

Blackstone Hazard Mitigation Plan



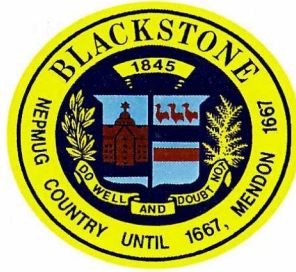
Blackstone Gorge - Photo from the Town of Blackstone



**CENTRAL MASSACHUSETTS
Regional Planning Commission**

**Adopted by the Board of Selectmen
on February 24th, 2026**

Local Hazard Mitigation Team
Town of Blackstone, Massachusetts
&
Central Massachusetts Regional Planning
Commission One Mercantile Street, Suite 520
Worcester, MA 01608



TOWN OF BLACKSTONE

Blackstone Municipal Building
15 St. Paul Street
Blackstone, MA 01504

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)).

CERTIFICATE OF ADOPTION BOARD OF SELECTMEN TOWN OF BLACKSTONE, MASSACHUSETTS

- A RESOLUTION ADOPTING THE *BLACKSTONE HAZARD MITIGATION PLAN*
- WHEREAS, the Town of Blackstone established a committee to prepare the 2026 update of the *Blackstone Hazard Mitigation Plan*; and
- WHEREAS, the updated *Blackstone Hazard Mitigation Plan* contains several potential future projects to mitigate potential impacts from natural hazards in the Town of Blackstone; and
- WHEREAS, duly noted public meetings were held by the LOCAL HAZARD MITIGATION PLANNING TEAM on June 25th, 2024, and February 24, 2026; and
- WHEREAS, the Town of Blackstone authorizes responsible departments and/or agencies to execute their responsibilities demonstrated in the plan.
- NOW, THEREFORE BE IT RESOLVED that the Town of Blackstone BOARD OF SELECTMEN adopts the 2026 update of the *Blackstone Hazard Mitigation Plan*, in accordance with M.G.L. 40 or the charter and bylaws of the Town of Blackstone.
- ADOPTED AND SIGNED this 24th day of February 2026.


Daniel P. Keefe, Chairman


Edward W. Castonguay


Michael Sweeney, Vice Chairman


Mary Bulso, Member


Gino Oraes, Member

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 Blackstone by the Central Massachusetts Regional Planning Commission (CMRPC). The Blackstone Board of Selectmen 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:

Gregory Gilmore, Police Department, Chief
Jimmy Sullivan, Department of Public Works, Superintendent
Gary Bibbo, Department of Public Works, Assistant
Kevin Roy, Fire Department, Chief
Colleen Strapponi, Health Department, Health Agent
Kevin Ryan, Board of Health, Vice Chairman
Chad Lovett, Town Administrator’s Office, Town Administrator
Lauren Taylor, Town Administrator’s Office, Town Accountant / Assistant Town Administrator
Karen Testa, Council on Aging, Director (former)
Bill Kessler, Fire Department, Chief (former)

CMRPC would also like to thank Board of Selectmen Secretary Sherlene Herandez for her help throughout the HMP update process.

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 Blackstone, 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 Blackstone. 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 Blackstone 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 grant to the Town of Blackstone from the Federal Emergency Management Agency (FEMA) through the Massachusetts Emergency Management Agency (MEMA).

The planning process in Blackstone 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 Blackstone 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 Blackstone. 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:

Gregory Gilmore, Police Department, Chief

Jimmy Sullivan, Department of Public Works, Superintendent

Gary Bibbo, Department of Public Works, Assistant

Kevin Roy, Fire Department, Chief

Colleen Strapponi, Health Department, Health Agent

Kevin Ryan, Board of Health, Vice Chairman

Chad Lovett, Town Administrator's Office, Town Administrator

Lauren Taylor, Town Administrator's Office, Town Accountant / Assistant Town Administrator

Karen Testa, Council on Aging, Director (former)

Bill Kessler, Fire Department, Chief (former)

To discuss hazard areas, critical infrastructure and other assets, and plan priorities and strategies, the Hazard Mitigation Planning team met six times on October 10th, 2023, December 13th, 2023, February 14th, 2024, March 27th, 2024, April 10th, 2024, and June 26th, 2024. A CMRPC staff member also met with Fire Chief Roy on August 26th, 2024 to discuss the finalization of the plan. Between meetings and during development of the draft and final plans, information and comments were shared among the local team and CMRPC. On December 14th, 2023, 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 on the Town's website and social media pages, and flyers for and paper copies of the survey were distributed around Town, including at the municipal center, senior center, and public library. A total of 33 responses were collected. Survey responses were discussed by the local planning team at its March 2024 meeting and helped inform the development and prioritization of the plan's mitigation strategies. CMRPC tabled at public events on December 16th, 2023 and on April 18th, 2024 to discuss the overall planning effort and to highlight best practices in mitigation efforts and policies. Specifically, the free town event at the Blackstone Valley Boys and Girls Club on December 16th, 2023 was attended by members of the Environmental Justice population in the Millerville neighborhood of town. Representatives from the surrounding communities of Millville, Mendon, Bellingham, Woonsocket, Rhode Island, and North Smithfield, Rhode Island 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 June 25th, 2024 at a Blackstone Board of Selectmen meeting to provide a summary of key aspects of the draft plan report then being finalized. The presentation was televised on the local cable access channel 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 Blackstone website for public comment for two weeks from June 26th, 2024 through July 12th, 2024. 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 Board of Selectmen members during the public presentation and from several community lifeline stakeholders during the public comment period was provided; this feedback was considered and, where deemed appropriate by the local planning team, incorporated as final edits were made to the plan; community lifeline stakeholder feedback from Early Village and the Town of Mendon, respectively, informed the descriptions of Early Village and of the Spindleville Pond Dam in the plan, and feedback received from the community survey informed the descriptions of and mitigation strategy relating to localized basement flooding.

The final draft plan was submitted to MEMA for review on January 27th, 2025, and was then relayed to FEMA for federal review. After receipt of FEMA's notice of approval pending adoption on December 18th, 2025, the plan was formally adopted by vote of the Board at the February 24th, 2026 meeting of the Board of Selectmen.

The Blackstone 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 Blackstone, 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 Blackstone 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:

- National Grid
- Liberty Gas
- Eversource
- American National Power
- Mass DCR
- Army Corps of Engineers
- Blackstone Watershed Collaborative

Food, Water, and Shelter Lifelines:

- Blackstone Valley Boys and Girls Club
- Blackstone-Millville Regional School District
- Blackstone Housing Authority
- Fox Brook Manor
- Early Village
- DuCharme Estates
- The Hamlet at Blackstone
- Divine Mercy Parish
- Christ Community Church
- Solid Rock Bible Baptist Church

Health and Medical Lifelines:

¹ FEMA, “Local Mitigation Planning Policy Guide,” FEMA.gov, Federal Emergency Management Agency, April 19, 2022, https://www.fema.gov/sites/default/files/documents/fema_local-mitigation-planning-policy-guide_042022.pdf, page 17.

- Landmark Medical Center, Woonsocket, Rhode Island
- Milford Regional Medical Center, Milford, Massachusetts

Communications Lifelines:

- The Blackstone Enlightener newspaper
- Comcast
- Verizon

Transportation Lifelines:

- Providence & Worcester Railroad / Genessee & Wyoming
- Tellstone & Son Bus Company

Hazardous Materials Lifelines:

- Kimball Sand Company

Emergency Shelter Lifelines:

- Blackstone-Millville Regional School District

2.0 COMMUNITY PROFILE AND DEVELOPMENT TRENDS

2.1 REGIONAL AND COMMUNITY PROFILE

The Central Massachusetts Regional Planning Commission (CMRPC) 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 9,208 reside in Blackstone.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. Blackstone is located in the southeast sub-region consisting of 11 towns located to the east and northeast of Worcester, including: Blackstone itself, Douglas, Grafton, Hopedale, Mendon, Millbury, Millville, Northbridge, Sutton, Upton, and Uxbridge.

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, Blackstone's neighboring community of Woonsocket, Rhode Island saw monthly mean temperatures ranging from 18.9 degrees Fahrenheit in January to 77.5 degrees Fahrenheit in July.³ According to this same source, between 2000 and 2023, average annual precipitation in Woonsocket has been relatively high at 52.9 inches,⁴ and, between 1999-2000 and 2023-2024, average annual snowfall has been 38.2 inches.⁵ Approximately 30 miles from the Atlantic coast, Blackstone and its neighboring communities are subject to a variety of types of severe storms, including hurricanes, nor'easters, thunderstorms, and blizzards.

The Town of Blackstone, Massachusetts was incorporated in 1845 and for many decades was an industrial center. It is located approximately 20 miles south of the City of Worcester and 20 miles north of Providence, RI and is now largely a bedroom community. Highway access to both major cities is available via Route 146, which is accessible in nearby Millville. Blackstone lies within the historic Blackstone River Valley. Its employment base is healthy: as of May 2024, 5,281 Blackstone

² "P1: Race," Data.Census.gov, United States Census Bureau, accessed June 10, 2024,

<https://data.census.gov/table/DECENNIALPL2020.P1?q=Blackstone%20Massachusetts>.

³ "Monthly Mean Avg Temperature for WOONSOCKET, RI," Weather.gov, National Oceanic and Atmospheric Association National Weather Service, accessed November 8, 2024,

<https://www.weather.gov/wrh/Climate?wfo=box>.

⁴ The calculation of this average does not incorporate data from the years 2007, 2011, 2021, and 2022, as there were months with missing data during these years.

"Monthly Total Precipitation for WOONSOCKET, RI," Weather.gov, National Oceanic and Atmospheric Association National Weather Service, accessed November 8, 2024, <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 WOONSOCKET, RI," Weather.gov, National Oceanic and Atmospheric Association National Weather Service, accessed November 8, 2024, <https://www.weather.gov/wrh/Climate?wfo=box>.

residents were employed⁶ and, as of 2021, 1,229 people were employed in Blackstone.⁷ Blackstone is bordered by Mendon to the north, Millville to the west, Woonsocket, Rhode Island and North Smithfield, Rhode Island to the south, and Bellingham to the east.

Blackstone has a total area of 11.2 square miles and a population of 9,208⁸. According to the CMRPC's Long Range Transportation Plan (LRTP), Blackstone's population is projected to continue growing. Blackstone is expected to grow by approximately 26% between 2020 and 2050, reaching 11,567 residents.⁹ The number of residents in town grew by approximately 34% between 1980 to 2000 but grew by only 4.5% between 2000 and 2020.¹⁰ According to the 2020 US Census, 90.7% of Blackstone's population identifies as white, 1.1% of the Town's population identifies as Asian, 1.0% of the Town's population identifies as Black or African American, 1.6% of the Town's population identifies as some other race, and 5.5% of the Town's population identifies as belonging to two or more races.¹¹ In addition, according to the 2020 Census, about 4.0% of Blackstone residents identify as Latino or Hispanic. According to the 2020 US Census, 19.6% of the Town's population is under 18 years old, while 18.2% of the population is 65 years and over.¹²

The median age in town, according to the 2020 US Census, is 43.0 years old, which is comparatively higher than the State's median age of 39.9.¹³ The Town's median age has increased from 39.8 years old in 2010, according to the 2010 US Census.¹⁴ At \$95,132, median household annual income in Blackstone (according to 2022 American Community Survey 5-year estimates) is similar to the median household annual income in the State of \$96,505 and the median household annual income in Worcester County of \$88,524.¹⁵ The poverty rate in town (according to 2022 ACS 5-year estimates) is 4.9%, approximately half of the State's and Worcester County's poverty rates of, respectively, 9.9% and 10.0%¹⁶. With a median value of owner-occupied housing units at

⁶ Massachusetts Department of Economic Research, "Municipal Employment Data: Blackstone - 2010," lmi.dua.eol.mass.gov, March 2024,

<https://lmi.dua.eol.mass.gov/lmi/MunicipalEmploymentData/LmiTown?A=000283>.

⁷ "Work Area Profile Analysis: Workers: Employed in Blackstone town (Worcester, MA)," onthemap.ces.census.gov, United States Census Bureau, accessed July 22, 2024, <https://onthemap.ces.census.gov/>.

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

⁹ Central Massachusetts Metropolitan Planning Organization. Central Massachusetts Metropolitan Planning Organization. "2050 Connections: 2024 Long Range Transportation Plan for the Central Massachusetts Metropolitan Planning Organization," [cmrpc.org](https://cmrpc.org/wp-content/uploads/2024/05/2050-Connections-Endorsed-Document.pdf), Central Massachusetts Regional Planning Commission, July 19, 2023, page III-5, <https://cmrpc.org/wp-content/uploads/2024/05/2050-Connections-Endorsed-Document.pdf>.

¹⁰ "Blackstone," cmrpc.org, Central Massachusetts Regional Planning Commission, accessed June 10, 2024, <https://cmrpc.org/data-center/community-snapshots/blackstone/>.

¹¹ "DP1: Profile of General Population and Housing Characteristics," [Data.Census.gov](https://data.census.gov), United States Census Bureau, accessed June 10, 2024, <https://data.census.gov/table?q=dp1%20blackstone%20ma>.

¹² *Ibid*

¹³ *Ibid*

¹⁴ "P13: Median Age by Sex", [Data.Census.gov](https://data.census.gov), United States Census Bureau, accessed June 15, 2025, <https://data.census.gov/table/DECENNIALSF12010.P13?q=blackstone+town+ma+median+age&t=Age+and+Sex&y=2010&d=DEC+Summary+File+1>.

¹⁵ "S1903: Median Income in the Past 12 Months (in 2022 Inflation-Adjusted Dollars)," [Data.Census.gov](https://data.census.gov), United States Census Bureau, accessed June 10, 2024, https://data.census.gov/table/ACSST5Y2022.S1903?q=ACS%20Massachusetts&g=050XX00US25027_060XX00US2502706015.

¹⁶ "S1701: Poverty Status in the Past 12 Months," [Data.Census.gov](https://data.census.gov), United States Census Bureau, accessed June 10,

\$355,100 according to 2022 ACS 5-year estimates, housing costs in town are relatively lower compared to in the State and to Worcester County, whose comparable numbers are \$483,900 and \$363,200, respectively.¹⁷ According to 2022 ACS 5-year estimates, 73.3% of occupied homes in town are single-family homes (detached or attached), and 26.7% are multi-unit structures.¹⁸ With a 5.2% vacancy rate according to the 2020 Census, the vacancy rate in Blackstone is relatively lower than the comparable rates in the State and Worcester County, which are 8.3% and 5.7%, respectively.¹⁹ The majority of homes in town were built between 1940 and 1999, with 22.3% of them being built before 1940 and 12.3% of them being built since 2000 according to 2022 ACS 5-year estimates.²⁰

2024,

https://data.census.gov/table/ACSST5Y2022.S1701?q=ACS%20Massachusetts&g=050XX00US25027_060XX00US2502706015.

¹⁷ “DP04: Selected Housing Characteristics,” Data.Census.gov, United States Census Bureau, accessed June 10, 2024,

https://data.census.gov/table/ACSDP5Y2022.DP04?q=ACS%20Massachusetts&t=Vacancy%20Characteristics&g=050XX00US25027_060XX00US2502706015.

¹⁸ “S2504: Physical Housing Characteristics for Occupied Housing Units,” Data.Census.gov, United States Census Bureau, accessed June 10, 2024,

https://data.census.gov/table/ACSST5Y2022.S2504?q=ACS%20Massachusetts&g=050XX00US25027_060XX00US2502706015.

¹⁹ “DP1: Profile of General Population and Housing Characteristics,” Data.Census.gov.

²⁰ “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))

Table 1: Town of Blackstone Development Projects between 2017 - 2024

| Name | Status | Year | Housing Units | Commercial SQ Feet | Project Type |
|-----------------------|--|------|---------------|--------------------|------------------------|
| 110 Milk Street | Complete | 2020 | N/A | N/A | Solar Project |
| 83 Federal Street | Complete | 2020 | N/A | N/A | Solar Project |
| 307 Blackstone Street | Complete – on Planning Board agenda because of stormwater issues | 2021 | N/A | N/A | Solar Project |
| 142 Blackstone Street | Complete – on Planning Board agenda because of stormwater issues | 2021 | N/A | N/A | Solar Project |
| 260 Main Street | Units 1-8 have been permitted and sold, units 9 and 10 are permitted and are up for sale (unit 10 still has certificate of occupancy pending), units 11-12 have not yet been built and permitted for occupancy | 2022 | 12 | 0 | Residential - Duplexes |

There are no substantial potential future development projects of note in Blackstone.

The Town of Blackstone is a former industrial center which is now largely a residential community. These features of the Town’s history and character contribute to ongoing development and redevelopment patterns throughout the Town. There are no industrial and commercial development projects currently underway in Town. There have been four solar projects which have been permitted in town since 2018; two of these projects have been completed and have caused few to no problems. The other two solar projects are completed, but these projects have been having stormwater issues which have caused the Town to issue a cease and desist on the projects until these problems have been resolved. All subdivisions and new developments in town are rigorously reviewed by the Planning Board, Fire Department, and Police Department, as well as any other applicable departments, boards, and committees, to ensure that new construction complies with bylaws and ensures emergency vehicle access.

There are several residential construction projects which have been recently completed or which are under construction in town; there have been three new single-family home construction projects requested in town since August 2023. A new 12-unit duplex development at 260 Main Street has been constructed since 2022; eight of the units in this development are currently occupied, two of

these units are up for sale, and two of these units are still to be built.

Table 2: Number of New Construction Residential Building Permits Issued by Year in Blackstone²¹

| Year | Single Family Permits | Attached Single-family Permits | Multi-family / Mixed Use | All Permits |
|------------------------|-----------------------|--------------------------------|--------------------------|-------------|
| 2017 | 0 | 0 | 0 | 0 |
| 2018 | 0 | 0 | 0 | 0 |
| 2019 | 0 | 0 | 0 | 0 |
| 2020 | 0 | 0 | 0 | 0 |
| 2021 | 0 | 0 | 0 | 0 |
| 2022 | 21 | 0 | 0 | 21 |
| 2023 | 21 | 0 | 0 | 21 |
| 2024 | 21 | 0 | 0 | 21 |
| 2017-2024 Total | 63 | 0 | 0 | 63 |

Recent development in Blackstone has affected and slightly increased the Town’s overall vulnerability to natural hazards, as 3 of the 104 properties which have been developed since 2017 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 flooding hazard areas, and 1 of these properties has a building located in the 100-year flood zone.

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 incorporation of resilience measures in any new solar developments in town will be especially important. According to the Executive Office of Housing and Livable Communities, this would mean taking into account hazards more intentionally at the local and state level when considering housing or community investments and creating new initiatives that invest in adaptive measures. In addition, the state and municipalities must consider seriously the option of relocation or retreat from the areas of highest vulnerability.²²

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,

²¹ “Housing Unit Building Permits for: BLACKSTONE TOWN, MA,” Socds.huduser.gov, United States Department of Housing and Urban Development, accessed April 29, 2025, <https://socds.huduser.gov/permits/>.

²² 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>.

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. Blackstone 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 Blackstone needs to be in line with the state building code. In addition, on January 1st, 2014, Blackstone codified a Stretch Energy Code based on the International Energy Conservation Code (IECC) 2009 building code created by the International Code Council.²³ This Stretch Energy Code provides a more energy efficient alternative to the base energy code for both new construction and existing buildings in Blackstone, strengthening the Town's climate resilience and hazard mitigation capabilities.

As the population of Blackstone 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 2018, the Town of Blackstone 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 Blackstone.

²³ "Massachusetts Building Energy Code Adoption by Municipality," Mass.gov, Massachusetts Department of Energy Resources, May 28, 2024, <https://www.mass.gov/doc/building-energy-code-adoption-by-municipality/download>.

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 BLACKSTONE

This Critical Facilities List for the Town of Blackstone 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:

- Blackstone'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.

Blackstone'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 Blackstone),
- 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 3: Emergency Response Facilities in Blackstone

| Type | Name | Address | Details | Has Emergency Generator? |
|--|---|-----------------------------|--|--------------------------|
| <p>Emergency Operations Center/Police Station</p> | <p>Blackstone Municipal Center / Public Safety Building / Senior Center / Emergency Operations Center</p> | <p>15 Saint Paul Street</p> | <p>This shared facility has a backup power generator located in the rear of the building. It is the location of the Police Headquarters as well as Fire Station #1. It is located adjacent to the FEMA 100 and 500-year flood zones on the Blackstone River. The basement is regularly flooded in long-duration rainstorms (causing damage to fire apparatus and Town archives), and historically the site has been flooded by the nearby Blackstone River. The facility's generator is also vulnerable to flooding, and this has been a problem during past power failures. The flat roof has to be shoveled off in major snow events (such as 2015's blizzards) due to concerns about snow loads and risks from falling snow and ice to nearby pedestrians. This facility was noted as vulnerable to locally identified snow load and flooding hazards by CMRPC's GIS analysis</p> | <p>Yes</p> |

| Type | Name | Address | Details | Has Emergency Generator? |
|-----------------|--|------------------------------------|--|---|
| Fire Department | Blackstone Municipal Center / Public Safety Building / Senior Center / Emergency Operations Center | 15 Saint Paul Street | See the description above. Fire Station #1 is located in the Municipal Center complex and is manned 24/7. This facility was noted as vulnerable to locally identified snow load and flooding hazards by CMRPC's GIS analysis | Yes |
| | Fire Station #2 / Backup Emergency Operations Center | 666 Rathbun Street | This station is located in a low-lying area with poor drainage; these factors can hinder vehicle access to the station. It experienced power outages from major storms prior to the generator being installed. It is manned as is needed. This facility was noted as vulnerable to locally identified flooding hazards by CMRPC's GIS analysis | Yes |
| | Fire Station #3 | 132 Elm Street | This station is only used for storage. It is unmanned and closed. It has experienced power outages from major storms, most recently in 2011, and it is thought to be vulnerable to roof damage from extreme winds. | Yes, a small, portable manual-start generator is currently in place at this facility to provide very limited backup power. The Town is looking into the possibility of improving the type of generator which is here. |
| | Dry hydrant system | Lake Shore Drive (Lake Hiawatha) | There are no noteworthy concerns regarding natural hazard impacts on this facility. | No |
| | Dry hydrant system | Mendon Street (Wojcik's farm pond) | There are no noteworthy concerns regarding natural hazard impacts on this facility. | No |

| Type | Name | Address | Details | Has Emergency Generator? |
|-----------------------------------|--|---------------------------------------|--|---|
| Communications Facilities | Blackstone Municipal Center / Public Safety Building / Senior Center / Emergency Operations Center | 15 Saint Paul Street | See the description above. This facility was noted as vulnerable to locally identified snow load and flooding hazards by CMRPC's GIS analysis. | Yes |
| | Fire Station #2 / Backup Emergency Operations Center | 666 Rathbun Street | See the description above. This facility was noted as vulnerable to locally identified flooding hazards by CMRPC's GIS analysis. | Yes |
| | Repeater | 128 Blackstone Street (at water tank) | This facility was identified as potentially susceptible to locally identified flooding hazards by the HMP Core Team. | Yes, a generator funded by FEMA's EMPG program was recently installed at the repeater site. |
| | AT&T Tower | near 286 Mendon Street | There are no noteworthy concerns regarding natural hazard impacts on this facility. | No |
| Department of Public Works | DPW Offices/Garage | 51-53 Elm Street | This facility was identified as potentially susceptible to locally identified flooding hazards by the HMP Core Team. | The Town recently acquired a new generator for this site as part of the Water Treatment Plant construction project; however, this generator only covers the Water Treatment Facility (CCF) and the Water Treatment Plant and does not cover the other two buildings at this site. The Town would like to acquire a generator which covers the other buildings at this site. |

| Type | Name | Address | Details | Has Emergency Generator? |
|----------------------------------|---|---|--|--------------------------|
| Emergency Shelters | Hartnett Regional Middle School | 35 Federal Street | This school is a primary emergency shelter and was noted as vulnerable to a locally identified snow load hazard by CMRPC's GIS analysis. | Yes |
| | Kennedy Elementary School | 200 Lincoln Street | This school is a back-up emergency shelter and was noted as vulnerable to a locally identified snow load hazard by CMRPC's GIS analysis. | Yes |
| Primary Evacuation Routes | Main Street (Route 122) to Millville | Main Street (Route 122) to Millville | This route has been noted as vulnerable by CMRPC's GIS analysis because it crosses locally identified flooding, invasive species, and wildfire hazard areas, the 100-year and 500-year flood zones, as well as a high slope hazard area. | N/A |
| | Main Street (Route 122) to Rhode Island | Main Street (Route 122) to Rhode Island | This route has been noted as vulnerable by CMRPC's GIS analysis because it crosses locally identified flooding, invasive species, and wildfire hazard areas, the 100-year and 500-year flood zones, as well as a high slope hazard area. | N/A |
| | Lincoln Street / Summer Street | Lincoln Street / Summer Street | This route has been noted as vulnerable by CMRPC's GIS analysis because it crosses locally identified flooding hazard areas as well as the 100-year flood zone. | N/A |

| Type | Name | Address | Details | Has Emergency Generator? |
|-----------------------------------|---|---|--|--------------------------|
| Primary Evacuation Routes (cont.) | Elm Street (southern end) to Bellingham | Elm Street (southern end) to Bellingham | This route has been noted as vulnerable by CMRPC's GIS analysis because it crosses locally identified flooding hazard areas as well as the 100-year flood zone. | N/A |
| | Blackstone Street | Blackstone Street | This route has been noted as vulnerable by CMRPC's GIS analysis because it crosses locally identified flooding hazard areas as well as the 100-year flood zone and high slope hazard areas. This route leads into Providence Street in Mendon and is subject to flooding at its lowest points on both sides of the border between the two towns. A review of the route from Mendon's DPW Director and the MEMA hazard mitigation team regarding needs for future improvements is currently underway. | N/A |
| | Federal Street | Federal Street | This route has been noted as vulnerable by CMRPC's GIS analysis because it crosses locally identified flooding hazard areas as well as high slope hazard areas. | N/A |

| Type | Name | Address | Details | Has Emergency Generator? |
|---|---|---|--|--------------------------|
| <p>Primary Evacuation Routes (cont.)</p> | Mendon Street to Mendon | Mendon Street to Mendon | <p>This route has been noted as vulnerable by CMRPC's GIS analysis because it crosses locally identified flooding and invasive species hazard areas as well as the 100-year flood zone. Its northern stretch within town also runs between two high slope hazard areas. This route leads into Blackstone Street in Mendon and is subject to flooding at its lowest points on both sides of the border between the two towns. A review of the route from Mendon's DPW Director and the MEMA hazard mitigation team regarding needs for future improvements is currently underway.</p> | N/A |
| | Rathburn Street to Woonsocket, Rhode Island | Rathburn Street to Woonsocket, Rhode Island | <p>This route has been noted as vulnerable by CMRPC's GIS analysis because a portion of it (between Carter Avenue and just north of Elmwood Street) lies along a locally identified flooding hazard area and it crosses multiple other locally identified flooding hazard areas.</p> | 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 Blackstone.

Table 4: Non-Emergency Response Facilities in Blackstone

| Type | Name | Address | Details | Has Emergency Generator? |
|--------------|---------------------------|----------------------------|--|--------------------------|
| Water Supply | Well Pumps #2, 7 | See maps in Appendix A | These wells were identified as the most likely water supply facility to be damaged in an extreme flooding event by the HMP planning team in town. The wells are 4 to 5 feet above the flow of the river. | No |
| | Well Pump #4 | See maps in Appendix A | This well was identified as potentially susceptible to locally identified flooding hazards by the HMP planning team in town. | No |
| | Well Pump #5a | See maps in Appendix A | This well was identified as potentially susceptible to locally identified flooding hazards by the HMP planning team in town. | Yes |
| | Well Pump #6 | See maps in Appendix A | This well was identified as potentially susceptible to locally identified flooding hazards by the HMP planning team in town. | Yes |
| | Well Pump #8 | See maps in Appendix A | This well was identified as potentially susceptible to locally identified flooding hazards by the HMP planning team in town. | Yes |
| | Well Pump #9 | See maps in Appendix A | This well was identified as potentially susceptible to locally identified flooding hazards by the HMP planning team in town. | Yes |
| | Water Supply Storage Tank | Near 315 Blackstone Street | This facility was identified as potentially susceptible to locally identified flooding hazards by the HMP planning team in town. | Yes |

| Type | Name | Address | Details | Has Emergency Generator? |
|-------------------------|---|------------------------------------|---|---|
| Water Supply (cont.) | Water Supply Storage Tank | Lincoln Street near Millville line | This facility was identified as potentially susceptible to locally identified flooding hazards by the HMP planning team in town. | Yes |
| | Water Supply Storage Tank | 45 Bellingham Road | This facility was identified as potentially susceptible to locally identified flooding hazards by the HMP planning team in town. | Yes |
| | Water Supply Water Tank | 128 Blackstone Street | This facility was identified as potentially susceptible to locally identified flooding hazards by the HMP planning team in town. | Yes |
| | DPW Offices and Garage / Corrosion Facility | 51-53 Elm Street | This facility was identified as potentially susceptible to locally identified flooding hazards by the HMP planning team in town. Roughly 80% of water users in town utilize the municipal water system. | The Town recently acquired a new generator for this site as part of the Water Treatment Plant construction project; however, this generator only covers the Water Treatment Facility (CCF) and the Water Treatment Plant and does not cover the other two buildings at this site. |

| Type | Name | Address | Details | Has Emergency Generator? |
|-------|---------------------|------------------|---|--|
| Sewer | Sewage Lift Station | 51-53 Elm Street | Blackstone's sanitary sewage is treated at a regional facility operated by the City of Woonsocket, RI. The Town's sewer system covers the more developed parts of town, primarily in the south of town near the Blackstone River. Roughly 35% of all households use the town sewage system – other households in town use private septic systems. This facility is near an 100-year flood zone and a locally-identified flood zone, but the HMP planning team in town has noted that it has not seen substantial damage during past flood events. | No - The Town recently acquired a new generator for this site as part of the Water Treatment Plant construction project; however, this generator only covers the Water Treatment Facility (CCF) and the Water Treatment Plant and does not cover the other two buildings at this site. |
| | Sewage Lift Station | Mill Street | See the first row of this section for more information on the Town's sewer system. This facility is in a 500-year flood zone and was therefore noted as vulnerable to flooding by CMRPC's GIS analysis, but the HMP planning team in town has noted that it has not seen substantial damage during past flood events. | Yes |
| | Sewage Lift Station | Main Street | See the first row of this section for more information on the Town's sewer system. This facility is in a 100-year flood zone and was therefore noted as vulnerable to flooding by CMRPC's GIS analysis, but the HMP planning team in town has noted that it has not seen substantial damage during past flood events. | Yes |

| Type | Name | Address | Details | Has Emergency Generator? |
|----------------------|---------------------|---------------------|---|--|
| Sewer (cont.) | Sewage Lift Station | Staples Lane | See the first row of this section for more information on the Town's sewer system. This facility is near an 100-year flood zone, but the HMP planning team in town has noted that it has not seen substantial damage during past flood events. | Yes |
| | Sewage Lift Station | 760 Rathburn Street | See the first row of this section for more information on the Town's sewer system. This facility is near a swampy area that can flood, but the HMP planning team in town has noted that it has not seen substantial damage during past flood events. | Yes |
| | Sewage Lift Station | Montcalm Avenue | See the first row of this section for more information on the Town's sewer system. This facility is near several locally identified flood zones, but the HMP Core Team has noted that it has not seen substantial damage during past flood events. | Yes |
| | Sewage Lift Station | Elmwood Avenue | See the first row of this section for more information on the Town's sewer system. This facility is near a locally identified flood zone, but the HMP planning team in town has noted that it has not seen substantial damage during past flood events. | Yes |
| | Sewage Lift Station | Edgewater Drive | See the first row of this section for more information on the Town's sewer system. This facility is near a an 100-year flood zone, but the HMP planning team in town has noted that it has not seen substantial damage during past flood events. | No, but this facility can be powered by a mobile generator if needed. This is less than ideal, though. |

| Type | Name | Address | Details | Has Emergency Generator? |
|---------------|---------------------|---------------------|---|--------------------------|
| Sewer (cont.) | Sewage Lift Station | Quickstream Street | See the first row of this section for more information on the Town's sewer system. This facility is near an 100-year flood zone, but the HMP planning team in town has noted that it has not seen substantial damage during past flood events. This facility has also been noted as vulnerable to high slope hazards by CMRPC's GIS analysis. | Yes |
| | Sewage Lift Station | 666 Rathburn Street | See the first row of this section for more information on the Town's sewer system. This facility is in a 100-year flood zone and was therefore noted as vulnerable to flooding by CMRPC's GIS analysis, but the HMP planning team in town has noted that it has not seen substantial damage during past flood events. | Yes |
| | Sewage Lift Station | Elm Street | See the first row of this section for more information on the Town's sewer system. This facility is in a 100-year flood zone and was therefore noted as vulnerable to flooding by CMRPC's GIS analysis, but the HMP planning team in town has noted that it has not seen substantial damage during past flood events. | Yes |
| | Sewage Lift Station | 175 Lincoln Street | See the first row of this section for more information on the Town's sewer system. This facility is near a locally identified flood zone, but the HMP planning team in town has noted that it has not seen substantial damage during past flood events. | Yes |

| Type | Name | Address | Details | Has Emergency Generator? |
|------------------------|--|------------------------------|---|--------------------------|
| Sewer (cont.) | Sewage Lift Station | Alice Avenue | See the first row of this section for more information on the Town's sewer system. This facility is near a locally identified flood zone, but the HMP planning team in town has noted that it has not seen substantial damage during past flood events. | Yes |
| Town Facilities | Public Library | 86 Main Street | This library is located within the FEMA 500-year flood zone. It is located near Fox Brook, just upstream from the brook's confluence with the Blackstone River. It is immediately adjacent to the 500-year flood zone and is in two locally identified flood zones, and therefore it was noted as vulnerable to flooding by CMRPC's GIS analysis. | Yes |
| | Blackstone Municipal Center / Public Safety Building / Senior Center / Emergency Operations Center | 15 Saint Paul Street | See the description above. The Senior Center part of this facility can be opened as a heating/cooling center. This facility was noted as vulnerable to locally identified snow load and flooding hazards by CMRPC's GIS analysis. | Yes |
| Utilities | Algonquin Natural Gas Pipeline | The northeast corner of town | There are no noteworthy concerns regarding natural hazard impacts on this pipeline. | N/A |
| | Providence and Worcester Railroad | Along the Blackstone River | Aging bridge structures over the Blackstone River along this freight railroad line may be at risk from very extreme riverine flooding or from earthquakes. This route has been noted as vulnerable by CMRPC's GIS analysis because there is a locally identified wildfire hazard along its length as well as because it crosses locally identified flooding hazards, the 100-year flood zone, and a high slope hazard area. | N/A |

| Type | Name | Address | Details | Has Emergency Generator? |
|--------------------------|---|----------------|---|--------------------------|
| Utilities (cont.) | ANP Blackstone Natural Gas Power Plant | 204 Elm Street | This power plant is adjacent to the 100-year flood zone next to Fish Pond and Mill River; however, it is elevated well above the waterways and is not considered vulnerable by the HMP planning team in town. | Yes |
| | Kimball Sand Company – sand / gravel mine | 202 Elm Street | During very heavy rain events, runoff from this facility reportedly increases turbidity and sometimes causes minor siltation in the nearby Mill River; however, the HMP planning team in town notes that there have not been noticeable impacts to the flood hazard level in this area. | Yes |

3.4 CATEGORY 3 – DAMS²⁴

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

Table 5: Dams in / of Concern in Relation to Blackstone

| National ID | Dam Name | Owner | Regulatory Authority | Hazard Code | Notes |
|-------------|-----------------------|---------------------------|----------------------|--------------------|--|
| MA00096 | Stone Diversion Dam | Private | FERC Jurisdiction | Low Hazard | This dam is also known as the Rolling Dam and is historic. It is located in the 100-year flood zone and therefore was noted as vulnerable by CMRPC's GIS analysis. |
| MA00624 | Hopedale Pond Dam | Private | Office of Dam Safety | Significant Hazard | This dam is also called the Mill River Dam. It is in Hopedale, Massachusetts, upstream from Blackstone. |
| MA00936 | Spindleville Pond Dam | Public – Town of Hopedale | Office of Dam Safety | Significant Hazard | This dam is in Hopedale, Massachusetts. The Mill River flows through Hopedale into Spindleville Pond and then into Mendon and Blackstone. This dam (which is also known as the Mill Street Dam) restricts the flow of the river as it travels south. The Mill River caused flooding along roadways and impacted Bellingham Street's bridges before this dam was constructed. Flooding in 1955 prompted a major reconstruction of this dam. This dam is currently being reviewed for further upgrades by the Town of Hopedale and MEMA. |

²⁴ "MassGIS Data: Dams," Mass.gov, Massachusetts Bureau of Geographic Information, February 2012, <https://www.mass.gov/info-details/massgis-data-dams>; "2023 Annual Report to the Governor on the Activities of the Dam Safety Program: 2023 Dam Safety Annual Report Attachment," Dem.ri.gov, Rhode Island Department of Environmental Management, Office of Compliance and Inspection, May 13, 2024, <https://dem.ri.gov/sites/g/files/xkgbur861/files/2024-05/damrpt23.pdf>, pages 15, 22; "Slatersville Reservoir Upper Dam: Visual Inspection / Evaluation Report," Dem.ri.gov, Pare Corporation, May 23, 2019, <https://dem.ri.gov/sites/g/files/xkgbur861/files/programs/maps/mapfile/damfiles/043.pdf>; "Slatersville Reservoir Middle Dam: Visual Inspection / Evaluation Report," Dem.ri.gov, Pare Corporation, June 23, 2016, <https://dem.ri.gov/sites/g/files/xkgbur861/files/programs/maps/mapfile/damfiles/046.pdf>; "Dam Safety Inspection Harris Pond (Providence County, RI)," Data.statesman.com, Austin American Statesman, accessed June 28, 2024, <https://data.statesman.com/dam/rhode-island/providence-county/harris-pond/ri03901/>; "Dam Safety Inspection Slatersville Reservoir Lower (Providence County, RI)," Data.statesman.com, Austin American Statesman, accessed June 28, 2024, <https://data.statesman.com/dam/rhode-island/providence/slatersville-reservoir-lower/ri02503/>.

