

Brookfield Hazard Mitigation Plan



CENTRAL MASSACHUSETTS
Regional Planning Commission

Adopted by the Select Board

DATE

Local Hazard Mitigation Team
Town of Brookfield, Massachusetts &
Central Massachusetts Regional
Planning Commission
1 Mercantile St, Suite 520

This Certificate of Adoption helps meet the following FEMA local mitigation plan requirements:

- F1. “For single-jurisdictional plans, has the governing body of the jurisdiction formally adopted the plan to be eligible for certain FEMA assistance?” (Requirement 44 CFR § 201.6(c)(5)).

< INSERT TOWN LETTERHEAD >

**CERTIFICATE OF ADOPTION
SELECT BOARD
TOWN OF BROOKFIELD, MASSACHUSETTS**

A RESOLUTION ADOPTING THE *BROOKFIELD HAZARD MITIGATION PLAN*

WHEREAS, the Town of Brookfield established a Committee to prepare the 2026 update of the *Brookfield Hazard Mitigation Plan*; and

WHEREAS, the updated *Brookfield Hazard Mitigation Plan* contains several potential future projects to mitigate potential impacts from natural hazards in the Town of Brookfield; and

WHEREAS, duly-noticed public meetings were held by the LOCAL HAZARD MITIGATION PLANNING TEAM on **DATE** and **DATE**; and

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

NOW, THEREFORE BE IT RESOLVED that the Town of Brookfield SELECT BOARD adopts the 2026 update of the *Brookfield Hazard Mitigation Plan*, in accordance with M.G.L. 40 or the charter and bylaws of the Town of Brookfield.

ADOPTED AND SIGNED this **DATE**, _____.

Name	Richard A. Chaffee	Sarah Campbell	Beth L. Coughlin
Title	Vice-Chair	Chair	Clerk

Signatures	_____	_____	_____
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ACKNOWLEDGEMENTS

This Acknowledgements section helps meet the following FEMA local mitigation plan requirements:

- A1. “Does the plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement 44 CFR § 201.6(c)(1))”

This Hazard Mitigation Plan (HMP) update was funded by the Federal Emergency Management Agency (FEMA) via the Massachusetts Emergency Management Agency (MEMA). This report was prepared for the community of Brookfield by the Central Massachusetts Regional Planning Commission (CMRPC). The Brookfield Select Board extends its thanks to participants in the Local Hazard Mitigation Team for their time and hard work in participating in this timely project. Core Team members include:

Steve Rich, Tantasqua Regional School District, Representative
Clarence R. Snyder III, Agricultural Commission, Chairperson
Marylou Knight, Council on Aging, Board Member
Donna Lafleur, Brookfield EMS, Chief
Lindsey Rockwood, Highway Department, Grant Coordinator (former)
Ron Aponte, Town Administrator’s Office, Town Administrator (former)
Peter Martell, Fire Department, Fire Chief
Michael Blanchard, Police Department, Police Chief

In addition, thanks are extended to the staff of the Central Massachusetts Regional Planning Commission for process facilitation and preparation of this document.

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Thanks are also due to the Massachusetts Emergency Management Agency (MEMA) for guidance and feedback regarding this plan.

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1.0 INTRODUCTION

1.1 DISASTER MITIGATION PLAN

Congress enacted the Disaster Mitigation Act of 2000 (DMA 2000) on October 10, 2000. Also known as the Stafford Act Amendments, this bill was signed into law by President Clinton on October 30, 2000, creating Public Law 106-390. The law established a national program for pre-disaster mitigation and streamlined the federal administration of disaster relief. Specific rules on the implementation of DMA 2000 were published in the Federal Register in February 2002 and required that all communities must have a Hazard Mitigation Plan in place in order to qualify for future federal disaster mitigation grants following a Presidential Disaster Declaration. Hazard Mitigation Plans emphasize measures that can be taken to reduce or prevent future disaster damage caused by natural hazards. In the context of natural hazard planning, Pre-Disaster Mitigation refers to any action that permanently reduces or eliminates long-term risks to human life and property.

1.2 PLAN PURPOSE

Section 1.2 helps meet the following FEMA local mitigation plan requirements:

- A1. *“Does the plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction?” (Requirement 44 CFR § 201.6(c)(1))*

This plan identifies the natural hazards facing the Town of Brookfield, assesses the vulnerabilities of the Town’s critical facilities, infrastructure, residents, and businesses of these hazards, and presents recommendations to mitigate the adverse effects of these hazards.

New England weather is renowned for its mercurial and dramatic nature. Late summer hurricanes, major winter blizzards, and summer droughts are all experienced in Central Massachusetts. These natural hazards occur frequently enough to be familiar scenes to residents of Brookfield. The negative effects of these natural hazards on the built environment can lead these events to be classified as natural disasters. As climate change continues to progress, the severity and frequency of natural hazard risk will increase.

This planning effort has drawn on the knowledge of local municipal officials and residents. The recommendations presented in the following report are intended to be realistic and practical steps for mitigating natural hazards and preparing Brookfield as best as possible for the effects of climate change. Implementation of these actions will translate into savings – fewer lives lost, less property destroyed, and less disruption to essential services and ecological systems.

1.3 PLANNING PROCESS

Section 1.3 helps meet the following FEMA local mitigation plan requirements:

- A1. “Does the plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction?” (Requirement 44 CFR § 201.6(c)(1));
- A2. “Does the plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development as well as businesses, academia, and other private and non-profit interests to be involved in the planning process?” (Requirement 44 CFR § 201.6(b)(2)); and
- A3. “Does the plan document how the public was involved in the planning process during the drafting stage and prior to plan approval?” (Requirement 44 CFR § 201.6(b)(1))

This Plan is funded through a Fiscal Year 2021 Hazard Mitigation Grant Program (HMGP) grant to the Town of Brookfield from the Federal Emergency Management Agency (FEMA) through the Massachusetts Emergency Management Agency (MEMA).

The planning process in Brookfield was composed of two distinct but related phases:

1. data collection and technical review, and
2. public input and planning.

The identification of natural hazards impacting the Town of Brookfield was accomplished through a review of available information from various sources. These sources included federal and state reports and datasets, existing plans, and in some cases engineering documents. An assessment of risks and vulnerabilities was performed primarily using geographic information systems (GIS) to identify the infrastructure (critical facilities, public buildings, roads, neighborhoods, etc.) at the highest risk of being damaged by hazards, particularly flooding. Local knowledge as imparted by Town officials, staff, emergency management volunteers, and others was a critical element of this phase.

The second phase of the planning process was focused on outreach, public participation and input, and planning. This phase was critical to fostering awareness of the process among a wide range of local officials, coordinating updates to different plan elements in ways that included important stakeholders, and providing opportunities for public comment and input from a representative base of residents and other stakeholders, including community lifelines, in Brookfield. Through community engagement, CMRPC was better able to gauge community priorities for mitigation and understand local resources as well as existing policies and procedures. With information from this phase of the planning process in hand, the local planning team was able to develop an informed list of mitigation strategies for the Town.

The Hazard Mitigation Planning team, consisting of local staff and volunteers, included:

- Steve Rich, Tantasqua Regional School District, Representative
- Clarence R. Snyder III, Agricultural Commission, Chairperson
- Marylou Knight, Council on Aging, Board Member
- Donna Lafleur, Brookfield EMS, Chief
- Lindsey Rockwood, Highway Department, Grant Coordinator (Former)
- Ron Aponte, Town Administrator’s Office, Town Administrator (Former)

- Peter Martell, Fire Department, Chief
- Michael Blanchard, Police Department, Police Chief

To discuss hazard areas, critical infrastructure and other assets, and plan priorities and strategies, the Hazard Mitigation Planning team met 4 times on May 14th, 2024, August 28th, 2024, October 2nd, 2024, and November 20th, 2024. Between meetings and during development of the draft and final plans, information and comments were shared among the local team and CMRPC. On October 4th, 2024, the Hazard Mitigation Planning team launched a public survey to gauge resident, worker, visitor, and business owner concerns about and experiences with natural hazards in Town. The survey was distributed through a Facebook ad. A total of 49 responses were collected. Survey responses were discussed by the local planning team at its November 2024 meeting and helped inform the development and prioritization of the plan's mitigation strategies. Feedback from a HMP Team Meeting was provided on the presence of emergency shelters in Town since the 2018 plan, and it was shared that the Town does not currently have an emergency shelter, though Tantasqua Regional School acts as a Regional Shelter. Representatives from the surrounding communities were invited to comment on the draft plan during the public comment period in an effort gather input from surrounding communities who might have shared interests or concerns. As planning activities progressed, a public presentation was made by CMRPC and the local planning team on **[August 5th, 2026]** at a Brookfield Select Board meeting to provide a summary of key aspects of the draft plan report then being finalized. The presentation was hybrid via Teams and the opportunity for public comment was emphasized during the presentation. Materials and notes from the presentation and subsequent public discussion are included in Appendix D and Appendix F, respectively. A full draft plan was provided to the Town for distribution and made available online on the Town of Brookfield website for public comment for two weeks from **[DATE]**. In addition, the full draft plan was distributed to officials in all neighboring communities for their review and input regarding shared hazards and to community lifelines identified by the local planning team and CMRPC for their review and input during this public comment period. Feedback from Select Board members during the public presentation and from several community lifeline stakeholders during the public comment period was provided; this feedback was considered as final edits were made to the plan.

The final draft plan was submitted to MEMA for review on **[DATE]** and was then relayed to FEMA for federal review. After receipt of FEMA's notice of approval pending adoption on **[DATE]**, the plan was formally adopted by vote of the Board at the **[DATE]** meeting of the Select Board.

The Brookfield Planning Board is the primary Town agency responsible for regulating development in town. Feedback to the Planning Board was ensured through the participation of the Town Administrator on the local hazard planning team. In addition, CMRPC, which is the State-designated Regional Planning Agency (RPA) for Brookfield, works with all agencies that regulate development in its region; these agencies that CMRPC works with include both the municipal entities listed above and state agencies such as the Department of Conservation and Recreation (MassDCR) and the Department of Transportation (MassDOT). The regular collaboration between CMRPC and these municipal entities and state agencies ensured that the operational policies of and any mitigation strategies or hazards identified by these entities and agencies were incorporated in this Brookfield Hazard Mitigation Plan. The engagement of a diverse array of representatives, stakeholders, community lifelines, and organizations during the planning process promoted the creation of mitigation strategies for local recovery and resilience efforts in town. This hazard mitigation planning process included stakeholders from a broad range of sectors both inside and outside of local government. The inclusion of these stakeholders in the planning process is a critical step towards ensuring equitable, effective, and comprehensive risk reduction outcomes.

The following community lifelines were sent the full draft plan during the public comment period for their review and input. FEMA defines community lifelines as “the most fundamental services in the community that, when stabilized, enable all other aspects of society to function.”¹

Safety and Security Lifelines:

- North Brookfield
- East Brookfield
- Sturbridge
- Brimfield
- Warren
- West Brookfield
- Brookfield Fire Department
- Brookfield Police Department

Food, Water, and Shelter Lifelines:

- Tantasqua Regional School District
- Brookfield Agricultural Commission
- Brookfield Water Department
- Red Cross
- Health and Medical Lifelines:
 - Brookfield Ambulance/EMS
 - Brookfield Board of Health
 - UMass Memorial – Spencer
 - UMass Memorial – Southbridge

Communications Lifelines:

- Apple Valley Radio
- Brookfield Communications Committee
- Brookfield Public Access Committee
- Transportation Lifelines:
 - Brookfield Council on Aging
 - WRTA

Hazardous Materials Lifelines:

¹ FEMA, “Local Mitigation Planning Policy Guide,” FEMA.gov, Federal Emergency Management Agency, April 19, 2022, page 17, https://www.fema.gov/sites/default/files/documents/fema_local-mitigation-planning-policyguide_042022.pdf.

- Casella Waste Systems

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2.0 COMMUNITY PROFILE AND DEVELOPMENT TRENDS

2.1 REGIONAL AND COMMUNITY PROFILE

The Central Massachusetts Regional Planning Commission (CMPRC) region occupies roughly 1,000 square miles in the southern two-thirds of Worcester County, Massachusetts. The City of Worcester, which is the second-largest city in Massachusetts and New England with a population of 206,518 according to the 2020 United States Census, is relatively in the central part of the region. Nearly 588,141 people live in the CMRPC Region, of whom 3,439 reside in Brookfield.²

The CMRPC region is bordered to the west by the Central Massachusetts uplands, to the south by Rhode Island and Connecticut, to the east by the Boston metropolitan area, and to the north by the Montachusett region in northern Worcester County. The forty-community region has been divided for planning purposes into six sub-regions, as determined by shared characteristics and roadway corridors. Brookfield is located in the western sub-region consisting of 9 towns located to the west of Worcester, including: Brookfield itself, Leicester, Spencer, North Brookfield, East Brookfield, West Brookfield, Warren, New Braintree, and Hardwick.

Massachusetts has a humid continental climate, with maritime influences increasing from northwest to southeast. According to the National Oceanic and Atmospheric Association's National Weather Service, between 2001 and 2020, Brookfield's neighboring community of Sturbridge, Massachusetts saw monthly mean temperatures ranging from 25.1 degrees Fahrenheit in January to 71.0 degrees Fahrenheit in July.³ According to this same source, between 2000 and 2025, average annual precipitation in Sturbridge has been relatively high at 42.66 inches,⁴ and, between 1999-2000 and 2023-2024, average annual snowfall has been 38.2 inches.⁵ Approximately 55 miles from the Atlantic coast, Brookfield and its neighboring communities are subject to a variety of types of severe storms, including hurricanes, nor'easters, thunderstorms, and blizzards.

The Town of Brookfield, Massachusetts, was incorporated in 1718 as a part of the historic Quaboag Plantation lands. The town is located approximately 15 miles west of the City of Worcester and 26 miles northeast of the City of Springfield. Access to Worcester is available via Route 9, and Springfield via Highway 90. Brookfield is a bedroom community with a workforce focused on commuting to job opportunities. According to the CMPRC's Long Range Transportation Plan (LRTP), 2050 Connections, the Town is projected to experience low population growth in the next 25 years.

Brookfield's employment base is healthy: as of December 2024, 1,962 Brookfield residents were

² "P1: Race," Data.Census.gov, United States Census Bureau, accessed February 18, 2025, <https://data.census.gov/table?q=Brookfield%20town,%20Massachusetts>.

³ "Monthly Mean Avg Temperature for EAST BRIMFIELD LAKE, MA," Weather.gov, National Oceanic and Atmospheric Association National Weather Service, accessed June 17, 2026, <https://www.weather.gov/wrh/Climate?wfo=box>.

⁴ The calculation of this average does not incorporate data from the years 2005, 2006, 2007, 2008, 2009, 2020, 2022, and 2023 as there were months with missing data during these years.

"Monthly Total Precipitation for EAST BRIMFIELD LAKE, MA," Weather.gov, National Oceanic and Atmospheric Association National Weather Service, accessed June 17, 2026, <https://www.weather.gov/wrh/Climate?wfo=box>.

⁵ This calculation of this average does not incorporate data from the years 2004-2005, 2006-2007, 2009-2010, 2010-2011, 2011-2012, and 2021-2022, as there was incomplete data for these years.

"Monthly Total Snowfall for EAST BRIMFIELD LAKE, MA," Weather.gov, National Oceanic and Atmospheric Association National Weather Service, accessed July 28, 2026, <https://www.weather.gov/wrh/Climate?wfo=box>.

employed⁶ and, as of 2022, there were 299 people employed within Brookfield itself.⁷ Nearly 21% of the employed population in Brookfield works in the educational service, healthcare, and social assistance industry, 18% percent in manufacturing, and 16% in retail trade.⁸ Brookfield is bordered by North Brookfield to the north, West Brookfield and Warren to the west, Sturbridge and Brimfield to the south, and East Brookfield to the east. Brookfield has a total area of 16.6 square miles and a population of 3,439. According to LRTP, Brookfield's population is projected to have a slow growth rate. Brookfield is expected to grow by approximately 11.6% between 2020 and 2050, reaching 3,931 residents.⁹ The number of residents in town grew by approximately 21.5% between 1980 to 2000 but grew by only 12% between 2000 and 2020.¹⁰ According to the 2020 US Census, 92% of Brookfield's population identifies as white, 1% of the Town's population identifies as Asian, 1% of the Town's population identifies as Black or African American, 1% of the Town's population identifies as some other race, and 6% of the Town's population identifies as belonging to two or more races.¹¹ In addition, according to the 2020 Census, about 2.9 % of Brookfield residents identify as Latino or Hispanic. According to the 2020 US Census, 15.2% of the Town's population is under 18 years old, while 25.6% of the population is 65 years and over.¹²

The median age in town, according to the 2020 US Census, is 51.5 years old, which is comparatively higher than the State's median age of 40.3.¹³ At \$71,875, median household annual income in Brookfield is relatively lower to the median household annual income in the State of \$101,341 and the median household annual income in Worcester County of \$93, 561.¹⁴ The poverty rate in town (according to 2022 ACS 5-year estimates) is 7.1%, approximately two-thirds of the State's and Worcester County's poverty rates of, respectively, 10% and 10.3%.¹⁵

With a median value of owner-occupied housing units at \$313,200, housing costs in town are relatively lower compared to in the State and to Worcester County, whose comparable numbers are \$525,800 and \$390,700, respectively.¹⁶ 67.9% of occupied homes in town are single-family homes

⁶ Massachusetts Department of Economic Research, "Municipal Employment Data: Brookfield - 2010," [lmi.dua.eol.mass.gov](https://lmi.dua.eol.mass.gov/Lmi/MunicipalEmploymentData/LmiTown?A=000504), February 2025, <https://lmi.dua.eol.mass.gov/Lmi/MunicipalEmploymentData/LmiTown?A=000504>.

⁷ "Work Area Profile Analysis: Workers: Employed in Brookfield town (Worcester, MA)," [Onthemap.ces.census.gov](https://onthemap.ces.census.gov), United States Census Bureau, accessed February 19, 2025, <https://onthemap.ces.census.gov/>.

⁸ "P1: Race," [Data.Census.gov](https://data.census.gov)

⁹ Central Massachusetts Metropolitan Planning Organization. "2050 Connections: 2024 Long Range Transportation Plan for the Central Massachusetts Metropolitan Planning Organization," [Cmrpc.org](https://cmrpc.org), Central Massachusetts Regional Planning Commission, February 25, 2025, page III-6, <https://cmrpc.org/wp-content/uploads/2024/05/2050-Connections-Endorsed-Documents.pdf>.

¹⁰ "Brookfield," [Cmrpc.org](https://cmrpc.org), Central Massachusetts Regional Planning Commission, accessed February 25, 2025, <https://cmrpc.org/data-center/community-snapshots/brookfield/>.

¹¹ "P1: Race," [Data.Census.gov](https://data.census.gov)

¹² "DP05: ACS Demographic and Housing Estimates" United States Census Bureau, accessed February 25, 2025. <https://data.census.gov/table/ACSDP5Y2023.DP05?q=brookfield+town+massachusetts>.

¹³ Ibid.

¹⁴ "S1903: Median Income in the Past 12 Months (in 2023 Inflation-Adjusted Dollars)," [Data.Census.gov](https://data.census.gov), United States Census Bureau, accessed February 25, 2025, https://data.census.gov/table/ACSST5Y2023.S1903?q=ACS+Massachusetts&g=050XX00US25027_060XX00US2502709105

¹⁵ "S1701: Poverty Status in the Past 12 Months," [Data.Census.gov](https://data.census.gov), United States Census Bureau, accessed February 25, 2025, https://data.census.gov/table/ACSST5Y2023.S1701?q=ACS+Massachusetts&g=050XX00US25027_060XX00US2502709105.

¹⁶ "DP04: Selected Housing Characteristics," [Data.Census.gov](https://data.census.gov), United States Census Bureau, accessed

(detached), and 14.3% are multi-unit structures.¹⁷ With a 3.2% vacancy rate according to the 2020 Census, the vacancy rate in Brookfield is relatively lower than the comparable rates in the State and Worcester County, which are 5.8% and 5.4%, respectively.¹⁸ The majority of homes in town were built between 1989 to 2009, with 22.5% of them being built before 1939 and 24.8% of them being built since 2000.¹⁹

February 25, 2025,

https://data.census.gov/table/ACSDP5Y2023.DP04?q=ACS+Massachusetts&t=Vacancy+Characteristics&g=050XX00US25027_060XX00US2502709105.

¹⁷ “S2504: Physical Housing Characteristics for Occupied Housing Units,” Data.Census.gov, United States Census Bureau, accessed June 17, 2026,

https://data.census.gov/table/ACSST5Y2023.S2504?q=ACS+Massachusetts&g=050XX00US25027_060XX00US2502709105.

¹⁸ “DP1: Profile of General Population and Housing Characteristics,” Data.Census.gov., United States Census Bureau, accessed June 17, 2026

https://data.census.gov/table/DECENNIALDP2020.DP1?q=dp1&g=040XX00US25_050XX00US25027_060XX00US2502709105.

¹⁹ “S2504: Physical Housing Characteristics for Occupied Housing Units,” Data.Census.gov.

2.2 DEVELOPMENT TRENDS

Section 2.2 helps meet the following FEMA local mitigation plan requirements:

- C1. “Does the plan document each participant’s existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs?” (Requirement 44 CFR § 201.6(c)(3)); and
- E1. “Was the plan revised to reflect changes in development?” (Requirement 44 CFR § 201.6(d)(3))

There have been no substantial development projects between 2018-2026, with exception of the WEB Brookfield solar farm, which became operational in 2021, of note in Brookfield.²⁰

Table 1: Number of New Construction Residential Building Permits Issued by Year in Brookfield

Year	Single Family Permits	Attached Single-family Permits	Multi-family / Mixed Use	All Permits
2018	0	0	0	0
2019	0	0	0	0
2020	0	0	0	0
2021	0	0	0	0
2022	7	0	0	7
2023	4	0	0	4
2024	8	0	0	8
2025	3	0	0	3
2026	0	0	0	0
2017-2026 Total	22	0	0	22

Recent development in Brookfield has affected and minimally increased the Town’s overall vulnerability to natural hazards, as 4 of the 26 properties which have been developed since 2018 have buildings in locally identified hazard areas and/or the FEMA 100-year and/or 500-year flood zones. 2 of these properties have buildings located in locally identified possible flood areas, and 2 of these properties have buildings located in the locally identified hazard areas.

If a development is formally approved by the appropriate boards and departments, due consideration should be given to the protection of newly constructed residences as well as natural resources. If resilience measures are implemented in construction, new development can decrease the Town’s vulnerability to natural hazards or prevent an increase in the Town’s vulnerability to natural hazards. The clearing of brush and trees lessens the chance of wildfires near new development, buried powerlines can reduce risk of power loss from storm events, and the usage of flood control measures such as drainage structures, rain gardens, swales and berms can reduce flood hazard risks in an area. However, new development built without the inclusion of hazard mitigation and resiliency in mind can increase the Town’s vulnerability to natural hazards; Building within the floodplain or close to the wildland interface, removing native plants, and draining wetlands can all greatly exacerbate natural hazard risks to life and property. Standardizing the

²⁰ GridInfo, “WEB Brookfield,” *GridInfo U.S. Power Plants*, accessed July 23, 2026, <https://www.gridinfo.com/plant/web-brookfield/66318>.

incorporation of resilience measures in any new solar developments in town will be especially important.

An increase in storm runoff in specific areas of town caused by new development is possible, and proper drainage infrastructure is necessary to mitigate disruption to surrounding properties, wetlands, streams, and aquifers caused by development-induced runoff. During the modern construction process, erosion control infrastructure is constructed to prevent sediment from forming along surface water resources, stormwater drainage infrastructure is constructed to replicate undeveloped conditions and help cleanse pollutants, trees are trimmed back from structures and power lines, utility lines are installed underground, roads are built wide enough to allow emergency vehicles to enter, modern building codes are followed, and setbacks from wetlands are required.

The Town, including various responsible boards and commissions, should ensure that new development processes take potential and known hazards into account and ensure that the mitigation of hazards occurs when needed. Brookfield utilizes various methods to ensure new development conforms with current Massachusetts General Laws as well as the Town's Bylaws. The Planning Board, Conservation Commission, and Zoning Board of Appeals (ZBA) in town consider water resource and open space preservation in decision making and, in the case of the ZBA, when hearing and deciding on appeals. This consideration includes specific evaluation criteria that are relevant to natural hazards – including requirements for preventing and mitigating flooding and stormwater impacts. The Town's Bylaws are amended and updated on an as needed basis to adapt to the needs of and the shifting forces that affect the Town. New development in Brookfield needs to be in line with the state building code.

As the population of Brookfield continues to grow and additional development occurs, officials should seek to further integrate hazard mitigation practices into the Town's planning and development processes. In 2024, the Town of Brookfield updated its Master Plan; this was a process which gave the Town an opportunity to identify threats and prioritize strategies to address them. Climate change, according to current predictions, will lead to an increase in extreme storm events, including more rain in shorter amounts of time. Planning for the future impacts of climate change is imperative to protecting the citizens of Brookfield.

3.0 CRITICAL FACILITIES AND VULNERABLE POPULATIONS

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

- is vital to hazard response efforts,
- currently helps protect the community from hazards, and/or
- would create a secondary disaster if a hazard were to impact it.

3.1 CRITICAL FACILITIES WITHIN BROOKFIELD

This Critical Facilities List for the Town of Brookfield has been created through the utilization of several online sources, several planning documents, and the knowledge and expertise of the local HMP planning team in town.

Planning documents and online resources which inform this plan include:

- Brookfield's Comprehensive Emergency Management Plan
- MassGIS and Rhode Island Department of Environmental Management data on dams
- Massachusetts Department of Early Education and Care data on childcare facilities
- Massachusetts Historical Commission data on historic sites
- Employment data from the Massachusetts Department of Economic Research and the Massachusetts Department of Education
- Critical infrastructure mapping undertaken by CMRPC under contract with the Central Region Homeland Security Advisory Council, which is charged by the Executive Office of Public Safety and Security to administer and coordinate the State Homeland Security Grant for central Massachusetts.

Brookfield's Local Hazard Mitigation Planning Team has broken up this list of critical facilities into four categories:

- Emergency response facilities needed in the event of a disaster,
- Non-emergency response facilities that have been identified by the local HMP planning team (these facilities are not required in an emergency response event, but are considered essential for the everyday operation of Brookfield),
- Dams, and
- Facilities that serve vulnerable populations and/or which the Town wishes to protect in the event of a disaster.

Critical infrastructure and facilities are mapped in Appendix A.

3.2 CATEGORY 1 – EMERGENCY RESPONSE FACILITIES

The Town has identified emergency response facilities and services as the highest priority facilities and services to protect in instances of natural and man-made hazards.

Table 2: Emergency Response Facilities in Brookfield

Type	Name	Address	Details	Has Emergency Generator?
Fire Department/Emergency Operations/Police Station	Brookfield Fire Dept./EOC	4 Central Street	There are no noteworthy concerns regarding natural hazard impacts on this facility.	Yes
	Police Headquarters	7 Prouty Street	There are no noteworthy concerns regarding natural hazard impacts on this facility.	Yes
	State Police Barracks	15 South Maple Street	There are no noteworthy concerns regarding natural hazard impacts on this facility.	Yes
	Life Flight Landing Zone 3	Main Street at Lewis Field	This location is the primary designated landing zone. There are no noteworthy concerns regarding natural hazard impacts on this facility.	N/A
	Life Flight Landing Zone 2	Quaboag Street at Boat Ramp	Life Flight Landing Area is located within FEMA Identified 100 Yr Flood Zone, as well as locally identified Severe Storm area.	N/A
	Life Flight Landing Zone 6	Rice Corner Road Across from Wagon Wheel	There are no noteworthy concerns regarding natural hazard impacts on this facility.	N/A

Type	Name	Address	Details	Has Emergency Generator?
Communications Facilities	Town Hall	6 Central Street	Hosts Apply Valley Radio, there are no noteworthy concerns regarding natural hazard impacts on this facility.	Yes
	Highway Antennae	56 Mill Street	See Highway Department Below	Yes
Highway Department	Highway Offices/Garage	56 Mill Street	This location serves as the town's backup EOC, as well as an emergency supplies distribution site. Facility is located adjacent to FEMA 100 Year Flood Zone, and within locally identified Severe Storm hazard areas.	Yes

Type	Name	Address	Details	Has Emergency Generator?
Emergency Shelters	None	N/A	The Town of Brookfield does not have adequate shelter facilities. The Elementary School in town does not have adequate backup power generation and its accommodations are sized for children. In previous sheltering events the town hall and library have been used as ad-hoc shelters.	None
Primary Evacuation Routes	MA Route 9	MA Route 9	This route has been noted as vulnerable by CMRPC's GIS analysis because it crosses locally identified severe storm areas and locally identified invasive species, the 100-year and 500- year flood zones, as well as a high slope hazard area.	N/A
	MA Route 148	MA Route 148	This route has been noted as vulnerable by CMRPC's GIS analysis because it crosses locally identified severe storm areas and locally identified invasive species, the 100-year and 500- year flood zones, as well as a high slope hazard area.	N/A

Type	Name	Address	Details	Has Emergency Generator?
Bridges	CSX Bridge: Fiskdale Road	Fiskdale Road	Bridge is located within the 100 year floodplain as well as locally identified flood hazard areas.	N/A
	CSX Bridge: Quaboag Street	Quaboag Street	Bridge is located within the 100 year floodplain.	N/A
	Dunn Brook Bridge	Quaboag Street	Bridge is located within the 100 year floodplain and within locally identified Severe Storm Hazard areas.	N/A
	Quaboag River Bridge	Fiskdale Road	Bridge is located within the 100 year floodplain as well as locally identified flood hazard areas.	N/A
	Sawmill Pond Bridges	Lake Road	There are no noteworthy concerns regarding natural hazard impacts on this facility.	N/A

3.3 CATEGORY 2 – NON-EMERGENCY RESPONSE FACILITIES

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

Table 3: Non-Emergency Response Facilities in Brookfield

Type	Name	Address	Details	Has Emergency Generator?
Water Supply	Brookfield Water Department Standpipe		There are no noteworthy concerns regarding natural hazard impacts on this facility.	No
	Brookfield Water Department Pump Station		The local planning team identified this town water supply wellfield, with a 500,000 gallon capacity. This location is located within the FEMA 100 yr Flood Zone as well as a locally identified Wildfire Hazard Area.	No
Town Facilities	Town Hall and	6 Central Street	There are no noteworthy concerns regarding natural hazard impacts on this facility.	Yes
	Transfer Station	7 Quaboag Street	According to GIS Analysis by CMRPC the facility is located adjacent to FEMA 500 Yr Flood Zone	No
	US Post Office	5 Post Road	Facility was built prior to updated earthquake building codes.	No
	Merrick Public Library	2 Lincoln Street	There are no noteworthy concerns regarding natural hazard impacts on this facility.	No
	Library Annex	18 Common Street	There are no noteworthy concerns regarding natural hazard impacts on this facility.	No

Type	Name	Address	Details	Has Emergency Generator?
Utilities	Cell Tower	Victory Road	There are no noteworthy concerns regarding natural hazard impacts on this facility.	N/A
	Cell Tower	Molasses Hill Road	There are no noteworthy concerns regarding natural hazard impacts on this facility.	N/A

3.4 CATEGORY 3 – DAMS²¹

The third category of critical infrastructure sites in this plan is a listing of dams in Brookfield and dams relevant to Brookfield.

Table 4: Dams in / of Concern in Relation to Brookfield

National ID	Dam Name	Owner	Regulatory Authority	Hazard Code	Notes
MA01821	Salmon Brook Dam	Private	Non-Jurisdictional	N/A	This dam has been identified by CMRPC's GIS analysis as being located within FEMA's 100yr flood zone.
MA03444	Quacumquasit Pond Outlet Flow Control Structure	Private	Non-Jurisdictional	N/A	This dam has been identified by CMRPC's GIS analysis as being located within FEMA's 100yr flood zone.
MA02757	Recreation Dam	Private	Non-Jurisdictional	N/A	This dam has been identified by CMRPC's GIS analysis as being located within FEMA's 100yr flood zone.
MA01822	Rice Reservoir Dam	Unknown	Non-Jurisdictional	Removed	Office of Dam Safety indicates that this dam has been removed and is owned by Department of Conservation and Recreation. The Local Planning team identified this dam as the largest privately-owned waterbody in the state, owned by Keith Realty. This dam has been identified by CMRPC's GIS analysis as being located within FEMA's 100yr flood zone.
MA01824	Pool Dam	Private	Non-Jurisdictional	N/A	There are no noteworthy concerns regarding natural hazard impacts on this dam.
MA00098	Saw Mill Pond Dam	Town of Brookfield	Office of Dam Safety	Significant Hazard	This dam has been identified by CMRPC's GIS analysis as being located within FEMA's 100yr flood zone.

²¹ "MassGIS Data: Dams," Mass.gov, Massachusetts Bureau of Geographic Information, February 2012, <https://www.mass.gov/info-details/massgis-data-dams>;

National ID	Dam Name	Owner	Regulatory Authority	Hazard Code	Notes
MA01932	Man-O-Name #20 Dam	Unknown	Office of Dam Safety	Significant Hazard	Concrete Dam located in North Brookfield, ownership is unclear (the towns of North Brookfield or Brookfield may own the dam or it may be privately owned by Midnight Harvest Tree Nursery). This dam acts as a water reservoir for the town of North Brookfield. There are no noteworthy concerns regarding natural hazard impacts on this dam.

For additional information on dams and dam failure hazards in Brookfield, see Chapter 4.

3.5 CATEGORY 4 – FACILITIES / POPULATIONS TO PROTECT

The fourth category of critical infrastructure sites in this plan is facilities that serve vulnerable populations and/or which the Town wishes to protect in the event of a disaster.

Table 5: Facilities and Populations to Protect in Brookfield

Type	Name	Address	Details
Apartment Complexes, Assisted Living Facilities, Housing Authority Properties and other Vulnerable Population Areas	Rehabilitation Resources Inc.	11 North Brookfield Road	There are no noteworthy concerns regarding natural hazard impacts on this facility.
	Rehabilitation Resources Inc.	53 Fiskdale Road	This facility is located in a high slope area.
	Nanatomqua Mobile Home Park	3 Nanatomqua Drive	According to CMRPC GIS analysis, this Mobile Home Community is located adjacent to FEMA identified Flood 100yr and 500yr flood zones.
	Brookfield Meadows	91 Town Farm Road	There are no noteworthy concerns regarding natural hazard impacts on this Mobile Home Community. 55+ Mobile Home Community.
	Wagon Wheel Cooperative	13 Buckboard Pass	There are no noteworthy concerns regarding natural hazard impacts on this Mobile Home Community.

Type	Name	Address	Details
Schools/Daycares²²	Brookfield Elementary School	37 Central Street	The local planning team has identified that this facility is vulnerable to snow load due to having a flat roof and leaks after severe storms. This facility has also been used as a shelter of last resort due to not having adequate power generation onsite and child sized facilities.
	Willow Brook Academy Montessori School	8 West Main Street	There are no noteworthy concerns regarding natural hazard impacts on this facility.
	Home Daycare	49 Webber Road	There are no noteworthy concerns regarding natural hazard impacts on this facility.
	Home Daycare	96 Molasses Hill Road	There are no noteworthy concerns regarding natural hazard impacts on this facility.
Historic Buildings/Sites²³	According to the Massachusetts Cultural Resources Information System (MACRIS) online database accessed in October 2025, there are 6 Areas, 279 Buildings, 1 Burial Ground, 121 Objects, and 29 Structures listed for Brookfield. 3 of these historic areas, 23 of these buildings, none of these burial grounds, 3 of these objects, and 1 of these structures lie within regulated or locally identified flood areas within town.		

²² Licensed Child Care Search," Childcare.Mass.gov, Massachusetts Department of Early Education and Care, accessed March 5, 2026, <https://childcare.mass.gov/findchildcare>.

²³ "Search Results," Mhc-macris.net, Massachusetts Historical Commission, accessed March 5, 2026, <https://mhc-macris.net/queryresults>.

EMPLOYMENT CENTERS

Based on data obtained from the Massachusetts Executive Office of Labor and Workforce Development (EOLWD)²⁴ and the knowledge of local HMP committee members, the following table shows the largest employers in Brookfield:

Table 6: Employment Centers in Brookfield

Company name	Address	Number of Employees	NAICS Code
Brookfield Elementary School	Central St	50-99	6111
Brookfield Fire Dept	Central St	20-49	9221
Clam Box	S Maple St	20-49	7225
State Police	S Maple St	20-49	9211
Brookfield Ambulance	Central St	10-19	6219
Brookfield Police Dept	Prouty St	10-19	9221
Dollar General	W Main St	10-19	4552
Exit Real Estate Executives	Fiskdale St	10-19	5312
Hillcrest Montessori	Central St	10-19	6111
Town Hall	Central St	10-19	9211
Brookies	S Maple St	5-9	7225
Community Resources – Justices	Fiskdale St	5-9	5416
Cumberland Farms	Post Rd	5-9	4451
Haleakala R&D Inc	Martin Rd	5-9	5413
Merrick Public Library	Lincoln St	5-9	5192
Multimedia Management Inc	E Main St	5-9	5131
Stone & Lime Imports Inc	Allen Rd	5-9	2381
Wacf Apple Seed Inc	Central St	5-9	4249
Western Union Agent Location	W Main St	5-9	5224

ENVIRONMENTAL JUSTICE AND VULNERABLE POPULATIONS

The Massachusetts Executive Office of Energy and Environmental Affairs (EEA) Environmental Justice (EJ) Policy sets the state's definition for Environmental Justice areas. The policy states that EJ populations are groups within the larger populace that EEA has determined to be most at risk of being unaware of or unable to participate in environmental decision-making, to be most at risk of being unable to gain access to state environmental resources, or to be especially vulnerable. The policy also states that EJ areas are defined as U.S. Census Bureau census block groups (which are often the size of neighborhoods) that meet one or more of the following criteria:

- The annual median household income is not more than 65% of the statewide annual median household income (according to American Community Survey 2020 5-year estimate data);
- Minorities comprise 40% or more of the population (according to 2020 US Census data);
- 25% or more of households lack English language proficiency (according to American Community Survey 2020 5-year estimate data); or

²⁴ "Largest 25 Employers in Brookfield," [lmi.dua.eol.mass.gov](https://lmi.dua.eol.mass.gov/LMI/LargestEmployersArea/LEAResult?A=05&GA=000504), Massachusetts Department of Economic Research, accessed February 26, 2025, <https://lmi.dua.eol.mass.gov/LMI/LargestEmployersArea/LEAResult?A=05&GA=000504>.

- Minorities comprise 25% or more of the population and the annual median household income of the municipality in which the neighborhood is located does not exceed 150% of the statewide annual median household income (according to 2020 US Census data and 2020 5-year estimate American Community Survey data, respectively).
 - In Brookfield, one block group (block group 1 of census tract 7601) in the eastern corner of town has been identified as an Environmental Justice area due to its relatively low median household income. As of the 2023 American Community Survey 5-year estimates, median household income in this block group is estimated at \$52,813, compared to Brookfield's town-wide median of \$71,875 and Worcester County's median of \$93,561.²⁵ Median income in this block group is well below regional and local norms and suggests that some residents may lack the economic capacity to fully prepare for or recover from a disaster. Therefore, it is recommended that hazard mitigation outreach and education efforts in Brookfield should include extra emphasis to reach residents of this area and that mitigation efforts in this block group should be prioritized when appropriate. The location of this EJ area is shown in Maps 1 and 3 in Appendix A.
 - It is important for the Town to consider EJ populations and other vulnerable community members in the hazard mitigation planning process. In Brookfield, according to the 2020 US Census, 18.3% of the population is under the age of 18 and 22% of the population over the age of 65.²⁶ According to 2023 ACS 5-year estimate data, approximately 2.3% of the population in town speaks a language other than English at home;²⁷ and approximately 15.5% of the population in Brookfield has a disability, which is characterized by having either hearing, vision, cognitive, ambulatory, self-care, or independent living difficulties.²⁸ This data also shows that people without health insurance account for about 1.3% of Brookfield's population²⁹ and that about 7.1% of the Town's population is living in poverty.³⁰
 - Outreach to EJ populations and other vulnerable community members was a vital part of the public outreach strategy for the Brookfield Hazard Mitigation Plan. CMRPC staff conducted a presentation at a hybrid Select Board meeting in town during the planning process. These measures allowed residents who lack access to reliable Internet service and/or who have difficulty using the Internet to have a chance to complete the survey as well as hear about and/or provide their feedback on the planning process.

²⁵ "Massachusetts 2020 Environmental Justice Populations," Mass-eoea.maps.arcgis.com, Massachusetts Executive Office of Energy and Environmental Affairs, February 26, 2025, <https://experience.arcgis.com/experience/60e419d78cb5493a91641ffa3c160dd6/page/GEAR-Maps/>. "B19013: Median Household Income in the Past 12 Months (in 2023 Inflation-Adjusted Dollars)," Data.Census.gov, United States Census Bureau, accessed February 26, 2025, https://data.census.gov/table/ACSDT5Y2023.B19013?q=b19013&q=050XX00US25027_060XX00US2502709105_1_500000US250277601001.

²⁶ "DP1: Profile of General Population and Housing Characteristics," Data.Census.gov.

²⁷ "S1601: Language Spoken at Home," Data.Census.gov, United States Census Bureau, accessed February 25, 2025.

²⁸ "S1810: Disability Characteristics," Data.Census.gov, United States Census Bureau, accessed February 26, 2025, <https://data.census.gov/table?q=s1810&q=060XX00US2502709105>.

²⁹ "S2701: Selected Characteristics of Health Insurance Coverage in the United States," Data.Census.gov, United States Census Bureau, accessed February 26, 2025, <https://data.census.gov/table/ACSST5Y2023.S2701?q=s2701&q=060XX00US2502709105>.

³⁰ "S1701: Poverty Status in the Past 12 Months," Data.Census.gov.

4.0 HAZARD PROFILES, RISK ASSESSMENT, AND VULNERABILITIES

Sections 4.0-4.13 help meet the following FEMA local mitigation plan requirements:

- A4. “Does the plan describe the review and incorporation of existing plans, studies, reports, and technical information?” (Requirement 44 CFR § 201.6(b)(3));
- B1. “Does the plan include a description of the type, location, and extent of all natural hazards that can affect the jurisdiction? Does the plan also include information on previous occurrences of hazard events and on the probability of future hazard events?” (Requirement 44 CFR § 201.6(c)(2)(i));
- B2. “Does the plan include a summary of the jurisdiction’s vulnerability and the impacts on the community from the identified hazards? Does this summary also address NFIP-insured structures that have been repetitively damaged by floods?” (Requirement 44 CFR § 201.6(c)(2)(ii));
- C1. “Does the plan document each participant’s existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs?” (Requirement 44 CFR § 201.6(c)(3));
- C2. “Does the plan address each jurisdiction’s participation in the NFIP and continued compliance with NFIP requirements, as appropriate?” (Requirement 44 CFR § 201.6(c)(3)(ii));
- C4. “Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure?” (Requirement 44 CFR § 201.6(c)(3)(ii)); and
- E1. “Was the plan revised to reflect changes in development?” (Requirement 44 CFR § 201.6(d)(3))

The following section of this plan includes a summary of natural hazards that have affected or could affect Brookfield in the future. Natural hazards are weather-related, climate-related, or other environmental processes which threaten people’s lives as well as property and/or other valuable assets to human society. By examining historical data on natural hazard occurrences, as well as future projections on how climate change will interact with natural hazards, it is possible to approximate the future risk of natural hazards.

Historical documents relating to natural hazard occurrences, discussions with local officials and emergency management personnel, available hazard mapping and databases, and weather-related databases were used to develop the following list of the most significant identified natural hazards which affect Brookfield:

- Flooding, including Associated Changes in Groundwater
- Severe Snowstorms / Ice Storms/ Nor’easters
- Hurricanes
- Severe Thunderstorms / Wind / Tornadoes
- Wildfires / Brushfires
- Earthquakes
- Dam Failure
- Drought, including Associated Changes in Groundwater

- Extreme Temperatures
- Invasive Species
- Other hazards

DRAFT

4.1 STATE-WIDE OVERVIEW OF HAZARDS

4.1.1 MASSACHUSETTS STATE HAZARD MITIGATION AND CLIMATE ADAPTATION

The state of Massachusetts under Governor Healy's administration has updated the 2018 State Hazard Mitigation and Climate Adaptation Plan (SHMCAP) pursuant to Executive Order 569. The 2023 ResilientMass Plan updates and expands upon the previous SHMCAP and outlines how the state of Massachusetts must prepare strategies to prevent, respond to, and mitigate natural hazards.³¹ This plan incorporates climate change adaptation into a state-level hazard mitigation plan. The plan is also the document which makes Massachusetts eligible for federal disaster recovery and hazard mitigation funding. The plan is effective under FEMA from September 12, 2023 to September 13, 2028. The Massachusetts SHMCAP is a useful model for incorporating considerations relating to the effects of climate change into the natural hazard mitigation planning process.

4.1.2 CLIMATE CHANGE INTERACTIONS

As part of the SHMCAP planning process, the state of Massachusetts performed a statewide analysis which detailed the effects of climate change on the cities and towns of Massachusetts. This analysis was included in the 2022 Climate Change Assessment, which detailed the impacts of climate change on the Central Region of Massachusetts (which includes 55 cities and towns) along with the other regions of the state. This report refocuses climate change impact assessment away from the specific hazards and towards how the most urgent of those hazards would affect the Region in the following sectors: Human, Infrastructure, Natural Environment, Governance, and Economy. The hazards identified as having the most urgent impacts for Central Massachusetts are **Extremes in Temperature and Precipitation**, with wide fluctuations in both precipitation extremes (including both flooding and droughts) as well as extremes in temperatures (both in extremely hot days becoming more prevalent, as well as extreme lows in temperature) being anticipated to having the greatest future risk to the Central Region across these sectors.

The State plan, while being comprehensive, places different priorities on the impacts of climate change and natural hazards than this Brookfield municipal plan. These different priorities are based more on the specificities of local conditions in Brookfield rather than any contradictions with the State's analysis, and this local hazard mitigation planning effort was informed by the state planning process.

The following descriptions provide an overview of climate change impacts on the five sectors identified in the 2022 Climate Change Assessment.

- **Human Impacts:** The assessment identified a **Reduction in Food Safety and Security** and **Health and Cognitive Effects** from extreme heat as the most urgent human sector climate change impacts for the Central Region. The reduction in food safety and security is likely to occur at all levels of production and distribution because of both extreme heat and extreme cold causing spoilage, power outages, and extremes in precipitation creating a more unpredictable environment for the growth of produce. According to multiple studies, reductions in crop yields across the state and within the Region are anticipated to occur; research has shown that key

³¹ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan," Mass.gov, Massachusetts Executive Office of Energy and Environmental Affairs, accessed June 10, 2024, <https://www.mass.gov/info-details/2023-ResilientMass-Plan-plan>.

commodity crop yields in the Central Region could decline by 12 percent by 2030.³² These impacts to the regional food supply chain are expected to be similar to impacts on state and national crop yields and food distribution patterns. While our food supply networks are currently anticipated to be able to withstand these shocks, the increases in food prices which these shocks will cause will correspondingly lead to an increase in food insecurity within the Central Region.

The impacts of extreme temperatures are also projected to have a significant impact on health and cognition within the Central Region, particularly in our more urbanized areas. Currently, three annual premature deaths are attributed to extreme temperature in the Region, but approximately 35 additional premature deaths per year are expected in the Region as a result of climate change by the end of the century,³³ assuming that no new mitigation measures are taken to reduce the threat of temperature extremes. The negative impacts of extreme heat on people's physical and cognitive health can cause declines in learning outcomes, declines in workplace productivity, and increases in the usage of and strain upon emergency rooms dealing with heat related illnesses and injuries.

Brookfield has a significant portion of its local economy that is comprised of agricultural production: within Brookfield there are two farms focused on vegetable and fruit production, one co-operative farmers market and one brewery producing local beers and ciders. An additional 4 agricultural businesses are in operation outside of Brookfield within a 5-mile radius.³⁴

Additional Human Sector impacts identified in the 2022 Massachusetts Climate Change Assessment include: **Increases in Mental Health Stressors; Increases in Vector Borne Disease Incidence and Bacterial Infections; Damage to Cultural Resources; Health Effects from Aeroallergens and Mold; Emergency Service Response Delays and Evacuation Disruptions; Health Effects of Extreme Storms and Power Outages; and Health Effects from Degraded Air Quality.**

- **Infrastructure Impacts:** The assessment identified the Loss of Urban Tree Cover and Damage to Electric Transmission and Distribution Infrastructure as the most urgent infrastructure sector climate change impacts for the Central Region. Urban Trees face a broad range of climate impacts and stressors, including increasing extreme weather activity, increasing threats from invasive pests and diseases, and reduced water and soil quality; All of these impacts and stressors correspond to an increased rate of tree mortality and therefore increased urban forest management costs for municipalities. Central Massachusetts has both urban and suburban centers where

³²Estimates derived from application of data from the following two sources:

USEPA, "Multi-Model Framework for Quantitative Sectoral Impacts Analysis: A Technical Report for the Fourth National Climate Assessment," U.S. Environmental Protection Agency, 2017, EPA 430-R-17-001; Robert H. Beach et al., "Climate change impacts on US agriculture and forestry: benefits of global climate stabilization," *Environmental Research Letters* 10, no. 9 (2015). doi:10.1088/1748-9326/10/9/095004

³³ Estimates derived from application of David Mills et al., "Climate change impacts on extreme temperature mortality in select metropolitan areas in the United States," *Climatic Change* 131 (2014): 83-95.
<https://doi.org/10.1007/s10584-014-1154-8>.

