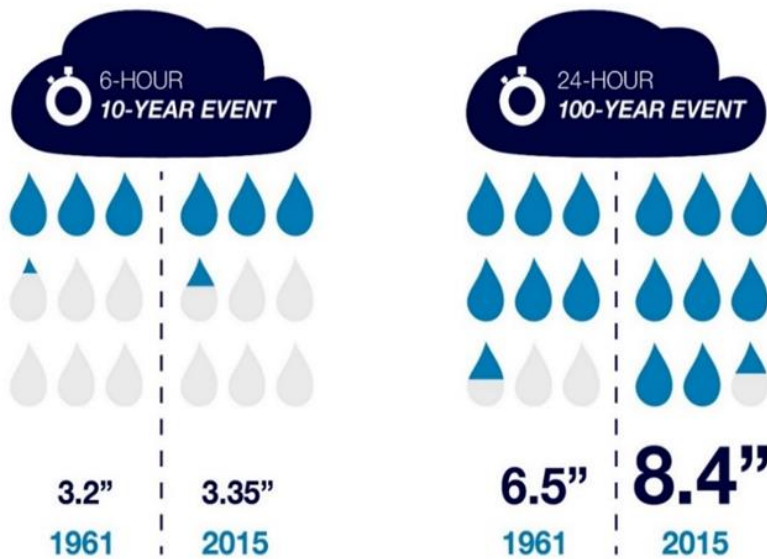


Figure 4.5 Stormwater Design Standards (Source: NOAA TP-40, 1961 and NOAA Atlas Volume 10, 2015)

Previous Occurrences

Minor local flooding occurs almost every year in the springtime. There have been limited occurrences of severe flooding. The August 1955 flood is considered to be the worst flood Brimfield has experienced in modern times. The flood was caused by Hurricanes Connie and Diane, which occurred days apart; During August 11-16, total rainfall ranged from 2 to 9 inches. This storm was followed by rainfall of from 2 to 19 inches from Hurricane Diane during August 17-20. Impacts in Brimfield included the failure of the Wheeler Pond Dam, which contributed to additional levels of flooding and damage to homes. Flooding in July 2021 seriously impacted the Flea Market, but there was limited damage to permanent structures.

A secondary impact from flooding is septic systems failing their Title V inspections. This was primarily due to heavy precipitation and flooding causing saturation of the drain field and wastewater overflowing septic tanks. There were 10 septic systems that failed in 2021 and 12 systems that failed in 2022.

Probability of Future Events

Based on local knowledge and experience, there is a very high probability of localized flooding every spring and a low probability of general (riverine) flooding.

Impact

The Town faces minor impacts from localized flooding, with minimal damage to structures, and a limited impact from general flooding, with more than 10% of property in the Town damaged or destroyed, or possibly 100% of structures in the SFHA damaged or destroyed.

To approximate the potential impact to property and people that could be affected by this hazard, the total value of all structures in SFHA, \$27,524,400 is used. An estimated 25% percent of damage could occur to 100 percent of structures in the SFHA, resulting in a total of \$6,881,100 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, Brimfield faces a hazard risk index rating of “1 – Very High Risk” from localized flooding and “2-High Risk” from general flooding. Although the impact of flooding in Brimfield is limited, the very high probability of occurrence and the number of structures affected increase the level of risk.

Severe Snow/Ice Storms

Severe winter storms can pose a significant risk to property and human life because the rain, freezing rain, ice, snow, cold temperatures and wind associated with these storms can disrupt utility service, phone service, and make roadways extremely hazardous. Severe winter storms can also be deceptive killers. The types of deaths that can occur as a result of a severe winter storm include: traffic accidents on icy or snow-covered roads, heart attacks while shoveling snow, and hypothermia from prolonged exposure to cold temperatures.

Infrastructure and other property are also at risk from severe winter storms and the associated flooding that can occur following heavy snow melt. Power and telephone lines, trees, and telecommunications structures can be damaged by ice, wind, snow, and falling trees and tree limbs. Icy road conditions or roads blocked by fallen trees may make it difficult to respond promptly to medical emergencies or fires.

Location

Severe winter weather occurs regionally and therefore would impact the entire town.

Any severe winter weather incident can cause critical snow and ice hazards at several points along roads in the northern portion of Town. This is due to significant grade and a dangerous turns, causing driving difficulties and impairing visibility.

Extent

New England generally experiences at least one or two severe winter storms each year with varying degrees of severity. Climate change is likely to cause higher overall temperatures in the winter, resulting in less snow overall, but more rain, sleet, and ice. Because of additional moisture in the atmosphere, when there are snowstorms, they may be more severe. In addition, there will likely be more repeated freezing and thawing of roads, resulting in worse road conditions and increased need for repair and maintenance.

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 factor in the area affected by the snowstorm, the snow, and the number of people living in the path of the storm. The NESIS score 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

Brimfield's recent history has not recorded any loss of life due to the extreme winter weather, but there are usually several incidents of property damage or personal injury each winter. In addition, during heavy snow years, accumulations can reach several feet deep. Brimfield's historic road network often creates some steep grades, dangerous intersections, or narrow throughways, sometimes

making plowing difficult and causing snow and ice hazards. The October 2011 Ice storm resulted in many limbs down and power outages in the north side of town for a week.

Based on data available from the National Oceanic and Atmospheric Administration, Brimfield has experienced 14 winter storms 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 Table 4.2 below in order of their NESIS severity. Since 2000 there have been seven federally declared disasters for winter weather affecting Hampden County. These are listed in Table 4.3 below. Additional historically significant winter storms affecting Brimfield include the Great Snow of 1717 and the Blizzard of 1888.

Table 4.2: Winter Storms Producing Over 10 inches of Snow in the Pioneer Valley, 2010 -2022			
Date	NESIS Value	NASIS Category	NESIS Classification
12/13/2022	8.52	4	Crippling
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
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

Table 4.3: Federal Disaster Declarations for Winter Weather Affecting Hampden 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	All 14 Massachusetts Counties

		Hazard Mitigation Grant Program	
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

Probability of Future Events

Based on the NESIS scale and previous events in Brimfield, as well as the likely effects of climate change, there is a very high probability of a severe snow or ice storm affecting the Town in any given year.

Impact:

The Town faces a limited impact from severe snow and ice storms, with more than 10% of property damaged or destroyed, and minor injuries likely.

To approximate the potential impact to property and people that could be affected by this hazard, the total value of all structures in town, \$378,658,900 is used. An estimated 20 percent of damage could occur to 10 percent of structures, resulting in a total of \$7,573,178 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, Brimfield faces a hazard risk index rating of “1 – Very High Risk” from severe snow and ice storms. Although the impact is limited, the very high probability of occurrence and the large area affected increase the level of risk. The entire town is vulnerable to the impacts of severe snow and ice. The Town’s energy and communication infrastructure is vulnerable, as snow and ice storms can cause power outages across the region. Ice buildup on roadways has been known to make winter travel challenging and could impact evacuation efforts if needed.

Hurricanes / Severe Wind

Hurricanes are violent rainstorms with strong winds that can reach speeds of up to 200 miles per hour, and 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. Climate change is increasing the threat of hurricanes as oceans and the atmosphere warms. Climate change research indicates that storms like hurricanes will become more intense and more frequent in the future. Severe wind can also occur in the absence of a hurricane, especially impacting mountain tops.

Location

All of Brimfield is at risk from hurricanes with ridgetops more susceptible to wind damage and the flood-prone portions of town to flooding from the heavy rains.

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, shown in the table below, which rates hurricane wind intensity on a scale of 1 to 5, with 5 being the most intense.