| National ID | Dam Name | Owner | Regulatory Authority | Hazard Code | Notes |
|-------------|--------------------------------------|--|----------------------------|--------------------|---|
| MA01164 | Blackstone River Dam at Canal Street | Public – Town of Blackstone Board of Selectmen | Office of Dam Safety | Low Hazard | This dam was noted as being a flooding hazard by the HMP planning team in town and is in the 100-year flood zone, so therefore it was noted as vulnerable by CMRPC's GIS analysis. The catwalk at this dam is in poor shape. This dam is also called the Saranac Dam. |
| MA01167 | Lake Hiawatha Dam | Public – Town of Blackstone Board of Selectmen | Office of Dam Safety | Significant Hazard | This dam was on the state's 2011 list of 100 dams needing substantial investments in maintenance and/or operations; these concerns were substantially addressed using funds from a state earmark, and the dam is no longer considered to be in poor condition. This dam was also noted as vulnerable to a locally identified flooding hazard by CMRPC's GIS analysis. |
| MA02741 | Canal Headgate Dam | Private | FERC Jurisdiction | Low Hazard | This dam is located in the 100-year flood zone and therefore was noted as vulnerable by CMRPC's GIS analysis. |
| MA02742 | Mill Pond Dam | Private | Office of Dam Safety | Low Hazard | This dam was noted as vulnerable to a locally identified flooding hazard by CMRPC's GIS analysis. It is also in the 100-year flood zone. |
| MA02743 | Crain's Pond Dam | Private | Non-Jurisdictional - Other | N/A | This dam was noted as vulnerable to a locally identified flooding hazard by CMRPC's GIS analysis. It is also in the 100-year flood zone. |
| MA02744 | Fish Pond Dam | Private | Non-Jurisdictional – Other | N/A | This dam is located in the 100-year flood zone and therefore was noted as vulnerable by CMRPC's GIS analysis. |
| MA02745 | Fox Brook Dam | Private | Non-Jurisdictional – Other | N/A | This dam is historic and was also noted as vulnerable to a locally identified flooding hazard by CMRPC's GIS analysis. |
| MA02746 | Old Ice Pond #1 Dam | Private | Non-Jurisdictional – Other | N/A | There are no noteworthy concerns regarding natural hazard impacts on this dam. |
| MA02748 | Walsh's Pond Dam | Public – Town of Blackstone Office of the Town Administrator | Non-Jurisdictional - Other | N/A | This dam is located in the 100-year flood zone and therefore was noted as vulnerable by CMRPC's GIS analysis. |

| National ID | Dam Name | Owner | Regulatory Authority | Hazard Code | Notes |
|-------------|-----------------------------------|------------------------------------|---|--------------------|--|
| RI00043 | Slatersville Reservoir Upper Dam | Private | Rhode Island Department of Environmental Management Office of Compliance and Inspection | High Hazard | This dam is in neighboring North Smithfield, Rhode Island. |
| RI00046 | Slatersville Reservoir Middle Dam | Private | Rhode Island Department of Environmental Management Office of Compliance and Inspection | High Hazard | This dam is in neighboring North Smithfield, Rhode Island. |
| RI00047 | Slatersville Reservoir Lower Dam | Private | Rhode Island Department of Environmental Management Office of Compliance and Inspection | Significant Hazard | This dam is in neighboring North Smithfield, Rhode Island. |
| RI00073 | Harris Pond Dam | Public – Woonsocket Water Division | Rhode Island Department of Environmental Management Office of Compliance and Inspection | High Hazard | This dam is in neighboring Woonsocket, Rhode Island, lies immediately along the town/state boundary, and creates Harris Pond upstream. The pond itself is almost completely within Blackstone. Impacts from a failure of this dam would take place almost completely in Rhode Island. A former iteration of this dam failed due to embankment collapse during Tropical Storm Diane in 1955, according to the Association of State Dam Safety Officials' inventory of failures and near-failures. ²⁵ |

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

²⁵ “Harris Pond – RI00000-196,” Damsafety.org, Association of State Dam Safety Officials, accessed September 23, 2024, <https://damsafety.org/incidents/ri00000-196/>

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 6: Facilities and Populations to Protect in Blackstone

| Type | Name | Address | Details |
|--|--|--|---|
| Facilities for People with Special Needs, Apartment Complexes, Assisted Living Facilities, and Housing Authority Properties | Fox Brook Manor (Blackstone Housing Authority) | 15 Fox Brook Manor (also known as Austin Street) | This complex has experienced power failures during past storms. |
| | Early Village (Blackstone Housing Corporation) | Early Village Drive, off of Blackstone Street | This complex, which serves especially vulnerable low-income elderly and disabled town residents, has experienced power failures during past storms; on July 3 rd , 2024, a tree fell and blocked the entrance into and exit out of the complex as well as knocked out the complex’s electricity for around eight hours. This complex was also noted as vulnerable to a locally identified flooding hazard by CMRPC’s GIS analysis. |
| | DuCharme Estates | 25 Federal Street | There are no noteworthy concerns regarding natural hazard impacts on this complex. |
| | The Hamlet | Fox Run Road | There are no noteworthy concerns regarding natural hazard impacts on this complex. |
| Schools/Daycares²⁶ | Blackstone/Millville Regional High School | 175 Lincoln Street | This school sustained roof damage during winter storms in 2013; More than \$1 million in repairs were required, in total, among the three schools affected for school roof damages from these storms. This school has a backup generator. It was also noted as vulnerable to a locally identified snow load hazard by CMRPC’s GIS analysis. |

²⁶ "Licensed Child Care Search," Childcare.Mass.gov, Massachusetts Department of Early Education and Care, accessed June 10, 2024, <https://childcare.mass.gov/findchildcare>.

| Type | Name | Address | Details |
|---------------------------------|---------------------------------------|--------------------|--|
| Schools/Daycares (cont.) | Hartnett Regional Middle School | 35 Federal Street | This school is a primary emergency shelter. It has a backup generator and is intended to shelter residents of both Blackstone and Millville as part of the regional school district arrangement. This school was also noted as vulnerable to a locally identified snow load hazard by CMRPC's GIS analysis. |
| | Kennedy Elementary School | 200 Lincoln Street | This school is a back-up emergency shelter. It sustained roof damage during winter storms in 2013; More than \$1 million in repairs were required, in total, among the three schools affected for school roof damages from these storms. This school has a backup generator. It was also noted as vulnerable to a locally identified snow load hazard by CMRPC's GIS analysis. |
| | Maloney Elementary School | 200 Lincoln Street | This school sustained roof damage during winter storms in 2013; More than \$1 million in repairs were required, in total, among the three schools affected for school roof damages from these storms. This school has a backup generator. It was also noted as vulnerable to a locally identified snow load hazard by CMRPC's GIS analysis. |
| | Bethany Christian Academy | 15 Cape Road | This school is located in Mendon. |
| | Blackstone Valley Boys and Girls Club | 115 Canal Street | The Boys and Girls Club offers afternoon daycare programs. It was noted as vulnerable to a locally identified flooding hazard by CMRPC's GIS analysis and is near the 100 and 500-year flood zones as well as a locally identified wildfire hazard area. |
| | Bouchard Home Daycare | 4 Susan Drive | There are no noteworthy concerns regarding natural hazard impacts on this daycare. |
| | | | |

| Type | Name | Address | Details |
|--|---|-----------------------|---|
| Schools/Daycares (cont.) | Growing Einsteins Home Daycare | 5 Rivers Edge Drive | This daycare was noted as vulnerable to a locally identified flooding hazard by CMRPC's GIS analysis and is near the 100-year flood zone. |
| | Hart Home Daycare | 21 Bellingham Road | There are no noteworthy concerns regarding natural hazard impacts on this daycare. |
| | Battaglia Home Daycare | 138 Blackstone Street | There are no noteworthy concerns regarding natural hazard impacts on this daycare. |
| | Languirand Home Daycare | 30 Carrington Street | There are no noteworthy concerns regarding natural hazard impacts on this daycare. |
| | Little People's Day Care Center, Inc. | 27 Federal Street | There are no noteworthy concerns regarding natural hazard impacts on this daycare. |
| | Viveiros Home Daycare | 32 Valley Street | This daycare was noted as vulnerable to a locally identified flooding hazard by CMRPC's GIS analysis. |
| | Wainwright Home Daycare | 7 Rhode Island Ave | There are no noteworthy concerns regarding natural hazard impacts on this daycare. |
| | St. Amant Home Daycare | 91 Elm Street | There are no noteworthy concerns regarding natural hazard impacts on this daycare. |
| Historic Buildings/Sites²⁷ | According to the Massachusetts Cultural Resources Information System (MACRIS) online database accessed in September 2024, there are 27 Areas, 429 Buildings, 15 Burial Grounds, 5 Objects, and 44 Structures listed for Blackstone. 19 of these historic areas, 168 of these buildings, 1 of these burial grounds, 1 of these objects, and 34 of these structures lie within regulated or locally identified flood areas within town. The following historic sites were identified by the Blackstone HMP Core Team as critical facilities or infrastructure: the Blackstone River Dam at Canal Street / the Saranac Dam and a series of five bridges along the Providence and Worcester Railroad. | | |

²⁷ "Search Results," Mhc-macris.net, Massachusetts Historical Commission, accessed June 10, 2024, <https://mhc-macris.net/queryresults>.

EMPLOYMENT CENTERS

Based on data obtained from the Massachusetts Executive Office of Labor and Workforce Development (EOLWD)²⁸ and the knowledge of local HMP committee members, the following table shows the largest employers in Blackstone:

Table 7: Employment Centers in Blackstone

| Company name | Address | Number of Employees | NAICS Code |
|--|----------------|---------------------|------------|
| Kennedy Elementary School and Maloney Elementary School | Lincoln St # 1 | 50-99 | 6111 |
| Blackstone/Millville Regional High School | Lincoln St | 50-99 | 6111 |
| Hartnett Regional Middle School | Federal St | 50-99 | 6111 |
| Blackstone Town Municipal Center | Saint Paul St | 50-99 | 9211 |
| Alternative Creative Energy | Union St | 20-49 | 2382 |
| Blackstone Fire Department | Saint Paul St | 20-49 | 9221 |
| Blackstone Police Department | Saint Paul St | 20-49 | 9221 |
| Blackstone Valley Boys & Girls Club | Canal St | 20-49 | 6241 |
| Blackstone Valley Dental Associates | Main St | 20-49 | 6212 |
| Blackstone-Millville Regional School District | Lincoln St | 20-49 | 6111 |
| Dunkin' | Main St # 4 | 20-49 | 7225 |
| Goodstuff Smokehouse | Main St | 20-49 | 4244 |
| Henry's Auto Parts Inc | Rathbun St | 20-49 | 4413 |
| Kimball Sand Co Inc | Elm St | 20-49 | 2381 |
| Roast House | Farm St | 20-49 | 7225 |
| Blackstone Department of Public Works | Elm St | 10-19 | 9261 |
| Fawcett Energy | Montcalm Ave | 10-19 | 2382 |
| Ideal Pizza | Main St # 2 | 10-19 | 7225 |
| New England Chimney & Roofing | Main St | 10-19 | 2381 |
| UPS Access Point Location | Main St | 10-19 | 5418 |

²⁸ "Largest 25 Employers in Blackstone," [lmi.dua.eol.mass.gov](https://lmi.dua.eol.mass.gov/LMI/LargestEmployersArea/LEAResult?A=05&GA=000283), Massachusetts Department of Economic Research, accessed June 10, 2024, <https://lmi.dua.eol.mass.gov/LMI/LargestEmployersArea/LEAResult?A=05&GA=000283>.

Local HMP committee members also noted that Cumberland Farms on Main Street, A Plus Tire and Auto Care on Rathburn Street, Harpin's Tire Shop Inc on Rathburn Street, and Toni's State Line Power Products, LLC on Main Street are notable employers in town.

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
- 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 Blackstone, one block group (block group 3 of census tract 7471.01) in the Millerville neighborhood in the southeastern corner of town has been identified as an Environmental Justice area due to its relatively low median household income.²⁹ As of the 2022 American Community Survey 5-year estimates, median household income in this block group is estimated at \$46,316, compared to Blackstone's town-wide median of \$95,132 and Worcester County's median of \$88,524.³⁰ 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 Blackstone should include extra emphasis to reach residents of Millerville 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 Blackstone, according to the 2020 US Census, 19.6% of the population is under the age of 18 and 18.2% of the population is 65 years and over.³¹ According to 2022 ACS 5-year estimate data, approximately 13.1% of the population in town speaks a language other than English at home;³² Approximately 13.2% of the population in

²⁹ "Massachusetts 2020 Environmental Justice Populations," Mass-eoea.maps.arcgis.com, Massachusetts Executive Office of Energy and Environmental Affairs, November 12, 2022, <https://mass-eoea.maps.arcgis.com/apps/webappviewer/index.html?id=1d6f63e7762a48e5930de84ed4849212>.

³⁰ "B19013: Median Household Income in the Past 12 Months (in 2022 Inflation-Adjusted Dollars)," Data.Census.gov, United States Census Bureau, accessed June 10, 2024, https://data.census.gov/table/ACSDT5Y2022.B19013?q=b19013%20blackstone%20ma&g=050XX00US25027_150000US250277471013.

³¹ "DP1: Profile of General Population and Housing Characteristics," Data.Census.gov.

³² "S1601: Language Spoken at Home," Data.Census.gov, United States Census Bureau, accessed June 10, 2024, <https://data.census.gov/table?q=s1601%20blackstone%20ma>.

Blackstone has a disability according to this same data.³³ This 2022 ACS 5-year estimate data also shows that people without health insurance account for about 1.6% of Blackstone's population³⁴ and that about 4.9% of the Town's population is living in poverty.³⁵

Outreach to EJ populations and other vulnerable community members was a vital part of the public outreach strategy for the Blackstone Hazard Mitigation Plan. Paper HMP surveys were made available at the municipal center, library, and senior center. CMRPC staff also attended multiple public events in town during the planning process and conducted a presentation at a hybrid Board of Selectmen 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. The public presentation for the draft plan was televised on local cable access TV, and a flyer for this presentation was sent to the HMP Team's contacts at the Blackstone Housing Authority and local businesses frequented by residents in the EJ block group in Millerville.

³³ "S1810: Disability Characteristics," Data.Census.gov, United States Census Bureau, accessed June 10, 2024, <https://data.census.gov/table?q=s1810%20blackstone%20ma>.

³⁴ "S2701: Selected Characteristics of Health Insurance Coverage in the United States," Data.Census.gov, United States Census Bureau, accessed June 10, 2024, <https://data.census.gov/table?q=s2701%20blackstone%20ma>.

³⁵ "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 Blackstone 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 Blackstone:

- Flooding, including changes in groundwater
- Severe Snowstorms / Ice Storms/ Nor’easters
- Hurricanes
- Severe Thunderstorms / Wind / Tornadoes
- Wildfires
- Earthquakes
- Dam Failure
- Drought, including changes in groundwater
- Extreme Temperatures
- Invasive Species
- Other hazards

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.³⁶ 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 Blackstone municipal plan. These different priorities are based more on the specificities of local conditions in Blackstone 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 commodity crop yields in the Central Region could decline by

³⁶ "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>.

12 percent by 2030.³⁷ 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,³⁸ 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.

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 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.³⁹

³⁷ Estimates 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.

³⁸ 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>.

³⁹ "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.

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 2090.⁴⁰ 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.

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 the Central Region.⁴¹

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

⁴⁰ 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>.

⁴¹ 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>.

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.

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.⁴²

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

⁴² 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>.

impacts on the local economies that rely on agricultural production and the individual farm workers and employers who work in this sector.⁴³

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. An example of this impact already affecting Blackstone is that Early Village Apartments are currently operating on a 4 to 6 year long waiting list. 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 Blackstone 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.

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 8: Previous Federally Declared Disasters and Massachusetts State of Emergency Declarations in Worcester County⁴⁴

| 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 |

⁴³ Estimates derived from application of USEPA (2017) and Beach et al. (2015)

⁴⁴ “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>.

| | | | |
|--|----------------------|---------------------------------|----------------|
| 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.

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 Blackstone. 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 Blackstone are:

- Flooding, including changes in groundwater,
- Severe Snowstorms / Ice Storms / Nor'easters,
- Hurricanes,
- Severe Thunderstorms / Wind / Tornadoes,
- Wildfire,
- Earthquakes,
- Dam Failure,
- Drought, including 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 9: 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 10: 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 11: 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 Blackstone 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 12: Hazard Risk Assessment for Each Natural Hazard in Blackstone

| 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 | 2 |
| <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 | 4 |

| Type of Hazard | Location of Occurrence | Probability of Future Events | Impact | Potential Climate Change Effects | Hazard Risk Index Rating |
|--|------------------------|------------------------------|---------|--|--------------------------|
| <i>Wildfire</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;⁴⁵ modified to reflect conditions in Blackstone.

⁴⁵ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan"

4.2.12 NATURAL HAZARD IMPACTS FROM CHANGES IN FUTURE CONDITIONS

The following table summarizes how changes in future conditions, including changes in population, changes in land use and development, and climate change could potentially change natural hazard impacts on people and vulnerable community assets in Blackstone.

Table 13: Natural Hazard Impacts from Changes in Future Conditions

| Type of Hazard | Impacts from Changes in Population | Impacts from Changes in Land Use and Development | Impacts from Climate Change |
|---|--|---|--|
| <i>Flooding, Including Changes in Groundwater</i> | The Blackstone Municipal Center / Public Safety Building / Senior Center / Emergency Operations Center, The DPW Offices/Garage, The Public Library, Early Village (Blackstone Housing Corporation), The Blackstone Valley Boys and Girls Club, and The Growing Einsteins and Viveiros home daycares have been identified as vulnerable to flooding, including flooding caused by changes in groundwater, by CMRPC’s GIS analysis or are very close to flooding hazard areas; if more people from vulnerable populations live in and/or frequent these critical infrastructure sites in the case that the Town continues to age and grow, the Town would be at higher risk in the case of flooding, including flooding caused by changes in groundwater, occurring. | If commercial and industrial development continues to be built in town and/or the pace of residential development in town increases from its currently low level, the Town will face increased flooding risk (and therefore increased risk from hurricanes and severe thunderstorms) if these developments are built near the 100-year, 500-year, and locally identified flooding hazard areas and/or have large amounts of impervious surface. | The Town may no longer be able to safely develop in areas of town that experience frequent flooding, including flooding caused by changes in groundwater, so the Town may need to change its zoning bylaw to emphasize stormwater resilience. New areas of town may be subject to severe and/or frequent flooding. Dams in town may face more pressure from flooding, including flooding caused by changes in groundwater. |
| <i>Severe Snowstorms / Ice Storms / Nor’easters</i> | The Blackstone Municipal Center / Public Safety Building / Senior Center / Emergency Operations Center, Hartnett Regional Middle School, Kennedy Elementary School, Blackstone/Millville Regional High School, and Maloney Elementary School have been identified as vulnerable to winter storms by CMRPC’s GIS analysis; if more people from vulnerable populations frequent these critical infrastructure sites in the case that the Town continues to grow, the Town would be at higher risk in the case of winter snow and ice storms occurring. | If developments with flat roofs are built in town in the future, the Town will face increased snow and ice load risk. | An increase in wintertime rains may lead to more frequent occurrences of hazardous roadway conditions. Snow and ice storms will become less frequent but will become more severe when they occur; this may lead to a need for more sheltering infrastructure in town. |

| Type of Hazard | Impacts from Changes in Population | Impacts from Changes in Land Use and Development | Impacts from Climate Change |
|------------------------------------|---|--|---|
| <i>Hurricanes</i> | The critical infrastructure sites described above that were identified as vulnerable to flooding by CMRPC's GIS analysis would likely be at risk in the case of hurricanes occurring in town; if more people from vulnerable populations live in and/or frequent these critical infrastructure sites in the case that the Town continues to age and grow, the Town would be at higher risk in the case of hurricanes occurring. | If most developments in town continue to not be built to Zone 1 Design Wind Speed Codes, the Town will continue to face increased risk from hurricanes. | More intense hurricanes may lead to the need to increase stormwater resilience measures in the Town's zoning bylaw and the need for more sheltering infrastructure in town. |
| <i>Severe Thunderstorms / Wind</i> | The critical infrastructure sites described above that were identified as vulnerable to flooding by CMRPC's GIS analysis would likely be at risk in the case of severe thunderstorms / wind occurring in town; if more people from vulnerable populations live in and/or frequent these critical infrastructure sites in the case that the Town continues to age and grow, the Town would be at higher risk in the case of severe thunderstorms / wind occurring. | If most developments in town continue to not be built to Zone 1 Design Wind Speed Codes, the Town will continue to face increased risk from severe thunderstorms and wind. | More intense severe thunderstorm and wind events may lead to the need to increase stormwater resilience measures in the Town's zoning bylaw and the need for more sheltering infrastructure in town. |
| <i>Tornadoes</i> | There are no anticipated impacts from changes in population on the impacts of tornadoes in Blackstone. | If most developments in town continue to not be built to Zone 1 Design Wind Speed Codes, the Town will continue to face increased risk from tornadoes. | More research needs to be conducted on the anticipated climate change impacts of tornadoes in Blackstone, but some studies indicate that the number of days with tornadoes will decrease but the number of tornadoes on these days will increase. ⁴⁶ |

⁴⁶ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan," page 5.1-56.

| Type of Hazard | Impacts from Changes in Population | Impacts from Changes in Land Use and Development | Impacts from Climate Change |
|--|---|---|---|
| <i>Wildfire</i> | There are no anticipated impacts from changes in population on the impacts of wildfires in Blackstone. | If commercial and industrial development continues to be built in town and/or the pace of residential development in town increases from its currently low level, the Town will face increased wildfire risk if these developments are built near the densely forested areas of the wildland-urban interface. | The Town may no longer be able to safely develop near densely forested areas in the wildland-urban interface. The Town may have less access to water to fight wildfires due to the increased prevalence of drought. Wildfire-related air quality risks may become more prevalent in town. |
| <i>Earthquakes</i> | There are no anticipated impacts from changes in population on the impacts of earthquakes in Blackstone. | If many developments in town continue to not be built to the Massachusetts State Building Code's seismic standards, the Town may continue to face increased risk from earthquakes. | There are no anticipated climate change impacts on earthquakes in Blackstone. |
| <i>Dam Failure</i> | There are no anticipated impacts from changes in population on the impacts of dam failure in Blackstone. | If new developments in town are built in the potential inundation zones of dams, the Town will face increased risks from potential dam failure. | Dams in town may face more pressure from flooding and therefore will face a higher risk of overtopping. |
| <i>Drought, Including Changes in Groundwater</i> | There are no anticipated impacts from changes in population on the impacts of drought, including drought-induced changes in groundwater, in Blackstone. | If commercial and industrial development is built in and/or the pace of residential development in town increases from its currently low level in areas of town not served by the public reservoir-fed water system, the Town will face increased risk from wells drying out due to lower groundwater levels caused by drought. | Land in Blackstone may become harder or impossible to farm due to more frequent and severe drought which causes groundwater levels to lower. The Town may see an increase in population, with people from parts of the country facing more severe drought impacts (such as more severely low groundwater levels) moving to the northeast. |

| Type of Hazard | Impacts from Changes in Population | Impacts from Changes in Land Use and Development | Impacts from Climate Change |
|-----------------------------|---|---|---|
| <i>Extreme Temperatures</i> | If the Town's population continues to age, the Town will face increased risk from extreme temperatures, as older adults are more vulnerable to extremely hot and cold conditions. | If the Town does not sufficiently prioritize artificial and/or passive/natural heating and cooling measures, both inside and outside, as the Town's development pattern changes in the future, the Town will face increased risk from extreme temperatures. | Growing seasons, ecosystem types, and migratory patterns in Blackstone will shift, and farmers and wildlife may be forced to adapt. More intense extreme heat events will lead to a need for more sheltering infrastructure in town, and residents and businesses in town may need to alter work patterns due to more frequent and severe extreme heat events. Blackstone may see an increase in population, with people from parts of the country facing more severe extreme heat impacts moving to the northeast. |
| <i>Invasive Species</i> | There are no anticipated impacts from changes in population on the impacts of invasive species in Blackstone. | If the Town does not sufficiently prioritize the control of invasive species when new developments and changes in land use encroach on wild areas, the Town will face increased risk from invasive species. | Changing climatic conditions, including warming temperatures, may assist invasive species in outcompeting native species in town. Invasive species may take advantage of climatic shocks and disturbances and may be more easily able to damage agricultural crops. Invasive vegetation species may be more easily able to build up as fuel that can increase the Town's wildfire risk. |

Blackstone has grown steadily in population in recent decades. The Town has a high population of pre-retirement age older adults between 40 and 64 years old, with the Town's largest five-year age cohort being older adults between 50 and 54 years old. The Town also has a moderate population of school-aged children and young adults between 10 and 19 years old, and the Town's largest five-year age cohort of people under 40 years old is adults between 30 and 34 years old.⁴⁷ If many older adults continue to live in town after they retire, the Town's number of retirement-age residents facing increased vulnerability to natural hazard impacts will rise. If a greater number of families with school-aged children choose to live in town in the future, the Town's number of young residents facing increased vulnerability to natural hazards will rise. If the proportion of new construction built in vulnerable areas in town remains the same, the Town's vulnerability to natural hazards will slightly increase over time if the population continues to increase.

⁴⁷ "Blackstone," Cmrpc.org

4.3 FLOODING, INCLUDING CHANGES IN GROUNDWATER

The local HMP planning team identified flooding, including flooding caused by changes in groundwater, as one of the most prevalent natural hazards in Blackstone. 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 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 raised groundwater levels during storms to dam failures. Riverine and stormwater flooding both occur in Blackstone, 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 Blackstone, including areas prone to flooding caused by changes in groundwater, are closely associated with the Blackstone River and its associated tributaries, canals, and impoundments, specifically in the areas around the municipal center, Main Street, St. Paul Street, Canal Street, and other locations in the southern part of town. According to a GIS analysis performed by CMRPC, there are 503 parcels in Blackstone that are susceptible to 100-year floods, with 354 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 Blackstone having numerous flooding problems, geographically much of Blackstone is a slightly elevated rolling plateau, 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.

The 2023 Worcester County Flood Insurance Study (FIS) from FEMA lists the following flooding sources which impact Blackstone:

- The Blackstone River (flood zone AE),
- Harris Pond (flood zone AE),
- The Mill River (flood zone AE),
- Quick Stream (flood zone AE),
- Saranac Canal (flood zone AE),
- Tupperware Mill Canal (flood zone AE), and

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.

- Zone A Flooding Sources from miscellaneous streams and ponds.

The 2023 Worcester County FIS also describes that the Blackstone River had a discharge rate of 29,500 cfs during the severe 1% annual chance flood that affected many communities in Worcester County in August 1955. 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.⁴⁸

As of September 2023, the Town of Blackstone has no 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 Blackstone has 14 NFIP policy holders in town, and the NFIP insures up to \$4,189,000.00 of property in the Town. NFIP has paid out 7 claims in total to policy holders in Blackstone.⁴⁹

EXTENT

The average annual precipitation for the closest weather station to Blackstone (which is located in Woonsocket, Rhode Island) has been 57.67 inches for the period from 2017 to 2023.⁵⁰ Over the past five years, Blackstone has received an average of 15 days annually with precipitation over 1 inch.⁵¹ Water levels in Blackstone's rivers, streams, groundwater sources, 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 2024, Blackstone received on average the most precipitation in the months of April, September, 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. Blackstone is especially vulnerable to riverine flooding due to its location next to the Blackstone River. While the area of flood vulnerability in town is geographically small, this area primarily consists of Blackstone's 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 Department of Public Works.

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

⁴⁸ 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>.

⁴⁹ "Community Overview: Blackstone, Town of," NFIP Community Information System, accessed July 2, 2024.

⁵⁰ 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 WOONSOCKET, RI," Weather.gov, National Oceanic and Atmospheric Association National Weather Service, accessed November 8, 2024, <https://www.weather.gov/wrh/Climate?wfo=box>.

⁵¹ Ibid.

at each particular site.⁵² 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.⁵³ 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, Blackstone 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 Blackstone Hazard Mitigation Planning Team:

- Downtown Blackstone
 - Saint Paul St
 - Rivers Edge Rd
 - Farnum St
 - Canal St
- Elm St & Mill Brook
- Farm St & Hop Brook
- Blackstone St & Hop Brook
- Lakeshore Dr & Quick Stream
- Mendon St & Fox Brook
- Rathbun St
- Main St
- Lincoln St & Fox Brook
- Carter Ave & Shore Dr

Most of the flood hazard areas listed here were identified due to known past occurrences in the respective areas. While some of the areas noted as potentially prone to flooding were included in the previous plan, new development of solar farms near Milk Street and Blackstone Street was identified in both survey results and in the planning meetings as causing flooding to their surrounds due to inadequate water retention at those facilities.

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

⁵² Lee Stanish, "Introducing the National Groundwater Conditions web application," Waterdata.usgs.gov, United States Geological Survey, accessed April 7, 2025, <https://waterdata.usgs.gov/blog/groundwater-levels-app/>.

⁵³ "Drinking Water Standards and Guidelines," Mass.gov, the Massachusetts Department of Environmental Protection, accessed April 7, 2025, <https://www.mass.gov/guides/drinking-water-standards-and-guidelines>.

Blackstone since the previous planning process:⁵⁴

- 5/15/18 – Flooding Caused by Heavy Rain: A cold front over the Great Lakes moved through Southern New England during the late afternoon and early night of May 15th. The air mass over Massachusetts was very warm and humid, and as the cold front moved into this air it generated numerous thunderstorms. Some thunderstorms produced damaging wind gusts, large hail, and heavy downpours. It was reported by an amateur radio operator that at 5:23 PM EST, Main Street in Blackstone was flooded and impassable. A car was trapped in the floodwaters and towed out.
- 7/17/2018 – Flash Flooding: A cold front moved east from the Great Lakes, crossing Massachusetts during the night of the 17th. The thunderstorms brought strong wind gusts and wind damage during the afternoon and evening. Thunderstorms also brought downpours in Western, Central, and Northeast Massachusetts. Two to four inches of rain fell from Westfield through Worcester to Boston. At 4:22 pm EST heavy rain in Blackstone made Rathbun Street at Champlain Avenue flooded and impassable.
- 11/03/2018 – Flood: Low pressure over New York City early in the morning on November 3rd rapidly intensified as it moved northeastward across New England. Heavy rain occurred in the early morning hours, with generally 1.50 to 2.50 inches in eastern sections of southern New England and up to 3.66 inches in the slopes of the Berkshires. A few severe thunderstorms moved from Rhode Island into eastern Massachusetts around daybreak. As the strong low passed to our north, strong to damaging westerly winds developed during the afternoon. In Blackstone, Main Street was closed due to flooding. A car was stuck in flood waters on Main Street near the CVS Pharmacy.
- 8/07/2019 – Flood: A warm front moving across southern New England triggered severe thunderstorms with wind damage across western portions of southern New England from the mid afternoon hours and through the evening. Another band of thunderstorms moved in from the southwest overnight, progressing to the coast before daybreak, causing some additional wind damage and some flooding. In Blackstone, a car was stuck in flood waters on Rathbun Street.
- 6/28/2020 – Flash Flood: A mid-level short wave trough combined with an approaching cold front and a warm, humid environment to produce severe thunderstorms and flash flooding across MA and northern RI during the afternoon and evening hours. A Flash Flood Emergency occurred in the Norwood, MA area. In

⁵⁴ “Storm Events Database Search Results for Worcester County, Massachusetts,” NCDc.NOAA.gov, National Oceanic and Atmospheric Administration National Centers for Environmental Information, accessed September 17, 2023,

https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28C%29+Flash+Flood&eventType=%28Z%29+Flood&eventType=%28C%29+Heavy+Rain&beginDate_mm=11&beginDate_dd=01&beginDate_yyyy=2000&endDate_mm=11&endDate_dd=30&endDate_yyyy=2023&county=WORCESTER%3A27&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=25%2CMASSACHUSETTS

Blackstone, two cars were stuck in flood waters on Rathbun Street. Roadway was impassable.

- 7/9/21 – Flood: Tropical Storm Elsa made landfall in Rhode Island on Friday morning before moving into the Gulf of Maine. It interacted with a stalled frontal boundary and brought widespread heavy rainfall of 2 to 3.5 inches as noted by the Local Planning Team.
- 11/12/21 – Flood: Strong southerly wind flow out ahead of an advancing cold front produced strong to damaging wind gusts and some heavy rain that caused some street and basement flooding, as noted by the Local Planning Team.

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.⁵⁵

PROBABILITY OF FUTURE EVENTS

Based upon previous data, there is a “moderate” probability (a 10% to 40% chance) of localized flooding, including flooding caused by changes in groundwater, occurring in Blackstone in the next year. This represents a slight increase over the last plan due to new development in Blackstone and increased precipitation driven by climate change.

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 Blackstone is unlikely to destroy any buildings, but a 500-year / .2% annual chance flood event could displace residents and come with a significant 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 14: HAZUS Potential Damages to Blackstone from .2% Annual Chance Flood Event

| | .2% annual chance flood event |
|--|-------------------------------|
| Building Characteristics | |
| Estimated total number of buildings in Blackstone | 2,421 |
| Estimated total building replacement value (2024 \$) | \$1,146,459,000.00 |
| Building Damages | |
| # of buildings sustaining minor damage (1-10%) | 6 |

⁵⁵ “ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan,” pages 5.1-34-5.1-35.

| | |
|--|-------------------------|
| # of buildings sustaining moderate damage (11-40%) | 13 |
| # of buildings sustaining severe damage (41-50%) | 1 |
| # of buildings destroyed | 0 |
| Population Needs | |
| # of households displaced | 169 |
| # of people seeking public shelter | 57 |
| Value of Damages | |
| Total property damage (buildings and content) | \$ 52,730,000.00 |
| Total losses due to business interruption | \$ 120,650,000.00 |
| Total Economic loss | \$173,380,000.00 |

Though there are no recorded instances of a flood event of this size in Blackstone, 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 Blackstone’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, in several cases including flooding caused by changes in groundwater, by the local HMP planning team in Blackstone and/or CMRPC's GIS analysis:

- The Blackstone Municipal Center / Public Safety Building / Senior Center / Emergency Operations Center,
- Fire Station #2 / Backup Emergency Operations Center,
- Repeater, Blackstone Street,
- The DPW Offices/Garage,
- Main Street (Route 122) to Millville and to Rhode Island, Lincoln Street / Summer Street, Elm Street (southern end) to Bellingham, Blackstone Street, Federal Street, Mendon Street to Mendon, and Rathburn Street to Woonsocket, Rhode Island,
- All well pumps and water supply tanks in town,
- Sewage lift stations at Mill Street, Main Street, Rathburn Street, and Elm Street,
- The Public Library,
- The Providence and Worcester / Genessee and Wyoming Railroad,
- The Blackstone River at Canal Street / Saranac, Lake Hiawatha, Mill Pond, Crain's Pond, and Fox Brook dams,
- Early Village (Blackstone Housing Corporation),
- The Blackstone Valley Boys and Girls Club, and
- The Growing Einsteins and Viveiros home daycares.

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.⁵⁶

⁵⁶ Ibid.

In summary, climate change is likely to increase the extent and probability of future flood events in Blackstone, 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 Blackstone Local HMP Planning Team, Blackstone faces a hazard index rating of “2 – high risk” from flooding. Conditions in Blackstone demonstrate somewhat greater vulnerability to flooding, including flooding caused by changes in groundwater, than in most other Central Massachusetts communities. Previous NFIP claims are slightly higher than in most nearby towns with similar populations and levels of development, a relatively large number of parcels with structures are located within the 100-year flood zone, and HAZUS simulations show that roughly 30% of Blackstone households would be displaced in a very rare flooding event along the lines of 1955's Tropical Storm Diane, despite the installation of limited flood control berms since that time. The local HMP planning team notes the following concerns:

- The Municipal Center / Public Safety Building / Senior Center complex sees recurrent basement and access road flooding when the Blackstone River is high and during long-duration rain events. This has been mitigated with some flood control measures, but fundamentally the building's location within the flood plain makes it naturally more susceptible to flooding hazards.
- The Public Library abuts Fox Brook and the site is partly within a FEMA flood zone. Flooding on the street behind this facility has been noted by the local HMP planning team.
- The Main Street, Blackstone Street, and Elm Street evacuation routes have seen regular flooding in some places. Mendon Street (a secondary evacuation route) is also subject to flooding.
- Pump stations for drinking water wells 2 and 7 are adjacent to flooding areas and remain vulnerable to flooding events.
- Extreme rainfall associated with Tropical Storm Diane in 1955 led to most of the Town's village centers along the Blackstone River being underwater and to vital public records being destroyed.⁵⁷
- Basement flooding at residences in town caused by changes in groundwater.

These concerns largely reflect the same concerns noted in the 2017 Blackstone Hazard Mitigation Plan update.

MITIGATION STRATEGIES

The Town of Blackstone is currently able to effectively respond to flooding, including flooding

⁵⁷ Fuss & O'Neill, "Town of Blackstone Community Resilience Building Workshop Summary of Findings," Mass.gov, Massachusetts Executive Office of Energy and Environmental Affairs, May 2018, <https://www.mass.gov/doc/2017-2018-mvp-planning-grant-report-blackstone/download>.

caused by changes in groundwater, 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, including flooding caused by changes in groundwater. The local HMP planning team identified the following strategies that could be used to reduce the threat of flooding in Blackstone:

- Conduct a townwide stormwater drainage improvement study. Include an inventory and visual assessment as well as hydrological modeling in this study.
- Complete drainage and structural resiliency improvements at Saint Paul Street / Rivers Edge Road / Farnum Street / Canal Street near the Municipal Center / Public Safety / Senior Center building; this area is just above Blackstone River 100-year flood zone and sees recurrent basement flooding in heavy and/or long rain events.
- Complete flood-proofing work on well pumps 2 and 7.
- Investigate the benefits and requirements of the Community Rating System (CRS) and decide whether to participate in this program or not.
- Complete a study on how development in town, such as solar farms, affects flooding in town, looking at problems and enforcement mechanisms. Create and enforce a solar development / land use bylaw.
- Work with homeowners to mitigate localized flooding caused by development.
- Assess green infrastructure opportunities for stormwater management in town and develop a list of specific priorities. Review Town regulations and update them as necessary to support green infrastructure and low-impact development. Consider projects in areas that are prone to flooding, such as the Harris Pond Village neighborhood, including Shore Drive and the Precious Blood Cemetery.
- Develop a comprehensive plan for beaver management to mitigate against unpredictable flooding/impoundment impacts. Investigate options for expanded beaver control in town.

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 Blackstone 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, including nor'easters, 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 / nor'easter, 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 15: Northeast Snowfall Impact Scale Categories⁵⁸

| 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 |

An ice storm is a winter storm in which freezing rain occurs and accumulates as ice on the ground when it lands on cold surfaces. 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. The expected extent of ice storms in Blackstone is similar to the expected extent of snowstorms in town. Ice storms with Sperry-Piltz indexes of zero through

⁵⁸ National Centers for Environmental Information, "The Northeast Snowfall Impact Scale (NESIS)," [ncei.noaa.gov](https://www.ncei.noaa.gov), National Oceanic and Atmospheric Association, accessed June 12, 2024, <https://www.ncei.noaa.gov/access/monitoring/rsi/nesis>.

five could possibly occur in Blackstone, with ice storms with a lower index and more minimal impacts such as black ice being present in some areas being expected to have a higher likelihood of occurring in town; More destructive ice storms with maximum extents resembling the December 2008 ice storm which affected much of the northeastern USA and which caused 0.5 inches of ice accumulation in town⁵⁹ could possibly occur in town.

Table 16: The Sperry-Piltz Ice Accumulation Index⁶⁰

| 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.⁶¹ The types of storm classifications under the Miller classification are listed below. Miller C / Storm Type C nor'easters are expected to be the most common type of nor'easters to affect Blackstone, with Miller A / Storm Type A, Miller B / Storm Type B, and Miller E / Storm Type E nor'easters also anticipated to potentially affect the Town.

⁵⁹ Hayden Frank and Joe DelliCarpini, "WFO Taunton Storm Series Report # 2009-01: Analysis of the December 11-12, 2008 Destructive Ice Storm across Interior Southern New England," Weather.gov, National Weather Service Forecast Office, 2009, https://www.weather.gov/media/box/science/December_2008_Ice_Storm.pdf.

⁶⁰ "What is the Sperry-Piltz Ice Accumulation Index?," Spia-index.com, SPIA Index, accessed March 18, 2025, <https://spia-index.com/>

⁶¹ 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 20, 2025, <https://glenallenweather.com/alink/18snow/stormtypes.htm>.

Table 17: 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, 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. |

Broadly speaking, the extent of damages for the winter storm category of natural hazard includes the results of heavy snowfall, strong winds, freezing rain, and/or snow and ice accumulation. 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. A nor'easter can be categorized under the NEISIS Scale and/or the Sperry-Piltz Ice Accumulation Index depending on what kind of wintry precipitation is to be expected.

PREVIOUS OCCURRENCES

Based on data available from the National Oceanic and Atmospheric Administration, there are 88 high-impact snowstorms (including nor'easters) since 1956 that have affected the Northeast Corridor. Of these, approximately 37 storms resulted in at least 10 inches of snow fall in Blackstone. These storms are listed in the table below:⁶²

Table 18: High-Impact Snowstorms with Snow Falls in Blackstone of at Least 10 Inches Since 1958

| Start Date | NEISIS Value | NEISIS Category | NEISIS Classification |
|------------|--------------|-----------------|-----------------------|
| 1/28/2022 | 1.73 | 1 | Notable |
| 1/4/2022 | 1.60 | 1 | Notable |

⁶² Ibid.

| Start Date | NESIS Value | NESIS Category | NESIS Classification |
|------------|-------------|----------------|----------------------|
| 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 at least one instance of heavy snowfall in the Southern Worcester County region, of which the Town of Blackstone is a part:⁶³

⁶³ “Storm Events Database Search Results for Worcester County, Massachusetts,” NCDC.NOAA.gov, National

- 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.