³⁴ "Directory Search: Farms within 5 Miles of Brookfield." Central Mass Grown, 2025.
<https://www.centralmassgrown.org/directory>

projected temperature increases make urban tree coverage particularly valuable at reducing the Heat Island Effect. A prime example of a community which could benefit from increased tree coverage is the City of Worcester, which is the state's second most populous city. 75 percent of the City's area falls within state-designated environmental justice block groups, but the City has relatively low canopy coverage and is at disproportionate risk for urban tree loss.³⁵

Across the Central Region, damage to electric transmission and distribution infrastructure is projected to cost orders of magnitude more in the coming decades, with additional annual costs projected to grow to \$6 million by 2030; \$12 million by 2050; \$19 million by 2070; and \$28 million by 2090.³⁶ These costs are anticipated to be caused by the need for repair activities in response to climate-related damages and failures, and they take into account a wide range of climate stressors beyond extremes in temperature and precipitation.

Brookfield being located more rurally and further to the west of urbanized areas is at lower exposure to the loss of urban tree cover, but has a greater risk to damage to electrical transmission from trees.

Additional Infrastructure Sector impacts identified in the 2022 Massachusetts Climate Change Assessment include: **Damage to Roads and Loss of Road Service; Reduction in Clean Water Supply; Increased Risk of Dam Overtopping or Failure; Loss of Energy Production and Resources; Damage to Inland Buildings; and Damages to Rails and Loss of Rail/Transit Service.**

- **Natural Environment Impacts:** The assessment identified **Freshwater Ecosystem Degradation** and **Forest Health Degradation** as the most urgent natural environment sector climate change impacts in the Central Region. Increased nutrient load and harmful algal bloom growth in freshwater ecosystems from increased precipitation runoff as well as increased concentrations of contaminants in these ecosystems under drought conditions are both exacerbated by climate extremes. In addition, shifts in habitat caused by increased average air and water temperatures especially threaten the cold-water habitats and fisheries of the Central Region.

The effect of climate change on the Region's forests is harder to predict, but the potential for significant forest ecosystem loss in the Region caused by climate change cannot be understated. Statewide, a third of tree species are classified by the U.S. Forest Service as having low capacity for adapting to projected climate change, and an increased frequency of extreme events poses an additional threat to forests in

³⁵ "2022 Massachusetts Climate Change Assessment," Mass.gov, Massachusetts Executive Office of Energy and Environmental Affairs and Massachusetts Emergency Management Agency, December 2022, <https://www.mass.gov/doc/2022-massachusetts-climate-change-assessment-december-2022-volume-iii-regional-reports/download>, pages RS36-RS37.

³⁶ Estimates derived from application of Charles Fant et al., "Climate change impacts and costs to U.S. electricity transmission and distribution infrastructure," *Energy*, 195 (2020). <https://doi.org/10.1016/j.energy.2020.116899>.

the Central Region.³⁷

Brookfield's location in the western part of Worcester county and its more rural development means that the town has overall more forest ecosystems that are at risk.

Additional Natural Environment Sector impacts identified in the 2022 Massachusetts Climate Change Assessment include: Shifting Distribution of Native and Invasive Species and Soil Erosion.

- **Governance Impacts:** As is true for other parts of the state, the assessment identified **Increase in Costs of Responding to Climate Migration; an Increase in Demand for State and Municipal Government Services; and a Reduction in State and Municipal Revenues** caused by climate change as the most urgent governance sector climate change impacts in the Central Region. Climate Migration, whether forced or voluntary, is already being felt by Massachusetts communities; it has been identified by the state as an impact which causes major consequences and will be the most difficult climate change impact to adapt to in the Central Region. Urban centers, particularly in and around Worcester, as well as towns serviced by state and regional transit services, are likely to become receiving zones for climate migration based on the relative assessment of climate hazards nationwide. The new influx of population caused by climate migration is expected to increase demand for government services. The need to increase government expenditures to maintain the current level of service for the existing population in addition to climate migrants and refugees is expected to be a significant stressor for local governments. Increased needs for MassHealth, food security support, and emergency services are expected in the Central Region due to population growth caused by climate migration in addition to other climate change impacts.

Many climate change impacts are expected to be concentrated in low-income areas. Existing inequalities in the Region may become exacerbated if steps are not taken to prepare for these impacts, as an influx of climate migrants and refugees may increase demand for and place strain on public services.

An increase in natural hazard impacts due to climate change is expected to increase disruptions to State and municipal revenue generation in the Region; these disruptions may include property tax and sales tax losses caused by interruptions to business and the economy.

³⁷ Estimates derived from application of US Forest Service Tree Atlas for Massachusetts.

Northern Research Station Landscape Change Research Group: Iverson, Peters, Prasad, Matthews. "Massachusetts - Climate Change Atlas Tree Species: Current and Potential Future Habitat, Capability, and Migration," Fs.usda.gov, United States Department of Agriculture Forest Service, September 2022, <https://www.fs.usda.gov/nrs/atlas/combined/resources/summaries/states/Massachusetts.pdf>; "Climate Change Atlas," Fs.usda.gov, United States Department of Agriculture Forest Service, accessed June 10, 2024, <https://www.fs.usda.gov/nrs/atlas/combined/resources/summaries/states>.

Additional Governance Sector impacts identified in the 2022 Massachusetts Climate Change Assessment include: **an Increased Need for State and Municipal Policy Review and Adaptation Coordination and Damage to Inland State and Municipal Buildings.**

- **Economic Impacts:** The assessment identified a **Reduced Ability to Work** and a **Decrease in Agricultural Productivity** caused by climate change as the most urgent economic sector climate change impacts in the Central Region. Both of these impacts relate to an increase in dangerous temperature extremes causing to a decrease in workers' abilities to work; these impacts also relate to other natural hazards affecting workers' abilities to get to the job safely and increases in illnesses among workers caused by primary or secondary effects of natural hazards and climate change. Workers in the Region in high-risk industries (those exposed to outdoor conditions) are projected to lose 31 hours of work per worker per year by 2050 and 128 hours of work per worker per year by 2090; these projected losses in work hours by the end of the century are the highest in the Commonwealth.³⁸

While the agricultural sector is a small part in the Central Region's economy, the impacts to this sector of the economy through climate change-induced lower crop yields have the potential to severely disrupt the local economy and regional food systems. Key commodity crop yields in the Central Region could decline by 12 percent by 2030 and by 14 percent by 2070; these declines in key commodity crop yields carry potentially disproportionate impacts on the local economies that rely on agricultural production and the individual farm workers and employers who work in this sector.³⁹

Additionally, though not identified as the one of the most urgent economic sector climate change impacts in the Central Region in the state's assessment, the expected **Reduction in Availability of Affordably Priced Housing** has become a more prevalent issue since the assessment was released. As affordable properties are typically situated in more hazard-prone areas, climate change-induced natural hazard impacts may lead to a decrease in the supply of affordable housing over time. Also, as increases in demand for housing continue in the Region due to a disproportionate economic impact on working families from climate change-induced natural hazard, the overall resiliency of the Region to shocks will also decrease.

Additional Economic Sector impacts identified in the 2022 Massachusetts Climate Change Assessment include: Damage to Tourist Attractions and Recreation Amenities and Economic Losses from Commercial Structure Damage and Business Interruptions.

During the local Hazard Mitigation Planning process, the local HMP planning team in Brookfield noted that their chief concerns related to the natural hazard impacts of climate change are extremes in precipitation in the form of rain or snow; these concerns are in concurrence with the state assessment. Brookfield is located more rurally than many urban and semi-urban towns located further east, and shares much in common with the more western counties of the state.

³⁸ Estimates derived from application of Matthew Neidell et al., "Temperature and work: Time allocated to work under varying climate and labor market conditions," *PLoS One*, 16, no. 8 (2021), <https://doi.org/10.1371/journal.pone.0254224>.

³⁹ Estimates derived from application of USEPA (2017) and Beach et al. (2015)

4.1.3 PREVIOUS FEDERALLY DECLARED DISASTERS AND MASSACHUSETTS STATE OF EMERGENCY DECLARATIONS IN WORCESTER COUNTY

From 2017 to the present, the following Federally Declared Disasters and Massachusetts State of Emergency Declarations have occurred in Worcester County:

Table 7: Previous Federally Declared Disasters and Massachusetts State of Emergency Declarations in Worcester County⁴⁰

Disaster Declaration	Disaster Type	Incident Period	Declaration Date
Massachusetts Severe Storms and Flooding (DR-4780-MA)	Flooding	September 11, 2023 - September 13, 2023	May 15, 2024
Massachusetts Hurricane Lee (EM-3599-MA)	Hurricane	September 15, 2023 - September 17, 2023	September 15, 2023
Shelter Capacity Crisis	Not a Natural Hazard	August 8, 2023 - Present	August 8, 2023
Massachusetts Covid-19 Pandemic (DR-4496-MA)	Pandemic	January 20, 2020 - May 11, 2023	March 27, 2020
Massachusetts Severe Winter Storm and Snowstorm (DR-4379-MA)	Snow	March 13, 2018 - March 14, 2018	July 19, 2018

All of the disaster occurrences described in the above table were both Federal Disaster Declarations and Massachusetts State of Emergency Declarations with the exception of the Shelter Capacity Crisis, which is a Massachusetts State of Emergency Declaration but not a Federal Disaster Declaration, and the March 13th-14th, 2018 Severe Winter Storm and Snowstorm, which was a Federal Disaster Declaration but not a Massachusetts State of Emergency Declaration.

The majority of these disaster occurrences directly relate to the natural hazard concerns of towns within Worcester County; flooding from rain events and other extremes in precipitation (such as snowfall events) are the chief concerns of residents and local hazard mitigation planners alike in the region.

⁴⁰ "Disaster Declarations for States and Counties," FEMA.gov, Federal Emergency Management Agency, accessed September 16, 2024, <https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties>; "State of Emergency Information," Mass.gov, Massachusetts Emergency Management Agency, accessed December 12, 2024, <https://www.mass.gov/info-details/state-of-emergency-information>.

4.2 NATURAL HAZARD IDENTIFICATION AND ANALYSIS

This section of the plan examines the hazards in the Massachusetts SHMCAP which are identified as likely to affect Brookfield. This analysis is organized into the following sections: Hazard Description, Location, Extent, Previous Occurrences, Probability of Future Events, Impact, Exposure, Potential Climate Change Effects, Vulnerability, and Mitigation Strategies. A description of each of these sections of the analysis and the risk assessment summary table which includes each hazard identified are provided below.

4.2.1 HAZARD DESCRIPTION

The natural hazards identified for Brookfield are:

- Flooding, including Associated Changes in Groundwater
- Severe Snowstorms / Ice Storms / Nor'easters,
- Hurricanes,
- Severe Thunderstorms / Wind / Tornadoes,
- Wildfire / Brushfire,
- Earthquakes,
- Dam Failure,
- Drought, including Associated Changes in Groundwater
- Extreme Temperatures, and
- Invasive Species.

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

4.2.2 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. Location classifications (large, medium, or small) are based on the area that would potentially be affected by the hazard, on the following scale:

Table 8: Percentage of Town Impacted by Natural Hazard

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

4.2.3 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.

4.2.4 PREVIOUS OCCURRENCES

Previous hazard events that have occurred are described in this section. Depending on the nature

of the hazard, events listed may have occurred on a local, state-wide, or regional level.

4.2.5 PROBABILITY OF FUTURE EVENTS

The likelihood of future events occurring in the planning area for each natural hazard was classified according to the following scale:

Table 9: 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

4.2.6 IMPACT

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

Table 10: Impacts, Magnitude of Multiple Impacts of Given Natural Hazard

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

4.2.7 EXPOSURE

Certain features of a community's infrastructure, society, and environment may face more of, or may be disproportionately impacted by, natural hazards; these features therefore can be described as experiencing increased exposure to natural hazards. Some of these features may be documented in the list of critical facilities and vulnerable populations in Section 3.

4.2.8 POTENTIAL CLIMATE CHANGE EFFECTS

Each natural hazard is influenced by one or more of the climate change interactions listed in Section 4.1.2 Climate Change Interactions. Climate change interactions can modify the location, extent, and/or probability of future events depending on the hazard. The hazard risk assessment table in section 4.2.11 of this plan lists climate change interactions as described by the 2023 ResilientMass Plan.

4.2.9 VULNERABILITY

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

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

This ranking is qualitative and is based, in part, on the local HMP planning team's knowledge of past experiences with each 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 in Brookfield can be applied to expected natural hazards, regardless of their unpredictability.

4.2.10 MITIGATION STRATEGIES

Based on meetings with the local planning team, a selection of mitigation strategies that address the specific hazard is included at the end of each hazard analysis section.

4.2.11 RISK ASSESSMENT

Table 11: Hazard Risk Assessment for Each Natural Hazard in Brookfield

Type of Hazard	Location of Occurrence	Probability of Future Events	Impact	Potential Climate Change Effects	Hazard Risk Index Rating
<i>Flooding/ Including Changes in Groundwater</i>	Small	Moderate	Minor	Increase extent; increase probability	3
<i>Severe Snowstorms / Ice Storms / Nor'easter</i>	Large	Very High	Minor	Increase extent	2
<i>Hurricanes</i>	Large	Low	Minor	Increase extent; increase probability	3
<i>Severe Thunderstorms / Wind</i>	Small	Moderate	Minor for severe thunderstorms; Limited for severe wind	Unclear	2
<i>Tornadoes</i>	Small	Very Low	Limited	Unclear	3

Type of Hazard	Location of Occurrence	Probability of Future Events	Impact	Potential Climate Change Effects	Hazard Risk Index Rating
<i>Wildfire / Brushfire</i>	Small	Moderate	Minor	Increase extent; increase probability	4
<i>Earthquakes</i>	Large	Very Low	Minor	None	5
<i>Dam Failure</i>	Small	Very Low	Limited	Indirect effects related to flooding	3
<i>Drought, Including Changes in Groundwater</i>	Large	Low	Minor	Increase extent; increase probability	3
<i>Extreme Temperatures</i>	Large	Moderate	Minor	Increase in average temperature; increase in probability of extreme heat	4
<i>Invasive Species</i>	Large	Very High	Limited	Increase in range and severity of invasive species	3

Source: based on Massachusetts Resilient Mass Plan 2023;⁴¹ modified to reflect conditions in Brookfield

⁴¹ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan"

4.3 FLOODING, INCLUDING CHANGES IN GROUNDWATER

Flooding is generally caused by hurricanes, nor'easters, severe rainstorms, and thunderstorms. Global climate change has the potential to exacerbate the hazards which cause flooding, including flooding caused by changes in groundwater, over time by leading to more severe and frequent storm and rainfall events. There are several different types of flood hazards – from stormwater inundation and poor drainage infrastructure to riverine flooding and storm surges to dam failures to flooding caused by an elevated water table.

Riverine and stormwater flooding both occur in Brookfield, though stormwater flooding is more common. Riverine flooding occurs when the surge of water comes from the top of streams, ponds, and rivers. Stormwater flooding occurs when the amount of precipitation in a storm is greater than the volume that the stormwater management system can handle.

LOCATION

Flooding and flood-prone areas in Brookfield are closely associated with the Chicopee and Quinebaug River Basins and their associated tributaries, canals, and impoundments. The town's environmental justice population is by accident or design the area in town that experiences the most flooding, specifically in the areas around Quaboag Pond and Quaboag River, with other dispersed areas of flooding around minor streams and tributaries where culvert infrastructure is undersized or inadequate. For the former, the streets of Quaboag Street, Lakeside Ave, Hobbs Ave, Lakeside Circle, Oak Ave, Pine Lane, Henrey Allen Ave, Fiskdale Road, River Street and other locations in the Eastern part of town, and typically lie within the 100-year flood zone. For the latter, Rice Corner Cross Road is the most notable with a damaged culvert that is undersized. According to a GIS analysis performed by CMRPC, there are 290 parcels in Brookfield that are susceptible to 100-year floods, with 171 of them containing structures. Building footprints that overlap with flood zones may be impacted by flooding, especially if residents and building owners do not act to mitigate their personal flood risk. Despite Brookfield having numerous flooding problems, geographically Brookfield is defined by rolling hills, away from rivers and ponds – as a result, the location of this hazard in town is considered “small” (less than 10% of the Town). Map 2 in Appendix A illustrates the FEMA FIRM 100-year / 1% flood zones in town as well as locally identified flooding areas.

FEMA Flood Zones

FEMA creates and manages Flood Insurance Rate Maps (FIRMs) that identify local Special Flood Hazard Areas (SFHAs). These SFHAs are locations that will be inundated by a flood event with a 1% or greater chance of occurring in any year. These areas are also referred to as the base flood, or 100-year / 1% flood zone. These areas are considered at high risk of flooding and have around a 1 in 4 chance of flooding during a 30-year mortgage.

FEMA FIRMs also identify areas with a “moderate” flood risk, defined as locations outside of the 100-year / 1% flood zone that will be inundated by a flood event with between a 1% and a .2% chance of occurring in any year. These areas are also known as the 500-year / 0.2% flood zone.

The 2023 Worcester County Flood Insurance Study (FIS) from FEMA⁴² lists the following flooding sources which could impact Brookfield:

- The Sevenmile River (flood zone AE) located in the town of East Brookfield,
- Quocumquasit Pond (flood zone AE) located in Brookfield, East Brookfield and Sturbridge⁴³,
- Quaboag Pond and
- Zone A Flooding Sources from miscellaneous streams and ponds

It also notes that causes of severe flooding in the county include hurricanes, melting snow in combination with rain in the spring, heavy thunderstorms and resulting rapid downstream runoff, ice jams, and the accumulation of debris at bridges. In addition, the study notes that flooding can occur in any season in the county, but that major flooding is less common in the summer than in other seasons.⁴⁴

As of July 2024, the Town of Brookfield has 4 repetitive loss structures according to FEMA's National Flood Insurance Program (NFIP). As defined by the NFIP, a repetitive loss property is any property which the NFIP has paid two or more flood claims of \$1,000 or more for in any given 10- year period since 1978. For more information on repetitive losses see <https://www.fema.gov/repetitive-flood-claims-grant-program-fact-sheet>. The Town of Brookfield has 7 NFIP policy holders in town, and the NFIP insures up to \$1,110,000.00 of property in the Town. NFIP has paid out 22 claims in total to policy holders in Brookfield.⁴⁵

EXTENT

The average annual precipitation for the closest weather station to Brookfield (which is located in in Sturbridge, Massachusetts) has been 52.76 inches for the period from 2017 to 2025.⁴⁶ Over the past five years, Brookfield has received an average of 13 days annually with precipitation over 1 inch.⁴⁷ Water levels in Brookfield's rivers, streams, and wetlands rise and fall seasonally and rise during high rainfall events. High water levels in town 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). Monthly precipitation levels are highly variable, but for the period between 2017 and 2025, Brookfield received on average the most precipitation in the months of April, July, October, and December. At any time, heavy rainfall may create conditions that raise water levels in rivers and streams above bank full stage; this results in overflow which floods adjacent lands, downtown neighborhood and municipal facilities. Heavy rainfall in town may also cause excessive runoff that causes the sides of roads to give way; This leads to public safety concerns and maintenance problems for the Town's Highway Department.

⁴² Federal Emergency Management Agency, "Flood Insurance Study: Worcester County, Massachusetts (All Jurisdictions)," Map1.msc.fema.gov, FEMA Flood Map Service Center, accessed August 21, 2024, <https://map1.msc.fema.gov/mipdata/25027CV001C.pdf?LOC=2cdcfc8d29a9ba73c75a69614806808>.

⁴³ The Worcester County Flood insurance study indicates this pond is located entirely within Sturbridge, which is inaccurate.

⁴⁴ Federal Emergency Management Agency, "Flood Insurance Study: Worcester County, Massachusetts (All Jurisdictions)," Map1.msc.fema.gov, FEMA Flood Map Service Center, accessed August 21, 2024, <https://map1.msc.fema.gov/mipdata/25027CV001C.pdf?LOC=2cdcfc8d29a9ba73c75a69614806808>.

⁴⁵ "Community Overview: Brookfield, Town of," NFIP Community Information System, accessed July 2, 2024.

⁴⁶ The calculation of this average does not incorporate data from the years 2021 and 2022, as there were months with missing data during these years. "Monthly Total Precipitation for East Brimfield," Weather.gov, National Oceanic and Atmospheric Association National Weather Service, accessed February 10, 2026, <https://www.weather.gov/wrh/Climate?wfo=box>.

⁴⁷ Ibid

More severe flooding occurrences in town will lead to more impactful changes in the levels and quality of groundwater. The United States Geological Survey National Groundwater Conditions web application measures groundwater levels by monthly percentiles as compared to historic levels at each particular site.⁴⁸ In Massachusetts, the quality of drinking water, including from groundwater sources, is assessed by measuring maximum containment levels (MMCLs) from a number of inorganic and organic chemical, radionuclide, and biological contaminants.⁴⁹ Shallow flooding caused by changes in groundwater system is measured with the same classification systems as other types of flooding.

PREVIOUS OCCURRENCES

In addition to the floodplains mapped by FEMA for the 100-year / 1% and 500-year / .2% annual chance floods, Brookfield periodically experiences minor flooding at isolated locations due to drainage problems or problem culverts. Town staff have reported that flooding events are becoming more frequent in recent years. The following specific flooding locations (mapped in Appendix A) were identified by the Brookfield Hazard Mitigation Planning Team:

- Quaboag Street
- Mill Street & Lower River Street
- Long Hill Road
- Route 9 Bridge
- Rice Corner Cross Road

Most of the flood hazard areas listed here were identified due to known past occurrences in the respective areas. At Quaboag Street, Mill Street & Lower River Street, those sections of road run through wetland area and flood on an occasional to semi regular basis. The wetlands in those areas are not maintained and the water often has very few places to go. The Route 9 bridge located in the northwest part of town has been inundated by a previous flash flooding event and is seeking funding for a replacement. Lastly, the Rice Corner Crossroad is at risk to flooding due to a blocked and inadequate culvert, and the town is as of writing utilizing state funding to replace the culvert with a nature-based culvert design.

In the past 10 years, there have been a number of flooding events that have occurred in and around Brookfield. The National Oceanic and Atmospheric Administration (NOAA)'s National Centers for Environmental Information (NCEI) database notes the following flood events as having occurred in or near Brookfield since the previous planning process:⁵⁰

- 07/06/2019 – Flooding caused by Heavy Rain: A cold front advanced into a very moist, almost tropical air mass in place across southern New England. This produced a line of thunderstorms, some with torrential downpours that caused flooding. Isolated but

⁴⁸ Lee Stanish, "Introducing the National Groundwater Conditions web application," Waterdata.usgs.gov, United States Geological Survey, accessed March 12, 2026, <https://waterdata.usgs.gov/blog/groundwater-levels-app/>.

⁴⁹ "Drinking Water Standards and Guidelines," Mass.gov, the Massachusetts Department of Environmental Protection, accessed March 12, 2026, <https://www.mass.gov/guides/drinking-water-standards-and-guidelines>.

⁵⁰ "Storm Events Database Search Results for Worcester County, Massachusetts," NCDC.NOAA.gov, National Oceanic and Atmospheric Administration National Centers for Environmental Information, accessed March 25, 2026, https://www.ncei.noaa.gov/stormevents/listevents.jsp?eventType=%28C%29+Flash+Flood&eventType=%28Z%29+Flood&eventType=%28C%29+Heavy+Rain&beginDate_mm=12&beginDate_dd=01&beginDate_yyyy=2017&endDate_mm=12&endDate_dd=31&endDate_yyyy=2025&county=WORCESTER%3A27&hailfilter=0.00&tomfilter=0&windfilter=000&sort=DT&submitButton=Search&statefips=25%2CMASSACHUSETTS

significant wind damage occurred in Longmeadow, MA from a wet microburst. Pleasant Street in Spencer was flooded an impassable, with manhole covers popped off.

- 08/23/2020 – Flooding caused by Heavy Rain: Diurnally driven thunderstorms brought wind damage, hail, and some flooding to mainly western and central Massachusetts. In West Brookfield, Shea Rd was closed from Birch Hill Rd to Wickaboag Rd due to flooding.
- 07/16/2023 – Flash Flood caused by Heavy Rain: A deep longwave trough, south-southwest flow at all levels, and the development of a QLCS (quasi-linear convective system) created all the ingredients for a widespread and substantial flash flood event across much of southern New England. For a few hours during the late morning, helicity values were high and a brief tornado formed along the QLCS in North Brookfield, MA.

In addition, minor flooding related to changes in groundwater was identified as affecting the Town, as basement flooding has been experienced by town residents who responded to the survey. The 2023 ResilientMass Plan describes how flooding resulting from changes in groundwater can impact communities in Massachusetts.⁵¹

PROBABILITY OF FUTURE EVENTS

Based upon previous data, there is a “moderate” probability (a 10% to 40% chance) of localized flooding occurring in Brookfield in the next year. This is regionally not uncommon.

IMPACT

The Town faces a minor impact from flooding, including flooding caused by changes in groundwater, with less than 10% of properties in the affected area of town likely to be damaged or destroyed by a 100-year / 1% annual chance flooding event. Based on the HAZUS analysis described below, a flood in Brookfield is unlikely to destroy any buildings, but a 500-year / .2% annual chance flood event could displace residents and come with an moderate economic cost.

HAZUS-MH (multiple-hazards) is a computer program developed by FEMA to estimate losses due to a variety of natural hazards. The HAZUS software was used to model potential damage to the community from a 500-year / .2% annual chance flood event, assuming a 1 square mile data resolution.

Table 1: HAZUS Potential Damages to Brookfield from .2% Annual Chance Flood Event

	.2% annual chance flood event
Building Characteristics	
Estimated total number of buildings in Brookfield	830
Estimated total building replacement value (2024 \$)	\$385,979,000.00
Building Damages	
# of buildings sustaining minor damage (1-10%)	1
# of buildings sustaining moderate damage (11-40%)	3
# of buildings sustaining severe damage (41-50%)	0

⁵¹ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan," pages 5.1 -34- 5.1-35.

# of buildings destroyed	0
Population Needs	
# of households displaced	45
# of people seeking public shelter	11
Value of Damages	
Total property damage (buildings and content)	\$ 1,160,000.00
Total losses due to business interruption	\$ 600,000.00
Total Economic loss	\$1,760,000.00

Though there are no recorded instances of a flood event of this size in Brookfield, this model was included in order to present a reasonable “worst case scenario” that would help planners and emergency personnel evaluate the impacts of flooding that might be more likely in the future as we enter into a period of more intense and frequent storms. For more information on the HAZUS-MH software, go to <http://www.fema.gov/hazus-software>.

EXPOSURE

Certain features within Brookfield’s infrastructure, society, and environment may face more exposure to flooding (including flooding caused by changes in groundwater), or be disproportionately impacted by it, relative to the rest of the community. Some of these features are documented in the list of critical facilities and vulnerable populations in Section 3. These features include:

- Low-lying areas, including but not limited to the FEMA 1% and .2% annual chance flood zones;
- Specific locations with undersized or outdated storm water infrastructure that cannot handle sudden surges in precipitation;
- Residents who may have trouble evacuating from their residences due to age, health concerns, or lack of a vehicle;
- Flood-prone municipal buildings and critical infrastructure that are subject to flooding and potential contamination from flood waters;
- Septic systems, especially in flood prone areas or locations with high water tables;
- Aquatic ecosystems, which may suffer from erosion, eutrophication, or sedimentation due to stormwater;
- The municipal financial burden of infrastructure maintenance and upgrades needed to address flooding;
- Highway department staff, who sometimes must unclog storm drains during extreme weather events. Due to limited staffing, highway department employees often have to go out alone, making safety a concern; and
- Sides of roadways, which may be eroded due to excessive rainfall. Lack of funding to make road repairs may compound this issue.

Specifically, the following critical infrastructure sites and routes identified in this plan were noted as being especially vulnerable to flooding by the local HMP planning team in Brookfield and/or CMRPC's GIS analysis:

- Life Flight Landing Zone 2,
- MA Route 9,
- MA Route 148,
- Brookfield Water Department Pump Station

POTENTIAL CLIMATE CHANGE EFFECTS

According to the 2023 State Hazard Mitigation and Climate Adaptation Plan, climate change effects coupled with changes in development and population density can increase the risk of flooding from precipitation. As noted earlier in this plan, the Central Region is most likely to be impacted by extremes in precipitation in the following ways:

- Climate change is projected to increase the variability of precipitation events in any given year, including the potential for extreme precipitation events. Instances of inland flooding, river overflows, and pressure on dams may result; and
- Projected changes in precipitation patterns in all seasons, as well as higher frequency of extreme weather (including hurricanes and nor'easters), will change patterns of river flow and increase the frequency and severity of inland riverine flooding.
- According to the 2023 ResilientMass Plan, climate change is predicted to affect groundwater levels. Sea level rise, extreme temperature events, and changes in precipitation patterns will all affect groundwater conditions and may increase the risk in town of minor basement flooding.⁵²

In summary, climate change is likely to increase the extent and probability of future flood events in Brookfield, which will make it more likely for multiple storms in a short duration to cause cumulative damage; These impacts can affect land use and development by causing people to no longer be able to develop in parts of town that flood frequently and causing the Town's government to zone for increased stormwater resilience as well as promote measures such as new storm drains and rain gardens.

VULNERABILITY

Based on this analysis and the assessment of the Brookfield Local HMP Planning Team, Brookfield faces a hazard index rating of "3 – moderate risk" from flooding, including flooding from changes in groundwater. While the vast majority of town is mostly unaffected by flooding events, there are certain parts of town that have had repetitive flood claims, and the town deals with aging culvert infrastructure and difficulties in funding improvements and repairs to drainage infrastructure.

MITIGATION STRATEGIES

The Town of Brookfield is currently able to effectively respond to flooding through the emergency response facilities and services identified in the critical infrastructure and facilities and existing protection sections of this plan. However, there are numerous opportunities for the Town to expand upon its existing capabilities to mitigate and respond to flooding. The local HMP planning team identified the following strategies that could be used to reduce the threat of flooding in Brookfield:

⁵² Ibid.

- Acquire repetitive loss properties and other flood-prone property along Quaboag Pond to turn into stormwater parks.
- Sweep streets at least annually to increase stormwater management capacity; capture & dispose of appropriately
- Replace a 36" culvert, 20' in length, on Rice Corner Cross Road that is about to collapse, in order to decrease the flood risk in this area.

DRAFT

4.4 SEVERE SNOWSTORMS / ICE STORMS / NOR'EASTERS

Severe winter storms can pose a significant risk to property and human life. Severe snowstorms and ice storms can involve rain, freezing rain, ice, snow, cold temperatures, and wind. Heavy snowfall and extreme cold can immobilize an entire region. Even areas that normally experience mild winters can be hit with a major snowstorm or extreme cold event. Winter storms can result in flooding, storm surges, closed highways, blocked roads, downed power lines, and hypothermia among residents. A northeast coastal storm, known as a nor'easter, is typically a large counterclockwise wind circulation around a low-pressure center; nor'easters often result in heavy snow, high winds, and rain.

LOCATION

The entire town of Brookfield equally is susceptible to severe snowstorms, ice storms and nor'easters; this means that the location of occurrence of severe snowstorms in town is "large." Because these storms occur regionally, the entire town is equally vulnerable to them.

EXTENT

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

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

Table 13: Northeast Snowfall Impact Scale Categories⁵³

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

The Sperry-Piltz Ice Accumulation Index rates approaching ice storms based on the potential damage they are projected to cause, their projected footprint, and their predicted total ice accumulation.

⁵³ National Centers for Environmental Information, "The Northeast Snowfall Impact Scale (NESIS)," [Ncei.noaa.gov](https://www.ncei.noaa.gov/access/monitoring/rsi/nesis), National Oceanic and Atmospheric Association, accessed June 12, 2024, <https://www.ncei.noaa.gov/access/monitoring/rsi/nesis>.

Table 14: The Sperry-Piltz Ice Accumulation Index⁵⁴

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

The Miller Classification is a system used to classify nor'easters.⁵⁵ The types of storm classification under the Miller classification are listed below.

Table 2: The Miller Classification for Nor'easters

Miller Classification	Description
Miller A / Storm Type A	Miller A, or Storm Type A, nor'easters form in the southeastern USA or along the Gulf of Mexico and intensify as they move north until turning east to the Atlantic Ocean. They are most impactful the mid-Atlantic region but can also lead to major snow events in New England if they are strong enough.
Miller B / Storm Type B	Miller B, or Type B, nor'easters form in the midwestern USA and move slightly southeast to the southern mid-Atlantic region until they combine with / transfer energy to a storm originating along the coast in this region. This combined storm then travels north,

⁵⁴ "What is the Sperry-Piltz Ice Accumulation Index?," Spia-index.com, SPIA Index, accessed March 12, 2026, <https://spia-index.com/>

⁵⁵ Mike Priante, "The Miller Classification," Weatherworksinc.com, WeatherWorks, December 4, 2020, <https://weatherworksinc.com/news/Miller-A-vs-Miller-B>; "Mid-Atlantic Winter Storm Patterns," Glenallenweather.com, Glen Allen, VA Weather, accessed March 12, 2026, <https://glenallenweather.com/dlink/18snow/stormtypes.htm>.

	impacting inland and coastal areas of the northeast USA with major snow events, before turning east to the Atlantic Ocean.
Miller C / Storm Type C	Miller C, or Type C, nor'easters are similar to Miller B nor'easters but are stronger and tend to be more impactful in the midwestern USA and southern New England.
Miller D / Storm Type D	Miller D, or Type D, nor'easters are similar to Miller B nor'easters but are weaker and tend to have more limited impacts in the southern mid-Atlantic region.
Miller E / Storm Type E	Miller E, or Type E, nor'easters are similar to Miller B nor'easters but form further to the south and tend to have a long band of area they are highly impactful in which stretches from the northern part of the inland southeastern states, through the mid-Atlantic region, and to inland New England.

The extent of damages broadly speaking in this category of natural hazard you can expect to see heavy snowfall, strong winds, freezing rain, and snow and ice accumulation. A nor'easter, being the worst type of winter storm event can be categorized under the NEISIS Scale and/or the Sperry-Piltz Ice Accumulation Index depending on what kind of wintery precipitation is to be expected, which is partially dependent on what Miller Classification the storm can be categorized into, and partially dependent on the specific weather conditions of the storm in question. Typically, the damage extent is lesser for a snowstorm, greater for an ice storm, and greatest for a nor'easter, which combines both snow and ice with high winds.

PREVIOUS OCCURRENCES

Based on data available from the National Oceanic and Atmospheric Administration, there are 88 high-impact snowstorms since 1956 that have affected the Northeast Corridor. Of these, approximately 42 storms resulted in at least 10 inches of snow fall in Brookfield. These storms are listed in the table below:⁵⁰

Table 3: High-Impact Snowstorms with Snow Falls in Brookfield of at Least 10 Inches Since 1958

Start Date	NESIS Value	NESIS Category	NESIS Classification
2/22/2026	3.86	2	Significant
1/23/2026	7.78	4	Crippling
2/14/2025	2.04	1	Notable
1/5/2024	1.43	1	Notable
1/28/2022	1.73	1	Notable
1/4/2022	1.60	1	Notable
1/30/2021	4.93	3	Major
12/14/2020	3.21	2	Significant
3/11/2018	3.16	2	Significant
1/3/2018	2.27	1	Notable

2/9/2017	1.87	1	Notable
3/12/2017	5.03	3	Major
2/8/2015	1.32	1	Notable
1/29/2015	5.42	3	Major
1/25/2015	2.62	2	Significant
3/4/2013	3.05	2	Significant
2/7/2013	4.35	3	Major
1/26/2011	2.17	1	Notable
1/9/2011	5.31	3	Major
12/24/2010	4.92	3	Major
12/18/2009	3.99	2	Significant
1/17/2009	1.32	1	Notable
2/12/2006	4.10	3	Major
1/21/2005	6.80	4	Crippling
2/15/2003	7.50	4	Crippling
3/31/1997	2.29	1	Notable
2/8/1994	5.39	3	Major
3/12/1993	13.2	5	Extreme
2/10/1983	6.25	4	Crippling
4/6/1982	3.35	2	Significant
2/5/1978	5.78	3	Major
1/19/1978	6.53	4	Crippling
2/18/1972	4.77	3	Major
2/22/1969	4.29	3	Major
2/8/1969	3.51	2	Significant
2/5/1967	3.50	2	Significant
2/2/1961	7.06	4	Crippling
1/18/1961	4.04	3	Major
12/11/1960	4.53	3	Major
3/2/1960	8.77	4	Crippling
2/14/1958	6.25	4	Crippling

Additionally, the NCEI database notes a few instances of heavy snowfall in the Southern Worcester County region, of which the Town of Brookfield is a part:⁵⁶

⁵⁶ "Storm Events Database Search Results for Worcester County, Massachusetts," NCEI.NOAA.gov, National Oceanic and Atmospheric Administration National Centers for Environmental Information, accessed June 25, 2026, https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%287%29+Heavy+Snow&beginDate_mm=01&beginDate_dd=01&beginDate_yyyy=2020&endDate_mm=06&endDate_dd=30&endDate_yyyy=2024&county=WORCESTER%3A27&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=25%2CM-MASSACHUSETTS.

- 1/25/2026 – Heavy Snow: Sunday evening brought a low pressure system through the eastern U.S. over an arctic airmass that brought 1-2 feet of snow to Southern New England through Tuesday morning. The highest snowfall was recorded at the Worcester Airport at 22.5 inches.
- 02/13/2024 – Heavy Snow: A quick hitting winter storm brought around 12 hours of snow, centered over Connecticut, with the greatest amount of snow in Massachusetts falling on Cape Cod and the islands. This was a notoriously difficult to forecast storm passing south of 40/70 benchmark, which was a significant shift south in the final 24 hours leading up to the storm. This moved the band of heavy snow well south of Boston (0.1) to Cape Cod which received 7-9 inches of snow. The heaviest snow of the storm fell in Hartford County, Connecticut where over 15 inches of snow was reported. The result was many schools and businesses in eastern MA closing and receiving little to no snow. Cape Cod had about 30,000 people lose power due to the heavy, wet nature of the snow. Winds were also strong on the Cape and islands, gusting 45 to 55 mph in the afternoon which reduced visibility in blowing snow. In Massachusetts, generally 4 to 10 inches of snow fell, with the highest amounts to the south and lesser amounts to the north.
- 01/07/2024 – Heavy Snow: A strong storm moved up the east coast passing near the 70/40 benchmark brought heavy snow to southern New England beginning late Monday night and continuing on Sunday. The first round of heavy snow fell overnight followed by a lull in the snow and mixing with rain Sunday morning. Comma head snow then filled back into eastern MA and RI bringing moderate to heavy snow Sunday afternoon and evening. Snow amounts ranged from 2 to 18 inches.

According to the planning team, 2015 was the most difficult year for Brookfield in terms of snow. The details of this are included in the previous version of the plan, and the town currently has a snow plan in place.

PROBABILITY OF FUTURE EVENTS

Based upon the availability of records for Worcester County, the likelihood that a severe snowstorm will affect Brookfield in any given year is “very high” (greater than 70 percent).

The 2023 ResilientMass Plan notes that, on average, Massachusetts experiences one to two nor’easters per year.⁵⁷ Between 2013 and 2022, there were 63 heavy snow days, 12 blizzard days, and two ice storm days in Massachusetts.

IMPACT

Brookfield faces a “minor” impact, with less than 10% of total property in affected areas damaged, from snowstorms. The weight from multiple snowfall events can test the load ratings of building roofs and can potentially cause significant damage. Multiple freeze-thaw cycles can also create large amounts of ice and can lead to even heavier, even more dangerous roof loads.

Other impacts from snowstorms and ice storms include:

- Tree damage and fallen branches that cause utility line damage and roadway blockages;

⁵⁷ “ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan”

- Disrupted power and phone service;
- Unsafe roadways and increased traffic accidents;
- Infrastructure and other property also being at risk from severe winter storms and the associated flooding that can occur following heavy snow melt;
- Damage to telecommunications structures; and
- Reduced ability of emergency officials to respond promptly to medical emergencies and fires.

EXPOSURE

Certain features within Brookfield's infrastructure, society, and environment may face more exposure to winter storms, or be disproportionately impacted by them, relative to the rest of the community. Some of these features may be documented in the list of critical facilities and vulnerable populations in Section 3. These features include:

- Elderly residents, who may have more difficulty clearing snow and walking on icy or snow-covered sidewalks. Elderly residents may also be more vulnerable to extremely low temperatures;
- Households with low or fixed incomes, who may be less able to afford sufficient heating or home improvements to improve energy efficiency and insulation;
- Renters, who may have less control over their living situation and indoor environment than homeowners;
- Public safety, utility, and highway department workers, who are tasked with responding to emergency calls, keeping the heat and power on, and keeping the streets clear during winter storms.

Specifically, the following critical infrastructure sites identified in this plan were noted as being especially vulnerable to winter storms by the local HMP planning team in Brookfield and/or CMRPC's GIS analysis:

- Brookfield Elementary school was noted as having roof leaks that are exacerbated by heavy snow load.
- The Library and Annex buildings were noted as being potentially vulnerable as well.

POTENTIAL CLIMATE CHANGE EFFECTS

According to the 2023 ResilientMass Plan, sea level rise, warming ocean temperatures, and changing atmospheric circulation patterns are likely to increase the frequency and severity of winter storms.⁵³ Warmer temperatures indicate that more precipitation will fall as rain rather than snow throughout the 21st century. The result of this will be fewer overall snowstorms; however, the snowstorms that do occur will likely be worse. Increased wintertime rain also creates a greater risk for wintry mix, sleet, and ice storms; in addition, it will cause hazardous roadway conditions, as temperature drops overnight will cause transportation infrastructure to ice over if mitigation measures are not put in place.

In summary, climate change is likely to increase the extent and probability of future snowstorm events in Brookfield. This may have societal impacts; more frequent severe winter storms may change land use and development protocols, as more homes and community buildings may need to have greater sheltering infrastructure to prepare for heavy snowfall.

VULNERABILITY

Based on the above assessment, Brookfield has a hazard index rating of “3 – moderate risk” from snowstorms, ice storms, and nor’easters. The town of Brookfield experienced difficult snow events in 2015 that caused them to improve their responses to snow, and developed a regional equipment sharing group with other highway departments in the region to reduce costs to each of the towns which has allowed them to more adequately address snow concerns. Snowstorms, ice storms, nor’easters, and other forms of winter precipitation are a frequent occurrence in Massachusetts, and they are expected to only become more frequent over time. Additionally, the expected increase in “wintery-mix” precipitation may lead to increased roadway hazards, as standing water freezing in overnight temperatures creates hazardous road conditions for travelers and responders.

MITIGATION STRATEGIES

The Town of Brookfield is currently able to effectively respond to severe snowstorms, ice storms, and Nor'easters through the emergency response facilities and services identified in the critical infrastructure and facilities and existing protection sections of this plan. Given that Brookfield, as well as other towns in the region, experience snowstorms frequently, local and state officials as well as emergency response personnel amply prepare for major snow events. However, there are numerous opportunities to expand upon the Town’s existing capabilities to mitigate and respond to severe snowstorms, ice storms, and nor’easters. The local HMP planning team identified the following strategies that could be used to reduce the threat of snowstorms in Brookfield:

- Replace/upgrade aging snow-removal equipment
- Develop and enhance working relationships with utility companies; ensure satellite spaces within each community for temporary emergency headquarters

4.5 HURRICANES

Hurricanes begin as tropical storms that form over warm ocean waters in the Atlantic Ocean off the west coast of Africa or the Pacific Ocean. These storms form as heated, moist air is drawn up into the atmosphere and begins circulating clockwise or counterclockwise, depending on which hemisphere they are in. Tropical storms become hurricanes when their sustained winds exceed 74 miles per hour. The primary damaging forces associated with these storms are high-level sustained winds and heavy precipitation. Hurricane winds can reach speeds of up to 200 miles per hour and can grow to 500 miles in diameter. The official hurricane season starts on June 1st. In New England, hurricanes generally occur in August, September, and the first half of October due to the time required for the waters south of Long Island to warm enough to sustain hurricane activity this far north. Hurricanes in the region can result in flooding and wind damage to structures and above- ground utilities.⁵⁸

LOCATION

Because of this hazard's regional nature, all of Brookfield is at risk from hurricanes, meaning the location of occurrence is "large." Ridgetops in town are more susceptible to wind damage. Areas susceptible to flooding are also likely to be affected by heavy rainfall from hurricanes.

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, is given a name, and is closely monitored by the National Hurricane Center in Miami, Florida. When sustained winds reach or exceed 74 miles per hour, the storm is deemed a hurricane. Hurricane intensity is further classified by the Saffir-Simpson Hurricane Wind Scale, which rates hurricane wind intensity on a scale of 1 to 5, with 5 being the most intense.

Table 17: The Saffir-Simpson Scale⁵⁹

Category	Maximum Sustained Wind Speed
1	74–95 mph: very dangerous winds will produce some damage
2	96–110 mph: extremely dangerous winds will cause extensive damage
3	111–129 mph: devastating damage will occur
4	130–156 mph: catastrophic damage will occur
5	157 + mph: catastrophic damage will occur

⁵⁸ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan"

⁵⁹ National Hurricane Center and Central Pacific Hurricane Center, "Saffir-Simpson Hurricane Wind Scale," National Oceanic and Atmospheric Association, accessed June 10, 2024, <https://www.nhc.noaa.gov/aboutsshws.php>.

PREVIOUS OCCURRENCES

Hurricanes that have affected the region near Brookfield are shown in the following table:

Table 4: Hurricanes Which Have Affected the Region Near Brookfield

Storm Name	Year	Saffir/Simpson Category (when reached MA)
Belle	1976	Tropical Storm
Gloria	1985	1
Henri	1985	Tropical Storm
Chris	1988	Minor Storm
Bob	1991	2
Beryl	1994	Tropical Storm
Bertha	1996	Tropical Storm
Floyd	1999	Tropical Storm
Gordon	2000	Minor Storm
Hermine	2004	Tropical Storm
Barry	2007	Minor Storm
Hanna	2008	Minor Storm
Irene	2011	Tropical Storm
Sandy	2012	Extratropical Storm, made landfall south of MA but still had impacts in the state
Andrea	2013	Minor Storm
Elsa	2021	Tropical Storm
Fred	2021	Extratropical Storm
Henri	2021	Tropical Storm/Depression

Brookfield and the surrounding region have historically been hit hard by hurricanes and tropical storms which resulted in widespread flooding. The local HMP team noted Tropical Storm Irene led to localized erosion and flooding in town and that consecutive storms pose an issue in this area.

PROBABILITY OF FUTURE EVENTS

Brookfield's inland location in Central Massachusetts approximately reduces the risk of extremely high winds that are associated with hurricanes, although the Town can still experience some high wind events. Based upon past occurrences, it is reasonable to say that there is a "low" probability (1% to 10% in any given year) of hurricanes in Brookfield. However, climate change is projected to result in more severe weather, including increased occurrence of hurricanes and tropical storms. Because of this, the occurrence of hurricanes will likely increase in town in the future.

IMPACT

Descriptions of damages that could occur due to hurricanes of different storm categories of the Saffir-Simpson scale are shown below:

Table 19: The Saffir-Simpson Scale

Storm Category	Damage Level	Description of Damages	Wind Speed (MPH)
	MINIMAL	No real damage to building structures. Damage primarily to	

1	Very dangerous winds will produce some damage	unanchored mobile homes, shrubbery, and trees. Also, some coastal flooding and minor pier damage. An example of a Category 1 hurricane is Hurricane Dolly (2008).	74-95
2	MODERATE Extremely dangerous winds will cause extensive damage	Some roofing material, door, and window damage. Considerable damage to vegetation, mobile homes, etc. Flooding damages piers and small craft in unprotected moorings may break their moorings. An example of a Category 2 hurricane is Hurricane Francis in 2004.	96-110
3	EXTENSIVE Devastating damage will occur	Some structural damage to small residences and utility buildings, with a minor amount of curtain wall failures. Mobile homes are destroyed. Flooding near the coast destroys smaller structures, with larger structures damaged by floating debris. Terrain may be flooded well inland. An example of a Category 3 hurricane is Hurricane Ivan (2004).	111-129
4	EXTREME Catastrophic damage will occur	More extensive curtain wall failures with some complete roof structure failure on small residences. Major erosion of beach areas. Terrain may be flooded well inland. An example of a Category 4 hurricane is Hurricane Charley (2004).	130-156
5	CATASTROPHIC Catastrophic damage will occur	Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Flooding causes major damage to lower floors of all structures near the shoreline. Massive evacuation of residential areas may be required. An example of a Category 5 hurricane is Hurricane Andrew (1992).	157+

HAZUS-MH (multiple-hazards) is a computer program developed by FEMA to estimate losses due to a variety of natural hazards. The HAZUS software was used to model potential damage to Brookfield from 1% and 0.2% hurricane events (storms that are 1% and 0.2% likely to happen each year, and roughly equivalent to Category 1 and Category 2 hurricanes, respectively). The damage caused by these hypothetical storms were modeled as if the storm track passed directly through the Town, bringing the strongest winds and greatest damage potential.