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

Previous Occurrences

Hurricanes and tropical storms that have affected Brimfield and western Massachusetts are shown in the table below. Hurricane Carol and the Great Hurricane of 1938 were category 3 storms, with winds ranging from 111-129 mph and the potential for major structural damage to homes, the destruction of mobile homes, and significant flooding. The 1938 hurricane was a major event with wind damage and flooding statewide, disruption of power and phone services, and flooding and washing out of evacuation routes. Hurricanes Donna, Gloria and Bob were category 1-2 storms, with winds ranging from 74-110 mph and the potential for some roofing or window damage to buildings, damage to unanchored mobile homes, trees, or poor construction, and/or some minor flooding. While these hurricanes were rated at these categories when they made landfall in Massachusetts, they were not necessarily at that strength once they reached western Massachusetts.

Between 1954 and 2020, Hampden County was included in 5 FEMA-declared severe Hurricane/Tropical Storm-related disasters (DR) or emergencies (EM) classified as one or a combination of the following hazards: hurricane and tropical storm. Ludlow may not have been impacted by all of these events. Hurricanes that have affected the Pioneer Valley are shown in Table 4.4 below.

Table 4.4: Major Hurricanes and Tropical Storms Affecting Brimfield		
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

Probability of Future Events

Based upon the past events, it is reasonable to say that there is a very low probability of major hurricanes affecting Brimfield in any given year.

Impact

The Town faces a “minor” impact from hurricanes, with minor property damage and very few injuries, if any. The main risk during a hurricane or tropical storm would be localized flooding or possible flooding in 100-year floodplains. Wind damage would likely be limited, although there could be downed power lines. Brimfield’s location in Western Massachusetts reduces the risk of extremely high winds that are associated with hurricanes, although it can experience some high wind events. During severe wind events, the Town has experienced small blocks of downed timber and uprooting of trees onto structures. Using a total a value of all structures in town of \$378,658,900, wind damage of 10 percent with 5 percent of structures damaged would result in an estimated \$1,893,295 of damage. An additional estimated flood damage to 5 percent of the structures with 10 percent damage to each structure would also result in \$1,893,295 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, Brimfield faces a hazard risk index rating of “4 – low risk” from hurricanes and tropical storms.

Severe Thunderstorms/Tornadoes / Microbursts

A thunderstorm is a storm with lightning and thunder produced by one or more cumulonimbus clouds, usually producing gusty winds, heavy rain, and sometimes hail. Effective January 5, 2010, the National Weather Service (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).

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 Hampden County.

Of additional concern are microbursts, which often do tornado-like damage and can be mistaken for tornadoes. In contrast to the upward rush of air in a tornado, air blasts rapidly downward from thunderstorms to create microbursts. Microbursts and tornadoes are expected to become more frequent and more severe as the earth’s atmosphere warms due to climate change.

Location

All of Brimfield is potentially at risk from severe thunderstorms, tornadoes, and microbursts, although likely a small to medium sized area would be affected. The hazard area for tornadoes in Brimfield would

vary according to the intensity and size of the tornado. There have not been enough tornadoes in Brimfield to accurately predict sections of town that are more likely to experience a tornado.

Extent

An average thunderstorm is 15 miles across and lasts 30 minutes; severe thunderstorms can be much larger and longer. Brimfield 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

Previous Occurrences

Because thunderstorms and wind affect the Town regularly on an annual basis, there are not significant records available for these events. 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 Brimfield.

In Western Massachusetts, the majority of sighted tornadoes have occurred in a swath of eastern Hampden County that includes Brimfield, known as “tornado alley.” Nineteen incidents of tornado

activity occurred in Hampden County between 1956 and 2020 (three of these incidents part of the 2011 tornado, which touched down in multiple locations). These are listed in Table 4.5 below.

On June 1, 2011, an EF3 tornado tore through communities in Hampden and Worcester counties for approximately 38 miles. The tornado reached its maximum width of approximately a half mile while going through Brimfield. A total of 39 houses were destroyed in the town, as well as 120 campers at the Village Green Campground. A woman at the campground died when her trailer was thrown into the air, one of three individuals in western Massachusetts to be killed during the tornado. According to State officials, approximately one-third of the 3,500-acre Brimfield State Forest was damaged, with more than 1,000 broken trees.

County	Date	Event	Scale	Deaths	Injuries	Property Damage
Hampden	6/1/1956	Tornado	F1	0	0	250000
Hampden	6/1/1956	Tornado	F1	0	0	25000
Hampden	6/1/1956	Tornado	F1	0	0	25000
Hampden	9/12/1956	Tornado	F1	0	0	250
Hampden	6/26/1958	Tornado	F1	0	0	250
Hampden	7/21/1963	Tornado	F0	0	0	2500
Hampden	8/11/1966	Tornado	F2	0	0	250000
Hampden	7/19/1968	Tornado	F0	0	0	250
Hampden	10/3/1970	Tornado	F1	0	0	0
Hampden	8/9/1972	Tornado	F1	0	0	2500
Hampden	9/14/1972	Tornado	F1	0	0	2500
Hampden	7/24/1975	Tornado	F2	0	0	25000
Hampden	6/29/1977	Tornado	F1	0	0	0
Hampden	8/10/1979	Tornado	F1	0	1	25000
Hampden	6/24/1992	Tornado	F0	0	0	0
Hampden	6/1/2011	Tornado	EF3	3	200	2.28E+08
Hampden	6/1/2011	Tornado	EF1	0	0	0
Hampden	6/1/2011	Tornado	EF1	0	0	0
Hampden	8/2/2020	Tornado	EF0	0	0	45000

Source: NOAA National Center for Environmental Information, Storm Events Database

Probability of Future Events

As per the 2018 SHMCAP, there are approximately 10 to 30 days of thunderstorm activity in the state each year. 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). There are on average eight tornadoes per year in New England, with two or three of those in Massachusetts. However, in the past few years, Massachusetts has seen an increasing number of tornadoes. On just one day, August 18, 2023, five tornadoes touched down in southern New England – three in Massachusetts, one in Connecticut and one

in Rhode Island. And additionally, two other tornadoes touched down in Massachusetts in 2023 – one in July and one in early August.

Based upon past events as well as taking into account the impacts of climate change, it is reasonable to say that there is a moderate probability of severe thunderstorms, tornadoes, or microbursts occurring in Brimfield.

Impact

Overall, the Town faces a limited impact from severe thunderstorms, with 10% of property affected and only minor injuries, but a potentially catastrophic impact from tornadoes, with multiple deaths and injuries possible, and more than 50% of property in affected areas damaged or destroyed.

The potential for locally catastrophic damage is a factor in any tornado or severe thunderstorm event. Most buildings in Brimfield have not been built to Zone 1, Design Wind Speed Codes. The first edition of the Massachusetts State Building Code went into effect on January 1, 1975, with most of the Town's housing built before this date.

Using a total value of \$378,658,900 of all structures in Brimfield, an estimated 20 percent of damage to 10 percent of structures could result from thunderstorms, with estimated total damages of \$7,573,178. An estimated 100% of damage to 5% of structures from tornadoes could occur, with a estimated total damages of \$18,932,945. This estimate does not include building contents, land values or damages to utilities.

Vulnerability

Based on the above assessment, Brimfield has a vulnerability of "1 – Very High" from severe thunderstorms, tornadoes, and microbursts. Town residents and infrastructure are vulnerable to the destruction caused by wind and flooding from severe thunderstorms and extreme wind from tornadoes and microbursts.

Wildfires / Brushfire

According to FEMA, there are three different classes of wildland fires: surface fires, ground fires and crown fires. The most common type of wildland fire is a surface fire that burns slowly along the floor of a forest, killing or damaging trees. A ground fire burns on or below the forest floor and is 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.

While wildfires or brushfires have not been a significant problem in Brimfield, there is always a possibility that changing land use patterns and weather conditions will increase a community's vulnerability. For example, drought conditions can make forests and other open, vegetated areas more vulnerable to ignition. Once the fire starts, it will burn hotter and be harder to extinguish. Soils and root systems starved for moisture are also vulnerable to fire.