The 2023 ResilientMass Plan notes that, on average, Massachusetts experiences one to two nor'easters per year.⁶⁴ Between 2013 and 2022, there were 63 heavy snow days, 12 blizzard days, and two ice storm days in Massachusetts. As was previously mentioned, the December 2008 ice storm affected Blackstone and led to 0.5 inches of ice accumulation in town.⁶⁵

PROBABILITY OF FUTURE EVENTS

Based upon the availability of records for Worcester County, the likelihood that a severe snowstorm, ice storm, or nor'easter will affect Blackstone in any given year is “very high” (greater than 70 percent).

Based on the information from the 2023 ResilientMass Plan described above, on average, Blackstone can expect to experience one to two nor'easters per year.⁶⁶ As this plan also describes, there were 63 heavy snow days, 12 blizzard days, and two ice storm days between 2013 and 2022 in Massachusetts, and Blackstone and the rest of the state should expect a relatively similar number of these types of storms over the next ten years.

IMPACT

Blackstone faces a “minor” impact, with less than 10% of total property in affected areas damaged, from snowstorms, ice storms, and nor'easters. 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, ice storms, and nor'easters include:

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

Oceanic and Atmospheric Administration National Centers for Environmental Information, accessed September 17, 2023,

https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28Z%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%2CMASSACHUSETTS.

⁶⁴ “ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan”

⁶⁵ Hayden Frank and Joe DelliCarpini, “WFO Taunton Storm Series Report # 2009-01: Analysis of the December 11-12, 2008 Destructive Ice Storm across Interior Southern New England”

⁶⁶ “ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan”

- Reduced ability of emergency officials to respond promptly to medical emergencies and fires.

EXPOSURE

Certain features within Blackstone’s infrastructure, society, and environment may face more exposure to snowstorms, ice storms, and nor’easters, 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 Blackstone and/or CMRPC’s GIS analysis:

- The Blackstone Municipal Center / Public Safety Building / Senior Center / Emergency Operations Center,
- Hartnett Regional Middle School,
- Kennedy Elementary School,
- Blackstone/Millville Regional High School, and
- Maloney Elementary School.

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.⁶⁷ 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 severe snowstorm, ice storm, and nor’easter events in Blackstone. This may have societal impacts; more frequent severe winter storms may change land use and development protocols, as more homes

⁶⁷ Ibid.

and community buildings may need to have greater sheltering infrastructure to prepare for heavy snowfall. The local HMP planning team in town noted that extreme snowfall events were high on their list of concerns.

VULNERABILITY

Based on the above assessment, Blackstone has a hazard index rating of “2 – high risk” from snowstorms, ice storms, and nor’easters. 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. The local HMP planning team also noted that the Municipal Center / Public Safety / Senior Center building has a flat roof and has needed shoveling off during snowy winters to prevent collapse and protect pedestrians. The critical infrastructure sites mentioned above as being especially vulnerable to winter storms as well as the Town’s water system are also vulnerable to losing power due to ice accumulation caused by ice storms. In addition, the evacuation routes listed in section 3.2 of this plan are vulnerable to becoming difficult to access because of roads being iced over after ice storms.

MITIGATION STRATEGIES

The Town of Blackstone 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 Blackstone, 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 Blackstone:

- Evaluate structural conditions and implement long-term solutions for buildings that have previously seen roof damage from winter storms, including the Municipal Center / Public Safety / Senior Center building, Regional High School, and elementary schools.
- Enhance road information coordination as well as planning for snow removal.
- Install/improve generators at critical public facilities where needed, including Fire Station #3, the DPW buildings at 51-53 Elm Street not covered by the recently acquired generator, and the residential areas at Early Village and Fox Brook Manor; also, evaluate the feasibility of obtaining a mobile generator to serve multiple public facilities.

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.⁶⁸

LOCATION

Because of this hazard's regional nature, all of Blackstone 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 19: The Saffir-Simpson Scale (1)⁶⁹

| 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 |

⁶⁸ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan"

⁶⁹ 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/aboutshws.php>.

PREVIOUS OCCURRENCES

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

Table 20: Hurricanes Which Have Affected the Region Near Blackstone

| 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 |

Blackstone 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. In 1955, Tropical Storm Connie and Tropical Storm Diane resulted in major flooding in town; this was noted by the local HMP planning team. USGS Circular #377 reports that water rushing at 18,800 cfs (cubic feet per second) flowed through the Blackstone River in Blackstone during Tropical Storm Diane, which followed only days after heavy rains from Tropical Storm Connie.⁷⁰ The photos below show the aftermath of the 1955 floods in Blackstone:

⁷⁰ "Geological Survey Circular 377: Floods of August 1955 in the Northeastern States," *United States Geological Survey Numbered Series Circular*, no. 377 (1956), <https://doi.org/10.3133/cir377>, page 10.



Images 1 and 2: Photos of the aftermath of the major flooding event in 1955 which occurred in Blackstone after Tropical Storm Connie and Tropical Storm Diane hit the Town in succession

PROBABILITY OF FUTURE EVENTS

Blackstone’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 Blackstone. 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 21: The Saffir-Simpson Scale (2)

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

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 Blackstone 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 22: HAZUS Potential Damages to Blackstone 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 | 2,421 | |
| Estimated total building replacement value (2024 \$) | \$1,146,642,000.00 | |
| Building Damages | | |
| # of buildings sustaining minor damage | 189 | 524 |
| # of buildings sustaining moderate damage | 20 | 115 |
| # of buildings sustaining severe damage | 1 | 11 |
| # of buildings destroyed | 1 | 16 |
| Population Needs | | |
| # of households displaced | 5 | 40 |
| # of people seeking public shelter | 2 | 18 |
| Debris | | |
| Building debris generated (tons) | 800 | 3,246 |
| Tree debris generated (tons) | 5,687 | 12,800 |
| # of truckloads to clear building debris | 32 | 130 |
| Value of Damages | | |
| Total property damage (buildings and content) | \$ 10,109,820.00 | \$ 40,162,880.00 |
| Total losses due to business interruption | \$ 874,330.00 | \$ 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>.

Blackstone 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 Blackstone’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 Blackstone, and the local planning team notes that that the Town has not had too many calls for emergency tree removal in between the last plan and this one;
- Municipal buildings have been impacted by high winds in the past. Damage to these buildings could impact critical town functions and distract people from other essential emergency response and recovery activities; and
- 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.

POTENTIAL CLIMATE CHANGE EFFECTS

According to the 2023 ResilientMass Plan, there are two major ways that climate change influences hurricanes and tropical storms:⁷¹

- 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 Blackstone. Having been hit in 1955 by a Tropical Storm Connie and Tropical Storm Diane which devastated the Town through flooding and precipitation, the chief concern relating to hurricanes of the local HMP planning team in Blackstone is expanded upon in the flooding section of this plan.

VULNERABILITY

Based on the above analysis, Blackstone has a hazard index rating of “3 – medium risk” from hurricanes. The local HMP planning team in town notes that the site of the current Municipal Center / Public Safety Building / Senior Center (this building was built in the late 1960s) was underwater during Tropical Storm Diane and suggests that critical items located in the basement (including town archives and fire apparatus parking) as well as the generator for the building (which is located outside behind the building) are vulnerable to hurricanes and tropical storms. Other critical facilities such as Fire Station #2/EOC (which is located in an area susceptible to minor flooding), evacuation routes such as Main Street, Blackstone Street and Elm Street, and low-lying water pump stations (especially pump stations #2 and #7) are also vulnerable to tropical storms.

MITIGATION STRATEGIES

The Town of Blackstone is currently able to effectively respond to hurricanes through the emergency response facilities and services identified in the critical infrastructure and facilities and existing

⁷¹ “ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan”

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 Blackstone:

- Complete drainage and structural resiliency improvements at Saint Paul Street / Rivers Edge Road / Farnum Street / Canal Street near the Municipal Center / Public Safety / Senior Center building; this area is just above Blackstone River 100-year flood zone and sees recurrent basement flooding in heavy and/or long rain events.
- Conduct a field inventory of bridges to rank and prioritize projects for increased flood resiliency and storm-hardening. Design and implement priority bridge/culvert resizing or replacement projects. Known problem areas should be areas of focus, and they include Elm Street Bridge, Lincoln Street Bridge, and culverts on Lincoln Street, Blackstone Street, and Shore Drive.
- Complete a Town-wide dam assessment of all public, private, and beaver dams. In this assessment, focus on reducing the risk of flooding from dam failures during intense storm events and protecting ecosystems that provide flood storage and other resilience benefits.
- Investigate/join the Central Massachusetts Stormwater Coalition to aid in public outreach and funding of drainage improvements.
- Assess green infrastructure opportunities for stormwater management in town and develop a list of specific priorities. Review Town regulations and update them as necessary to support green infrastructure and low-impact development. Consider projects in areas that are prone to flooding, such as the Harris Pond Village neighborhood, including Shore Drive and the Precious Blood Cemetery.

4.6 SEVERE THUNDERSTORMS / WIND / TORNADOES

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.⁷²

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, with Blackstone approximately 40 miles east of the zone of most frequent past occurrences.

LOCATION

As per the 2023 ResilientMass Plan, the entire town is at risk of high winds, severe thunderstorms, and tornadoes. This plan identifies Blackstone 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 the Town generally affected.

EXTENT

An average thunderstorm is 15 miles across and lasts for 30 minutes; severe thunderstorms can be

⁷² “ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan”

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 Damage⁷³

| 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. |

Table 24: Extent Scale for Hail⁷⁴

| Hail Size (in.) | Object Analog Reported |
|-----------------|------------------------|
| .50 | Marble, moth ball |
| .75 | Penny |
| .88 | Nickel |
| 1.00 | Quarter |
| 1.25 | Half Dollar |
| 1.50 | Walnut, ping pong |
| 1.75 | Golf ball |
| 2.0 | Hen egg |
| 2.5 | Tennis ball |

⁷³ 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>.

⁷⁴ 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/hailsizes.htm>.

| | |
|------|------------|
| 2.75 | Baseball |
| 3.00 | Tea cup |
| 4.00 | Grapefruit |
| 4.50 | Softball |

PREVIOUS OCCURRENCES

Because thunderstorms and wind affect Blackstone 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.⁷⁵

- 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 6 years, there has only been one small tornado that has affected communities near Blackstone:

- 2018 Tornado (East Douglas, Uxbridge, Upton)⁷⁶

⁷⁵ "Tornado Paths," Arcgis.com, ESRI, accessed March 13, 2025, <https://www.arcgis.com/apps/View/index.html?appid=01672085b139432e8fe1296a743f67d7>.

⁷⁶ Ibid

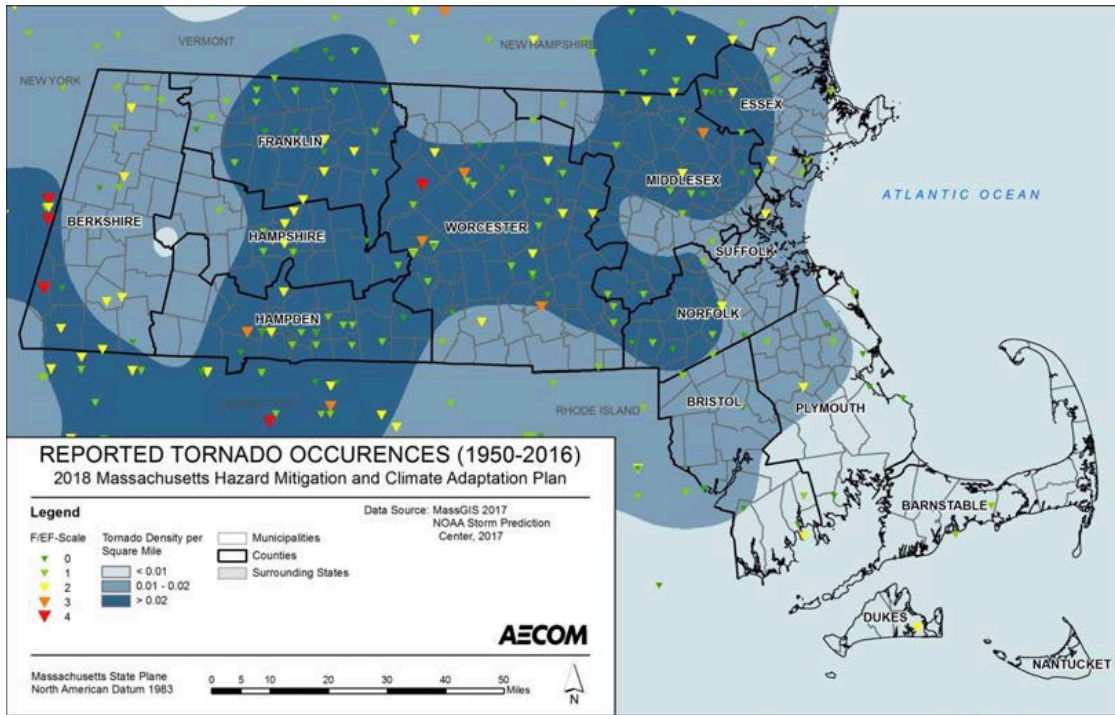


Figure 1: Density of Reported Tornadoes per Square Mile (1950-2016)⁷⁷



Image 3: 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.

⁷⁷ “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>.

Thunderstorm occurrences are more frequent in Massachusetts than tornados, as thunderstorms have the potential to produce tornados. However, the type of storm that most commonly produces tornados is supercells: severe, long-lived thunderstorms. Approximately 20 percent of supercells produce tornados. In Blackstone, there have been several severe thunderstorm/wind occurrences:⁷⁸

- 10/01/2010 – Strong Wind: Several waves of low pressure moved across Southern New England bringing unseasonably warm air into the area. This allowed for good mixing which brought strong winds from a strong low level jet to the surface. The Automated Surface Observing Station at Worcester Regional Airport (KORH) recorded sustained winds of 31 mph and a wind gust of 47 mph. Several trees were downed throughout southern Worcester County, including one in Oxford that landed on a garage and another downed on wires on Elm Street in Blackstone.
- 01/31/2013 – High Wind: A warm front moved northward across southern New England. This brought a period of mainly rain and warm temperatures. In addition, a strong low level jet (up to 80 kts) resulted in high winds across much of southern New England. There was some tree damage and downed power lines with winds gusting to 60 to 70 mph. An amateur radio operator in Milford recorded a wind gust to 64 mph on their home weather station. The Automated Surface Observation System at Worcester Regional Airport (KORH) recorded a wind gust to 55 mph. In Blackstone, power lines were downed onto the intersection of Reilly Avenue and Austin Street. Trees were downed onto wires on Williams Street in Hopedale. In Grafton, a tree was downed onto a house on Pleasant Street. A tree was downed onto a house on Snow Street in Webster. In Uxbridge, a tree was downed onto a house on West Street. A two foot diameter tree was downed on Fowler Road in Northbridge.
- 02/25/2015 – High Wind: A storm moving north through the Great Lakes redeveloped along the Mid Atlantic coast on the 24th, then moved up the coast past Southern New England. This coastal storm brought damaging west-northwest winds to Massachusetts as it moved off through the Maritimes on the 25th. At 9:33 AM EST a tree and wires were down on Flint Road at Old Town Road. At 10:05 AM EST a tree and wires were down on Fitzgerald Street in Charlton. At 11:57 AM EST a tree and wires were down on Grove Street in Worcester. At 2:22 PM EST the Automated Surface Observing System platform at Worcester Regional Airport measured a wind gust to 64 mph. At 2:29 PM EST a tree was down at the intersection of U.S> Route 20 and State Route 50 in Oxford. At 2:43 PM EST an amateur radio operator in Mendon reported a gust to 67 mph. At 4:47 PM EST a large tree blocked U.S. Route 20 in Auburn. At 5 PM EST a tree was down on Union Street in Blackstone. At 7:05 PM EST a tree fell through the roof of a house on Columbine Street in Worcester; also, a tree was down on Richmond Street in Worcester.
- 06/23/2015 – Thunderstorm Wind: A strong cold front combined with a remnant of an elevated mixed layer (EML) and a significant amount of deep layer shear and instability

⁷⁸ “Storm Events Database Search Results for Worcester County, Massachusetts,” NCDc.NOAA.gov, National Oceanic and Atmospheric Administration National Centers for Environmental Information, accessed September 24, 2023, 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.

to produce showers and thunderstorms across southern New England. Many of these thunderstorms became severe, producing strong to damaging winds, large hail, and even two EFO tornadoes. A tree was downed onto wires at the intersection of Milk and Chestnut Streets in Blackstone.

- 01/01/2019 – High Wind: Low pressure center passing through New York State on January 1 brought strong west winds to Massachusetts on January 1. At 11:10 AM EST a tree fell on Arnold Road in Sturbridge. At 11:15 AM EST a tree fell on wires on Beaver Street in Worcester. At 11:15 AM EST a large tree fell on Blackstone Street in Blackstone. At 11:35 AM EST a tree fell on Leland Hill Road in Grafton. At 12:30 PM EST a tree fell on a car on Canal Street in Sutton. At 2:33 PM EST a tree fell on Morrison Drive in Mendon. At 10:53 AM EST an amateur radio operator estimated a wind gust of 53 mph.
- 07/17/2019 – Thunderstorm Wind: An approaching cold front, coupled with moisture associated with the remnants of Barry brought showers and thunderstorms to the region. A few of these storms were severe, with damaging wind gusts. There was also isolated flooding from heavy rainfall. In Blackstone, trees were down on Lincoln Street at Tee Jay Lane. Also, a tree was down at the intersection of Goddard and Washington Streets.
- 08/19/2019 – Thunderstorm Wind: An upper level short wave combined with a surface trough and unstable conditions to provide an environment favorable for severe thunderstorms, with both large hail and damaging wind gusts. In Blackstone, a tree was down on Federal Street near the Hartnett Middle School. Trees and wires were down on Farm 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.

PROBABILITY OF FUTURE EVENTS

According to the 2023 ResilientMass Plan, Massachusetts averages two to five tornadoes per year.⁷⁹ Only two tornadoes in the state (which occurred in 1953 and 2011) received disaster declarations. Massachusetts has experienced 12 EFO to EF1 tornadoes since 2018; six EFO tornadoes occurred in the state in 2021, and these 2021 EFO 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 Blackstone is difficult.

Based upon the available historical record, as well as Blackstone's location in a moderate-density

⁷⁹ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan"

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, Blackstone 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. Blackstone 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 23 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.

The potential for locally catastrophic damage is a factor in any tornado, severe thunderstorm, or wind event. In Blackstone, 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 60.9% of the Town’s 4,030 total housing units were constructed in 1979 or earlier (according to the 2022 American Community Survey 5-year estimates).⁸⁰ Some important town facilities are also vulnerable to strong winds and tornados in Blackstone.

Blackstone’s median home value is \$355,100 (according to American Community Survey 2022 5-year estimates).⁸¹ Utilizing the total value of all property in town, \$1,385,688,347,⁸² and an estimated 10 percent of damage to 5 percent of all structures, the estimated amount of damage from a tornado in town is \$6,928,441.74. The cost of repairing or replacing roads, bridges, utilities,

⁸⁰ “DP04: Selected Housing Characteristics,” Data.Census.gov, United States Census Bureau, accessed September 24, 2024,

<https://data.census.gov/table?q=dp04%20selected%20housing%20characteristics&g=060XX00US2502706015>.

⁸¹ Ibid.

⁸² Data Analytics and Research Bureau, “Assessed Values by Class,” Dlsgateway.dor.state.ma.us, Massachusetts Department of Revenue, September 24, 2024,

<https://dlsgateway.dor.state.ma.us/reports/rdPage.aspx?rdReport=PropertyTaxInformation.AssessedValuesbyClass.assessedvaluesbyclass&tblassessedvalues-PageNr=4&rdDataCache=400584956&rdShowModes=&rdSort=&rdNewPageNr=True1&rdRequestForwarding=Form>.

and contents inside structures is not included in this estimate.

EXPOSURE

Certain features within Blackstone’s infrastructure, society, and environment may face more exposure to severe thunderstorms/wind/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. Blackstone’s older building stock makes it particularly vulnerable to high wind events.

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.⁸³

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 Blackstone. 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, Blackstone has a hazard index rating of “2 – high risk” from severe thunderstorms and winds, and a “4 – low risk” from tornadoes.

MITIGATION STRATEGIES

The Town of Blackstone 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 Blackstone:

- 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.

⁸³ “ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan,” page 5.1-56.

4.7 WILDFIRES

Wildfires are fires involving full-sized trees, meadows, and/or scrublands. Typical causes of wildfires 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.”⁸⁴ When relative moisture drops, light fuels like grasses become drier and burn more easily.⁸⁵

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.⁸⁶ Much of this region of Massachusetts, including the Blackstone area, has a high risk of wildfire. In Blackstone, approximately 49.6% of land is deciduous forest, approximately 9.2% of land is evergreen forest, approximately 7.4% of land is forested wetland, approximately 1.1% of land is scrub/shrub land, and approximately 4.4% of land is grassland.⁸⁷ Blackstone 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, 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 Blackstone covers roughly 80% of the Town. The majority of the Town’s water is supplied by a tubular well field. There are also five separate wells in town that provide additional water. The Blackstone Fire Department manages a cistern off Francis Road and has the ability to pull water from Spindleville Pond for firefighting purposes.

⁸⁴ “Understanding Fire Danger,” Nps.gov, United States National Park Service, August 17, 2023, <https://www.nps.gov/articles/understanding-fire-danger.htm>.

⁸⁵ Ibid.

⁸⁶ 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>.

⁸⁷ Ibid.

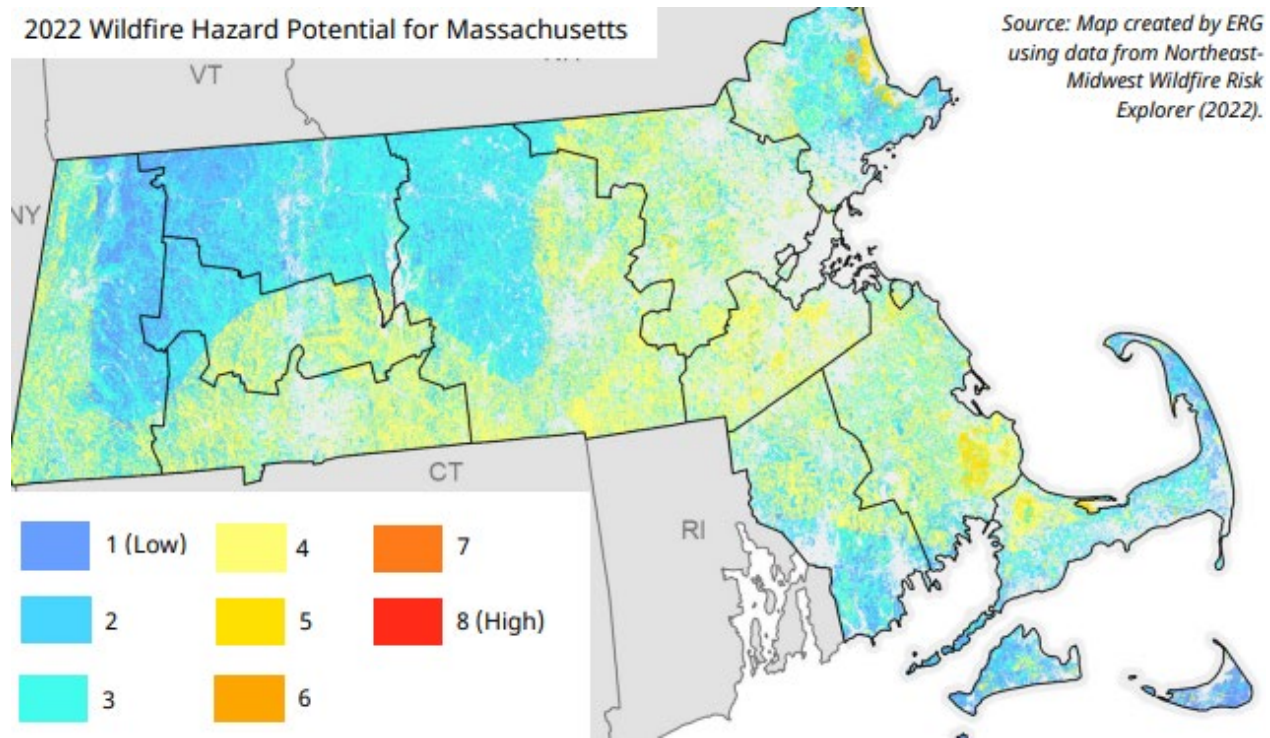


Figure 2: Wildfire Risk Areas for the Commonwealth of Massachusetts.⁸⁸

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 Blackstone, approximately 71.7% 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 140 and the Grafton-Upton Railroad) breaking up the forest. In drought conditions, a 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:

Table 25: 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. |

⁸⁸ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan"

| | | |
|--|---|---|
| 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.⁸⁹ 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 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.

⁸⁹ "Air Quality Index (AQI) Basics," Airnow.gov, United States Environmental Protection Agency, accessed June 10, 2024, <https://www.airnow.gov/aqi/aqi-basics/>.

Table 26: 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

Blackstone has a full-time Fire Department providing 24/7 coverage and is part of the Massachusetts Fire District 7 Mutual Aid Association. Blackstone has experienced 66 wildfires between 2001-2020; however, each of these fires were quite small, and altogether they consumed 8.9 acres of brush/wildland.⁹⁰

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.⁹¹

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

⁹⁰ "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?sourcedoc=%7B1F0B29EB-3A47-4669-B4E6-FA4FC08AD498%7D&file=Wildfire%20Data.xlsx&action=default&mobileredirect=true.

⁹¹ Massachusetts Emergency Management Agency, "Massachusetts Emergency Management Agency Situational Awareness Statement # 24: Statewide Wildfire Operations," (issue brief), Boston, Massachusetts, November 21, 2024.

temperatures are expected to increase the frequency and severity of wildfires.⁹² 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 Blackstone River Basin are projected to increase by 3.6° F to 8.1° F due to climate change.⁹³ 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 Blackstone 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 wildfires 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).

IMPACT

While a large wildfire could in theory damage much of the landmass of Blackstone, 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.

Wildfires can consume homes, other buildings, and/or agricultural resources. Wildfires impact:

- Benefits that people receive from the environment, such as food/water and the regulation of floods and drought;
- 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, \$1,385,688,347,⁹⁴ and an estimated 5 percent of damage to 1 percent of all structures, the estimated amount of damage from a wildfire in town is \$692,844.17. 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

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

⁹³ ResilientMass Plan Maps and Data Center, “Climate Change Projections Dashboard,” Resilientma-mapcenter-mass-eoea.hub.arcgis.com, ResilientMass Plan, accessed July 1, 2024, <https://resilientma-mapcenter-mass-eoea.hub.arcgis.com/#ClimateDashboard>.

⁹⁴ Data Analytics and Research Bureau, “Assessed Values by Class”

undeveloped wildland vegetation; the WUI represents a large percentage of the land use within Worcester County as a whole.⁹⁵

EXPOSURE

Certain features within Blackstone’s infrastructure, society, and environment may face more exposure to wildfires, 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 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;⁹⁶ and
- First responders, especially the Town’s firefighters.

Specifically, the following critical infrastructure routes identified in this plan were noted as being especially vulnerable to wildfires by CMPRC’s GIS analysis:

- Main Street (Route 122) to Millville and to Rhode Island, and
- The Providence and Worcester / Genessee and Wyoming Railroad.

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 (PM_{2.5}) – on June 6th 2023.⁹⁷

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.⁹⁸ 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.

⁹⁵ 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, 2023, https://www.fs.usda.gov/rds/archive/products/RDS-2015-0012-4/ metadata_RDS-2015-0012-4.html.

⁹⁶ Kat J. McAlpine (2021, July 27). “Wildfire Smoke in New England Is ‘Pretty Severe from Public Health Perspective’,” BU.edu, The Brink: Pioneering Research from Boston University, July 27, 2021, <https://www.bu.edu/articles/2021/wildfire-smoke-in-new-england/>.

⁹⁷ “Pre-Generated Data Files,” Aqs.epa.gov, United States Environmental Protection Agency, October 26, 2023, https://aqs.epa.gov/aqsweb/airdata/download_files.html.

⁹⁸ “ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan”

In summary, climate change is likely to increase the frequency and extent of wildfires in Blackstone. 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 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 Blackstone 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, Blackstone has a hazard risk index of “4 – low risk” from wildfires. 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. Sustained drought conditions could put Blackstone at risk to a greater frequency and ferocity of wildfires, and wildfires outside of Blackstone could reduce air quality to dangerous levels in town.

MITIGATION STRATEGIES

The Town of Blackstone is currently able to effectively respond to wildfires 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. The local HMP planning team identified the following strategies that could be used to reduce the threat of wildfires in Blackstone:

- Improve vegetation and debris management along Genesee & Wyoming / P&W Railroad rights-of-way; recurrent wildfires have been reported near Genesee & Wyoming / P&W tracks.
- Investigate rural firefighting capabilities for the Town. Investigate options for having more rural firefighting assets such as dry hydrants and cisterns.
- In tandem with the water conservation outreach listed above, conduct enhanced enforcement of water usage restrictions (in part to conserve water for firefighting).

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 Blackstone 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 8.⁹⁹

Table 27: 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. |

⁹⁹ "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 28: Modified Mercalli Intensity Scale for and Effects¹⁰⁰

| 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 |

¹⁰⁰ 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.

PREVIOUS OCCURRENCES

The last recorded earthquake to cause major damage in New England occurred in 1755,¹⁰¹ though seismologists state that another serious earthquake occurrence in the region in the future is possible. Earthquakes which caused damage in New England occurred in:

- 1638 (magnitude 6.5, Concord, New Hampshire),
- 1727 (magnitude 5.6, Newburyport, MA),
- 1755 (magnitude 6.2, off the coast of Cape Ann, MA),
- 1791 (magnitude 4-5, East Haddam, Connecticut),
- 1904 (magnitude 5.9, far eastern Maine, at the border with New Brunswick),
- 1940 (magnitude 5.5, west of Whittier, New Hampshire), and
- 1973 (magnitude 4.8, across the Quebec border from northern Oxford County, Maine)¹⁰²

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 seismologically active regions like parts of Canada may also impact Massachusetts.¹⁰³ Earthquakes occur without warning and may be followed by aftershocks. Central New Hampshire is one of the most seismically active regions of New England, and earthquakes with epicenters in this region could cause damage in Blackstone, as New England's often very hard igneous and metamorphic bedrock causes earthquake shockwaves to travel further than they do in other regions, such as the US West Coast.¹⁰⁴ Figure 3 below shows the locations of earthquakes that have occurred across the New England region and beyond from January 1975 through October 2017.

¹⁰¹ 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://nsec.org/massachusetts-earthquakes/>.

¹⁰² Ibid; "New England Significant Earthquake Atlas," Aki.bc.edu, Weston Observatory at Boston College, accessed February 14, 2025, http://aki.bc.edu/quakes_historical.htm; Juli Mancini, "Big Noises: The Great Connecticut Quake of 1791," Patch.com, Patch: The Haddams-Killingworth, CT, March 27, 2011, <https://patch.com/connecticut/thehaddams-killingworth/big-noises-the-great-connecticut-quake-of-1791>; Henry N. Berry IV, "Earthquakes in Maine," Maine.gov, Maine Department of Agriculture, Conservation, and Forestry, January 26, 2015, <https://www.maine.gov/dacf/mgs/hazards/earthquakes/quake.htm>.

¹⁰³ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan"

¹⁰⁴ "New York Earthquakes," NESEC.org, Northeast States Emergency Consortium, accessed September 16, 2024, <https://nsec.org/new-york-earthquakes/>; Kevin Skarupa, "Why New England earthquakes are felt so far from epicenters," WMUR.com, WMUR9-ABC, January 27, 2025, <https://www.wmur.com/article/feeling-new-england-earthquakes-bedrock/63574691>.

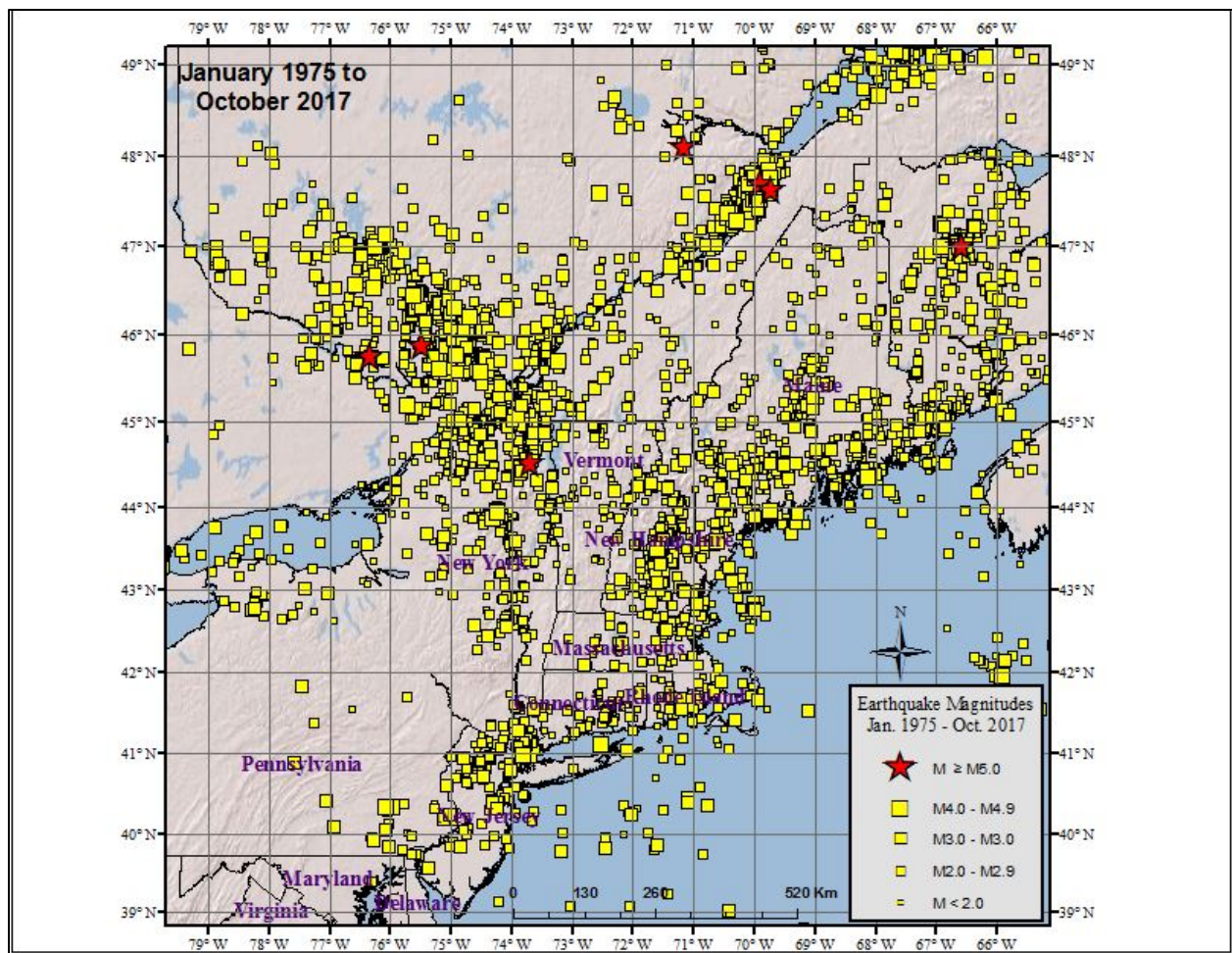


Figure 3: Map of Earthquakes of the Northeastern US and Southeastern Canada 1975 to 2017.¹⁰⁵

The local hazard mitigation planning team reports that no earthquakes have recently been felt in Blackstone. To determine whether earthquakes have occurred recently near Blackstone, 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 Duration magnitude scales have been recorded at the Weston Observatory since 2018:

- 12/21/2018 – 3 km WSW of Gardner, 2.1/2.1 [M_n^*/M_c^{**}]
- 8/21/2019 – 2 km SSE of Wareham, 1.7/2.4

¹⁰⁵ “New York Earthquakes,” NESEC.org, Northeast States Emergency Consortium, accessed September 16, 2024, <https://nsec.org/new-york-earthquakes/>.

- 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
- 7/25/2021 – 5.0 km W of Peabody 1.4/2.5
- 1/1/2022 – 13.0 km N of Rockport 2.3/3.0
- 3/4/2022 – 5.0 km WSW of Orange 2.2/2.7
- 11/10/2022 – 12.0 km NW of Nantucket 2.6/3.0
- 11/13/2023 – 208.0 km E of Chatham 2.8/3.3
- 12/26/2023 – 52.0 km ENE of Rockport 2.2/2.8
- 3/11/2024 – 6.0 km 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.¹⁰⁶

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%.”¹⁰⁷ 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 Blackstone.

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 60.9% of the Town’s 4,030 total housing units, according to 2022 American Community Survey 5-year estimates, were constructed in 1979 or earlier.¹⁰⁸ Seismic standards in Massachusetts were upgraded with the 1997 revision of the state building code. Despite its fairly old housing stock, Blackstone 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.

¹⁰⁶ 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.

¹⁰⁷ “ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan,” page 5.1-42.

¹⁰⁸ “DP04: Selected Housing Characteristics,” Data.Census.gov

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 29: HAZUS Potential Damages from a Magnitude 5.0 Earthquake with an Epicenter in Blackstone

| | Magnitude 5.0 |
|--|--------------------|
| Building Characteristics | |
| Estimated total number of buildings | 2,421 |
| Estimated total building replacement value (2024 \$) | \$1,146,000,000.00 |
| Building Damages | |
| # of buildings sustaining slight damage | 729 |
| # of buildings sustaining moderate damage | 359 |
| # of buildings sustaining extensive damage | 79 |
| # of buildings completely damaged | 17 |
| Population Needs | |
| # of households displaced | 60 |
| # of people seeking public shelter | 27 |
| Debris | |
| Building debris generated (tons) | 18,000 |
| # of truckloads to clear debris (@ 25 tons/truck) | 720 |
| Value of Damages (dollars) | |
| Total property damage | \$131,611,800.00 |
| Total losses due to business interruption | \$18,708,200.00 |

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

EXPOSURE

Certain features within Blackstone’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 (these buildings would see substantial damage in the case of an earthquake similar

in magnitude and length to the 1755 Cape Ann earthquake); and

- Underground infrastructure, which is especially vulnerable to earthquakes due to the glacial outwash sand and gravel and glacio-lacustrine fine sand, silt and clay which make up a large portion of the Town's soils being prone to liquefaction during prolonged shaking when the water table is shallow.¹⁰⁹

POTENTIAL CLIMATE CHANGE EFFECTS

The 2023 ResilientMass Plan identifies no climate change effects that pertain to earthquake hazards.¹¹⁰

VULNERABILITY

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

MITIGATION STRATEGIES

The Town of Blackstone 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 Blackstone:

- During the next municipal facilities or capital improvement planning process, review options for relocating departments (especially public safety departments) away from the current Municipal Center / Public Safety / Senior Center building; this building potentially may flood and is adjacent to 100-year flood zone.
- 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.
- Complete evacuation plan updates; where possible, ensure that evacuation routes are outside of hazard areas.

¹⁰⁹ “What is liquefaction,” USGS.gov, United States Geological Survey, April 19, 2023, <https://www.usgs.gov/faqs/what-liquefaction>; “Soil Survey Map,” ArcGIS.com, ESRI, accessed February 14, 2025, <https://www.arcgis.com/apps/View/index.html?webmap=38a93357a08b4f6d94d7e07a424fafd5>.

¹¹⁰ “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.¹¹¹ Dam failures may be influenced by storm floodwaters, but most dam failures are caused by structural, mechanical, or hydraulic failures.¹¹² 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).¹¹³ 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.

LOCATION

According to the Massachusetts Office of Dam Safety, there are ten dams in Blackstone. Of these dams, zero are ranked as High Hazard and one is ranked as Significant Hazard. Of some note is the town-owned Lake Hiawatha Dam, which was on the state's 2011 list of 100 dams needing substantial investments in maintenance and/or operations. Concerns relating to this dam were substantially addressed using funds from a state earmark, and the dam is no longer considered to be in poor condition. In addition to the dams in town, the Harris Pond Dam (High Hazard, RI00073) in neighboring Woonsocket, RI lies immediately along the town/state boundary, creating Harris

¹¹¹ 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>

¹¹² “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.