Table 5: HAZUS Potential Damages to Brookfield from 1% and .2% Annual Chance Hurricane Events

	1% storm (89 mph winds)	0.2% storm (102-105 mph winds)
Building Characteristics		
Estimated total number of buildings	830	
Estimated total building replacement value (2024 \$)	\$ 386,064,000.00	
Building Damages		
# of buildings sustaining minor damage	31	125
# of buildings sustaining moderate damage	3	21
# of buildings sustaining severe damage	0	2
# of buildings destroyed	0	1
Population Needs		
# of households displaced	0	6
# of people seeking public shelter	0	3
Debris		
Building debris generated (tons)	112	463
Tree debris generated (tons)	7,963	14,334
# of truckloads to clear building debris	4	19
Value of Damages		
Total property damage (buildings and content)	\$ 2,639,700.00	\$ 8,266,910.00
Total losses due to business interruption	\$ 74,690.00	\$ 4,336,840.00

Though there are no recorded instances of a hurricane equivalent to a 0.2% storm passing through Massachusetts, this model was included in this plan in order to present a reasonable “worst case scenario” that can help planners and emergency personnel evaluate the impacts of storms that might be more likely in the future, as more intense and frequent storms become more common. For more information on the HAZUS-MH software, go to <http://www.fema.gov/hazus-software>.

Brookfield faces a “minor” impact from hurricanes, with 10% or less of property in the affected area of town being damaged or destroyed in any given hurricane instance.

EXPOSURE

Certain features within Brookfield’s infrastructure, society, and environment may face more

exposure to hurricanes, or be disproportionately impacted by them, relative to the rest of the community. Some of these features may be documented in the list of critical facilities and vulnerable populations in Section 3. These features include:

- The electrical grid, which is vulnerable to outages from trees falling across power lines. National Grid proactively trims trees in their right of way in Brookfield, and the local planning team notes that the Town has not had too many calls for emergency tree removal in between the last plan and this one;
- Public safety, utility, and highway department workers, who are tasked with responding to emergency calls and keeping the streets clear during hurricanes.

In addition to high winds, hurricanes can also bring heavy precipitation and cause flooding. The vulnerable features identified in the flooding section above also apply to hurricanes. The local planning team notes that consecutive storms back to back would heavily strain resources in this area of the state.

POTENTIAL CLIMATE CHANGE EFFECTS

According to the 2023 ResilientMass Plan, there are two major ways that climate change influences hurricanes and tropical storms:⁶⁰

- Warming oceans will provide more energy for hurricanes and tropical storms, which could lead to more intense or potentially damaging storms in the future, and larger storms could result in more storms that are likely to impact Massachusetts; and
- Warmer air can hold more water vapor and will enable greater precipitation rates during future storms.

In summary, climate change is likely to increase the frequency and extent of hurricanes in Brookfield.

VULNERABILITY

Based on the above analysis, Brookfield has a hazard index rating of “4 – Low risk” from hurricanes. Its position further inland means that the frequency and severity of hurricanes and tropical storm events are typically reduced. The hazards caused by flooding from hurricanes are captured in the flooding section of the hazard analysis.

MITIGATION STRATEGIES

The Town of Brookfield is currently able to effectively respond to hurricanes through the emergency response facilities and services identified in the critical infrastructure and facilities and existing protection sections of this plan. However, there are numerous opportunities to expand upon the Town’s existing capabilities to mitigate and respond to hurricanes. The local HMP planning team identified the following strategies that could be used to reduce the threat of hurricanes in Brookfield:

- Annually clean all stormwater structure and basins
- Develop a Debris Management Plan to improve the management of vegetative debris and thereby mitigate risk of stormwater flooding, riverine flooding, winter storm damage,

⁶⁰ “ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan”

4.6 SEVERE THUNDERSTORMS / WIND / TORNADOES / HAIL

A thunderstorm is a storm with lightning and thunder produced by a cumulonimbus cloud; thunderstorms usually produce gusty winds as well as heavy rain and sometimes generate 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.

Every thunderstorm has an updraft (rising air) and a downdraft (sinking air). Sometimes strong downdrafts, known as downbursts, can cause tremendous wind damage that is similar to that of a tornado. A small (less than 2.5-mile path) downburst is known as a “microburst”, and a larger downburst is called a “macro-burst.” An organized, fast-moving line of microbursts traveling across large areas is known as a “derecho” – these occasionally occur in Massachusetts. The strongest downburst ever recorded was a 175 mph downburst in North Carolina. Downburst winds exceeding 100 mph have been measured in Massachusetts.⁶¹

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

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 paths that range from a few dozen yards to over a mile in width. The path of a tornado can be unpredictable because tornadoes can stall or change direction abruptly. High wind speeds, hail, and debris generated by tornadoes can result in loss of life, downed trees and power lines, and damage to structures and other personal property. In Massachusetts, tornadoes have occurred most frequently in the Connecticut River Valley and in western Worcester County,

These events have been grouped together in this analysis due to the similarities between them in that the primary cause of damage occurs from high winds, with lightning damage existing as a potential to occur, and have similar mitigation strategies to address them. Hail damage is not expected to be a significant factor for damage based on previous occurrences.

LOCATION

As per the 2023 ResilientMass Plan, the entire town is at risk of high winds, severe thunderstorms, and tornadoes. This plan identifies Brookfield and the communities surrounding it as having a moderate frequency of tornado occurrence within the Massachusetts context. However, the actual area affected by thunderstorms, wind, or tornadoes in town is “small,” with less than 10 percent of

⁶¹ “ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan”

the Town generally affected.

EXTENT

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

High wind is linked to a number of other hazards, including hurricanes and winter storms, in addition to thunderstorms and tornadoes. High winds can cause damage to structures and trees and can also increase the risk of wildfire.

Tornadoes are measured using the Enhanced Fujita Scale, which is shown below with the following categories and corresponding descriptions of damage:

Table 23: Enhanced Fujita Scale Levels and Descriptions of Damage⁶²

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; damage to sign boards.
EF1	Moderate	86–110	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
EF2	Significant	111–135	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
EF3	Severe	136–165	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
EF4	Devastating	166–200	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.

The extent of the damages caused by hail can be measured by the size of the hailstones and the intensity at which they fall, which is variable based on the extent of the high wind or thunderstorm they are attached to and are included in the risk analysis for high winds and thunderstorms.

Table 6: Extent Scale for Hail⁶³

Hail Size (in.)	Object Analog Reported
.50	Marble, moth ball

⁶² National Weather Service, "The Enhanced Fujita Scale (EF Scale)," Weather.gov, National Oceanic and Atmospheric Administration, accessed June 10, 2024, <https://www.weather.gov/oun/efscale>.

⁶³ Storm Prediction Center, "Converting Traditional Hail Size Descriptions," Spc.noaa.gov, National Oceanic and Atmospheric Administration, accessed June 10, 2024, <https://www.spc.noaa.gov/misc/tables/hailsize.htm>.

.75	Penny
.88	Nickel
1.00	Quarter
1.25	Half Dollar
1.50	Walnut, ping pong
1.75	Golf ball
2.0	Hen egg
2.5	Tennis ball
2.75	Baseball
3.00	Tea cup
4.00	Grapefruit
4.50	Softball

PREVIOUS OCCURRENCES

Because thunderstorms and wind affect Brookfield regularly, there is not a comprehensive record available of all thunderstorm and wind events which have affected the Town. As per the Massachusetts State Hazard Mitigation and Climate Adaptation Plan, there are approximately 10 to 30 days of thunderstorm activity in the state each year.

In Worcester County, there have been several F1 tornadoes over the years; Tornadoes with a rating of 3 or above and tornadoes resulting in a death or injury, or significant property damage, are listed below.

- In 1953, an F4 tornado struck Worcester. The event resulted in at least 90 fatalities and more than 1,200 injuries. There was extensive property damage. On the same date, an F3 tornado began in the Town of Sutton.
- In 1981 an F3 tornado struck Westminster, resulting in 3 injuries and very little reported property damage.
- In June 2011, an F3 tornado struck Massachusetts. Few deaths were reported, all in Hampden County. No deaths were reported in Worcester County.

Within the last 10 years, there been a few small tornados that has affected communities near Brookfield:

- 09/06/2025 – EF0 Tornado in Holden: A cold front moved through Southern New England in the afternoon bringing a round of severe storms which caused a wide swath of wind damage through MA with some in western CT. Some severe hail occurred in northern MA and a single storm dropped 5 tornadoes in central MA which led to widespread tree damage along but limited damage to structures. During this event, an EF1 tornado briefly touched down over Willow Brook Rd in Holden causing significant tree damage.
- 07/16/2023 – EF0 Tornado in North Brookfield: During a substantial flash flood event in across southern New England, helicity values peaked and formed a brief tornado along the Quasi-Linear Convective System in North Brookfield. Maximum estimated peak winds of 80 mph touched down in the late morning on July 16th. No casualties or

significant damage to homes were reported, though some eyewitnesses report that they saw strong winds making a garage door at an auto body shop bow inward, debris be lofted into the air, swirling as the tornado passed by. It is estimated that the tornado touched down just east of the North Brookfield Waste Water Center, travel 2 miles northeast, and end east of the Ryan Road and Hillsville Road intersection.

- 08/04/2018 – EF1 Tornado in Dudley-Webster: A moist, tropical environment was in place across southern New England on the morning of August 4th. A short-wave trough was approaching, along with a cold front. The main concern was for flash flooding, but early morning sunshine destabilized the atmosphere and contributed to the development of the tornado, which had touched down in northeast Connecticut, prior to this second touchdown. In just about one minute, an EF-1 tornado, with maximum winds estimated at 110 mph, wreaked havoc in the easternmost portion of Dudley, MA and in the downtown portion of Webster, MA. It touched down along Route 12 (Schofield Avenue) to the west of Laprise Court in Dudley and traveled northeastward onto Main Street in Webster, then lifted near the French River by Oxford Avenue. Many trees were snapped and debarked. In Webster, a gas station overhang was twisted. An old brick rooftop was damaged, with bricks having fallen onto Main Street. The rubber roof covering of another building was peeled completely off. Windows were blown out at a business on Main Street and the street was littered with broken glass. The side walls of an apartment complex were bent slightly outward toward the tornado. Window screens were sucked outward. A car windshield and side mirror was damaged. There were other reports of trees fallen onto cars. Utility poles were snapped and numerous wires were downed. According to MEMA, at least 3 buildings were condemned and at least 5 were uninhabitable.
- According to the NWS Storm Survey “Nearly everyone that our survey team spoke with had heard the warning via the Wireless Emergency Alert on their cell phones as much as 20+ minutes in advance of the touchdown! This undoubtedly played a big role in the fact that there were no fatalities. According to media reports, there was one minor injury when part of a roof fell on top of a woman's car.”⁶⁴
- 10/23/2018 – EF1 Tornado Hardwick and EF0 Tornado in Hubbardston: Low pressure over upstate New York moved east-southeastward across northern Rhode Island and southeast Massachusetts during the afternoon and early evening. A warm frontal boundary extending eastward from the low, combined with strong mid-level wind shear, provided the focus for tornado development, both in MA and RI. In Hardwick a tornado touched down south of the middle stretch of Patrill Hollow Road in Hardwick around 403 PM EDT. It then moved northeast, crossing the road and ended up in a wooded area to the northwest of the intersection of Patrill Hollow Road and Czesky Road, to the south of Greenwich Road. There were several eyewitnesses who saw the tornado. A school teacher at the Eagle Hill School saw it form, touch down, and lift just as quickly as it had touched down. Another person who was much closer to the circulation saw the swirling of debris. A third person heard a tremendous roaring sound. More than 150 trees, many of which were medium to large oaks, were either uprooted or snapped on Patrill Hollow Road. While most were blown down from southwest to northeast, the survey team did

⁶⁴ “Storm Events Database Search Results for Worcester County, Massachusetts,” NCDC.NOAA.gov, National Oceanic and Atmospheric Administration National Centers for Environmental Information, accessed June 25, 2026 <https://www.ncei.noaa.gov/stormevents/eventdetails.jsp?id=774224>

find several that were blown down from east to west, indicating rotation. Wind speeds were estimated at 90-95 mph, which is classified as EF-1 on the Enhanced Fujita Scale. Farther to the east, three very large trees were downed in the Old Cemetery near Hardwick Common. At an old abandoned gas station, shingles were missing and a metal cover to a pump was blown off. Next door, a cupola was blown off the roof of the fire department. It is believed that the wind damage there was from straight-line winds associated with the same storm cell, but not directly from the tornado. According to the NWS Storm Survey a tornado touched down in Hubbardston around 426 PM EDT. The determination was based on doppler radar imagery, damage photos, conversations with town officials, and the history of storms in the region that afternoon. This tornado was from a separate cell from the one that produced a tornado in Hardwick. The tornado began on the northernmost island within Brigham Pond. It traveled to the northeast, crossing near Brigham Street and Evergreen Road, the moved across railroad tracks, and ended in a wooded area a short distance beyond the tracks, to the west of the southern portion of Old Westminster Road. Dozens of trees were uprooted or snapped in half. A few telephone poles were snapped at the top. Some siding from a building was discovered on Old Westminster Road.

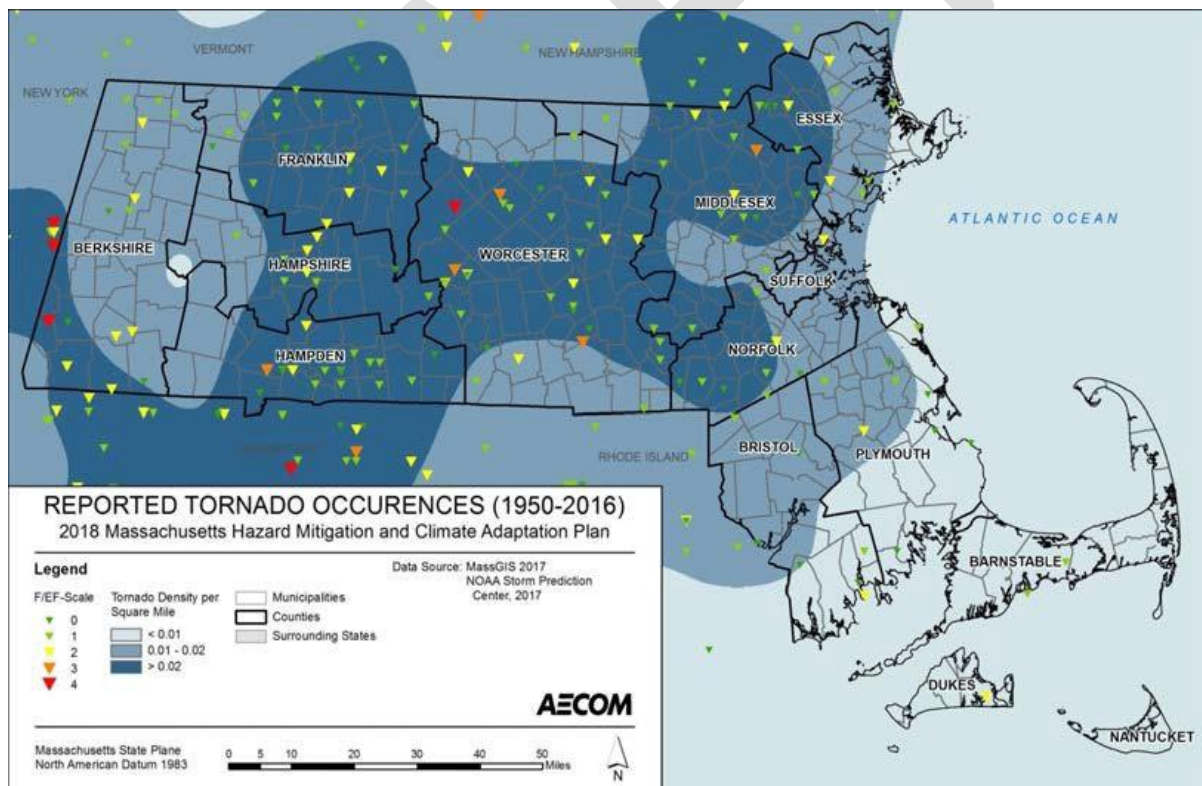


Figure 1: Density of Reported Tornadoes per Square Mile (1950-2016) ⁶⁵

⁶⁵ "Massachusetts State Hazard Mitigation and Climate Adaptation Plan," Mass.gov, Massachusetts Executive Office of Energy and Environmental Affairs and Massachusetts Emergency Management Agency, September 2018, <https://www.mass.gov/doc/state-hazard-mitigation-and-climate-adaptation-plan/download>.



Image 1: Above - NASA released this image of part of the 39-mile-long tornado track through south-central Mass. The image was captured on June 5, 2011 by the Landsat 5 satellite.

Thunderstorm occurrences are more frequent in Massachusetts than tornados, as thunderstorms have the potential to produce tornadoes. However, the type of storm that most commonly produces tornadoes is supercells: severe, long-lived thunderstorms. Approximately 20 percent of supercells produce tornadoes. In Brookfield, there have been several severe thunderstorm/wind occurrences:⁶⁶

- 06/06/2020 – Thunderstorm Wind: A cold front pushed into a warm, humid air mass and produced two rounds of severe thunderstorms. One moved across the region in the afternoon and a second round impacted eastern sections in the evening. In West Brookfield, a tree was down on Birch Hill Road.
- 07/02/2020 – Thunderstorm Wind: Late in the afternoon and early evening, a surface trough dropped southward from New Hampshire and caused severe thunderstorms in central and eastern Massachusetts and northern Rhode Island. In North Brookfield, a tree was down on Route 148 near Brooks Pond Road. Also, a large tree was down on power lines on Hillsville Road.
- 07/22/2020 – Thunderstorm Wind: A warm front moved slowly northward across southern New England during the day, reaching the Mass Pike late in the day. This provided the focus for a few severe thunderstorms in western and central Massachusetts during the early evening hours. In West Brookfield, a funnel cloud was sighted by several emergency management officials from 5 surrounding towns. No actual tornado reached the ground. However, straight line winds downed wires on Checkered Lane.
- 08/23/2020 – Thunderstorm Wind: Diurnally driven thunderstorms brought wind damage, hail, and some flooding to mainly western and central Massachusetts. In West Brookfield, a tree was down on a house and car on New Braintree Rd. A tree fell onto a roof of a house on East Main St. A tree was down on wires on Myrick Rd. Multiple trees and wires were down on Ragged Hill Rd.
- 12/25/2020 – Strong Wind: An anomalously deep, full-latitude mid-level trough over the Mississippi Valley caused a strong frontal system to move up the Appalachians. It brought strong to damaging winds, heavy rain with minor flooding, and well above normal temperatures to southern New England early on Christmas Day. Winds generally gusted to 40 to 60 mph, except 65 to 70 mph along the southeast Massachusetts coast. South winds were blowing more than 100 mph only 2000 feet above the ground in eastern Massachusetts and Rhode Island, but despite temperatures in the lower 60s there, a surface inversion was strong enough to prevent these very damaging winds from reaching the surface. Two to four inches of rain fell across the region, with the highest totals from central Rhode Island northwestward across northern Connecticut and portions of western and central Massachusetts. Winds generally were gusting to around 50 mph. In Dudley at 333 AM EST, a large tree branch was down on Dresser Hill Road. In Upton at 530 AM EST, a tree was down on Glenview Street. In Southbridge at 604 AM EST, a tree was down on Main Street. In Northborough at 737 AM EST, a tree was down on

⁶⁶ “Storm Events Database Search Results for Worcester County, Massachusetts,” NCDc.NOAA.gov, National Oceanic and Atmospheric Administration National Centers for Environmental Information, accessed May 5th, 2026, https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28C%29+Hail&eventType=%28Z%29+High+Wind&eventType=%28Z%29+Strong+Wind&eventType=%28C%29+Thunderstorm+Wind&eventType=%28C%29+Tornado&beginDate_mm=01&beginDate_dd=01&beginDate_yyyy=2010&endDate_mm=12&endDate_dd=30&endDate_yyyy=2024&county=WORCESTER%3A27&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=25%2CMASSACHUSETTS.

Franklin Circle. In Webster at 940 AM EST, a tree was down on South Shore Road. In Milford at 10 AM EST, a large tree was down on Dogwood Lane by Wildwood Drive.

- 05/22/2022 – Thunderstorm Wind: A pre-frontal trough caused isolated thunderstorms to form in eastern Massachusetts during the late afternoon. But a scattered line of severe thunderstorms impacted western and central Massachusetts during the evening, in association with an approaching cold front. In Warren, a large tree was down on Crescent Street
- 06/02/2023 – Lightning: Near-record heat and a strong short-wave trough digging southeastward across Quebec led to the development of afternoon thunderstorms, mainly along the higher terrain in central MA and northeast CT. A few of these storms produced isolated wind damage and some large hail. One storm caused flash flooding in North Chelmsford, MA. Lightning caused a massive 6-alarm fire that destroyed a 160-year old church in Spencer, MA. The steeple of the First Congregational United Church came crashing down and this made national news. The rest of the building was destroyed. A detailed analysis of lightning strike data showed that one strike a little north of the church occurred at 2:24:47 PM EDT but a closer one occurred at 2:29:16 PM EDT. That was most likely the one that caused the blaze. No injuries were reported.
- 07/21/2023 – Thunderstorm Wind: A warm front stalled across Connecticut and Rhode Island, producing thunderstorms with very heavy rainfall. This caused significant flash flooding. Also, wind shear was just strong enough for a few thunderstorms to become severe, with locally damaging wind gusts. A Tornado Warning was even issued for a storm in northern Worcester County, but no tornado damage was reported. In North Brookfield, a tree was down on Ayers Street.
- 02/28/2024 – High Wind: A strong cold front crossed southern New England on Wednesday night the 28th bringing soaking rains and strong wind gusts to southern New England followed by sharply falling temperatures. This cold frontal passage included a fine line stronger storms. Winds generally gusted 45 to 55 mph. The strongest gusts were 59 mph at the Worcester Airport ASOS (KORH) at 2:18 AM EST on the 29th and a gust to 55 mph at the Fitchburg Airport ASOS (KFIT) at 1:57 AM EST on the 29th.

Also, the local HMP planning team in town noted that two lightning strikes damaged multiple homes each within town during the summer of 2023. One of these strikes damaged two homes off of King Street, and another damaged three homes on Ingrid Drive.

The NCEI database also has recorded instances of hail events in and around Brookfield:

- 04/26/2019 – Hail: Southern New England was on the cool side of a frontal boundary. However, strong winds aloft and directional shear led to rotating thunderstorms in the mid-afternoon hours that moved from northern CT into central MA. Strong rotation prompted a few tornado warnings but with the circulation remained aloft presumably due to the cool surface temperatures. Large hail did fall, however. New Braintree police reported half dollar size hail, and Amateur radio operators reported quarter size hail in West Brookfield.
- 06/06/2023 – Hail: A low pressure system, stacked vertically from the surface through the upper levels, was located over the Gulf of Maine and the Canadian Maritimes. An upper level disturbance rotating around this low moved southeastward from Quebec to New England, triggering scattered afternoon thunderstorms in southern New England, a few of which were strong to severe. At 322 PM EDT (222 PM EST), quarter size hail was

reported by a NWS employee traveling on the Mass Pike in Charlton.

- 09/08/2023 – Hail: Southerly flow brought elevated dewpoints in the 70s to southern New England leading to a heat advisory. All the heat and humidity led to good instability which, along with forcing from a strong mid level jet produced severe storms in Massachusetts and Connecticut and some flash flooding in Massachusetts. In West Brookfield, there was quarter size hail.

PROBABILITY OF FUTURE EVENTS

According to the 2023 ResilientMass Plan, Massachusetts averages two to five tornadoes per year.⁶⁷ Only two tornadoes in the state (which occurred in 1953 and 2011) received disaster declarations. Massachusetts has experienced 12 EF0 to EF1 tornadoes since 2018; six EF0 tornadoes occurred in the state in 2021, and these 2021 EF0 tornadoes caused under \$50,000 in property damage. Because tornadoes are relatively rare in the Commonwealth, residents are less likely to be prepared for them in the Commonwealth than in other parts of the country. People who live in manufactured housing, such as mobile homes, are more at risk to tornadoes. Tornadoes can affect all sectors and populations, and their primary effect is damage from their high winds to structures and the environment. Any structure located in a tornado zone or path is at risk. Tornado activity may become more variable due to climate change, so predicting the likelihood of future tornado events in Brookfield is difficult.

Based upon the available historical record, as well as Brookfield's location in a moderate-density cluster of tornado activity for Massachusetts, there is a "very low" probability (less than 1% chance in any given year) of a tornado affecting the Town, and a moderate (10% to 40% chance in any given year) probability of a severe thunderstorm and/or high winds affecting the Town.

IMPACT

Overall, Brookfield faces a "minor" impact from severe thunderstorms, with less than 10% of property in the affected area of town expected to be damaged in this type of hazard event. Brookfield also faces a "limited" impact from severe winds and tornados, with between 10% and 25% of property in town expected to be damaged in these types of hazard events.

As indicated in Table 19 above, the following likely impacts on the physical environment can result from tornadoes of different levels:

- EF0 - Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damage to sign boards.
- EF1 - The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving automobiles pushed off the roads; attached garages may be destroyed.
- EF2 - Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
- EF3 - Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
- EF4 - Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.

⁶⁷ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan"

The potential for locally catastrophic damage is a factor in any tornado, severe thunderstorm, or wind event. In Brookfield, a tornado that hits residential areas would leave much more damage than a tornado with a travel path that ran along the Town's uplands, where there is less settlement. Most buildings in town have not been built to Zone 1 Design Wind Speed Codes. The first edition of the Massachusetts State Building Code went into effect on January 1, 1975, and 48.1% of the Town's 1,620 total housing units were constructed in 1979 or earlier (according to the 2022 American Community Survey 5-year estimates).⁶⁸ Brookfield's median home value is \$341,900 (according to American Community Survey 2022 5- year estimates).⁶⁹ Utilizing the total value of all property in town, \$473,206,027,⁷⁰ and an estimated 10 percent of damage to 5 percent of all structures, the estimated amount of damage from a tornado in town is \$2,366,030.16. The cost of repairing or replacing roads, bridges, utilities, and contents inside structures is not included in this estimate.

EXPOSURE

Certain features within Brookfield's infrastructure, society, and environment may face more exposure to severe thunderstorms/wind/hail/tornadoes, or be disproportionately impacted by them, relative to the rest of the community. Some of these features may be documented in the list of critical facilities and vulnerable populations in Section 3. Vulnerable features to severe thunderstorms/wind/tornadoes overlap with the features vulnerable to hurricanes and flooding described in the sections of this plan focusing on these other hazards. The local planning team noted that the town did not have tornado sirens in town, and is currently uses reverse 911 for early warning.

POTENTIAL CLIMATE CHANGE EFFECTS

The 2023 ResilientMass Plan identifies that current climate models predict an increase in severe thunderstorms, which have the potential to produce tornadoes. However, it is unknown if tornado frequency will increase with climate change. Some studies suggest there will be a decrease in the number of tornado days, but an increase in the number of tornadoes per day.⁷¹

Without a clear understanding of how climate change will impact tornadoes, the Town is not able to determine exactly how this hazard will impact population patterns and land use needs for the Town of Brookfield. However, if climate change does increase the likelihood of tornado occurrence, the Town may have to incorporate additional emergency shelters into development and land use.

VULNERABILITY

Based on the above assessment, Brookfield has a hazard index rating of "2 – high risk" from severe thunderstorms and winds, and a "3 – moderate risk" from tornadoes and hail.

⁶⁸ "DP04: Selected Housing Characteristics," Data.Census.gov, United States Census Bureau, accessed May 5, 2026, <https://data.census.gov/table?q=dp04+selected+housing+characteristics&q=060XX00US2502709105>

⁶⁹ Ibid

⁷⁰ Data Analytics and Research Bureau, "Assessed Values by Class," Dls.gateway.dor.state.ma.us, Massachusetts Department of Revenue, May 5, 2026, <https://dls-gw.dor.state.ma.us/reports/rdPage.aspx?rdReport=propertytaxinformation.assessedvaluesbyclass.assessedvaluesbyclass&tblassessedvalues-PageNr=6&rdDataCache=400584956&rdShowModes=&rdSort=&rdNewPageNr=True1&rdRequestForwarding=Form>

⁷¹ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan," page 5.1-56.

MITIGATION STRATEGIES

The Town of Brookfield is currently able to effectively respond to severe thunderstorms, wind, and tornadoes through the emergency response facilities and services identified in the critical infrastructure and facilities and existing protection sections of this plan. However, there are numerous opportunities for the Town to expand upon its existing capabilities to mitigate and respond to severe thunderstorms, wind, and tornadoes. The local HMP planning team identified the following strategies that could be used to reduce the threat of severe thunderstorms and tornados in Brookfield:

- Establish a town program to buy lightning rods on an as-needed basis.
- Enhance needed tree trimming throughout town to protect utility wires; enhance coordination with utility to implement a systematic approach to tree trimming.
- Investigate shelter/emergency resources to develop a town emergency shelter. Identify an appropriate site for a town shelter.

4.7 WILDFIRES / BRUSH FIRES

Wildfires are typically larger fires involving full-sized trees as well as meadows and scrublands. Brush fires are uncontrolled fires that occur in meadows and scrublands and that do not involve full-sized trees. Typical causes of wildfires and brush fires are lightning strikes, human carelessness, and arson. Relative humidity and wind are two weather-related factors that influence fire danger. Relative humidity refers to “the ratio of the amount of moisture in the air to the amount of moisture necessary to saturate the air at the same temperature and pressure.”⁷² When relative moisture drops, light fuels like grasses become drier and burn more easily.⁷³

FEMA has classifications for three different types of wildfires:

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

Potential effects of wildfires include damage to structures and other human infrastructure as well as impacts on natural resources. Smoke and air pollution from wildfires can be a health hazard, especially for sensitive populations including children, the elderly, and people with respiratory and cardiovascular diseases.

LOCATION

Approximately 74.4% of total land area in Worcester County is deciduous forest, evergreen forest, forested wetland, scrub/shrub land, scrub/shrub wetland, or grassland.⁷⁴ Much of this region of Massachusetts, including the Brookfield area, has a high risk of wildfire. In Brookfield, approximately 4% of the land is cultivated or pasture land, approximately 42% of land is deciduous forest, approximately 20% of land is evergreen forest, approximately 6% of land is forested wetland, approximately 1% of land is scrub/shrub land, and approximately 2% of land is grassland.⁷⁵ Brookfield is developed in a moderate to high-density suburban pattern, with few uninterrupted tracts of forest present. Although the substantial tree cover in town does present some risk for wildfires and brush fires, the total amount of the Town that could be affected by a wildfire is categorized as “small,” or less than 10 percent of its total area.

The public water supply in Brookfield covers roughly 9 miles of water mains, 487 service connections, 84 fire hydrants and a 500,000-gallon water storage tank.⁷⁶ Brookfield’s drinking water comes entirely from four gravel wells located off Quaboag St. The water supply covers most of the developed areas of town.

⁷² “Understanding Fire Danger,” Nps.gov, United States National Park Service, August 17, 2023, <https://www.nps.gov/articles/understanding-fire-danger.htm>.

⁷³ Ibid

⁷⁴ Massachusetts Bureau of Geographic Information, “MassGIS Data: 2016 Land Cover/Land Use,” Mass.gov, Massachusetts Executive Office of Technology Services and Security, May 2019, <https://www.mass.gov/info-details/massgis-data-2016-land-coverland-use>.

⁷⁵ Ibid

⁷⁶ <https://www.brookfieldma.us/departments/water-department/system-info/>

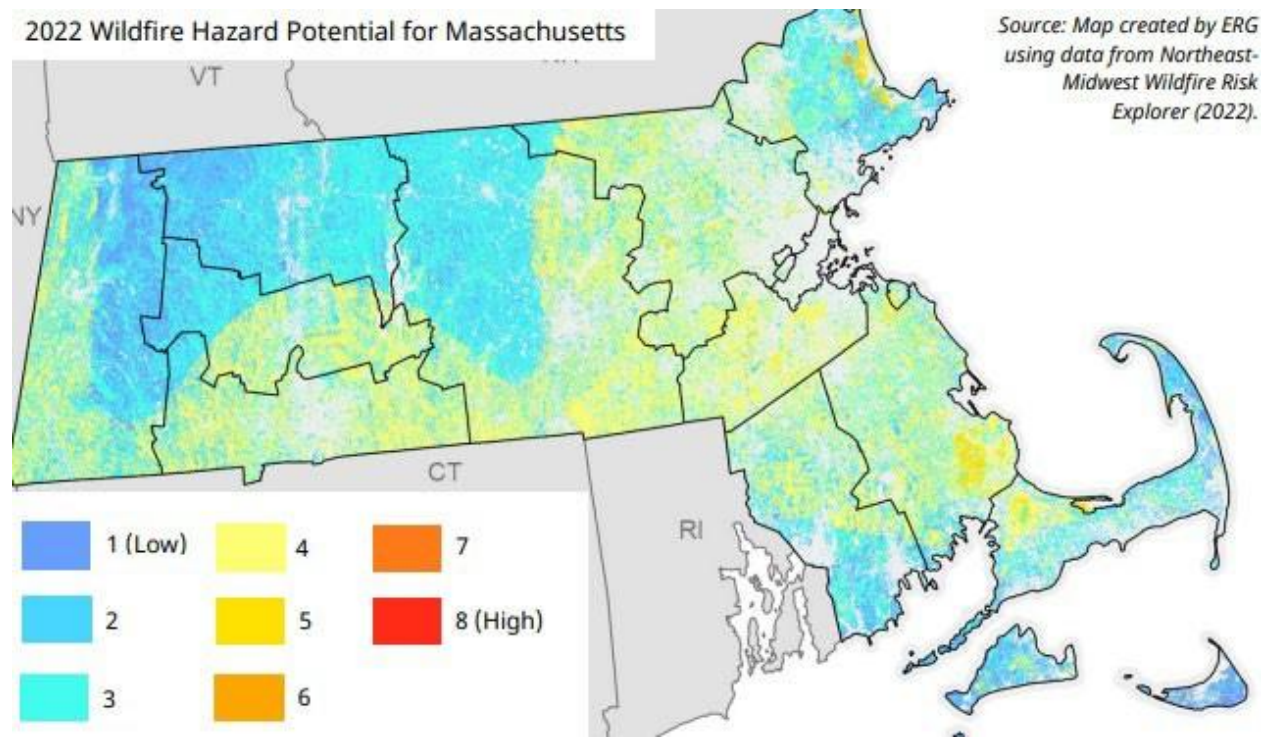


Figure 2: Wildfire Risk Areas for the Commonwealth of Massachusetts.⁷⁷

EXTENT

Wildfires can cause widespread damage. They can spread very rapidly, depending on local wind speeds, and can be very difficult to get under control. Wildfires can last from several hours up to several days.

In Brookfield, approximately 81% of the Town's total land area is deciduous forest, evergreen forest, forested wetland, scrub/shrub land, or grassland. These areas are at risk of fire and are spread evenly throughout the community, with developed areas, rivers, and major transportation corridors (such as Route 148 and the CSX Railroad) breaking up the forest. In drought conditions, a brushfire or wildfire would be a matter of concern in town.

The National Fire Danger Rating system illustrates the potential extent of wildfires should they occur under the different fire danger conditions:

⁷⁷ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan"

Table 23: The National Fire Danger Rating System

Rating	Basic Description	Detailed Description
CLASS 1: Low Danger (L) Color Code: Green	Fires not easily started	Fire starts are unlikely. Weather and fuel conditions will lead to slow fire spread, low intensity, and relatively easy control with light mop up. Controlled burns can usually be executed with reasonable safety.
CLASS 2: Moderate Danger (M) Color Code: Blue	Fires start easily and spread at a moderate rate	Some wildfires may be expected. Expect moderate flame length and rate of spread. Control is usually not difficult and light to moderate mop up can be expected. Although controlled burning can be done without creating a hazard, routine caution should be taken.
CLASS 3: High Danger (H) Color Code: Yellow	Fires start easily and spread at a rapid rate	Wildfires are likely. Fires in heavy, continuous fuel, such as mature grassland, weed fields, and forest litter, will be difficult to control under windy conditions. Control through direct attack may be difficult but possible, and mop up will be required. Outdoor burning should be restricted to early morning and late evening hours.
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 may spread faster than suppression resources can travel. Flame lengths will be long with high intensity, making control very difficult. Both suppression and mop up will require an extended and very thorough effort. Outdoor burning is not recommended.
CLASS 5: Extreme (E) Color Code: Red	Fire situation is explosive and can result in extensive property damage	Fires will start and spread rapidly. Every fire start has the potential to become large. Expect extreme, erratic fire behavior. NO OUTDOOR BURNING SHOULD TAKE PLACE IN AREAS WITH EXTREME FIRE DANGER.

Beyond the direct hazards that wildfires pose, wildfires pose the indirect hazard of air quality reduction from smoke particulates. Smoke particulates are measured, along with other particulates that affect air quality, by the EPA's Air Quality Index.⁷⁸ For each pollutant, an AQI value of 100 generally corresponds to an ambient air concentration that equals the level of the short-term national ambient air quality standard for the protection of public health. AQI values at or below 100 are generally thought of as satisfactory. When AQI values rise above 100, air quality is unhealthy; at first for certain sensitive groups of people, then for everyone as AQI values get higher. The EPA establishes an AQI for five major air pollutants regulated by the Clean Air Act. Each of these pollutants has a national air quality standard set by EPA to protect public health, and these pollutants are: ground-level ozone; particle pollution (also known as particulate matter, including

⁷⁸ Air Quality Index (AQI) Basics," Airnow.gov, United States Environmental Protection Agency, accessed June 10, 2024, <https://www.airnow.gov/aqi/aqi-basics/>.

PM2.5 and PM10); carbon monoxide; sulfur dioxide; and nitrogen dioxide.

The AQI is divided into six categories. Each category corresponds to a different level of health concern. Each category also has a specific color. The color makes it easy for people to quickly determine whether air quality is reaching unhealthy levels in their communities.

Table 24: AQI Basics for Ozone and Particle Pollution

Daily AQI Color	Levels of Concern	Values of Index	Description of Air Quality
Green	Good	0 to 50	Air quality is satisfactory, and air pollution poses little or no risk.
Yellow	Moderate	51 to 100	Air quality is acceptable. However, there may be a risk for some people, particularly those who are unusually sensitive to air pollution.
Orange	Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is less likely to be affected.
Red	Unhealthy	151 to 200	Some members of the general public may experience health effects; members of sensitive groups may experience more serious health effects.
Purple	Very Unhealthy	201 to 300	Health alert: The risk of health effects is increased for everyone.
Maroon	Hazardous	301 and higher	Health warning of emergency conditions: everyone is more likely to be affected.

PREVIOUS OCCURRENCES

Brookfield has a call/volunteer Fire Department providing 24/7 coverage and is part of the Massachusetts Fire District 7 Mutual Aid Association. Brookfield has experienced 66 wildfires / brush fires between 2001-2020; however, each of these fires were quite small, and altogether they consumed 0.1 acres of brush/wildland.⁷⁹

During a critical drought which occurred across most of Massachusetts in late 2024 and was ongoing at the time of the writing of this plan, at least 638 wildfires which in combination burned at least 3,413 acres occurred in the state.⁸⁰

⁷⁹ "Wildfire Data," Cmrpc-my.sharepoint.com, Massachusetts Fire Incident Reporting System, accessed September 17, 2024, https://cmrpc-my.sharepoint.com/:x:/r/personal/wtalbot_cmrpc_org/_layouts/15/Doc.aspx?source.doc=%7B1F0B29EB-3A47-4669-B4E6-FA4FC08AD498%7D&file=Wildfire%20Data.xlsx&action=default&mobileRedirect=true.

⁸⁰ Massachusetts Emergency Management Agency, "Massachusetts Emergency Management Agency Situational Awareness Statement # 24: Statewide Wildfire Operations," (issue brief), Boston, Massachusetts, November 21, 2024.

PROBABILITY OF FUTURE EVENTS

The 2023 ResilientMass Plan notes that climate-change driven changes in the intensity and frequency of precipitation and thunderstorms, prolonged drought conditions, and rising temperatures are expected to increase the frequency and severity of wildfires.⁸¹ In drought conditions, forest types that are not typically prone to wildfires will become more likely to burn. Globally, wildfires are projected to increase worldwide by 14% by 2030, 30% by 2050, and 50% by 2100.

Changes in weather patterns driven by climate change can intensify fires which in turn heighten the effects of climate change. By mid-century, mean summer temperatures in the Chicopee River Basin are projected to increase by 3.6° F to 8.1° F due to climate change.⁸² Rising temperatures coupled with variable precipitation could exacerbate summer drought and could encourage more high-elevation wildfires; These wildfires release stores of carbon that contribute to the buildup of greenhouse gases and therefore further exacerbate climate change.

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

The Brookfield HMP Planning Team found it difficult to predict the likelihood of wildfires in a probabilistic manner because of the number of variables involved; fuel availability, weather and climate conditions, and human activity all factor into wildfire occurrences. However, based on regular previous occurrences of minor brush fires in town, the local HMP planning team determined the probability of future damaging wildfire events to be “moderate” (10% to 40% percent probability in the next year). This is corroborated by modelling performed by the US Forest Service, which identifies that Brookfield has, on average, greater wildfire likelihood than 29% of communities in the US.⁸³ When compared to other towns in Massachusetts, populated areas in Brookfield, MA have, on average, greater wildfire likelihood than 87% of communities in the state.⁸⁴

IMPACT

While a large wildfire could in theory damage much of the landmass of Brookfield most forested areas are sparsely developed; this means that fires in the most wildfire-prone areas of town are not likely to cause damage to property. For this reason, the Town faces a “minor” impact from wildfires, with damage to less than 10% of property in the affected area of town likely to occur in the case of a wildfire hazard event.

Both wildfires and brush fires can consume homes, other buildings, and/or agricultural resources. Wildfires and brush fires impact:

- Benefits that people receive from the environment, such as food/water and the regulation of floods and drought;

⁸¹ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan"

⁸² ResilientMass Plan Maps and Data Center, "Climate Change Projections Dashboard," Resilientma-mapcenter- mass-eoeea.hub.arcgis.com, ResilientMass Plan, accessed May 5, 2026, <https://resilientma-mapcenter-mass-eoeea.hub.arcgis.com/#ClimateDashboard>.

⁸³ USDA Forest Service. *Wildfire Risk to Communities*. <https://wildfirerisk.org>, May 5, 2026,

⁸⁴ Ibid

- Local heritage, through the destruction of natural features;
- The economy, due to damage to property and income from land following a wildfire;
- The overall destruction of property, loss of life, and/or injuries.

Utilizing the total value of all property, \$473,206,027,⁸⁵ and an estimated 5 percent of damage to 1 percent of all structures, the estimated amount of damage from a wildfire in town is \$236,684.0135. The cost of repairing or replacing roads, bridges, utilities, and contents inside structures is not included in this estimate.

The Wildland Urban Interface (WUI) is defined as the area where houses meet or intermingle with undeveloped wildland vegetation; the WUI represents a large percentage of the land use within Worcester County as a whole.⁸⁶

EXPOSURE

Table 7 Vulnerable populations in Brookfield⁸⁷

Certain features within Brookfield's infrastructure, society, and environment may face more exposure to wildfires/brush fires, or be disproportionately impacted by them, relative to the rest of the community. Some of these features may be documented in the list of critical facilities and vulnerable populations in Section 3. These features include:

- People who are sensitive to smoke, including children, the elderly, and individuals with health conditions. Air pollution from wildfires is a public health concern, as it leads to smoke inhalation which can be severe. Smoke can exacerbate respiratory conditions like asthma and can carry toxic chemicals and particulate matter. In

Indicator	Number	MOE	Percent	MOE
Families in poverty	19	±22	2.1%	±2.5%
People with disabilities	601	±169	17.4%	±4.9%
People over 65 years	982	±198	28.4%	±5.7%
People under 5 years	92	±75	2.7%	±2.2%
People of color	469	±254	13.6%	±7.3%
Black	26	±32	0.8%	±0.9%
Native American	0	±14	0%	±0.4%
Hispanic	184	±152	5.3%	±4.4%
Difficulty with English	12	±70	0.4%	±2.1%
Households with no car	90	±58	6%	±3.9%
Mobile homes	327	±119	21.7%	±23.1%

2021, wildfire smoke from western states and Canada extended across the continental US and forced the Massachusetts Department of Environmental Protection to issue an air quality alert;⁸⁸ and

⁸⁵ Data Analytics and Research Bureau, "Assessed Values by Class"

⁸⁶ Volker C. Radeloff et al., "The 1990-2020 wildland-urban interface of the conterminous United States - geospatial data," FS.USDA.gov, Forest Service Research Data Archive, 2026, https://www.fs.usda.gov/rds/archive/products/RDS-2015-0012-4/metadata_RDS-2015-0012-4.html.

⁸⁷ USDA Forest Service. Wildfire Risk to Communities. <https://wildfirerisk.org>, May 5, 2026.

⁸⁸ Kat J. McAlpine (2021, July 27). "Wildfire Smoke in New England Is 'Pretty Severe from Public Health Perspective',"

- First responders, especially the Town's firefighters.

The US Forest Services Risk Modelling has identified that 54% of buildings located within Brookfield are directly exposed to wildfire risk, with the remaining 46% of structures in town being indirectly exposed.⁸⁹

As indicated in Table 24, Brookfield has significant portions of its population that are especially vulnerable to the direct and indirect threats of wildfire. Social and economic factors can make it more difficult for some people to prepare for, respond to, and recover from wildfire. Vulnerable populations may lack access to resources, experience cultural and institutional barriers, have limited mobility, or have medical conditions exacerbated by stress or smoke.⁹⁰

As previously described in the 2021 example above, wildfires do not have to take place within town to affect the Town; in March through July of 2023, historic wildfires in Canada sent smoke across a broad swath of New England, peaking in June of that year. In Worcester County, these fires reduced air quality throughout the months of May and June. The AQI for Worcester County peaked at 148 – Unhealthy for Sensitive Groups for fine particulate matter (PM2.5) – on June 6th 2023.⁹¹

POTENTIAL CLIMATE CHANGE EFFECTS

Climate change effects will impact future wildfires, as is noted in the “Probability of Future Events” section above. According to the 2023 ResilientMass Plan, precipitation changes, prolonged drought, rising temperatures, and increased frequency of lightning are expected to contribute to increased frequency and severity of wildfire.⁹² As droughts become more frequent and severe, forest types that do not usually burn and are not fire adapted will be more likely to burn. Wildfires are projected to increase worldwide by 14% by 2030, 30% by 2050, and 50% by 2100.

Seasonal drought exacerbated by climate change may also make it more difficult to ensure a reliable water source for firefighting.

In summary, climate change is likely to increase the frequency and extent of wildfires in Brookfield. This increase in wildfires may lead to changes in land use, such as the Town no longer being able to develop near dense forest. Additionally, if wildfires and brush fires worsen significantly, residents may desire to move away from dense forest, shifting populations from more rural areas to cities or downtown communities. The future air quality risks to Brookfield from wildfires are hard to predict with any certainty and represent a threat to the broader region; town officials could consider including air purifying equipment as a needed aspect of shelter planning in the future.

VULNERABILITY

Based on the above assessment, Brookfield has a hazard risk index of “2 – high risk” from wildfires. Though the town has a lower potential than other communities across the United States, it has a much higher potential for risk within the Massachusetts context. This type of low frequency/high vulnerability event represents one of the gravest dangers to the community. However, this risk assessment is highly dependent on short term weather patterns like wind, lightning, and rainfall, which are impossible for the Town to predict with certainty.

BU.edu, The Brink: Pioneering Research from Boston University, July 27, 2021, <https://www.bu.edu/articles/2021/wildfire-smoke-in-new-england/>.

⁸⁹USDA Forest Service. Wildfire Risk to Communities. <https://wildfirerisk.org>, May 5, 2026.

⁹⁰ Ibid

⁹¹ "Pre-Generated Data Files," Aqs.epa.gov, United States Environmental Protection Agency, May 5, 2026, https://aqs.epa.gov/aqsweb/airdata/download_files.html.