Residential growth in rural, forested areas increases the total area that is vulnerable to fire and places homes and neighborhoods closer to areas where wildfires are more likely to occur. Global climate changes may also influence precipitation patterns, making the region more susceptible to drought and therefore, wildfires.

Hampden County has approximately 273,000 acres of forested land, which accounts for 67% of total land area. Forest fires are therefore a potentially significant issue. In Brimfield, approximately 78% of the town's total land area is in forest, or about 17,803 acres, and is therefore at risk of fire.

Location

As close to 80% of Brimfield is forested, the entire town is therefore at risk of wildfires, although the forested areas and homes closest to forests are most at risk.

Extent

The Brimfield Fire Department reports that it has records of only small brushfires covering less than a few acres at the most. All of these fires permitted burns that got out of control.

However, moderate risk exists for potential wildfire incidents due to the extensive forest cover. Forested and agricultural areas with high fuel content have more potential to burn. In addition, it is often very difficult to access some of the locations to extinguish the brushfire. Wildfires can cause widespread damage to the areas that they affect. They can spread very rapidly, depending on local wind speeds, and be difficult to get under control. Fires can last for several hours up to several days. In drought conditions, a brushfire or wildfire would be a greater matter of concern. The overall extent of wildfires is shown in Table 4.6 below.

Table 4.6: Wildfire Severity Rating		
Rating	Basic Description	Detailed Description
CLASS 1: Low Danger (L) Color Code: Green	Fires not easily started	Fuels do not ignite readily from small firebrands. Fires in open or cured grassland may burn freely a few hours after rain, but wood fires spread slowly by creeping or smoldering and burn in irregular fingers. There is little danger of spotting.
CLASS 2: Moderate Danger (M) Color Code: Blue	Fires start easily and spread at a moderate rate	Fires can start from most accidental causes. Fires in open cured grassland will burn briskly and spread rapidly on windy days. Woods fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel – especially draped fuel -- may burn hot. Short-distance spotting may occur, but is not persistent. Fires are not likely to become serious and control is relatively easy.
CLASS 3: High Danger (H) Color Code: Yellow	Fires start easily and spread at a rapid rate	All fine dead fuels ignite readily and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly and short-distance spotting is common. High intensity burning may develop on slopes or in concentrations of fine fuel. Fires may become serious and their control difficult, unless they are hit hard and fast while small.
CLASS 4: Very High Danger (VH) Color Code: Orange	Fires start very easily and spread at a very fast rate	Fires start easily from all causes and immediately after ignition, spread rapidly and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop high-intensity characteristics - such as long-distance spotting - and fire whirlwinds, when they burn into heavier fuels. Direct attack at the head of such fires is rarely possible after they have been burning more than a few minutes.
CLASS 5: Extreme (E) Color Code: Red	Fire situation is explosive and can result in extensive property damage	Fires under extreme conditions start quickly, spread furiously and burn intensely. All fires are potentially serious. Development into high-intensity burning will usually be faster and occur from smaller fires than in the Very High Danger class (4). Direct attack is rarely possible and may be dangerous, except immediately after ignition. Fires that develop headway in heavy slash or in conifer stands may be unmanageable while the extreme burning condition lasts. Under these conditions, the only effective and safe control action is on the flanks, until the weather changes or the fuel supply lessens.

Previous Occurrences

Illegal brushfires are somewhat common in Brimfield, but the vast majority are small and quickly contained. According to the Brimfield Fire Department, there were 15 brushfires in 2022, and six unauthorized or illegal burns. Burn permits are issued online. There is no record, authenticated or anecdotal, of any significant wildfires in Brimfield.

Probability of Future Events

Based upon past events as well as the probability of increasing temperatures and incidences of drought associated with climate change, it is reasonable to say there is a high probability of wildfires in Brimfield.

Impact

The impact from wildfires and brushfires in Brimfield would be minor, with only minor property damage and few to no injuries.

To approximate the potential impact to property and people that could be affected by a wildfire, the total value of all residential structures in town, \$378,658,900 is used. An estimated 50 percent of damage would

occur to 1 percent of structures, resulting in a total of \$1,893,295 worth of damage. This estimate does not include building contents, land values or damages to utilities.

Vulnerability

Based on the above assessment, Brimfield faces a hazard index rating of “3 – medium risk” from wildfires.

While most of the Town is forested, there are not any densely settled areas, which reduces the risk of damage to homes and injury to residents from a wildfire.

Earthquakes

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. 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. Earthquakes can occur suddenly, without warning, at any time of the year. New England experiences an average of 10 - 20 earthquakes each year, according to the Boston College seismologist John Ebel, although most are not noticed by people.²

Location

In the event of an earthquake, all of Brimfield would be affected with some portions more impacted than others, depending on the magnitude of the earthquake and the underlying population density.

Extent

Massachusetts introduced earthquake design requirements into their building code in 1975. 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 1975 may not have been designed to withstand the forces of an earthquake. The seismic standards were upgraded with the 1997 revision of the State Building Code.

Modified Mercalli Intensity Scale and Effects			
Scale	Intensity	Description Of Effects	Corresponding Richter Scale Magnitude
I	Instrumental	Detected only on seismographs.	
II	Feeble	Some people feel it.	< 4.2

² <https://www.bc.edu/bc-web/schools/mcas/departments/eesc/people/faculty-directory/john-ebel.html>

Modified Mercalli Intensity Scale and Effects			
Scale	Intensity	Description Of Effects	Corresponding Richter Scale Magnitude
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

Previous Occurrences

Nineteen earthquakes, intensity V (Modified Mercalli scale) or greater, have centered in Massachusetts since it was colonized by Europeans. A shock in 1755 reached intensity VIII at Boston and was felt across the State. In addition, Massachusetts was affected by some of the more severe Canadian shocks plus the earthquake of 1929 that centered on Grand Banks of Newfoundland.

Tables 4.7 and 4.8 list all of the earthquakes that have affected the northeast region. Table 4.7 lists the largest magnitude earthquakes in New England over the last approximately 100 years, and Table 4.8 lists all of the earthquakes on record in the New England states and New York. None have been noted to cause any damage in Brimfield or the surrounding area.

Table 4.7: Largest Earthquakes in Northeast 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

Table 4.8: New England States Record of Historic Earthquakes		
State	Years of Record	Number Of Earthquakes
Connecticut	1668 - 2007	137
Maine	1766 - 2007	544
Massachusetts	1668 - 2007	355
New Hampshire	1638 - 2007	360
Rhode Island	1776 - 2007	38
Vermont	1843 - 2007	73
New York	1840 - 2007	755
<i>Total Number of Earthquakes within the New England states between 1638 and 1989 is 2262.</i>		

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

Probability of Future Events

Based upon the past events, it is reasonable to say that there is a low frequency of major earthquakes in Brimfield (there have been no earthquakes over 4.2 on the Richter scale in nearly 100 years). The possibility of a less severe earthquake affecting Brimfield in any given year is slightly greater, but these are unlikely to cause any significant damage.

Impact

The impact of an earthquake in Brimfield could be catastrophic, although it more likely that there would be a moderate amount of damage. To approximate the potential impact to property and people that could be affected by an earthquake, the total value of all residential structures in town, \$378,658,900 is used. An estimated 50 percent of damage would occur to 1 percent of structures, resulting in a total of \$1,893,295 worth of damage. This estimate does not include building contents, land values or damages to utilities.

Vulnerability

Based on the above assessment, Brimfield faces a hazard index rating of “4 – low risk” from earthquakes.

Dam Failure

Although dams and their associated impoundments provide many benefits to a community, such as water supply, recreation, hydroelectric power generation, and flood control, they also pose a

potential risk to lives and property. Dam failure is not a common occurrence, but dams do represent a potentially disastrous hazard. When a dam fails, the potential energy of the stored water behind the dam is released.