¹¹³ “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%20public%20review%20of%20the%20performance%20of%20a%20dam>.

Pond upstream from the dam; The pond itself is almost completely within Blackstone, although the impacts from a failure event would take place almost completely in Rhode Island. A former iteration of this dam failed due to embankment collapse during Tropical Storm Diane in 1955, according to the Association of State Dam Safety Officials' inventory of failures and near-failures.¹¹⁴ The Slatersville Reservoir Upper (High Hazard, RI00043), Middle (High Hazard, RI00046), and Lower (Significant Hazard, RI00047) Dams in North Smithfield, Rhode Island as well as the Hopedale Pond Dam (Significant Hazard, MA00624) and the Spindleville Pond Dam in Hopedale (Significant Hazard, MA00936) are also of concern to the Town. Dams in Blackstone are listed below and are mapped in Appendix A.

Table 30: Dams within Blackstone

| National ID | Dam Name | Owner | Regulatory Authority | Hazard Code | Notes |
|-------------|--------------------------------------|--------------------|----------------------|--------------------|---|
| MA00096 | Stone Diversion Dam | Private | Office of Dam Safety | Low Hazard | This dam is also known as the Rolling Dam and is historic. It is located in the 100-year flood zone and therefore was noted as vulnerable by CMRPC's GIS analysis. |
| MA01164 | Blackstone River Dam at Canal Street | Town of Blackstone | Office of Dam Safety | Low Hazard | This dam was noted as being a flooding hazard by the HMP planning team in town and is in the 100-year flood zone, so therefore it was noted as vulnerable by CMRPC's GIS analysis. The catwalk at this dam is in poor shape. This dam is also called the Saranac Dam. |
| MA01167 | Lake Hiawatha Dam | Town of Blackstone | Office of Dam Safety | Significant Hazard | This dam was on the state's 2011 list of 100 dams needing substantial investments in maintenance and/or operations; these concerns were substantially addressed using funds from a state earmark, and the dam is no longer considered to be in poor condition. This dam was also noted as vulnerable to a locally identified flooding hazard by CMRPC's GIS analysis. |
| MA02741 | Canal Headgate Dam | Private | Office of Dam Safety | N/A | This dam is located in the 100-year flood zone and therefore was noted as vulnerable by CMRPC's GIS analysis. |

¹¹⁴ "Harris Pond – RI00000-196," Damsafety.org,

| | | | | | |
|---------|---------------------|--------------------|----------------------|------------|--|
| MA02742 | Mill Pond Dam | Private | Office of Dam Safety | Low Hazard | This dam was noted as vulnerable to a locally identified flooding hazard by CMRPC's GIS analysis. It is also in the 100-year flood zone. |
| MA02743 | Crain's Pond Dam | Private | Office of Dam Safety | Low Hazard | This dam was noted as vulnerable to a locally identified flooding hazard by CMRPC's GIS analysis. It is also in the 100-year flood zone. |
| MA02744 | Fish Pond Dam | Private | Office of Dam Safety | N/A | This dam is located in the 100-year flood zone and therefore was noted as vulnerable by CMRPC's GIS analysis. |
| MA02745 | Fox Brook Dam | Private | Office of Dam Safety | N/A | This dam is historic and was also noted as vulnerable to a locally identified flooding hazard by CMRPC's GIS analysis. |
| MA02746 | Old Ice Pond #1 Dam | Private | Office of Dam Safety | N/A | There are no noteworthy concerns regarding natural hazard impacts on this dam. |
| MA02748 | Walsh's Pond Dam | Town of Blackstone | Office of Dam Safety | N/A | This dam is located in the 100-year flood zone and therefore was noted as vulnerable by CMRPC's GIS analysis. |

Inundation areas for these dams cover less than 10% of Blackstone, 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 one dam failure in Blackstone, as noted by the local HMP planning team in town. In the 1960s, a historic low stone dam on the Mill River just upstream from Summer Street failed due to damage from severe winter icing, draining its mill pond and causing minor downstream damage. In addition, the Harris Pond Dam on the Mill River on the Town's border with Woonsocket, Rhode Island failed during Tropical Storm Diane in 1955. Harris Pond is located almost entirely in Blackstone, though the dam is in Rhode Island.

PROBABILITY OF FUTURE EVENTS

The probability of future dam failure events in Blackstone 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 “limited impact” from the failure of dams with, with 10% to 25% of property in the affected area of town likely to see damage in the case of a dam failure event.

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.¹¹⁵

EXPOSURE

Certain features within Blackstone'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.

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.

¹¹⁵ "About DSS-WISE™ Web," Dsswiseweb.ncche.olemiss.edu, University of Mississippi, accessed June 10, 2024, <https://dsswiseweb.ncche.olemiss.edu/userpages/about.php>.

VULNERABILITY

Based on a mostly qualitative assessment, Blackstone's overall vulnerability to dam failure is considered to be "3 – medium." While the historic Harris Pond Dam collapse on the Blackstone River in next door Woonsocket, Rhode Island during Tropical Storm Diane and the 1960s Summer Street low stone dam collapse from ice damage are quite unlikely to be repeated, they do indicate that there is local exposure to very extreme hazard events that can result in dam failures. In addition, while the state's primary concerns with conditions at the Lake Hiawatha Dam have been addressed, it remains a Significant Hazard dam and presents some continued risk to residences as well as to the Harris Pond Dam downstream. A failure at the Lake Hiawatha Dam would also impact Elm Street, a designated evacuation route for the Town. Significant damage to property and the Town's current and future assets and/or injuries to people may occur in the case that the Significant Hazard Lake Hiawatha dam in town was to fail. However, dam failure events are unlikely to occur in town.

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 not available to the Town.

MITIGATION STRATEGIES

The Town of Blackstone 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 Blackstone:

- Enhance the monitoring of conditions at the town-owned Lake Hiawatha Dam (Significant Hazard) to ensure compliance with the state mandate on structural conditions.
- Review town communications regarding downstream management of the Blackstone River, especially coordination with neighboring Woonsocket. Ensure that both municipalities are anticipating the impacts of development on water wells and flood storage areas.
- Complete a Town-wide dam assessment of all public, private, and beaver dams. In this assessment, focus on reducing the risk of flooding from dam failures during intense storm events and protecting ecosystems that provide flood storage and other resilience benefits.

4.10 DROUGHT, INCLUDING CHANGES IN GROUNDWATER

Drought 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 (including reduced groundwater levels); increased livestock and wildlife mortality rates; and damage to wildlife and fish habitat. Drought impacts, including reduced groundwater levels, can have far-reaching effects throughout the region and even the country.

LOCATION

Because of this hazard's regional nature, drought (including reduced groundwater levels) would likely impact the entire community, meaning the location of occurrence within Blackstone 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 31: National Drought Mitigation Center D0-D4 Scale¹¹⁶

| 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 |

More severe drought will lead to more impactful changes in groundwater by reducing water table levels and affecting groundwater quality. The United States Geological Survey's National Groundwater Conditions web application measures groundwater levels by monthly percentiles as

¹¹⁶ "Drought Classification," Droughtmonitor.unl.edu, National Drought Mitigation Center, University of Nebraska-Lincoln, accessed June 10, 2024,

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

compared to historic levels at each particular site.¹¹⁷ 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.¹¹⁸ Massachusetts also has a Drought Management Plan which provides an overview of how groundwater levels are monitored in the state;¹¹⁹ data from groundwater monitoring locations in and near Blackstone can be studied to see if groundwater levels in town are fluctuating outside of historically-experienced ranges.

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 withdrawals at lower water (including groundwater) levels caused by drought. The Blackstone area has been spared the most severe impacts in each case according to the information for Massachusetts included in USGS Water Supply Paper #2375.¹²⁰

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

Table 32: Peak Drought Severity Data in Massachusetts Per Year Since 2000¹²¹

| 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 |

¹¹⁷ Lee Stanish, “Introducing the National Groundwater Conditions web application,” Waterdata.usgs.gov, United States Geological Survey, accessed April 7, 2025, <https://waterdata.usgs.gov/blog/groundwater-levels-app/>.

¹¹⁸ “Drinking Water Standards and Guidelines,” Mass.gov, the Massachusetts Department of Environmental Protection, accessed April 7, 2025, <https://www.mass.gov/guides/drinking-water-standards-and-guidelines>.

¹¹⁹ “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>.

¹²⁰ 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.

¹²¹ “Statistics by Threshold,” Droughtmonitor.unl.edu, National Drought Mitigation Center, University of Nebraska-Lincoln, accessed June 10, 2024, <https://droughtmonitor.unl.edu/DmData/DataDownload/StatisticsbyThreshold.aspx>.

| | |
|------------------------------|-------------------------------------|
| 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 (through late November) | D3 conditions in 47% 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 33: Peak Drought Severity Data in Worcester County Per Year Since 2018¹²²

| 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 (through late November) | D3 conditions in 51% of Worcester County |

The local HMP planning team in Blackstone noted that 2022 was an especially severe drought year, including in terms of reduced groundwater levels, for the Town. The Town issues has often water restrictions which are advertised via signage, via the local access cable network, and on the town website.

As of the writing of this plan, the Town of Blackstone and large portions of Massachusetts are currently in critical drought conditions; since August 2024, all regions of the state except for the

¹²² Ibid.

Cape and Islands have seen a rainfall deficit of 8 to 11 inches.¹²³

PROBABILITY OF FUTURE EVENTS

In Blackstone, as in the rest of the state, the probability of extreme and exceptional droughts, including those that cause extreme and exceptional reductions in groundwater levels, 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 such as severe reductions in groundwater levels.¹²⁴ 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 resulting reduced groundwater levels, including extreme and exceptional drought and reductions to these groundwater levels, may increase in Blackstone 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 and drought-induced reductions in groundwater levels in Massachusetts are categorized by the National Drought Mitigation Center in Table 34 below:

Table 34: Historic Impacts of Drought in Massachusetts¹²⁵

| 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 |

¹²³ “Drought Management in Massachusetts,” Mass.gov, Massachusetts Executive Office of Energy and Environmental Affairs Drought Management Task Force, December 9, 2024, <https://www.mass.gov/guides/drought-management-in-massachusetts>.

¹²⁴ “Massachusetts Drought Management Plan,” Mass.gov.

¹²⁵ “State Impacts,” Droughtmonitor.unl.edu, National Drought Mitigation Center, University of Nebraska-Lincoln, accessed June 10, 2024, <https://droughtmonitor.unl.edu/DmData/StateImpacts.aspx>.

| | |
|----|--|
| | 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.¹²⁶

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 fire 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.

Specific drought impacts in Blackstone, including the level of reduction in groundwater levels may vary among and between customers of the Town’s water system and private well users. While the impact of a drought, including the reduction in groundwater levels, 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.

EXPOSURE

Certain features within Blackstone’s infrastructure, society, and environment may face more exposure to drought (including the reduction in groundwater levels), 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 impacts, could also

¹²⁶ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan"

negatively affect local residents. Other factors like PFAS contamination of water sources could compound drought-related water supply challenges. Contaminants, including PFAS, can pose greater risk to the community after shifting position due to drought-driven changes in groundwater.¹²⁷ Blackstone has already experienced PFAS contamination, as it has had to inactivate one of its wells due to PFAS.

POTENTIAL CLIMATE CHANGE EFFECTS

According to the 2023 ResilientMass Plan, there are two major ways that drought can be influenced by climate change:¹²⁸

- 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.
- 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.

A common concern among town residents who responded to the survey was that wells in town may dry up in the future as groundwater levels lower during drought events. The Blackstone public water system is supplied by groundwater wells and is distributed through a vast network of water mains. According to the 2023 ResilientMass Plan, climate change is predicted to affect groundwater availability;¹²⁹ the increased frequency and duration of drought conditions will increase the risk in town of wells drying up.

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 Blackstone. 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, as the current town water system is noted to be “at capacity” by the local HMP planning team; it is primarily fed through town-owned wells, with about 20% of the Town on private well water as the alternative. There are currently no means by which additional water could easily be obtained by the Town in the event of an emergency. 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 Blackstone.

VULNERABILITY

Based on the above assessment, Blackstone’s overall vulnerability to drought is considered to be “3 – medium risk.” Minimal or no loss of or damage to property and the Town’s current and future assets, injuries, or loss of life is expected from drought in town. However, the Town is vulnerable to drought impacts such as reduced groundwater levels causing less water availability, especially at private wells not connected to the Town’s water system. Residents and businesses in the 20% of

¹²⁷ “ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan,” pages 5.1-34-5.1-35.

¹²⁸ Ibid.

¹²⁹ “ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan,” pages 5.1-34-5.1-35.

town which relies on private wells (an area concentrated in the northwestern part of the Town) which are more prone to dry up in the case of drought may face water shortages during drought events. The Town-owned wells are also to an extent vulnerable to drought, and the Town is especially vulnerable to drought events that affect these wells at the time of wildfire events due to the Town currently having difficulty finding additional water outside them to use in case of emergencies such as wildfires.

MITIGATION STRATEGIES

The Town of Blackstone is currently able to effectively respond to drought, including drought-induced reductions in groundwater levels, 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, including drought-induced reductions in groundwater levels. The local HMP planning team identified the following strategies that could be used to reduce the threat of drought, including drought-induced reductions in groundwater levels, in Blackstone:

- Evaluate the feasibility of and possibly implement a permanent water system connection between Blackstone and neighboring Bellingham to provide resilience in drought (currently, hydrants can be connected to share limited water between the two towns).
- Plan and site new wells to supply the town water system.
- Enhance the provision of information to residents and businesses on conserving water through reduction in use, low-impact landscaping, and other low-cost measures; in part, an impetus for this strategy is to conserve water for firefighting.

4.11 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.¹³⁰ 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 Blackstone are:

Table 35: Normal Temperatures in the Period Between 1991-2020 in the Area Near Blackstone¹³¹

| | July (Hottest Month) | January (Coldest Month) |
|-------------------|----------------------|-------------------------|
| Average High (°F) | 84.0° | 37.8° |
| Average Low (°F) | 63.3° | 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 Blackstone 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:

¹³⁰ “ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan,” pages 5.2-1-5.2-2.

¹³¹ These temperature estimates are based on data recorded at a weather station in Woonsocket, Rhode Island. “U.S. Climate Normals Quick Access,” [ncei.noaa.gov](https://www.ncei.noaa.gov), National Oceanic and Atmospheric Administration National Centers for Environmental Information, accessed September 25, 2024, <https://www.ncei.noaa.gov/access/us-climate-normals/>.

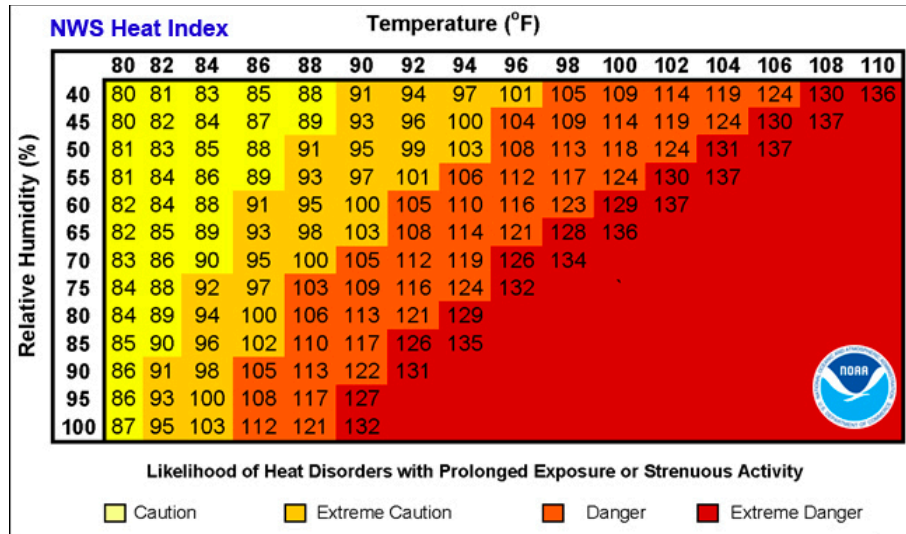


Figure 4: Heat Index¹³²

Extreme heat causes more fatalities in the United States than all other weather-related natural hazards combined.¹³³ Extreme heat can be the underlying cause of death or can worsen other medical conditions like heart disease, hypertension, alcohol poisoning, and drug overdoses.¹³⁴ The heat-related mortality rate is higher among males and people aged 65 years and older.¹³⁵

Table 36: 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 36: Heat Effects on the Body¹³⁶

| 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. |

¹³² 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>.

¹³³ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan,"

¹³⁴ 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>.

¹³⁵ Ibid.

¹³⁶ 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.¹³⁷ Prolonged heat can cause power use to spike and in turn can overload the electrical grid, causing outages.¹³⁸ Extreme heat and cold can both negatively impact transportation infrastructure; Railroad tracks are a particular concern because metal rails can kink in high temperatures.¹³⁹

The 2023 ResilientMass Plan notes that the extent (severity or magnitude) of extreme cold temperatures is generally measured through the Wind Chill Temperature Index.¹⁴⁰ 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.¹⁴¹ 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.

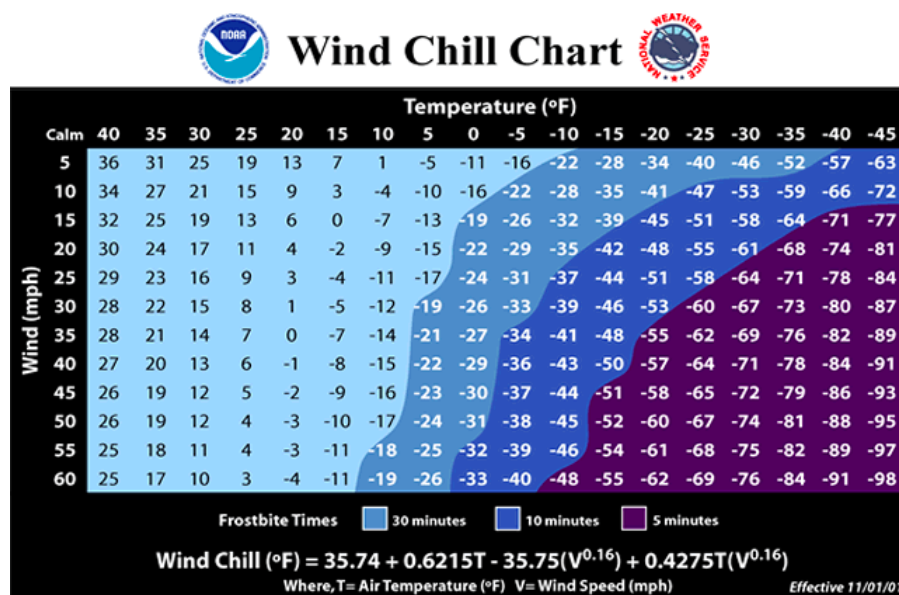


Figure 5: NWS Wind Chill Temperature (WCT) index.¹⁴²

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.¹⁴³ Carbon monoxide poisoning is another risk during cold weather, especially when households lack adequate power or heat.¹⁴⁴

¹³⁷ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan,"

¹³⁸ Ibid.

¹³⁹ Ibid.

¹⁴⁰ Ibid.

¹⁴¹ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan," pages 5.2-1-5.2-3.

¹⁴² National Weather Service, "Understanding Wind Chill," Weather.gov, National Oceanic and Atmospheric Administration, accessed September 16, 2024, <https://www.weather.gov/safety/cold-wind-chill-chart>.

¹⁴³ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan," pages 5.2-1-5.2-3.

¹⁴⁴ Ibid.

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 2022.¹⁴⁵ 2010–2022 had seven of the 10 warmest summers on record in the state.

2012 and 2013 were notably hot summers in Massachusetts¹⁴⁶ 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.¹⁴⁷

The hottest two summers on record in the Commonwealth were 2020 and 2022.¹⁴⁸ 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 Blackstone HMP was developed in 2017:¹⁴⁹

- 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 Blackstone.

PROBABILITY OF FUTURE EVENTS

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

¹⁴⁵ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan," pages 5.2-7-5.2-8.

¹⁴⁶ Ibid.

¹⁴⁷ Ibid.

¹⁴⁸ Ibid.

¹⁴⁹ "Storm Events Database Search Results for Worcester County, Massachusetts," NCDC.NOAA.gov, National Oceanic and Atmospheric Administration National Centers for Environmental Information, accessed September 17, 2024,

https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28%29+Extreme+Cold%2FWind+Chill&beginDate_mm=01&beginDate_dd=01&beginDate_yyyy=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 Blackstone 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 Blackstone'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.¹⁵⁰ 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:¹⁵¹

- 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.¹⁵²

In summary, climate change is likely to increase the frequency and duration of extreme heat events

¹⁵⁰ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan"

¹⁵¹ Ibid.

¹⁵² "2022 Massachusetts Climate Change Assessment," page RS30.

in Massachusetts. Changes to average annual temperatures will also impact Blackstone. Seasonal temperatures will shift, with spring and summer temperatures extending through more of the year.¹⁵³ Winters may also be milder than historical norms.¹⁵⁴ 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.¹⁵⁵

To respond to climate change-induced changes in temperatures, Blackstone 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. Blackstone 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.¹⁵⁶

VULNERABILITY

Blackstone's vulnerability to extreme heat and cold is considered to be, "4 – low risk." The Town has operated heating and cooling shelters and continues to do so at their municipal building and other town facilities. Its local ecology, with forested areas covering approximately 60% of the Town, and its location along the Blackstone River also provide natural evaporation and transpiration-related cooling effects to the Town.

MITIGATION STRATEGIES

The Town of Blackstone 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 Blackstone:

- Plan and site new wells to supply the town water system.
- Install central air conditioning in the Town's schools, including the schools which act as emergency shelters, to protect children, older adults, people with disabilities, and other vulnerable populations from the impacts of increasing heat.

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

¹⁵⁴ Ibid.

¹⁵⁵ Ibid.

¹⁵⁶ Ibid.

4.1.2 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.”¹⁵⁷ 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.¹⁵⁸ 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. Blackstone, with its forested uplands and location along the Blackstone River, is vulnerable to intrusion from both land-based and aquatic invasive flora and fauna; 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;¹⁵⁹ the Center for Invasive Species and Ecosystem Health’s Early Detection and Distribution Mapping System (EDDMapS) hosted by the University of Georgia;¹⁶⁰ and the Forest Ecosystem Monitoring Cooperative’s Northeastern Forest Health Atlas.¹⁶¹

¹⁵⁷ 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.

¹⁵⁸ “ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan,” page 5.1-48.

¹⁵⁹ “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>.

¹⁶⁰ “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>.

¹⁶¹ “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 2017 to 2024, according to EDDMapS analysis of verified invasive species reporting, there have been 378 records of locations with invasive species; In the county, 353 distinct sightings of invasive species ranging from plants to insects have been left unchecked, 2 invasive species are being treated, and a total of 47 acres are considered to be infested with invasive species.¹⁶²

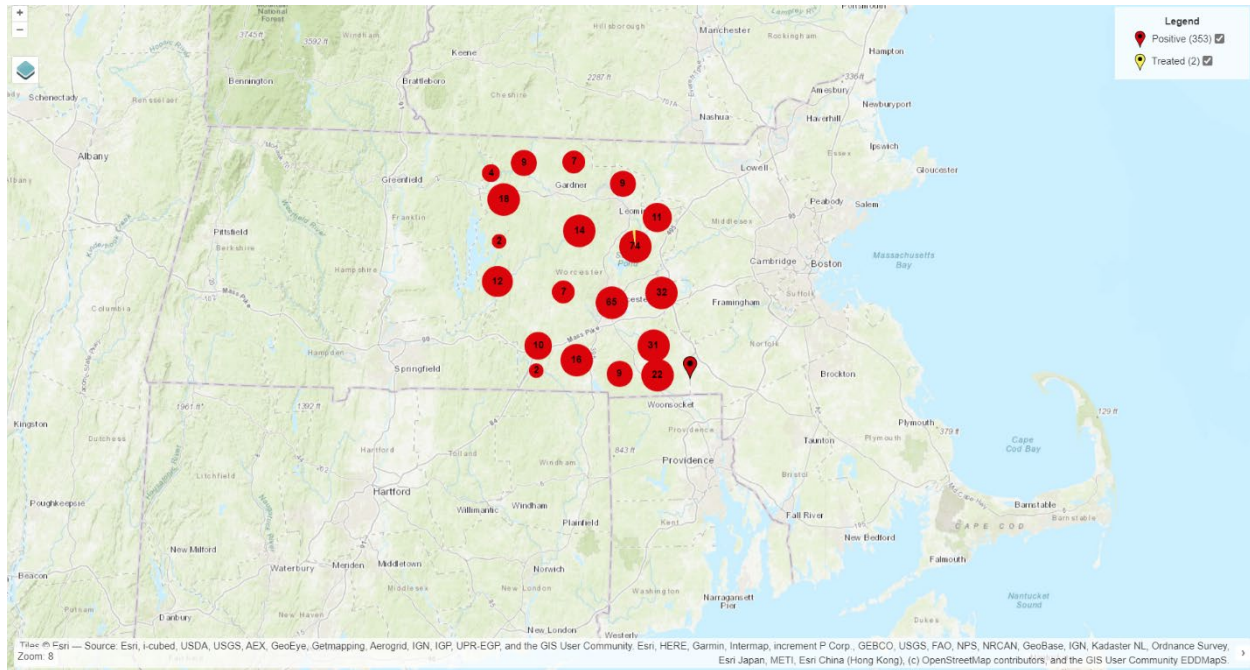


Figure 6: EDDMapS Analysis of Worcester County Invasives 2017-2024

The Massachusetts Department of Agriculture’s Invasive Pests Dashboard notes that Emerald Ash Borer was detected in Blackstone in 2022 and that nearby towns suffer from infestations of 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.¹⁶³

A lack of reporting on invasives may mean that the extent of invasives in Blackstone 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 past 3 years.¹⁶⁴

¹⁶²“My EDDMapS,” EDDMapS.org.

¹⁶³“MDAR Invasive Pest Dashboard: Emerald Ash Borer (*Agilus 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.

¹⁶⁴“Northeastern Forest Health Atlas - Defoliation: Years of Damage,” UVM.edu, Forest Ecosystem Monitoring Cooperative, accessed June 10, 2024, https://www.uvm.edu/femc/forest-health-atlas?premade=All_Defo.

Area Damaged by Number of Years of Damage

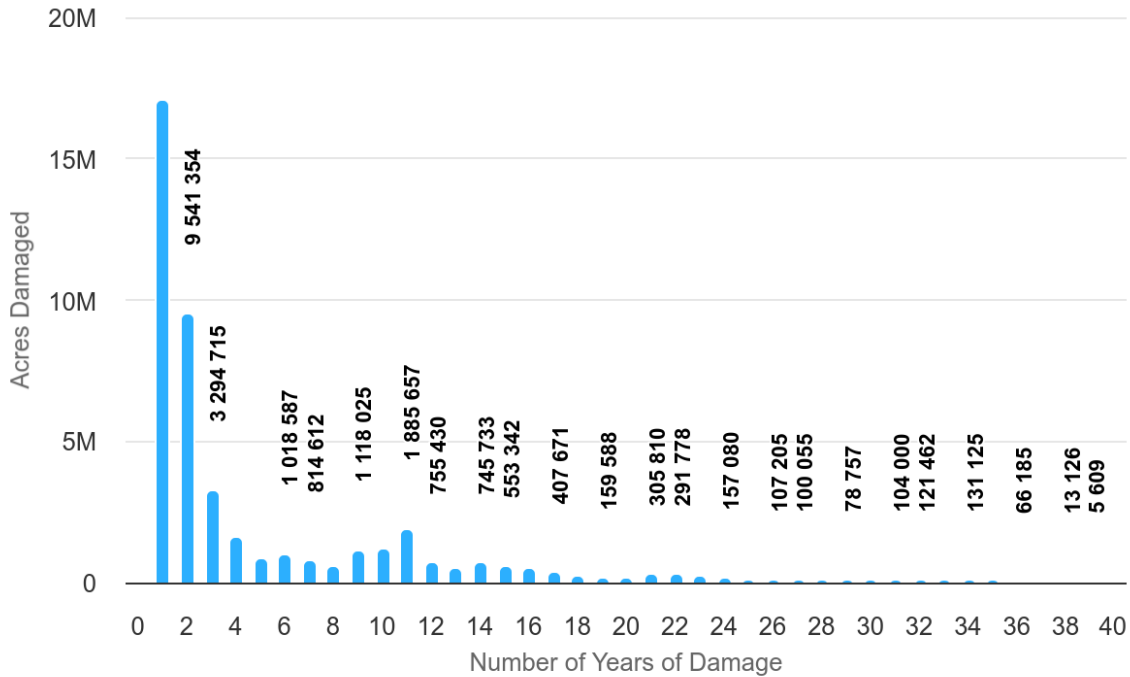


Figure 7: Area Damaged by Spongy Moth, Forest Tent Caterpillar, and Winter Moth from 1979 to 2019

In Worcester County, the vast majority of these invasive pest tree damage events occurred in the southern part of the county, and in particular the south-east of the county where Blackstone is located. Significant damage events have also occurred in the west and southwest of the county (near the border with Hampshire and Hamden Counties). 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.¹⁶⁵ In 2008, an outbreak of Asian long-horned beetles in Worcester destroyed nearly 30,000 trees.¹⁶⁶

Blackstone 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.¹⁶⁷ 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 an already fragile ecology. Based on the previously identified occurrences and trends, the probability of an invasive species event occurring in Blackstone is very high, with a 70-100%

¹⁶⁵ Ibid.

¹⁶⁶ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan"

¹⁶⁷ Ibid.

probability of occurrence in the next year.

IMPACT

Specific impacts of invasive species in Blackstone 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 region¹⁶⁸ (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).¹⁶⁹ Invasives are also one of the costliest natural hazards in terms of control efforts, costing the United States and estimated \$21 billion per year.¹⁷⁰ As there is a lack of reliable information about the extent of invasive species within Blackstone, 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 Blackstone'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.

Specifically, the following critical infrastructure routes identified in this plan were noted as being especially vulnerable to invasive species by CMPRC's GIS analysis:

- Main Street (Route 122) to Millville and to Rhode Island as well as Mendon Street to Mendon.

POTENTIAL CLIMATE CHANGE EFFECTS

According to the 2023 ResilientMass Plan, climate change is predicted to increase the spread of

¹⁶⁸ Ibid.

¹⁶⁹ 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>.

¹⁷⁰ 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-study-finds>.

invasive species and expand their range.¹⁷¹ Already fragile ecosystems, if left unmanaged, will suffer the worst effects of invasive species; native flora and fauna species could be supplanted by 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

- a. 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

- a. 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.
- b. 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, Blackstone has a hazard index rating of “3 – medium risk” from invasive species.

MITIGATION STRATEGIES

The Town of Blackstone 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 Blackstone:

- Increase education and outreach (on social media and through schools, the senior center, and community-based organizations) on all hazards in town, especially thunderstorms, snowstorms, and invasive species.
- Educate residents about invasive species management using existing and new resources. Explore participating in a regionalized education and abatement program for invasive species management.

¹⁷¹ “ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan”

4.13 OTHER HAZARDS

In addition to the hazards identified in previous sections, the Blackstone 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 Blackstone 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 Blackstone due to the Town being around 20 miles from the nearest coastline.

Although landslides have been recognized as affecting communities in Central Massachusetts, the HMP team in Blackstone did not identify them as 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

One other hazard discussed in the SHMCAP that can affect Blackstone is 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 Blackstone. The Town is relatively flat and most of its rivers are slow moving, are frequently dammed, and/or are lined with riprap, which can minimize landslide risk. Roadways in town are not generally built close to river channels; this reduces undercutting risk from stormwater-induced bank erosion. CMRPC's data review and the local HMP planning team both noted no specific concerns relating to landslides in town.

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 Blackstone 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 CodeRed for emergency notifications. The Town plans to research the utility of public awareness and education programs as a result of this planning process.

Blackstone has most no-cost or low-cost hazard mitigation capabilities in place. These include land use regulations (including 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. Blackstone also has appropriate staff dedicated to hazard mitigation-related work for a community of its size, including a Town Administrator, an Emergency Management Director/Fire Chief, a professionally run Department of Public Works, a Building Commissioner, and a Tree Warden. Blackstone has several plans relevant to hazard mitigation in place, including a Comprehensive Emergency Management Plan (2023), an Open Space and Recreation Plan (2024), a Master Plan (2018), and an Illicit Discharge Detection and Elimination (IDDE) Plan (2019). Not only does Blackstone 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 and the Town’s DPW will provide assistance to neighboring towns. Blackstone 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 Blackstone. 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 37: 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. | <p>Blackstone has participated in the National Flood Insurance program since September 30th, 1977. As of July 2nd, 2024, there are approximately 14 homeowners in town with flood insurance policies.¹⁷² There are no repetitive loss properties in Blackstone.</p> <p>Blackstone’s Building Commissioner / Zoning Enforcement Officer has been designated as the Town’s FEMA Floodplain Administrator 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. Blackstone has adopted the Flood Insurance Rate Map (FIRM)¹⁷³ dated from July 4th, 2011, and this is</p> | <p>Effective</p> <p>Blackstone should seek to further limit development in the 100-year flood zone. It should work to score in the Community Rating System (CRS) under NFIP to enable its residents to obtain lower flood insurance rates. Blackstone should also educate its residents about NFIP.</p> <p>The Town is working on improving its process for carrying out the substantial improvement / substantial damage provisions of floodplain regulations, along with substantial damage claims. In the future, the Town will collaborate with Flood Hazard Management Program staff at the state level to ensure a post-disaster plan is put in</p> |

¹⁷² “Community Overview: Blackstone, Town of,” NFIP Community Information System, accessed July 1, 2024.

¹⁷³ “BLACKSTONE, TOWN OF,” Msc.fema.gov, Federal Emergency Management Agency, accessed June 7, 2024, <https://map1.msc.fema.gov/firm?id=25027C1030E>, <https://map1.msc.fema.gov/firm?id=25027C1033E>, <https://map1.msc.fema.gov/firm?id=25027C1034E>, <https://map1.msc.fema.gov/firm?id=25027C1037E>, <https://map1.msc.fema.gov/firm?id=25027C1039E>, <https://map1.msc.fema.gov/firm?id=25027C1041E>, <https://map1.msc.fema.gov/firm?id=25027C1042E>, <https://map1.msc.fema.gov/firm?id=25027C1043E>, <https://map1.msc.fema.gov/firm?id=25027C1044E>, <https://map1.msc.fema.gov/firm?id=25027C1055E>.

| Existing Measure | Description | Action | Effectiveness & Recommendations |
|--|--|---|---|
| Participation in National Flood Insurance Program (NFIP) (cont.) | | <p>noted in Article IV of Blackstone’s Zoning Bylaw.¹⁷⁴ The Town’s Flood Hazard District, described in this same Zoning Bylaw, includes all special flood hazard areas (SFHAs) designated as Zone A and AE in town and regulates and permits development within these areas.</p> <p>Blackstone currently administers the substantial improvement/substantial damage (SI/SD) provisions of its floodplain management regulations in compliance with the NFIP (CFR Title 44, Parts 59 through 65) and Massachusetts State Building Code (780 CMR).</p> | <p>place to employ SI/SD provisions.</p> <p>The Town should also enhance its participation in NFIP training offered by the State and/or FEMA that addresses flood hazard planning and management.</p> |
| Floodplain Zoning District Bylaw | This bylaw requires all development to be in compliance with state building code requirements for construction in floodplains. | Blackstone regulates development in FEMA mapped floodplains as part of its zoning bylaw, specifically Chapter 123, Section 19. | Effective |

¹⁷⁴ "Chapter 123: Zoning," Townofblackstone.org, The Town of Blackstone, accessed August 12, 2025, <https://www.townofblackstone.org/DocumentCenter/View/1372/Zoning-Bylaws-2024>.

| Existing Measure | Description | Action | Effectiveness & Recommendations |
|--|---|--|---|
| 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. | Blackstone enacted a Stormwater Management and Land Disturbance Bylaw in 2011, which is included as Chapter 110 in the Town's General Bylaws. The Town's DPW and Planning Board are also currently working with Weston & Sampson to update the Town's stormwater rules and regulations by October 2024, and plan to bring this update to the Spring 2025 Town Meeting. | Very effective No changes recommended; however, Blackstone should evaluate participation in the Central Massachusetts Regional Stormwater Coalition. |
| Zoning Bylaw (land use regulations) | The Town's zoning bylaw 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 adopted at the June 1968 special town meeting and has been amended several times since. | Somewhat effective The Town of Blackstone's current zoning bylaw is only somewhat effective in advancing the Town's hazard mitigation goals because it lacks provisions for low-impact development (LID) or open space residential development (OSRD). Adopting either of these strategies could significantly reduce stormwater runoff and aid in the preservation of vital open space and could collectively strengthen the Town's ability to manage hazards, particularly those related to flooding and environmental preservation. |

| Existing Measure | Description | Action | Effectiveness & Recommendations |
|--|--|---|--|
| Subdivision Regulations (land use regulations) | These Planning Board rules describe how the Town regulates the development of subdivisions in Town to ensure public safety and welfare. | The Town's current subdivision regulations became effective in June 1963 and were last revised in October 2010. | Somewhat effective The Town of Blackstone's current subdivision regulations are only somewhat effective in advancing the Town's hazard mitigation goals because they lack measures which can aid in the reduction of impermeable surfaces. These regulations could be enhanced by mandating a reduction in impermeable surface area and by exploring requirements for the use of permeable or semipermeable pavement in low-traffic zones such as sidewalks and driveways. These enhancements could strengthen the Town's ability to manage hazards, particularly those related to flooding and environmental preservation. |
| Local Open Space and Recreation Plan | This local plan identifies significant natural resources to ensure their protection. Following Massachusetts Department of Conservation and Recreation guidance for the development of OSRPs, this document does not focus on specific hazards. | Blackstone's Open Space and Recreation Plan received final approval by the Massachusetts Division of Conservation Services in 2024 and will expire in November of 2029. | Somewhat effective This plan recommends establishing a Sustainability Committee whose tasks would include identifying parcels useful in improving resiliency to climate change as well as identifying opportunities for adding solar panels to Town sites. It also identifies the need to cleanup brownfield sites in town, notes development impacts on erosion and stormwater management, and describes the potential of green infrastructure to address these issues. |

| Existing Measure | Description | Action | Effectiveness & Recommendations |
|---|--|---|--|
| NPDES MS4 Compliance Program | This program includes the upgrade of municipal sewer systems and system inputs to reduce or eliminate CSOs (combined sewer overflows) and illicit connections to comply with NPDES (National Pollutant Discharge Elimination System) requirements. | Blackstone has implemented a stormwater program to ensure compliance with NPDES requirements, and the Town sends out a newsletter for this program. Recent actions which the Town has taken under this program include installation of LID infrastructure at the Municipal Center (including a bioretention area, pervious pavement, and plantings), stormwater bylaw updates, public outreach, GPS mapping, capital improvements, inspections for illicit connections, and the completion of an Illicit Discharge Detection and Elimination (IDDE) Plan in 2019. Approximately 1/3 rd of the Town is on municipal sanitary sewer. | Very effective No changes recommended |
| 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. | Blackstone adopted a wetlands protection bylaw (general bylaws, Chapter 119) in 1986 to protect wetlands and related waterways throughout town in accordance with Massachusetts regulations. | Very effective No changes recommended |

| Existing Measure | Description | Action | Effectiveness & Recommendations |
|---|--|--|---|
| Drainage System Cleaning and Preventive Maintenance | The Town plans to keep municipal drainage facilities (storm drains, culverts, etc.) in good order. | Blackstone performs street sweeping and catch basin cleaning from April to November. | <p>Effective</p> <p>Blackstone should continue its public education program for residents on storm drain clearance and other best practices.</p> |
| Tree Trimming | The Town completes maintenance of trees to reduce the likelihood of vegetative debris problems during and after storm events. | Blackstone conducts roadside mowing from April-November to remove juvenile trees. Tree trimming (take-downs and the clearing of dead branches) takes place as needed. | <p>Very Effective</p> <p>Blackstone 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.</p> |
| 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. | <p>Somewhat effective</p> <p>Current efforts in town are piecemeal and are limited by a lack of resources and a lack of a systematic approach.</p> <p>Blackstone 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.</p> |

| Existing Measure | Description | Action | Effectiveness & Recommendations |
|-------------------|---|--|--|
| CodeRED system | CodeRed is an emergency warning system that sends voicemail/text/email alerts to residents (text/email alerts are optional). | Blackstone Emergency Management officials are able to alert residents through CodeRed when information is received that a natural or man-made disaster is impending. | <p>Effective</p> <p>Blackstone should consider National Weather Service StormReady certification and the adoption of StormReady emergency notification practices to supplement CodeRED.</p> |
| Generator Program | The Town installs emergency backup power generators at key Town facilities to enable their continued operations during and after natural and manmade disasters. | In 2016, the Town obtained generators through FEMA's EMPG program for the Blackstone Street emergency communications repeater site and for Fire Station #2. These supplement generators already in place at the Municipal Center / Public Safety Building / Senior Center and at the public schools which serve as shelters. A generator was also installed to cover the main office building of Early Village (through U.S. Housing and Urban Development (HUD)) within the past 2 years, and state funding has been allocated to install a generator to cover the community room of Fox Brook Manor. | <p>Effective</p> <p>The Town should continue to pursue resources to install generators at key facilities, including Fire Station #3, the DPW buildings at 51-53 Elm Street not covered by the recently acquired generator, and the residential areas of Early Village and Fox Brook Manor.</p> <p>The Town should also enhance the provision of information to residents and businesses on generator safety.</p> |

| Existing Measure | Description | Action | Effectiveness & Recommendations |
|---|---|--|---------------------------------|
| Master Plan | The Master Plan inventories town resources and can help in future town decision-making efforts over a 10-to-20-year period. It includes both short-term, incremental and long-term, more aspirational goals and objectives for the community. | The Blackstone Master Plan was completed in 2018. | Effective |
| 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 Blackstone MVP Plan was completed in May 2018. | 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 30th, 2025. | Very Effective |

6.0 STATUS OF MITIGATION MEASURES FROM 2017 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 Blackstone provided updates on the status of mitigation measures from the Town’s 2017 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 2017 plan to this plan are noted in the **bolded** passages from the “2026 Notes” column in the table below. These changes in community priorities, including that structural resiliency improvements are now recognized to be needed near the Town Hall/Public Safety/Senior Center building and that completed work has resolved the flooding issue at Rathbun Street in the area of Fire Station #2/EOC, have resulted from reassessments of specific hazards-related challenges described in the 2017 plan.