⁹² "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan"

MITIGATION STRATEGIES

The Town of Brookfield is currently able to effectively respond to wildfires and brush fires through the emergency response facilities and services identified in the critical infrastructure and facilities and existing protection sections of this plan. However, there are numerous opportunities for the Town to expand upon its existing capabilities to mitigate and respond to wildfires and brush fires. The local HMP planning team identified the following strategies that could be used to reduce the threat of wildfires / brush fires in Brookfield:

- Participate in the development and implementation of the Regional Community Wildfire Protection Plan with East Brookfield, West Brookfield and North Brookfield.
- Achieve Firewise Community Designation
- Increase the amount of vegetative debris that is clear from fire roads to include a 10 foot area on each side in order to mitigate the risk of wildland fires

4.8 EARTHQUAKES

An earthquake is a sudden, rapid shaking of the ground caused by the breaking and shifting of rock beneath the Earth's surface. Earthquakes can occur suddenly and without warning at any time of the year. Ground shaking from earthquakes can rupture gas mains and disrupt other utility services, can damage buildings, bridges, and roads, and can trigger other hazardous events such as avalanches, flash floods (which can be caused by dam failure), and fires. Unreinforced masonry buildings, buildings with foundations that rest on filled land or unconsolidated and unstable soil, and mobile homes not tied to their foundations are especially vulnerable during an earthquake.

LOCATION

Because of the regional nature of the hazard, the entire Town of Brookfield is susceptible to earthquakes. This makes the location of occurrence for this hazard "large."

EXTENT

Earthquake magnitude and intensity are two measures of the overall extent of earthquakes in a given area. Magnitude is defined as the energy produced by an earthquake, and intensity is defined as an earthquake's level of effect on the Earth's physical environment, nature, people, and structures.

The magnitude of an earthquake can be measured using the Richter Scale, which measures the energy of an earthquake by determining the size of the greatest vibrations recorded on a seismogram. On this scale, one step up in magnitude (from 5.0 to 6.0, for example) indicates an increase in energy of an earthquake of more than 30 times. Earthquakes are also commonly measured using the moment magnitude scale, which provides similar measurements to the Richter scale but more accurately measures earthquakes with magnitudes greater than 8.⁹³

Table 8: Richter Scale Magnitudes and Effects

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

⁹³ "How Do We Measure Earthquake Magnitude? Michigan Technological University," MTU.edu, Michigan Tech, accessed June 10, 2024, <https://www.mtu.edu/geo/community/seismology/learn/earthquake-measure/>.

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

Table 9: Modified Mercalli Intensity Scale for and Effects⁹⁴

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

PREVIOUS OCCURRENCES

The last recorded earthquake to cause major damage in New England occurred in 1755,⁹⁵ though seismologists state that another serious earthquake occurrence in the region in the future is possible. There are five seismological faults in Massachusetts, but there is no discernible pattern of previous earthquakes along these fault lines. Additionally, earthquakes that are based in more

⁹⁴ Earthquake Hazards Program, "The Modified Mercalli Intensity Scale," USGS.gov, United States Geologic Survey, accessed June 10, 2024, https://www.usgs.gov/programs/earthquake-hazards/modified-mercalli-intensity-scale?qt-science_center_objects=0#qt-science_center_objects.

⁹⁵ Northeast States Emergency Consortium and John E. Ebel, PhD. Boston College, Weston Observatory, "Massachusetts Earthquakes," NESEC.org, Northeast States Emergency Consortium, accessed June 10, 2024, <http://nasec.org/massachusetts-earthquakes/>.

seismologically active regions like parts of Canada may also impact Massachusetts.⁹⁶ Earthquakes occur without warning and may be followed by aftershocks. Figure 3 below shows the locations of earthquakes that have occurred across the New England region and beyond from January 1975 through October 2017.

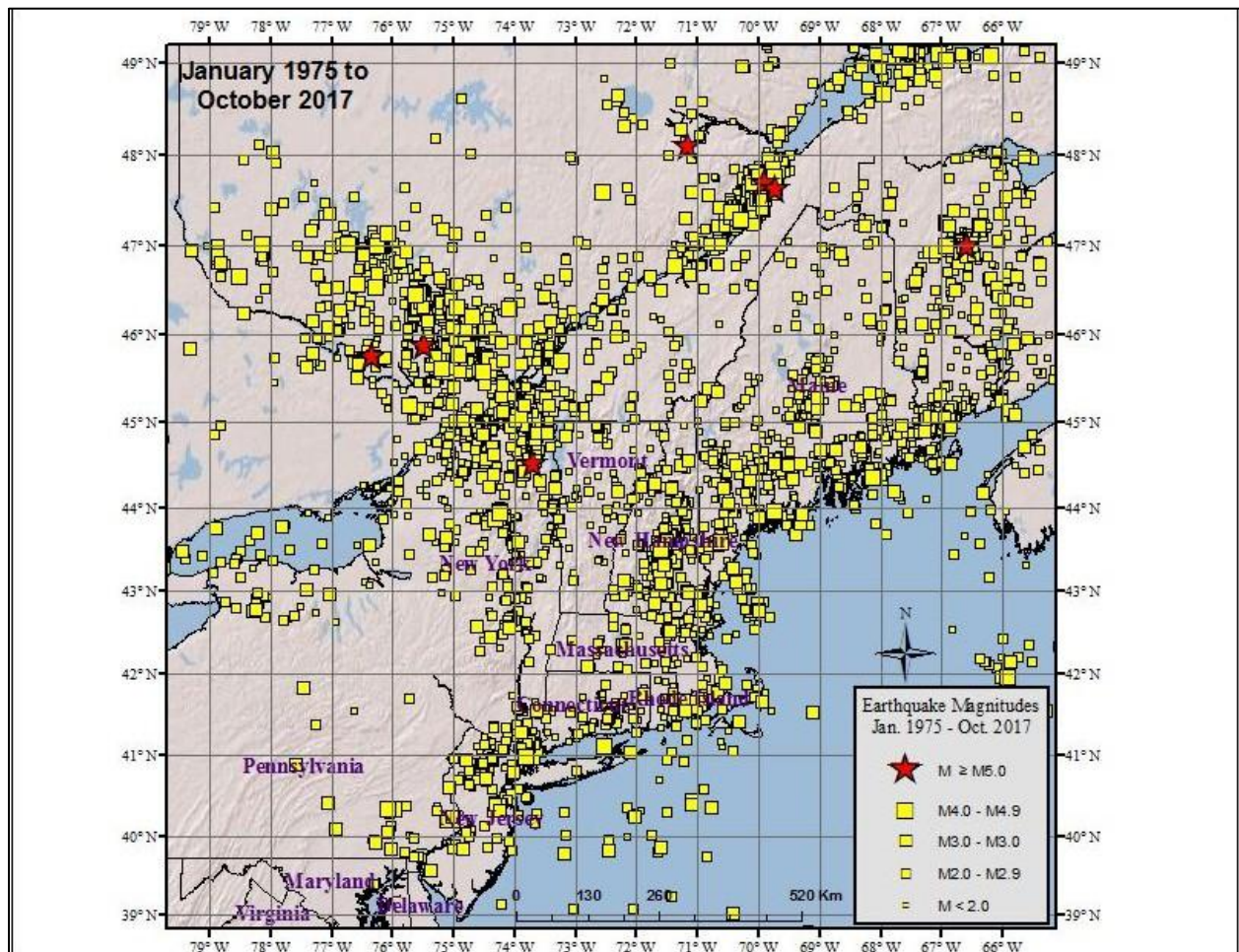


Figure 3: Map of Earthquakes of the Northeastern US and Southeastern Canada 1975 to 2017.⁹⁷

The local hazard mitigation planning team reports that no earthquakes have recently been felt in Brookfield. To determine whether earthquakes have occurred recently near Brookfield, earthquake data over the past six years for all Massachusetts cities and towns gathered by the Weston Observatory at Boston College was reviewed.

The Weston Observatory utilizes two scales to track the magnitude of earthquakes. One of these scales is the Nuttli magnitude (M_n) for North America east of the Rocky Mountains. Weston Observatory also utilizes the Coda Duration magnitude (M_c) scale, which is based on the duration of shaking at a particular station. The Coda Duration magnitude can quickly estimate the magnitude of an earthquake before its exact location is known.

The following earthquakes with a magnitude of over 2.0 on either the Nuttli magnitude or Coda

⁹⁶ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan"

⁹⁷ "New York Earthquakes," NESEC.org, Northeast States Emergency Consortium, accessed September 16, 2024, <https://nsec.org/new-york-earthquakes/>.

Duration magnitude scales have been recorded at the Weston Observatory since 2018:

- 12/21/2018 – 3 km WSW of Gardner, 2.1/2.1 [Mn*/Mc**]
- 8/21/2019 – 2 km SSE of Wareham, 1.7/2.4
- 12/3/2019 – 4 km SSE of Plymouth, 1.6/2.2
- 11/8/2020 – 11 km SW of New Bedford, 3.8/3.4
- 11/22/2020 – 12 km WSW of New Bedford, 1.7/2.6
- 07/25/2021 – 5.0km W of Peabody 1.4/2.5
- 01/01/2022 – 13.0km N of Rockport 2.3/3.0
- 03/04/2022 - 5.0km WSW of Orange 2.2/2.7
- 11/10/2022 – 12.0km NW of Nantucket 2.6/3.0
- 11/13/2023 – 208.0km E of Chatham 2.8/3.3
- 12/26/2023 – 52.0km ENE of Rockport 2.2/2.8
- 03/11/2024 – 6.0KM E of Lawrence 1.1/2.1

*Mn is the Nuttli Magnitude (see below)

**Mc is the Coda Duration Magnitude (see below)

Each of these earthquakes are minor. Additionally, earthquakes with a magnitude of about 2.0 or less are usually called "microearthquakes" and are generally only recorded locally.⁹⁸

PROBABILITY OF FUTURE EVENTS

The 2023 ResilientMass Plan notes that “The probability of a magnitude 5.0 or greater earthquake centered in New England in a 10-year period is about 10–15%.”⁹⁹ Additionally, this plan notes that while Massachusetts is not near any tectonic plate boundaries, it is still susceptible to earthquakes on the North American Plate. Earthquakes elsewhere could also have secondary effects on the state and the region, such as potentially disrupting supply chains.

Based upon existing records, there is “very low” frequency (less than 1 percent probability in any given year) of damaging earthquakes in Brookfield.

IMPACT

Massachusetts introduced earthquake design requirements into its state building code in 1975 and improved its state building code for seismic resilience in the 1980s. However, these specifications apply only to new buildings or to extensively modified existing buildings. Buildings, bridges, water supply lines, and electrical power lines and facilities built before the 1980s may not be designed to withstand the forces of an earthquake. The first edition of the Massachusetts State Building Code went into effect on January 1, 1975, and 48.1% of the Town’s 1,620 total housing units were constructed in 1979 or earlier (according to the 2024 American Community Survey 5-year estimates).¹⁰⁰ Seismic standards in Massachusetts were upgraded with the 1997 revision of the state

⁹⁸ New England Seismic Network, “NESN Recent Earthquakes,” Aki.bc.edu, Weston Observatory at Boston College, June 10, 2024, http://aki.bc.edu/cgi-bin/NESN/recent_events.pl.

⁹⁹ “ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan,” page 5.1-42.

¹⁰⁰ “DP04: Selected Housing Characteristics,” Data.Census.gov

building code. Despite its fairly old housing stock, Brookfield faces a “minor” impact from earthquakes, with damage to less than 10% of property in town likely to occur in the event of an earthquake due to the extreme rarity of damaging events.

HAZUS-MH (multiple-hazards) is a computer program developed by FEMA which estimates losses due to a variety of natural hazards. The HAZUS earthquake module allows users to define an earthquake magnitude and model the potential damages caused by that earthquake as if its epicenter is at the geographic center of the study area. For the purposes of this plan, a magnitude 5.0 earthquake was selected for analysis. Historically, major earthquakes are rare in New England, although a magnitude 5 earthquake occurred in the region in 1963.

Table 10: HAZUS Potential Damages from a Magnitude 5.0 Earthquake with an Epicenter in Brookfield

Magnitude 5.0	
Building Characteristics	
Estimated total number of buildings	831
Estimated total building replacement value (2024 \$)	\$ 386,064,000.00
Building Damage	
# of buildings sustaining slight damage	245
# of buildings sustaining moderate damage	149
# of buildings sustaining extensive damage	43
# of buildings completely damaged	9
Population Needs	
# of households displaced	39
# of people seeking public shelter	17
Debris	
Building debris generated (tons)	8,000
# of truckloads to clear debris (@ 25 tons/truck)	320
Value of Damages (dollars)	
Total property damage	\$ 47,931,300.00
Total losses due to business interruption	\$ 7,030,400.00

For more information on the HAZUS-MH software, go to www.fema.gov/hazus-software.

EXPOSURE

Certain features within Brookfield’s infrastructure, society, and environment may face more exposure to earthquakes, or be disproportionately impacted by them, relative to the rest of the

community. Some of these features may be documented in the list of critical facilities and vulnerable populations in Section 3. These features include:

- Older buildings constructed prior to the first edition of the Massachusetts State Building Code.

POTENTIAL CLIMATE CHANGE EFFECTS

The 2023 ResilientMass Plan identifies no climate change effects that pertain to earthquake hazards.¹⁰¹

VULNERABILITY

Based on the above analysis, Brookfield has a hazard index rating of “5 – lowest risk” from earthquakes.

MITIGATION STRATEGIES

The Town of Brookfield is currently able to effectively respond to earthquakes through the emergency response facilities and services identified in the critical infrastructure and facilities and existing protection sections of this plan. However, there are numerous opportunities for the Town to expand its existing capabilities to mitigate and respond to earthquakes. The local HMP planning team identified the following strategies that could be used to reduce the threat of earthquakes in Brookfield:

- Inventory unreinforced masonry and brick buildings in town which may be vulnerable to earthquakes. Conduct a study which identifies ways that these buildings can meet the Massachusetts State Building Code’s seismic standards.
- Participate in the development and implementation of the Regional Evacuation Plan

¹⁰¹ ” ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan”

4.9 DAM FAILURE

Dams and their associated impoundments provide many benefits, such as water supply, recreation, hydroelectric power generation, and flood control, to communities. However, dams also pose a risk to lives and property in cases in which they fail. Dam failure is not a common occurrence, but dams do represent a potentially disastrous hazard.

When a dam fails, the potential energy of the stored water behind the dam is released rapidly. Some dam failures occur when floodwaters overtop and erode the material components of the dam. Other dam failures are caused by foundation defects, inadequate maintenance, internal erosion caused by seepage, and other specific causes.¹⁰² Dam failures may be influenced by storm floodwaters, but most dam failures are caused by structural, mechanical, or hydraulic failures.¹⁰³ Dam breaches can lead to catastrophic consequences; they cause water to rush in a torrent downstream, flooding an area engineers refer to as an “inundation area.” The number of casualties and the amount of property damage resulting from a dam failure will depend upon the timing of the warning provided to downstream residents, the number of people living or working in the inundation area, and the number of structures in the inundation area.

Many dams in Massachusetts were built during the 19th century without the benefit of modern engineering design and construction oversight. Dams of this age are more vulnerable to failing because of structural problems caused by their age and/or lack of proper maintenance, as well as due to structural damage caused by an earthquake or flooding. The Massachusetts Department of Conservation and Recreation (DCR) Office of Dam Safety is the agency responsible for regulating dams in the state (M.G.L. Chapter 253, Section 44 and the implementing regulations 302 CMR 10.00).¹⁰⁴ Dams that are in excess of 6 feet in height (regardless of storage capacity) and that have more than 15 acre-feet of storage capacity (regardless of height) are under DCR regulation. Dam safety regulations enacted in 2005 transferred significant responsibilities for dams from the Commonwealth of Massachusetts to dam owners, including the responsibility to conduct dam inspections.

At the time of this hazard mitigation plan update, the hazard mitigation planning team has opted not to pursue an analysis for High Hazard Potential Dams, as there are none in or near town that would affect the town according to local expertise.

LOCATION

According to the Massachusetts Office of Dam Safety, there are five dams in Brookfield. Of these dams, zero are ranked as High Hazard and one is ranked as Significant Hazard. In addition to the 5 dams in town, the Man-O-Name #20 Dam on Cooley Hill in North Brookfield Significant Hazard, MA01932, privately owned in neighboring North Brookfield lies roughly a half-mile up gradient from a populated section of Brookfield and breach of this dam would potentially washout MA-148.

¹⁰² Association of State Dam Safety Officials. (n.d.). Dam Failures and Incidents. Association of State Dam Safety Officials. Retrieved December 29, 2021, from <https://damsafety.org/dam-failures>

¹⁰³ “Living with Dams: Know Your Risks (FEMA P-956),” Federal Emergency Management Agency, February 2013, page 9, https://www.fema.gov/sites/default/files/2020-08/fema_living-with-dams_p-956.pdf.

¹⁰⁴ “Section 44: Definitions applicable to Secs. 44 to 48B,” MAlegislature.gov, The 193rd General Court of the Commonwealth of Massachusetts, accessed September 17, 2024, <https://malegislature.gov/Laws/GeneralLaws/PartIII/TitleIV/Chapter253/Section44>; “302 CMR 10.00: Dam safety,” Mass.gov, The Commonwealth of Massachusetts, Massachusetts Court System, February 10, 2017, <https://www.mass.gov/regulations/302-CMR-1000-dam-safety#:~:text=302%20CMR%2010.00%20provides%20regulatory%20guidelines%20for%20the,public%20review%20of%20the%20performance%20of%20a%20dam>.

Table 11: Dams Within Brookfield or Would Impact Brookfield

National ID	Dam Name	Owner	Regulatory Authority	Hazard Code	Notes
MA01821	Salmon Brook Dam	Private	Non-Jurisdictional	N/A	This dam has been identified by CMRPC's GIS analysis as being located within FEMA's 100yr flood zone.
MA03444	Quacumquasit Pond Outlet Flow Control Structure	Private	Non-Jurisdictional	N/A	This dam has been identified by CMRPC's GIS analysis as being located within FEMA's 100yr flood zone.
MA02757	Recreation Dam	Private	Non-Jurisdictional	N/A	This dam has been identified by CMRPC's GIS analysis as being located within FEMA's 100yr flood zone.
MA01822	Rice Reservoir Dam	Unknown	Non-Jurisdictional	Removed	Office of Dam Safety indicates that this dam has been removed and is owned by Department of Conservation and Recreation. The Local Planning team identified this dam as the largest privately-owned waterbody in the state, owned by Keith Realty. This dam has been identified by CMRPC's GIS analysis as being located within FEMA's 100yr flood zone.
MA01824	Pool Dam	Private	Non-Jurisdictional	N/A	There are no noteworthy concerns regarding natural hazard impacts on this dam.
MA00098	Saw Mill Pond Dam	Town of Brookfield	Office of Dam Safety	Significant Hazard	This dam has been identified by CMRPC's GIS analysis as being located within FEMA's 100yr flood zone.
MA01932	Man-O-Name #20 Dam	Unknown	Office of Dam Safety	Significant Hazard	Concrete Dam located in North Brookfield, ownership is unclear (the towns of North Brookfield or Brookfield may own the dam or it may be privately owned by Midnight Harvest Tree Nursery). This dam acts as a water reservoir for the town of North Brookfield. There are no noteworthy concerns regarding natural hazard impacts on this dam.
MA01821	Salmon Brook Dam	Private	Non-Jurisdictional	N/A	This dam has been identified by CMRPC's GIS analysis as being located within FEMA's 100yr flood zone.
MA03444	Quacumquasit Pond Outlet Flow Control Structure	Private	Non-Jurisdictional	N/A	This dam has been identified by CMRPC's GIS analysis as being located within FEMA's 100yr flood zone.
MA02757	Recreation Dam	Private	Non-Jurisdictional	N/A	This dam has been identified by CMRPC's GIS analysis as being located within FEMA's 100yr flood zone.
MA01822	Rice Reservoir Dam	Unknown	Non-Jurisdictional	Removed	Office of Dam Safety indicates that this dam has been removed and is owned by Department of Conservation and Recreation. The Local Planning team identified this dam as the largest privately-owned waterbody in the state, owned by Keith Realty. This dam has been identified by CMRPC's GIS

					analysis as being located within FEMA's 100yr flood zone.
MA01824	Pool Dam	Private	Non-Jurisdictional	N/A	There are no noteworthy concerns regarding natural hazard impacts on this dam.
MA00098	Saw Mill Pond Dam	Town of Brookfield	Office of Dam Safety	Significant Hazard	This dam has been identified by CMRPC's GIS analysis as being located within FEMA's 100yr flood zone.
MA01932	Man-O-Name #20 Dam	Unknown	Office of Dam Safety	Significant Hazard	Concrete Dam located in North Brookfield, ownership is unclear (the towns of North Brookfield or Brookfield may own the dam or it may be privately owned by Midnight Harvest Tree Nursery). This dam acts as a water reservoir for the town of North Brookfield. There are no noteworthy concerns regarding natural hazard impacts on this dam.

Inundation areas for these dams cover less than 10% of Brookfield, or a "small" portion of its area.

EXTENT

As stated in the introduction to this dam failure section, dam or levee breaches often lead to catastrophic consequences; water released by a breach 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 which a dam failure causes will depend upon the timing of the warning provided to downstream residents, the number of people living or working in the inundation area, and the number of structures in the inundation area.

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

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

Some dams do not have a hazard rating.

PREVIOUS OCCURRENCES

To date, there has been no dam failures in Brookfield, as noted by the local HMP planning team in town.

PROBABILITY OF FUTURE EVENTS

The probability of future dam failure events in Brookfield is "very low," with a less than 1 percent chance of a dam in town failing in any given year.

IMPACT

The Town faces a “catastrophic” impact from the dam failure, with there being the possibility of multiple deaths and injuries and more than 50% of property in affected areas being damaged or destroyed in the case of a dam failure event in town.

It is not possible to estimate the property loss impacts of dam failure quantitatively given the large number of variables involved in failure events. Qualitatively, losses from failure of an individual dam could be significant but would likely be geographically limited to portions of the dam's inundation zone. The geographic areas included in dam inundation zones may change with future improvements to dam breach modeling software which are being developed and are currently in early trial stages, such as the DSS-WISE™ (Decision Support System for Water Infrastructural Security) program.¹⁰⁵

EXPOSURE

Certain features within Brookfield's infrastructure, society, and environment may face more exposure to dam failures, or be disproportionately impacted by them, relative to the rest of the community. Some of these features may be documented in the list of critical facilities and vulnerable populations in Section 3. These features include:

- Structures located within the inundation areas of Significant and High Hazard Dams;
- Downstream waterway infrastructure; and
- Poorly maintained or inspected dam infrastructure held in public or private hands.

As noted earlier in the plan, the Man-O-Name #20 Dam on Cooley Hill in North Brookfield Significant Hazard, MA01932, privately owned in neighboring North Brookfield lies roughly a half-mile up gradient from a populated section of Brookfield and breach of this dam would potentially washout MA-148.

POTENTIAL CLIMATE CHANGE EFFECTS

Intensified and more frequent flooding caused by climate change can increase dam failure risk. Flooding can cause dam failure through overtopping; Overtopping occurs when floodwaters flowing into a dammed body of water exceed the spillway capacity of the dam and cause water to flow over the top of the dam. If the water flowing over the dam erodes the dam, then a dam failure can occur. Therefore, the risk of dam failure may be indirectly impacted by climate change through intensified flooding.

VULNERABILITY

Based on a mostly qualitative assessment, Brookfield has a hazard index rating of “4 – Low” from dam failure. There are very few dams in town that pose any degree of risk, and only one dam outside of town that could impact a major travel route.

The Town is interested in incorporating more information on High Hazard Potential Dams in future iterations of this plan. This information would include the location and size of populations at risk, potential impacts to institutions and critical infrastructure/facilities/lifelines, inundation maps, emergency action plans, floodplain management plans, data or summaries provided by dam breach modeling software such as HEC-RAS, DSS-WISE HCOM, DSS-WISE Lite, and FLO-2D, and/or more detailed studies. However, at the time of the writing of this plan, this information was

¹⁰⁵ “About DSS-WISE™ Web,” Dsswiseweb.ncche.olemiss.edu, University of Mississippi, accessed June 10, 2024, <https://dsswiseweb.ncche.olemiss.edu/userpages/about.php>.

not available to the Town.

MITIGATION STRATEGIES

The Town of Brookfield is currently able to effectively respond to dam failure through the emergency response facilities and services identified in the critical infrastructure and facilities and existing protection sections of this plan. However, there are numerous opportunities for the Town to expand its existing capabilities to mitigate and respond to dam failures. The local HMP planning team identified the following strategies that could be used to reduce the threat of Dam Failure in Brookfield:

- Identify Owners of nearby Man-O-Name #20 Dam (MA01932) and bring them into compliance with Office of Dam Safety. Develop an emergency Action plan for this dam and identify what should be done to reduce the risk of this dam, as well as whether to repair, retrofit, or remove the dam and restore the local ecology.

4.10 DROUGHT, INCLUDING CHANGES IN GROUNDWATER

Drought, including changes in groundwater, is a normal and recurrent feature of climate. It occurs almost everywhere, although its features vary from region to region. Drought is a lack of precipitation over an extended period of time which results in a prolonged water shortage for some activity, group, or environmental sector. The direct impacts of droughts include: reduced crop yields; reduced rangeland and forest productivity; increased fire hazards; reduced water levels; increased livestock and wildlife mortality rates; and damage to wildlife and fish habitat. Drought impacts can have far-reaching effects throughout the region and even the country.

LOCATION

Because of this hazard's regional nature, a drought (including reduced groundwater levels) would likely impact the entire community, meaning the location of occurrence within Brookfield of this hazard is "large."

EXTENT

The National Drought Mitigation Center records information on historical drought occurrences. Unfortunately, drought data are only available at the state and county levels and not at the local level. The National Drought Mitigation Center categorizes drought severity on a D0-D4 scale as is shown below.

Table 12: National Drought Mitigation Center D0-D4 Scale¹⁰⁶

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

PREVIOUS OCCURRENCES

In Massachusetts, five statewide extreme droughts have occurred since 1930. These historic major droughts range in severity and in length, lasting from three to nine years. During many of these droughts, water supply systems around the state were found to be inadequate; At the times of these droughts, water was piped into urban areas, and water-supply systems were modified to permit

¹⁰⁶ "Drought Classification," Droughtmonitor.unl.edu, National Drought Mitigation Center, University of Nebraska-Lincoln, accessed April 10, 2026, <https://droughtmonitor.unl.edu/About/AbouttheData/DroughtClassification.aspx>.

withdrawals at lower water levels. The Brookfield area has been spared the most severe impacts in each case according to the information for Massachusetts included in USGS Water Supply Paper #2375.¹⁰⁷

The following table shows peak drought severity data in Massachusetts from the National Drought Mitigation Center for each year since 2000:

Table 13: Peak Drought Severity Data in Massachusetts Per Year Since 2000¹⁰⁸

Year	Maximum Severity
2000	No drought
2001	D2 conditions in 21% of the state
2002	D2 conditions in 100% of the state
2003	No drought
2004	D0 conditions in 48% of the state
2005	D1 conditions in 7% of the state
2006	D0 conditions in 98% of the state
2007	D1 conditions in 71% of the state
2008	D0 conditions in 69% of the state
2009	D0 conditions in 45% of the state
2010	D1 conditions in 27% of the state
2011	D0 conditions in 0.01% of the state
2012	D2 conditions in 51% of the state
2013	D1 conditions in 60% of the state
2014	D1 conditions in 54% of the state
2015	D1 conditions in 58% of the state
2016	D3 conditions in 52% of the state
2017	D3 conditions in 9% of the state
2018	D1 conditions in 36% of the state
2019	D0 conditions in 85% of the state
2020	D3 conditions in 36% of the state
2021	D2 conditions in 1% of the state
2022	D3 conditions in 70% of the state
2023	D1 conditions in 0.4% of the state
2024	D3 conditions in 47% of the state
2025	D2 conditions in 14% of the state

¹⁰⁷ Richard W. Paulson et al., "National Water Summary 1988-89 – Hydrologic Events and Floods and Droughts," *United States Geological Survey Numbered Series Water Supply Paper*, no. 2375 (1991), <https://doi.org/10.3133/wsp2375>, page 329.

¹⁰⁸ "Statistics by Threshold," Droughtmonitor.unl.edu, National Drought Mitigation Center, University of Nebraska-Lincoln, accessed May 18, 2026, <https://droughtmonitor.unl.edu/DmData/DataDownload/StatisticsbyThreshold.aspx>.

2026 (to May)	D2 conditions in 11% of the State
---------------	-----------------------------------

The following table shows peak drought severity data in Worcester County from the National Drought Mitigation Center for each year since 2018:

Table 32: Peak Drought Severity Data in Worcester County Per Year Since 2018¹⁰⁹

Year	Maximum Severity
2018	D1 conditions in 33% of Worcester County
2019	D0 conditions in 100% of Worcester County
2020	D3 conditions in 14% of Worcester County
2021	D1 conditions in 51% of Worcester County
2022	D3 conditions in 53% of Worcester County
2023	D0 conditions in 74% of Worcester County
2024	D3 conditions in 51% of Worcester County
2025	D2 Conditions in 57% of Worcester County
2026	D2 Conditions in 20% of Worcester County

As of the writing of this plan, the Town of Brookfield and large portions of central and northeastern Massachusetts are currently in significant drought conditions.¹¹⁰

PROBABILITY OF FUTURE EVENTS

In Brookfield, as in the rest of the state, the probability of extreme and exceptional droughts and reductions in groundwater availability is “low” (a 1% to 10% chance in the next year). Based on past events and current criteria outlined in the Massachusetts Drought Management Plan, Central Massachusetts may be slightly more vulnerable than parts of eastern Massachusetts to severe drought conditions.¹¹¹ However, many factors such as water supply sources, population, economic factors (i.e., if an area has an agriculture-based economy), and infrastructure may affect the severity and length of a drought event in different parts of the state.

The long-term risk of drought and reduced groundwater levels, may increase in Brookfield due to climate change influences. Specifically, climate change may cause an increase in consecutive dry days over time.

IMPACT

The specific impacts of historical droughts in Massachusetts are categorized by the National Drought Mitigation Center in Table 30 below:

¹⁰⁹ Ibid.

¹¹⁰ “Drought Management in Massachusetts,” Mass.gov, Massachusetts Executive Office of Energy and Environmental Affairs Drought Management Task Force, June 25, 2026, <https://www.mass.gov/guides/droughtmanagement-in-massachusetts>.

¹¹¹ “Massachusetts Drought Management Plan,” Mass.gov, Massachusetts Executive Office of Energy and Environmental Affairs and Massachusetts Emergency Management Agency, December 2023, <https://www.mass.gov/doc/massachusetts-drought-management-plan/download>.

Table 33: Historic Impacts of Drought in Massachusetts¹¹²

Category	Historically observed impacts
D0	Crop growth is stunted; planting is delayed
	Fire danger is elevated; spring fire season starts early
	Lawns brown early; gardens begin to wilt
	Surface water levels decline
D1	Irrigation use increases; hay and grain yields are lower than normal
	Honey production declines
	Wildfires and ground fires increase
	Trees and landscaping are stressed; fish are stressed
	Voluntary water conservation is requested; reservoir and lake levels are below normal capacity
D2	Specialty crops are impacted in both yield and fruit size
	Producers begin feeding cattle; hay prices are high
	Warnings are issued on outdoor burns; air quality is poor
	Golf courses conserve water
	Trees are brittle and susceptible to insects
	Fish kills occur; wildlife move to farms for food
	Water quality is poor; groundwater is declining; irrigation ponds are dry; outdoor water restrictions are implemented
D3	Crop loss is widespread; Christmas tree farms are stressed; dairy farmers are struggling financially
	Well drillers and bulk water haulers see increased business
	Water recreation and hunting are modified; wildlife disease outbreak is observed
	Extremely reduced flow to ceased flow of water is observed; river temperatures are warm; wells are running dry; people are digging more and deeper wells

The 2023 ResilientMass plan notes that while drought is a naturally occurring climate phenomenon, its impacts can be exacerbated by human behavior. The volume and rate of groundwater withdrawn from underground aquifers can impact the amount of water that flows through surface water bodies; therefore, high rates of groundwater withdraw can negatively impact aquatic ecosystems. Additionally, more impervious surface coverage, and some forms of stormwater infrastructure, can prevent the natural infiltration of precipitation into groundwater and can therefore exacerbate drought.¹¹³

Specific drought impacts in Brookfield may vary among and between customers of the Town's water system and private well users. While the impact of a drought can be assessed as "minor" overall, with very little damage to property (damage to less than 10% of property in the area affected by the hazard), injuries, or loss of life likely to occur in town, drought impacts may be higher in the parts of town that are not located within the Town's water service area.

¹¹² "State Impacts," Droughtmonitor.unl.edu, National Drought Mitigation Center, University of Nebraska-Lincoln, accessed April 10, 2025, <https://droughtmonitor.unl.edu/DmData/StateImpacts.aspx>.

¹¹³ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan"

Reduced groundwater levels caused by drought can cause public water suppliers to have difficulty in meeting users' demands while also maintaining enough water pressure in their systems to facilitate suppression and water quality needs. Decreased firefighting capabilities due to low water availability during drought can increase the community's vulnerability to wildfires and fires caused by lightning strikes. Reduced groundwater levels can also lead to remaining well water having sediment (due to intense pumping into bedrock or the overburden aquifer being needed) and/or pollutants such as nitrates and heavy metals in it, and communities may need to consider drilling deeper wells or re-siting wells to areas less affected by drought if sedimentation and/or contamination occurs.

As described above, impacts in Brookfield may vary among customers of the municipal water systems and private well users. Wildfire and brush fires would also be a concern in long periods of drought. While the impact of a drought can be assessed as "minor" overall, with very little damage to property (damage to less than 10% of property in the area affected by the hazard), injuries, or loss of life likely to occur in town, drought impacts may be higher in the parts of town that are not located within the town's water service area.

Regardless, the Town made no mention of significant droughts, or wells running dry from changes in ground water, in Brookfield in recent decades.

EXPOSURE

Certain features within Brookfield's infrastructure, society, and environment may face more exposure to drought, or be disproportionately impacted by it, relative to the rest of the community. Some of these features may be documented in the list of critical facilities and vulnerable populations in Section 3. These features include:

- Residences or businesses with shallow wells;
- Wild plants and animals, including trees; and
- Vegetation, which may become more vulnerable to wildfire due to prolonged drought.

Higher water bills or the cost of re-drilling private wells due to drought or reductions in groundwater availability could also negatively affect local residents. The town of Brookfield has approximately 500 homes on town water, with a 500,000 gallon capacity of storage. The town has a significant agricultural component to its economy that could be impacted by significant drought or changes in groundwater: according to the Central Mass Grown directory, there are four farms in Brookfield that grow fruits, vegetables, beef, poultry, pork, and other farm animals, and an additional four farms within 5 miles of town.¹¹⁴ Other factors like PFAS contamination of water sources could compound drought-related water supply challenges.

POTENTIAL CLIMATE CHANGE EFFECTS

According to the 2023 ResilientMass Plan, there are two major ways that drought can be influenced by climate change:¹¹⁵

- The frequency and extent of droughts are projected to increase in summer and fall as higher temperatures result in more evaporation, snow melts earlier in the year, and precipitation becoming less frequent yet more extreme when it does occur.

¹¹⁴ Find Local Farms and Food. Central Mass Grown, accessed June 26, 2026.
<https://www.centralmassgrown.org/directory>

¹¹⁵ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan"

- Rising temperatures and changes in precipitation patterns will reduce snowpack and hasten snowmelt and therefore can exacerbate drought. The process of reduced snowmelt can result in less snowmelt recharge of groundwater, less snowmelt feeding stream flows, and less snowmelt available as an agricultural water source.

In summary, climate change is likely to increase the frequency and extent of drought in Massachusetts. Drought that is worsened by climate change can have numerous community-wide implications in Brookfield. Due to the impacts of drought on crop yield, land use designated for farming could be altered or reduced. The Town may also have to plan for changes in its drinking water system to account for drought conditions. Residents ranked concerns related to water quality/quantity degradation highly in the community survey for this plan. In addition, drought is predicted to worsen significantly in other parts of the country, particularly in the southwestern United States, and it is possible that this could result in people from other parts of the country moving to the northeast, including to Brookfield.

VULNERABILITY

Based on the above assessment, Brookfield has a hazard index rating of “4 – Low risk” from drought. Minimal or no loss of or damage to property, injuries, or loss of life is expected from drought in town.

MITIGATION STRATEGIES

The Town of Brookfield is currently able to effectively respond to drought through the emergency response facilities and services identified in the critical infrastructure and facilities and existing protection sections of this plan. However, there are numerous opportunities for the Town to expand its existing capabilities to mitigate and respond to drought. The local HMP planning team identified the following strategies that could be used to reduce the threat of drought in Brookfield:

- Provide information to residents and businesses on water conservation through reduction in use, low-impact landscaping and other low-cost measures (in part to conserve water for firefighting)

4.1.1 EXTREME TEMPERATURES

The 2023 ResilientMass Plan states that there are no universal definitions of “extreme heat,” “extreme cold,” or “extreme temperatures”; these terms are relative terms whose meaning depends on the normal average temperatures and climatic highs and lows in a region. Extreme heat in Massachusetts is typically defined as a period of three or more consecutive days with temperatures above 90 °F.¹¹⁶ Extreme heat may also refer to any prolonged period of especially hot weather (which is called a heat wave) which may also be accompanied by high humidity. Extreme cold, like extreme heat, is a dangerous situation that can result in health emergencies for susceptible people. People without shelter, who are stranded, or who live in homes that are poorly insulated or are without heat and/or air conditioning are especially at risk to extreme temperatures.

For Massachusetts, extreme temperatures can be defined as those that are far outside the normal ranges. Normal temperatures within the period ranging from 1991-2020 for the area near Brookfield are:

Table 34: Normal Temperatures in the Period Between 1991-2020 in the Area Near Brookfield¹¹⁷

	July (Hottest Month)	January (Coldest Month)
Maximum High (°F)	80.0°	34.2°
Maximum Low (°F)	61.5°	18.8°

The National Weather Service’s (NWS’s) specific criteria for issuing extreme heat and extreme cold watches, warnings, and advisories are described in the Extent section below.

LOCATION

Extreme temperatures can be expected to be uniform across Brookfield during a given extreme temperature event, due to the Town’s lack of extreme elevations, urban areas, and coastal areas. Therefore, this hazard has a “large” geographic coverage in town.

EXTENT

The NWS uses the heat index scale to categorize extremely hot temperatures. This scale combines relative humidity with actual air temperature to determine the risk to humans. The NWS issues an Excessive Heat Advisory if the heat index is forecast to reach 95°F-99°F for 2 or more hours over 2 consecutive days, or 100°F-104°F for 2 or more hours over 1 day. The NWS issues an Excessive Heat Warning when the daytime heat index is forecasted to reach 105°F for 2 or more hours. The NWS defines a Heat Wave as 3 or more days of greater than or equal to 90°F temperatures. The following chart indicates the relationship between heat index and relative humidity:

¹¹⁶ ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan,” pages 5.2-1- 5.2-2.

¹¹⁷ These temperature estimates are based on data recorded at a weather station in E Brimfield Lake (Sturbridge). “U.S. Climate Normals Quick Access,” Ncei.noaa.gov, National Oceanic and Atmospheric Administration National Centers for Environmental Information, accessed June 26, 2026, <https://www.ncei.noaa.gov/access/us-climate-normals/>.

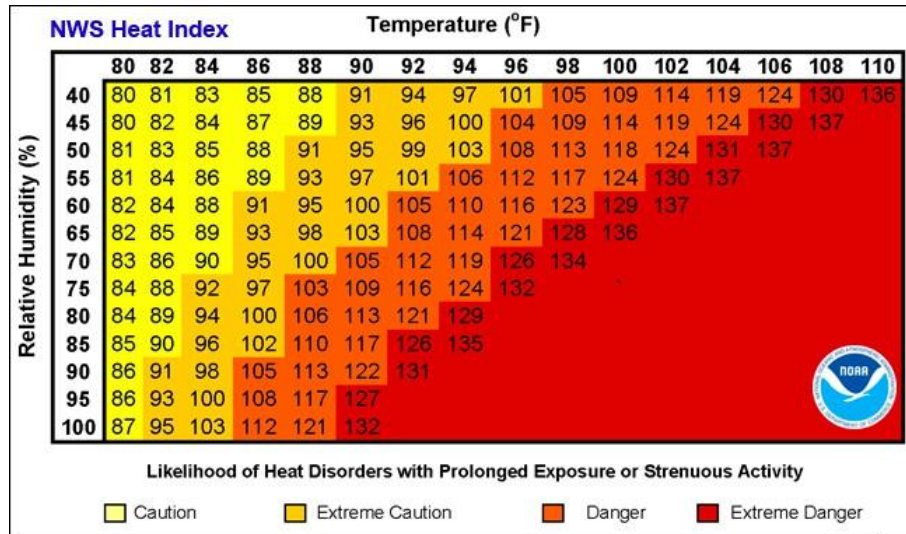


Figure 4: Heat Index¹¹⁸

Extreme heat causes more fatalities in the United States than all other weather-related natural hazards combined.¹⁰⁹ Extreme heat can be the underlying cause of death or can worsen other medical conditions like heart disease, hypertension, alcohol poisoning, and drug overdoses.¹¹⁹ The heat-related mortality rate is higher among males and people aged 65 years and older.¹²⁰

Table 32: Heat Effects on the Body lists the effects of extreme heat on the body at different levels of the heat index. It is important to note that while temperatures exceeding 100°F are unusual for Central Massachusetts, high humidity is very common during the summer and can drive the heat index in the region to dangerous levels / temperatures above 100°F.

Table 35: Heat Effects on the Body¹²¹

Classification	Heat Index	Effect on Body
Caution	80°-90°F	Fatigue possible with prolonged exposure and/or physical activity.
Extreme Caution	90°-103°F	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
Danger	103°-124°F	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity
Extreme Danger	125°F+	Heat strokes highly likely.

¹¹⁸ National Weather Service, "What is the heat index?," Weather.gov, National Oceanic and Atmospheric Administration, accessed September 16, 2024, <https://www.weather.gov/ama/heatindex>.

¹¹⁹ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan,"

¹²⁰ Ambarish Vaidyanathan et al., "Heat-Related Deaths—United States, 2004–2018," *Morbidity and Mortality Weekly Report* 69, no. 24 (2020): 729–734. <https://doi.org/10.15585/mmwr.mm6924a1>.

¹²¹ Ibid.

¹²¹ National Weather Service, "What is the heat index?," Weather.gov, National Oceanic and Atmospheric Administration, accessed June 10, 2024, <https://www.weather.gov/ama/heatindex>.

Other impacts of high temperatures include drought, wildfire, and the formation of ground-level ozone.¹²² Prolonged heat can cause power use to spike and in turn can overload the electrical grid, causing outages.¹²³ Extreme heat and cold can both negatively impact transportation infrastructure; Railroad tracks are a particular concern because metal rails can kink in high temperatures.¹²⁴

The 2023 ResilientMass Plan notes that the extent (severity or magnitude) of extreme cold temperatures is generally measured through the Wind Chill Temperature Index.¹²⁵ The wind chill temperature is the temperature that people and animals feel when outside; it is based on the rate of heat loss from exposed skin due to the effects of wind and cold.¹²⁶ In Massachusetts, the National Weather Service (NWS) Norton Forecast Office issues a wind chill warning when the Wind Chill Temperature Index, based on sustained wind, is -25°F or lower for at least three hours. The NWS Wind Chill Chart below shows three shaded areas of combinations of wind and temperature conditions in which there is frostbite danger; Each shaded area shows how long a person can be exposed before frostbite develops.

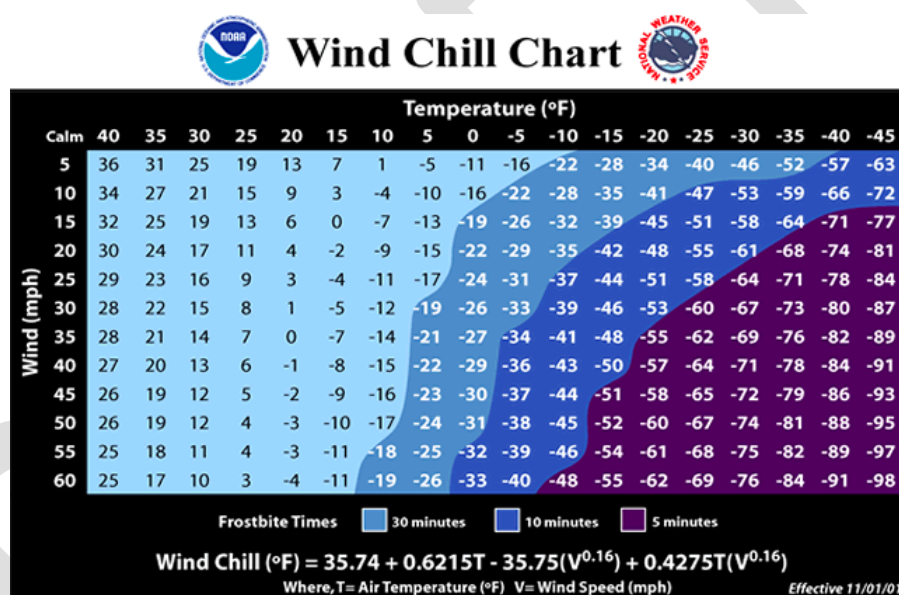


Figure 5: NWS Wind Chill Temperature (WCT) index.¹¹⁸

Cold temperatures are often combined with winter storms. People may experience the loss of heat and power in their homes and workplaces due to storm damage, which could further subject them to the cold.¹¹⁹ Carbon monoxide poisoning is another risk during cold weather, especially when households lack adequate power or heat.¹²⁰

¹²² "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan,"

¹²³ Ibid.

¹²⁴ Ibid.

¹²⁵ Ibid.

¹²⁶ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan," pages 5.2-1-5.2-3.

PREVIOUS OCCURRENCES

There is not a comprehensive data source that lists instances when the National Weather Service has issued extreme heat or cold warnings or advisories in Worcester County.

According to the 2023 Resilient Mass Plan, there have been 118 warm weather events (heat and excessive heat events) in the state between 1995 and 2022.¹²⁷ 2010–2022 had seven of the 10 warmest summers on record in the state.

2012 and 2013 were notably hot summers in Massachusetts.¹²⁸ In July 2013, a long period of hot and humid weather occurred throughout New England. One fatality occurred on July 6, when a postal worker collapsed as the heat index reached 100°F.¹²⁹

The hottest two summers on record in the Commonwealth were 2020 and 2022.¹³⁰ August 2022 was the hottest August ever recorded in the Commonwealth, with temperatures more than 6°F greater than the 20th century average. In August 2022, Boston experienced at least 17 days above 90 degrees, including two six-day heat waves.

Statewide, there were 33 extreme cold weather events between 1994 and 2018. The NOAA storm Events database lists the following Extreme Cold / Wind Chill Events as having occurred in Southern Worcester County since the last Brookfield HMP was developed in 2018:¹³¹

- 01/06/2018: Strong west winds trailed the January 4 winter storm. These winds drew bitterly cold arctic air over Massachusetts. The combination of strong wind and low temperatures created a dangerous wind chill, with readings reaching 25 degrees below zero or colder in a couple of locations during the early mornings of January 6 and 7.
- 01/21/2019: Strong west to northwest winds trailing the January 20th storm drew cold air across Southern New England on January 21st and caused wind chill values of 25 below zero or colder in Central and Western Massachusetts. The wind diminished during the afternoon and evening of January 21st allowing wind chill values to become less extreme, in the teens below zero.

Inland portions of Massachusetts are more subject to extreme temperatures because they lack the moderating effect of the Atlantic Ocean. However, densely developed cities are more likely to be impacted by heat waves than smaller towns like Brookfield.

PROBABILITY OF FUTURE EVENTS

The probability of future extreme heat or extreme cold events occurring in Brookfield is considered to be "moderate," or between 10% and 40% in the next year.

¹²⁷ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan," pages 5.2-7- 5.2-8.

¹²⁸ Ibid.

¹²⁹ Ibid.

¹³⁰ Ibid.

¹³¹ "Storm Events Database Search Results for Worcester County, Massachusetts," NCDC.NOAA.gov, National Oceanic and Atmospheric Administration National Centers for Environmental Information, accessed June 29, 2026, https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28Z%29+Extreme+Cold%2FWind+Chill&beginDate_mm=01&beginDate_dd=01&beginDate_yyy=2018&endDate_mm=12&endDate_dd=31&endDate_yyyy=2024&county=WORCESTER%3A27&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitButton=Search&statefips=25%2CMASSACHUSETTS.

IMPACT

The impact of extreme heat or cold in Brookfield is considered to be "minor," with no property damage and a limited effect on humans anticipated in the case of extreme temperature events.