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

Many dams in Massachusetts were built in the 19th century without the benefit of modern engineering design and construction oversight. Dams can fail because of structural problems due to age and/or lack of proper maintenance. Dam failure can also be the result of structural damage caused by an earthquake or flooding brought on by severe storm events. Most earthen dam failures occur when floodwaters above overtop and erode the material components of the dam.

The Massachusetts Department of Conservation and Recreation (MA DCR) 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). Until 2002, DCR was also responsible for conducting dam inspections, however state law was then changed to place the responsibility and cost for inspections on the owners of the dams. This means that individual dam owners are now responsible for conducting inspections.

Location

According to DCR and MEMA sources, as well as local knowledge, there are currently nine (9) dams in Brimfield. The following table identifies the dams within the town, their owners, hazard risk classification, date of last inspection and condition.

Table 4.9: Dams in Brimfield					
Dam Name / Date Built	ID	Owner	Purpose	Condition / Last Inspected	Hazard Risk
Wheeler Pond Dam (Mill Lane Road Dam)	MA00077	Town of Brimfield	Recreation	Fair 11/13/2019	Significant EAP Status Date: 4/19/2022
Dean Pond Dam	MA00078	Commonwealth of MA / DCR	Recreation	Satisfactory 02/24/2020	Significant EAP Status Date: 07/09/2018
W.D. Cheney Dam	MA00076	Cheney Family Limited Partnership	Agricultural	Unknown / Unknown	Low Non-jurisdictional
Woodman Pond Dam	MA00529	Commonwealth of MA / DCR	Recreation	Fair 02/23/2017	Low
Dearth Hill Road Dam	MA02528	Commonwealth of MA / DCR	Recreation	Fair 03/30/2017	Low

Little Alum Pond Dam	MAo2713	Town of Brimfield	Unknown	Not required	Non-jurisdictional
Butler Dam	MAo2716	Commonwealth of MA / DCR	Unknown	09/18/2006	Non-jurisdictional
Boys Club Dam	MAo2712	Boys Club of Brimfield	Recreation	Unknown	Non-jurisdictional
No name recorded	MAo2714	Thomas & Sarah Scrivner	Unknown	Unknown	Non-jurisdictional

Extent

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. The state has four 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.
- Non-jurisdictional: The storage capacity of the impoundment and height of dam are such that they need not be regulated.

The inspection schedule for dams is as follows:

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

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

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

Previous Occurrences

The Wheeler Pond Dam was destroyed in 1955 during flooding caused by Hurricane Diane. It is unknown how much damage was caused by that dam failure. The dam was rebuilt by the state, and ownership was turned over to the Town.

Probability of Future Events

Based upon past events as well as the probable impacts of climate change, it is reasonable to say that there is a very low probability of dam failure occurring in Brimfield.

Impact

The impact of dam failure on the Town would be minor, with few to no injuries, and a limited amount of damage from flooding. The two dams assessed as “significant hazards” are in fair and satisfactory condition, and are being monitored by the community.

If the Wheeler Dam failed, an estimated 29 residential structures and 7 commercial structures would be affected. Routes affected include Palmer Road/Main Street, Wales Road, Haynes Hill Road, and Mill Road.

The Dean Pond dam is located away from structures and would not be anticipated to cause damage to residences or commercial structures if it failed.

Vulnerability

Based on the above assessment, and the low probability and probably impact from two significant hazard dams in the Town, Brimfield faces a hazard index rating of “5 – very low risk” from dam failure.

Drought

Drought is a normal, recurrent feature of climate that 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. Normally the incidence of drought in Massachusetts is fairly low, however, occurrences of drought are increasing with the effects of climate change. While climate change is causing an increase in average yearly precipitation, more precipitation is occurring in intense one- or two-day events, and the number of dry days is also increasing.

Reduced crop, rangeland, and forest productivity, increased fire hazard, reduced water levels, increased livestock and wildlife mortality rates, and damage to wildlife and fish habitat are a few examples of the direct impacts of drought. Of course, these impacts can have far-reaching effects throughout the region and even the country.

Location

A drought would affect all of Brimfield.

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.

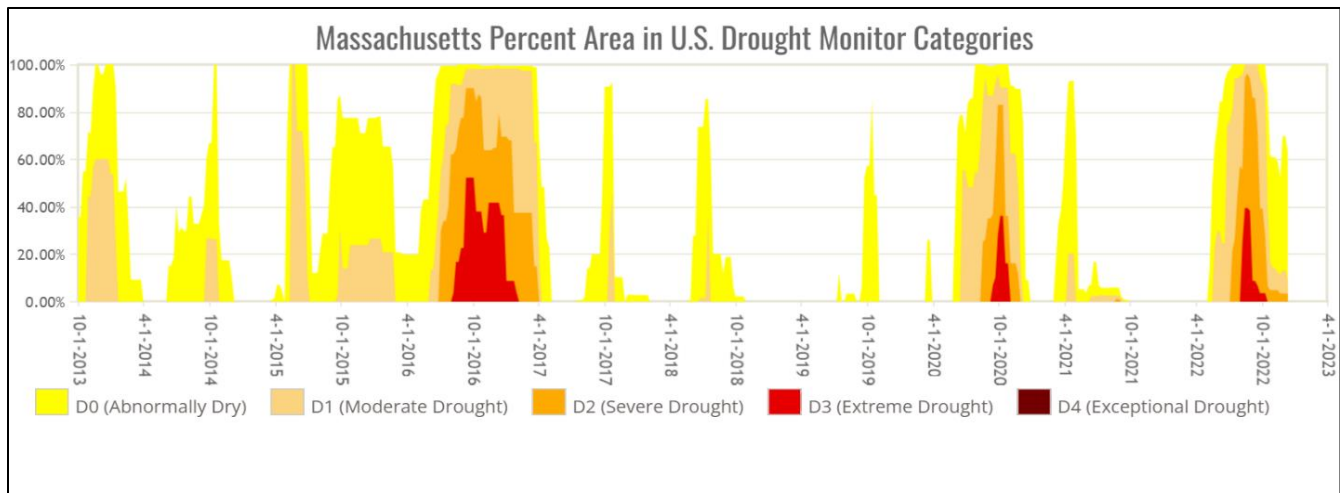
When evaluating the region’s risk for drought on a national level, utilizing a measure called the Palmer Drought Severity Index, Massachusetts is historically in the lowest percentile for severity and risk of drought. Even so, there have been several years of drought-like conditions in Western Massachusetts, and the frequency is likely increasing with the effects of climate change. Predicted changes in precipitation include an increase in the number of consecutive days without precipitation, and this coupled with projected increases in temperatures will increase the probability of more severe and longer-lasting droughts. Additionally, even minor droughts will increase the risk of wildfire, especially in areas of high recreational use.

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

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

Previous Occurrences

Massachusetts has suffered significant droughts several times in the last century, with three major droughts within the last 10 years (2016-2017, 2020, and 2022). Other major droughts occurred in 1929-1932, 1939-1944, 1961-1969, and 1980-1983. In many of these droughts, water-supply systems in some communities were found to be inadequate. Water was piped into urban areas, and water-supply systems were modified to permit withdrawals at lower water levels. Additionally, even minor droughts will increase the risk of wildfire, especially in areas of high recreational use. The following table indicates previous occurrences of drought in Massachusetts since 2000, based on the US Drought Monitor:



Source: US Drought Monitor, 2023

The Town of Brimfield has had limited experience with severe drought conditions in the past, but that is changing with the impacts of climate change. Residents of Brimfield are vulnerable to droughts as they depend on private wells for their water supply, and shallow wells may fail during severe drought conditions. In 1930, drought conditions caused urban areas to permit withdrawals at lower water levels, including from the Quaboag River in West Brimfield. There is some history of residents' wells drying up, mostly due to increased development nearby. There have also been more recent well failures due to low water levels during drought conditions. There were 18 permits for new wells issued in 2021 and 22 permits for new wells in 2022.