Table 38: Status of Mitigation Measures from 2017 Plan

| Structure & Infrastructure Strategies | | | |
|--|--------------------------------|--|-----------------------|
| 2017 Task | 2026 Status | 2026 Notes | Include in 2026 Plan? |
| Continued drainage improvements at Saint Paul Street/Rivers Edge Road/Farnum Street/Canal Street near Town Hall/Public Safety/Senior Center building; area is just above Blackstone River 100 year flood zone and sees recurrent basement flooding in heavy/long rain events | No movement on this action yet | There has not been much progress on this item due to a lack of funding and the complicated group of stakeholders in this area. Structural resiliency improvements are also needed in this area. | YES |
| Drainage improvements at Main Street on mostly south side from appx. 1st Avenue to Blackstone Street; area is partly within 100 and 500 year flood zones and sees recurrent flooding in heavy/long rain events; includes Public Library on Fox Brook | No movement on this action yet | Since 2017, only road resurfacing has been done here. | YES |

| 2017 Task | 2026 Status | 2026 Notes | Include in 2026 Plan? |
|---|--------------------------------|---|-----------------------|
| Evaluate structural conditions and implement long-term solutions for buildings that have previously seen roof damage from winter storms, including Town Hall/Public Safety/Senior Center building, regional High School, and elementary schools | In Progress | The roof at the Municipal Center / Public Safety / Senior Center building has been re-done, but it still leaks. All schools in town but the middle school have received new roofs (The Town owns the elementary school, but the middle and high schools are operated by the Blackstone-Millville Regional School District). | YES |
| Culvert/bridge upgrade on Elm Street at Mill River; within 100 year flood zone and area floods during storms when river exceeds capacity under roadway; evacuation route impacted | No movement on this action yet | There has been no progress relating to this action due to a lack of municipal resources. | YES |
| Culvert/bridge upgrade on Farm Street at Hop Brook; within 100 year flood zone and area floods during storms when river exceeds capacity under roadway | No movement on this action yet | There has been no progress relating to this action due to a lack of municipal resources, except for the road (Farm Street) being re-done near this area. | YES |
| Culvert/bridge upgrade on Blackstone Street at Hop Brook; within 100 year flood zone and area floods during storms when river exceeds capacity under roadway; evacuation route impacted | No movement on this action yet | There has been no progress relating to this action due to a lack of municipal resources. | YES |
| Culvert/raceway upgrade on Lakeshore Drive at Quick Stream at the outlet of the Lake Hiawatha Dam; near 100 year flood zone and wetland and area floods when dam is at maximum release | In Progress | The rebuilding of the headwalls on Elm Street is ongoing and was funded through an Annual Town Meeting article as well as a state grant. The Town of Bellingham controls the load of Lake Hiawatha. | YES |

| 2017 Task | 2026 Status | 2026 Notes | Include in 2026 Plan? |
|---|--------------------------------|---|-----------------------|
| Culvert upgrade on Mendon Street at Fox Brook below Crain's Pond Dam; within 100 year flood zone and area floods during storms when river exceeds capacity under roadway; secondary evacuation route impacted | No movement on this action yet | There has been no progress relating to this action due to competing priorities / a lack of municipal resources. | YES |
| Identify and address drainage problem in 600s area of Rathbun Street in area of Fire Station #2/EOC; low area sees mostly roadway flooding; adjacent area of Bellingham is in 500 year flood zone; within EJ area | Completed | Work was completed to re-do the roadway (Rathburn Street) in this area in 2019, and this flooding issue has been resolved. | NO |
| Identify and address roadway flooding problem on Main Street between Federal Street and Castle Hill Way; low area may also be impacted by runoff from upgradient subdivision; adjacent to 100 year flood zone | No movement on this action yet | This issue is caused by dirt and leaves covering catch basins. MassDOT has responsibility to help address this issue, and it has not been addressed. Runoff from new subdivisions is an issue in this area. | YES |
| Tree trimming needed throughout town to protect utility wires; coordinate with utility to implement systematic approach | In Progress | Over the past two years, the Town has done a better job with tree trimming; as a result, power outages have become less frequent in town. | YES |
| Evaluate feasibility and possibly implement a permanent water system connection between Blackstone and neighboring Bellingham to provide resilience in drought (currently hydrants can be connected to share limited water) | No movement on this action yet | There has been no progress relating to this action, although the informal water system connection between the two towns is still in place. | YES |

| 2017 Task | 2026 Status | 2026 Notes | Include in 2026 Plan? |
|--|--------------------|---|-----------------------|
| <p>Install/improve generators at critical public facilities where needed, including the DPW garage, Fire Station #3 and the Housing Authority's Fox Brook Manor complex; also evaluate feasibility of obtaining a mobile generator to serve multiple public facilities</p> | <p>In Progress</p> | <p>State funding has been allocated to install a generator to cover the community room of Fox Brook Manor. A generator has been installed at the Water Treatment Facility (CCF) and the Water Treatment Plant, but this generator does not cover the other two buildings at the DPW site at 51-53 Elm Street. There is still a need to install generators at Fire Station #3 and at the other two DPW buildings at 51-53 Elm Street. The Town would still like to evaluate the feasibility of obtaining a mobile generator.</p> | <p>YES</p> |
| <p>Continue to monitor conditions at the Town-owned Lake Hiawatha Dam (Significant Hazard) to ensure compliance with state mandate on structural conditions.</p> | <p>Ongoing</p> | <p>The Town has been monitoring conditions at the dam and has been reporting on these conditions to the Massachusetts Department of Conservation and Recreation.</p> | <p>YES</p> |

Preparedness, Coordination & Response Action Strategies

| 2017 Task | 2026 Status | 2026 Notes | Include in 2026 Plan? |
|---|--------------------------------|---|-----------------------|
| Continue to participate in National Flood Insurance Program (NFIP) (or other) training offered by the State and/or FEMA that addresses flood hazard planning and management | Ongoing | The Town continues to participate in the NFIP. | YES |
| Investigate Community Rating System (CRS) benefits and requirements and decide whether to participate | No movement on this action yet | The Town has not investigated the CRS. | YES |
| Road information coordination and planning for snow removal | Ongoing | | YES |
| Evacuation Plan updates; where possible, ensure that routes are outside of hazard areas | No movement on this action yet | There has been no progress relating to this action. | YES |
| Improve vegetation and debris management along P&W Railroad rights-of-way; recurrent wildfires reported near tracks in neighboring towns | No movement on this action yet | There are issues with trains causing wildfires in nearby Northbridge. In Blackstone, there have been issues with trees falling on train tracks, wildfires being exacerbated by drought, and herbicides leading to trees along the train tracks being more vulnerable. | YES |
| Investigate/join the Central Massachusetts Stormwater Coalition to aid in public outreach and funding of drainage improvements | In Progress | The Town has attempted to reach out to the Central Massachusetts Stormwater Coalition but has had a hard time finding a contact there to reach out to. There are some MS4 areas in town. | YES |

| Education & Awareness Strategies | | | |
|--|--------------------|---|------------------------------|
| 2017 Task | 2026 Status | 2026 Notes | Include in 2026 Plan? |
| 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) | Ongoing | The Town has continued water prohibition outreach which has been ongoing for decades; besides this, there has not been much progress relating to this action. | YES |
| Provide information to residents and businesses on generator safety and sump pump usage; Blackstone has seen generator safety problems during past floods when power was lost and homeowners switched to generator power for pumps | Ongoing | The Town circulates info on generator safety once or twice a year. There have been instances of town residents using generators unsafely within the past year. | YES |
| Continue/restart education program begun under NPDES MS4 permit to supplement pollution prevention effort with storm drain safety/clearance and related topics | Ongoing | The Town includes educational information on stormwater management in the water bills that are sent out four times per year to town residents who use the municipal water system. | YES |

Local Plan & Regulation Strategies

| 2017 Task | 2026 Status | 2026 Notes | Include in 2026 Plan? |
|---|-----------------------------------|--|---------------------------|
| <p>During next municipal facilities or capital improvement planning process; review options for relocating departments (esp. public safety departments) away from current Town Hall/Public Safety/Senior Center building, which floods regularly and is adjacent to 100-year flood zone</p> | <p align="center">In Progress</p> | <p>This is an important action, as this building really needs improvements and its facilities do not currently accommodate the Town's needs. The Town attempted to move the senior center out of this building, but this proposal failed at Town Meeting. The Town has applied for a grant to begin studying options for this building and is considering starting the process of completing a feasibility study relating to this building using local funding. The building has not flooded regularly in recent years, but the potential that the building can be flooded exists.</p> | <p align="center">YES</p> |
| <p>In tandem with water conservation outreach listed above, conduct enhanced enforcement of water usage restrictions (in part to conserve water for firefighting)</p> | <p align="center">Ongoing</p> | <p>On an ongoing basis, the Town tells people to shut their water off if they are not following local water usage regulations.</p> | <p align="center">YES</p> |
| <p>Update Open Space and Recreation Plan (expired) to include mitigation goals</p> | <p align="center">Completed</p> | <p>The Town's updated Open Space and Recreation Plan includes hazard mitigation goals and received final approval from the Massachusetts Division of Conservation Services in 2024. Also, two new playgrounds are going to be built in town, as the proposals for them passed at the 2023 Town Meeting.</p> | <p align="center">YES</p> |

| 2017 Task | 2026 Status | 2026 Notes | Include in 2026 Plan? |
|---|-------------|---|-----------------------|
| Review and update local plans and development review processes (planning, zoning, stormwater management, conservation, etc.) to ensure new construction will not be affected by hazards | In Progress | There is a process in place in town to include hazard mitigation concerns in local planning and development review processes. The Town would like natural hazards to be more explicitly addressed in development review meeting agendas and in the Town's Zoning Bylaw, which currently does not have any passages dedicated to natural hazard concerns. | YES |
| Monitor implementation of Hazard Mitigation Plan | In Progress | The HMP team that met to draft the last HMP update for the Town has not met regularly to monitor the progress of the plan. This action is in progress due to the current HMP planning process in town. The HMP team for this plan update should meet once a year over the lifetime of this plan update to discuss the progress of the plan's mitigation strategies. | YES |

The Town would also like to note that a new culvert has been added on Lincoln Street near the Town's elementary school since the last HMP update; this project was funded through an Annual Town Meeting article and a state grant.

7.0 MITIGATION STRATEGY

The Blackstone 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
- Medium – between \$50,000 – \$100,000
- High – over \$100,000

7.3 EXPECTED 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 Board of Selectmen; 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.

7.6 TOWN OF BLACKSTONE 2026 HAZARD MITIGATION STRATEGIES

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));
- 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 Blackstone 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 39: Town of Blackstone 2026 Hazard Mitigation Strategies

| Structure & Infrastructure Strategies | | | | | | | |
|---|-------------------|------------------------------------|---|----------|--------|----------------|-------------------|
| Actions | Hazards Addressed | Agencies Involved | Potential Funding Sources | Priority | Impact | Estimated Cost | Expected Timeline |
| Complete drainage and structural resiliency improvements at Saint Paul Street / Rivers Edge Road / Farnum Street / Canal Street near the Municipal Center / Public Safety / Senior Center building; this area is just above the Blackstone River’s 100-year flood zone and sees recurrent basement flooding in heavy and/or long rain events. | FL, SS, ST, HU | DPW , Building Commissioner | Local (capital trust, DPW and inspectional services operating budgets, town meeting), Federal (FEMA HMGP, BRIC, FMA Grants), State (MVP Action Grant) | High | High | High | 3-5 years |

| Actions | Hazards Addressed | Agencies Involved | Potential Funding Sources | Priority | Impact | Estimated Cost | Expected Timeline |
|--|-------------------|--|--|---------------|--------|----------------|-------------------|
| Complete drainage improvements at Main Street, mostly on the south side from approximately 1st Avenue to Blackstone Street; this area is partly within the 100- and 500-year flood zones and sees recurrent flooding during heavy and/or long rain events. This area includes the Public Library on Fox Brook. | FL, SS, ST, HU | DPW, MassDOT | Federal (FEMA HMGP, BRIC, FMA Grants), State (MVP Action Grant) | Medium | High | High | 3-5 years |
| Evaluate structural conditions and implement long-term solutions for buildings that have previously seen roof damage from winter storms, including the Municipal Center / Public Safety / Senior Center building, Regional High School, and elementary schools. | SS | Building Commissioner , Blackstone-Millville Regional School District, MSBA (Massachusetts School Building Authority) | Local (capital trust, inspectional services and Blackstone-Millville Regional School District operating budgets, town meeting), Federal (FEMA HMGP, BRIC Grants), State (MVP Action Grant), State/Federal (CDBG) | Medium | Medium | High | 3-5 years |
| Study and address the flooding issue on Valley Street, which affects a cemetery as well as a neighborhood in Rhode Island. | FL | DPW, Building Commissioner | State (MA (MVP Action Grant) and RI (Climate Resilience Fund)), Federal (FEMA FMA, BRIC Grants) | Low | Low | High | 5+ years |
| Study and address flooding / drainage issues along Champlain Avenue. | FL | DPW | Local (capital trust, DPW operating budget, town meeting), Federal (FEMA BRIC, FMA Grants) | Medium / High | High | High | 3-5 years |

| Actions | Hazards Addressed | Agencies Involved | Potential Funding Sources | Priority | Impact | Estimated Cost | Expected Timeline |
|---|-------------------|-------------------|--|----------|--------|----------------|-------------------|
| Complete side wall repairs at the canal side of the Saranac / Blackstone River Dam. Study possible modifications to the canal side structures near the dam, such as removing the top part of the headworks. | FL | DPW | State (Dam & Seawall Grant), Federal (FEMA BRIC, FMA Grants, Army Corps of Engineers Corps Water Infrastructure Financing Program) | High | Medium | High | 0-1 years |
| Complete culvert/bridge upgrade on Elm Street at Mill River; this area is in the 100-year flood zone and floods during storms when the river exceeds capacity under the roadway. This flooding impacts the Elm Street evacuation route. | FL, SS, ST, HU | DPW | Local (capital trust, DPW operating budget, town meeting), Federal (FEMA HMGP, BRIC, FMA Grants, TIP), State (MVP Action Grant, Culvert Replacement Municipal Assistance Grant Program) | Medium | High | High | 1-2 years |
| Complete culvert/bridge upgrade on Farm Street at Hop Brook; this area is in the 100-year flood zone and floods during storms when the river exceeds capacity under the roadway. | FL, SS, ST, HU | DPW | Local (capital trust, DPW operating budget, town meeting), Federal Grants (FEMA HMGP, BRIC, FMA Grants, TIP), State (MVP Action Grant, Culvert Replacement Municipal Assistance Grant Program) | Medium | Medium | High | 1-2 years |

| Actions | Hazards Addressed | Agencies Involved | Potential Funding Sources | Priority | Impact | Estimated Cost | Expected Timeline |
|---|-----------------------|------------------------|--|---------------|---------------|----------------|-------------------|
| <p>Complete culvert/bridge upgrade on Blackstone Street at Hop Brook; this area is in the 100-year flood zone and floods during storms when the river exceeds capacity under the roadway. This flooding impacts the Blackstone Street evacuation route.</p> | <p>FL, SS, ST, HU</p> | <p>DPW, BOH</p> | <p>Local (capital trust, DPW and Board of Health operating budgets, town meeting), Federal Grants (FEMA HMGP, BRIC, FMA Grants, TIP), State (MVP Action Grant, Culvert Replacement Municipal Assistance Grant Program)</p> | <p>Medium</p> | <p>High</p> | <p>High</p> | <p>1-2 years</p> |
| <p>Complete culvert/raceway upgrade on Lakeshore Drive at Quick Stream at the outlet of the Lake Hiawatha Dam; this area is near the 100-year flood zone and wetland areas, and it floods when the dam is at maximum release.</p> | <p>FL, SS, ST, HU</p> | <p>DPW</p> | <p>Local (capital trust, DPW operating budget, town meeting), Federal Grants (FEMA HMGP, BRIC Grants, TIP), State (MVP Action Grant, Culvert Replacement Municipal Assistance Grant Program)</p> | <p>Medium</p> | <p>Medium</p> | <p>High</p> | <p>0-1 years</p> |
| <p>Complete culvert upgrade on Mendon Street at Fox Brook below Crain's Pond Dam; this area is in the 100-year flood zone and floods during storms when the river exceeds capacity under the roadway. This flooding impacts the Mendon Street evacuation route.</p> | <p>FL, SS, ST, HU</p> | <p>DPW</p> | <p>Local (capital trust, DPW operating budget, town meeting), Federal Grants (FEMA HMGP, BRIC, FMA Grants, TIP), State (MVP Action Grant, Culvert Replacement Municipal Assistance Grant Program)</p> | <p>Medium</p> | <p>Medium</p> | <p>High</p> | <p>1-2 years</p> |

| Actions | Hazards Addressed | Agencies Involved | Potential Funding Sources | Priority | Impact | Estimated Cost | Expected Timeline |
|--|-------------------|---|--|----------|--------|----------------|-------------------------|
| Address roadway flooding problem (caused by dirt and leaves covering catch basins) on Main Street between Federal Street and Castle Hill Way; this low-elevation area may also be impacted by runoff from an up-gradient subdivision and is adjacent to the 100-year flood zone. | FL, SS, ST, HU | DPW, MassDOT | Federal (FEMA HMGP, BRIC Grants), State (MVP Action Grant) | Low | Low | Low / Medium | 1-2 years |
| 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 | National Grid, Tree Warden , private property owners | Utility (National Grid), Local (capital trust, Tree Warden operating budget, town meeting), Private (property owners) | Low | High | Low / Medium | 0-2 years, then ongoing |
| Establish a town program to buy lightning rods on an as-needed basis. | LG, ST | Town Administrator, Building Department | Local (capital trust, town administration and inspectional services operating budgets, town meeting) | Low | Medium | Low | 1-2 years, then ongoing |
| Evaluate the feasibility of and possibly implement a permanent water system connection between Blackstone and neighboring Bellingham to provide resilience in drought (currently, hydrants can be connected to share limited water between the two towns). | DR | DPW , Town of Bellingham | Local (capital trust, DPW operating budget, town meeting), State (Drinking Water Supply Grant, Statewide Water Management Act Grant) | Medium | Low | Medium / High | 3-5 years |

| Actions | Hazards Addressed | Agencies Involved | Potential Funding Sources | Priority | Impact | Estimated Cost | Expected Timeline |
|---|-------------------|---|--|----------|--------|----------------|-------------------------|
| Install/improve generators at critical public facilities where needed, including Fire Station #3, the DPW buildings at 51-53 Elm Street not covered by the recently acquired generator, and the residential areas of Early Village and Fox Brook Manor; also, evaluate the feasibility of obtaining a mobile generator to serve multiple public facilities. | All | Building Commissioner, DPW , Housing Authority | Local (capital trust, DPW, inspectional services, and Housing Authority operating budgets, town meeting), Federal (FEMA HMGP, BRIC Grants), State (MVP Action Grant), State/Federal (CDBG) | High | Medium | High | 5+ years |
| Complete flood-proofing work on well pumps 2 and 7. | FL | DPW , USGS | Local (capital trust, DPW operating budget, town meeting), State (MVP Action Grant), Federal (FEMA FMA, BRIC Grants) | Low | Medium | High | 0-1 years |
| Plan and site new wells to supply the town water system. | DR, XT, WF | DPW | State/ Federal (CDBG) | High | High | High | 2-5 years, then ongoing |

| Actions | Hazards Addressed | Agencies Involved | Potential Funding Sources | Priority | Impact | Estimated Cost | Expected Timeline |
|---|-----------------------|------------------------|--|---------------|-------------|----------------|---|
| <p>Conduct a field inventory of bridges to rank and prioritize projects for increased flood resiliency and storm-hardening. Design and implement priority bridge/culvert resizing or replacement projects. Known problem areas should be areas of focus, and they include Elm Street Bridge, Lincoln Street Bridge, and culverts on Lincoln Street, Blackstone Street, and Shore Drive.</p> | <p>FL, SS, ST, HU</p> | <p>DPW</p> | <p>Local (capital trust, DPW operating budget, town meeting), State (MVP Action Grant, Mass Works Infrastructure Grant), Federal (FEMA FMA, BRIC Grants)</p> | <p>High</p> | <p>High</p> | <p>High</p> | <p>1-2 years for inventory, 3-5 years for design, 5+ years for implementation</p> |
| <p>Extend Rathbun Street to develop a connector that links the existing Rathbun Street to Elm Street and provides a more direct route for emergency access to the southeast portion of town.</p> | <p>All</p> | <p>DPW, BOS</p> | <p>Local (capital trust, DPW and BOS operating budgets, town meeting), State (Mass Works Infrastructure Grant), Federal (FEMA BRIC Grant)</p> | <p>High</p> | <p>High</p> | <p>High</p> | <p>5+ years</p> |
| <p>Pursue public facilities upgrades that increase resiliency, including the purchase of generators for the recycling center / animal control facility and the public library.</p> | <p>All</p> | <p>DPW, BOS</p> | <p>Local (capital trust, DPW and BOS operating budgets, town meeting), Federal (FEMA BRIC Grant)</p> | <p>Medium</p> | <p>High</p> | <p>High</p> | <p>3-5 years</p> |

| Actions | Hazards Addressed | Agencies Involved | Potential Funding Sources | Priority | Impact | Estimated Cost | Expected Timeline |
|---|-------------------|--|---|----------|--------|----------------|-------------------|
| Install central air conditioning in the Town's schools, including the schools which act as emergency shelters, to protect children, older adults, people with disabilities, and other vulnerable populations from the impacts of increasing heat. | XT, DR | DPW, BOS, Blackstone-Millville Regional School District | Local (capital trust, DPW, BOS, and Blackstone-Millville Regional School District operating budgets, town meeting), Federal (FEMA BRIC Grant) | Medium | Medium | Medium | 3-5 years |
| Purchase an improved communications system to support Police, Fire, and Department of Public Works staff in providing emergency response during hazard events. | All | Police, Fire, DPW | Local (capital trust, fire department, police department, and DPW operating budgets, town meeting), Federal Homeland Security Grant funding through CRHSAC and MEMA | Medium | High | Medium | 3-5 years |
| Establish a second community center that would double as an emergency center to serve residents on the other side of Town from the existing community center and provide easier access to services for all residents. | All | BOS, Council on Aging | Local (capital trust, Senior Center and BOS operating budgets, town meeting) | Medium | High | High | 5+ years |

Preparedness, Coordination & Response Action Strategies

| Actions | Hazards Addressed | Agencies Involved | Potential Funding Sources | Priority | Impact | Estimated Cost | Expected Timeline |
|--|-------------------|--|---|----------|--------|----------------|-------------------------|
| Enhance participation 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 | Building Commissioner, DPW, PB | Local (capital trust, inspectional services, DPW, and PB operating budgets, town meeting), State (LPA), Federal (FEMA FMA Grant) | High | High | Low | 0-3 years, then ongoing |
| Investigate the benefits and requirements of the Community Rating System (CRS) and decide whether to participate in this program or not. | FL, SS, ST, HU | DPW, PB | Local (capital trust, DPW and PB operating budgets, town meeting) | Low | Low | Low | 1-2 years |
| Enhance road information coordination as well as planning for snow removal. | SS | DPW, MassDOT, Mass State Police, CMRPC | Local (capital trust, DPW operating budget, town meeting), Federal (FEMA HMGP, BRIC Grants), State (LPA), private contracts | High | High | Low | 0-2 years, then ongoing |
| Complete evacuation plan updates; where possible, ensure that evacuation routes are outside of hazard areas. | All | Local Emergency Management, DPW, CMRPC, MassDOT | Local (capital trust, emergency management and DPW operating budgets, town meeting), Federal (FEMA BRIC, FMA, EMPG Grants, Homeland Security Grant funding through CRHSAC and MEMA, US DOT PROTECT Grant) | High | High | Low | Update every 5 years |

| Actions | Hazards Addressed | Agencies Involved | Potential Funding Sources | Priority | Impact | Estimated Cost | Expected Timeline |
|--|-------------------|---|---|----------|--------|----------------|-------------------------|
| Improve vegetation and debris management along Genesee & Wyoming / P&W Railroad rights-of-way; recurrent wildfires have been reported near Genesee & Wyoming / P & W tracks. | DF, WF | Genesee / P&W Railroad, Fire, DPW | Private (Genessee & Wyoming / P&W Railroad) | High | High | Low | 0-3 years, then ongoing |
| Work with homeowners to mitigate localized flooding caused by development. | FL | DPW | Local (capital trust, DPW operating budget, town meeting), State (MVP Action Grant), Federal (FEMA BRIC, FMA Grants) | High | High | High | 0-5 years, then ongoing |
| Investigate rural firefighting capabilities for the Town. Investigate options for having more rural firefighting assets such as dry hydrants and cisterns. | WF | Fire | Federal (FEMA Assistance to Firefighters Grant) | Medium | Medium | Low / Medium | 3-5 years |
| Coordinate with Liberty Gas and the State to develop emergency preparedness procedures regarding the Blackstone Street Natural Gas Regulator Station. | All | All Town Departments, Liberty Gas, State Agencies (MEMA) | Local (capital trust, operating budgets for all town departments, town meeting), State (LPA), Federal Homeland Security Grant funding through CRHSAC and MEMA | High | High | Low | 0-3 years |

| Actions | Hazards Addressed | Agencies Involved | Potential Funding Sources | Priority | Impact | Estimated Cost | Expected Timeline |
|--|-------------------|---|--|----------|--------|----------------|-------------------------|
| Coordinate with hydropower plant in Rhode Island to prevent flooding near the Blackstone Valley Boys and Girls Club. | FL | DPW | Local (capital trust, DPW operating budget, town meeting), State (LPA, MVP Action Grant), Federal Grants (FEMA BRIC, FMA Grants) | High | High | Low | 0-3 years |
| Enhance the monitoring of conditions at the town-owned Lake Hiawatha Dam (Significant Hazard) to ensure compliance with the state mandate on structural conditions. | DF | DPW | Local (capital trust, DPW operating budget, town meeting), State (Dam & Seawall Grant) | High | Low | Low | 0-3 years, then ongoing |
| Review town communications regarding downstream management of the Blackstone River, especially coordination with neighboring Woonsocket. Ensure that both municipalities are anticipating the impacts of development on water wells and flood storage areas. | FL, DF | DPW | Local (capital trust, DPW operating budget, town meeting) | High | High | Low | 0-2 years |
| Provide more resilient storage facilities for vital information, including birth, death, and marriage records as well as voter registration data, and associated equipment. Establish coordination between the Town Clerk, Treasurer, Assessor, and Planning Board to assess all vulnerable records information and ensure that the Town protects critical data. | All | BOS, Town Clerk, Treasurer, Assessor, PB | Local (capital trust, BOS, Town Clerk, Treasurer, Assessor, and PB operating budgets, town meeting) | High | Medium | Low / Medium | 1-3 years |

| Education & Awareness Strategies | | | | | | | |
|--|-------------------|----------------------|--|----------|--------|----------------|-------------------------|
| Actions | Hazards Addressed | Agencies Involved | Potential Funding Sources | Priority | Impact | Estimated Cost | Expected Timeline |
| Enhance the provision of information to residents and businesses on conserving water through reduction in use, low-impact landscaping, and other low-cost measures; in part, an impetus for this strategy is to conserve water for firefighting. | DR, WF | DPW, CC, Fire | Local (capital trust, DPW, CC, and fire department operating budgets, town meeting) | High | Medium | Low | 0-2 years, then ongoing |
| Enhance the provision of information to residents and businesses on generator safety and sump pump usage; Blackstone has seen generator safety problems during past floods when power was lost and homeowners switched to generator power for pumps. | FL, SS, ST, HU | Fire, DPW | Local (capital trust, DPW and fire department operating budgets, town meeting), Federal (Assistance to Firefighters Grant, Fire Prevention and Safety Grant) | High | Medium | Low | 0-2 years, then ongoing |
| Increase education and outreach (on social media and through schools, the senior center, and community-based organizations) on all hazards in town, especially thunderstorms, snowstorms, and invasive species. | All | All Town Departments | Local (capital trust, operating budgets for all town departments, town meeting) | High | High | Low | 0-2 years, then ongoing |
| Investigate/join the Central Massachusetts Regional Stormwater Coalition to aid in public outreach and funding of drainage improvements. | FL, SS, ST, HU | DPW, CC, PB | Local (CC, DPW, and PB operating budgets), State (LPA) | Medium | Medium | Low | 1-2 years |

| Actions | Hazards Addressed | Agencies Involved | Potential Funding Sources | Priority | Impact | Estimated Cost | Expected Timeline |
|--|--------------------------|--------------------------|---|-----------------|---------------|-----------------------|--------------------------------|
| Enhance the education program begun under NPDES MS4 permit to supplement pollution prevention efforts; educate on storm drain safety/clearance and related topics. | FL, SS, ST, HU | DPW | Local (capital trust, DPW operating budget, town meeting) | High | Medium | Low | 0-2 years, then ongoing |
| Educate residents about invasive species management using existing and new resources. Explore participating in a regionalized education and abatement program for invasive species management. | IS | CC | Local (CC operating budget), State (MVP Action Grant) | Low | Low | Low | Yearly and/or as hazards occur |

| Local Plan & Regulation Strategies | | | | | | | |
|---|-------------------|---|--|----------|--------|----------------|-------------------------|
| Actions | Hazards Addressed | Agencies Involved | Potential Funding Sources | Priority | Impact | Estimated Cost | Expected Timeline |
| Conduct a townwide stormwater drainage improvement study. Include an inventory and visual assessment as well as hydrological modeling in this study. | FL | DPW | State (MVP Action Grant), Federal (FEMA FMA, BRIC Grants) | High | High | Medium / High | 0-3 years |
| During the next municipal facilities or capital improvement planning process, review options for relocating departments (especially public safety departments) away from the current Municipal Center / Public Safety / Senior Center building; this building potentially may flood and is adjacent to 100-year flood zone. | All | Building Commissioner, PB, Fire Police | Local (capital trust, inspectional services, PB, fire department, and police department operating budgets, town meeting) | Medium | High | High | 1-2 years |
| In tandem with the water conservation outreach listed above, conduct enhanced enforcement of water usage restrictions (in part to conserve water for firefighting). | DR, WF | DPW, CC, Fire | Local (capital trust, DPW, CC, and fire department operating budgets, town meeting) | High | Medium | Low | 0-2 years, then ongoing |
| Investigate options for improving the enforcement of zoning and land use regulations as well as the building code. | All | Building Commissioner / Zoning Agent, ZBA, BOS, PB | Local (inspectional services, ZBA, BOS, and PB operating budgets, town meeting) | Medium | Medium | Medium | 0-3 years |

| Actions | Hazards Addressed | Agencies Involved | Potential Funding Sources | Priority | Impact | Estimated Cost | Expected Timeline |
|--|-------------------|---|--|----------|--------|----------------|-------------------|
| <p>Establish a comprehensive emergency awareness plan to build awareness of town resources and make town residents aware of the many planning efforts, agreements, shelters, etc. which are focused on making / help make the Town more resilient. Ensure that all residents know how to access these resources when they are needed.</p> | All | <p>DPW, Fire, Police, Health Department, PB</p> | <p>Local (capital trust, fire department, DPW, health department, and PB operating budgets, town meeting), State (EEA Planning Assistance Grant, DLTA), Federal (FEMA BRIC Grant, Homeland Security Grant funding through CRHSAC and MEMA)</p> | High | High | Low / Medium | 1-2 years |
| <p>Develop a comprehensive plan for beaver management to mitigate against unpredictable flooding/impoundment impacts. Investigate options for expanded beaver control in town.</p> | FL, DF | <p>DPW, PB</p> | <p>Local (capital trust, DPW and PB operating budgets, town meeting), State (MVP Action Grant), Federal (FEMA FMA, BRIC Grants)</p> | High | Medium | Low / Medium | 2-3 years |
| <p>Assess green infrastructure opportunities for stormwater management in town and develop a list of specific priorities. Review Town regulations and update them as necessary to support green infrastructure and low-impact development. Consider projects in areas that are prone to flooding, such as the Harris Pond Village neighborhood, including Shore Drive and the Precious Blood Cemetery.</p> | FL, ST, HU | <p>PB, DPW, CMRPC</p> | <p>Local (capital trust, PB and DPW operating budgets, town meeting), State (EEA Planning Assistance Grant, DLTA), Federal (FEMA BRIC Grant)</p> | Medium | Medium | Medium | 2-3 years |

| Actions | Hazards Addressed | Agencies Involved | Potential Funding Sources | Priority | Impact | Estimated Cost | Expected Timeline |
|---|--------------------------|----------------------------------|---|-----------------|---------------|-----------------------|---|
| Incorporate hazard mitigation goals into the Open Space and Recreation planning process (CMRPC can be a resource for this). | All | PB, Parks | Local (capital trust, PB and parks and recreation operating budgets, town meeting), State (LPA, Land Conservation Assistance Grant) | High | Medium | Medium / High | 3-5 years, then at least every 7 years |
| Review and update local plans, bylaws, and development review processes (planning, zoning, stormwater management, conservation, etc.) to ensure that new construction will not be affected by hazards. | All | All Town Departments | Local (capital trust, operating budgets for all town departments, town meeting) | Medium | High | Low | 1-3 years, then ongoing |
| Monitor implementation of Hazard Mitigation Plan. Once a year, meet to discuss the progress of mitigation strategies. | All | All Town Departments | Local (capital trust, operating budgets for all town departments, town meeting) | High | High | Low | At least yearly / as hazards affecting the Town occur |
| 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. | EQ | Building Commissioner, PB | Local (inspectional services and PB operating budgets), Federal (FEMA's National Earthquake Hazards Reduction Program's State Assistance Program) | Low | Medium | Low | 0-3 years, then ongoing |

| Actions | Hazards Addressed | Agencies Involved | Potential Funding Sources | Priority | Impact | Estimated Cost | Expected Timeline |
|---|--------------------|----------------------------|--|----------|--------|----------------|-------------------|
| Complete a study on how development in town, such as solar farms, affects flooding in town, looking at problems and enforcement mechanisms. Create and enforce a solar development / land use bylaw | FL | DPW, Building Commissioner | Local (capital trust, inspectional services and DPW operating budgets, town meeting), State (EEA Planning Assistance Grant), Federal (FEMA BRIC, FMA Grants) | High | High | Medium | 0-5 years |
| Complete a feasibility study for flood-proofing well pumps 2 and 7. | FL | DPW | Local (capital trust, DPW operating budget, town meeting), Federal (FEMA FMA, BRIC Grants) | High | High | Low | 0-3 years |
| Complete a Town-wide dam assessment of all public, private, and beaver dams. In this assessment, focus on reducing the risk of flooding from dam failures during intense storm events and protecting ecosystems that provide flood storage and other resilience benefits. | DF, FL, SS, ST, HU | DPW | Local (capital trust, DPW operating budget, town meeting), State (MVP Action Grant), Federal (FEMA FMA, BRIC Grants) | High | High | Medium | 2-3 years |

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, Including Changes in Groundwater |
| EQ | Earthquakes | FL | Flooding, Including Changes in Groundwater |
| HU | Hurricanes | IS | Invasive Species |
| LG | Lightning Strikes | OT | Other |

SS Severe Snowstorms / Ice Storms / Nor'easters

WF Wildfire

ST Severe Thunderstorms / Wind / Tornadoes

XT Extreme Temperatures

'Agencies Involved' abbreviations (these abbreviations are also used in the 'Potential Funding Sources' column):

BOS Board of Selectmen

CC Conservation Commission

PB Planning Board

CMRPC Central Massachusetts Regional Planning Commission

DPW Department of Public Works

ZBA Zoning Board of Appeals

8.0 PLAN ADOPTION, IMPLEMENTATION, AND MAINTENANCE

8.1 PLAN ADOPTION

A public meeting was held on June 25th, 2024 as part of the Board of Selectmen meeting in order to detail the Blackstone Hazard Mitigation Plan update process to that date and to solicit comments and feedback from the public and the Board of Selectmen 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 July 10th, 2024 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 Blackstone Board of Selectmen and certified on February 24th, 2026.

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 Blackstone has completed the 2018 Blackstone Municipal Vulnerability Preparedness Plan, the 2018 Blackstone Master Plan, and the 2024 Blackstone Open Space and Recreation Plan; Findings from the 2026 Blackstone Hazard Mitigation Plan update, including the data, ideas, and strategies incorporated into the plan, 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 Board of Selectmen 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 2017 Blackstone Hazard Mitigation Plan were incorporated into other planning mechanisms and policies in town besides this plan update, including the Town's 2018 Municipal Vulnerability Preparedness (MVP) Plan, the Town's 2024 Open Space and Recreation Plan (OSRP), and (through a brief mention) the Town's 2023 Comprehensive Emergency Management Plan. The Town's 2017 HMP informed the descriptions of past flooding caused by issues at bridges and culverts in the Town's 2018 MVP Plan and the Town's 2024 OSRP; 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 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:

- **Blackstone Comprehensive Emergency Management Plan** (particularly the critical infrastructure section) – the critical infrastructure section of this plan 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.