EXPOSURE

Certain features within Brookfield's infrastructure, society, and environment may face more exposure to extreme temperatures, or be disproportionately impacted by them, relative to the rest of the community. Some of these features may be documented in the list of critical facilities and vulnerable populations in Section 3. These features include:

- Children and elderly residents, who are more vulnerable to the effects of extremely hot or cold conditions;
- Low-income residents who are unable to afford adequate cooling or heating;
- Renters who may have few home improvement options for mitigating extreme heat and cold;
- People who work outdoors such as construction or farm workers;
- The utility grid, which could be vulnerable to outages due to surges in power use during extreme temperatures. Power outages during extremely hot or cold days could cause further problems for people who rely on air conditioners or electric heaters; and
- Certain forms of agriculture which may be negatively affected by extreme temperatures, especially extreme heat.

POTENTIAL CLIMATE CHANGE EFFECTS

According to the 2023 ResilientMass Plan, climate change is already causing more high heat days and fewer extreme cold events in Massachusetts and beyond.¹³² Climate change is also shifting the average temperature in Massachusetts higher, leading to longer warm seasons as well as shifts to growing seasons, habitat and vegetation ecosystems, and migratory patterns. Rising temperatures will also cause warming seas, a degradation in air quality, impacts on people's health, and an increased demand for energy and government services. Secondary climate change effects of extreme temperatures include increased severity of wildfires, droughts, and flooding as well as encroachment by invasive species. According to the 2023 ResilientMass Plan:¹³³

- By 2050, average annual temperatures are expected to increase by between 5.9° and 7.9°F. This is a drastically shortened timeline from the 2018 state hazard mitigation plan, where increases of this magnitude were not expected until the end of the century.
- By 2100, annual average temperatures are expected to increase by between 10.0° and 12.9°F compared to the 1971-2000 baseline.

According to the 2022 Massachusetts Climate Change assessment, by 2030, the summer mean temperature could increase by 3.6°F from the period between 1950 and 2013, worsening stress on electric transmission and utility distribution infrastructure.¹³⁴

¹³² "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan"

¹³³ Ibid.

¹³⁴ "2022 Massachusetts Climate Change Assessment," page RS30.

In summary, climate change is likely to increase the frequency and duration of extreme heat events in Massachusetts. Changes to average annual temperatures will also impact Brookfield. Seasonal temperatures will shift, with spring and summer temperatures extending through more of the year.¹³⁵ Winters may also be milder than historical norms.¹³⁶ Changes to average temperatures could impact the agricultural industry and the natural environment. Farmers may need to shift their practices to account for new climate conditions, and certain specific plants and animals may need to migrate to new ranges to find suitable habitat.¹³⁷

To respond to climate change-induced changes in temperatures, Brookfield residents and businesses may have to alter work patterns during extreme heat days and events to reduce workplace injuries in vulnerable jobs such as construction trades and agricultural labor. The Town may have to plan to offer more cooling stations for residents, particularly vulnerable populations such as the elderly and low-income residents. Brookfield may also have to account for an increase in people moving to town and/or visiting town to seek refuge from extreme heat in other parts of the country.¹³⁸

VULNERABILITY

Brookfield's vulnerability to extreme heat and cold is considered to be, "4 – low risk." The Town has operated heating and cooling shelters at the Library, Police Station Conference room, and other town facilities. Its local ecology, with forested areas covering approximately 68% of the Town, and its location along the Quaboag River also provide natural evaporation and transpiration-related cooling effects to the Town.

MITIGATION STRATEGIES

The Town of Brookfield is currently able to effectively respond to extreme temperatures through the emergency response facilities and services identified in the critical infrastructure and facilities and existing protection sections of this plan. However, the Town has numerous opportunities to expand upon its existing capabilities to mitigate and respond to extreme temperatures. The local HMP planning team identified the following strategies that could be used to reduce the threat of extreme temperatures in Brookfield:

- Investigate shelter/emergency resources to develop a town emergency shelter. Identify an appropriate site for a town shelter.
- Promote use of federal & state resources related to disaster mitigation such as training, educational materials & National Weather Service forecasts
- Develop and enhance working relationships with utility companies; ensure satellite spaces within each community for temporary emergency headquarters.
- Develop a Climate Action Plan.

¹³⁵ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan"

¹³⁶ Ibid.

¹³⁷ Ibid.

¹³⁸ Ibid.

4.12 INVASIVE SPECIES

An invasive species, as defined by the Invasive Species Advisory Committee (ISAC) of the U.S. Department of the Interior, is “a species that is non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health.”¹³⁹ Invasive species are not the same as native pest species, such as beavers and deer. The State of Massachusetts, being heavily forested with relatively new growth forest, as well as having a great deal of its water sourced from open reservoirs, is vulnerable to the threat of both land and aquatic invasive species. Invasive species can damage and disrupt existing ecosystems by outcompeting the native flora and fauna: many invasive aquatic species harm water quality, and many land-borne invasive species increase the risk of wildfires. The effects of invasives are species-dependent, and a challenge for invasive species management is that many municipalities are affected by some invasive species but not others.

LOCATION

Several invasive species affect broad regions of Massachusetts. The Emerald Ash Borer (*Agrilus planipennis*) has been detected in every city and town within the Central Region.¹⁴⁰ However, invasives and their effects can also be very species-dependent and localized, so invasive species hazards can also bear a resemblance to other more localized hazards such as localized flooding. Brookfield’s suburban development along with its geography lends itself towards being more vulnerable to invasives. Brookfield is characterized by its relatively flat geography and its proximity along the Quaboag River, and vulnerable to intrusion from both land based and aquatic invasives. More than 50% of the Town is vulnerable to invasives, so this hazard has a “large” geographic coverage in town.

EXTENT

It is difficult for local officials to understand the extent of the impacts that invasive species have on their communities. Factors that lead to a dearth of knowledge about the extent of impacts of invasive species include: the unpredictable nature of invasives, the lack of verified data clearinghouses about invasive species, and the lack of resources and capacity for local conservation officials to track invasives. Often, it is not until the damage caused by invasives is apparent that local officials discover the true extent of the hazard. Still, there are some resources available to the local hazard mitigation planning team. This plan utilizes the Massachusetts Department of Agriculture’s Invasive Pest Dashboard,¹⁴¹ the Center for Invasive Species and Ecosystem Health’s Early Detection and Distribution Mapping System (EDDMapS) hosted by the University of Georgia,¹⁴² and the Forest Ecosystem Monitoring Cooperative’s Northeastern Forest Health Atlas.¹⁴³

¹³⁹ Definitions Subcommittee of the Invasive Species Advisory Committee (ISAC). “Invasive Species Definition Clarification and Guidance,” Doi.gov, United States Department of the Interior, April 27, 2006, https://www.doi.gov/sites/doi.gov/files/uploads/isac_definitions_white_paper_rev.pdf.

¹⁴⁰ “ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan,” page 5.1-48.

¹⁴¹ “MDAR Invasive Pest Dashboard,” Experience.arcgis.com, Massachusetts Department of Agricultural Resources, accessed June 10, 2024, <https://experience.arcgis.com/experience/a25afa4466a54313b21dd45abc34b62d/page/Page-2/?views=Town-by-Town>.

¹⁴² “My EDDMapS,” EDDMapS.org, Center for Invasive Species and Ecosystem Health, accessed June 10, 2024, <https://www.eddmaps.org/tools/query/index.cfm?observationDateStart=06/03/2017&observationDateEnd=06/03/2024&eradicationstatus=1,2&country=926&state=92625000&fipscode=92625027>.

¹⁴³ Northeastern Forest Health Atlas,” UVM.edu, Forest Ecosystem Monitoring Cooperative, accessed June 10, 2024, <https://www.uvm.edu/femc/forest-health-atlas>.

In Worcester County from August 20, 2018, to June 29, 2026, according to EDDMapS analysis of verified invasive species reporting, there have been 694 records of locations with invasive species. According to this analysis, only 3 invasive species infestations are being treated in this county.¹⁴⁴

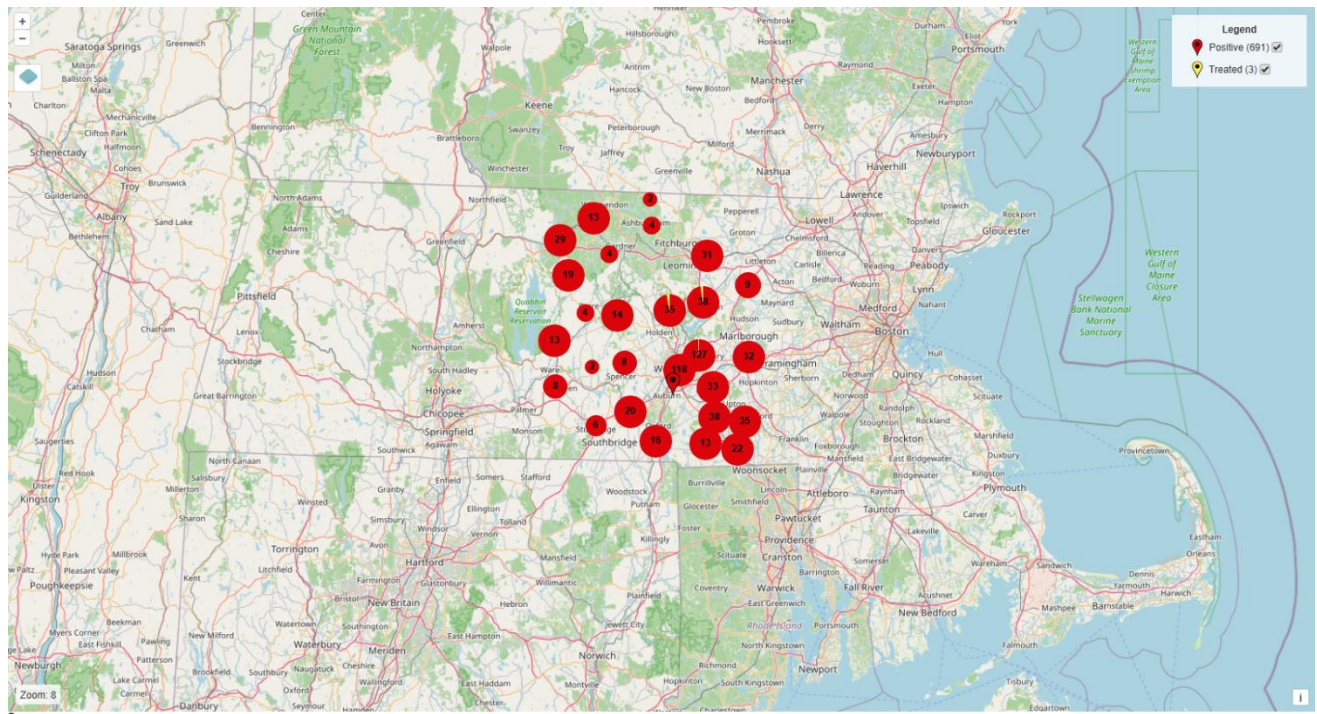


Figure 6: EDDMapS Analysis of Worcester County Invasives 2018-2026

The Massachusetts Department of Agriculture's Invasive Pests Dashboard notes that Emerald Ash Borer was detected in Brookfield in 2020, and Beech Leaf Disease was detected in 2024. Nearby towns also suffer from these invasives, as well as infestations of the Spotted Lanternfly and Mile-A-Minute Vine. Also, as of the time of writing of this plan, the entire state of Massachusetts is under a U.S. Department of Agriculture quarantine to restrict the spread of the Box Tree Moth.¹⁴⁵

A lack of reporting on invasives may mean that the extent of invasives in Brookfield is far greater than these databases report.

PREVIOUS OCCURRENCES

According to the Northeast Forest Health Atlas, in the past 20 years of reporting, Massachusetts has experienced tree damage (including defoliation and mortality events) to 43,127,411 acres of forests from a variety of invasive pests; alarmingly, the greatest proportion of this damage has occurred in the latter 3 years.¹⁴⁶

¹⁴⁴ "My EDDMapS," EDDMapS.org . Accessed June 29, 2026.

¹⁴⁵ "MDAR Invasive Pest Dashboard: Emerald Ash Borer (*Agrilus planipennis*)," Experience.arcgis.com, Massachusetts Department of Agricultural Resources, June 10, 2024, https://experience.arcgis.com/experience/a25afa4466a54313b21dd45abc34b62d/page/Page-2/?views=Emerald-Ash-Borer#data_s=id%3AdataSource_3-17f4202b73c-layer-3%3A87.

¹⁴⁶ "Northeastern Forest Health Atlas - Defoliation: Years of Damage," UVM.edu, Forest Ecosystem Monitoring Cooperative, accessed June 29, 2026, https://www.uvm.edu/femc/forest-health-atlas?premade=All_Defo.

Area Damaged by Number of Years of Damage

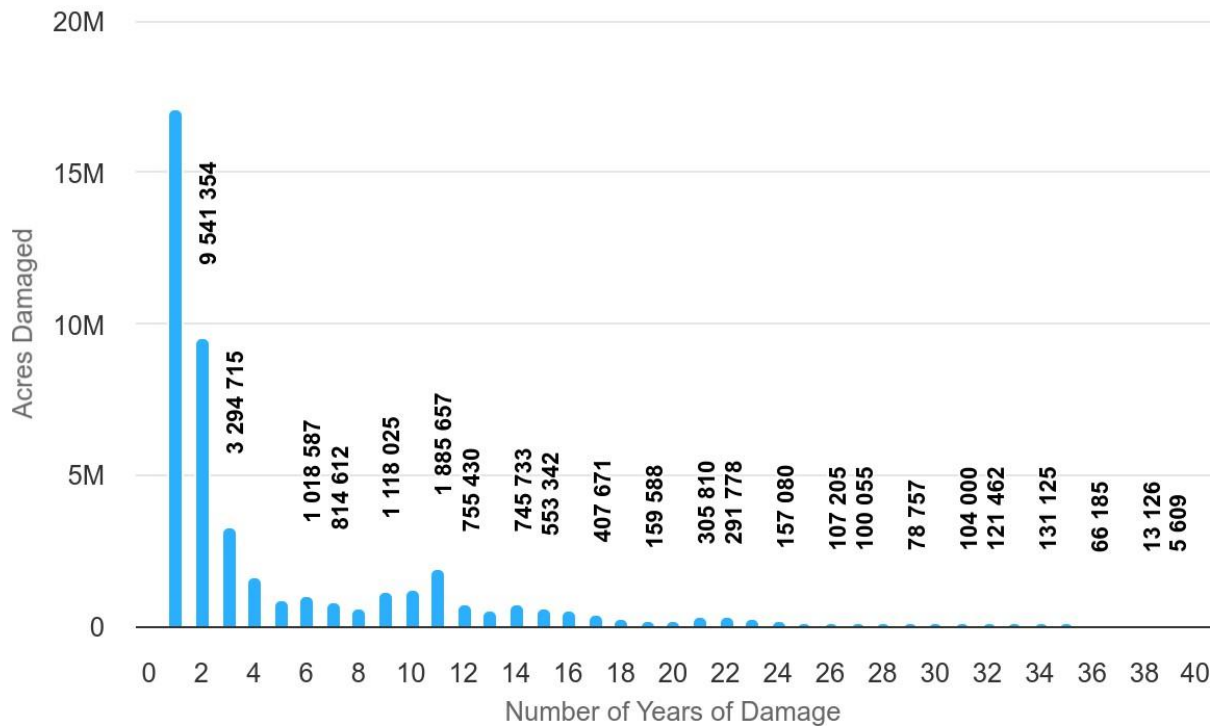


Figure 7: Area Damaged by Spongy Moth, Forest Tent Caterpillar, and Winter Moth from 1979 to 2019

In Worcester County, the vast majority of these invasive pest tree damage events occurred in the southern part of the county, and significant damage has occurred in the west and southwest of the county where Brookfield is located. In addition, localized defoliation events have occurred around the Town of Barre, the Tatnuck neighborhood of Worcester, and other communities. Tree mortality correlated with invasive species has been concentrated in the southern half of Worcester County.¹⁴⁷ In 2008, an outbreak of Asian long-horned beetles in Worcester destroyed nearly 30,000 trees.¹⁴⁸

Brookfield has experienced invasives-related defoliation events from 1998 through 2020, with significant mortality events occurring in 2018, 2019, and 2020. Based on trends identified in the Atlas, there is no reason to assume that invasive forest species hazards have lessened in more recent years.

PROBABILITY OF FUTURE EVENTS

The 2023 ResilientMass Plan notes that increased globalization of trade has created new paths for invasive species to spread.¹⁴⁹ Climate change is also an aggravating factor in the spread of invasives, as natural ecosystems become strained by increased temperatures and shifting precipitation patterns; Climate change therefore creates more opportunities for invasives to disrupt

¹⁴⁷ Ibid.

¹⁴⁸ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan"

¹⁴⁹ Ibid.

an already fragile ecology. Based on the previously identified occurrences and trends, the probability of an invasive species event occurring in Brookfield is very high, with a 70-100% probability of occurrence in the next year.

IMPACT

Specific impacts of invasive species in Brookfield may vary, depending on the type of invasive, the habitat that it is supplanting within the native ecosystem, and other factors. Invasive species' direct impact on the natural ecology has many notable secondary impacts. The 2023 ResilientMass plan identifies that invasive species can introduce new diseases to a region¹⁵⁰ (such as the 2005 Chikungunya Epidemic, spread in part by a viral mutation that allowed for the virus to be more commonly present in the *Aedes albopictus* mosquito, an invasive subspecies).¹⁵¹ Invasives are also one of the costliest natural hazards in terms of control efforts, costing the United States and estimated \$21 billion per year.¹⁵² As there is a lack of reliable information about the extent of invasive species within Brookfield, we can only estimate a "limited" impact on the Town from invasive species, with between 10% and 25% of property in the areas affected by this hazard being damaged or destroyed.

EXPOSURE

Certain features within Brookfield's infrastructure, society, and environment may face more exposure to invasive species, or be disproportionately impacted by them, relative to the rest of the community. Some of these features may be documented in the list of critical facilities and vulnerable populations in Section 3. These features include:

- People with compromised immune systems or preexisting health conditions, children under the age of five, and people over 65 years old who might be particularly vulnerable to new diseases or aggravated health problems caused by invasives;
- Roadways, as Japanese Knotweed, an invasive known to cause streambank destabilization, can contribute to flood damages and can affect sightlines along roadways, potentially causing roadway hazards;
- Local government, as invasive species may pose a management cost burden that exceeds local financial capacity, especially for departments tasked with their management and for departments tasked with the maintenance of facilities that are impacted by invasives;
- The local ecology, as invasive species can also change the local ecology to make it more fire prone, either by damaging the native plants or by being prone to fire themselves.

POTENTIAL CLIMATE CHANGE EFFECTS

According to the 2023 ResilientMass Plan, climate change is predicted to increase the spread of invasive species and expand their range.¹⁵³ Already fragile ecosystems, if left unmanaged, will suffer the worst effects of invasive species; native flora and fauna species could be supplanted by

¹⁵⁰ Ibid.

¹⁵¹ Konstantin A. Tsetsarkin et al., "A single mutation in chikungunya virus affects vector specificity and epidemic potential," PLOS Pathogens 3, no. 12 (December 7, 2007): e201, <https://doi.org/10.1371/journal.ppat.0030201>.

¹⁵² Kerry Sheridan, "Invasive species cost the US \$21 billion per year, study finds," WUSF.org, WUSF Public Media, January 4, 2022, <https://www.wusf.org/local-state/2022-01-04/invasive-species-cost-the-us-21-billion-per-year->

¹⁵³ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan"

invasive species that outperform or outright damage them. The vast majority of invasive species introductions are caused by human activity, either accidental or intentional.

Both changes in precipitation patterns and temperature may increase the chance of successful invasion of ecosystems by non-native species.

1. Precipitation

- Elevated atmospheric CO₂ concentrations could reduce the ability of ecosystems to recover from climate shocks; this can create an opportunity for invasive species, which can often rapidly establish themselves following a disturbance, to successfully propagate.

2. Temperature

- Climate-driven temperature changes exacerbate the impacts of invasive species by altering ecosystem conditions in ways that enhance their ability to reproduce, spread, and in some cases outcompete native species
- As warmer temperatures place stress on native cold-weather species in the region, invasive species accustomed to higher temperatures are able to more easily fill native species' niches and therefore expand their habitat ranges northward.

Secondary hazard impacts from invasive species include increased temperatures, damage to agricultural crops, and increased wildfire risk; as described in previous sections, all of these hazard impacts have associated potential societal implications through population shifts and changes in land use and development.

VULNERABILITY

Based on the above assessment, Brookfield has a hazard index rating of “3 – medium risk” from invasive species.

MITIGATION STRATEGIES

The Town of Brookfield is currently able to effectively respond to invasive species through the emergency response facilities and services identified in the critical infrastructure and facilities and existing protection sections of this plan. However, there are numerous opportunities for the Town to expand upon its existing capabilities to mitigate and respond to invasive species. The local HMP planning team identified the following strategies that could be used to reduce the threat of invasive species in Brookfield:

- Provide resources to residents about invasive species (how to identify them, how to manage them, etc.).

4.13 OTHER HAZARDS

In addition to the hazards identified in previous sections, the Brookfield Hazard Mitigation Planning Team reviewed the other hazards listed in the Massachusetts State Hazard Mitigation and Climate Adaptation Plan (SHMCAP). Hazards from the SHMCAP deemed irrelevant to Brookfield due to the Town's location are coastal hazards, atmospheric hazards, ice jams, coastal erosion, sea level rise, and tsunamis. Coastal hazards, coastal erosion, sea level rise, and tsunamis are recognized to affect coastal jurisdictions in Massachusetts and other New England states but have been deemed irrelevant to Brookfield due to the Town being around 55 miles from the nearest coastline.

Although landslides have been recognized as affecting communities in Central Massachusetts, the HMP team in Brookfield did not identify naturally occurring landslides as having the risk of affecting the Town; therefore, they were omitted from having a full section in this plan. A brief overview of this hazard is included below.

Notably, the SHMCAP hazard of changes in groundwater has been profiled as a sub-hazard of flooding and drought in this plan.

LANDSLIDES

Landslides occur in all U.S. states and territories. During a landslide, masses of rock, earth, or debris move down a slope. Landslides may be small or large, slow or rapid. They are generally activated by:

- Storms,
- Earthquakes,
- Volcanic eruptions,
- Fires,
- Alternate freezing and thawing, and/or
- Steepening of slopes caused by natural erosion or human modification.

Debris and mud flows (landslides) are rivers of rock, earth, and other debris saturated with water. They develop when water rapidly accumulates in the ground during heavy rainfall or rapid snowmelt, changing the earth into a flowing river of mud or "slurry." They can flow rapidly, striking with little or no warning at avalanche speeds. They also can travel several miles from their source, growing in size as they pick up trees, boulders, cars, and other materials. Vulnerabilities in the Central Massachusetts region to landslides could include damage to structures, damage to transportation and other infrastructure, and localized road closures. Injuries and casualties, while possible, would be unlikely given the low extent and impact of landslides in the region.

Landslides are therefore considered low frequency events that may occur once in 50 to 100 years (with a 1% to 2% chance of occurring per year) in Central Massachusetts.

There are no documented previous occurrences of significant landslides in Brookfield. The Town is relatively flat and most of its rivers are slow moving, are frequently dammed, which can minimize landslide risk. Roadways in town are not generally built close to river channels; this reduces undercutting risk of stormwater-induced bank erosion. High slope terrain (defined as 15 to 25% grade) cover 1015.22 acres, or only 9.57% of the town; very high slopes (higher than 25% grade) cover 134.5 acres, or less than 1.27% of the town's area. Little development is present in these areas. Should a landslide occur in town in the future, the type and degree of impacts would be highly localized. Vulnerabilities in town to landslides could include damage to structures, damage

to transportation and other infrastructure, and localized road closures, though CMRPC's data review noted no specific concerns. Injuries and casualties, while possible, would be unlikely given the low extent and impact of landslides in Brookfield.

DRAFT

5.0 EXISTING PROTECTION

Sections 5.0 and 5.1 help meet the following FEMA local mitigation plan requirements:

- A4. “Does the plan describe the review and incorporation of existing plans, studies, reports, and technical information?” (Requirement 44 CFR § 201.6(b)(3));
- B2. “Does the plan include a summary of the jurisdiction’s vulnerability and the impacts on the community from the identified hazards? Does this summary also address NFIP-insured structures that have been repetitively damaged by floods?” (Requirement 44 CFR § 201.6(c)(2)(ii));
- C1. “Does the plan document each participant’s existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs?” (Requirement 44 CFR § 201.6(c)(3)); and
- C2. “Does the plan address each jurisdiction’s participation in the NFIP and continued compliance with NFIP requirements, as appropriate?” (Requirement 44 CFR § 201.6(c)(3)(ii))

The Town of Brookfield currently makes use of most available locally controlled tools, including zoning regulations, planning, and physical improvements, to help mitigate the consequences of natural hazards. The Town does not participate in any federal programs such as StormReady certification or Firewise community certification, but it does utilize Blackboard Connect for emergency notifications. The Town plans to research the utility of public awareness and education programs as a result of this planning process.

Brookfield has most no-cost or low-cost hazard mitigation capabilities in place. These include land use, zoning, and subdivision regulations as well as an array of specific policies and regulations that include hazard mitigation best practices, such as limitations on development in floodplains, tree maintenance, and other practices. Brookfield also has appropriate staff dedicated to hazard mitigation-related work for a community of its size, including an Interim Town Administrator, an Emergency Management Director/Fire Chief, a professionally run Highway Department, and a Building Commissioner. Brookfield has several plans relevant to hazard mitigation in place, including a Master Plan (2024), a Municipal Vulnerability Preparedness (MVP) Summary of Findings (2019), an Open Space and Recreation Plan (2018). Not only does Brookfield have these capabilities in place, but they are also deployed for hazard mitigation, as appropriate. The Town also has very committed and dedicated volunteers who serve on Boards, Commissions, and Committees as well as in other volunteer positions. The Town has opted into a fire protection mutual aid agreement through MEMA. Brookfield is also an active member community of the Central Massachusetts Regional Planning Commission (CMRPC) and can take advantage of no cost local planning assistance provided by the professional planning staff at CMRPC as is needed.

The table below describes existing hazard mitigation protections in Brookfield. It includes a brief description of each activity, a subjective evaluation of each activity’s effectiveness, and a description of any recommendations for improvement for each activity.

5.1 EXISTING PROTECTION MATRIX

Table 36: Existing Protection Matrix

Existing Measure	Description	Action	Effectiveness & Recommendations
Participation in National Flood Insurance Program (NFIP)	The NFIP provides flood insurance for structures located in flood-prone areas. Also, communities participating in the NFIP have adopted and enforce ordinances, bylaws, and regulations that meet or exceed FEMA requirements to reduce the risk of flooding.	Brookfield monitors building activity within the flood plain to ensure compliance with provisions of state building code. Brookfield has participated in the National Flood Insurance Program since July 2nd, 1980. As of July 2nd, 2024, there are approximately 7 homeowners in town with flood insurance policies.¹⁵⁴ The Town's Planning Board is the appointed designee who implements the addressed commitments and requirements of the NFIP in town, and the Town monitors building activity within the flood plain to ensure compliance with provisions of state building code. The Town has adopted the Flood Insurance Rate Map (FIRM) dated from July 2nd, 1981.¹⁵⁵	Effective There are 5 repetitive loss properties in Brookfield. Brookfield should seek to further enforce local floodplain management regulations to regulate and permit development. It should work to join the Community Rating System (CRS) under NFIP to enable its residents to obtain lower flood insurance rates. Brookfield should educate its residents about NFIP.

¹⁵⁴“Community Overview: Brookfield, Town of,” NFIP Community Information System, accessed July 2, 2024.

¹⁵⁵ Brookfield Hazard Mitigation Plan

¹⁵⁵ BROOKFIELD, TOWN OF, “msc.fema.gov, Federal Emergency Management Agency, accessed July 22, 2026 <https://map1.msc.fema.gov/firm?id=2502980005B>

Reverse 9-1-1 System	Emergency warning system that sends voicemail/text/email alerts to residents (text/email alerts are optional) participating in the NFIP have adopted and enforce ordinances, bylaws, and regulations that meet or exceed FEMA requirements to reduce the risk of flooding.	Town officials are able to alert residents when information is received that a natural or man-made disaster is impending.	Effective Brookfield should consider NWS StormReady certification and adoption of StormReady emergency notification practices to supplement Reverse 9-1-1 Improve notification of emergency by fully utilizing town webpage and social media.
Brookfield Comprehensive Emergency Management Plan	The Brookfield Comprehensive Emergency Management Plan (CEMP) establishes the framework for how the town prepares for, responds to, recovers from, and mitigates the effects of emergencies and disasters		Effective The Brookfield CEMP was most recently updated in 2022.

Existing Measure	Description	Action	Effectiveness & Recommendations
Floodplain Zoning District	Requires all development to be in compliance with state building code requirements for construction in floodplains	Brookfield has a Flood Plain District (Section C) in its Zoning Bylaw. This Chapter was last updated in May of 2011.	Very effective No changes recommended
Stormwater Management Policy and Regulations	The Town's Planning Board and Conservation Commission review projects for consistency with MA DEP standards. This helps ensure adequate on-site retention and recharge and reduces the burden on the NPDES MS4 permitted stormwater system.	Brookfield does not have a Stormwater Management and Erosion Control Bylaw in place.	Not effective Brookfield should work to implement Stormwater Regulations

Existing Measure	Description	Action	Effectiveness & Recommendations
Local Open Space and Recreation Plan	Local plan identifying significant natural resources and identifying mechanisms to ensure their protection. Following Mass. Department of Conservation and Recreation guidance for development of OSRPs, this document does not focus on specific hazards. Open Space Plans can provide many tools. Towns must commit to making the land acquisitions and regulatory changes, giving increased attention to preserving undeveloped flood-prone areas and associated lands.	Brookfield's Open Space and Recreation Plan was adopted in 2019.	Somewhat effective Brookfield should prepare an OSRP update as per Mass DCR guidance by the time the currently active plan expires. Where allowable, Brookfield should integrate hazard mitigation activities and recommendations into this OSRP update

Existing Measure	Description	Action	Effectiveness & Recommendations
Local Wetlands Protection Bylaw and Regulations	This bylaw and these regulations build upon the State's Wetlands Protection Act and related regulations. They add regulatory oversight provisions for development within the jurisdictional wetland buffer zone which increase attention to alteration of wetlands and the opportunity to preserve wetland capacity and quality.	Brookfield has a local town-wide wetland bylaw in place.	Very effective
Drainage System Cleaning and Preventive Maintenance	The Town plans to keep municipal drainage facilities (storm drains, culverts, etc.) in good order.	Brookfield performs street sweeping and catch basin cleaning from April to November.	Effective Brookfield should continue its public education program for residents on storm drain clearance and other best practices.

Existing Measure	Description	Action	Effectiveness & Recommendations
Tree Trimming	The Town completes maintenance of trees to reduce the likelihood of vegetative debris problems during and after storm events.	Brookfield conducts roadside mowing from April-November to remove juvenile trees. Tree trimming (take-downs and clearing dead branches) takes place as needed.	Very Effective Brookfield should enhance tree trimming throughout town to protect utility wires and should enhance coordination with its electrical utility to foster a more systematic tree trimming program. DPU should push utilities to manage trees pre-disaster; utilities have been fined for their tree management practices, pole replacement, etc.; regional strategy to promote DPU due diligence; share list of trees with utility, publicly acknowledge and ask for their feedback
Drainage Maintenance, Replacements and Upgrades	The Town maintains existing culverts and drains through regular maintenance and (in some cases) beaver controls; it also replaces / expands culverts where needed to allow for adequate stormwater flow.	The Town generally maintains and replaces problem culverts and other infrastructure when needed and as funding allows. Historically, the Town also installed flood protection berms, walls, and riprap in vulnerable parts of the village centers in town.	Somewhat effective Current efforts in town are piecemeal and are limited by a lack of resources and a lack of a systematic approach. Brookfield should develop a prioritized inventory of problem culverts / drains for use in seeking external financial support. The Town's planning must comply with the 2014 Massachusetts Wetlands Protection Act update and any future updates to this Act; culverts may not simply be replaced in-kind.

Existing Measure	Description	Action	Effectiveness & Recommendations
Master Plan	The Master Plan serves as a policy guide as well as the Town's future vision of itself. It compiles a comprehensive analysis of all aspects of community development and is designed to be a resource for the Town over the next 10 to 20-year time period.	Brookfield Master Plan was adopted in September 2024.	Somewhat Effective The Town should consider creating a Master Plan Implementation Committee and integrate the plan in other planning efforts.
Municipal Vulnerability Preparedness (MVP) Plan	This plan is a guide for climate resiliency implementation projects in town. It includes a vulnerability assessment and an action-oriented resiliency plan. This plan makes the Town eligible for MVP Action Grant funding.	The Brookfield MVP Plan was completed in June 2019. In FY25, Brookfield received an MVP Action Grant for the Rice Corner Cross Road Culvert replacement, in which an undersized culvert in town was upgraded to USDA NRCS standards.	Effective
State Building Code	Compliance with the state building code means that buildings in town meet the minimum established requirements for structural strength, sanitation, and efficiency and are safe for regular use as well as during hazard events and other emergency situations.	The Town's Planning Board, Zoning Board of Appeals, and Building Inspector work to implement compliance with the state building code. The new update to the state building code (the 10th Edition of the Base Building Code (Massachusetts Amendments)) became effective on October 11th, 2024 and was concurrent with the previous edition through June 30 th , 2025.	Very Effective

Existing Measure	Description	Action	Effectiveness & Recommendations
Zoning Bylaw	This part of the Town Charter establishes zoning districts and overlay districts in town as well as defines use regulations, density and dimensional requirements, nonconforming uses and structures, development regulations, and special regulations in Town.	The Town's current zoning bylaw was last updated in June 2023.	Somewhat Effective

6.0 STATUS OF MITIGATION MEASURES FROM 2018 PLAN

Section 6.0 helps meet the following FEMA local mitigation plan requirements:

- E2. “Was the plan revised to reflect changes in priorities and progress in local mitigation efforts?” (Requirement 44 CFR § 201.6(d)(3))

During this hazard mitigation plan update process, the local HMP team in Brookfield provided updates on the status of mitigation measures from the Town’s 2018 Hazard Mitigation Plan. Certain measures were incomplete as of 2026 and were deemed as still being relevant; These relevant measures were re-incorporated in the 2026 Hazard Mitigation Plan action strategy if they are anticipated to be effective. The changes in the Town’s priorities from the 2018 plan to this plan are noted in the bolded passages from the “2026 Notes” column in the table below. These changes in community priorities have resulted from reassessments of specific hazards-related challenges described in the 2018 plan.

Table 37: Status of Mitigation Measures from 2018 Plan

Structure & Infrastructure Strategies			
2018 Task	2026 Status	2026 Notes	Include in 2026 Plan?
Replace a 36" culvert, 20' in length, on Rice Corner Cross Road that is about to collapse, in order to decrease the flood risk in this area.	In progress	Brookfield was awarded an FY25 MVP Action Grant for the replacement of this culvert. The full replacement is an ongoing effort.	YES
Implement a vegetative debris management program to reduce debris and thereby mitigate risk of stormwater flooding, riverine flooding, winter storm damage, etc.	No movement on this action yet		YES

2018 Task	2026 Status	2026 Notes	Include in 2026 Plan?
Increase the amount of vegetative debris that is clear from fire roads to include a 10 foot area on each side in order to mitigate the risk of wildland fires	No movement on this action yet		YES
Sweep streets at least annually to increase stormwater management capacity; capture & dispose of appropriately	No movement on this action yet		YES
Annually clean all stormwater structure and basins	No movement on this action yet		YES
Locate and identify using GPS all catch basins, drainage infrastructure (DI), culverts, bridges, etc.	No movement on this action yet		YES
Continue annual tree trimming program across the Town to protect utility wires.	In Progress		YES

Preparedness, Coordination & Response Action Strategies			
2018 Task	2026 Status	2026 Notes	Include in 2026 Plan?
Inventory shelter/emergency resources	No movement on this action yet	The Town does not currently have an emergency shelter, though Tantasqua Regional School acts as a Regional Shelter.	YES
Implement Unified Command	In Progress		YES
Continue to maintain radio interoperability between neighboring agencies	In Progress		YES
Promote the use of local WACF-LP Radio Station	No movement on this action yet		YES
Investigate Community Rating System (CRS) benefits and requirements and decide whether to participate	No movement on this action yet		YES

2017 Task	2026 Status	2026 Notes	Include in 2026 Plan?
Participate in National Flood Insurance Program (NFIP) (or other) training offered by the State and/or FEMA that addresses flood hazard planning and management	In Progress		YES

Education & Awareness Strategies			
2018 Task	2026 Status	2026 Notes	Include in 2026 Plan?
Promote use of federal & state resources related to hazard mitigation such as training, educational materials & National Weather service forecasts	Ongoing	The HMP Planning Team is interested in increased, targeted outreach related to preparedness training.	YES
Develop means of sharing information on a regional basis about successful disaster mitigation planning & programs.	No movement on this action yet	The HMP Planning Team is interested in sharing Emergency Planning materials in the Town Annual Report and community Facebook pages.	YES
Continue to support mutual aid agreements between safety agencies.	No movement on this action yet	These safety agencies would include the Brookfields and Sturbridge.	YES
Continue to support the Regional Highway Equipment Sharing Co-op	No movement on this action yet		YES
Provide information to residents and businesses on water conservation through reduction in use, low-impact landscaping and other low-cost measures (in part to conserve water for firefighting	No movement on this action yet	The HMP Planning Team is interested in sharing information on social media when there is a water ban	YES

Local Plan & Regulation Strategies			
2018 Task	2026 Status	2026 Notes	Include in 2026 Plan?
Incorporate flood protection measures when critical structures located in floodplains are re-built or renovated	No movement on this action yet		YES
Continue to enforce and comply with Massachusetts Wetlands Protection Act	Ongoing		YES
Pursue funding that builds local capacity and supports grant writing for mitigation actions identified in the regional and local HMP plans.	Ongoing		YES
Develop & enhance working relationships with utility companies; ensure satellite spaces within each community for temporary emergency headquarters	Ongoing		YES
Improve Hazard warning systems & notifications to vulnerable populations	Ongoing	Brookfield uses Blackboard Connect to reach citizens during emergency events	YES

2018 Task	2026 Status	2026 Notes	Include in 2026 Plan?
Continue to enforce seismic standards in the State's Building Code	Ongoing		YES
Continue to identify hazard prone buildings as new threats are identified	Ongoing		YES
Integrate hazard mitigation concerns into subdivision, site plan review, 40B reviews, and other zoning reviews. In particular, require the consideration of downstream flooding impacts caused by new projects—even if the impacts cross town lines—and urban/wildland interface concerns in high-risk areas. Work on model bylaw language for urban/wildland interface and model parking standards to reduce the amount of impervious coverage.	No movement on this action yet		YES
Seek funding to review and update the local hazard mitigation plans on a five-year cycle.	Complete & Ongoing	Funding was received through this plan update through FEMA's FY21 Hazard Mitigation Planning Grant, and will continue to seek funding for updates according to the 5-year cycle.	YES

7.0 MITIGATION STRATEGY

The Brookfield Hazard Mitigation Planning team developed a list of mitigation strategies (both new and previously identified by local officials) and prioritized them using the criteria described below. This list of factors is broadly derived from FEMA's STAPLE+E feasibility criteria.

7.1 PRIORITY AND IMPACT

Section 7.1 helps meet the following FEMA local mitigation plan requirements:

- C5. "Does the plan contain an action plan that describes how the actions identified will be prioritized (including a cost-benefit review), implemented, and administered by each jurisdiction?" (Requirement 44 CFR § 201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))

Real world considerations were brought into the analysis to inform the priority ranking process for the different mitigation strategies. Factors considered in this step include costs and cost effectiveness (including eligibility and suitability for outside funding), timing, political and public support, and local administrative burden. Each strategy was ranked as being high, medium, or low priority.

- High priority strategies have obvious mitigation impacts that clearly justify their costs and to a large degree can be funded, can be completed in a timely fashion, can be administered effectively, and are locally supported.
- Medium priority strategies have some clear mitigation impacts that generally justify their costs and generally can be funded, can be completed in a timely fashion, can be administered effectively, and are locally supported.
- Low priority strategies have relatively low mitigation impacts that do not necessarily justify their costs and may have difficulty being funded, being completed in a timely fashion, being administered effectively, and garnering local support.

Costs and 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 clear and viable potential funding streams, such as FEMA's Hazard Mitigation Grant Program (HMGP), are also given higher priority.

Time required for completion – Projects that are faster to implement, either due to short work duration, current or near-term availability of funds, and/or ease of permitting or other regulatory procedures, are given higher priority.

Political and public support – Strategies are given higher priority if they have political and/or public support which is shown through public feedback, prioritization in previous regional and local plans, initiatives that were locally initiated or adopted, and/or prioritization in the Municipal Vulnerability Preparedness Program Community Resilience Building workshop process.

Administrative burden – Strategies that are realistically within the administrative capacity of the Town and its available support network (CMRPC, local non-profit organizations, regional collaborative associations etc.) are prioritized. Grant application requirements, grant administrative requirements (including audit requirements), procurement, and staff time to oversee projects are all considered when figuring out the administrative burden of a strategy.

Impact – The HMP Core Team's consideration of each strategy included an analysis of the mitigation impact each can provide, regardless of cost, political support, funding availability, and other constraints. The intent of this step is to separately evaluate the theoretical potential benefit of each

strategy to answer the question: if cost were no object, what strategies have the most benefit? Factors considered in this analysis include the number of hazards each strategy helps mitigate (more hazards equals higher impact), the estimated benefit of the strategy in reducing loss of life and property (more benefit equals higher impact), and the geographic extent of each strategy's benefits (other factors being equal, a larger area equals higher impact).

- High impact actions help mitigate several hazards, substantially reduce loss of life and property (including loss of critical facilities and infrastructure), and/or aid a relatively large portion of the community.
- Medium impact actions help mitigate multiple hazards, somewhat reduce loss of life and property (including loss of critical facilities and infrastructure), and/or aid a sizeable portion of the community.
- Low impact actions help mitigate a single hazard, lead to little or no reduction in loss of life and property (including loss of critical facilities and infrastructure), and/or aid a highly localized area.

7.2 ESTIMATED COST

Each implementation strategy is provided with a rough cost estimate based on available third party or internal estimates and past experience with similar projects. Each cost estimate includes hard costs (construction and materials), soft costs (engineering design, permitting, etc.), and, where appropriate, Town staff time (valued at appx. \$25/hour for grant applications, administration, etc.). Strategies that already have secured funding are noted. Detailed and current cost estimates for strategies were generally not available, so costs are summarized within the following ranges:

- Low – less than \$50,000
- Moderate – between \$50,000 - \$250,000
- Medium – between \$250,000 – \$1,000,000
- High – over \$1,000,000

7.3 ESTIMATED TIMELINE

Section 7.3 helps meet the following FEMA local mitigation plan requirements:

- C5. “Does the plan contain an action plan that describes how the actions identified will be prioritized (including a cost-benefit review), implemented, and administered by each jurisdiction?” (Requirement 44 CFR § 201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))

Each strategy is provided with an estimated length of time it will take for implementation. For strategies for which funding has been secured, a specific future timeline is provided for when completion is expected. However, most strategies do not currently have funding, and thus it is difficult to know exactly when they will be completed. For these projects, an estimate is provided for the amount of time it will take to complete the project once funding becomes available. Each strategy has a timeframe of either a specified period of less than 5 years, a 5+ year timeframe, or an ongoing timeframe.

7.4 STRATEGY TYPES

Mitigation strategies included in this plan are subdivided into the following four broad categories which can help facilitate local implementation discussions, especially regarding budget considerations and staff roles/responsibilities:

Structure and Infrastructure Projects relate to constructing “brick & mortar” infrastructure and building improvements in order to eliminate or reduce hazard threats or in order to mitigate the impacts of hazards. Examples of this type of project include drainage system improvement, dam repair, and generator installation. Structure and infrastructure improvements tend to have the greatest level of support at the local level but are highly constrained by funding limits.

Preparedness, Coordination and Response Actions ensure that a framework exists to facilitate and coordinate the administration, enforcement and collaboration activities described in this plan. They integrate disaster prevention/mitigation and preparedness into every relevant aspect of town operations, including the operations of the Police Department, Fire Department, EMD, EMS, DPW, Planning Board, Conservation Commission and Select Board; they also help the Town coordinate with neighboring communities where appropriate. Recommendations in this category often help standardize generally practiced activities.

Education and Awareness Programs help raise awareness of overall or hazard-specific risk and generate support for individual or community-wide efforts to reduce risk. Education and awareness seek to affect broad patterns of behavior. Awareness-building activity tends to have a fairly slow effect, although in the end it can provide extraordinary benefits with relatively little cash outlay.

Local Plans and Regulations propose updates to or formally update or establish local bylaws, ordinances and other regulations to protect vulnerable resources and prevent future natural hazard impacts on these resources. Local plans can also review the effectiveness of past mitigation projects, programs, procedures, and policies so that strategies for making them more effective in the future can be formed. An example of a project which fits under this category is incorporating mitigation planning into master plans, open space plans, capital improvement plans, facility plans, and other town plans.

Planning and regulatory activity tends to provide extraordinary benefits to towns with relatively little cash outlay. However, in smaller communities where planning activities are largely the purview of volunteers, outside assistance from the state or regional levels may be required to maximize the benefits of planning. Political support may be difficult to achieve for some planning and regulatory measures, especially those that place new constraints on land use.

In addition to describing action items in each of these categories, the row for each strategy also identifies what hazard(s) the strategy is intended to address. Each row also identifies the lead organizations who serve as the primary points of contact for coordinating efforts associated with the corresponding strategy and identify potential funding sources for implementing the strategy.

7.5 STRATEGY GOALS

Section 7.5 helps meet the following FEMA local mitigation plan requirements:

- C3. “Does the plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards?” (Requirement 44 CFR § 201.6(c)(3)(i))

For each of the strategy types included above, there is an associated mitigation goal. The goals are as follows:

Structure and Infrastructure Projects – Harden and adapt the Town’s current infrastructure to withstand hazards in the near-term and the long-term, incorporating nature-based strategies whenever feasible and desirable to build a more resilient municipality.

Preparedness, Coordination and Response Actions – Improve the Town’s emergency and municipal service capabilities to effectively respond to and recover from natural disasters, as well as to build and establish relationships with stakeholders to ensure the continuation of essential

services in the event of a disaster.

Education and Awareness Programs – Educate and inform the public about the threats of natural hazards and climate change; provide the resources for individual and community preparedness and foster a whole community response to natural hazards and climate change.

Local Plans and Regulations – Adopt and approve plans and legislation that prioritize climate resiliency and hazard mitigation; incorporate principles of resiliency within local and regional planning and legislative actions.

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7.6 TOWN OF BROOKFIELD 2026 HAZARD MITIGATION STRATEGIES

Section 7.6 helps meet the following FEMA local mitigation plan requirements:

- C3. “Does the plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards?” (Requirement 44 CFR § 201.6(c)(3)(i));
- C4. “Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure?” (Requirement 44 CFR § 201.6(c)(3)(ii));
- C5. “Does the plan contain an action plan that describes how the actions identified will be prioritized (including a cost-benefit review), implemented, and administered by each jurisdiction?” (Requirement 44 CFR § 201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii)); and
- D2. “Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a five-year cycle)?” (Requirement 44 CFR § 201.6(c)(4)(i))

The Town has decided to prioritize the following mitigation strategies. The columns of the table below reflect the criteria described above. In the “Who (Agencies Involved)” column, the lead agency for each strategy is **bolded**.

OVERALL GOAL: The overall goal of these mitigation strategies is to facilitate activity within the Town of Brookfield that reduces the loss of people’s lives, property in town, and environmental resources in town as well of the risk of these losses in the case of natural hazard occurrences. Please view section 8.4, Potential Federal and State Funding sources, for more information on the funding sources listed below.