Probability of Future Events

Based upon past events as well as the likelihood of impacts from climate change, it is reasonable to say that there is a low probability of drought occurring in Brimfield.

Impact

The impact of drought on the Town would be minor, with no injuries and limited damage to infrastructure. The most significant damage would be to private wells, some of which could fail during an extended and severe drought, as well as to agricultural operations.

Vulnerability

Based on the above assessment, Brimfield faces a hazard index rating of “4 – low risk” from droughts.

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. Climate change is causing average temperatures to increase, and also causing more extreme heat. As discussed on pp 24-25, climate projections indicate a possible 2,000% (60 day) increase in days over 90 degrees per year by the end of the century from a baseline average of three days per year.

Extreme Cold

Extreme cold does not have a threshold temperature, but rather is defined as a prolonged period of excessively cold weather. The National Weather Service issues a wind chill advisory when the wind chill index is between -15° and -24° for at least three hours (see Figure 4.3- wind chill chart below). A wind chill warning is issued when the wind chill index is below -25° for at least three hours. In Massachusetts, where temperatures regularly go below freezing during winter months, the community is often accustomed 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 Brimfield, 20.6% of the population is over 65 years old and 14.1% of the population has a disability (American Community Survey, 2021).

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.

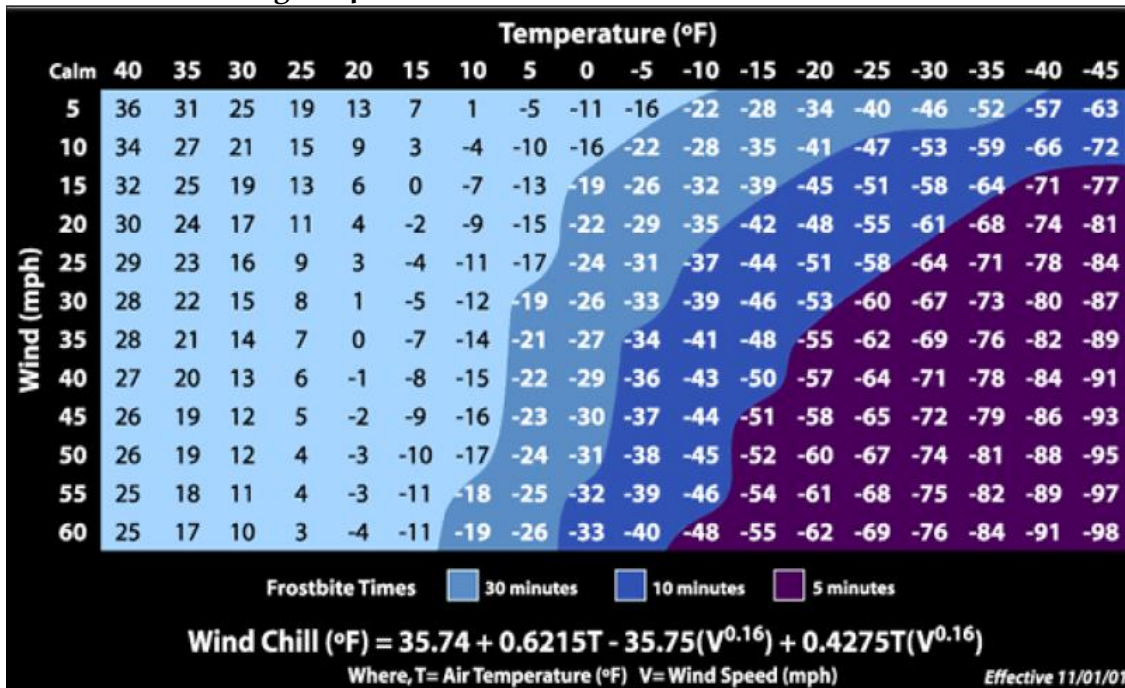
Extent

Extremely cold temperatures are measured using the Wind Chill Temperature Index provided by the NWS. The updated index was implemented in 2001 and helps explain the impact of cold temperatures on unexposed skin, as described on Figure 4.10.

According to NOAA's NCEI Storm Events Database records for extreme cold events Massachusetts experienced 20 extreme cold and wind chill events between 2000 and September 2020. None of these events were reported for Hampden County, however.³

³ 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&ort=DT&submitbutton=Search&statefips=25%2CMASSACHUSETTS

Figure 4.10 Extreme Cold and Wind Chill Index



Source: National Weather Service

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

The NWS issues a Heat Advisory when the Heat Index (Figure 4.4) 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.

Figure 4.11 Heat Index Chart

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

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 (CDC), 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 NCEI Storm Events Database provides data on extreme heat and cold events. 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 Hampden County.⁴ During this same time period, there were three extreme cold events reported for Eastern Hampden County, in 2015, 2016, and 2019.

⁴ https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28Z%29+Excessive+Heat&beginDate_mm=11&beginDate_dd=01&beginDate_yyyy=1999&endDate_mm=11&endDate_dd=30&endDate_yyyy=2021&

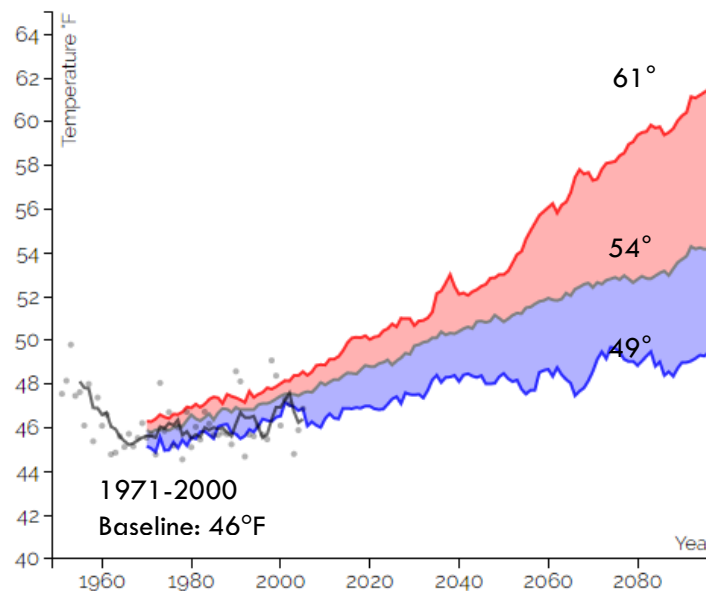
Extreme temperatures are classified as medium frequency events. As defined by the 2013 State Hazard Mitigation Plan, these events occur from once in 5 years to once in 50 years or have a chance of occurrence of 2% to 20% per year. According to the 2018 SHMCAP, between 4 and 5 heat waves (3 or more consecutive days of 90°F temperatures) occur annually in Massachusetts.

July is the hottest month in Brimfield and the average daytime high temperature in July is around 82°F (NEIC, 2021). January is typically the coldest month, with an average high temperature of 33°F and an average low of 18°F. The Town of Brimfield 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 limited use of the Senior Center by residents as a cooling center during heat waves. The fact that many Brimfield residents do not have air conditioning was discussed during the CRB workshops. While there may not have been a great need for it in the past, as the occurrence of those high heat days increases, the need for air conditioning and the availability of a cooling center for those without it will increase.

Probability of Future Events

The baseline (1971-2000) average annual temperature for the Chicopee River Basin was 46° F , and by the end of the century it is predicted to rise between 4 and 15° F from that baseline, depending on greenhouse gas emissions, as shown in Figure 4.5 below. Both the average temperature and number of extreme heat days are predicted to increase in future climate conditions.

Figure 4.5: Projection for Annual Average Temperature in the Chicopee River Basin



Source: NE CASC, Massachusetts Climate Change Clearinghouse: <https://resilientma.mass.gov/>

The probability of future extreme heat and extreme cold occurring in Brimfield is considered to be "very high," or between 70 and 100 percent in any given year.