- **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 evacuation routes and emergency shelters. This plan will soon be updated by CMRPC.
- **Blackstone Open Space and Recreation Plan** – This Plan was used to identify the natural context within which mitigation planning takes place; it 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. This information was incorporated into this plan to ensure that the Town's mitigation efforts would be sensitive to the surrounding environment.¹⁷⁵
- **Blackstone 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.¹⁷⁶
- **Blackstone Master Plan** – This plan was used to identify the main priorities for the Town so that the Hazard Mitigation Plan's strategies can align with these priorities.¹⁷⁷
- **Blackstone Municipal Vulnerability Preparedness Plan** – The medium and high-priority recommendations from this plan were incorporated into the Hazard Mitigation Plan's mitigation strategies.¹⁷⁸
- **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.¹⁷⁹
- **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.¹⁸⁰
- **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 the plan, are consistent with the State's data and priorities.¹⁸¹

A Fiscal Year 2023-2028 Capital Improvement Plan for the Town has also been drafted and was

¹⁷⁵ The Town of Blackstone, with assistance from PGC Associates, LLC, "Open Space and Recreation Plan 2023: Blackstone, Massachusetts," Drive.google.com, The Town of Blackstone, March 26, 2024, https://drive.google.com/file/d/109n9h_uqACI-6ho22VfxZzY5Vb7pW19Z/view

¹⁷⁶ "Chapter 123: Zoning," Townofblackstone.org.

¹⁷⁷ PGC Associates, LLC., "Town of Blackstone Master Plan 2018," Townofblackstone.org, The Town of Blackstone, November 1, 2018, [https://www.townofblackstone.org/DocumentCenter/View/882/Blackstone-Master-Plan-December-2018---Part-1-PDF?bidId=.](https://www.townofblackstone.org/DocumentCenter/View/882/Blackstone-Master-Plan-December-2018---Part-1-PDF?bidId=)

¹⁷⁸ Fuss & O'Neill, "Town of Blackstone Community Resilience Building Workshop Summary of Findings"

¹⁷⁹ "ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan"

¹⁸⁰ "2022 Massachusetts Climate Change Assessment"

¹⁸¹ 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>.

still being finalized at the time of this plan update's completion; this plan will inform how the Town invests resources into town priorities, including several which directly relate to mitigation strategies included in this plan. The Local HMP Planning Committee would also like to note that the Town recently completed an Emergency Action Plan for coordination between the Town and Liberty Gas, an Emergency Dispensing Site Plan to help the Town respond in the case of a public health emergency, as well as an Illicit Discharge Detection and Elimination (IDDE) Plan which meets the requirements of the US Environmental Protection Agency's 2016 NPDES MS4 General Permit for Stormwater Discharges for Massachusetts. In addition, they would like to note that the Town, in collaboration with the Red Cross, recently completed a site evaluation for the Hartnett Regional Middle School and the Kennedy Elementary School, which are used by the Town as emergency shelters. These documents informed mitigation strategies included in this plan update.

Additionally, this plan incorporated information from the 2011 FIRM maps for Blackstone and the 2023 Worcester County Flood Insurance Study.

After this plan has been approved by both FEMA and the Blackstone Board of Selectmen, 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 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.

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 (with the next plan update starting three-and-a-half years after the adoption of this plan update) through forming an HMP planning team and working with a contractor to complete the update. The planning process for future updates of this plan will be the similar to the planning process for this plan update, will be overseen by the Town’s Emergency Management Director, and will include holding several meetings of the local HMP planning team to review and update the critical infrastructure inventory, hazards descriptions, existing protection measures matrix, and mitigation strategies in the plan, a public presentation, and a public comment period. 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 Board of Selectmen 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, will update it with any progress on the strategies which has been made since the plan update was adopted, and will 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 Board of Selectmen 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 / the Municipal Center, and copies of the revised Plan will be made available to the public at Town Hall / the Municipal Center.

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 40: 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 |
|---|---|--|------------------------|-------------------------------------|
| <i>Hazard Mitigation Grant Program Post-Fire (HMGP-PF)</i> | Cost-share post-wildfire disaster mitigation measures | Annual, within six months after a Fire Management Assistance Grant declaration | FEMA | 75% FEMA / 25% non-federal |
| <i>Assistance to Firefighters Grants (AFG)</i> | Training & equipment for wildfire-related hazards | Annual | FEMA | FEMA |
| <i>Fire Prevention & Safety Grant Program (AFG) (FP&S)</i> | Cost-share funding to support projects that protect people from fire-related hazards | Annual | FEMA | 95% FEMA / 5% non-federal |
| <i>Fire Management Assistance Grants (FMAG)</i> | Cost-share funding to mitigate & manage major disasters caused by fire | Any time (pre- & post disaster) | FEMA | 75% FEMA / 25% non-federal |
| <i>National Dam Safety Program (State Assistance Grant Program) (NDSP)</i> | Funding to improve dam safety & state dam safety programs | Annual | FEMA | FEMA, Bipartisan Infrastructure Law |
| <i>Rehabilitation of High Hazard Potential Dam Program (State Dam Safety Divisions) (HHPD)</i> | Cost-share funding to plan and rehabilitate high hazard potential dams | Annual | FEMA | 65% FEMA / 35% non-federal |
| <i>National Earthquake Hazards Reduction Program's State Assistance Program (NEHRP)</i> | Cost-share funding for pre-earthquake risk management | Annual | FEMA | 75% FEMA / 25% non-federal |
| <i>Emergency Food and Shelter Program (EFSP)</i> | 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 |
|--|--|---------------------|------------------------|---|
| <i>Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation Program (PROTECT)</i> | 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](#).

Note: the FEMA BRIC program is currently not being funded as of May 2025.

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:

A. 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.

B. 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.

C. 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 CORP 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 41: 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 Funder | Mass.gov](https://www.mass.gov/info-details/community-grant-funder). 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>.

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 (LCWF) 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:

1. Planning Ahead for Housing;

2. Planning Ahead for Growth;
3. Technical Assistance to support Community Compact Cabinet Activities including Regionalization; and
4. 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

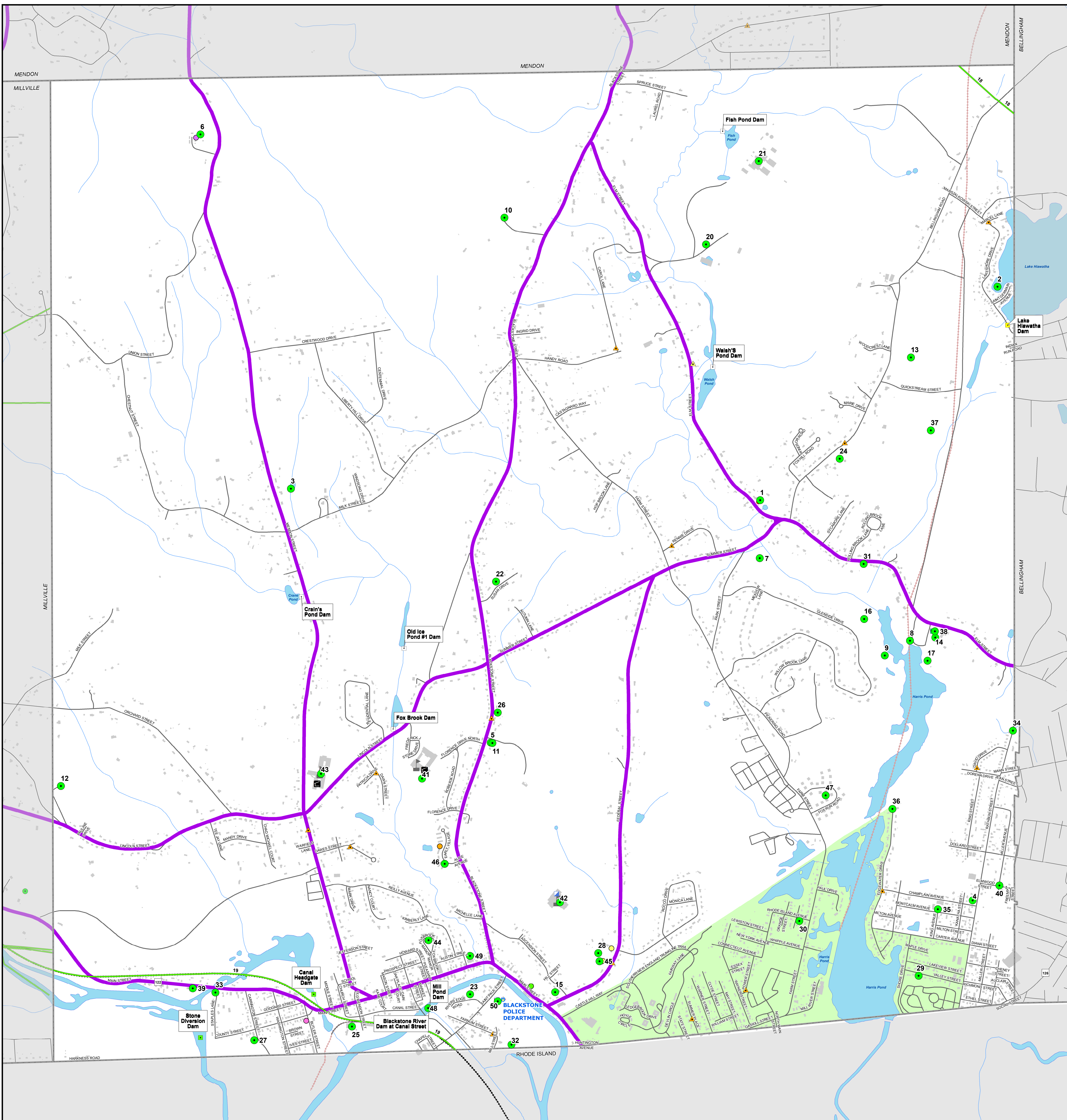
Hazard Mitigation Plan

Map 1

Critical Infrastructure and Facilities

Town of Blackstone, Massachusetts

August 2024



Legend

| | |
|------------------------|---|
| Assisted Living | Town Halls |
| Elderly Housing | Local Police |
| Emergency Shelters | Fire Station |
| End Of Life Facilities | Schools (Pre-K through High School) |
| Misc Data | Active Rail Line |
| Nursing/Rest Homes | Out of Service/Abandoned Rail Line |
| Power Plant | MA Environmental Justice Block Groups 2020 (Income) |
| Daycare | |
| Electric Distribution | |
| Electric Substation | |
| EOC | |
| Water Treatment Plant | |

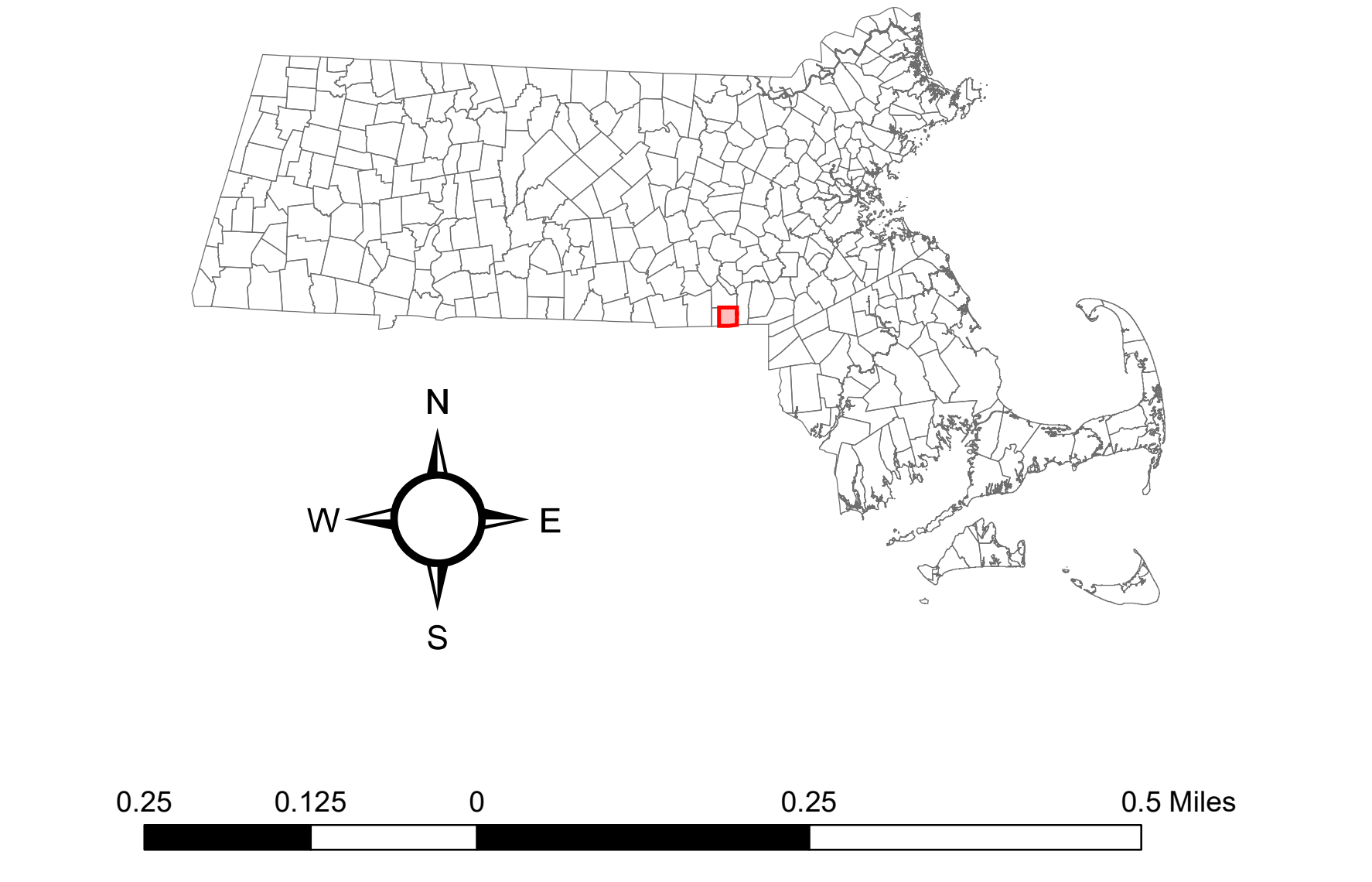
| | | |
|-----------------|---------|------------------------------|
| Town Boundaries | Streams | Regionwide Evacuation Routes |
| Structures | Roads | |
| Water Bodies | | |

Dams (2/2012)

| | | |
|--------------------|------------|-----|
| Significant Hazard | Low Hazard | N/A |
|--------------------|------------|-----|

Locally Defined

| | | |
|-------------------------|-------------------------|-------------------------|
| Critical Infrastructure | Critical Infrastructure | Critical Infrastructure |
|-------------------------|-------------------------|-------------------------|

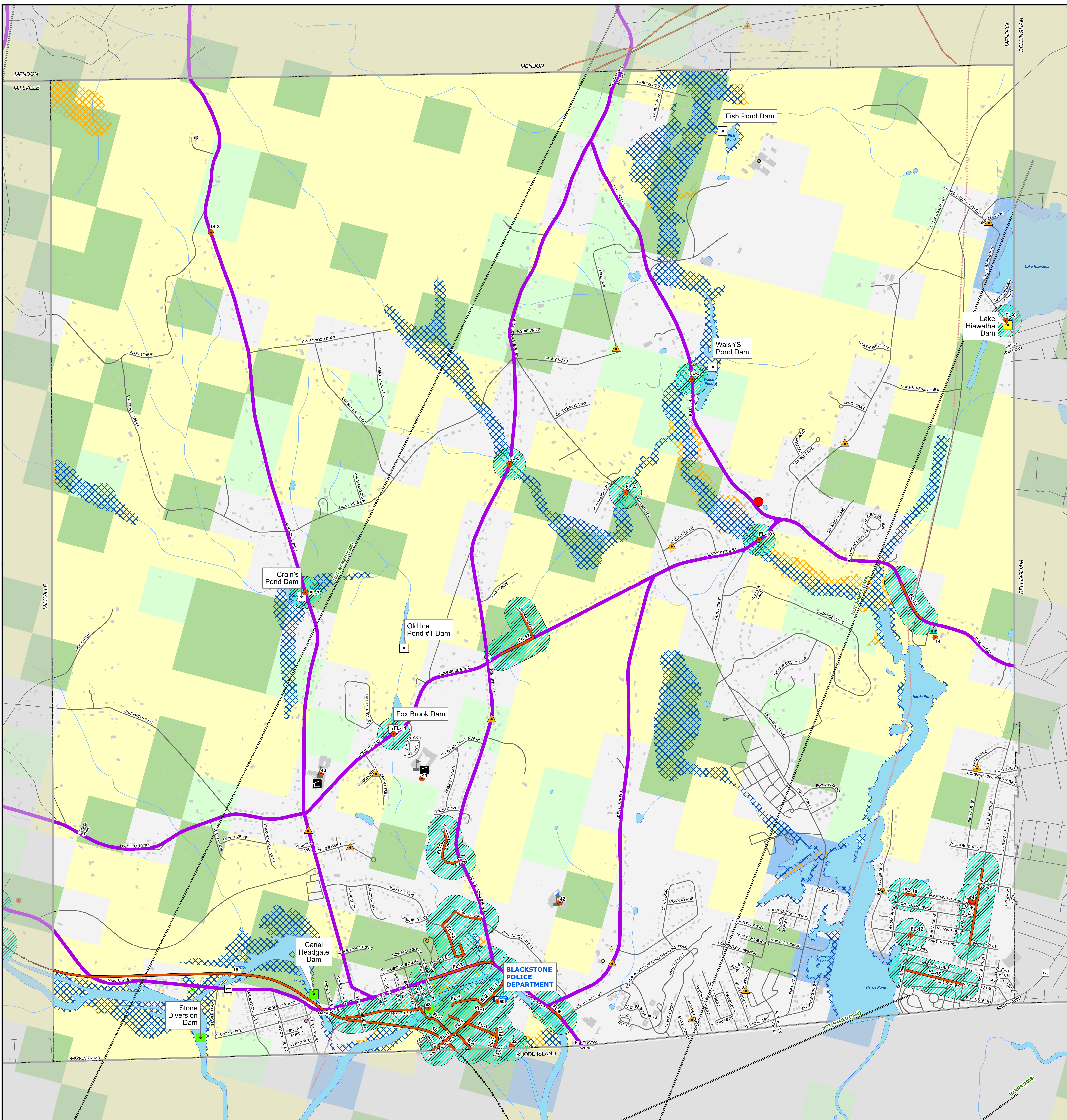


Hazard Mitigation Plan

Map 2 Hazards

Town of Blackstone, Massachusetts

June 2024



Legend

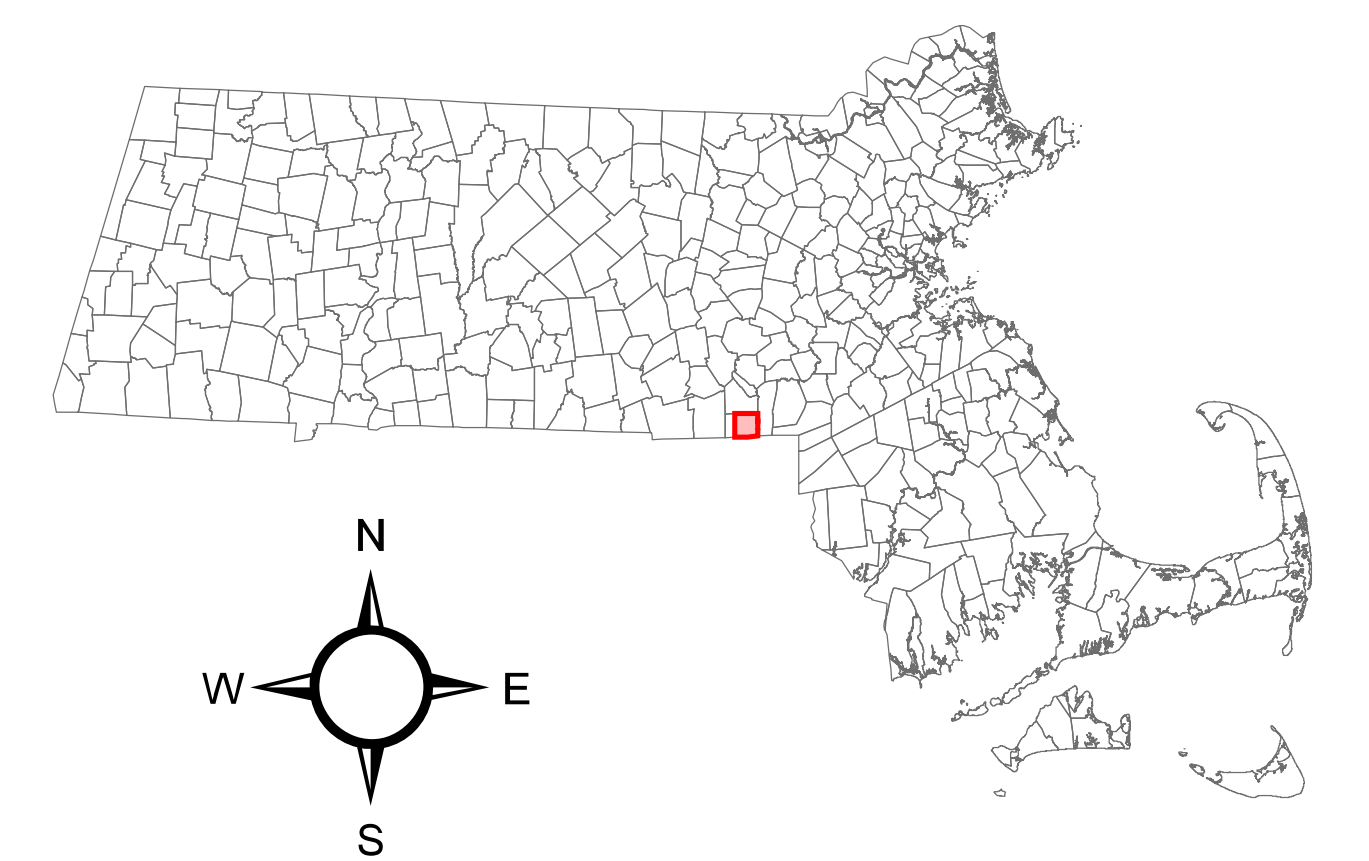
- Assisted Living
- Elderly Housing
- Emergency Shelters
- End Of Life Facilities
- Misc Data
- Nursing/Rest Homes
- Power Plant
- ▲ Daycare
- ▲ Electric Distribution
- ▲ Electric Substation
- ▲ EOC
- Water Treatment Plant
- Town Halls
- Local Police
- Fire Station
- Schools (Pre-K through High School)
- Active Rail Line
- Out of Service/Abandoned Rail Line
- Town Boundaries
- Streams
- Regionwide Evacuation Routes
- Structures
- Roads
- Water Bodies

Hazards

- Dams (2/2012)**
 - High Hazard
 - N/A
- FEMA DFIRM Flood Zones**
 - 100-year Flood Area*
 - 500-year Flood Area
 - Repetitive Loss Property Areas
 - NOAA Historic Hurricane Tracks (1842-2022)
- USDA Wildfire Hazard Potential, Version 2023**
 - 1: Very Low
 - 2: Low
 - 3: Moderate
 - 4: High
 - 5: Very High
 - 6: Non-burnable
 - 7: Water

Locally Defined Hazards

- Hazard
- Hazard
- Possible Flood Area
- Hazard



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.



Hazard Mitigation Plan

Map 3

Vulnerable Critical Infrastructure and Facilities

Town of Blackstone, Massachusetts

August 2024



Legend

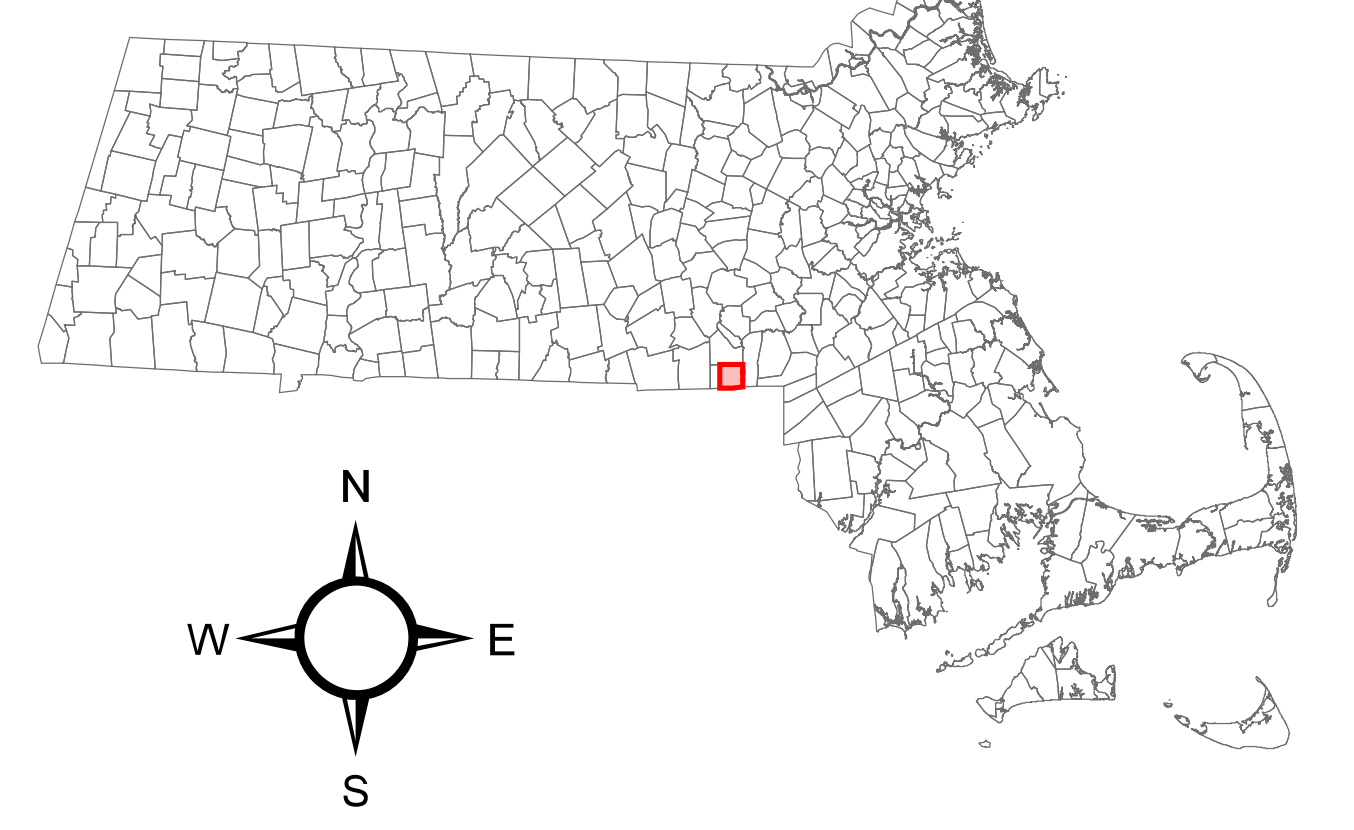
- Assisted Living
- Elderly Housing
- 🏠 Emergency Shelters
- End Of Life Facilities
- Misc Data
- Nursing/Rest Homes
- Power Plant
- ▲ Daycare
- ▲ Electric Distribution
- ▲ Electric Substation
- ▲ EOC
- ▲ Water Treatment Plant
- 🏛️ Town Halls
- 👮 Local Police
- 🔥 Fire Station
- 🎓 Schools (Pre-K through High School)
- ⚡ Active Rail Line
- ⚡ Out of Service/Abandoned Rail Line
- 🌿 MA Environmental Justice Block Groups 2020 (Income)
- ▭ Town Boundaries
- ▭ Structures
- ▭ Water Bodies
- 🌊 Streams
- 🛣️ Roads
- 🚚 Regionwide Evacuation Routes

Hazards

- 🟡 Dams (2/2012) Significant Hazard
- 🟢 Dams (2/2012) Low Hazard
- ⬜ Dams (2/2012) N/A
- 🟡 FEMA DFIRM Flood Zones 1% Annual Chance Flood Hazard or Regulatory Floodway
- 🟡 FEMA DFIRM Flood Zones 0.2% Annual Chance Flood Hazard
- 🟡 High Slope (15% and above)
- 🟡 Repetitive Loss Property Areas
- 📍 IBTrACS Historical Hurricane Tracks (1842-2020)

Locally Defined

- Hazard
- Vulnerable Critical Infrastructure
- Vulnerable Critical Infrastructure/Hazard
- Non-vulnerable Critical Infrastructure
- Non-vulnerable Critical Infrastructure/Hazard
- 🟡 Hazard
- 🟡 Vulnerable Critical Infrastructure
- 🟡 Vulnerable Critical Infrastructure/Hazard
- 🟡 Non-vulnerable Critical Infrastructure
- 🟡 Possible Flood Area
- 🟡 Hazard
- 🟡 Vulnerable Critical Infrastructure
- 🟡 Non-vulnerable Critical Infrastructure



Key to Locally Identified Hazards and Critical Infrastructure and Facilities in Appendix A Maps

| Facility/Infrastructure/Hazard | Type | Map ID | Vuln. (Town) | Vuln. (GIS) |
|---|-------------|---------------|---------------------|--------------------|
| Flooding – Saint Paul St/Rivers Edge Rd/Farnum St/Canal St | H | FL-1 | N/A | N/A |
| Flooding – Main St from appx. 1st Ave to Blackstone St | H | FL-2 | N/A | N/A |
| Flooding – Elm St & Mill Brook | H | FL-3 | N/A | N/A |
| Flooding – Farm St & Hop Brook | H | FL-4 | N/A | N/A |
| Flooding – Blackstone St & Hop Brook | H | FL-5 | N/A | N/A |
| Flooding – Lakeshore Dr & Quick Stream | H | FL-6 | N/A | N/A |
| Flooding – Mendon St & Fox Brook | H | FL-7 | N/A | N/A |
| Flooding – Rathbun St near Fire Station | H | FL-8 | N/A | N/A |
| Flooding – Main St between Federal St & Castle Hill Way | H | FL-9 | N/A | N/A |
| Flooding – Mill River flooding/failed dam site | H | FL-10 | N/A | N/A |
| Flooding – Lincoln St & Fox Brook | H | FL-11 | N/A | N/A |
| Flooding – Carter Ave & Shore Dr | H | FL-12 | N/A | N/A |
| Flooding – Elm St (North of Harris Pond) | H | FL-13 | N/A | N/A |
| Flooding – Fox Brook, high water hazard | H | FL-14 | N/A | N/A |
| Flooding – Valley St | H | FL-15 | N/A | N/A |
| Flooding – Champlain Ave | H | FL-16 | N/A | N/A |
| Flooding – Summer St / Autumn Lane | H | FL-17 | N/A | N/A |
| Flooding – Early Village / Alice Ave | H | FL-18 | N/A | N/A |
| Invasive Species – Bittersweet on Canal St | H | IS-1 | N/A | N/A |
| Invasive Species – Wisteria along St. Paul St | H | IS-2 | N/A | N/A |
| Invasive Species – Red Flame Bushes, Mendon St by the Gas Line | H | IS-3 | N/A | N/A |
| Fire Department – Fire Station #3 - sewer lift station nearby | CI | 1 | | |
| Fire Department – Dry Hydrant - Lake Shore Drive (Lake Hiawatha) | CI | 2 | | |
| Fire Department – Dry Hydrant - Wojcik's Farm Pond | CI | 3 | | |
| Fire Department – Fire Station #2 / Backup Emergency Operations Center - flooding hazard | CI/H | 4 | Y | Y |
| Communications – Radio Repeater Blackstone St Water tank | CI | 5 | Y | |
| Communications – AT&T Tower | CI | 6 | | |
| Water Supply – Well Pumps #2,7 | CI | 7 | Y | |
| Water Supply – Well Pump #5a | CI | 8 | Y | |
| Water Supply – Well Pump #8 | CI | 9 | Y | |
| Water Supply – Storage Tank - Near 315 Blackstone St | CI | 10 | Y | |
| Water Supply – Water Tank - 128 Blackstone St | CI | 11 | Y | |
| Water Supply – Storage Tank - Lincoln St near Millville line | CI | 12 | Y | |
| Water Supply – Storage Tank - 45 Bellingham Rd | CI | 13 | Y | |
| Water Supply – DPW Offices and Garage / Corrosion Facility - sewage lift station on site, part of the site lacks a backup generator | CI/H | 14 | Y | Y |
| Water Supply – Well Pump #4 | CI | 15 | Y | |
| Water Supply – Well Pump #9 | CI | 16 | Y | |
| Water Supply – Well Pump #6 | CI | 17 | Y | |
| Utilities – Algonquin Natural Gas Pipeline | CI | 18 | Y | |
| Utilities – Providence Worcester RR - Wildfires along rail line | CI/H | 19 | Y | Y |
| Utilities – Kimball Sand Co. | CI | 20 | | |
| Utilities – ANP Blackstone Natural Gas Power Plant | CI | 21 | | |
| Daycare – Bouchard, 4 Susan Dr | CI | 22 | | |
| Daycare – Growing Einsteins Daycare - 5 Rivers Edge Drive | CI | 23 | Y | Y |
| Daycare – Hart, 21 Bellingham Rd | CI | 24 | | |

| | | | | |
|---|------|----|---|---|
| Daycare – Boys & Girls Club - Afterschool Programs, 115 Canal St | CI | 25 | Y | Y |
| Daycare – Battaglia Home Daycare | CI | 26 | | |
| Daycare – Languirand Home Daycare | CI | 27 | | |
| Daycare – Little People’s Day Care Center, Inc | CI | 28 | | |
| Daycare – Viveiros Home Daycare | CI | 29 | | Y |
| Daycare – Wainwright Home Daycare | CI | 30 | Y | |
| Daycare – St. Amant Home Daycare | CI | 31 | | |
| Sewer – Mill Street Sewer Lift Station - flooding hazard | CI/H | 32 | Y | Y |
| Sewer – Staples Lane Sewer Lift Station | CI | 33 | | |
| Sewer – Rathburn Street Sewer Lift Station | CI | 34 | | |
| Sewer – Montcalm Ave Sewer Lift Station | CI | 35 | | |
| Sewer – Edgewater Drive Sewer Lift Station | CI | 36 | | |
| Sewer – Quickstream Street Sewer Lift Station | CI | 37 | Y | Y |
| Sewer – Elm Street Sewer Lift Station | CI | 38 | | Y |
| Sewer – Upper Main Street Sewage Lift Station | CI | 39 | | Y |
| Sewer – Elmwood Street Sewer Lift Station | CI | 40 | | |
| Schools – Blackstone-Millville Regional High School (sewer lift station nearby) - snow load hazard | CI/H | 41 | Y | Y |
| Schools – Hartnett Regional Middle School - Primary Emergency Shelter - snow load hazard | CI/H | 42 | Y | Y |
| Schools – Kennedy and Maloney Elementary Schools (Kennedy is an Emergency Shelter) - snow load hazard | CI/H | 43 | Y | Y |
| Housing – Fox Brook Manor, Blackstone Housing Authority | CI | 44 | | |
| Housing – DuCharme Estates | CI | 45 | | |
| Housing – Early Village, Blackstone Housing Authority (sewer lift station nearby) | CI | 46 | | Y |
| Housing – The Hamlet of Blackstone (over 55 community) | CI | 47 | | |
| Saranac Dam / Blackstone River Dam at Canal Street - flooding hazard | CI/H | 48 | Y | Y |
| Town Facilities – Public Library | CI | 49 | Y | Y |
| Town Facilities – Blackstone Municipal Center / Public Safety Building / Senior Center / Emergency Operations Center - snow load hazard | CI/H | 50 | Y | Y |

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))*



Blackstone Hazard Mitigation Plan

Survey Responses Needed

The Town of Blackstone is in the process of updating its Hazard Mitigation Plan and is requesting input from residents to inform this plan. An updated HMP will help the Town assess and reduce community risk from natural hazards.



You are invited to submit your thoughts on natural hazards, such as flooding, snowstorms, or thunderstorms, in the Blackstone Hazard Mitigation Plan Community Survey.

Take our survey using the QR code below.



Tip: Open your phone camera, point at the QR code, and click the pop-up link to take the survey.

Link to the survey: <https://www.surveymonkey.com/r/YSTHFQM>

Blackstone Hazard Mitigation Plan Community Survey

Blackstone Hazard Mitigation Plan

In October 2023, the Town of Blackstone 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 Blackstone.

By participating in this survey, you will help the Town of Blackstone understand the current and future natural hazards that residents are most concerned about. Survey responses will be accepted until January 24th, 2024.

1. Check all that apply.

- I live in Blackstone.
- I work in Blackstone.
- I frequently visit Blackstone.

2. Has your family or property, in Blackstone, been impacted by any of the following natural hazards? Select all that apply:

- I have not been impacted by natural hazards in Blackstone
- Winter Storms / Ice
- Thunderstorms, Microbursts, and/or Extreme Wind
- Tornadoes
- Flooding
- Extreme Heat / Extreme Cold
- Drought
- Wildfire / Brushfire
- Hurricanes
- Earthquakes
- Poor Air Quality
- Other (please specify)

3. Where have you observed hazard impacts in Blackstone, 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 Blackstone (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 Blackstone? Rank the responses below in order from most concerned (1) to least concerned (5).

- Local natural resources and environments
- Resident health, safety, and property
- Local infrastructure
- Local business and the town economy
- 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)

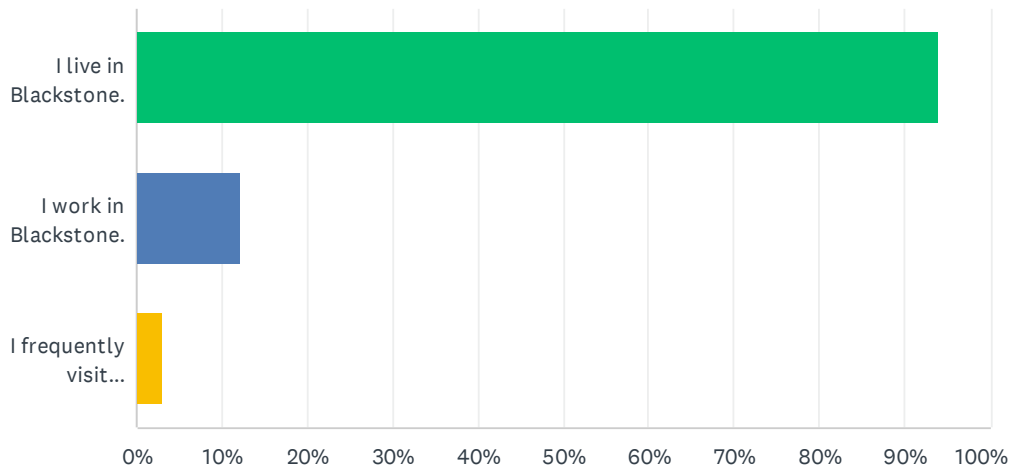
9. What actions should the Town of Blackstone take to cultivate local resilience to natural hazards?

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 Blackstone's Hazard Mitigation planning process, please enter your E-mail address below.

Q1 Check all that apply.