Table 38: Town of Brookfield 2026 Hazard Mitigation Strategies

Structure & Infrastructure Strategies							
Actions	Hazards Addressed	Agencies Involved	Potential Funding Sources	Priority	Impact	Estimated Cost	Expected Timeline
Replace a 36" culvert, 20' in length, on Rice Corner Cross Road that is about to collapse, in order to decrease the flood risk in this area.	FL, SS, ST, HU	Highway	Local (capital trust, current operating budget, town meeting), State (MVP Action Grant Federal (FEMA HMGP, BRIC, FMA Grants)	High	High	High	3-5 years

Actions	Hazards Addressed	Agencies Involved	Potential Funding Sources	Priority	Impact	Estimated Cost	Expected Timeline
Implement a vegetative debris management program to reduce debris and thereby mitigate risk of stormwater flooding, riverine flooding, winter storm damage, etc.	FL, SS, ST, HU, WF	Highway	Local (Highway Department operating budget)	Medium	Medium	Low	1-2 Years
Increase the amount of vegetative debris that is clear from fire roads to include a 10 foot area on each side in order to mitigate the risk of wildland fires	WF	Highway, Fire, Mass DCR	Local (Highway Department and Fire Department operating budgets), State (Mass DCR Grants)	High	High	Low	1 Year
Sweep streets at least annually to increase stormwater management capacity; capture & dispose of appropriately.	FL, SS, HU, ST	Highway	Local (Highway Department operating budget)	High	High	Low	0-1 Years, then Ongoing
Annually clean all stormwater structures and basins.	FL, SS, HU, ST	Highway	Local (Town Administration and Highway Department operating budgets)	High	High	Low	0-2 Years, then Ongoing

Actions	Hazards Addressed	Agencies Involved	Potential Funding Sources	Priority	Impact	Estimated Cost	Expected Timeline
Locate and identify using GPS all catch basins, drainage infrastructure (DI), culverts, bridges, etc.	FL, SS, HU, ST, OT	Highway	Local (Highway Dept, Town Administration, and Planning Board operating budgets), State (MVP Action Grant, Mass Works Infrastructure Grant), Federal FEMA BRIC Grant)	High	High	Low	1-2 Years, then Ongoing
Enhance needed tree trimming throughout town to protect utility wires; enhance coordination with utility to implement a systematic approach to tree trimming.	SS, ST, HU	Highway	Local (Highway and Town Administration operating budgets, Conservation Commission), Federal (FEMA BRIC Grant)	High	High	Low	0-1 Years, then Ongoing
Identify Owners of nearby Man-O-Name #20 Dam (MA01932) and bring them into compliance with Office of Dam Safety. Develop an emergency Action plan for this dam and identify what should be done to reduce the risk of this dam, as well as whether to repair, retrofit, or remove the dam and restore the local ecology.	DF	Town of Brookfield, Town of North Brookfield	State (MVP Program Funding, EEA Dam and Seawall Grants), Federal (FEMA HMA)	High	Medium	High	5+ Years

Preparedness, Coordination & Response Action Strategies							
Actions	Hazards Addressed	Agencies Involved	Potential Funding Sources	Priority	Impact	Estimated Cost	Expected Timeline
Investigate shelter/emergency resources to develop a town emergency shelter. Identify an appropriate site for a town shelter.	All	EMD	Local (Fire Department operating budget) State (DLTA), Federal (USDA Rural Development Community Facilities Grants)	High	High	Moderate	2-3 Years, then Ongoing
Investigate the benefits and requirements of the Community Rating System (CRS) and decide whether to participate in this program or not.	All	EMD	Local (capital trust, current operating budget, town meeting), State (LPA, private contracts)	Medium	Medium	Low	1-2 years
Continue to implement Unified Command	All	EMD	Local (Police and Fire Operating Budgets) Federal (Homeland Security Grant Program)	High	High	Moderate	0-1 Years, then Ongoing

Actions	Hazards Addressed	Agencies Involved	Potential Funding Sources	Priority	Impact	Estimated Cost	Expected Timeline
Incorporate town EMS and other first responders into radio interoperability between the Highway, Police, and Fire departments for seamless radio communication	All	EMD , Fire, Police, Highway, BOH	Local (Police and Fire operating budgets) Federal (Homeland Security Grant Program)	High	High	Low	1-2 Years, then Ongoing
Promote the use of local WACF-LP Radio Station for sending out emergency communications	All	SB , Apple Country Radio	Local (Town Administration operating budget, Police and Fire operating budgets)	Medium	Moderate	Low	0-1 Years, then Ongoing
Participate in National Flood Insurance Program (NFIP) (or other) training offered by the State and/or FEMA that addresses flood hazard planning and management	FL, SS, ST, HU	Highway	Local (Highway and Planning Board operating budget)	High	High	Low	0-1 Years, Ongoing

Education & Awareness Strategies							
Actions	Hazards Addressed	Agencies Involved	Potential Funding Sources	Priority	Impact	Estimated Cost	Expected Timeline
Promote use of federal & state resources related to disaster mitigation such as training, educational materials & National Weather Service forecasts	All	SB, EMD, Police, Fire, Highway	Local (Fire Department, Police Department, Highway, Town operating budgets), State (DLTA, LA, MEMA operating budget) Federal (FEMA operating budget)	Medium	Moderate	Moderate	2-3 Years, then Ongoing
Develop means of sharing information on a regional basis about successful disaster mitigation planning & programs, such as mutual aid agreements	All	EMD, State (MEMA)	Local (Fire Department operating budget), State (Community Compact IT Grant Program, Efficiency & Regionalization (E&R) Grant), State/Federal (FEMA HMEP Grant through MEMA)	Low	Low	Low	0-1 Years
Continue to support mutual aid agreements between safety agencies	All	SB, EMD, Police, Fire, Highway, EMS	Local (Fire Department, Police Department, Highway, Town operating budgets), State (Efficiency & Regionalization (E&R) Grant)	High	High	Low	0-1 Years, then Ongoing
Continue to support the Regional Highway Equipment Sharing Co-Op	All	Highway, SB	Local (Highway Department and Town operating budgets)	High	Medium	Low	0-1 Years, then Ongoing

Actions	Hazards Addressed	Agencies Involved	Potential Funding Sources	Priority	Impact	Estimated Cost	Expected Timeline
Achieve Firewise Community Designation.	WF	Fire	Local (Town and Fire Department Operating budgets)	High	Medium	Low	0-1 Years
Provide information to residents and businesses on water conservation through reduction in use, low-impact landscaping and other low-cost measures (in part to conserve water for firefighting)	DR, WF	Fire, Water, DEP	Local (Police and Fire Department operating budgets) State (DLTA, LPA, MEMA operating budget), Federal (FEMA operating budget)	High	High	Low	2-3 Years, then Ongoing

Local Plan & Regulation Strategies							
Actions	Hazards Addressed	Agencies Involved	Potential Funding Sources	Priority	Impact	Estimated Cost	Expected Timeline
Incorporate flood protection measures when critical structures located in floodplains are rebuilt or renovated	FL	Building Inspector, PB	Local (Town and Building Department operating budget, Planning Board operating budget), State (DLTA, LPA)	High	High	Low	Years 0-1
Incorporate hazard mitigation actions into appropriate local and regional plans - Master Plans, Open Space and Recreation Plans, land use planning, transportation planning, and capital programming	All	All	Local (Town Administration operating budget)	High	High	Low	Ongoing
Seek funding to review the Hazard Mitigation Plan (HMP) on an annual basis and to update it every five years	All	SB	Federal (HMGP, BRIC, FMA)	Medium	Medium	Low	1-2 Years
Continue to enforce and comply with MA Wetlands Protection Act (WPA)	FL	CC., Building Inspector	Local (Town Administration operating budget, Conservation Commission)	High	High	Low	Ongoing

Actions	Hazards Addressed	Agencies Involved	Potential Funding Sources	Priority	Impact	Estimated Cost	Expected Timeline
Pursue funding that builds local capacity and supports grant writing for mitigation actions identified in the local and regional HMPs	All	SB, EMD, PB, Highway	Local (Town Administration, Police Department, and Fire Department operating budgets), State (LPA, DLT, MVP Action Grants, MEMA operating budget), Federal (FEMA BRIC)	Low	Low	Low	Years 2-3
Develop and enhance working relationships with utility companies; ensure satellite spaces within each community for temporary emergency headquarters	All	EMD, SB, Police, Fire	Local (Town Administration, Police Department, and Fire Department operating budgets)	High	High	Low	Ongoing
Improve hazard warning systems and notifications to vulnerable populations	All	EMD, Police, Fire	Local (Fire Department, Police Department, Health Department operating budgets), Federal (FEMA EMPG grant through MEMA)	Medium	Medium	Medium	Ongoing

Actions	Hazards Addressed	Agencies Involved	Potential Funding Sources	Priority	Impact	Estimated Cost	Expected Timeline
Enforce seismic standards in the State's Building Code, and identify earthquake vulnerable structures in town and develop site specific strategies to address risks to those structures from earthquakes	EQ	PB	Local (Building Department operating budget) Federal (National Earthquake Hazards Reduction Program, FEMA EMPG Grant through MEMA)	High	High	Low	Ongoing
Develop a Climate Action Plan	All	PB, CC	Local (Town Administration operating budget, Conservation Commission), State (LPA, DLTA)	Medium	Medium	Low	1-2 Years
Continue to identify hazard prone buildings as new threats are identified	All	Building Inspector, BOH	Local (Town Administration, Building Department and Board of Health operating budget)	Medium	Medium	Medium	Ongoing
Integrate hazard mitigation concerns into subdivision, site plan review, 40B reviews, and other zoning reviews. In particular, require the consideration of downstream flooding impacts caused by new projects—even if the impacts cross town lines—and urban/wildland interface concerns in high-risk areas. Work on model bylaw language for urban/wildland interface and model parking standards to reduce the amount of impervious coverage	All	All	Private (Municipal Affordable Housing Trust), Local (Planning Board operating budgets), State (DLTA, Citizen Planning Training Collaborative (CPTC))	High	High	Low	Ongoing

Actions	Hazards Addressed	Agencies Involved	Potential Funding Sources	Priority	Impact	Estimated Cost	Expected Timeline
Participate in the development and implementation of the Regional Community Wildfire Protection Plan with East Brookfield, West Brookfield and North Brookfield	WF	Fire, Neighboring Municipalities	Local (Town Administration and Fire Department operating budgets, Conservation Commission, MVP Action Grant), Federal (FEMA BRIC, Community Wildfire Defense Grant)	High	High	Low	Years 1-3
Participate in the development and implementation of the Regional Evacuation Plan	All	All	Local (Planning Board and Town Administration operating budgets), Federal (Homeland Security Grant funding through EOPSS and CRHSAC, FEMA BRIC)	High	High	Low	Years 1-3

Note: Mitigation strategies with an ongoing expected timeline after their initial expected timeline are hazard mitigation actions that the Town should continually work on advancing and/or periodically work on once they have begun.

'Hazards Addressed' abbreviations:

DF	Dam Failure	DR	Drought
EQ	Earthquakes	FL	Flooding
HU	Hurricanes	IS	Invasive Species
LG	Lightning Strikes	OT	Other
SS	Severe Snowstorms / Ice Storms / Nor'easters	ST	Severe Thunderstorms / Wind / Tornadoes
WF	Wildfire / Brushfire	XT	Extreme Temperatures

'Agencies Involved' abbreviations:

BOH Board of Health

EMD Emergency Management Director

PB Planning Board

CC Conservation Commission

EMS Emergency Medical Services

SB Select Board

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8.0 PLAN ADOPTION, IMPLEMENTATION, AND MAINTENANCE

8.1 PLAN ADOPTION

A public meeting was held on **[August 5th, 2026]** as part of the Select Board meeting in order to detail the Brookfield Hazard Mitigation Plan update process to that date and to solicit comments and feedback from the public and the Select Board on the draft plan which was then being developed. The draft plan was provided to the Town for distribution and posted on the Town's website for two weeks starting on **[DATE]** for public review and input. The Plan was then submitted to the Massachusetts Emergency Management Agency (MEMA) and the Federal Emergency Management Agency (FEMA) for their review. Upon receiving conditional approval of the plan by FEMA, the final plan was adopted by vote of the Brookfield Select Board and certified on **[DATE]**.

8.2 PLAN IMPLEMENTATION

Section 8.2 helps meet the following FEMA local mitigation plan requirements:

- A4. “Does the plan describe the review and incorporation of existing plans, studies, reports, and technical information?” (Requirement 44 CFR § 201.6(b)(3)); and
- E2. “Was the plan revised to reflect changes in priorities and progress in local mitigation efforts?” (Requirement 44 CFR § 201.6(d)(3)).

The Town of Brookfield has taken steps to implement findings from its 2018 Brookfield Hazard Mitigation Plan, the 2019 Brookfield Municipal Vulnerability Preparedness Plan, the 2019 Brookfield Open Space & Recreation Plan, and the 2024 Brookfield Master Plan. Findings from the 2026 Brookfield Hazard Mitigation Plan update may be integrated into future iterations of all of these plans as well as into zoning updates for the Town, stormwater and/or flooding studies/plans completed in town, and other planning mechanisms and documents.

The implementation of the 2026 plan update began upon its formal adoption by the Select Board and approval by MEMA and FEMA. Town departments and boards responsible for ensuring the development of policies, ordinance revisions, and programs as described in Sections 6 and 7 of this plan will be notified of their responsibilities immediately following this plan's approval. The local Hazard Mitigation Planning Team in town will oversee the implementation of this plan.

Incorporation with Other Planning Documents

Findings from the 2018 Brookfield Hazard Mitigation Plan were incorporated into other planning mechanisms and policies in town besides this plan update, including the Town's 2024 Comprehensive Master Plan and the 2019 Municipal Vulnerability Preparedness (MVP) Plan. The Town's 2018 HMP informed the descriptions of past climate-related events which have significantly impacted the Town and potentially vulnerable critical infrastructure in town in the Town's 2019 MVP Plan;¹⁵⁶ It also informed an overall heightened focus on as well as guidance relating to the threat of natural hazards in these planning documents. Existing plans, studies, reports, and municipal documents completed by and/or relating to the Town were also incorporated throughout this planning process. The following key documents were reviewed as part of the planning process, and information from these documents was incorporated into this plan update:

- **Regional Evacuation Plan** – Funded by United States Department of Homeland Security via the Commonwealth of Massachusetts and the Central Region Homeland Security Advisory Council, this regional evacuation plan prepared by CMRPC was used to identify

¹⁵⁶ CMRPC, Town of Brookfield Core team et al., “Municipal Vulnerability Preparedness: Summary of Findings,” <https://cmrpc.org/wp-content/uploads/2024/01/Brookfield-MVP-Final-Report-1.pdf>

evacuation routes and emergency shelters. This plan will soon be updated by CMRPC.

- **Brookfield Comprehensive Emergency Management Plan** – The critical infrastructure section of this plan, which was most recently updated in 2022, was used to help identify infrastructure components in town that have been identified as crucial to the function of the Town; this resource was also used to identify potentially vulnerable populations and potential emergency response shortcomings.
- **Brookfield Zoning Bylaw** – The Zoning Bylaw was used in this planning process to identify the actions that the Town is already taking (such as implementing and enforcing floodplain regulations) that reduce the potential impacts of a natural hazard and to make sure that this plan's mitigation strategies do not duplicate existing successful efforts.¹⁵⁷
- **Brookfield Municipal Vulnerability Preparedness Plan** – The medium and high-priority recommendations from this plan were incorporated into the Hazard Mitigation Plan's mitigation strategies.¹⁵⁸
- **Brookfield Open Space and Recreation Plan** – This plan, which was updated in November 2019, proved useful for this planning process insofar as it identified water bodies, rivers, streams, infrastructure components (i.e., water and sewer, or the lack thereof), and population trends in Brookfield; this information on the Town's natural and infrastructural context was incorporated into this plan to ensure that the Town's future mitigation efforts will be sensitive to the surrounding environment.¹⁵⁹
- **ResilientMass State Hazard Mitigation and Climate Adaptation Plan** - This plan was used to ensure that the Town's HMP data and priorities, especially in the hazards section of the plan, are consistent with the State's data and priorities.¹⁶⁰
- **2022 Massachusetts Climate Change Assessment** - This plan was used to ensure that the Town's HMP data and priorities, especially in the hazards section of the plan, are consistent with the State's data and priorities.¹⁶¹
- **2025 Massachusetts Statewide Comprehensive Housing Plan** - This plan was used to ensure that the Town's HMP data and priorities, especially in the development trends section of this plan, are consistent with the State's data and priorities.¹⁶²

Additionally, this plan incorporated information from the FIRM maps for Brookfield and the 2023 Worcester County Flood Insurance Study.

After this plan has been approved by both FEMA and the Brookfield Select Board, a link to the plan will be emailed to all Town staff, boards, and committees; along with this link, the Town staff, boards, and committees will be sent a reminder to review the plan periodically and work to incorporate its contents, especially the action plan, into other town planning processes and/or documents. In addition, during annual monitoring meetings for the Hazard Mitigation Plan

¹⁵⁷ Town of Brookfield "Zoning Bylaw, amended June 2023". https://www.brookfieldma.us/wp-content/uploads/2026/01/zoning_bylaw_for_the_town_of_brookfield_last_amended_june_2023_2.pdf

¹⁵⁸ CMRPC, Town of Brookfield Core team et al., "Municipal Vulnerability Preparedness: Summary of Findings," <https://cmrpc.org/wp-content/uploads/2024/01/Brookfield-MVP-Final-Report-1.pdf>

¹⁵⁹ CMRPC, Town of Brookfield Open Space Committee et al., "Brookfield Open Space and Recreation Plan"; <https://cmrpc.org/wp-content/uploads/2024/01/Brookfield-2019-OSRP.pdf>

¹⁶⁰ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan"

¹⁶¹ "2022 Massachusetts Climate Change Assessment"

¹⁶² HOUSING ADVISORY COUNCIL, "A HOME FOR EVERYONE: A Comprehensive Housing Plan for Massachusetts 2025 – 2029," Mass.gov, Executive Office of Housing and Livable Communities, 2025, <https://www.mass.gov/doc/a-home-for-everyone/download>.

implementation process, the local Hazard Mitigation Team will review whether any of these plans are in the process of being updated. If so, the Hazard Mitigation Team will remind people working on these plans and/or documents of the Hazard Mitigation Plan and will encourage them to incorporate information and strategies from the Hazard Mitigation Plan into their efforts. The Hazard Mitigation Team will also review current town programs and policies to ensure that they are consistent with the mitigation strategies described in this plan. Information from the Hazard Mitigation Plan will also be incorporated into updates of the Town's Comprehensive Emergency Management Plan.

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8.3 PLAN MONITORING AND EVALUATION

Section 8.3 helps meet the following FEMA local mitigation plan requirements:

- D1. *“Is there discussion of how each community will continue public participation in the plan maintenance process?” (Requirement 44 CFR § 201.6(c)(4)(iii));*
- D2. *“Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a five-year cycle)?” (Requirement 44 CFR § 201.6(c)(4)(i)); and*
- D3. *“Does the plan describe a process by which each community will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate?” (Requirement 44 CFR § 201.6(c)(4)(ii))*

The Town will review and update the Hazard Mitigation Plan every five years through forming a HMP planning team and working with a contractor to complete the update. The Town’s Emergency Management Director will also call meetings of all responsible parties to review, track, and monitor the progress of the Hazard Mitigation Plan on a yearly basis and/or as is needed based on the occurrence of hazard events. Any substantial revisions made to the plan will be made open for public comment and/or will be presented on at a Select Board meeting which is open to the public. Parties identified as responsible for specific mitigation actions will be asked to submit their reports relating to these actions in advance of town hazard mitigation planning meetings.

Town hazard mitigation planning meetings will involve evaluation, assessment, tracking, and monitoring of the most recent HMP plan update. Responsible parties will review the plan’s effectiveness at achieving its goals and stated purpose at these meetings. The following questions will serve as the criteria that are 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 relating to the impact of previous hazard events or the probability of future hazard occurrences? If so, this information should be incorporated into the plan.
- How will progressing climate change impact the risk of this natural hazard? What impacts do hotter, wetter, and more variable weather have on each natural hazard?

EXISTING MITIGATION STRATEGIES

- Are the current strategies effectively mitigating the effects of any recent hazard events?
- Has there been any damage to property caused by natural hazards since the plan was

last reviewed?

- How could the existing mitigation strategies be improved 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 level of impact in town of hazards that have occurred since the strategy was completed?
- Should the criteria for prioritizing the mitigation strategies in the plan 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 and/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 activities of the Planning Board, the zoning bylaw, the Comprehensive Emergency Management Plan, and the Capital Improvement Plan?

Plan tracking and monitoring will be accomplished by a group of town stakeholders led by the Town's Emergency Management Director who have similar to if not the same credentials as the local HMP planning team for this plan update. When this team meets, they will review the mitigation strategies table from this plan update, update it with any progress on the strategies which has been made since the plan update was adopted, and discuss priorities for mitigation strategies which have not yet been implemented. They will also discuss how the data, ideas, and strategies from this plan update will be incorporated into other planning mechanisms and documents actively being worked on in town, including but not limited to updates to the Town's Master Plan, Open Space and Recreation Plan, Comprehensive Emergency Management Plan, and zoning bylaw as well as Municipal Vulnerability Preparedness Program efforts in town. Following these meetings, it is anticipated that the HMP planning team in town 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 most recent plan update. The Town also has the option to work with a contractor to help facilitate the tracking and monitoring of the plan.

Public participation will be a critical component of the Hazard Mitigation Plan maintenance process. Any substantial revisions to the plan will be made open for public comment and/or will be presented on at a Select Board meeting which is open to the public. Plan implementation will be approved through standard capital planning, Town Meeting, and/or other publicly accessible local approval processes. 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.

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8.4 POTENTIAL FEDERAL AND STATE FUNDING SOURCES

8.4.1 FEDERAL FUNDING SOURCES

The following is a summary of the programs which are the primary sources for federal funding of hazard mitigation projects and activities in Massachusetts:

Table 36: Federal Hazard Mitigation Funding Sources

Program	Type of Assistance	Availability	Managing Agency	Funding Source
<i>National Flood Insurance Program (NFIP)</i>	Pre-disaster insurance	Any time (pre & post disaster)	DCR Flood Hazard Management Program	Property Owner, FEMA
<i>Community Rating System (CRS) (Part of the NFIP)</i>	Flood insurance discounts	Any time (pre & post disaster)	DCR Flood Hazard Management Program	Property Owner
<i>Hazard Mitigation Grant Program (HMGP)</i>	Post-disaster cost-share grants	Post disaster program	MEMA	75% FEMA / 25% non- federal
<i>Building Resilient Infrastructure and Communities (BRIC)</i>	National, competitive cost- share grant program for projects & planning	Annual, pre-disaster mitigation program	MEMA	75% FEMA / 25% non- federal
<i>Flood Mitigation Assistance (FMA) Program</i>	Cost share grants for pre-disaster planning & projects	Annual pre-disaster grant program	MEMA	75% FEMA / 25% non- federal
<i>Public Assistance</i>	Post-disaster aid to state & local governments	Post Disaster	MEMA	FEMA, plus a non-federal share
<i>Small Business Administration (SBA) Mitigation Loans</i>	Pre- & Post- disaster loans to qualified applicants	Ongoing	MEMA	Small Business Administration
<i>Emergency Management Performance Grant (EMPG)</i>	Pre- & post-disaster management and implementation grants	Annual	MEMA	50% FEMA / 50% non-federal match
<i>Homeland Security Grant Program (HSGP)</i>	Funding to prevent, respond to, and recover from acts of terrorism	Annual	MEMA	FEMA

Program	Type of Assistance	Availability	Managing Agency	Funding Source
Hazard Mitigation Grant Program Post-Fire (HMGP-PF)	Cost-share post-wildfire disaster mitigation measures	Annual, within six months after a Fire Management Assistance Grant declaration	FEMA	75% FEMA / 25% non-federal
Assistance to Firefighters Grants (AFG)	Training & equipment for wildfire-related hazards	Annual	FEMA	FEMA
Fire Prevention & Safety Grant Program (AFG) (FP&S)	Cost-share funding to support projects that protect people from fire-related hazards	Annual	FEMA	95% FEMA / 5% non-federal
Fire Management Assistance Grants (FMAG)	Cost-share funding to mitigate & manage major disasters caused by fire	Any time (pre- & post disaster)	FEMA	75% FEMA / 25% non-federal
National Dam Safety Program (State Assistance Grant Program) (NDSP)	Funding to improve dam safety & state dam safety programs	Annual	FEMA	FEMA, Bipartisan Infrastructure Law
Rehabilitation of High Hazard Potential Dam Program (State Dam Safety Divisions) (HHPD)	Cost-share funding to plan and rehabilitate high hazard potential dams	Annual	FEMA	65% FEMA / 35% non-federal
National Earthquake Hazards Reduction Program's State Assistance Program (NEHRP)	Cost-share funding for pre-earthquake risk management	Annual	FEMA	75% FEMA / 25% non-federal
Emergency Food and Shelter Program (EFSP)	Grant funding for supplemental food & shelter for those experiencing / at risk of experiencing homelessness	Annual	FEMA	FEMA

Program	Type of Assistance	Availability	Managing Agency	Funding Source
Public Health Crisis Response Cooperative Agreement (PHCRCA)	Funding to support surge needs of existing public health programs responding to public health emergencies	Annual for approved by unfunded (ABU) roster	CDC	Varies
Army Corp of Engineers Planning Assistance	Water supply, conservation, wetlands, & dam safety funding	Any time (pre & post disaster)	U.S. Army Corps of Engineers	50% Federal / 50% non-federal
Forest Service Community Wildfire Defense Grant (USDA-FSCWDG)	Grant funding to plan for and reduce wildfire risk	Annual	USDA-FS	75% USDA / 25% non-federal
Emergency Watershed Protection Program (EWP)	Technical assistance and funding for helping communities mitigate natural disaster risks which affect watersheds	Ongoing	USDA-NRCS	75% USDA / 25% non-federal (90% USDA / 10% non-federal in limited resource areas)
Agricultural Management Assistance (Drought Mitigation Funding Program) (AMA)	Technical assistance for agricultural producers to manage financial risks	Ongoing	USDA-NRCS	75% USDA / 25% non-federal
USDA Community Facilities Direct Loan & Grant Program (Rural Development) (CFDLGP)	Funding for improving essential community facilities	Annual	USDA-RD	Varies
National Culvert Removal, Replacement, & Restoration Grant (NCRRRG)	Competitive grant funding to replace, remove, and repair culverts or weirs	Annual	US DOT	Varies
Bridge Investment Program (BIP)	Competitive grant program for improving the conditions of existing bridges	Annual	US DOT	80% FHWA / 20% other

Program	Type of Assistance	Availability	Managing Agency	Funding Source
Promoting Resilient Operations for Transformative, Efficient, and Cost- saving Transportation Program (PROTECT)	Discretionary program which includes Competitive Resilience Improvement Grants and planning grants	Annual	US DOT	Varies (generally, up to 80% federal share)

This FEMA web page describes several funding opportunities: [FEMA Grants | FEMA.gov](#). The programs listed in the above table are described in more detail below.

NATIONAL FLOOD INSURANCE PROGRAM (NFIP) AND COMMUNITY RATING SYSTEM (CRS) (PART OF THE NFIP)

The National Flood Insurance Program (NFIP) provides insurance to communities required to manage and adopt mitigation practices for high flood-risk areas. The Community Rating System (CRS) incentivizes communities to incorporate flood management practices and mitigation strategies through discounted flood insurance rates; Incentives are available on a voluntary and participatory basis to encourage communities to meet the minimum requirements of the NFIP. In encouraging communities to meet NFIP's minimum requirements, CRS can extend the availability of funding to homeowners, businesses, and renters for whom flood insurance may not be accessible. CRS allocates insurance discount rates according to a community's demonstrated efforts to implement the program's three goals:

- Reduce flood damage to insurable properties;
- Strengthen and support NFIP; and
- Incentivize proactive floodplain management.

Communities can earn CRS points based on their implementation of various flood mitigation initiatives, including but not limited to: (1) restricting development on flood prone areas, (2) extending public risk communication with flood warning systems, and (3) enhancing infrastructural resilience to flood damage. Please refer to [| The National Flood Insurance Program \(floodsmart.gov\)](#) and [Community Rating System | FEMA.gov](#) for more information.

HAZARD MITIGATION ASSISTANCE (HMA)

The Hazard Mitigation Assistance (HMA) grant programs provide funding opportunities for pre- and post-disaster mitigation. While the statutory origins of these programs differ, all share the common goal of reducing the risk of loss of life and property from natural hazards. Brief descriptions of the HMA grant programs can be found below. For more information on the individual programs, or to see information related to a specific fiscal year, please click on one of the program links.

Hazard Mitigation Grant Program (HMGP)

The Hazard Mitigation Grant Program (HMGP) assists in implementing long-term hazard mitigation measures following Presidential disaster declarations. Funding is available under this program to implement projects in accordance with state, tribal, and local priorities. Please refer to [Hazard Mitigation Assistance Grants | FEMA.gov](#) for additional information.

HMGP funds may be used to fund projects that will reduce or eliminate the losses from future disasters. Projects completed under this program must provide a long-term solution to a problem; for example, elevation of a home to reduce the risk of flood damages as opposed to buying sandbags and pumps to fight a flood. In addition, a project's potential savings must be more than the cost of implementing the project. Funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. Examples of eligible HMGP projects include, but are not limited to:

- Acquisition of real property from willing sellers and demolition or relocation of buildings to convert this property to open space use;
- Retrofitting structures and facilities to minimize damages from high winds, earthquakes, flooding, wildfires, or other natural hazards;
- Elevation of flood prone structures;
- Development and initial implementation of vegetative management programs;
- Minor flood control projects that do not duplicate the flood prevention activities of other federal agencies;
- Localized flood control projects, such as certain ring levees and floodwall systems, that are designed specifically to protect critical facilities; and
- Post-disaster building code related activities that support building code officials during the reconstruction process.

Hazard Mitigation Grant Program Post-Fire (HMGP-PF)

The Hazard Mitigation Grant Program Post-Fire (HMGP-PF) is a program aimed at providing financial funding to localities to reduce risk of damage from future fires after a given area has experienced a fire. Funds are determined through benefit-cost analysis software. For more information, please refer to: [Hazard Mitigation Grant Program Post Fire | FEMA.gov](#).

Building Resilient Infrastructure and Communities (BRIC)

The Building Resilient Infrastructure and Communities (BRIC) program aims to categorically shift the federal focus away from reactive disaster spending and toward research-supported, proactive investment in community resilience. Examples of BRIC projects are projects that demonstrate innovative approaches to partnerships, such as shared funding mechanisms, and/or project design. For example, an innovative BRIC project may bring multiple funding sources or in-kind resources from a range of private and public sector partners. Or an innovative project may offer multiple benefits to a community in addition to the benefit of risk reduction. The BRIC program has replaced the Pre-Disaster Mitigation (PDM) grant program. More information on the BRIC program can be found here: [Building Resilient Infrastructure and Communities | FEMA.gov](#).

The Massachusetts Emergency Management Agency (MEMA) coordinates BRIC applications for municipalities within the Commonwealth. Links to MEMA resources and BRIC application materials can be found here: [Building Resilient Infrastructure and Communities \(BRIC\) & Flood Mitigation Assistance \(FMA\) Grant Programs | Mass.gov](#).

FLOOD MITIGATION ASSISTANCE (FMA)

Flood Mitigation Assistance (FMA) provides funds on an annual basis so that measures can be taken to reduce or eliminate risk of flood damage to buildings insured under the National Flood Insurance Program. Please refer to the FMA website: [Flood Mitigation Assistance Grant Program | FEMA.gov](#).

The following types of FMA grants are available to states and communities:

- **Project Scoping Grants** are designed to develop mitigation strategies and obtain data to prioritize, select, and develop complete applications in a timely manner that result in either an improvement in the capability to identify appropriate mitigation projects or in the development of an application-ready mitigation project for FMA or another program.
- **Planning Grants** to prepare flood mitigation plans; Only NFIP-participating communities with approved flood mitigation plans can apply for FMA project grants.
- **Technical Assistance Grants** are awards of up to \$50,000 federal cost share for recipients to which FEMA obligated at least \$1 million federal share the previous FMA cycle.
- **Project Grants** to implement measures to reduce flood losses, such as the elevation, acquisition, or relocation of NFIP-insured structures. States are encouraged to prioritize FMA funds for applications that include repetitive loss properties (structures with 2 or more losses each with a claim of at least \$1,000 within any ten-year period since 1978).

MEMA coordinates FMA applications for municipalities within the Commonwealth. Links to MEMA resources and FMA application materials can be found here: [Building Resilient Infrastructure and Communities \(BRIC\) & Flood Mitigation Assistance \(FMA\) Grant Programs | Mass.gov](#).

DISASTER ASSISTANCE

Disaster Assistance is money or direct assistance to individuals, families, and businesses whose property has been damaged or destroyed and whose losses are not covered by insurance. It is meant to help with critical expenses that cannot be covered in other ways. This assistance is not intended to restore damaged property to its condition before the disaster. While some housing assistance funds are available through FEMA's Individuals and Households Program, most disaster assistance from the Federal government is in the form of loans administered by the Small Business Administration.

Disaster Assistance Available from FEMA

Assistance from FEMA in the event of a disaster declaration is grouped into the following 3 categories:

Housing Needs

- **Temporary Housing** (a place to live for a limited period of time): Money is made available to rent a different place to live, or a government-provided housing unit when rental properties are not available.
- **Repair**: Money is available to homeowners to repair damage from the disaster to their primary residence that is not covered by insurance. The goal is to make the damaged home safe, sanitary, and functional.
- **Replacement**: Money is available to homeowners to replace their home destroyed in the disaster that is not covered by insurance. The goal is to help the homeowner with the cost of replacing their destroyed home.
- **Permanent Housing Construction**: Direct assistance or money is made available for the construction of a home. This type of help occurs only in insular areas or remote locations specified by FEMA, where no other type of housing assistance is possible.

Other than Housing Needs

- Money is available for necessary expenses and serious needs caused by a disaster, including:
 - Disaster-related medical and dental costs;
 - Disaster-related funeral and burial costs;
 - Clothing;
 - Household items (room furnishings, appliances);
 - Tools (specialized tools or protective clothing and equipment) required for people's jobs;
 - Necessary educational materials (computers, schoolbooks, supplies);
 - Fuels for primary heat source (heating oil, gas);
 - Clean-up items (wet/dry vacuums, dehumidifiers);
 - Expenses relating to disaster-damaged vehicles;
 - Moving and storage expenses related to the disaster (moving and storing property to avoid additional disaster damage while disaster-related repairs are being made to the home);
 - Other necessary expenses or serious needs as determined by FEMA; and
 - Other expenses that are authorized by law.

Additional Services

- Crisis Counseling
- Disaster Unemployment Assistance
- Legal Services
- Special Tax Considerations

For additional information, please refer to: [Get Assistance After a Disaster | FEMA.gov](#).

DISASTER LOANS AVAILABLE FROM THE U.S. SMALL BUSINESS ADMINISTRATION

The U.S. Small Business Administration (SBA) can make federally subsidized loans to repair or replace homes, personal property, or businesses that sustained damages not covered by insurance. The Small Business Administration can provide the following three types of disaster loans to qualified homeowners and businesses:

- Physical damage loans: Loans to cover repairs and replacement of physical assets damaged in a declared disaster.
- Mitigation assistance: Funding to cover small business operating expenses after a declared disaster.
- Economic injury disaster loans: Loans which provide economic relief to small businesses and nonprofit organizations that have suffered damage to their home or personal property.
- Military reservist loans: Loans to help eligible small businesses with operating expenses to

- make up for employees on active duty leave.

For many individuals, the SBA disaster loan program is the primary form of disaster assistance. Please find more information about this loan program here: [Disaster assistance | U.S. Small Business Administration \(sba.gov\)](#).

DISASTER ASSISTANCE FROM OTHER ORGANIZATIONS AND ENTITIES

[Home | disasterassistance.gov](#) is a secure, user-friendly U.S. Government web portal that consolidates disaster assistance information in one place. If individuals need assistance following a Presidentially declared disaster which has been designated for individual assistance, they can now go to DisasterAssistance.gov to register for receiving assistance online. Local resource information to help keep citizens safe during an emergency is also available. Currently, 17 U.S. Government agencies, which sponsor almost 70 forms of assistance, contribute to the portal.

DisasterAssistance.gov speeds up the application process by feeding common data to multiple online applications. Application information is shared only with those agencies individuals identify and is protected by the highest levels of security. DisasterAssistance.gov will continue to expand to include forms of assistance available at federal, state, tribal, regional, and local levels.

EMERGENCY MANAGEMENT PERFORMANCE GRANT (EMPG)

The Emergency Management Performance Grant (EMPG) provides resources for state, local, tribal, and territorial emergency response organizations required for the National Preparedness System. EMPG supports efforts in building and strengthening capabilities in areas related to protection, mitigation, prevention, response and recovery. In fiscal year 2024, this grant had a total available funding of \$319.55 million. Please find more information about this grant program at the link here: [Emergency Management Performance Grant | FEMA.gov](#).

HOMELAND SECURITY GRANT PROGRAM (HSGP)

The Homeland Security Grant Program (HSGP) provides a suite of grant opportunities in support of efforts in the mitigation of, prevention of, protection from, and recovery from terrorist and other threats at the state, local, tribal, and territorial levels. As of the 2024 fiscal year, the program, including its three separate grants, had \$1.008 billion in funding. The three grants available under this program are:

- The State Homeland Security Program (SHSP);
- The Urban Area Security Initiative (UASI); and
- Operation Stonegarden (OPSG).

Please find more about this program at the link here: [Homeland Security Grant Program | FEMA.gov](#).

ASSISTANCE TO FIREFIGHTERS GRANTS (AFG) AND FIRE PREVENTION & SAFETY GRANT PROGRAM (FP&S)

The FEMA Assistance to Firefighters Grants (AFG) program provides funds to equip and train emergency personnel to recognized standards, enhance operations efficiencies, foster interoperability, and support community resilience. Under AFG, funds may be available for equipment, vehicles, and/or training that can be used to mitigate and/or respond to wildfire-related hazards. AFG also has a Fire Prevention and Safety (FPS) component which funds public outreach programs and prevention activities, which can emphasize wildfire mitigation. More about

these programs can be found at these links: [Assistance to Firefighters Grants Program | FEMA.gov](#), [Fire Prevention and Safety \(FP&S\) | FEMA.gov](#).

FIRE MANAGEMENT ASSISTANCE GRANTS (F-MAG)

The Fire Management Assistance Grants (F-MAG) Program supports firefighting efforts in cases of fire-related disasters impacting public and private forests as well as grasslands at the state, local and tribal levels. For more information on this program, please refer to: [Fire Management Assistance Grants | FEMA.gov](#).

NATIONAL DAM SAFETY PROGRAM (STATE ASSISTANCE GRANT PROGRAM) (NDSP)

The National Dam Safety Program (NDSP) provides financial assistance to strengthen the individual dam safety programs of states and territories. In the 2024 fiscal year, this program distributed \$24.2 million among 49 states and Puerto Rico. For more information on this program, please refer to: [Grant Assistance to States | FEMA.gov](#).

REHABILITATION OF HIGH HAZARD POTENTIAL DAM PROGRAM (STATE DAM SAFETY DIVISIONS) (HHPD)

The Rehabilitation of High Hazard Potential Dams Program (HHPD) provides technical, planning, design, and construction assistance in the form of grants for the rehabilitation of high hazard potential dams in eligible states and territories. For more information, please refer to: [Rehabilitation Of High Hazard Potential Dam \(HHPD\) Grant Program | FEMA.gov](#).

NATIONAL EARTHQUAKE HAZARDS REDUCTION PROGRAM'S STATE ASSISTANCE PROGRAM (NEHRP)

The National Earthquake Hazards Reduction Program's State Assistance Program (NEHRP) provides funding to localities for the reduction of risk associated with earthquakes. This is done through two grants:

- Individual State Earthquake Assistance (ISEA) and
- Multi-State National Earthquake Assistance (MSNEA).

More information about this program can be found at this link: [National Earthquake Hazards Reduction Program's State Assistance Program | FEMA.gov](#).

EMERGENCY FOOD AND SHELTER PROGRAM (EFSP)

The Emergency Food and Shelter Program (EFSP) assists and expands upon the work of local nonprofit and governmental social service organizations to provide shelter, food, and other services to people experiencing or at risk of hunger and/or homelessness. For more information, please refer to: [Emergency Food and Shelter Program | FEMA.gov](#).

PUBLIC HEALTH CRISIS RESPONSE COOPERATIVE AGREEMENT (PHCRCA)

The Center for Disease Control and Prevention's Public Health Crisis Response Cooperative Agreement (PHCRCA) allows for opportunities for state, local, and tribal government to receive funding in response to public health emergencies. For more information, please refer to: [The Centers for Disease Control and Prevention's Public Health Crisis Response Cooperative Agreement Program Awards \(hhs.gov\)](#).

ARMY CORPS OF ENGINEER PLANNING ASSISTANCE

Under the authority provided by Section 22 of the Water Resources Development Act of 1974 (PL 93-251), as amended, the U.S. Army Corps of Engineers can provide states, local governments, other non-federal entities, as well as eligible Native American Indian tribes, assistance in the preparation of comprehensive plans for the development, utilization, and conservation of water and related land resources. Typical studies funded under this program are only at the planning level of detail; they do not include detailed engineering designs intended for project construction. The program can encompass many types of planning studies which address water resources issues. Types of studies conducted in recent years under the program include the following: water supply/demand, water conservation, water quality, environmental/conservation, wetlands evaluation/restoration, dam safety/failure, flood damage reduction, coastal zone protection, and harbor planning. For more information, please refer to: [Planning Assistance to States, U.S. Army Corps of Engineers, New England District](#).

FOREST SERVICE COMMUNITY WILDFIRE DEFENSE GRANT (USDA-FSCWDG)

The Forest Service Community Wildfire Defense Grant Program (USDA-FSCWG) provides funding and assistance to at-risk local communities and tribes to reduce wildfire risk. Funding and assistance under this program are primarily used to revise and develop community wildfire protection plans and to assist in implementing new projects described in said plans. For more information on this program, please refer to: [Community Wildfire Defense Grant Program | US Forest Service \(usda.gov\)](#).

EMERGENCY WATERSHED PROTECTION PROGRAM (EWP)

The Emergency Watershed Protection Program (EWP) provides technical and financial assistance to localities in response to imminent life- and property-threatening natural disasters which negatively impact local watersheds. For more information about this program, please refer to: [Emergency Watershed Protection | Natural Resources Conservation Service \(usda.gov\)](#).

AGRICULTURAL MANAGEMENT ASSISTANCE (DROUGHT MITIGATION FUNDING PROGRAM) (AMA)

Agricultural Management Assistance (AMA) is a program to help farmers build on and diversify their agricultural practices. The program is available in 16 states that have had historically low rates of participation in the Federal Crop Insurance Program. AMA covers up to 75% of funds needed to install conservation practices on farms, with a cap of \$50,000 per individual participant in a given fiscal year. For more information, please refer to: [Agricultural Management Assistance | Natural Resources Conservation Service \(usda.gov\)](#).

USDA COMMUNITY FACILITIES DIRECT LOAN & GRANT PROGRAM

The USDA Community Facilities Direct Loan & Grant program provides affordable funding to develop essential community facilities in rural areas. An essential community facility is defined as a facility that provides an essential service to the local community for the orderly development of the community in a primarily rural area, and does not include private, commercial or business undertakings. Rural areas including cities, villages, and townships and towns, including Federally Recognized Tribal Lands, with no more than 20,000 residents according to the latest U.S. Census Data are eligible for this program. Program funds can be used to purchase, construct, and / or

improve essential community facilities, purchase equipment, and pay related project expenses. For more information on this program, please refer to: [Community Facilities Direct Loan & Grant Program | Rural Development \(usda.gov\)](#).

NATIONAL CULVERT REMOVAL, REPLACEMENT, & RESTORATION GRANT (NCRRRG)

The National Culvert Removal, Replacement, and Restoration Grant Program (NCRRRG) (Culvert Aquatic Organism Passage (AOP) Program) assists eligible tribes, states and local governments in issues related to culverts and weirs to improve and/or restore passage for anadromous fish in freshwater waterways. Anadromous fish are those that spawn in freshwater but live most of their lives in saltwater. More information about this program can be found at this link: [Aquatic Organism Passage - Culvert Hydraulics - Hydraulics - Bridges & Structures - Federal Highway Administration \(dot.gov\)](#).

BRIDGE INVESTMENT PROGRAM (BIP)

The Bridge Investment Program (BIP) provides the opportunity for governments at all levels to receive funding to repair and restore aging bridge infrastructure. BIP grant applications have a maximum grant award of 80% of the total eligible bridge project costs. For more information regarding this program, please refer to: [BIP - Funding Programs - Management and Preservation - Bridges & Structures - Federal Highway Administration \(dot.gov\)](#).

PROMOTING RESILIENT OPERATIONS FOR TRANSFORMATIVE, EFFICIENT, AND COST-SAVING TRANSPORTATION PROGRAM (PROTECT)

The Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (Protect) Program is a program established by the Bipartisan Infrastructure Law (BIL) which funds resilience-building activities for surface transportation, such as plans (including evacuation plans) and infrastructure improvements, which increase reliance to natural hazards and climate change. For more information regarding this program, please refer to: [Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation Program \(PROTECT\) | US Department of Transportation and Bipartisan Infrastructure Law - Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation \(PROTECT\) Formula Program Fact Sheet | Federal Highway Administration \(dot.gov\)](#).

8.4.2 STATE FUNDING SOURCES

The following is a summary of state funding opportunities for hazard mitigation projects and activities in Massachusetts:

Table 37: State Hazard Mitigation Funding Sources

Program	Type of Assistance	Availability	Managing Agency	Funding Source
604b Water Quality Management Planning Grant Program	Grants focused on nonpoint source pollution assessment and watershed planning	Annual	Mass DEP	State funding (match not required but recommended)
Section 319 Nonpoint Source Competitive Grants Program	Competitive grant program funding projects that address the prevention, control, and abatement of nonpoint source (NPS) pollution	Annual	Mass DEP	State funding
Water Quality Monitoring Grant Program	Reimbursement funding for monitoring and/or data collection efforts that support water quality assessments	Annual	Mass DEP	State funding
Statewide Water Management Act Grant	Reimbursement grant funding for projects to help public water suppliers plan and manage water use	Annual	Mass DEP	Reimbursement grant
Massachusetts Gap Energy Grant Program (Gap III)	Program providing grant assistance (up to \$200,000 per community) for implementing energy efficiency and clean energy generation projects at water and wastewater plants	Annual (likely)	Mass DEP	State funding
State Revolving Fund	Low-interest loans	Annual	Mass DEP	Municipal funding with state loan

Program	Type of Assistance	Availability	Managing Agency	Funding Source
<i>Municipal Vulnerability Preparedness (MVP) Action Grants</i>	Competitive climate adaptation grants	Annual	EEA	75% EEA / 25% non-state match
<i>Planning Assistance Grants (EEA PAG)</i>	Competitive grants that support efforts to plan, regulate (zone), and act to conserve and develop land consistent with the Massachusetts Sustainable Development Principles	Annual	EEA	75% EEA / 25% non-state match
<i>Dam and Seawall Repair or Removal Program</i>	Competitive grants for dam and seawall repair and removal, as well as construction loans	Annual	EEA	State funding
<i>Massachusetts Land & Water Conservation Fund Grant Program (LWCF)</i>	Federal grant program to help improve access to and protection for public lands and waters	Annual	DCS	Federal program that funds up to 50% of total costs for acquisition, development, and renovation
<i>Local Acquisitions for Natural Diversity (LAND)</i>	Financial assistance to municipalities for the acquisition of conservation land	Annual	DCS	Reimbursement grant, the reimbursement rate varies per town
<i>Drinking Water Supply Protection Grant (DWSP)</i>	Competitive grants for protection of drinking water supplies	Annual	DCS	State funding
<i>Land and Recreation Grants and Loans</i>	Varies, though primarily grant funding for conservation and recreation projects	Varies, generally annually	DCS	Varies

Program	Type of Assistance	Availability	Managing Agency	Funding Source
Land Conservation Assistance Grant Program	Financial assistance for permanently protecting land	Annual (Likely)	DCS	90% state reimbursement / 10% other
Forest Legacy Grant Program (USDA-FS) (FLGP)	Grant funding to protect environmentally important forestland from conversion	Annual	DCR	75% USDA FS / 25% non-federal
Culvert Replacement Municipal Assistance Grant Program	Competitive grants for replacing an undersized, perched, and/or degraded culvert located in an area of high ecological value	Annual	DER	State funding
Division of Ecological Restoration Priority Project Program	State competitive grant program that funds projects that restore and protect the state's rivers, wetlands, and watersheds (priority projects may differ each year)	Annual	DER	State funding
Mass Wildlife Habitat Management Grant Program (MWHMGP)	Reimbursement grant funding to assist municipalities in enhancing wildlife habitat and increasing recreational opportunities on protected lands	Annual	DFW	USDA NRCS
Agricultural Climate Resiliency and Efficiencies Program (ACRE)	Competitive reimbursement grant funding that supports practices that mitigate the agricultural sector's vulnerability to climate change	Annually through Climate Smart Agriculture Program (CSAP)	MDAR	MDAR

Program	Type of Assistance	Availability	Managing Agency	Funding Source
<i>Agricultural Preservation Restriction Program (APR)</i>	Financial assistance in exchange for permanent deed restriction to protect lands' agricultural viability	Any time for owners of at least 5 acres of farmland	MDAR	MDAR
<i>Hazard Mitigation Grant Program (State) (HMGP)</i>	Sub-grant programs for the Hazard Mitigation Grant Program	Annual	MEMA	State funding
<i>Community Development Block Grants (CDBG)</i>	Competitive community development grants	Annual	EOHLC	US Department of Housing and Urban Development
<i>Emergency Solutions Grant (ESG)</i>	Competitive grant funding designed to support services that assist those experiencing / at risk of experiencing homelessness	Annual	EOHLC	MA EOHLC
<i>Mass Works</i>	Competitive infrastructure grants	Annual	EOED	State funding
<i>Community Preservation Act (CPA)</i>	Establishes a local community preservation fund through tax surcharge to support a variety of project related to conservation and housing	Ongoing	Department of Revenue (DOR)	Statewide Community Preservation Trust Fund / Local Community Preservation Fund
<i>Special appropriations and legislative earmarks</i>	Varies	Infrequent, after natural disasters or legislature vote	Massachusetts General Legislature	State funding
<i>District Local Technical Assistance (DLTA)</i>	Funding to support planning and technical assistance for housing, economic growth, and regional projects	Varies, generally annually	Massachusetts General Legislature, CMRPC	State funding

Program	Type of Assistance	Availability	Managing Agency	Funding Source
Local Planning Assistance (LPA)	Planning and technical assistance	Annual	CMRPC	Planning assistance hours
Support and Incentive Grant	Reimbursement grant funding designed to assist in providing enhanced 911 service	Annual	MA EOPSS	MA EOPSS
Municipal Small Bridge Program	Competitive grants for small bridge replacement, preservation, and rehabilitation projects	Annual	MassDOT	State funding
Chapter 90 Program (Transportation Capital Improvement Projects) (Chpt. 90)	Reimbursable grants to support capital improvements on local public ways	Ongoing	MassDOT	State funding
State Transportation Improvement Program (STIP)	Competitive funding opportunity for transportation projects along federal-aid roadways	Annually updated five-year programming document	MassDOT	MassDOT
Complete Streets (CS)	Reimbursement grant funding to provide safe and accessible options for all travel modes	Annually available to municipalities that adopt a Complete Streets Policy	MassDOT	State funding
Drought Resiliency and Water Efficiency Grant Program	Funding for reducing indoor and outdoor water use, improving water loss control, and increasing drought management and planning in public water systems across the state	Annual	EEA	State funding

The Community Grant Funder web page includes the municipal grant programs listed above, as well as other funding opportunities: [Community Grant Finder | Mass.gov](#). The programs listed in the above table are described in more detail below.