Impact

The impact of extreme heat or cold in Brimfield is considered to be "minor" with no property damage and very limited effect on humans. However, it is a hazard the Town needs to make sure residents are prepared for, as the projection is for days over 90° F in the Chicopee and Quinebaug River Basins to significantly

increase over the coming decades. 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. 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 and negative impacts on native plants and on pollinators that rely on plants flowering at particular times.

Vulnerability

Brimfield's vulnerability from extreme heat and cold is considered to be, "3 - Medium Risk."

Structures and infrastructure in town are not at significant risk for damage due to extreme temperatures, but populations that are not prepared to contend with these extreme temperatures could be highly vulnerable.

Chapter 5: Capability Assessment and Existing Mitigation Measures

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

The Town of Brimfield is already undertaking measures to mitigate local hazards. Chapter 5 documents the Town's current authorities, policies, programs, funding, and resources are available to support the mitigation strategy, and discusses potential improvements.

For the extent of this analysis, the Committee reviewed the following Town documents:

- Zoning Bylaw
- Subdivision Regulations
- Brimfield Community Development Plan - Open Space and Recreation Element
- CEM Plan
- Other relevant Bylaws as identified (Fire Department Burn Permit Procedures, Building Code, etc.)

This section of the plan serves to identify current mitigation strategies and recommend future mitigation strategies. This is done both generally, and by hazard type.

Table 5.1: Existing Mitigation Capabilities and Mitigation Measures in Brimfield

<i>Existing Mitigation Capabilities and Mitigation Measures</i>				
Strategy	Action Type	Description	Hazards Mitigated	Effectiveness / Improvements
Culvert Replacement	Capital Construction	Priority list of necessary culvert replacements and other construction projects to effectively manage flooding	Flooding	Somewhat effective. Need significant funding for top-priority projects.
Culvert and storm drain cleaning	Maintenance	Annual clearing out of culvert outfalls and storm drains.	Flooding	Effective. Done yearly.
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	Effective for preventing incompatible development within the flood prone areas
Open Space Communities	Zoning By-law	Provides regulations for cluster subdivision development by special permit. Allows protection of contiguous open space.	Flooding/Drought	Very effective if needed (not utilized because no subdivisions)
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 but rarely utilized
Special Permit/Site Plan Approval	Zoning By-law	Proposed uses must meet requirements for protection of wetlands, floodplain, slopes, vegetation, erosion and sedimentation, etc.	Flooding	Effective for preventing incompatible development
Site Plan Approval	Zoning By-law	Requires location and description of proposed water supply; Fire Department approval.	Wildfire/Brushfire	Effective
Procedural Requirements	Subdivision Regulations	Preliminary and definitive plans must include proposed drainage layout.	Flooding	Effective if needed -currently no subdivisions in Brimfield

<i>Existing Mitigation Capabilities and Mitigation Measures</i>				
Strategy	Action Type	Description	Hazards Mitigated	Effectiveness / Improvements
Design Standards	Subdivision Regulations	Clearing for Roads, Tree planting specifications	Flooding, Drought, Extreme Temperatures	Could be amended to reduce required road width and thus less tree clearing
Design Standards	Subdivision Regulations	Plans are reviewed to assure that proposals, public utilities, and facilities minimize flood damage, and adequate drainage is provided to reduce risk from flood hazards.	Flooding	Effective
Mobile Home/Trailer Regulations	Zoning By-law	Not more than one (1) house trailer, mobile home or trailer which contains sleeping and eating accommodations may be kept on any parcel of land. No house trailer, mobile home or trailer which contains sleeping and eating accommodations may be used as living quarters while so located.	Flooding/Severe Thunderstorms/Wind/Tornadoes/Microbursts	Effective
Preliminary and Definitive Plan	Subdivision Regulations	The Fire Chief, along with the Planning Board and all regulatory boards are involved in the review of the preliminary and definitive plan.	Wildfire/Brushfire	Effective when plans are submitted.
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

<i>Existing Mitigation Capabilities and Mitigation Measures</i>				
Strategy	Action Type	Description	Hazards Mitigated	Effectiveness / Improvements
Open Space and Recreation Plan	Planning Document	Inventories natural features and promotes natural resource preservation in the town, including areas in the floodplain; such as wetlands, groundwater recharge areas, farms and open space, rivers, streams and brooks. Makes recommendations for protecting Brimfield's water supply.	Flooding, Drought, Extreme Heat	Effective in identifying sensitive resource areas, including floodplains. Encourages forest, farmland protection, water quality protection and conservation, conserving the town's flood storage capacity. Work to implement relevant action items. Needs to be updated, add 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, updated in 2022
National Flood Insurance Program (NFIP) Participation	Operational Strategy	As of 6/2023 there were five active policies, and four previous losses with a total payment of \$41,431.99. In 2006, there were 15 policies, so participation has decreased.	Flooding	Effective.
State Building Code	Regulation	The town has adopted the state building code	Severe Snow/Ice/Severe Thunderstorms/Wind/Tornadoes/Microbursts/ Earthquakes	Effective for new buildings. Evaluate older structures categorized as critical facilities to determine if they are earthquake resistant.
Backup Electric Power	Operational Strategy	Elementary School, PSC	Severe Snow/Ice, Thunderstorms/wind, tornadoes/microbursts, earthquakes, extreme temperatures	Effective, but need generator for First Congregational Church (COA) so can be used as a secondary emergency shelter.

<i>Existing Mitigation Capabilities and Mitigation Measures</i>				
Strategy	Action Type	Description	Hazards Mitigated	Effectiveness / Improvements
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	Somewhat Effective. About 2,600 households enrolled. Need to increase enrollment.
Tree Management	Operational Strategy	List of dangerous trees created annually for National Grid.	Severe Snow/Ice/Severe Thunderstorms/Wind/Tornadoes/Microbursts	Somewhat effective, more work than funding and timing allows. Need additional funding. Consider changing abutter notification requirements
Burn Permit	Operational Strategy	Residents must obtain burn permits between January 15 th and May 1st, and personnel provide information on safe burn practices.	Wildfire/Brushfire	Somewhat Effective. Consider increasing enforcement of burning regulations, perhaps invoke penalties for offenders.
Public Education/Outreach	Education	The Fire Department conducts educational programs in the schools	Wildfire/Brushfire/All Hazards	Somewhat effective. The Town could increase outreach, put information on website and send mailings twice a year about fire safety and emergency preparedness
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.
Dam Inspections	Regulation	DCR has an inspection schedule that is based on the hazard rating of the dam.	Dam Failure	Effective

Chapter 6: Hazard Mitigation and Climate Adaptation Strategies

Status of 2011 Action Strategies

After the adoption of the 2011 HMP, the Town of Brimfield's Hazard Mitigation Committee took steps to ensure that there was progress on implementing the priority actions. The Committee also ensured that the findings from the 2011 HMP were incorporated into other relevant planning documents and processes, including the 2022 Comprehensive Emergency Management Plan.

The Core Team reviewed the mitigation actions from the 2011 Hazard Mitigation Plan to determine which actions had been completed, and which to keep in the updated plan if not completed. 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 2023 update.