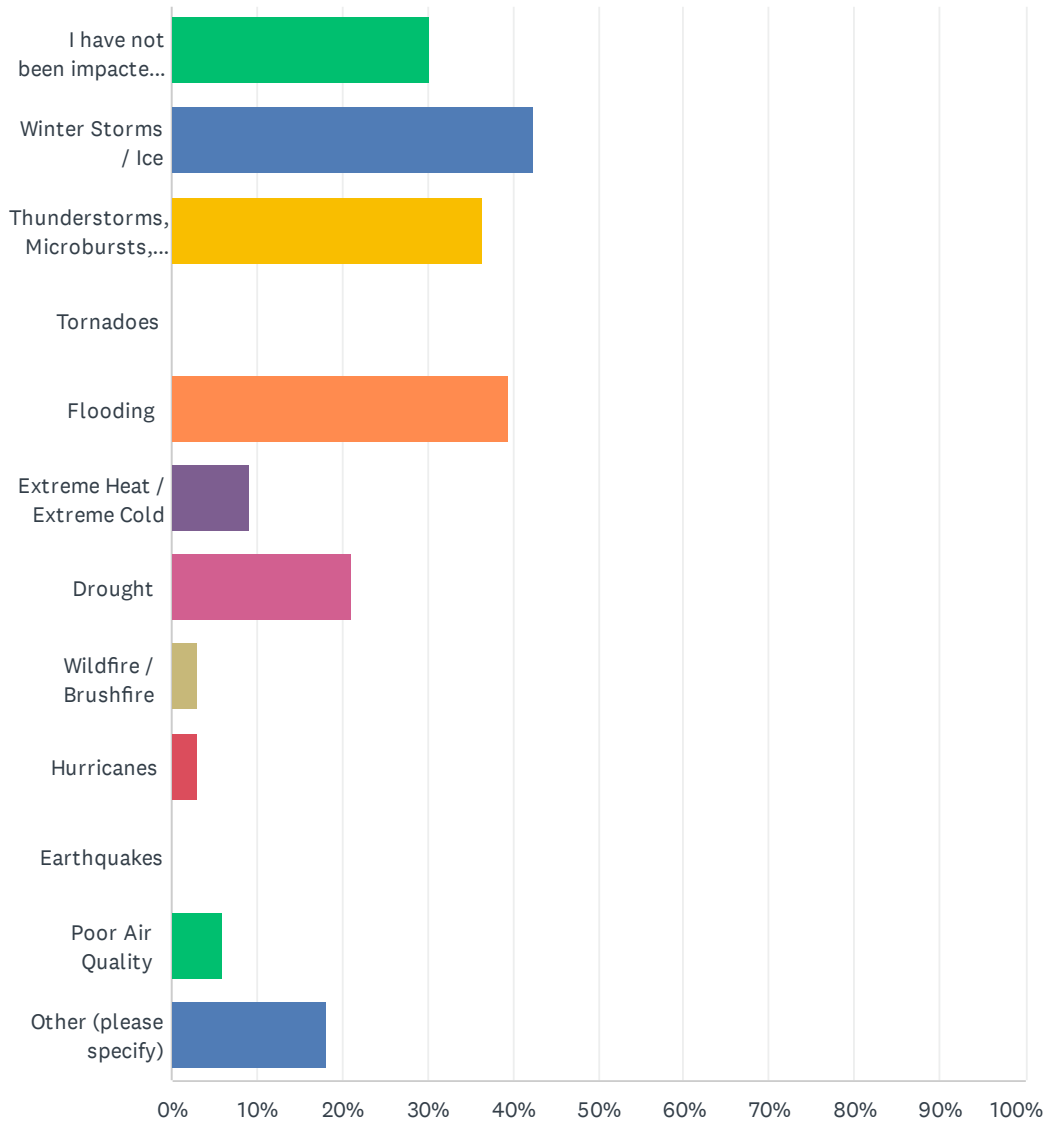
Answered: 33 Skipped: 0



| ANSWER CHOICES | RESPONSES | |
|--------------------------------|-----------|----|
| I live in Blackstone. | 93.94% | 31 |
| I work in Blackstone. | 12.12% | 4 |
| I frequently visit Blackstone. | 3.03% | 1 |
| Total Respondents: 33 | | |

Q2 Has your family or property, in Blackstone, been impacted by any of the following natural hazards? Select all that apply:

Answered: 33 Skipped: 0



Blackstone Hazard Mitigation Plan Community Survey

| ANSWER CHOICES | RESPONSES | |
|---|-----------|----|
| I have not been impacted by natural hazards in Blackstone | 30.30% | 10 |
| Winter Storms / Ice | 42.42% | 14 |
| Thunderstorms, Microbursts, and/or Extreme Wind | 36.36% | 12 |
| Tornadoes | 0.00% | 0 |
| Flooding | 39.39% | 13 |
| Extreme Heat / Extreme Cold | 9.09% | 3 |
| Drought | 21.21% | 7 |
| Wildfire / Brushfire | 3.03% | 1 |
| Hurricanes | 3.03% | 1 |
| Earthquakes | 0.00% | 0 |
| Poor Air Quality | 6.06% | 2 |
| Other (please specify) | 18.18% | 6 |
| Total Respondents: 33 | | |

| # | OTHER (PLEASE SPECIFY) | DATE |
|---|---|-------------------|
| 1 | Do not live in Blackstone, Millville Resident | 3/26/2024 5:58 PM |
| 2 | Solar Farm on Blackstone putting in the retention ponds like they promised. All the Abutters, this was in thier plans. No retention ponds and it floods back yards. Also the cattle crossinbg on Summer was closed and the water backs up in our yard washing out the soil. Retention were in | 2/29/2024 4:18 PM |
| 3 | Flooding Caused by town closing in a cattle crossing under summer st AND Solar Farm not putting in retention ponds that are in their plans | 2/29/2024 4:03 PM |
| 4 | tap water discolored at times, and slow ground sinking | 1/7/2024 8:58 AM |
| 5 | Dead trees due to gypsy moth infestation | 1/7/2024 8:28 AM |
| 6 | Possible sink hole? Behind King St property abutting Dorena property. | 1/7/2024 8:08 AM |

Q3 Where have you observed hazard impacts in Blackstone, 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: 27 Skipped: 6

| # | RESPONSES | DATE |
|----|---|-------------------|
| 1 | When water is low we cannot water our yards. Kids can't ever (ever is underlined) use water outdoors and I am a homeowner. I cannot keep my...alive. I buy flowers and they always die. | 3/26/2024 6:13 PM |
| 2 | Flooding on Blackstone St Flooding on Summer St | 3/26/2024 6:05 PM |
| 3 | Lincoln St | 3/26/2024 6:00 PM |
| 4 | Flooding on Roads | 3/26/2024 5:54 PM |
| 5 | Elm st flooding, main st flooding. Old trees falling all over the town .. | 3/15/2024 3:47 PM |
| 6 | The Fox Brook located next to the Blackstone Library, Blackstone, MA. | 3/4/2024 5:45 PM |
| 7 | I live on Main Street on the river and my yard is subject to more flooding than ever. In the last 30 years that my family has owned this home, the last few years have seen the most flood encroachment on the yard. | 3/3/2024 10:35 AM |
| 8 | tree down on road | 2/29/2024 4:22 PM |
| 9 | (respondent underlined "drought/effects on water supply" and "trees down on roads") | 2/29/2024 4:20 PM |
| 10 | Cattle Crossing - Same as #2 Spoke to Jimmy Sullivan about this Solar Farm on Blackstone Street, should be held accountable for these retention ponds. | 2/29/2024 4:18 PM |
| 11 | Sever flooding of the mill river. Impacting a wetland that is part of our property on Rennie Drive | 2/29/2024 4:05 PM |
| 12 | Flooding from Sealed up Cattle crossing under summer st, which stopped the flow of our culvert. Also flooding due to solar farm on Blackstone st cutting down all those trees and not installing retention ponds as approved in their plans! | 2/29/2024 4:03 PM |
| 13 | Main Street Flooding/ Sewer Overflow | 2/29/2024 3:56 PM |
| 14 | The area behind the library is prone to flooding. | 2/19/2024 8:18 AM |
| 15 | Flooding on Bellingham Rd. REDACTED When there is excessive rain a literal river starts REDACTED back yard and flows so heavily through REDACTED backyard that it overwhelms all the French drain around REDACTED. The past storm the water flowed so hard it over flowed the drains and broke in my basement window. The continues down the road and floods Elm street. Something needs to be addressed with the water level and drainage at the top of the hill on the street. One storm the force of the water push fifty feet of crushed stone 3 feet deep out of all my drains and into my front yard. Have had them all redone with larger stone. | 1/7/2024 9:04 AM |
| 16 | Jefferson St, river flow floods backyards and basements | 1/7/2024 8:58 AM |
| 17 | Road flooding in front of CVS | 1/7/2024 8:28 AM |
| 18 | n/a | 1/7/2024 1:17 AM |
| 19 | Farm St-down trees, extended power outages Glenside Dr-power outages | 1/6/2024 11:08 PM |
| 20 | Flooding: washing out roadways, overflowing/topping and dismantling retention ponds. Extreme drought: the town has suffered public water supply issues, residents experienced financial losses as a result. | 1/6/2024 10:53 PM |
| 21 | Catch basins on farm st(Anderson end) don't seem to catch water runoff. When it rains water | 1/6/2024 6:59 PM |

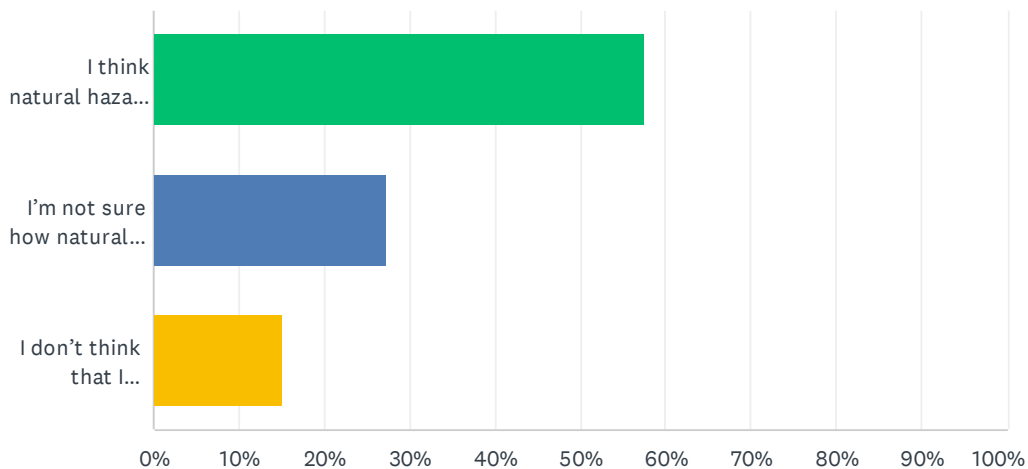
Blackstone Hazard Mitigation Plan Community Survey

runs down the road like a stream. Properties (front yards) are frequently flooded as a result.

| | | |
|----|---|--------------------|
| 22 | Flooding on parts of Farm St, wind damage and trees down on roads, unsafe road conditions during snow storms after plow trucks have been by | 1/6/2024 6:53 PM |
| 23 | We have an water ban for outdoor water use every year. | 12/17/2023 7:36 PM |
| 24 | Minor flooding on Mendon Street by the entrance to Goulet Park | 12/17/2023 9:30 AM |
| 25 | Watched river rise to almost flood the Waterford section in 2004 | 12/16/2023 3:31 PM |
| 26 | Flooding on rathbun street in two areas by turbesi park and by valley street | 12/16/2023 2:07 PM |
| 27 | Alice Ave floods | 12/16/2023 1:39 PM |

Q4 How much do you think the impacts of natural hazards and climate change will threaten your personal health, safety, or property?

Answered: 33 Skipped: 0



| ANSWER CHOICES | RESPONSES | |
|---|-----------|-----------|
| I think natural hazards and climate change will negatively impact my life. | 57.58% | 19 |
| I'm not sure how natural hazards and climate change will impact my life. | 27.27% | 9 |
| I don't think that I personally will be impacted by natural hazards and climate change. | 15.15% | 5 |
| TOTAL | | 33 |

**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: 25 Skipped: 8

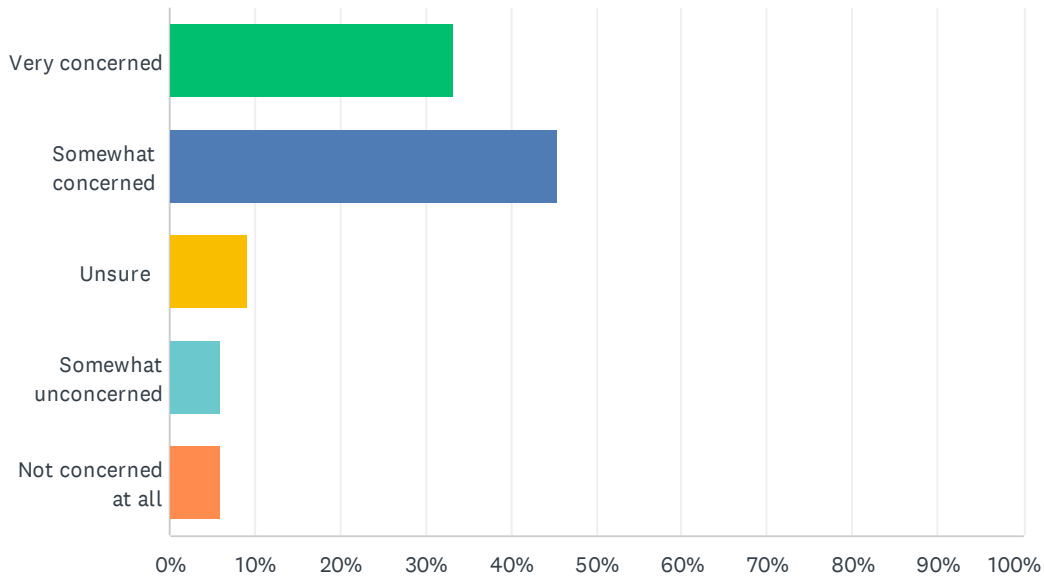
| # | RESPONSES | DATE |
|----|--|--------------------|
| 1 | wells drying out / contaminated ability to grow food people not wanting to live here because we don't have...water | 3/26/2024 6:13 PM |
| 2 | air quality, water sources/safety, ability to grow food | 3/26/2024 6:05 PM |
| 3 | Basement flooding and Yard flooding | 3/26/2024 6:00 PM |
| 4 | BASEMENT FLOODING - worried about erosion of due to lawn dying due inability to water lawn to continuous water ban | 3/26/2024 6:00 PM |
| 5 | Wells drying out and contamination issues with my septic tank | 3/26/2024 5:58 PM |
| 6 | Flooding, basement | 3/26/2024 5:54 PM |
| 7 | Basement flooding from Fox Brook overflowing. | 3/4/2024 5:45 PM |
| 8 | I worry about my home flooding beyond my yard with the increase in severity of storms. I worry more broadly about the impact on roadways and infrastructure. Also worried about the impact of insect born illness due to climate change (Lyme, EEE). | 3/3/2024 10:35 AM |
| 9 | trees falling on the house | 2/29/2024 4:22 PM |
| 10 | (respondent underlined "basement flooding, wells drying out / contamination of wells, ability to grow food") | 2/29/2024 4:20 PM |
| 11 | The Water table is very high here due to the water coming from where the solar farm is (Blackstone St) we now after 65 years have water in basement when there is a heavy rain. | 2/29/2024 4:18 PM |
| 12 | Flooding and erosion , west Nile, insects Wildlife loss of land use. | 2/29/2024 4:05 PM |
| 13 | Basement flooding -> I live in a basement apartment in an extremely high water table, Future problems with septic and property drainage due to no where for the water to go! | 2/29/2024 4:03 PM |
| 14 | Power lines w/poles wind | 2/29/2024 3:56 PM |
| 15 | I am most concerned about property damage both in my house and around my yard. | 1/7/2024 9:04 AM |
| 16 | basement flooding mold build up), water contamination, falling trees | 1/7/2024 8:58 AM |
| 17 | Brush fire, air quality, flooding, inflation of utility cost, inflation of cost of food, missed school/work due to natural disasters, loss of life from natural disasters | 1/7/2024 8:28 AM |
| 18 | Basement flooding. Property loss to possible sink hole. | 1/7/2024 8:08 AM |
| 19 | That the town will spend money on this climate change hoax... | 1/7/2024 1:17 AM |
| 20 | The town will not be able to sustain a population growth with climate impacts on our water system. | 1/6/2024 10:53 PM |
| 21 | Basement flooding, contamination of wells | 1/6/2024 6:53 PM |
| 22 | My primary concerns are water supply, the potential for property damage from storms, and impacts to down power lines. | 12/17/2023 7:36 PM |
| 23 | Droughts ans affect on wells | 12/17/2023 9:30 AM |

Blackstone Hazard Mitigation Plan Community Survey

| | | |
|----|----------------------------|--------------------|
| 24 | Flooding and contamination | 12/16/2023 2:07 PM |
| 25 | Fence falls | 12/16/2023 1:39 PM |

Q6 How concerned are you about the impacts that natural hazards and climate change will have on the Town of Blackstone (the local infrastructure, economy, environment, and/or town residents)?

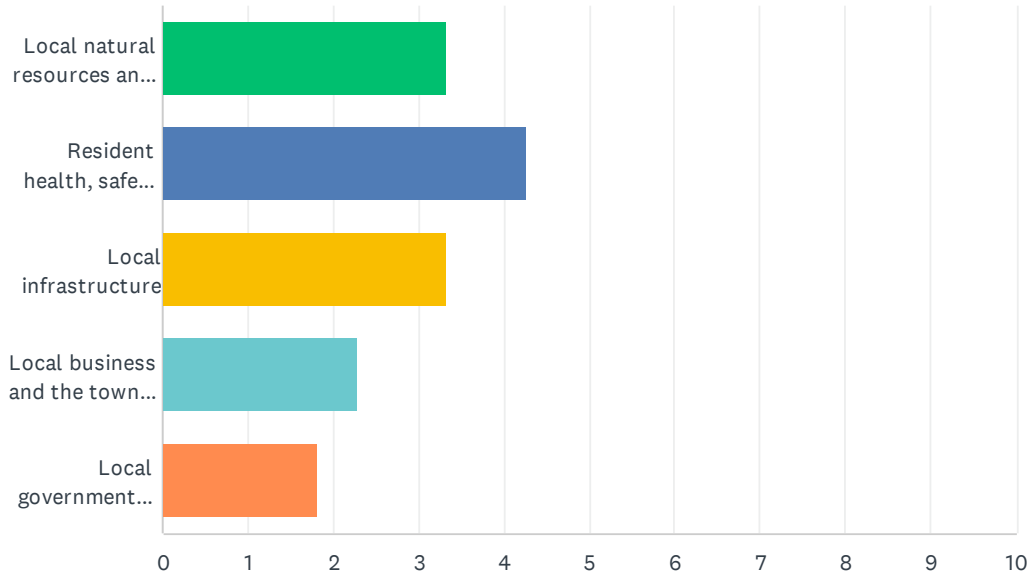
Answered: 33 Skipped: 0



| ANSWER CHOICES | RESPONSES | |
|----------------------|-----------|-----------|
| Very concerned | 33.33% | 11 |
| Somewhat concerned | 45.45% | 15 |
| Unsure | 9.09% | 3 |
| Somewhat unconcerned | 6.06% | 2 |
| Not concerned at all | 6.06% | 2 |
| TOTAL | | 33 |

Q7 What community assets are you most concerned about when you consider the potential impact of natural hazards and climate change on the Town of Blackstone? Rank the responses below in order from most concerned (1) to least concerned (5).

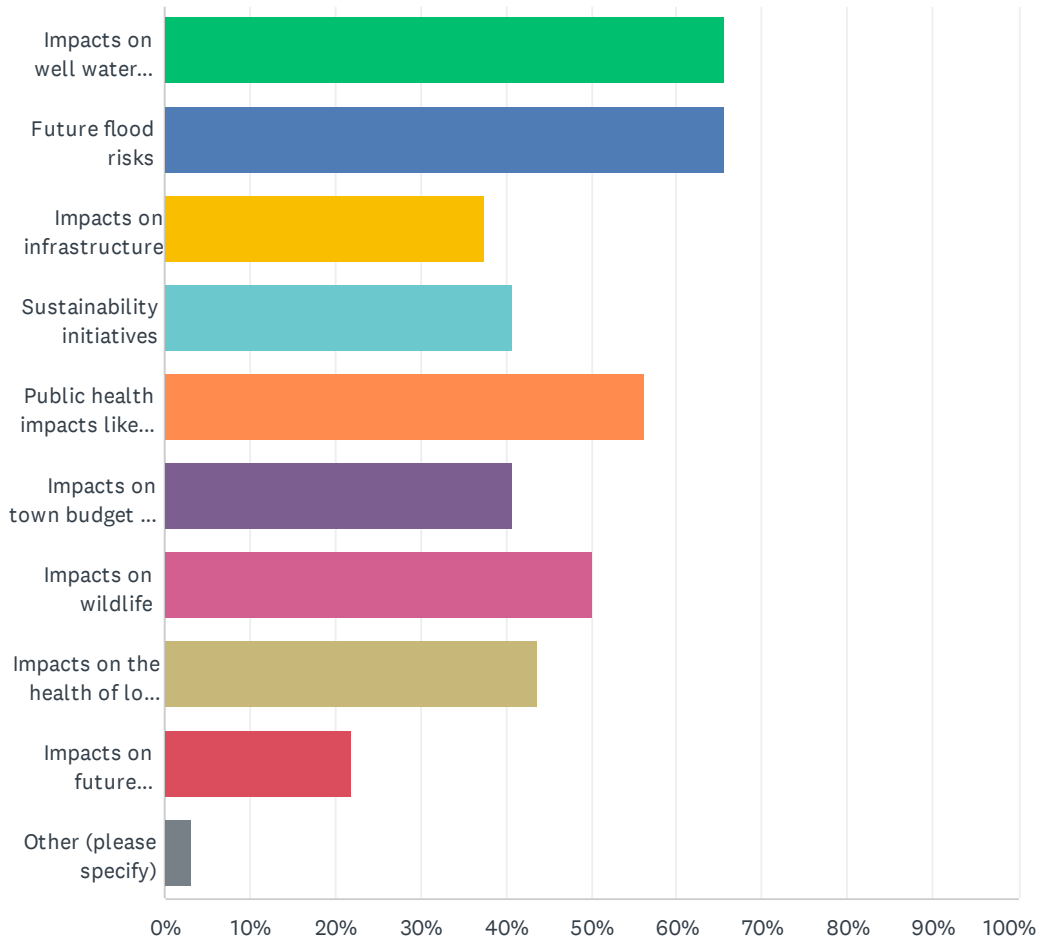
Answered: 31 Skipped: 2



| | 1 | 2 | 3 | 4 | 5 | TOTAL | SCORE |
|--|--------------|--------------|--------------|--------------|--------------|-------|-------|
| Local natural resources and environments | 19.35% 6 | 25.81% 8 | 32.26% 10 | 12.90% 4 | 9.68% 3 | 31 | 3.32 |
| Resident health, safety, and property | 64.52% 20 | 12.90% 4 | 12.90% 4 | 3.23% 1 | 6.45% 2 | 31 | 4.26 |
| Local infrastructure | 9.68% 3 | 45.16% 14 | 19.35% 6 | 19.35% 6 | 6.45% 2 | 31 | 3.32 |
| Local business and the town economy | 6.45% 2 | 3.23% 1 | 22.58% 7 | 48.39% 15 | 19.35% 6 | 31 | 2.29 |
| Local government resources | 0.00% 0 | 12.90% 4 | 12.90% 4 | 16.13% 5 | 58.06% 18 | 31 | 1.81 |

Q8 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.

Answered: 32 Skipped: 1



Blackstone Hazard Mitigation Plan Community Survey

| ANSWER CHOICES | RESPONSES | |
|---|-----------|----|
| Impacts on well water quantity / quality | 65.63% | 21 |
| Future flood risks | 65.63% | 21 |
| Impacts on infrastructure | 37.50% | 12 |
| Sustainability initiatives | 40.63% | 13 |
| Public health impacts like increased risks of vector-borne disease (ex. Lyme disease, West Nile Virus, EEE - Eastern equine encephalitis) | 56.25% | 18 |
| Impacts on town budget and finances | 40.63% | 13 |
| Impacts on wildlife | 50.00% | 16 |
| Impacts on the health of local forests | 43.75% | 14 |
| Impacts on future development | 21.88% | 7 |
| Other (please specify) | 3.13% | 1 |
| Total Respondents: 32 | | |

| # | OTHER (PLEASE SPECIFY) | DATE |
|---|--------------------------|--------------------|
| 1 | Clean water availability | 12/16/2023 3:31 PM |

Q9 What actions should the Town of Blackstone 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: 22 Skipped: 11

| # | RESPONSES | DATE |
|----|---|-------------------|
| 1 | Dig more wells or any way to get more water (clean) into town | 3/26/2024 6:13 PM |
| 2 | Improve Stormwater | 3/26/2024 6:00 PM |
| 3 | More Education | 3/26/2024 5:58 PM |
| 4 | Education and outreach | 3/26/2024 5:54 PM |
| 5 | Stop building | 3/15/2024 3:47 PM |
| 6 | The water from the Fox Brook can't flow under the Main Street bridge/pipe fast enough and backs up. The brook could possibly be damned by beavers or littered from residents, which should be investigated. The brook was dredged in late 80's or early 90's...it needs to be done again! | 3/4/2024 5:45 PM |
| 7 | Anything to mitigate hazards should be pursued. Invasive plants seem to be overtaking parts of the river in Blackstone above the gorge; this should be addressed. New building has to be done and approved with water and wildlife impacts evaluated. | 3/3/2024 10:35 AM |
| 8 | dead tree trimmings taken down | 2/29/2024 4:22 PM |
| 9 | Hold the Solar Farm Accountable, make them put in retention ponds. Fix Cattle Crossing under summer st so it doesnt back up into the yard. have Highway put correct berm from corner of blackstone street to the culvert on summer st. (respondent included the following at the end of the form "Please email me with any questions on what Solar Farm Said to abutters on Blackstone Street") | 2/29/2024 4:18 PM |
| 10 | Rebuild the dam on summer street to better control the Mill river | 2/29/2024 4:05 PM |
| 11 | Improve Stormwater Management: I>E> Water comes off the road and down my drive and washes away my gravel driveway. Open Cattle crossing and provide a way to naturally flow up Blackstone street. Solar Farm Made To Construct retention Ponds As Agreed Upon By Abuter. | 2/29/2024 4:03 PM |
| 12 | ADD: More Municipal / Emergency Assistance/ Response Teams, Equipment: ALL TERRAIN and Personell | 2/29/2024 3:56 PM |
| 13 | Look into grant funding to improve storm water management | 1/7/2024 9:04 AM |
| 14 | add more drainage systems, cut dead town-owned trees behind/in front of homes that may fall during storms | 1/7/2024 8:58 AM |
| 15 | Emergency preparedness | 1/7/2024 8:28 AM |
| 16 | All listed above in the example. | 1/7/2024 8:08 AM |
| 17 | Cutting trees over utilities. Everything should be cut back 10 feet and nothing taller than the poles for 20 feet off the road. | 1/7/2024 1:17 AM |
| 18 | Grant funding Cutting/trimming dead trees over roads and wires Less tree removal for either | 1/6/2024 11:08 PM |

Blackstone Hazard Mitigation Plan Community Survey

sale or gravel removal including solar panel farms Upgrade first responder facilities, communications and equipment

| | | |
|----|---|--------------------|
| 19 | Improve storm water management | 1/6/2024 6:59 PM |
| 20 | There should be plans in place on how to support residents and town infrastructure impacted by a climate related event. | 12/17/2023 7:36 PM |
| 21 | Secure water supply | 12/16/2023 3:31 PM |
| 22 | Encourage proper pitch of roads and drainage | 12/16/2023 2:07 PM |



Blackstone Hazard Mitigation Plan

Survey Responses Needed

The Town of Blackstone is in the process of updating its Hazard Mitigation Plan and is requesting input from residents to inform this plan. An updated HMP will help the Town assess and reduce community risk from natural hazards.



You are invited to submit your thoughts on natural hazards, such as flooding, snowstorms, or thunderstorms, in the Blackstone Hazard Mitigation Plan Community Survey.

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Blackstone Hazard Mitigation Plan

Survey Responses Needed

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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))*



Blackstone Hazard Mitigation Plan Update
Local Planning Team Kickoff Meeting

Date/Time: Tuesday, October 10th, 2023, 2:00pm

Location: Blackstone Town Hall, 15 Saint Paul Street, Blackstone, MA

AGENDA

I. Introductions

II. Plan Background

- o Review Contract
- o Roles and Responsibilities
- o Estimated Timeline

III. Project Phases & Preliminary Schedule

| <u>Phase</u> | <u>Completion (proposed)</u> |
|--|------------------------------|
| o Assembly of local planning team, kickoff | October 2023 |
| o Information gathering | November 2023-March 2024 |
| o Natural hazards | |
| o Critical infrastructure and facilities | |
| o Mitigation strategy development | March 2024-June 2024 |
| o Stakeholder and public involvement | November 2023-August 2024 |
| o Plan narrative development | August 2024-October 2024 |
| o Plan submission (initial) | November 2024 |
| o Plan adoption | December 2024-January 2025 |

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

- o 2017 HMP Mitigation Strategies

VI. Next Meeting – Natural Hazards and/or Infrastructure

- o Date/location
- o What to prepare

Blackstone Hazard Mitigation Plan Kickoff Meeting

Sign-In Sheet

| Name | Department | E-Mail | Phone |
|----------------------|------------|---|--------------|
| Gregory Gilmore | Police | chief@blackstonepolice.org | 508 853 1212 |
| Colleen M. Strappani | Bolt | colleen healthagent@townofblackstone.org | 508 999 5628 |
| Gary Bibbo | DPU Asst | Gibbo@TownofBlackstone.org | 508 902 1377 |
| James Sullivan | DPU Asst | JSullivan@TownofBlackstone.org | 019 137 1377 |
| Kevin Roy | Fire | KRoy@Townofblackstone.org | |
| Bill Kessler | Fire | bkessler@townofblackstone.org | |
| Kevin Ryan | | Bolt | |
| Lauren | | Town Accountant / Asst Town Admin | |



Meeting Name:
**Blackstone Hazard Mitigation
 Plan Kickoff Meeting**

Community: Blackstone

**Location: Blackstone Town Hall, 15 Saint
 Paul Street, Blackstone, MA**

Date: October 10th, 2023

Meeting Time: 2:00 PM

| Participant Name | Organization | Title | E-mail |
|-------------------------|-----------------------------|---|----------------------------------|
| Gregory Gilmore | Police | Chief | chief@blackstonepolice.org |
| Colleen M. Strapponi | Board of Health | Health Agent | healthagent@townofblackstone.org |
| Gary Bibbo | DPW | Assistant | gbibbo@townofblackstone.org |
| James Sullivan | DPW | Superintendent | jsullivan@townofblackstone.org |
| Kevin Roy | Fire Department | Deputy Chief | kroy@townofblackstone.org |
| Bill Kessler | Fire Department | Chief | bkessler@townofblackstone.org |
| Kevin Ryan | Board of Health | Vice Chairman | |
| Lauren Taylor | Town Administrator's Office | Town Accountant / Assistant Town Administrator | ltaylor@townofblackstone.org |
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Blackstone Hazard Mitigation Plan Update
Local Planning Team Meeting #2
Natural Hazards and Critical Infrastructure

Date/Time: Wednesday, December 13, 2023 9:30 AM

Location: Blackstone Town Hall, 15 Saint Paul Street, Blackstone, MA

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 – Existing Protection Measures Review, Public Forum and Community Survey Planning

- Date/location
- What to prepare



Meeting Name:
 Blackstone Hazard Mitigation Plan
 Natural Hazards and Critical
 Infrastructure Meeting

Community: Blackstone

Location: Blackstone Town Hall, 15 Saint
 Paul Street, Blackstone, MA

Date: December 13th, 2023

Meeting Time: 9:30 AM

| Participant Name | Organization | Title | E-mail |
|----------------------|--------------|------------------------------|--|
| Gregory Gilmore | Police | Chief | chief@blackstonepolice.org |
| William M. Strappone | Town | Health Agent | healthagent@townofblackstone.org |
| Will Talbot | CMRPC | Assistant Resiliency Planner | wtalbot@cmrpc.org |
| Gary Bibbo | DPW | Assistant Super. | GBibbo@townofblackstone.org |
| Jimmy Sullivan | DPW | sup | J.SULLIVAN@TOWNOFBLACKSTONE.ORG |
| Karen Testa | COA | Director | Ktesta@townofblackstone.org |
| CHAD LOVETT | TAB | T.A. | CLOVETT@TOWNOFBLACKSTONE.ORG |
| Kevin Roy | Fire/EMD | Deputy Chief | KRoy@townofblackstone.org |
| Marc Gerardo | CMRPC | | |



Blackstone Hazard Mitigation Plan Update
Local Planning Team Meeting #3

Date/Time: Wednesday, February 14th, 2024, 9:00 AM

Location: Blackstone Town Hall, 15 Saint Paul Street, Blackstone, MA

AGENDA

I. Introductions

II. Natural Hazards and Critical Infrastructure Meeting Recap

III. Community Lifelines

IV. Reference Documents

V. Discussion of Mitigation Strategies

- Review of last plan's mitigation strategies
- Development of new mitigation strategies
- Discussion of vulnerable populations and facilities

VI. Existing Protection Measures Review

- Review/Update the Existing Protection Matrix

VII. Community Survey

VIII. Public Presentation Planning

- Purpose
- Format
- Date/Time/Location
- Outreach

IX. Next Meeting

- Date/location
- What to prepare



Meeting Name:
Blackstone Hazard Mitigation Plan
Meeting #3

Community: Blackstone

Location: Blackstone Town Hall, 15 Saint
Paul Street, Blackstone, MA

Date: February 14th, 2024

Meeting Time: 9:00 AM

| Participant Name | Organization | Title | E-mail |
|---------------------|-----------------|--------------|----------------------------------|
| Kevin Roy | Blackstone Fire | Fire Chief | KRoy@townofblackstone.org |
| Jimmy Sullivan | D.P.W. | SUP P.W. | JSULLIVAN@TOWNOFBLACKSTONE.ORG |
| Colleen M. Shapponi | BeH | Health Agent | healthagent@townofblackstone.org |
| Gary Bibbo | D.P.W. | Ass. S.W.S. | GBibbo@blackstone.org |
| Will Talbot | CMRPC | | wtalbot@cmrpc.org |
| Marc Granato | CMRPC | | mggranato@cmrpc.org |
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Blackstone Hazard Mitigation Plan Update
Local Planning Team Meeting #4

Date/Time: Wednesday, March 27th, 2024, 9:00 AM

Location: Blackstone Town Hall, 15 Saint Paul Street, Blackstone, MA

AGENDA

I. Introductions

II. Meeting #3 Recap

- Mitigation Strategies Review

III. Community Lifelines

IV. Reference Documents

V. Existing Protection Measures Review

- Review/Update the Existing Protection Matrix

VI. Community Survey Review

- Brainstorm new mitigation strategies from community survey results

VII. Public Presentation Planning

- Purpose
- Format
- Date/Time/Location
- Outreach

VIII. Next Meeting

- Date/location
- What to prepare



Meeting Name:
Blackstone Hazard Mitigation Plan
Meeting #4

Community: Blackstone

Location: Blackstone Town Hall, 15 Saint Paul Street, Blackstone, MA

Date: ~~March 27th~~ ^{March 27th}, 2024

Meeting Time: 9:00 AM

| Participant Name | Organization | Title | E-mail |
|----------------------|--------------|------------------------|----------------------------------|
| Gary Bibbo | DPW | Ass. Supt. Water/Sewer | Gbibbo@TownofBlackstone.org |
| Colleen M. [unclear] | Boff | Health Agent | healthagent@townofblackstone.org |
| Greg Gilmore | Police | Chief | chief@blackstonepolice.org |
| Marlene Gama | CMRPC | Emergency planner | mgama@cmrpc.org |
| Kevin Roy | Fire/EMD | Chief | KRoy@TownofBlackstone.org |
| Will Talbot | CMRPC | Asst. Planner | Wtalbot@cmrpc.org |
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Blackstone Hazard Mitigation Plan Update
Local Planning Team Meeting #5

Date/Time: Wednesday, April 10th, 2024, 9:00 AM

Location: Blackstone Town Hall, 15 Saint Paul Street, Blackstone, MA

AGENDA

I. Introductions

II. Meeting #4 Recap

- Review updates to mitigation strategies.
- Review updates to existing protection measures.
- Make additional updates as needed.

III. Community Lifelines

IV. Reference Documents

VII. Public Presentation Planning

- Purpose
- Format
- Date/Time/Location
- Outreach

VIII. Next Meeting

- Date/location
- What to prepare



Meeting Name:
Blackstone Hazard Mitigation Plan
Meeting #5

Community: Blackstone

Location: Blackstone Town Hall, 15 Saint
Paul Street, Blackstone, MA

Date: April 10thth, 2024

Meeting Time: 9:00 AM

| Participant Name | Organization | Title | E-mail |
|---------------------|--------------|--------------------------------|----------------------------------|
| Gary Bibbo | DPW | Asst. Supt. water/sewer | Gbibbo@TownofBlackstone.org |
| Kevin Roy | FIRE | FIRE Chief / EMD | Kroy@Townofblackstone.org |
| Mate Grants | CMRPC | Emergency Preparedness Planner | mgrants@cmrpc.org |
| Will Talbot | CMRPC | Ass-stnt Planner | wtalbot@cmrpc.org |
| Colleen M. Stappert | Both | Health Agent | healthagent@townofblackstone.org |
| Jimmy Sullivan | DPW | Supt. | JSULLIVAN@TOWNOFBLACKSTONE.ORG |
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Blackstone Hazard Mitigation Plan Update
Local Planning Team Meeting #6

Date/Time: Wednesday, June 26th, 2024, 9:00 AM

Location: Blackstone Town Hall, 15 Saint Paul Street, Blackstone, MA

AGENDA

I. Introductions

II. Meeting #5 Recap

III. Community Lifelines

IV. Reference Documents

V. Public Presentation Review

- Review of any questions and/or comments from the public and/or the Board of Selectmen

VI. Review of Questions from Blackstone HMP Team on Draft Plan

VII. Review of Questions from CMRPC Staff

VIII. Discuss High Hazard Potential Dams

IX. Next Steps

- Two-week public and community lifeline comment period
- Submission for MEMA and then FEMA review
 - Revisions made as are needed
- FEMA issues conditional approval
- Formal adoption of plan by Board of Selectmen
- Final approval by FEMA



Meeting Name:
Blackstone Hazard Mitigation Plan
Meeting #6

Community: Blackstone

Location: Blackstone Town Hall, 15 Saint Paul Street, Blackstone, MA

Date: June 26th, 2024

Meeting Time: 9:00 AM

| Participant Name | Organization | Title | E-mail |
|----------------------|-----------------|------------------------------|----------------------------------|
| Will Talbot | CMRPC | Assistant Planner | wtalbot@cmrpc.org |
| Colleen M. Strappone | Town | Health Agent | healthagent@townofblackstone.org |
| Kevin Roy | EMD/FIRE | Chief | K.Roy@Townofblackstone.org |
| Marc Grapato | CMRPC | Emergency Planner | mgrapato@cmrpc.org |
| JAMES SULLIVAN | DPW | SEPT | J.SULLIVAN@TOWNOFBLACKSTONE.ORG |
| Flynt Tuller | USACE CGNPE-EDW | ICW Lead | flynt.tuller@usace.army.mil |
| Heather Shields | USACE | Level Safety Program Manager | Heather.P.Shields@usace.army.mil |
| Kevin DiRocco | USACE | Senior Geotechnical Engineer | Kevin.J.DiRocco@usace.army.mil |
| Gary Bibbo | DPW | Asst. Supt. WATER/SEWER | Gibbo@TownofBlackstone.org |



Blackstone Hazard Mitigation Plan Update
Local Planning Team Meeting #7

Date/Time: Monday, August 26th, 2024, 10:00 AM

Location: Zoom meeting, <https://us02web.zoom.us/j/81729072412>

AGENDA

- I. Discussion of Community Lifeline Comments on Draft Blackstone HMP**
 - Would we like to make changes to the plan to reflect these comments?

- II. Update on Progress in Finalizing Blackstone HMP and Timeline for Submission to MEMA**

- III. Next Steps**
 - Submission for MEMA and then FEMA review
 - Revisions made as are needed
 - FEMA issues conditional approval
 - Formal adoption of plan by Board of Selectmen
 - Final approval by FEMA

APPENDIX D:

Public Presentation at

Board of Selectmen 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))*

PUBLIC PRESENTATION

Blackstone Hazard Mitigation Plan



The Town of Blackstone is hosting a public presentation at a Board of Selectmen meeting on the Town's draft Hazard Mitigation Plan update.



- *Attend to hear about draft mitigation strategies that can help the Town assess and reduce community risk from natural hazards.*
- *The draft plan will be posted on the town website for public review for two weeks following this presentation.*

If you have any comments on the draft plan or would like more information, contact Will Talbot at wtalbot@cmrpc.org.

If you need assistance accessing the Municipal Center, call the Selectmen's office at (508) 883 1500 Ext 101.