604B WATER QUALITY MANAGEMENT PLANNING GRANT PROGRAM

The 604B Water Quality Management Planning Grant Program provides funding opportunities to regional planning agencies, councils of governments, conservation districts, counties, cities and towns, federally and state recognized tribes, and other substate public planning agencies and interstate agencies to determine and correct water quality issues in Massachusetts. For more information on this program, please refer to: [Grants & Financial Assistance: Watersheds & Water Quality | Mass.gov](#).

SECTION 319 NONPOINT SOURCE COMPETITIVE GRANTS PROGRAM

Section 319 of the Clean Water Act provides funding opportunities for the prevention, control, and abatement of nonpoint source (NPS) pollution. These grants are available to eligible Massachusetts public or private organizations, including: state and federally recognized tribes, regional planning agencies, councils of governments, counties, conservation districts, cities and towns, other substate public planning agencies, and interstate agencies. To be eligible for this program, these entities' projects must: include measures that address the prevention, control, and abatement of NPS pollution, target major sources of NPS pollution within a watershed, contain an appropriate method for evaluating the project results, and address activities in the current Massachusetts NPS Management Program Plan. For more information on this program, please refer to: [Grants & Financial Assistance: Watersheds & Water Quality | Mass.gov](#).

WATER QUALITY MONITORING GRANT PROGRAM

The Water Quality Monitoring Grant Program provides funding opportunities to eligible entities and organizations to increase the amount of data on water quality in Massachusetts. For more information, please refer to: [Grants & Financial Assistance: Watersheds & Water Quality | Mass.gov](#).

STATEWIDE WATER MANAGEMENT ACT GRANT

The Statewide Water Management Act Grant provides grant funding for projects which improve the ecological conditions of specific watersheds and projects aimed at reducing water demand. Specifically, projects funded under this program must: improve or increase instream flow, keep wastewater local, relate to stormwater management, reduce impervious cover and/or improve water quality, relate to water supply operational improvements, improve habitat, reduce wastewater inflow and infiltration, and/or be another type of project which can be demonstrated to mitigate the impacts of water withdrawals. This program awards approximately 10 grants a year and has a reimbursement rate of 80%. Grants are awarded to eligible public water suppliers and municipalities with Water Management Act permits. For more information, please refer to: [Water Management Act Grant Programs for Public Water Suppliers | Mass.gov](#).

MASSACHUSETTS GAP ENERGY GRANT PROGRAM (GAP III)

Through a partnership between the Massachusetts Department of Energy Resources (DOER) and the Massachusetts Clean Energy Center (MassCEC), the Massachusetts Gap Energy Grant Program (Gap III) provides funding to fill the last financial "gap" needed for clean energy projects spearheaded by a variety of organizations to promote clean and efficient energy projects. In 2022, the GAP III program awarded a total of \$8.1 million in grants. For more information about this program, please refer to: [Massachusetts' Gap Energy Grant Program | Mass.gov](#).

PLANNING ASSISTANCE GRANTS (EEA PAG)

Executive Office of Energy and Environmental Affairs Planning Assistance Grant (EEA PAG) program grants are available to municipalities and regional planning agencies acting on their behalf to financially support efforts to conserve and develop land consistent with the Massachusetts Sustainable Development Principles. Top priorities of the program include: zoning for sustainable housing production, mitigation of climate change through zoning and other regulatory actions, and zoning that results in permanent land conservation. For more information about these grants, please refer to: [Planning Assistance Grants | Mass.gov](#).

STATE REVOLVING FUND

This statewide loan program through the Massachusetts Department of Environmental Protection assists communities in funding local drinking water, wastewater, and stormwater infrastructure improvements.

MUNICIPAL VULNERABILITY PREPAREDNESS ACTION GRANT PROGRAM

The Municipal Vulnerability Preparedness (MVP) Action Grant program offers financial resources to municipalities that are seeking to advance priority climate adaptation actions to address impacts resulting from extreme weather, sea level rise, inland and coastal flooding, severe heat, and other climate change-related events. Towns are eligible for this competitive grant program after successfully completing an MVP planning grant. A variety of project types are eligible for funding under this program, but projects must address local vulnerabilities to climate change and incorporate MVP Core Principles. Grant application information can be found here: [MVP Action Grant | Mass.gov](#). The MVP Core Principles can be found here: [https:// www.mass.gov/doc/mvp-core-principles/download](https://www.mass.gov/doc/mvp-core-principles/download).

DAM AND SEAWALL REPAIR OR REMOVAL PROGRAM

The EEA funds projects for the repair and removal of dams, levees, seawalls, and other forms of inland and coastal flood control under the Dam and Seawall Repair or Removal Program. For additional information, please refer to [Dam and Seawall Repair or Removal Program Grants and Funds | Mass.gov](#).

LAND & WATER CONSERVATION FUND GRANT PROGRAM (LWCF)

The Land & Water Conservation Fund Grant Program (LWCF) provides up to 50% of total project funding to eligible municipalities, tribes, and state agencies for park, trail and conservation area related projects. For more information, please refer to: [Massachusetts Land and Water Conservation Fund Grant Program | Mass.gov](#).

LOCAL ACQUISITIONS FOR NATURAL DIVERSITY (LAND)

The Local Acquisitions for Natural Diversity (LAND) grant program assists cities and towns in acquiring new lands for conservation and passive recreation purposes. Grants are awarded at a maximum of \$500,000 with reimbursement rates ranging from 52% to 70%. For more information, please refer to: [Local Acquisitions for Natural Diversity \(LAND\) Grant Program | Mass.gov](#).

DRINKING WATER SUPPLY PROTECTION GRANT (DWSP)

The Drinking Water Supply Grant (DWSP) program provides financial assistance to public water systems and municipal water departments for the purchase of land or interests in land for the following purposes: 1) protection of existing DEP-approved public drinking water supplies; 2)

protection of planned future public drinking water supplies; or 3) groundwater recharge. This is a reimbursement program. For more information, please refer to [Drinking Water Supply Protection Grant Program | Mass.gov](#).

LAND AND RECREATION GRANTS AND LOANS

The Massachusetts Division of Conservation Services (DCS) manages several grant and loan programs that enable land preservation, natural resources conservation, and public recreation. Municipalities with an active Open Space and Recreation Plan are generally eligible to apply for these programs. Preserving natural open space can buffer natural systems from development impacts, protect open spaces from future development, and maintain ecosystem services like natural flood mitigation. The full list of DCS grant programs can be found here: [Land and Recreation Grants & Loans | Mass.gov](#).

LAND CONSERVATION ASSISTANCE GRANT PROGRAM

The Land Conservation Assistance Grant Program from the Massachusetts Division of Conservation Services (DCS) provides reimbursement funding to municipalities, qualified 501(c)(3) land trusts, tribal governments, and other public entities for the permanent protection of land as well as to Regional Planning Agencies (RPAs) and qualified 501(c)(3) land trusts which assist these entities in this goal. Eligible activities under this program include preparing grant applications for permanently protecting land, completing other tasks which progress transactions which permanently protect land, developing or updating municipal Open Space and Recreation Plans, and planning for developing and/or renovating a park to help with a grant application to DCS. For more information on this program, please refer to: [Apply to the Land Conservation Assistance Grant Program | Mass.gov](#).

FOREST LEGACY GRANT PROGRAM (USDA-FS) (FLGP)

The Forest Legacy Grant Program (FLGP) is a voluntary grant funding opportunity for private landowners to either sell their land outright or to sell a conservation restriction on their land. A conservation restriction is a legally binding agreement which limits the types of land use on a property, in this case restricting land to forestry, recreation, or another conservation-related use. For more information about this program, please refer to: [Forest Legacy Program | Mass.gov](#).

CULVERT REPLACEMENT MUNICIPAL ASSISTANCE GRANT PROGRAM

The Culvert Replacement Municipal Assistance Grant program provides a funding opportunity for local governments to replace undersized, perched, and/or degraded culverts in areas of high ecological value. For more information on this program, please refer to: [Culvert Replacement Municipal Assistance Grant Program | Mass.gov](#).

DER PRIORITY PROJECTS

The Priority Project Program is an opportunity under the Division of Ecological Restoration (DER) for organizations to receive technical assistance, consulting, and/or direct grant funding for wetland and river restoration projects through a state-wide, competitive process. DER chooses high-priority projects that bring significant ecological and community benefits to the Commonwealth. DER's most recent call for applications solicited projects that focus on cranberry bog wetland restoration, dam removal and river restoration, coastal wetland restoration projects, or a combination of these topics. More information on the Priority Projects program can be found here: [Become a DER Priority Project | Mass.gov](#). This program can be used to remove significant or high hazard dams that communities no longer want to maintain; the removal of these dams

may improve the health and resilience of aquatic systems.

MASS WILDLIFE HABITAT MANAGEMENT GRANT PROGRAM (MWHMGP)

The Mass Wildlife Habitat Management Grant Program (MWHMGP) is a program dedicated to the protection and restoration of wildlife habitat. MWHMGP awards grants ranging from \$10,000 to \$75,000 to private landowners for habitat restoration projects. The program places emphasis on the protection of endangered species, the expansion of outdoor recreation opportunities, and the enhancement of ecological communities disproportionately susceptible to climate change. For more information about this program, please refer to: [Mass Wildlife Habitat Management Grant Program | Mass.gov](#).

AGRICULTURAL CLIMATE RESILIENCY AND EFFICIENCIES PROGRAM (ACRE)

The Agricultural Climate Resiliency and Efficiencies Program (ACRE) is a competitive grant program available to eligible farmers that funds materials and labor to improve climate and economic resilience and forwards the goals of the Massachusetts Local Food Action Plan. For more about this program, please refer to: [Agricultural Climate Resiliency & Efficiencies \(ACRE\) Program | Mass.gov](#).

AGRICULTURAL PRESERVATION RESTRICTION PROGRAM (APR)

The Agricultural Preservation Restriction (APR) program is a voluntary program that allows farmers to be paid the difference between the "fair market value" and the "agricultural value" of their farms in exchange for a permanent deed restriction by the state. This restriction is meant to prevent any use of the property that will negatively impact the land's future agricultural viability. To qualify for this program, a farm must be at least 5 acres in size, must have been actively devoted to agriculture for at least the past 2 tax years, and must produce at least \$500 in gross sales per year for the first five acres plus \$5 for each additional acre or 50 cents per each additional acre of woodland and/or wetland; there are various other considered criteria which farms must meet to qualify for this program. For more information on this program, please refer to: [Agricultural Preservation Restriction \(APR\) Program Details | Mass.gov](#).

HAZARD MITIGATION GRANT PROGRAM (STATE) (HMGP)

The Hazard Mitigation Grant Program (HMGP) provides funds to areas after a natural disaster with the purpose of lowering the risk of damage and loss of life from future natural disasters. This grant program seeks to reduce the reliance on taxpayer-funded federal assistance for disaster recovery. For more information about this program, please refer to: [Hazard Mitigation Grant Program \(HMGP\) | Mass.gov](#).

COMMUNITY DEVELOPMENT BLOCK GRANT (CDBG)

The Community Development Block Grant (CDBG) program remains the principal source of revenue for many communities to use in identifying solutions to address physical, economic, and social deterioration in lower-income neighborhoods and communities. CDBG is primarily a housing and community development program administered through the Executive Office of Housing and Livable Communities (EOHLC). The program can fund certain critical infrastructure projects, and necessary housing improvements that benefit populations who may be more vulnerable to certain natural hazards. The program can also fund the rehabilitation of municipal buildings serving low- and moderate-income populations, which in many cases also serve as Emergency Operations Centers for their communities. For more information, please refer to: [Community Development Block Grant \(CDBG\) | Mass.gov](#).

EMERGENCY SOLUTIONS GRANT (EFG)

The Emergency Solutions Grant (EFG) program funds necessary services to help house/rehouse those who are homeless or at risk of homelessness and to provide shelter for those in need of emergency shelter. For more information on this program, please refer to: [Emergency Solutions Grant Program \(ESG\)](#). | [Mass.gov](#).

MASSWORKS INFRASTRUCTURE PROGRAM

The MassWorks Infrastructure Program provides a one-stop shop for municipalities and other eligible public entities seeking public infrastructure funding to support economic development and job creation. Although this program is not specific to natural hazards per se, infrastructure enhancements under MassWorks can address identified hazard mitigation needs. The MassWorks Infrastructure Program is administered by the Executive Office of Housing and Economic Development, in cooperation with the Department of Transportation and Executive Office for Administration & Finance. For additional information on this program, please refer to [MassWorks Infrastructure Program](#). | [Mass.gov](#).

COMMUNITY PRESERVATION ACT (CPA)

The Community Preservation Act (CPA) is a smart growth tool that helps communities preserve open space and historic sites, create affordable housing, and develop outdoor recreational facilities. CPA also helps strengthen the state and local economies by expanding housing opportunities and construction jobs for the commonwealth's workforce and by supporting the tourism industry through preservation of the commonwealth's historic and natural resources. All communities in Massachusetts pay into statewide Community Preservation Trust fund through a real estate excise tax. However, communities must set up a local Community Preservation Fund and governing committee to utilize the trust fund. CPA projects can build local resilience by protecting open spaces and/or creating affordable housing; these types of projects can benefit residents who may be the most vulnerable to natural hazards. More information on the CPA program can be found here: [CPA: An Overview](#). | [Community Preservation Coalition](#).

SPECIAL APPROPRIATIONS AND LEGISLATIVE EARMARKS

Although there is no separate state disaster relief fund in Massachusetts, the state legislature may enact special appropriations for those communities sustaining damages following a natural disaster that are not large enough for a Presidential disaster declaration. Since 2011, Massachusetts has issued 12 state of emergency declarations. Additionally, individual legislators may seek specific project funding for projects through the legislative budgeting and appropriations process.

DISTRICT LOCAL TECHNICAL ASSISTANCE

District Local Technical Assistance (DLTA) is funding allocated by the Massachusetts General Assembly (Legislature) to the Central Massachusetts Regional Planning Commission (CMRPC) to provide technical assistance to member communities on eligible projects. DLTA planning dollars help cities and towns take on necessary projects that they don't have the staff capacity to address on their own and partner with neighboring communities to tackle shared projects with reduced administrative burden.

According to the most recent guidelines of the Commonwealth's DLTA program, a proposed project must fall into one of the following four (4) general priority categories to be considered eligible for technical assistance:

- Planning Ahead for Housing;

- Planning Ahead for Growth;
- Technical Assistance to support Community Compact Cabinet Activities including Regionalization; and
- Supporting the Housing Choice Initiative

The goal of the DLTA Fund is to direct funds to projects and activities that result in change in the municipality/municipalities receiving DLTA Fund services, whether in law, regulation, program management, or practice, that serve to further the objectives listed above. Community Compact Cabinet (CCC) best practices should include both those that the Commonwealth of Massachusetts is seeking to fund as part of the CCC program as a first priority and best practices that explicitly align with CCC best practices but are not best practices identified in a signed CCC agreement. COVID-19 relief / recovery activities that fall under the above priority categories are eligible. For more information, please refer to [2024 District Local Technical Assistance \(DLTA\) Call for Concepts - CMRPC](#).

LOCAL PLANNING ASSISTANCE

The Local Planning Assistance (LPA) program was initiated to improve the direct services of CMRPC to its member communities. Under the LPA program, each CMRPC community annually receives a set number of hours of technical assistance to be used in any reasonable planning project authorized by the community's CMRPC commissioner.

SUPPORT AND INCENTIVE GRANT

The Support and Incentive Grant provides opportunity funding to public safety answering points (PSAPs) and regional emergency communication centers (RECCs) in providing enhanced 9-1-1 service. Entities eligible for the Support Grant include: primary or regional public safety answering points, regional secondary public safety answering points, and regional emergency communication centers. To be eligible for the Incentive Grant, a regional public safety answering point or regional emergency communication center must be expanding. For more on this program, please refer to: [Apply for the Support & Incentive Grant | Mass.gov](#).

MUNICIPAL SMALL BRIDGE PROGRAM

The Municipal Small Bridge Program offers funding opportunities to Massachusetts municipalities for small bridge replacement, preservation, and rehabilitation projects. For more information about this program, please refer to: [Municipal Small Bridge Program | Mass.gov](#).

CHAPTER 90 FUNDS

The statewide Chapter 90 program reimburses communities for roadway improvement projects, such as projects relating to resurfacing and related work, preliminary engineering (including State Aid/Consultant Design Agreements), right-of-way acquisition, shoulders, side road approaches, landscaping and tree planting, roadside drainage, structures (including bridges), sidewalks, traffic control and service facilities, and street lighting (excluding operating costs), as well as for such other purposes specifically authorized. Maintaining and upgrading critical infrastructure and evacuation routes is an important component of hazard mitigation. For more information, please refer to [Chapter 90 Program | Mass.gov](#).

STATE TRANSPORTATION IMPROVEMENT PROGRAM (STIP)

The State Transportation Improvement Program (STIP) is an annual list of transportation infrastructure projects funded and planned through the combined effort of MassDOT and other

state agencies. For more information on this program, please refer to: [State Transportation Improvement Program \(STIP\) | Mass.gov](#).

COMPLETE STREETS (CS)

The Complete Streets (CS) Funding Program provides grants to municipalities in Massachusetts for projects that improve safety and accessibility for all modes of transportation. To qualify for the program, municipalities must pass a Complete Streets Policy and develop a Prioritization Plan. After these requirements have been met, municipalities can apply for up to \$500,000 in construction funding. For more information about this program, please refer to: [Complete Streets Public Overview \(site.com\)](#).

DROUGHT RESILIENCY AND WATER EFFICIENCY GRANT PROGRAM

The Drought Resiliency and Water Efficiency Grant Program aims to provide funding for projects that will help the Commonwealth become more climate resilient, specifically by reducing indoor and outdoor water use, improving water loss control, and increasing drought management and planning in public water systems across the state. Target awards are up to \$50,000 per project, with potential for larger awards depending on the number of applications received. This grant program helps implement actions in the State Hazard Mitigation and Climate Adaptation Plan (SHMCAP). For more information about this program, please refer to: [COMMBUYS](#).

APPENDIX A:

Maps

Hazard Mitigation Plan

Map 1

Critical Infrastructure and Facilities

Town of Brookfield, Massachusetts

July 2026

Assisted Living

Elderly Housing

Emergency Shelters

End Of Life Facilities

Misc Data

Nursing/Rest Homes

Daycare

EOC

Airports

Town Halls

Local Police

State Police

Fire Station

Schools (Pre-K through High School)

WRTA Bus Stop

WRTA Bus Routes (IN/OUT)

Active Rail Line

MA Environmental Justice Populations 2020

Income

Town Boundaries

Structures

Water Bodies

Streams

Roads

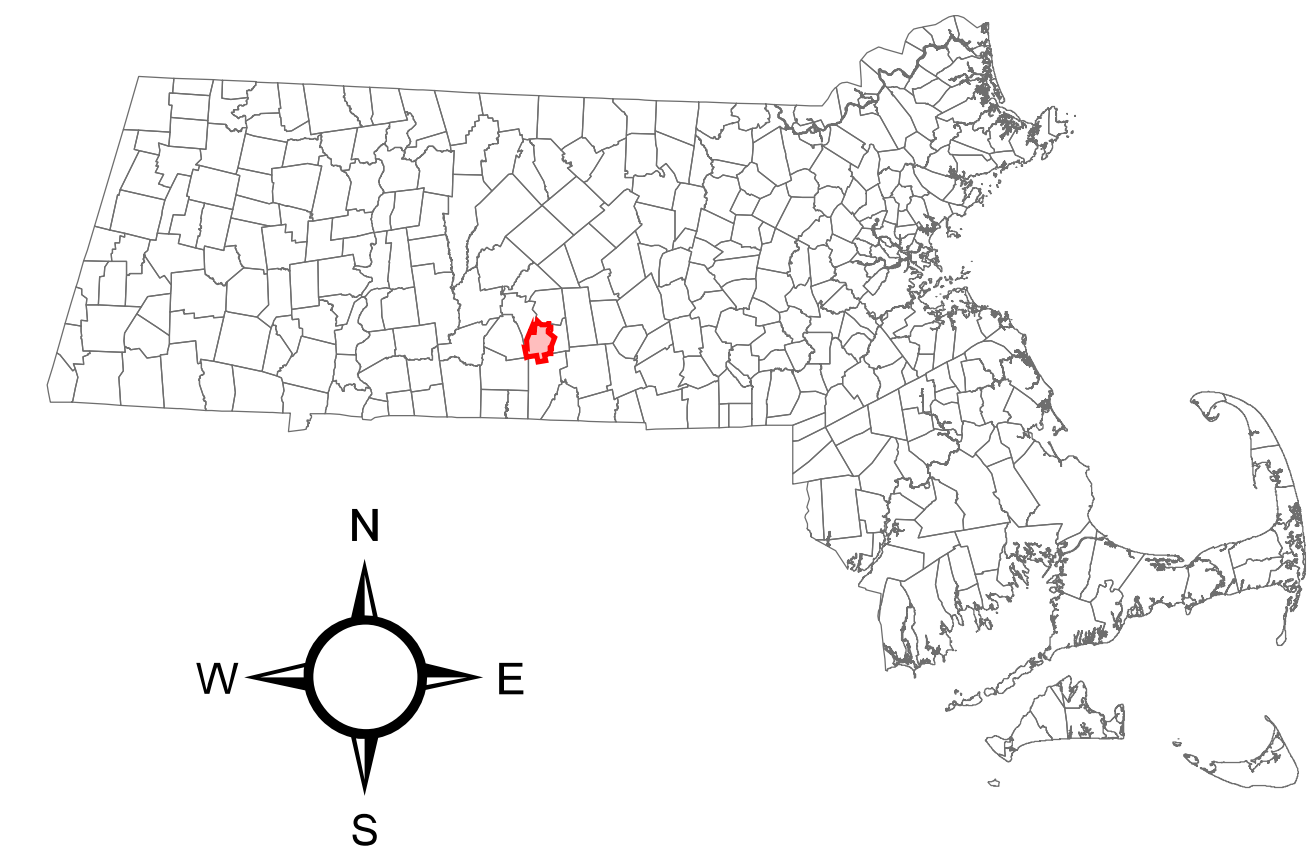
Regionwide Evacuation Routes

Dams (2/2012)

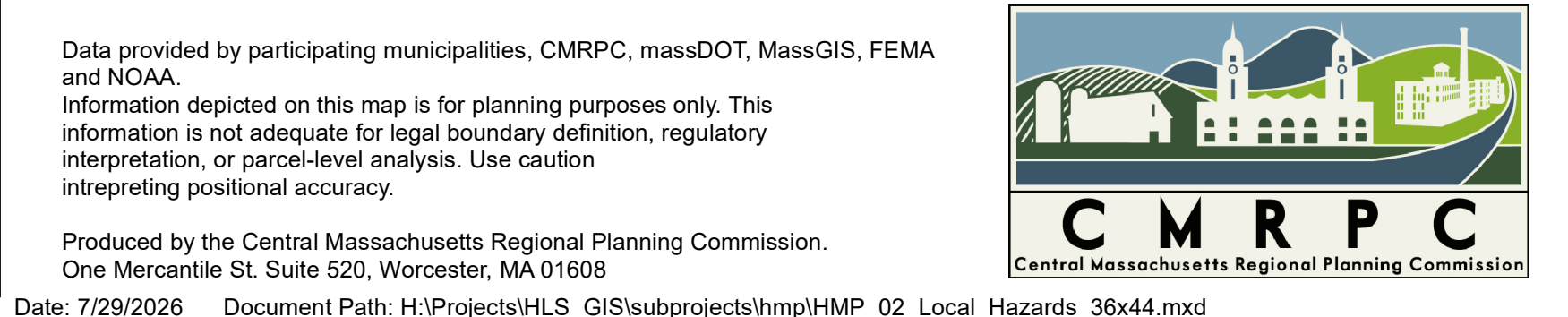
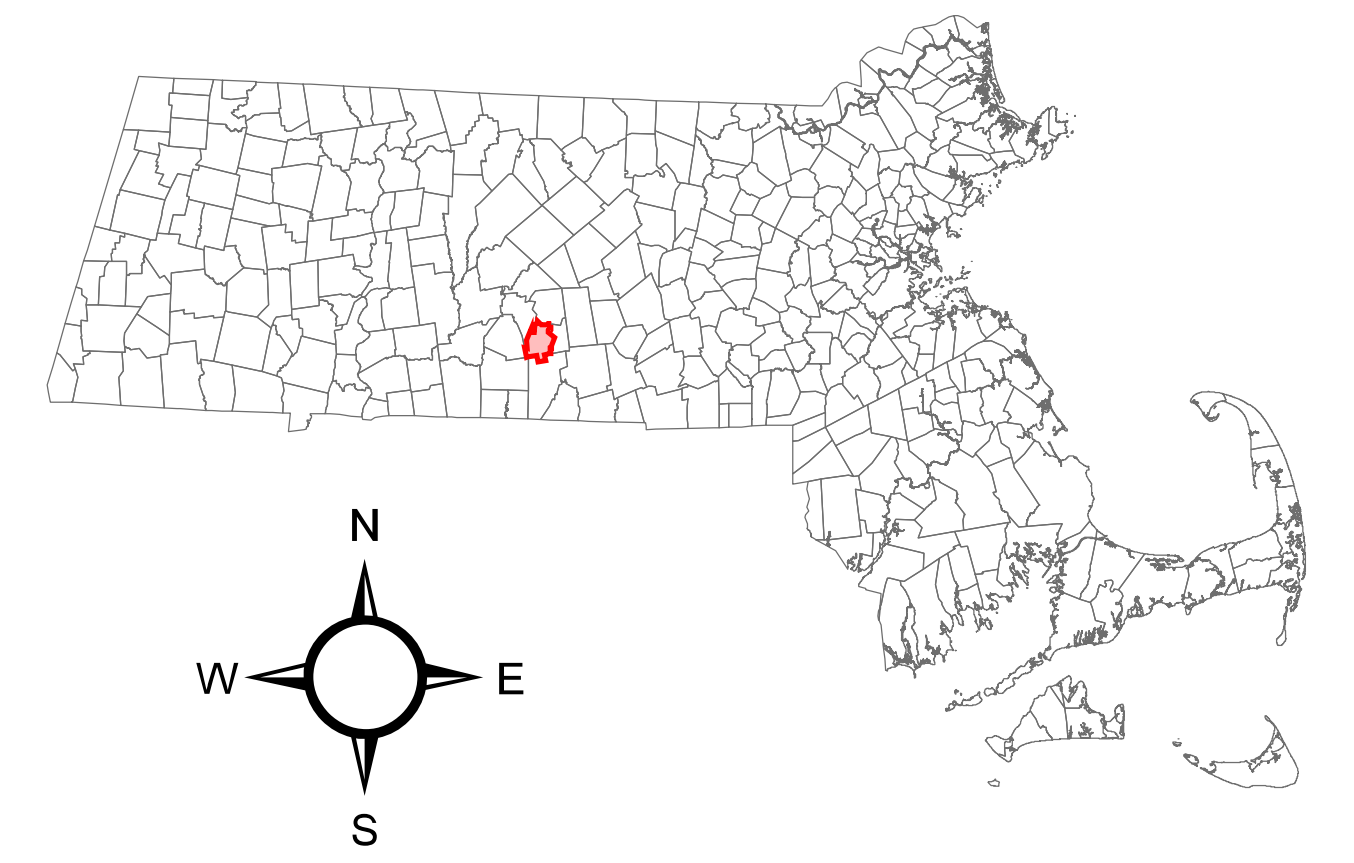
Critical Infrastructure

Critical Infrastructure

Critical Infrastructure



Map 2
Hazards
Town of Brookfield,
Massachusetts
July 2026



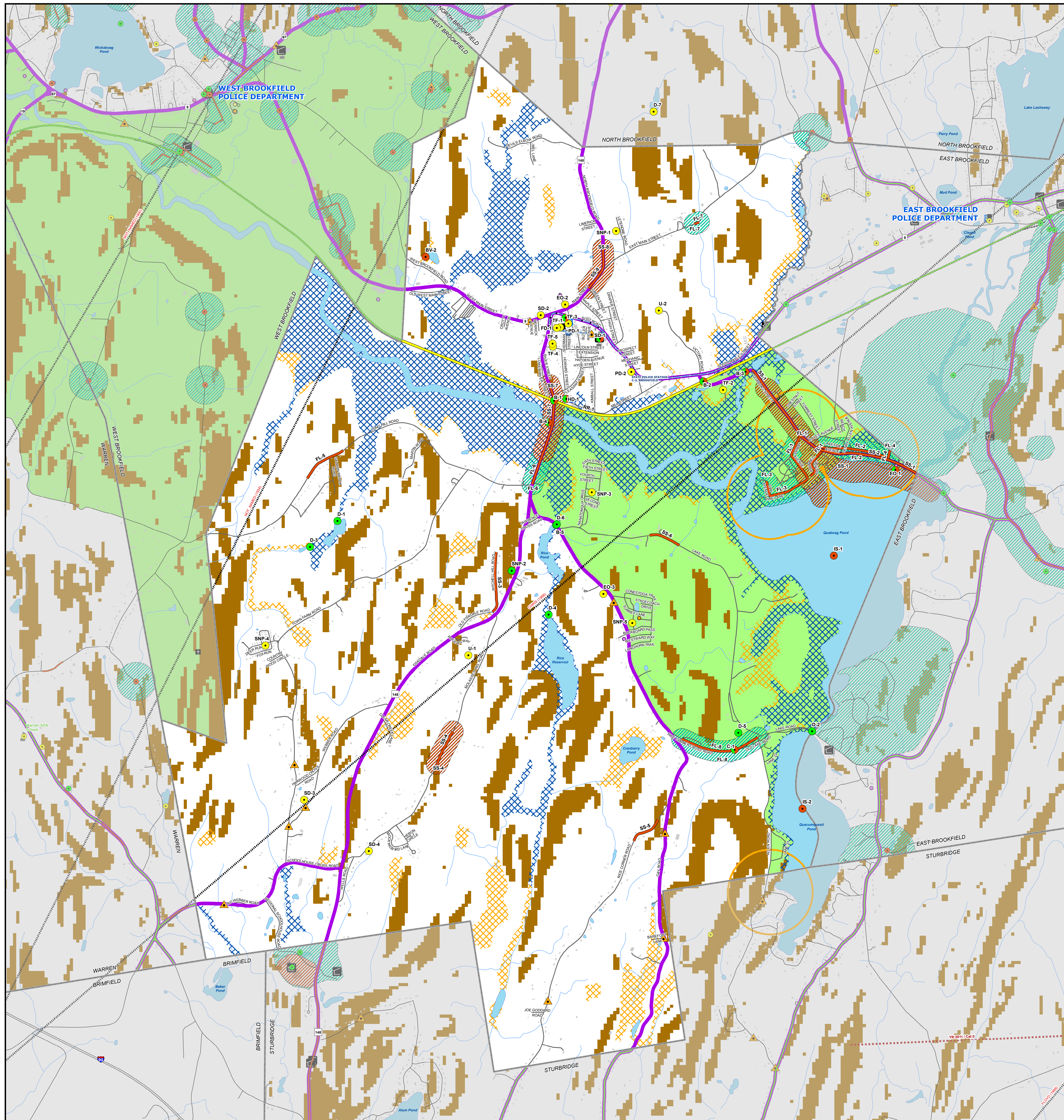
Hazard Mitigation Plan

Map 3

Vulnerable Critical Infrastructure and Facilities

Town of Brookfield, Massachusetts

July 2026



Legend

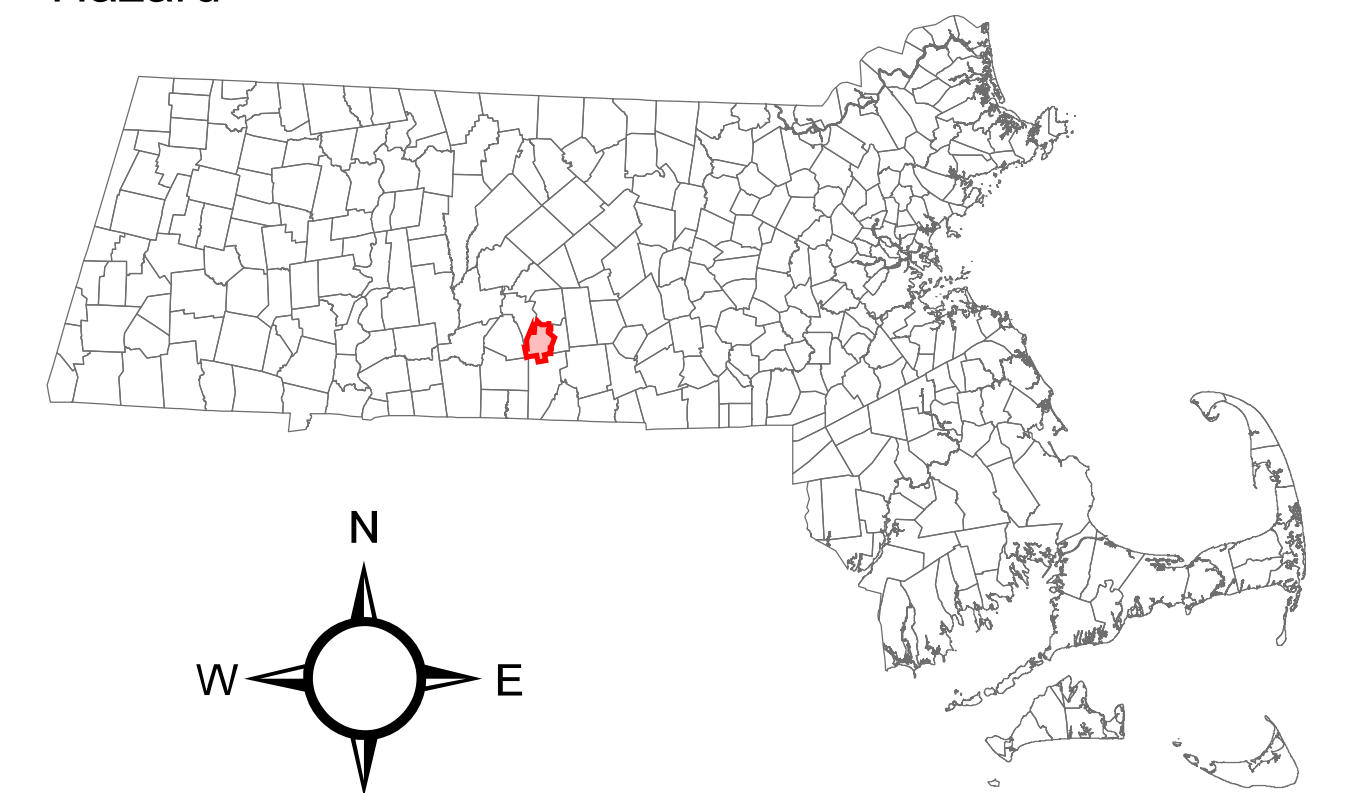
- | | | |
|------------------------|-------------------------------------|---|
| Assisted Living | Town Halls | MA Environmental Justice Populations 2020 |
| Elderly Housing | Local Police | Income |
| Emergency Shelters | State Police | |
| End Of Life Facilities | Fire Station | |
| Misc Data | Schools (Pre-K through High School) | |
| Nursing/Rest Homes | WRTA Bus Stop | |
| Daycare | WRTA Bus Routes (IN/OUT) | |
| EOC | Active Rail Line | |
| Airports | | |
-
- | | | |
|-----------------|---------|------------------------------|
| Town Boundaries | Streams | Regionwide Evacuation Routes |
| Structures | Roads | |
| Water Bodies | | |

Hazards

- FEMA DFIRM Flood Zones
- 1% Annual Chance Flood Hazard or Regulatory Floodway
 - FEMA Q3 Flood Zones
- IBTrACS Historical Hurricane Tracks (1842-2020)
- High Slope (15% and above)
 - Repetitive Loss Property Areas
 - NOAA Tornado Tracks (as of 9/2021)

Locally Defined

- | | | |
|--|--|--|
| Hazard | Hazard | Possible Flood Area |
| Vulnerable Critical Infrastructure | Vulnerable Critical Infrastructure | Hazard |
| Vulnerable Critical Infrastructure/ Hazard | Vulnerable Critical Infrastructure/ Hazard | Vulnerable Critical Infrastructure |
| Non-vulnerable Critical Infrastructure | Non-vulnerable Critical Infrastructure | Non-vulnerable Critical Infrastructure |
| Non-vulnerable Critical Infrastructure/ Hazard | | |



0.45 0.225 0 0.45 0.9 Miles

Data provided by participating municipalities, CMRPC, massDOT, MassGIS, FEMA and NOAA. Information depicted on this map is for planning purposes only. This information is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Use caution interpreting positional accuracy.

Produced by the Central Massachusetts Regional Planning Commission, One Mercantile St. Suite 520, Worcester, MA 01608

Date: 7/29/2026 Document Path: H:\Projects\HLS_GIS\subprojects\hmp\HMP_03_Local_Cls_Hazards_36x44.mxd



Key to Locally Identified Hazards and Critical Infrastructure

Facility/Infrastructure/Hazard	Type	Map ID	Vuln. GIS	Vuln. Town
Brookfield Fire/EMS	CI	FD-1		
Brookfield Police Department	CI	PD-1		
State Police Barracks	CI	PD-2		
Life Flight Landing Zone 2	CI/H	EO-1	Y	Y
Life Flight Landing Zone 3	CI	EO-2		
Life Flight Landing Zone 6	CI	EO-3		
Brookfield Highway Department	CI/H	HD-1	Y	Y
Brookfield Town Hall and A.P.P.L.E. Seed Inc. WAFC-LP Radio Station	CI	TF-1		
Transfer Station	CI	TF-2		
U.S. Post Office	CI/H	TF-3	Y	Y
Merrick Public Library	CI	TF-4		
Library Annex	CI	TF-5		
Cell Tower – Rodgers Way	CI	U-1		
Cell Tower – Victory Road	CI	U-2		
CSX Railroad	CI	RR-1		
CSX Bridge – Fiskdale Road	CI/H	B-1	Y	Y
CSX Bridge – Quaboag Street	CI/H	B-2	Y	Y
Dunn Brook Bridge	CI/H	B-3	Y	Y
Quaboag River Bridge	CI/H	B-4	Y	Y
Sawmill Pond Bridges	CI	B-5		
Rice Corner Cross Road Culvert	CI/H	C-1	Y	Y
Salmon Brook Dam	CI	D-1	Y	
Quacumquasit Pond Outlet Flow Control Structure	CI	D-2	Y	Y
Recreation Dam	CI	D-3	Y	
Rice Reservoir Dam	CI	D-4	Y	
Pool Dam	CI	D-5	Y	
Sawmill Pond Dam	CI	D-6	Y	
Man-O-Name #20 Dam (also known as Cooley Hill Dam)	CI	D-7		
Brookfield Elementary School	CI/H	SD-1	Y	Y
Willow Brook Academy Montessori School	CI	SD-2		
Daycare	CI	SD-3		
Daycare	CI	SD-4		
Rehabilitative Resources Inc.	CI	SNP-1		
Rehabilitative Resources, Inc.	CI	SNP-2	Y	
Nanatomque Mobile Home Park	CI	SNP-3		
Brookfield Meadows	CI	SNP-4		
Wagon Wheel Cooperative	CI	SNP-5		

Facility/Infrastructure/Hazard	Type	Map ID	Vuln. GIS	Vuln. Town
Town Farm Road Beaver Problems	H	BV-1	N/A	N/A
West Brookfield Road Beaver Dam	H	BV-2	N/A	N/A
Flooding – Hobbs Ave and Brunelle Ave	H	FL-1	N/A	N/A
Flooding – Quaboag Street towards North Pond	H	FL-2	N/A	N/A
Flooding – Oak Ave and Pine Lane	H	FL-3	N/A	N/A
Flooding – Hebert Road Pump Station	H	FL-4	N/A	N/A
Flooding – Long Hill Road at Salmon Brook	H	FL-5	N/A	N/A
Flooding – Route 148 Quaboag River to Long Hill Road	H	FL-6	N/A	N/A
Flooding – East Main Street	H	FL-7	N/A	N/A
Flooding – Rice Corner Cross Road	H	FL-8	N/A	N/A
Quabog Pond Invasives	H	IS-1	N/A	N/A
Quacumquasit Pond Invasives	H	IS-2	N/A	N/A
Snow Drifting – Hobbs Ave and Quaboag Street	H	SS-1	N/A	N/A
Snow Drifting – Quaboag Street near East Brookfield	H	SS-2	N/A	N/A
Snow Drifting – Mitchell Hill Road	H	SS-3	N/A	N/A
Snow Drifting – #50 Molasses Hill Road	H	SS-4	N/A	N/A
Snow Drifting – Dresser Hill Road	H	SS-5	N/A	N/A
Snow Drifting – #110 and #112 Rice Corner Road	H	SS-6	N/A	N/A
Snow Drifting – 50 Lake Road to South Pond	H	SS-7	N/A	N/A
Snow Drifting – Route 148 by the Quaboag River	H	SS-8	N/A	N/A
Snow Drifting – Route 148 and East Main Street	H	SS-9	N/A	N/A

Critical Infrastructure Acronym Codes:

FD: Fire Department

PD: Police Department

EO: Emergency Operations

HD: Highway Department

TF: Town Facilities

U: Utilities

RR: Railroad

B: Bridges

C: Culverts

D: Dams

SD: Schools and Daycares

SNP: Special Needs Populations

Hazards Acronym Codes:

BV: Beavers

FL: Flooding

IS: Invasive Species

SS: Severe Snowstorm

APPENDIX B

Public Survey Materials and Results

Appendix B helps meet the following FEMA local mitigation plan requirements:

- A1. *“Does the plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction?” (Requirement 44 CFR § 201.6(c)(1))*
- A2. *“Does the plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development as well as businesses, academia, and other private and non-profit interests to be involved in the planning process?” (Requirement 44 CFR § 201.6(b)(2)); and*
- A3. *“Does the plan document how the public was involved in the planning process during the drafting stage and prior to plan approval?” (Requirement 44 CFR § 201.6(b)(1))*

Brookfield Hazard Mitigation Plan Community Survey

Brookfield Hazard Mitigation Plan

In May 2024, the Town of Brookfield started the planning process to update its Hazard Mitigation Plan (HMP). An updated HMP will help the town identify strategies to reduce its vulnerability to hazards like flooding, winter storms, and drought. Climate change may shift the extent and severity of certain natural hazards, including those that already impact Brookfield.

By participating in this survey, you will help the Town of Brookfield understand the current and future natural hazards that residents are most concerned about. Survey responses will be accepted until January 15th, 2025.

1. Check all that apply.

- ☐ I live in Brookfield.
- ☐ I work in Brookfield.
- ☐ I frequently visit Brookfield.

2. Has your family, household, or property in Brookfield been impacted by any of the following natural hazards? Select all that apply:

- ☐ I have not been impacted by natural hazards in Brookfield
- ☐ Winter Storms / Ice
- ☐ Thunderstorms, Microbursts, and/or Extreme Wind
- ☐ Tornadoes
- ☐ Flooding
- ☐ Extreme Heat / Extreme Cold
- ☐ Drought
- ☐ Wildfire / Brushfire
- ☐ Hurricanes
- ☐ Earthquakes
- ☐ Poor Air Quality
- ☐ Invasive Species
- ☐ Other (please specify)

3. Where have you observed hazard impacts in Brookfield, and what were those impacts?

Examples: flooding on specific roads, drought/effects on water supply, extended power outages, trees down on roads, beaver dams affecting property and septic systems due to flooding from dams.

4. How much do you think the impacts of natural hazards and climate change will threaten your personal health, safety, or property?

- ☐ I think natural hazards and climate change will negatively impact my life.
- ☐ I'm not sure how natural hazards and climate change will impact my life.
- ☐ I don't think that I personally will be impacted by natural hazards and climate change.

5. If you are concerned about impacts to your life from natural hazards and/or climate change, what impacts are you most concerned about?

Examples: basement flooding, wells drying out / contamination of wells, ability to grow food

6. How concerned are you about the impacts that natural hazards and climate change will have on the Town of Brookfield (the local infrastructure, economy, environment, and/or town residents)?

- ☐ Very concerned
- ☐ Somewhat concerned
- ☐ Unsure
- ☐ Somewhat unconcerned
- ☐ Not concerned at all

7. What community assets are you most concerned about when you consider the potential impact of natural hazards and climate change on the Town of Brookfield? Rank the responses below in order from most concerned (1) to least concerned (5).

- | | | |
|---|----------------------|--|
| ☰ | <input type="text"/> | Local natural resources and environments |
| ☰ | <input type="text"/> | Resident health, safety, and property |
| ☰ | <input type="text"/> | Local infrastructure |
| ☰ | <input type="text"/> | Local business and the town economy |
| ☰ | <input type="text"/> | Local government resources |

8. Which of the following aspects of natural hazards and climate change would you like to learn more about? Select all that you are interested in.

- ☐ Impacts on well water quantity / quality
- ☐ Future flood risks
- ☐ Impacts on infrastructure
- ☐ Sustainability initiatives
- ☐ Public health impacts like increased risks of vector-borne disease (ex. Lyme disease, West Nile Virus, EEE - Eastern equine encephalitis)
- ☐ Impacts on town budget and finances
- ☐ Impacts on wildlife
- ☐ Impacts on the health of local forests
- ☐ Impacts on future development
- ☐ Other (please specify)

9. What actions should the Town of Brookfield take to cultivate local resilience to natural hazards?

Examples: increase local capacity to apply for hazard mitigation grant funding and implement hazard mitigation projects; improve storm water management; provide more education and outreach about how climate change could impact my life; encourage planting climate-resilient tree species; encourage cutting/trimming dead trees beside/hanging over roads; etc.

10. If you would like to stay informed about other opportunities to participate in Brookfield's Hazard Mitigation planning process, please enter your E-mail address below.

Survey Responses Needed!

The Town of Brookfield is currently working with The Central MA Regional Planning Commission on the town's Hazard Mitigation Plan and we need your input!

We want to hear from you about:

- How you have been affected by natural hazards in and around Town
- What natural hazards are you most concerned about
- How you think climate change and natural hazards will affect Brookfield
- Your suggestions for mitigating the effects of climate change and natural hazards to Brookfield

Answer the survey by January 15th, 2025 using the QR code below:



TIP: Open your phone camera, point at QR code, and click on pop-up link to take the survey, OR type the link below into your web browser:

<https://www.surveymonkey.com/r/38TNND5>





Brookfield residents! The Town of Brookfield is currently working with CMRPC to update its 2018 Hazard Mitigation Plan (HMP) and we need your input! Please consider taking this short survey to share your experiences with natural hazards. Take the survey by January 15th, 2025: <https://www.surveymonkey.com/r/38TNND5>

Town of Brookfield Hazard Mitigation Plan (HMP) Public Survey

The Town of Brookfield is working with the Central MA Regional Planning Commission (CMRPC) to update its HMP and we need your input!