Table 6.1: Status of Previous Mitigation Strategies

Priority	Mitigation Action	Responsible Department/Board	Proposed Completion Date	Status	Include in New Plan?
1	Seek funding to replace top priorities on culvert replacement list.	Highway Department, Emergency Management, Select Board	2015	Lack of funding, ongoing	Yes
2	Work to implement relevant action items in OSRP.	Conservation Commission, Planning Board, Select Board	2015	Some actions implemented	Yes, need to update OSRP
8	Work with National Grid Electric Company to facilitate the underground placement of new utility lines in general and existing utility lines in locations where repetitive outages occur (as applicable).	Select Board	ongoing	Not completed due to lack of staff/volunteer time	Yes – communicate with Natl Grid and legislator
3	Participate in the creation of a Regional Debris Management Plan.	Highway Department, Emergency Management, Select Board	2015	No communication with other towns, was a priority at the time but has not been a priority since	Remove because not necessary – Town can handle own debris
4	Consider increasing enforcement of burning regulations, perhaps invoke penalties for offenders.	Fire Department	ongoing	Has not been needed up to now, but should keep in plan	Yes
7	Evaluate critical facilities to determine if they are earthquake resistant.	Building Inspector, Emergency Management, Select Board	2016	Completed	
5	Identify sources of funding for dam safety inspections for dams for which municipality is responsible.	Highway Department, Emergency Management, Select Board	2016	Municipal funding for inspection and maintenance	Yes, ongoing
6	Consider revising Floodplain District bylaw to limit storage of hazardous materials/wastes (as defined by DEP).	Conservation Commission, Planning Board, Select Board	2016	Completed	Remove

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 sessions. 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 to the Town. 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 has 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 - Implementation costs are provided as an estimate for all mitigation measures, and categorized as High, Medium, or Low according to the cost ranges described on p. 73. All cost data would need to be updated at the time of design and construction.

Potential Funding Source - Identification of funding sources for each mitigation action, including grant programs, state or federal agencies, private organization, the planning commission, town funding (general fund), 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 Brimfield 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.
- **Eligibility under the MVP Action Grant Program** – The MVP Action Grant program offers financial resources to municipalities that are seeking to advance priority climate adaptation actions to address climate change impacts resulting from extreme weather, sea level rise, inland and coastal flooding, severe heat, and other climate impacts. MVP Action Grants should incorporate the 9 Core Principles of the MVP program⁵, including utilizing climate change data for proactive solutions, employing nature-based solutions, increasing equitable outcomes for EJ and Climate Vulnerable Populations, and conducting robust community engagement.
- **Eligibility under FEMA Grant Programs** – FEMA’s Hazard Mitigation Grant Program (HMGP) provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. Funding is made available through FEMA by MEMA. Municipalities apply for grants to fund specific mitigation projects under MEMA requirements.

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

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

⁵ <https://www.mass.gov/doc/mvp-core-principles/download>

- **Medium** – Strategies that would have some benefit to people and property and are somewhat cost effective at reducing damage to property and people
- **High** – Strategies that provide mitigation of several hazards and have a large benefit that warrants their cost and time to complete

Cost Estimates

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 6.2 below is a completed list of mitigation strategies recommended by the Committee. The following action plan identifies Responsibility, Funding and a Timeframe 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 “Proposed Completion Date” column in Table 6.2 below.

Table 6.2: Mitigation Strategies to Implement and Prioritized Implementation Schedule

Priority Level	Mitigation Action	Responsible Department/ Board	Hazards Addressed	Proposed Completion Date	Estimated Cost	Possible Funding Sources
Infrastructure						
H	Create culvert prioritization program. Seek funding to replace top priorities on culvert replacement list.	Highway Department, Emergency Management, Select Board	Flooding	2024 for prioritization plan, 2026 for completion of study/design of priority culvert replacements after obtaining funding	Medium	MVP, FEMA, DER, Mass DOT
H	Explore opportunities for a new Municipal Complex to include Town offices, emergency shelter and senior center. In interim, install ADA ramp at Town Hall.	Building Committee, Select Board	All hazards	2029	High	MVP, FEMA, DOER
H	Make First Congregational Church (also COA) the secondary shelter and obtain backup generator for building.	EMD, COA	All hazards	2024-2025	Low	FEMA, MVP
H	Develop an agreement with private property owner to allow changes to water level on Wheeler Pond Dam	Select Board, Town Counsel	Dam failure, flooding	2025	Low	General Fund, Staff and volunteer time
M	Access funding for dam repair/maintenance for municipally owned and maintained dams.	Highway Department, Emergency Management, Select Board	Dam failure, flooding	2024 and ongoing	H for Repair, L for maintenance	Dam and Seawall Program, BRIC
M	Commission a flood damage reduction study to monitor and map areas of frequent flooding and explore how flooding might impact emergency support systems	Highway Department, Select Board, Emergency Management	Flooding	2025-2026	Medium	MVP, FEMA

Table 6.2: Mitigation Strategies to Implement and Prioritized Implementation Schedule

Priority Level	Mitigation Action	Responsible Department/ Board	Hazards Addressed	Proposed Completion Date	Estimated Cost	Possible Funding Sources
M	Evaluate existing bylaws regulating stormwater management to promote use of green infrastructure/LID. Assess existing stormwater resources for nature-based solution potential, beginning with demonstration projects.	Planning Board, Highway, Conservation Commission	Flooding	2027	Low	DLTA, General Fund, staff and volunteer time
M	Encourage more residents to install solar + batteries. Provide information on rebates and loans, explore “Solarize Brimfield” program.	Select Board, Building Department	Strong storms, hurricanes, extreme temperatures	2025	Low	General Fund, staff and volunteer time
M	Map hazardous materials in Zone I and II of public water supplies. Conduct outreach about testing program for well-water users.	Board of Health	Flooding, severe snow and ice storms	2025 and ongoing	Low	DEP, General Fund
M	Work with National Grid and state representative to facilitate the underground placement of new utility lines in general and existing utility lines in locations where repetitive outages occur (as applicable).	Select Board	Severe snow/ice storms, severe wind events	2026	Low	General Fund, staff and volunteer time
Societal						
H	Explore bylaw/code to require that all tents have tie-downs and inspections by building and Fire. Encourage field owners to install/plant hedge rows as wind breaks.	Building Commission, Fire Department, Planning Board, Select Board	Severe wind events	2024-2025	Low	General Fund, staff and volunteer time
H	Develop emergency plan for the Flea Market: Include evacuation routes and procedures, shelters/cooling station. Increase communication between the	EMD – Lead, Building Commission, Fire	Flooding, extreme temperatures, hurricanes, strong	2025-2026	Low	General Fund, staff and volunteer time

Table 6.2: Mitigation Strategies to Implement and Prioritized Implementation Schedule

	Town, field owners and local business owners.	Department, Planning Board, Select Board	thunderstorms and tornadoes			
H	Increase enrollment in CodeRed. Publicize at town events, flea market, social media, website.	EMD, Board of Health	All hazards	2024 and ongoing	Low	General fund, staff and volunteer time
H	Develop/update local database with information on elderly, disabled, and homebound residents, and distribute more file of life magnets/stickers	EMD, Police, COA	All hazards	2025	Low	General fund, staff and volunteer time
M	Promote age-friendly and dementia-friendly community. Explore having a dedicated case worker for seniors to conduct outreach	COA	All hazards	2024-2025	Low-Medium	General fund, staff and volunteer time
M	Provide education to residents about preparing for natural hazards and emergencies (post information on Town website, and send mailings twice per year)	EMD, Fire Department, Board of Health	All hazards	2024 and ongoing	Low	General fund, staff and volunteer time
M	Develop additional local resources and guidance for the prevention and of vector-borne diseases. Increase public outreach to understand the signs, symptoms and treatment of tick and mosquito diseases	Board of Health	Vector-borne diseases, flooding, extreme temperatures	2024 and ongoing	Low	General fund, staff and volunteer time, DLTA, PVPC
M	Work with other towns on “shared” positions to increase departmental availability and hours of operation	Select Board	All hazards	2025 and ongoing	Low-Medium	General Fund
M	Recruit volunteers for the CERT (Crisis Emergency and Response Team) and seek funding to have volunteers trained by MEMA. Collaborate with HS for student volunteers	EMD	All hazards	2025 and ongoing	Low	General Fund, staff and volunteer time, MEMA/FEMA

Table 6.2: Mitigation Strategies to Implement and Prioritized Implementation Schedule