You may fill out paper copies at the Town Hall, Library, or TipTop Country Store or take the survey online.



Questions? Send an email to
gjarvis@cmrpc.org

HAZARD MITIGATION PLAN (HMP) PUBLIC SURVEY DROP BOX

The Town of Brookfield is working with the Central MA Regional Planning Commission (CMRPC) to update its Hazard Mitigation Plan (HMP) and we need your input!

For more information on this planning process, please email:
mgranato@cmrpc.org

You may submit a paper copy in this drop box or take the survey online by scanning the QR code with your phone or visiting this link:

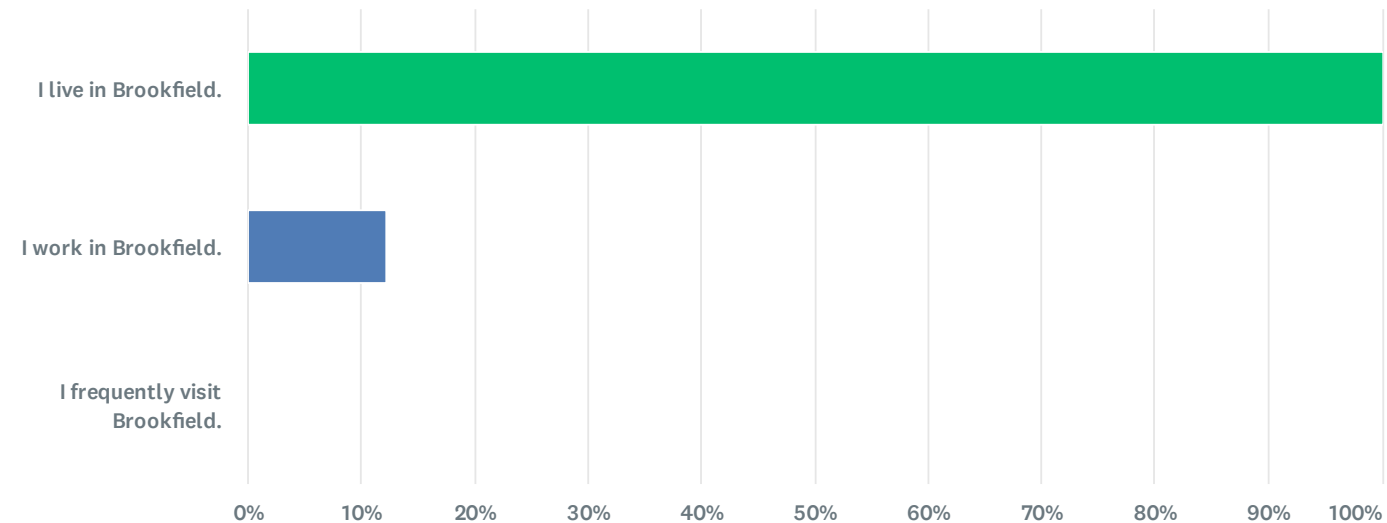
<https://www.surveymonkey.com/r/38TNND5>

SCAN ME



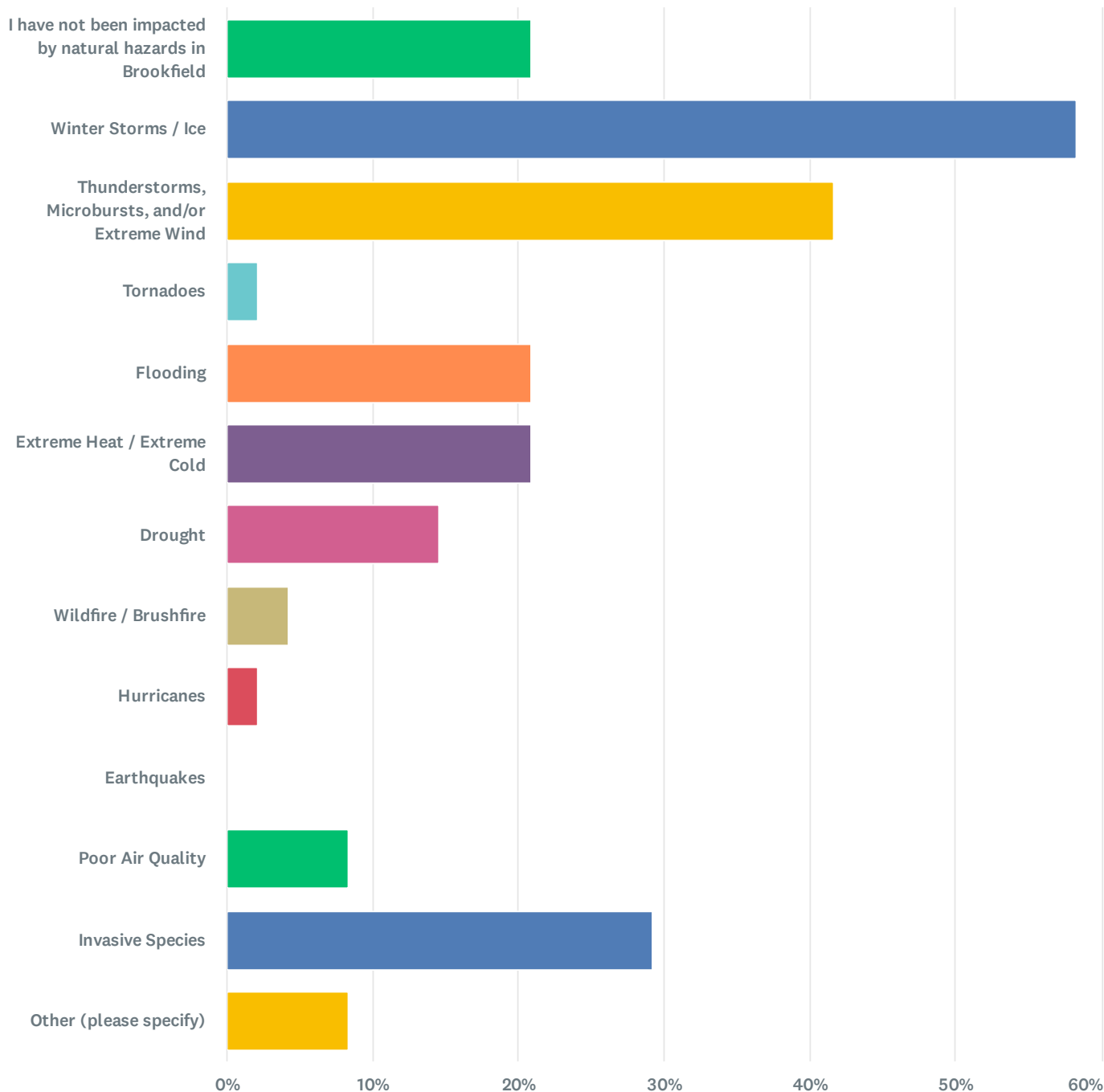
Q1 49 responses

Check all that apply.



Q2 48 responses

Has your family, household, or property in Brookfield been impacted by any of the following natural hazards? Select all that apply:



#	OTHER (PLEASE SPECIFY)	DATE
1	Dead fallen trees	11/14/2024 11:29 PM
2	Ticks/ mosquitoes	11/12/2024 2:24 PM

Brookfield Hazard Mitigation Plan Community Survey

3	Just	11/7/2024 9:42 PM
4	Dead tree's/branches hanging over power wires & power wires anchored to dead tree	11/7/2024 7:32 PM

Q3 Where have you observed hazard impacts in Brookfield, and what were those impacts? Examples: flooding on specific roads, drought/effects on water supply, extended power outages, trees down on roads, beaver dams affecting property and septic systems due to flooding from dams.

Answered: 38 Skipped: 11

#	RESPONSES	DATE
1	A windy thunderstorm toppled a >2' diameter maple onto my garage. Disruption of an 1850's French drain by a new septic system nearby has resulted in frequent basement flooding year round. Every year I have to pull up invasive species.	11/23/2024 11:59 AM
2	Flooding Quaboag st	11/17/2024 6:26 AM
3	Trees down on Molasses Hill and Wells Road. Flooding on Quaboag Rd and 148 near the river.	11/15/2024 8:20 PM
4	Quaboag st - flooding	11/14/2024 8:05 PM
5	Flooding on specific roads, trees down on roads, rats from the dump in houses.	11/14/2024 3:15 PM
6	Brush fire, lower/ dry streams.	11/12/2024 2:24 PM
7	Flooding/ Quaboag street	11/11/2024 12:42 PM
8	Every storm brings down trees and causes power issues where we live, on Lake Rd. At one point, a tree fell on our power lines causing them to smoke and spark, and necessitating emergency intervention. Additionally, knotweed and bittersweet are everywhere, and the town routinely just cuts it back from the road, which causes it to spread.	11/10/2024 3:08 PM
9	Beaver dams	11/9/2024 5:54 PM
10	Household trash dump on the little lane from Rt 9 to the railroad tracks very close to the river.	11/9/2024 8:13 AM
11	Lots of older trees have been coming down taking down power lines for years. Rice Corner Road is always impacted by any weather event and loses power.	11/8/2024 8:46 PM
12	Trees frequently down causing power outages Invasive plant species Increased Mosquito population	11/8/2024 6:25 PM
13	Living on the river I deal with Flooding on the Quaboag River, loss of land, threat of home. Invasive weeds at rivers edge.	11/7/2024 11:38 PM
14	110 Quaboag Street	11/7/2024 11:01 PM
15	Flooding on pint lane. Fallen pine trees from storms. Downed power lines	11/7/2024 9:42 PM
16	Flooding on QUABOAG street ! Extreme sewerage on Draper street at town water supply!!	11/7/2024 8:01 PM
17	Molasses Hill Rd	11/7/2024 7:32 PM
18	Ice storm, power out 1 week, a lot of dead tree along roads	11/7/2024 6:26 PM
19	Flooding Rte 148 at quaboag river bridge. Flooding long hill rd	11/7/2024 5:55 AM
20	Flooding on Route 148, Quaboag St	11/6/2024 5:20 PM
21	We have seen the effects of natural hazards on our property, where we have lost a number of trees in recent years due to storms and wind. Our gardens have been impacted by the weather as well, with drought being an issue in the most recent growing season. Unfortunately, when there is substantial rain, our basement floods.	11/6/2024 6:55 AM
22	Winter storms have not brought snow but wind and ice, increasing damage to personal property and increasing power outages resulting in an increased electric bill for many. Prolonged intense	11/6/2024 1:20 AM

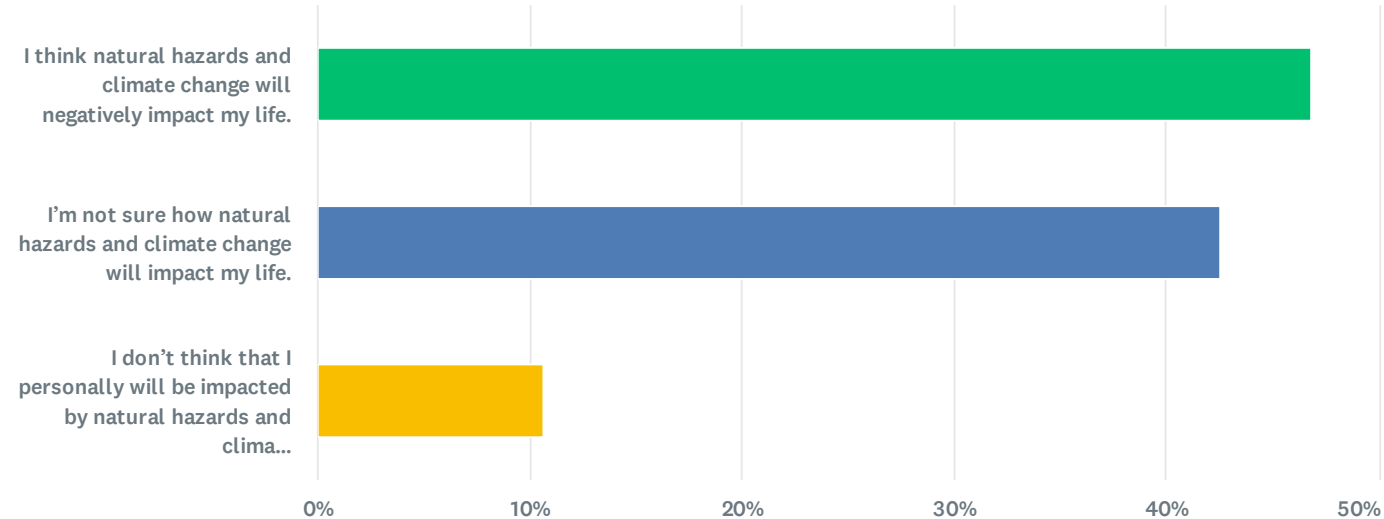
Brookfield Hazard Mitigation Plan Community Survey

heat waves also have been a problem for both electric efficiency outdoor productivity. The ticks, mosquitoes and other pests are relentless lately, I have stopped enjoying time outside.

23	Invasive species in Quaboag and quicumquaset lakes,	11/5/2024 10:08 PM
24	Quahog River over banks Molasses Hill power outages	11/5/2024 8:09 PM
25	Molasses ; rice corner, town farm	11/5/2024 6:56 PM
26	Trees down from winter storm and summer winds caused extended power outage.	11/5/2024 6:39 PM
27	Some of the things that I think have impacted Brookfield are; Flooding roadways and private properties Drought causing brush fires and growth of invasive plant species in water ways Trees down causing extensive power outages	11/5/2024 11:30 AM
28	I haven't	11/5/2024 11:03 AM
29	Power outages and downed trees	10/10/2024 1:34 PM
30	Thunderstorms causing more frequent power outages. Hi wind causing outdoor furniture to top over and blow across the yard. Extreme heat and cold impacting bird and animal breeding and lack of food for Young at the proper season. Extreme heat and cold raising electric bills sharply. Drought in September 2024 Causing curling and dried leaves for many established trees and bushes, making it necessary for us to water, sometimes daily, areas of the landscape we have not needed to water for years. Poor air quality and increased tree allergies causing family members difficulty being outdoors often.	10/9/2024 1:50 PM
31	My driveway has been damaged my severe rainfall and ice. Our woodlands on our property has several invasive species including oriental bittersweet, multiflora rose, and others.	9/30/2024 10:38 PM
32	Trees taking down power lines due to weather conditions. Sometimes they are dead trees from invasive species infestation.	9/30/2024 10:14 PM
33	beaver dams causing severe flooding on property	9/25/2024 9:42 AM
34	Quaboag street floods. So does the end of Pine lane by the river.	9/24/2024 10:45 PM
35	Homes near North Pond	9/24/2024 7:06 PM
36	I haven't seen any hazard impacts in Brookfield	9/24/2024 5:04 PM
37	I have not observed much impact	9/24/2024 2:08 PM
38	Flooding on Quaboag St resulting in road being closed	9/24/2024 11:35 AM

Q4 47 responses

How much do you think the impacts of natural hazards and climate change will threaten your personal health, safety, or property?



**Q5 If you are concerned about impacts to your life from natural hazards and/or climate change, what impacts are you most concerned about?
Examples: basement flooding, wells drying out / contamination of wells, ability to grow food**

Answered: 33 Skipped: 16

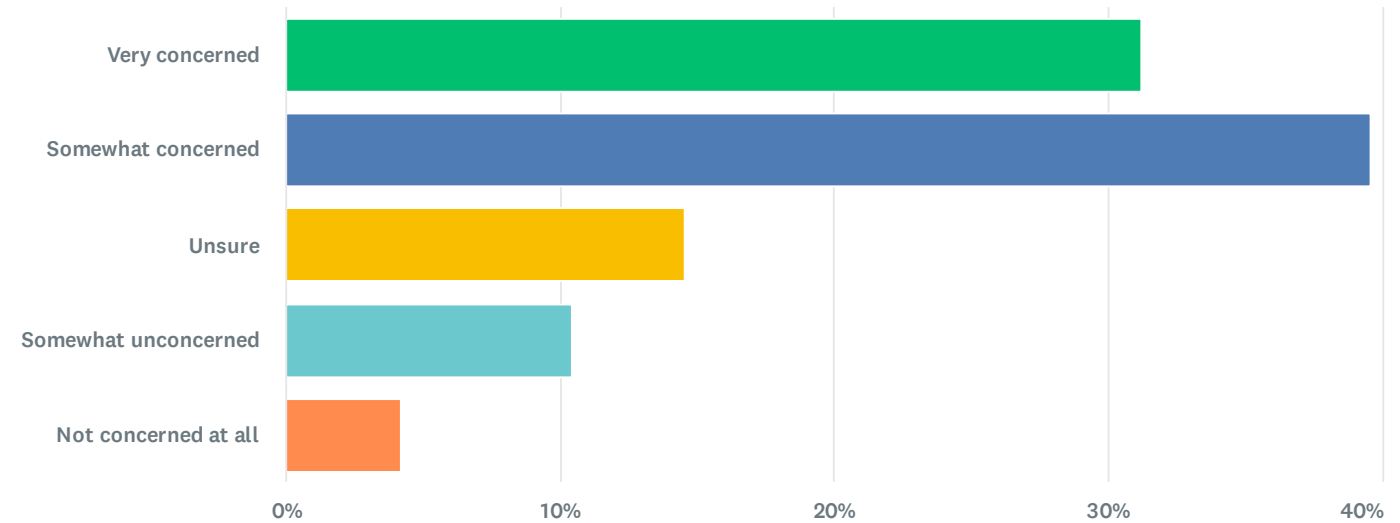
#	RESPONSES	DATE
1	Power loss from increasingly frequent and violent storms.	11/23/2024 11:59 AM
2	Town water supply	11/17/2024 6:26 AM
3	Fought impacting good growth, wells drying out	11/15/2024 8:20 PM
4	Loss of taxpayer dollars spent on the scam of climate change	11/14/2024 11:29 PM
5	None	11/14/2024 8:05 PM
6	Drought, severe winter weather, severe wind and rain storms. Mainly because I'm an senior citizen.	11/14/2024 3:15 PM
7	Well drying out	11/12/2024 2:24 PM
8	Resources such as water limited ability to grow food	11/10/2024 8:26 PM
9	Wells drying out	11/9/2024 5:54 PM
10	I've been fortunate with no basement flooding, even throughout last season with the many rainstorms we got. It would be devastating for my well to go dry.	11/8/2024 8:46 PM
11	All effects caused by climate change Extreme weather issues Mosquito born disease Tick born disease	11/8/2024 6:25 PM
12	Flooding	11/7/2024 11:38 PM
13	Flooding or drought	11/7/2024 11:01 PM
14	Fallen trees; flooding;; snow; torrential rains	11/7/2024 9:42 PM
15	Losing power because of dead tree's/limbs hanging over power wires or too close to wires	11/7/2024 7:32 PM
16	Not sure at this time	11/7/2024 6:26 PM
17	Drought. We have well water this could be an issue. Also with everything so dry, fires spread quickly and there are no hydrants or public water on the south side of the quaboag river.	11/7/2024 5:55 AM
18	Im concerned about being forced to buy shitty electric vehicle	11/6/2024 5:20 PM
19	Invasive species	11/6/2024 1:35 PM
20	Basement flooding; ability to grow food; keeping our house cool/warm in a changing climate where temperatures hit extremes	11/6/2024 6:55 AM
21	Energy costs. One of the biggest expenses in New England is heating and cooling. With summers getting longer and hotter this means many homes like mine without fancy boilers and window unit 10 year old air conditioners will continue to struggle with high energy costs.	11/6/2024 1:20 AM
22	Flooding basement well issues	11/5/2024 8:09 PM
23	The huge costs associated with doing no for so long.	11/5/2024 7:44 PM
24	Basement flooding, wells drying, high winds and downed trees.	11/5/2024 6:39 PM
25	Not concerned at this time	11/5/2024 11:03 AM

Brookfield Hazard Mitigation Plan Community Survey

26	Ability to grow food, ability for wildlife to reproduce and for bees to pollinate food, Ability for plants and trees to survive, ability for people with allergies to be outdoors.	10/9/2024 1:50 PM
27	Basement flooding, wells drying out, ability to grow food, ability to enter and exit property. For the town I am concerned about the lakes and rivers flooding/drying out. 148 runs right by a large section of wetlands that gets very close to the road during extreme rainfall. If this trend continues I may not be able to get to town if the road floods.	9/30/2024 10:38 PM
28	Extreme seasonal weather. Well drying out. Well contamination. Health of trees, plants, and wildlife.	9/30/2024 10:14 PM
29	farm land flooded and rendered useless for agriculture	9/25/2024 9:42 AM
30	Inability to grow food and freezing cold winters that cost a fortune to heat	9/24/2024 10:45 PM
31	On a local scale I am not concerned about effects of climate change. I own and operate a small farm and it has been effected by excess rain and now lack of rain but I will refocus efforts to grow drought tolerant flowers and crops.	9/24/2024 5:04 PM
32	Large politics influencing local government to to rash decisions which adversely effect the community	9/24/2024 2:08 PM
33	Flooding basement	9/24/2024 11:35 AM

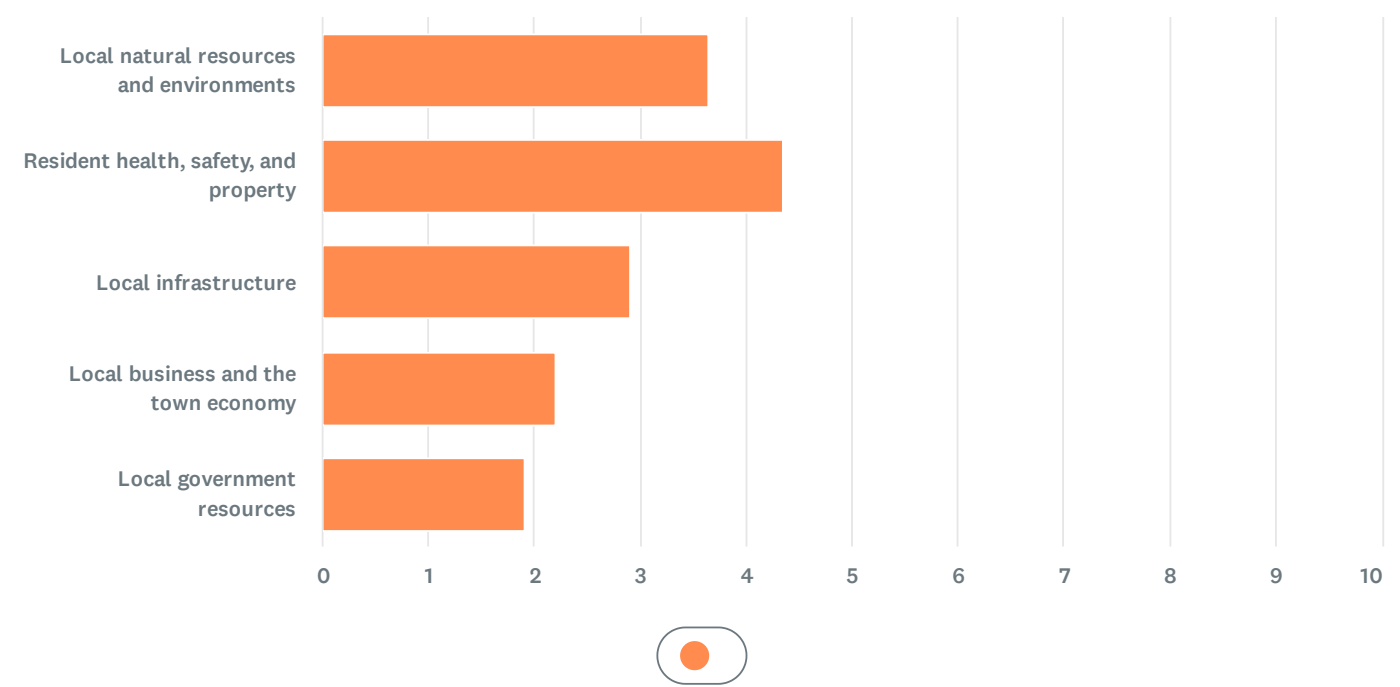
Q6 48 responses

How concerned are you about the impacts that natural hazards and climate change will have on the Town of Brookfield (the local infrastructure, economy, environment, and/or town residents)?



Q7 49 responses

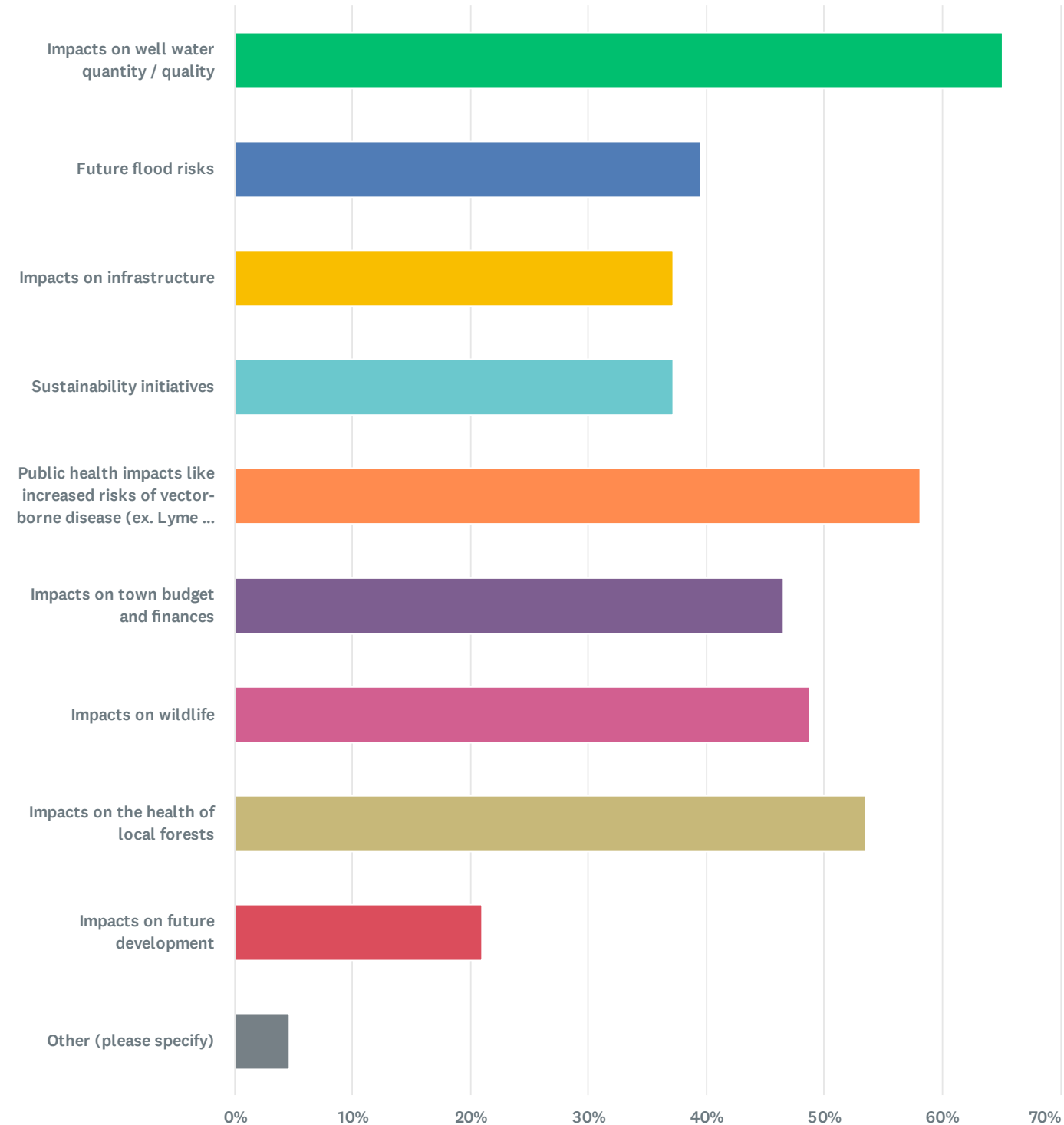
What community assets are you most concerned about when you consider the potential impact of natural hazards and climate change on the Town of Brookfield? Rank the responses below in order from most concerned (1) to least concerned (5).



Q8

43 responses

Which of the following aspects of natural hazards and climate change would you like to learn more about? Select all that you are interested in.



#	OTHER (PLEASE SPECIFY)	DATE
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Brookfield Hazard Mitigation Plan Community Survey

1	Climate change is a scam	11/14/2024 11:29 PM
2	Increases in taxes and invasive restrictions	9/24/2024 2:08 PM

Q9 What actions should the Town of Brookfield take to cultivate local resilience to natural hazards? Examples: increase local capacity to apply for hazard mitigation grant funding and implement hazard mitigation projects; improve storm water management; provide more education and outreach about how climate change could impact my life; encourage planting climate-resilient tree species; encourage cutting/trimming dead trees beside/hanging over roads; etc.

Answered: 31 Skipped: 18

#	RESPONSES	DATE
1	Improve storm water management; cut dead safety-hazard trees; broadcast a free public broadband internet a la Princeton.	11/23/2024 11:59 AM
2	Tree trimming and health of trees	11/17/2024 6:26 AM
3	Education and outreach about climate change - it's a real threat	11/15/2024 8:20 PM
4	Encourage cutting and trimming dead trees, get rid of beavers	11/14/2024 11:29 PM
5	More and extended hazard mitigation training, also emergency training like our C.E.R.T.S	11/14/2024 3:15 PM
6	Brush fire control	11/12/2024 2:24 PM
7	Not sure	11/10/2024 8:26 PM
8	Honestly, I don't know enough about the degree to which all of these hazards are present in town to appropriately determine how they are prioritized and addressed. I am happy to share what information I have to contribute to a more complete picture and hopefully help increase the success of what plan is created.	11/10/2024 3:08 PM
9	Definitely need to address the many old and dead trees that line our roads.	11/8/2024 8:46 PM
10	All of above	11/8/2024 6:25 PM
11	Because of my proximity to lake, I would feel more secure if trees that could fall on buildings, could be removed without so much red tape	11/7/2024 11:01 PM
12	Get grants for tree management.	11/7/2024 9:42 PM
13	maintain trees hanging over wires/too close to roadway	11/7/2024 7:32 PM
14	Take care of roads, trees, infrastructure	11/7/2024 6:26 PM
15	Hazard trees	11/6/2024 1:35 PM
16	All the above. Financial assistance to residents to prepare for impact (such as flood mitigation assistance; funding to plant native species to help the micro environment; money to assist with purchasing sustainable heating/cooling options like mini splits) or conducting outreach with folks who are trained in these areas and can provide information/resources would be incredibly helpful.	11/6/2024 6:55 AM
17	Increasing capacity to apply for hazard funding is a great idea. Brookfield is small and many residents do not have the means to protect themselves from increased costs related to climate change. I believe the town should have a way to help residents who are at risk of financial burden due to energy costs upgrade their properties to be more efficient.	11/6/2024 1:20 AM
18	Assist the Qqla with invasive weed mitigation	11/5/2024 10:08 PM
19	Expand the water system to reduce reliance on individual wells.	11/5/2024 7:44 PM

Brookfield Hazard Mitigation Plan Community Survey

20	All	11/5/2024 6:56 PM
21	Encourage cutting live trees which have potential of falling onto electric lines during a storm. Trees leaning naturally, having the weight of the leaves and extreme wind or snow will cause the tree to land on the power line.	11/5/2024 6:39 PM
22	This question seems familiar, I might have already answered this survey. But, forget about trying to get more money to spend. Instead encourage citizens to grow their own food or teach people how to preserve and store food. Simple things like that will help more than conducting another grant funded survey.	11/5/2024 11:03 AM
23	All the above.	10/20/2024 9:01 AM
24	Remove damaged trees prior to them becoming a hazard. Have generators in place to meet community needs, water, fire police.	10/10/2024 1:34 PM
25	Encourage planting of climate resilient tree species, encourage organic and native plantings, education about various kinds of hazard preparedness, Applying for any appropriate grants.	10/9/2024 1:50 PM
26	Everything listed as examples above	9/30/2024 10:38 PM
27	Conserve natural resources. Protect trees, plants, and wildlife from invasive species. Encourage cutting dead trees. Improve roads and utilities.	9/30/2024 10:14 PM
28	remove beaver dams and block future construction of them	9/25/2024 9:42 AM
29	Can the town take action? How much will get done with most of the town bullies being Trumpers who refuse to acknowledge climate change. Town is run by the vocal minority.	9/24/2024 10:45 PM
30	Encourage growing your own food, even a small garden will help out, troubled times or not. A community garden would be nice to encourage. Discourage watering of lawns with automatic sprinklers, a dry lawn will always come back but a watered lawn is just wasting water. Save the water for vegetable plants.	9/24/2024 5:04 PM
31	Start doing the routine maintenance on road side trees near power line and clean the drainage structures routinely	9/24/2024 2:08 PM

Q10 If you would like to stay informed about other opportunities to participate in Brookfield's Hazard Mitigation planning process, please enter your E-mail address below.

Answered: 14 Skipped: 35

#	RESPONSES	DATE
1	Larivieresr@hotmail.com	11/14/2024 3:15 PM
2	dwcutler@gmail.com	11/12/2024 2:24 PM
3	Harrypearson@hotmail.com	11/9/2024 8:13 AM
4	Countrygal1958@yahoo.com	11/7/2024 11:38 PM
5	Kenkimball@yahoo.com	11/7/2024 11:01 PM
6	Knfellmeth@gmail.com	11/6/2024 6:55 AM
7	Chrisjroberts742@gmail.com	11/5/2024 10:08 PM
8	Varnumed@charter.net	11/5/2024 6:39 PM
9	Bienzi@aol.com	11/5/2024 11:03 AM
10	gwenbroz1@icloud.com	10/20/2024 9:01 AM
11	Dtaft9492@gmail.com	10/10/2024 1:34 PM
12	sherry@gnomesteadying.com	10/9/2024 1:50 PM
13	elizabeth.olesin@gmail.com	9/30/2024 10:38 PM
14	skarmann@gmail.com	9/30/2024 10:14 PM

APPENDIX C:

Meetings

Appendix C helps meet the following FEMA local mitigation plan requirements:

- A1. “Does the plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction?” (Requirement 44 CFR § 201.6(c)(1))
- A2. “Does the plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development as well as businesses, academia, and other private and non-profit interests to be involved in the planning process?” (Requirement 44 CFR § 201.6(b)(2)); and
- A3. “Does the plan document how the public was involved in the planning process during the drafting stage and prior to plan approval?” (Requirement 44 CFR § 201.6(b)(1))



Brookfield Hazard Mitigation Plan Update **Local Planning Team Kickoff Meeting**

Date/Time: Tuesday May 14th, 2024, 10:00am

Location: Public Safety Building, 1370 Main Street Holden MA, First Floor Training Room

AGENDA

I. Introductions

II. Plan Background

- o Review Contract
- o Roles and Responsibilities
- o Estimated Timeline

III. Project Phases & Preliminary Schedule **Phase**

Completion (proposed)

- o Assembly of local planning team, kickoff
- o Information gathering
 - o Natural hazards
 - o Critical infrastructure and facilities
- o Mitigation strategy development
- o Stakeholder and public involvement
- o Plan narrative development
- o Plan submission (initial)
- o Plan adoption

IV. Local Planning Team Meetings/Council Presentations

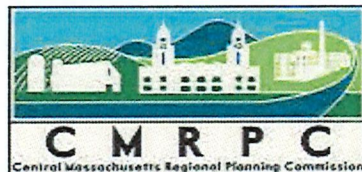
- o Meeting #1 (kickoff)
- o Meeting #2 (hazards and critical infrastructure/facilities) (*can be two meetings*)
- o Meeting #3 (mitigation strategies)
- o Presentation #1 (summary of draft plan – setting is flexible)
- o Presentation #2 (final plan and request for adoption @ BOS) (optional)

V. Review of Mitigation Strategies

- 2017 HMP Mitigation Strategies

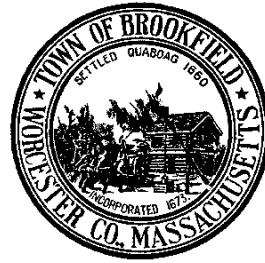
VI. Next Meeting –

- Date/location
- What to prepare



Meeting Name: Brookfield HMP Kickoff Community: Brookfield
 Location: Town hall Date: 05/14 Meeting Time: 10:00

Participant Name	Organization	Title	E-Mail
Marc Granto	CMRPC	Emergency Planner	mgranto@cmrpc.org
Steve Rich	TRSD	School Rep	Richs@tantasqua.org
Cynthia Saper	AGCMA	Chair	CRSUTG@agcma.com
Mary Lou Knight	Council on Aging	Board Member	MARYLOU-Knight@yaphod.com
Donna Lafleur	Ambulance	Chief Ems	dmlafleur7@gmail.com
Lindsey Rockwood	Highway + Grant Coordinator		Highway@BrookfieldMA.us
Greer Jarvis	CMRPC	Ast Pres.	gjarvis@cmrpc.org



Brookfield Hazard Mitigation Plan Update
Local Planning Team Meeting #2
Natural Hazards and Critical Infrastructure

Date/Time: Wednesday, August 28, 2024 10:00 AM-12:00 PM

Location: Brookfield Town Hall (6 Central St, Brookfield, MA 01506)

AGENDA

I. Introductions

II. Meeting #1 Recap

III. Community Lifelines

- When should we include them in the planning Process?

IV. Reference Documents

V. Natural Hazards Review

- a. Flooding
- b. Severe Snowstorms, Ice Storms, and Nor'easters
- c. Hurricanes
- d. Severe Thunderstorms, Wind, and Tornadoes
- e. Wildfires and Brushfires
- f. Earthquakes
- g. Dam Failure
- h. Drought
- i. Extreme Temperatures
- j. Landslides and Other Hazards

VI. Break

VII. Critical Infrastructure/Facilities and Vulnerable Populations Review

Review previous CI/F/P lists and update as necessary

- Category 1 – Emergency Response Facilities
- Category 2 – Non-Emergency Response Facilities
- Category 3 – Dams
- Category 4 – Populations and Facilities to Protect

X. Next Meeting – Mitigation Strategies

- Date/location
- What to prepare



Meeting Name:

Community:

Location:

Date:

Meeting Time:

Name

Organization (if any)

Title

E-Mail

Pete DeFlorio

HIGHWAY

SUPERINTENDENT

HIGHWAY@BrookfieldMA.US

Lindsey Rockwood

Grants / Highway

Admin

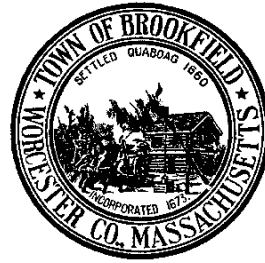
grants@brookfieldma.us

Peter Martell

EM/EMS/FD

Chief

chief.martell@brookfieldma.com



Brookfield Hazard Mitigation Plan Update
Local Planning Team Meeting #3
Mitigation Strategies

Date/Time: Wednesday, October 2nd, 2024 10:00 AM-12:00 PM

Location: Brookfield Town Hall (6 Central St, Brookfield, MA 01506)

AGENDA

I. Introductions

II. Meeting #2 Recap

III. Community Lifelines

IV. Reference Documents

- CEMP
- MVP (we have)

V. Mitigation Strategies

VI. Community Survey

VII. MVP Project

X. Next Meeting – Existing Protection Measures, Public Presentation Planning

- Date/location
- What to prepare



Brookfield Hazard Mitigation Plan Update
Local Planning Team Meeting #4
Mitigation Strategies

Date/Time: Wednesday, November 20th, 2024 10:00 AM-12:00 PM

Location: Brookfield Town Hall (6 Central St, Brookfield, MA 01506)

AGENDA

- I. Introductions**
- II. Meeting #3 Recap – Mitigation Strategies**
- III. Public Survey Update**
- IV. Review and Update 2018 Existing Protection Measures**
- V. Community Lifelines Discussion**
- VI. Reference Documents**
 - CEMP (Town)
 - MVP (CMRPC): <https://cmrpc.org/wp-content/uploads/2024/01/Brookfield-MVP-Final-Report-1.pdf>
- VII. Next Meeting – Draft Review & Public Presentation Planning**
 - Date/location
 - What to prepare

APPENDIX D:

Public Presentation at

Select Board Meeting

Materials

Appendix D helps meet the following FEMA local mitigation plan requirements:

- A1. “Does the plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction?” (Requirement 44 CFR § 201.6(c)(1))
- A2. “Does the plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development as well as businesses, academia, and other private and non-profit interests to be involved in the planning process?” (Requirement 44 CFR § 201.6(b)(2)); and
- A3. “Does the plan document how the public was involved in the planning process during the drafting stage and prior to plan approval?” (Requirement 44 CFR § 201.6(b)(1))

APPENDIX E:

Public Comment

Period and

Community Lifeline

Comment Period

Materials

Appendix E helps meet the following FEMA local mitigation plan requirements:

- A1. “Does the plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction?” (Requirement 44 CFR § 201.6(c)(1))
- A2. “Does the plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development as well as businesses, academia, and other private and non-profit interests to be involved in the planning process?” (Requirement 44 CFR § 201.6(b)(2)); and
- A3. “Does the plan document how the public was involved in the planning process during the drafting stage and prior to plan approval?” (Requirement 44 CFR § 201.6(b)(1))

APPENDIX
F: Glossary

APPENDIX F

GLOSSARY OF TERMS

As used in this plan, these terms are defined as follows:

Blizzard – Issued for sustained or frequent gusts to 35 mph or more for an hour or greater and considerable falling and/or blowing snow. These conditions frequently occur alongside reduced to or below one-quarter mile. These conditions must be the predominant condition over a 3-hour period.

Blizzard warning - Sustained winds or frequent gusts of 35 mph or higher, occurring in combination with considerable falling and/or blowing snow. When proclaimed, these conditions are expected to prevail for a period of at least three (3) hours. Visibilities will frequently be reduced to less than one-quarter mile.

Blowing snow - Wind driven snow that reduces visibility to six (6) miles or less causing significant drifting. Blowing snow may be snow that is falling and/or loose snow on the ground picked up by the wind.

Community Lifelines - The most fundamental services in the community that, when stabilized, enable all other aspects of society to function (definition from FEMA)

Conflagration - A large destructive fire; which attains such intensity that it creates and sustains its own wind system. It is most commonly a natural phenomenon, created during some of the largest bushfires, forest fires, and wildfires.

Drifting snow - Uneven distribution of snowfall caused by strong surface winds. Drifting snow is usually associated with blowing snow.

Flurries – Intermittent light snow with no measurable accumulation; a light dusting is all that is expected.

Exposure - The people, property, systems, or functions that could be lost to a hazard. Generally, exposure includes what lies in the area that the hazard could affect.

Freeze - Occurs when the surface air temperature is 32 degrees Fahrenheit or below over a widespread area for a climatologically significant period of time. The term “freeze” is usually restrictive to advective situations or occasions when wind or other conditions prevent frost.

Freezing rain or drizzle – Rain that falls as a liquid but freezes into an icy glaze when it hits the ground or other surfaces such as trees, cars, and roads=.

Frost - The formation of thin ice crystals on the ground or other surfaces in the form of scales, needles, feathers, or fans. Frost develops when the temperature of the earth's surface falls below 32 degrees Fahrenheit, but because frost is primarily an event that occurs as the result of radiation cooling, it frequently occurs with air temperatures in the middle 30s.

Graupel - Small pellets of ice created when super-cooled water droplets coat or rime, a snowflake. The pellets are cloudy or white, not clear like sleet, and are often mistaken for hail. Same as snow pellets or small hail.

Gustnado - A whirlwind of dust or debris at or near the ground with no condensation funnel. Typically forms as an eddy in thunderstorm outflows.

Hail - A form of showery precipitation in the form of irregular pellets or balls of thin ice that occur when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere where they freeze into ice.

Heavy snow - This definition depends on the region of the USA. In Massachusetts, heavy snow means that six (6) or more inches of snow have fallen in 12 hours, or eight (8) inches in 24 hours. Heavy snow is also observed when snow is falling at a rate of one (1) inch per hour.

Heavy Snow Warning - Snow accumulations are expected to approach or exceed six (6) inches in 12 hours or eight (8) inches or more in 24 hours but will not be accompanied by significant wind. During a heavy snow warning, freezing rain and sleet are not expected.

Hurricane - An intense tropical cyclone in the Atlantic, Caribbean Sea, Gulf of Mexico, or eastern Pacific, which the maximum 1-minute sustained surface wind is 74 mph or greater.

Ice Storm - An ice storm is used to describe occasions when damaging accumulation of ice are expected during freezing rain situations. Significant accumulations of ice are recognized to pull down trees and utility lines, resulting in power loss; they are defined as one-quarter inch or greater.

Ice Storm Warning – Predicted significant coating of freezing rain; one-quarter inch or more is expected to accumulate in an area.

Invasive Species - A species that is non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health (definition from the Invasive Species Advisory Committee of the U.S. Department of the Interior).

Mitigation - The process of reducing the severity of the impact of natural hazards through planning. Each hazard requires a specific type of mitigation. In some cases, we can use engineering solutions (such as an earthquake-resistant building) to at least temporarily reduce the impact of a natural hazard. In other cases, the only form of mitigation that is guaranteed to be successful is to limit or not allow human activities where the hazard occurs (such as in floodplains).

Natural Disaster - A hazard event caused by nature or the natural process of the earth, such as a flood or tornado. Natural disasters result in widespread destruction or death to the lives of individuals, damaging their property, causing economic loss and/or the inability for a population to rebuild.

Natural Hazard - An act or phenomenon that has the potential to produce harm or other undesirable consequences to a person or thing.

Risk - Depends on all three factors: hazard, vulnerability, and exposure. Risk is the estimated impact that a hazard would have on people, services, facilities, and structures in a community. It refers to the likelihood of a hazard event resulting in an adverse condition that causes injury or damage.

Sleet – Pellets of ice composed of frozen or mostly frozen rain drops or refrozen partially melted snowflakes. Sleet usually bounces when hitting a surface and does not stick to objects. However, it can accumulate like snow and cause a hazard to motorists. Heavy sleet occurs when a half of an inch of sleet accumulates

Snow Showers - Snow falling at varying intensities for brief periods of time. Some accumulation is possible.

Snow Squalls - Intense, but of limited duration, periods of moderate to heavy snowfall, accompanied by strong, gusty surface winds and possible lightning.

Storm Surge – An abnormal rise in sea level, accompanying a hurricane or other intense storm, whose height is the difference between the observed level of the sea surface and the level that would have occurred in the absence of the cyclone. Storm surge is usually estimated by subtracting the normal or astronomic tide from the observed storm tide. Storm surges can reach 25' high and 50-100 miles wide. This can cause severe erosion, major flooding and extensive damage to coastal areas.

Sustained Wind - Two-minute average wind measured at about 33' above the surface. BB.

Technological Disaster - A disaster that results from a technological or man-made hazard event.

Technological Hazard - A hazard that originates in accidental or intentional human activity (oil spill, chemical spill, building fires, terrorism, etc.)

Tropical Depression - A tropical cyclone in which the maximum 1-minute sustained surface wind is 38 mph or less.

Tropical Storm - A tropical cyclone in which the maximum 1-minute sustained surface wind ranges from 39-73 mph.

Vulnerability - Susceptibility to physical injury, harm, damage, or economic loss. It depends on an asset's construction, contents, and economic value of its functions. Vulnerability assessment provides the extent of injury and damages that may result from a hazard event of a given intensity in a given area.

Wind Chill Warning - Life-threatening wind chills reaching minus 50 degrees Fahrenheit or lower. Criteria varies by state.

Watch (Storm) - A watch is used when the risk of a hazardous weather event has increased significantly, but the occurrence, location and timing are still uncertain.

Warning/Advisory (Storm) - These products are issued when a hazardous weather event is occurring, is imminent, or has a very high probability of occurrence. A warning is used for conditions posing a threat to life or property. Advisories are for less serious conditions that cause significant inconvenience and, if caution is not exercised, could lead to situations that may threaten life and property.

Whiteout - A condition caused by falling and/or blowing snow that reduces visibility to nothing or zero miles; typically, only a few feet. Whiteouts can rapidly occur, blinding motorists and creating chain-reaction crashes involving multiple vehicles. Whiteouts are most frequent during blizzards.

Wind Chill - The wind chill is based on the rate of heat loss from exposed skin caused by the combined effects of wind and cold. As the wind increases, heat is carried away from the body at an accelerated rate, driving down the body temperature. This temperature is the reading the body "feels" given the combination of wind and air temperature. At wind speeds of four (4) mph or less, the wind chill temperature is the same as the actual air temperature. The threshold for potentially dangerous wind chill conditions is about negative 20 degrees Fahrenheit.