Environmental						
H	Develop a roadside forestry management program for tree removal/replacement/maintenance. Replant with more southern species.	Tree Warden, Select Board	Severe snow/ice storms, severe wind events	2025	L-M	Town Appropriation, MVP, DCR
M	Provide education to residents about identifying and managing invasive plant species	Conservation Commission	Drought, Extreme Temperatures	Ongoing	Low	General Fund, Resources from MDAR
M	Work with private landowners on beaver management, specifically dams on private property, access agreements to install WLCD. Provide education on beavers to residents.	Board of Health, Conservation Commission	Flooding	Ongoing	Low	General Fund, MassWildlife
M	Identify areas to install cold water fisheries BMPs to promote infiltration of road runoff prior to entering stream	Conservation Commission	Flooding	2025-2026	Low	MVP, 604 (DEP), 319 grants
M	Update the Open Space and Recreation Plan (OSRP)	Conservation Commission, Planning Board, Select Board	Flooding, Drought	2024-2025	Low	DLTA, EEA, General Fund
M	Contract with aquatic management company to develop management plans for lakes. Explore 604b grant to develop watershed-based plans for Lake Sherman and Little Alum Ponds.	Con Comm, Select Board	Extreme Temperatures, Flooding, Drought	2027-2028	Medium	604b (DEP), 319 grants
M	Consider increasing enforcement of burning regulations, perhaps invoke penalties for offenders.	Fire Department	Wildfire/brushfire	2024	Low	General Fund, staff and volunteer time
M	Consider developing comprehensive plan that focuses on agric. Protection. Encourage farmers to explore APR program to protect agricultural lands and ensure local food sources.	Ag Commission and Con Comm	Extreme Temperatures, Flooding, Drought	2027	Low	DLTA, MDAR

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 MassDOT, MEMA, and DCR, as well as sometimes federal agencies. 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 Brimfield, 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 6.1. 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 Brimfield are listed in Table 7.2 below.

Table 7.2: Potential Funding Sources

Category	Agency/Grant	Description	Limitations & Stipulations
Community Development	MassWorks (Community OneStop for Growth)	Provides grants to communities to help them prepare for success and contribute to the long-term strength and sustainability of the Commonwealth.	None
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).

Table 7.2: Potential Funding Sources

Category	Agency/Grant	Description	Limitations & Stipulations
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	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
Environment	604b Grant Program	Water quality assessment and management planning.	None

Table 7.2: Potential Funding Sources

Category	Agency/Grant	Description	Limitations & Stipulations
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 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'

Table 7.2: Potential Funding Sources

Category	Agency/Grant	Description	Limitations & Stipulations
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

Chapter 7: Plan Adoption, Implementation, and Maintenance

Plan Adoption

Upon completion, copies of the Draft Local Hazards Mitigation Plan for the Town of Brimfield were distributed to the town boards for their review and comment. A public meeting was held by the Brimfield Board of Selectmen to present the draft copy of the Brimfield Hazard Mitigation Plan to town officials and residents and to request comments from this committee and the general public. The Brimfield Hazard Mitigation Plan was formally approved by the Board of Selectmen and forwarded to the Massachusetts Emergency Management Agency (MEMA) and the Federal Emergency Management Agency (FEMA) for their approval.

Plan Implementation

The implementation of this plan will be the responsibility of the Core Team. Implementation will begin upon its formal adoption by the Ludlow 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 7.2 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 2023 MVP-HMP will also inform future planning and budgeting processes. At a minimum, the Core Team will review and update the plan every five years, beginning in 2028. The meetings of the Core Team will be organized and facilitated by the Emergency Management Director or the Brimfield Board of Selectmen. The approved Brimfield Hazard Mitigation plan will be available for public review on the Town website, at the Town Hall, the public library, and at the PVPC for ongoing public review and comment.

Plan Maintenance

The measure of success of the Brimfield Hazard Mitigation Plan will be the number of identified mitigation strategies implemented. In order for the town to become more disaster resilient and better equipped to respond to natural disasters, there must be a coordinated effort between elected officials, appointed bodies, town employees, regional and state agencies involved in disaster mitigation, and the general public.

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 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 laws 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.

Incorporation with Other Planning Documents

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

- *Brimfield Open Space and Recreation Plan* – this Plan was used to identify the natural context within which the Brimfield mitigation planning would take place. This proved useful insofar as it identified water bodies, rivers, streams, other natural resources, and infrastructure components (i.e. water and sewer, or the lack thereof). This was incorporated to ensure that the Town’s mitigation efforts would be sensitive to the surrounding environment. The OSRP is due to be updated in the near future; during the OSRP update process, the Town can use the work of the MVP-HMP plan update to incorporate identified hazard areas into open space and recreation planning. This could either take the form of acquiring parcels of land that are currently undeveloped, but situated within an identified hazard area, as permanent open space, thereby minimizing the likelihood that critical infrastructure components will be constructed in an area prone to damage from natural hazards.
- *Brimfield Zoning Bylaw* - The Town’s Zoning Bylaw was used to gather and identify those actions that the Town is already taking that are reducing the potential impacts of a natural hazard (i.e. floodplain regulations) to avoid duplicating existing successful efforts.
- *State of Massachusetts SHMCAP* - This plan was used to provide information on hazards affecting the state and to ensure that the Town’s plan was consistent with the State’s Plan.
- *Comprehensive Emergency Management Plan (CEMP)* – This plan was used to provide information on mitigation capabilities existing in Brimfield as well as to inform possible mitigation strategies that specifically protect vulnerable populations.

As the Town of Brimfield creates new and updates existing planning documents, this plan and its implementation strategies will be incorporated as applicable. This process will be ongoing and part of the standard practice of reviewing other plans to ensure consistency between plans.

After this plan has been approved by both FEMA and the local government, links to the plan will be emailed to all Town staff, boards, and committees, with a reminder to review the plan periodically and work to incorporate its contents, especially the action plan, into other planning processes and documents.

In addition, during annual monitoring meetings for the MVP and HMP implementation process, the Core Team will review whether any of these plans are in the process of being updated. If so, the Core Team will remind people working on these plans, policies etc. of the 2022 HMP Update, and urge them to incorporate the plan into their efforts. The Core Team will also review current Town programs and policies to ensure that they are consistent with the mitigation strategies described in this plan. The HMP update will also be incorporated into updates of the Town's CEMP.

Following this plan update, the Core Team will note when they reach out to other Town staff about the incorporation of applicable hazard mitigation strategies into plan updates.

Plan Monitoring and Evaluation

The Select Board will call meetings of all responsible parties to review plan progress an annual basis in each of the following years of 2024 - 2028, and as needed (*i.e.*, following a natural disaster). The public will be notified of these meetings in advance through a posting of the agenda at Town Hall. Responsible parties identified for specific mitigation actions will be asked to submit their reports in advance of the meeting. Meetings will entail the following actions:

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

Following these discussions, it is anticipated that the committee may decide to reassign the roles and responsibilities for implementing mitigation strategies to different town departments and/or revise the goals and objectives contained in the plan. The committee will review and update the Hazard Mitigation Plan every five years. The next updated plan will be submitted to MEMA and FEMA in 2029.

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

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

Plan Mission and Goal

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

Hazard Identification and Risk Assessment

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

Existing Mitigation Strategies

- Are the current strategies effectively mitigating the effect of any recent hazard events?
- Has there been any damage to property since the plan was last reviewed?
- How could the existing mitigation strategies be improved upon to reduce the impact from recent occurrences of hazards? If there are improvements, these should be incorporated into the plan.

Proposed Mitigation Strategies

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

Review of the Plan and Integration with Other Planning Documents

- Is the current process for reviewing the Hazard Mitigation Plan effective? Could it be improved?
- Are there any Town plans in the process of being updated that should have the content of this Hazard Mitigation Plan incorporated into them?

- How can the current Hazard Mitigation Plan be better integrated with other Town planning tools and operational procedures, including the zoning bylaw, the CEM Plan, and the Capital Improvement Plan?

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

Brimfield, Massachusetts 2023 HMP & MVP Work Map Critical Facilities With Past & Present Hazards