During the BOS meeting on Tuesday, June 25th, 2024 at 6:30pm at the Blackstone Municipal Center, 15 Saint Paul Street, in the John Eldridge Meeting Room, and on cable access channel 8



Town of Blackstone, Natural Hazard Mitigation Plan
Public Presentation: June 25th, 2024

What is hazard mitigation? What is a mitigation plan?

- Hazard mitigation is the effort to reduce loss of life and property by lessening the impact of natural disasters.
- Mitigation is not disaster response; its goal is to reduce hazard impacts before a disaster occurs.
- A mitigation plan identifies natural hazards and the risks they pose to residents, infrastructure, property, and natural resources. It prioritizes projects, policies, education, and procedures for reducing these risks, now and in the future.
- Mitigation helps break the cycle of disaster damage, reconstruction, and repeated damage.

Why should Blackstone complete and adopt this kind of plan?

- Natural hazard mitigation planning establishes a road map for achievable actions that can substantially reduce risks.
- If the town has an active natural hazard mitigation plan approved by the Federal Emergency Management Agency (FEMA), the town is eligible to receive non-emergency federal disaster assistance and mitigation funding as mandated under the Disaster Mitigation Act of 2000.
- This plan is primarily funded by a grant from FEMA through MEMA (with a local in-kind match).

plan in January 2017, and this plan expired in January 2022.

What natural hazards pose the greatest risks to Blackstone?

- Largest risks: flooding (mostly involving the Blackstone River and associated tributaries, canals, and impoundments), winter storms, severe thunderstorms and wind
- Moderate risks: drought, hurricanes and tropical storms, wildfires
- Lower risks: tornados, dam failures, extreme temperatures, earthquakes

Local partners

Local knowledge is essential to the mitigation planning process. Partners in Blackstone to date include:

Chief Kevin Roy and Former Chief Bill Kessler, Fire Department; Health Agent Colleen Strapponi, Health Department; Superintendent James Sullivan and Assistant Gary Bibbo, Department of Public Works; Chief Gregory Gilmore, Police Department; Town Administrator Chad Lovett and Town Accountant / Assistant Town Administrator Lauren Taylor, Town Administrator’s Office; Former Director Karen Testa, Council on Aging; Vice Chairman Kevin Ryan, Board of Health.

Planning timeline

- | | |
|---|-------------------|
| • Information gathering via mapping, research, and local input | Oct. 2023 to date |
| • Draft plan development | April – June 2024 |
| ○ Public comments/questions requested within two weeks of the draft plan being posted on the town website | |
| • Public presentation #1 | June 2024 |
| • MEMA review | Summer 2024 |
| • FEMA approval | Fall 2024 |
| • Local adoption | Fall 2024 |
| • 5-year update | 2029 |

Recent/ongoing mitigation activities

- Street sweeping and catch basin cleaning
- Maintaining and replacing problem culverts and maintaining and repairing problem roadways when needed and as funding allows
- Installing backup generators at critical public facilities when needed and as funding allows
- Dam monitoring
- Tree trimming program
- Snow removal
- Education and outreach
- Plans and studies

Recommended high priority mitigation strategies in the DRAFT plan

A. Structure and Infrastructure Strategies

- Continued drainage and structural resiliency improvements in the area near the Municipal Center building.
- Complete side wall repairs at the canal side of the Saranac / Blackstone River Dam. Study possible modifications to the canal side structures near the dam, such as removing the top part of the headworks.
- Install/improve generators at critical public facilities where needed, including the DPW garage and the Fire Station #3; also evaluate feasibility of obtaining a mobile generator to serve multiple public facilities.
- Continue to monitor conditions at the Town-owned Lake Hiawatha Dam (High Hazard) to ensure compliance with state mandate on structural conditions.
- Plan and site new wells to supply the town water system.
- Conduct field inventory of bridges to rank and prioritize projects for increased flooding resiliency and storm-hardening. Design and implement priority resizing or replacement projects.
- Extend Rathbun Street to develop a connector that links the existing Rathbun Street to Elm Street and provides a more direct route for emergency access to the southeast portion of town.

B. Preparedness, Coordination, and Response Strategies

- Continue to participate in National Flood Insurance Program (NFIP) (or other) training offered by the State and/or FEMA that addresses flood hazard planning and management. Hire a floodplain manager.
- Road information coordination and planning for snow removal
- Evacuation Plan updates; where possible, ensure that routes are outside of hazard areas
- Improve vegetation and debris management along P&W Railroad rights-of-way
- Complete a study on how development in town, such as solar farms, affects flooding in town, looking at problems and enforcement mechanisms. Create and enforce a solar development / land use bylaw.
- Work with homeowners to mitigate localized flooding caused by development.

- Coordinate with Liberty Gas and the State to develop emergency preparedness procedures regarding the Blackstone Street Natural Gas Regulator Station.
- Coordinate with hydropower plant in Rhode Island to prevent flooding near the Blackstone Valley Boys and Girls Club.
- Review communications regarding downstream management of Blackstone River, especially in coordination with neighboring Woonsocket. Ensure that both towns are anticipating the impacts of development on water wells and flood storage area.

- Provide more resilient storage facilities for vital information, including birth, death, and marriage records, voter registration data, and associated equipment.
- Complete a Town-wide dam assessment of all public, private, and beaver dams, focusing on reducing the risk of flooding from dam failures during intense storm events and protection of ecosystems that provide flood storage and other resilience benefits.
- Continue to 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).
- Continue to provide information to residents and businesses on generator safety and sump pump usage.
- Increase education and outreach (on social media and through schools, the senior center, and community-based organizations) on all hazards in town, especially thunderstorms and snowstorms.
- Continue education program begun under NPDES MS4 permit to supplement pollution prevention effort with storm drain safety/clearance and related topics.

D. Local Plan and Regulation Strategies

- Conduct a townwide stormwater drainage improvement study. Include an inventory and visual assessment as well as hydrological modeling in this study.
- In tandem with water conservation outreach listed above, conduct enhanced enforcement of water usage restrictions (in part to conserve water for firefighting).
- Establish a comprehensive emergency awareness plan to build awareness of town resources and make Town residents aware of the many planning efforts, agreements, shelters, etc. which are focused on making the Town more resilient. Ensure that all residents know how to access these resources when they are needed.
- Develop a comprehensive plan for beaver management to mitigate against unpredictable flooding / impoundment impacts. Investigate options for expanded beaver control.
- Incorporate hazard mitigation goals into the Open Space and Recreation planning process.
- Monitor implementation of Hazard Mitigation Plan. Once a year, meet to discuss the progress of mitigation strategies.

The draft plan with the full list of mitigation strategies will be available shortly on Blackstone's town website.

Comments and questions should be directed to Will Talbot (wtalbot@cmrpc.org) within two weeks of the draft plan being posted on the town website.

This natural hazard mitigation planning activity is funded by an FY 2023 Hazard Mitigation grant from the Federal Emergency Management Agency through the Mass. Emergency Management Agency



Home | News Flash

Home

Posted on: June 21, 2024

2024 Blackstone Hazard Mitigation Plan update

Work is now underway on the update of Blackstone’s 2017 Natural Hazard Mitigation Plan, which will help guide local efforts to reduce damage from future natural disasters. The Town of Blackstone invites local residents, business operators, property owners, and other interested parties to attend a public presentation on the draft 2024 Blackstone Hazard Mitigation Plan update. This presentation will take place at the Board of Selectmen meeting on Tuesday, June 25th, 2024 in the John Eldridge Meeting Room of the Blackstone Municipal Center at 15 Saint Paul Street; this meeting begins at 6:30pm. The presentation will also be livestreamed on Blackstone Cable Access Television channel 8.

All are encouraged to attend this meeting and to comment on the draft plan, which will be available for review on the Town of Blackstone’s website for two weeks following the presentation. This planning process is a chance for the public to help protect Blackstone from flooding, winter storms, thunderstorms, and other natural hazards.

The Natural Hazard Mitigation Plan is being developed by a team of local officials and staff with technical assistance from the Central Massachusetts Regional Planning Commission (CMRPC). Final adoption of the plan is contingent on approval from the Town’s Board of Selectmen, the Federal Emergency Management Agency (FEMA), and the Massachusetts Emergency Management Agency (MEMA).

This planning process is funded by a Hazard Mitigation Grant Program (HMGP) grant from the FEMA through MEMA to the Town of Blackstone. The purpose of HMGP is to help communities implement hazard mitigation measures following a Presidential major disaster declaration. Hazard mitigation is any action taken to reduce or eliminate long term risk to people and property from natural hazards. Mitigation planning is a key process used to break the cycle of disaster damage, reconstruction, and repeated damage. Adoption of the final plan will make Blackstone eligible for hazard mitigation project funding from FEMA.

PUBLIC PRESENTATION
Blackstone Hazard Mitigation Plan

The Town of Blackstone is holding a public presentation at a Board of Selectmen meeting on the Town's draft Hazard Mitigation Plan update.

- Attend to hear about draft mitigation strategies that can help the Town assess and reduce community risk from natural hazards.
- The draft plan will be posted on the town website for public review for two weeks following this presentation.

If you have any comments on the draft plan or would like more information, contact Will Taylor at wtaylor@blackstone.org.

If you need assistance accessing the Meeting Center, call the Selectmen's Office at (508) 868-3369 ext 106.

During the BOS meeting on Tuesday, June 25th, 2024 at 6:30pm at the Blackstone Municipal Center, 15 Saint Paul Street, in the John Eldridge Meeting Room, and on cable access channel 8.

Page 4 (Rev. 4/16) of the Massachusetts Emergency Management Agency (MEMA)



TOWN OF BLACKSTONE HAZARD MITIGATION PLAN



Blackstone Board of Selectmen
June 25th, 2024

Marc Granato, Emergency Preparedness Planner

Will Talbot, Assistant Planner

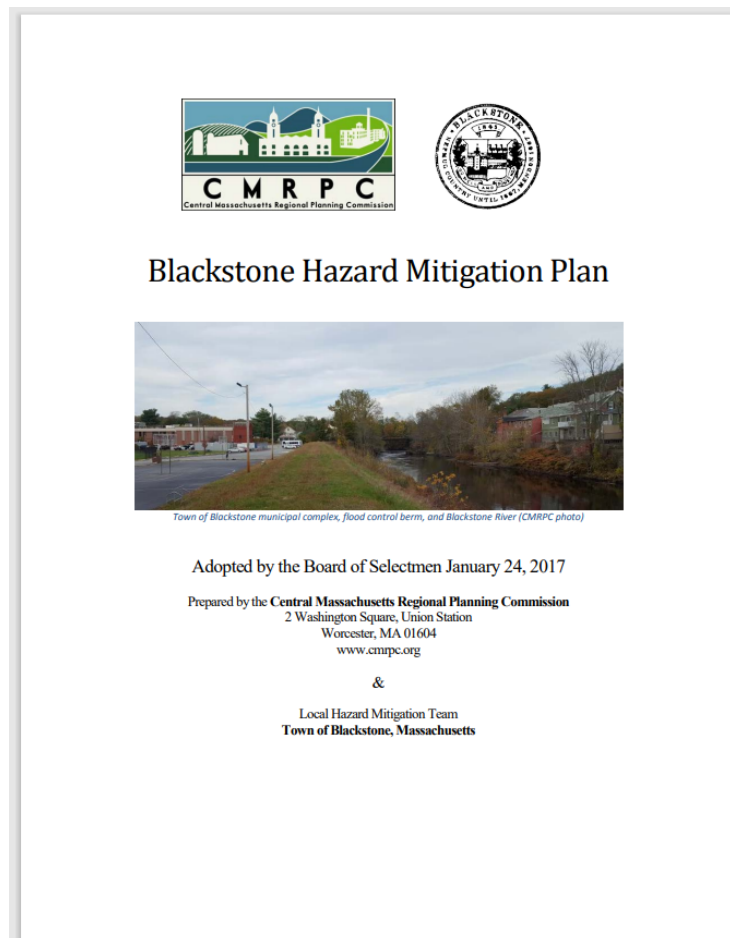
Andrew Loew, Director, Community Development &
Resiliency Planning

Central Massachusetts Regional Planning Commission



WHY IS BLACKSTONE COMPLETING THIS PLAN?

- The **Federal Disaster Mitigation Act of 2000** requires that cities and towns adopt and update a Hazard Mitigation Plan to be eligible for FEMA mitigation grants.
- This plan will meet FEMA's requirements and help the town make good use of its resources.
- Blackstone's last HMP update was approved in January 2017 and expired in January 2022.



PLAN FOR MITIGATING DAMAGES FROM NATURAL HAZARDS






- Flooding
- Severe Snowstorms / Ice Storms / Nor'easters
- Hurricanes
- Severe Thunderstorms / Wind / Tornadoes
- Wildfires / Brush Fires
- Earthquakes
Dam Failure
- Drought
- Extreme Temperatures
- Invasive Species
- Other Hazards (Landslides, Groundwater Intrusion)

Not an Emergency Response Plan

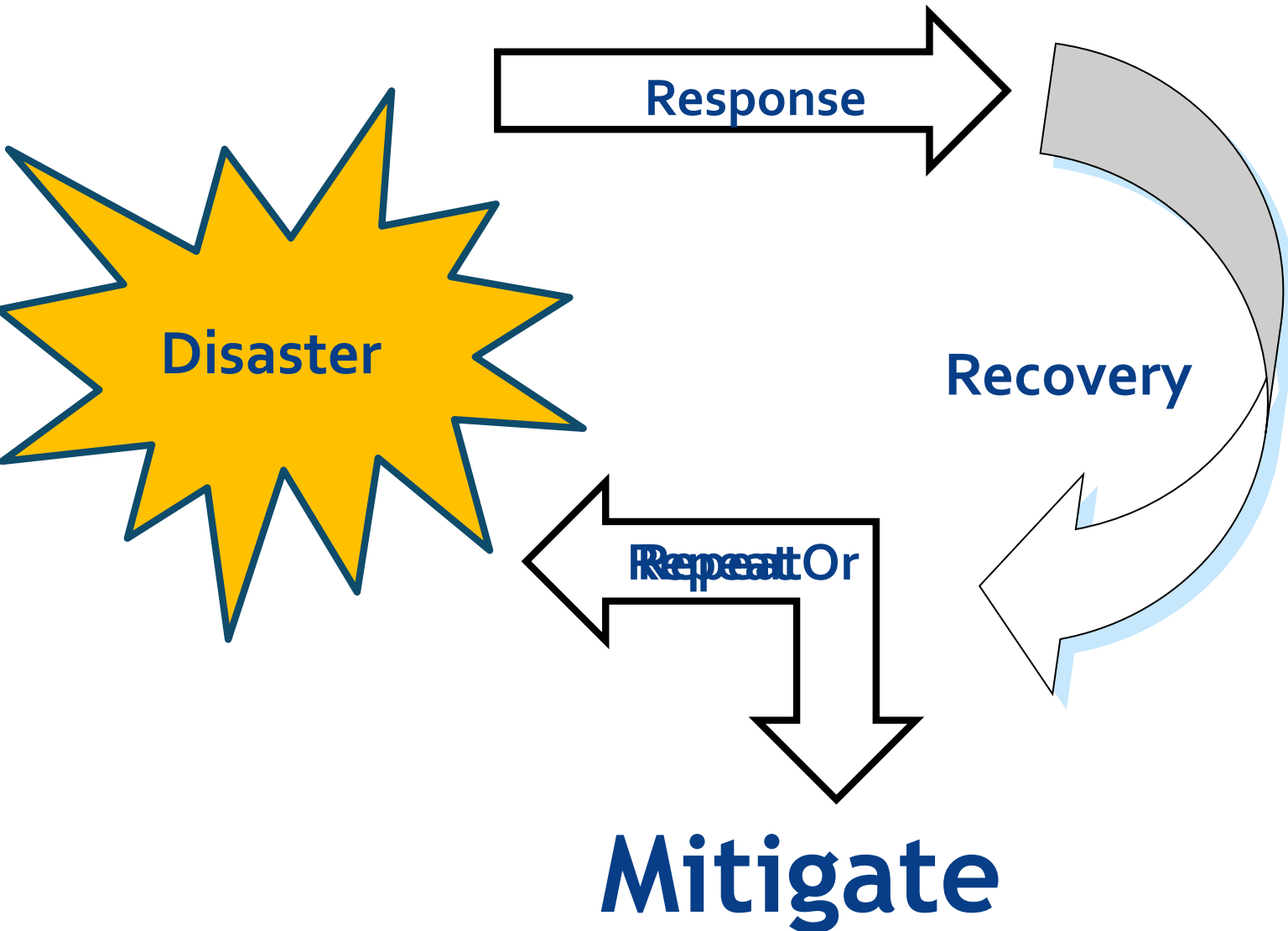
WHAT IS HAZARD MITIGATION?

- *To permanently reduce or prevent losses of life, injuries and property damage by using long-term strategies*
- *_____*
to reduce future risks and damages?
- *What additional actions can be taken in the FUTURE?*
- *According to the National Institute of Building Sciences Natural Hazard Mitigation Saves: 2019 Report, on average between 4 to 6 dollars is saved for every dollar spent on hazard mitigation*

THE BENEFITS OF MITIGATION

| National Benefit-Cost Ratio (BCR) Per Peril <i>*BCR numbers in this study have been rounded</i> | | Beyond Code Requirements | Federally Funded |
|--|--------------------------------------|--------------------------|------------------|
| Overall Hazard Benefit-Cost Ratio | | \$4:1 | \$6:1 |
|  | Riverine Flood | \$5:1 | \$7:1 |
|  | Hurricane Surge | \$7:1 | Too few grants |
|  | Wind | \$5:1 | \$5:1 |
|  | Earthquake | \$4:1 | \$3:1 |
|  | Wildland-Urban Interface Fire | \$4:1 | \$3:1 |

Breaking the Cycle of Risk



Four Tools & Techniques for Hazard Mitigation

1. Structure & Infrastructure Projects
2. Preparedness, Coordination & Response Actions
3. Education & Awareness Programs
4. Local Plans & Regulations

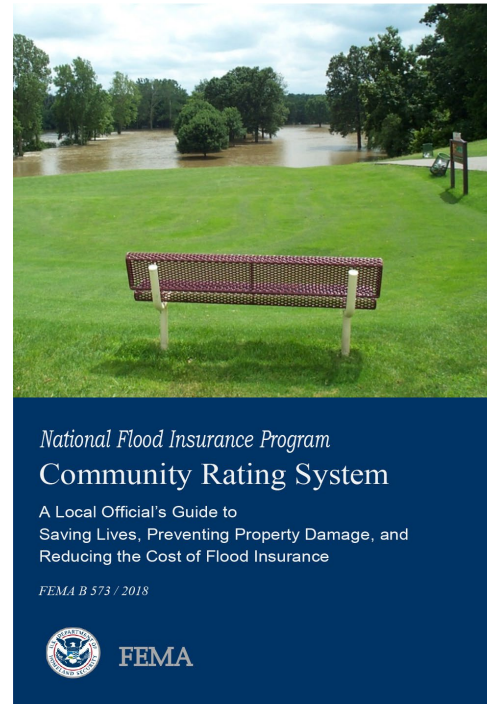
STRUCTURE AND INFRASTRUCTURE PROJECTS

- Prevent floodwaters from reaching properties
- Man-made structures to control water flows
- Culverts, dams, storm drainage facilities, pumping facilities



PREPAREDNESS AND RESPONSE

- National Flood Insurance Program
- Evacuation Planning
- Community Rating System
- Facilitate and coordinate the administration, enforcement and collaboration



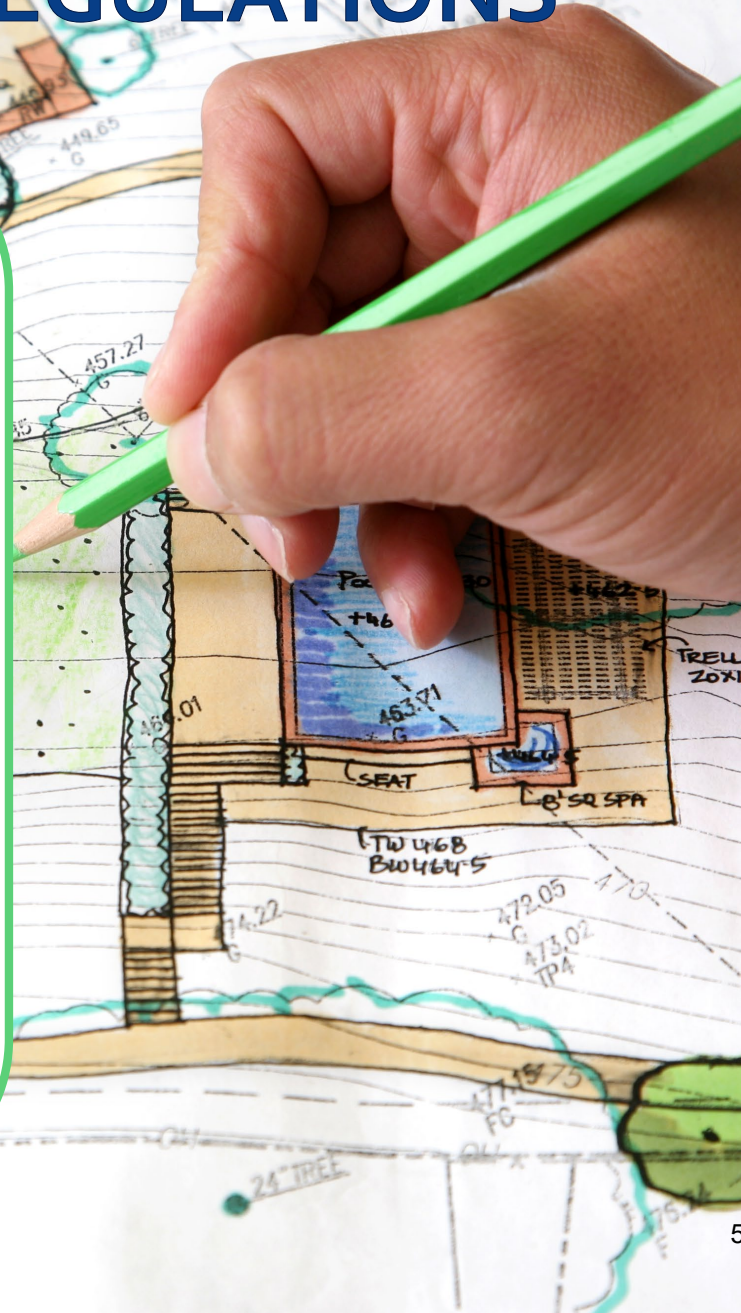
EDUCATION AND AWARENESS

- Natural hazard awareness websites
- Hazard information at libraries, schools, and public buildings
- Information brochures mailed to residents (e.g., safe operation of home generators)
- Public outreach at community events



LOCAL PLANS & REGULATIONS

- Planning & Zoning
- Subdivision and Site Plans
- Floodplain regulations
- Wetlands bylaws
- Storm water regulations
- Building Code
- Master Plans
- MVP Plans



PLANNING PROCESS

- CMRPC provides technical assistance to the Town for plan development
- The Town coordinates through its Local Hazard Mitigation Team
- Public Survey
- Public presentation (tonight), during plan development and review of the draft plan
- Submittal of Draft Plan to MEMA and FEMA for review, revision, and approval
- Plan adoption by the Board of Selectmen

DEVELOPMENT OF THE PLAN

CMRPC assisted the Blackstone
Local Hazard Mitigation Planning Team to:

- Identify & Map Critical Facilities
- Identify & Map Locally Identified Hazard Areas
- Identify & Review Existing Mitigation Measures
- Identify and Prioritize New Mitigation Strategies
- Gather Feedback & Input from the Public

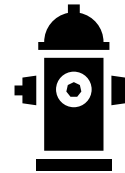


IDENTIFY CRITICAL FACILITIES

Database & GIS maps of critical facilities, infrastructure

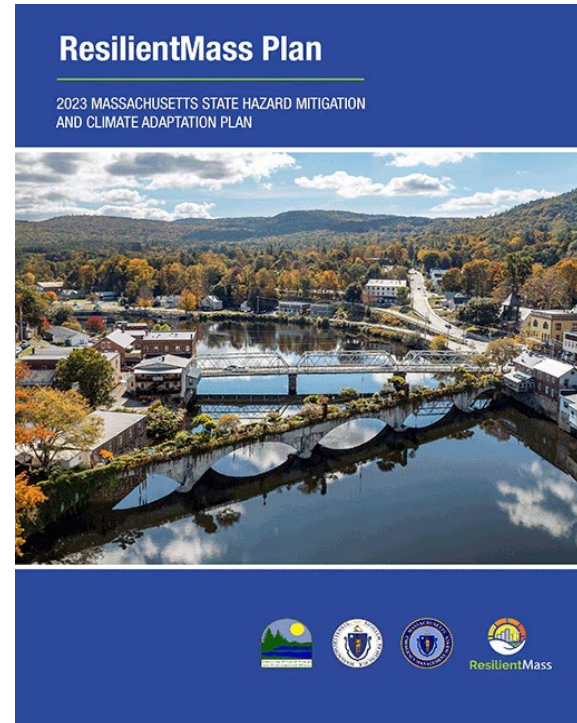
Sites identified include:

- Emergency Response Facilities
- Water Supply and Sewer Facilities, Town Facilities, and Utilities
- Dams
- Facilities and populations to protect



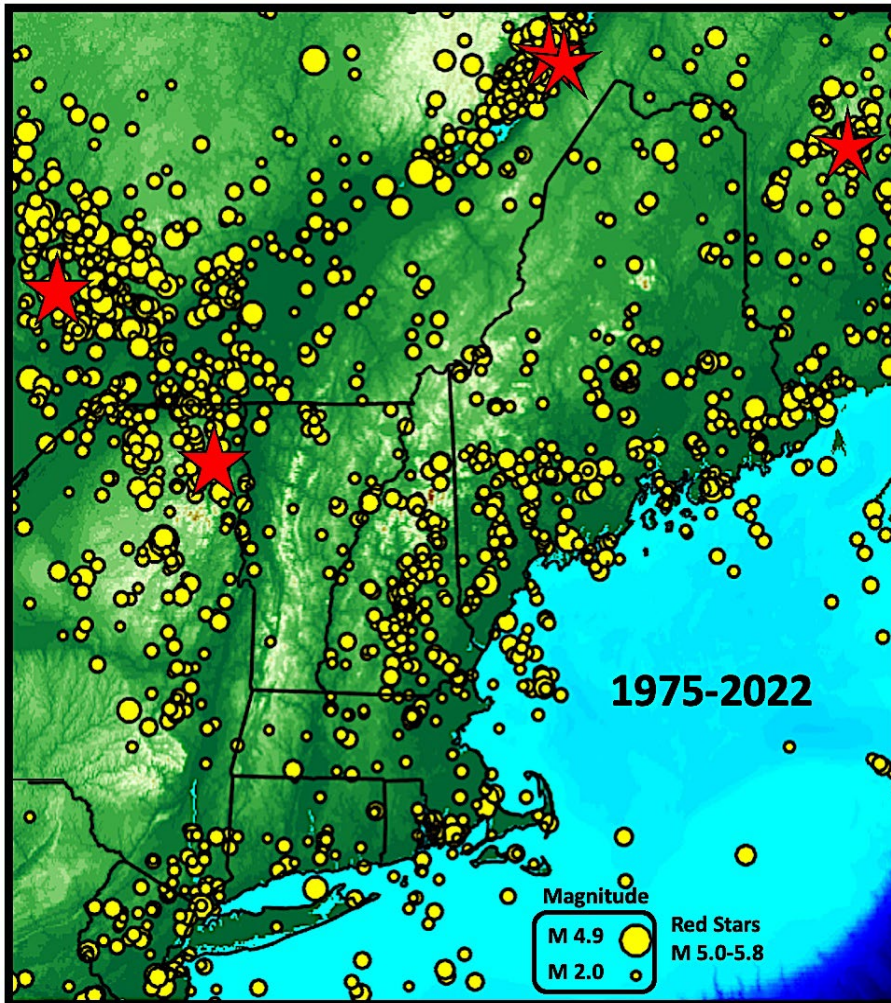
HAZARD IDENTIFICATION & MAPPING

- State & Federal data on floodplains, snowfall, wind speeds, hurricanes, earthquake risk, etc.
- Review Mass. State Hazard Mitigation Plan
- Coordinate with Local Team to get local information on hazard areas and potential future developments



OTHER HAZARDS – GEOLOGIC, WIND, & SNOW

Earthquakes from 1975 to 2022 2+ Magnitude



Recent Declared Hurricanes & Snow Disasters

| Disaster | Declaration Date | Incident Period | FEMA ID |
|---------------|------------------|---------------------|---------------------------------|
| Hurricane Lee | 09/15/23 | 09/15/23 - 09/17/23 | EM-3599-MA |
| | 08/22/21 | 8/20/21 - | 3566-EM-Mashpee Wampanoag Tribe |

| Disaster | Declaration Date | Incident Period | FEMA ID |
|---|------------------|---------------------|------------|
| Massachusetts Severe Winter Storm and Snowstorm | 04/18/22 | 01/28/22 - 01/29/22 | DR-4651-MA |
| Massachusetts Severe Winter Storm and Snowstorm | 07/19/18 | 03/13/18 - 03/14/18 | DR-4379-MA |
| | | | 61 |

LOCALLY-IDENTIFIED HAZARD AREAS

Flooding - Downtown Blackstone

Flooding - Elm St & Mill Brook

Flooding - Farm St & Hop Brook

Flooding - Pump Stations 2 and 7
Vulnerability

Flooding - Main Street

Flooding - Blackstone Street

Wildfire - Providence & Worcester RR

Hurricane - Town Hall/Municipal
Complex

Lightning & High Winds -
Federal Street



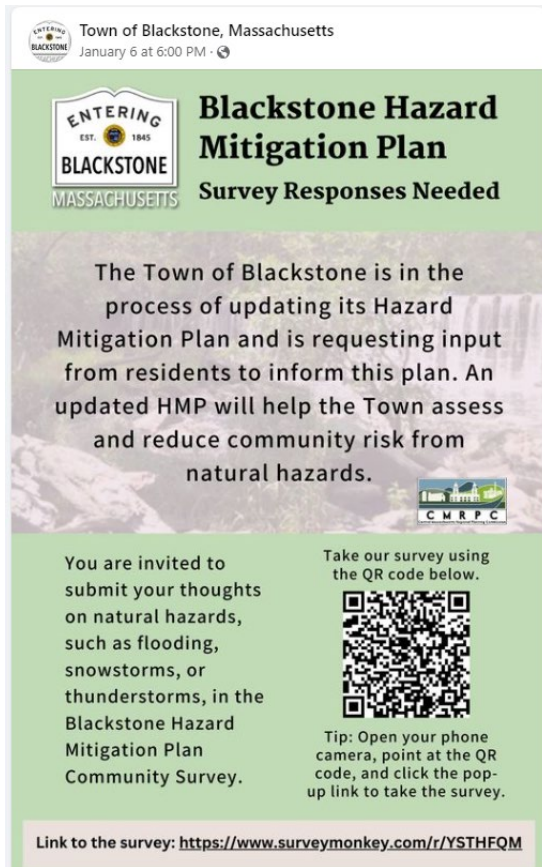
PUBLIC SURVEY – Winter 2023-2024

Blackstone Hazard Mitigation Plan Community Survey

Blackstone Hazard Mitigation Plan

In October 2023, the Town of Blackstone 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 Blackstone.

By participating in this survey, you will help the Town of Blackstone understand the current and future natural hazards that residents are most concerned about. Survey responses will be accepted until March 31st, 2024.



The flyer is a vertical rectangular graphic with a light green background. At the top left, it features the Town of Blackstone logo and the text 'Town of Blackstone, Massachusetts' and 'January 6 at 6:00 PM'. Below this is a 'ENTERING BLACKSTONE MASSACHUSETTS' logo. The main title is 'Blackstone Hazard Mitigation Plan Survey Responses Needed'. The central text reads: 'The Town of Blackstone is in the process of updating its Hazard Mitigation Plan and is requesting input from residents to inform this plan. An updated HMP will help the Town assess and reduce community risk from natural hazards.' To the right of this text is a small image of a building labeled 'CMRPC'. Below the central text, it says 'You are invited to submit your thoughts on natural hazards, such as flooding, snowstorms, or thunderstorms, in the Blackstone Hazard Mitigation Plan Community Survey.' To the right of this is a QR code and the text 'Take our survey using the QR code below.' Below the QR code is a tip: 'Tip: Open your phone camera, point at the QR code, and click the pop-up link to take the survey.' At the bottom, it provides a link to the survey: 'Link to the survey: <https://www.surveymonkey.com/r/YSTHEQM>'.

Town of Blackstone, Massachusetts
January 6 at 6:00 PM · 📍

**ENTERING
BLACKSTONE
MASSACHUSETTS**

Blackstone Hazard Mitigation Plan Survey Responses Needed

The Town of Blackstone is in the process of updating its Hazard Mitigation Plan and is requesting input from residents to inform this plan. An updated HMP will help the Town assess and reduce community risk from natural hazards.

You are invited to submit your thoughts on natural hazards, such as flooding, snowstorms, or thunderstorms, in the Blackstone Hazard Mitigation Plan Community Survey.

Take our survey using the QR code below.

Tip: Open your phone camera, point at the QR code, and click the pop-up link to take the survey.

Link to the survey: <https://www.surveymonkey.com/r/YSTHEQM>

- 33 total responses
- Hazards of greatest concern: Winter Storms / Ice, Flooding, and Thunderstorms / Microbursts / Extreme Wind
- The survey was promoted through town Facebook pages, the Blackstone Enlightener, and a tabling event, as well as being posted in several high traffic locations in town.

EXISTING MITIGATION MEASURES

MULTIHAZARD

- Comprehensive Emergency Management Plan (CEMP)
- Massachusetts State Building Code
- Education and outreach
-

FLOOD RELATED HAZARDS

- National Flood Insurance Program
- Street sweeping
- Catch basin cleaning
- Roadway treatments
- Drainage preventive practices to reduce clogging
- Subdivision Rules and Regulations
- Zoning Regulations

DAM FAILURES

- State permits for dam construction
- DCR dam safety regulations

WIND-RELATED HAZARDS

- Tree trimming program

WINTER-RELATED HAZARDS

- Salting and sanding of roads and plowing

BRUSH FIRE RELATED HAZARDS

- Permits for outdoor burning

BLACKSTONE MITIGATION STRATEGIES



- Where are the GAPS?
- What actions will further reduce vulnerability?
- Where are the PRIORITIES?

DRAFT PLAN SELECT HIGH-PRIORITY MITIGATION MEASURES

- Conduct a townwide stormwater drainage improvement study. Include an inventory and visual assessment as well as hydrological modeling in this study.
- Continue drainage and structural resiliency improvements in the area near the Municipal Center building.
- Coordinate with hydropower plant in Rhode Island to prevent flooding near the Blackstone Valley Boys and Girls Club.
- Plan and site new wells to supply the town water system.
- Increase education and outreach (on social media and through schools, the senior center, and community-based organizations) on all hazards in town, especially thunderstorms, snowstorms, and invasive species.

PLAN APPROVAL AND ADOPTION

- The Draft plan will be reviewed by MEMA.
- FEMA will review the plan and is the agency that issues conditional approval.
- A Board of Selectmen resolution to adopt the plan can occur after FEMA conditional approval.
- FEMA issues final plan approval.
- The plan will be in effect for 5 years.



IMPLEMENTING THE PLAN

WHAT HAPPENS AFTER THE PLAN IS APPROVED?

- Establish a local implementation group.
- Prepare a timeline for implementation.
- Integrate the plan's recommendations with other local plans and policies.
- Seek FEMA and other funding sources and other resolutions for plan mitigation measures.
-
- Update the plan every 5 years.

DRAFT PLAN

The full draft plan will be available on the Blackstone town website.

or questions about the plan to wtaibot@cmprc.org by July 12th, 2024 / within two weeks of the draft plan being posted on the town website.

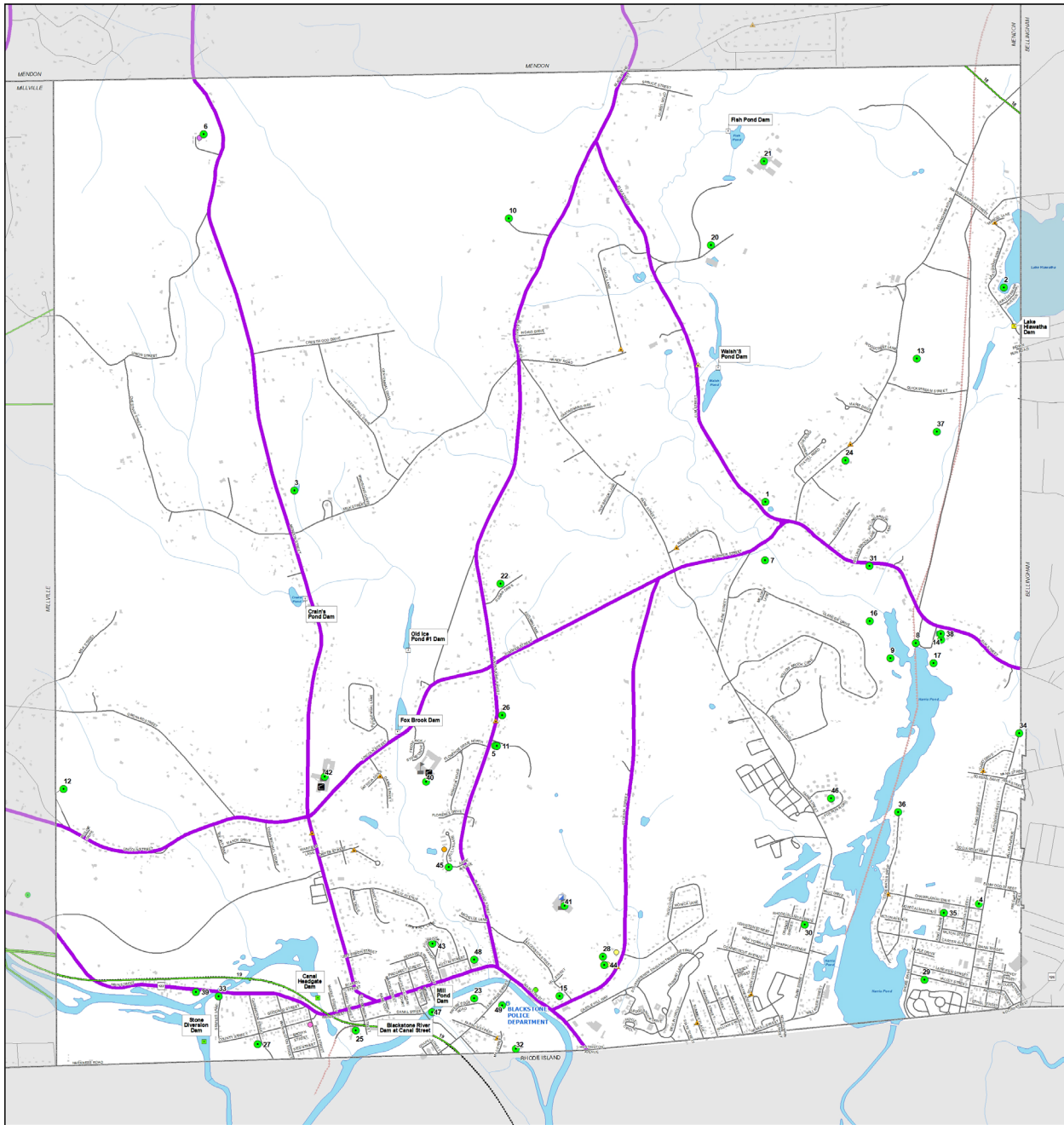
Hazard Mitigation Plan

Map 1

Critical Infrastructure and Facilities

Town of Blackstone, Massachusetts

June 2024



Legend

- Assisted Living
- Elderly Housing
- Emergency Shelters
- End Of Life Facilities
- Misc Data
- Nursing/Rest Homes
- Power Plant
- ▲ Daycare
- ▲ Electric Distribution
- ▲ Electric Substation
- ▲ EOC
- Water Treatment Plant
- Town Halls
- Local Police
- Fire Station
- Schools (Pre-K through High School)
- Active Rail Line
- Out of Service/Abandoned Rail Line

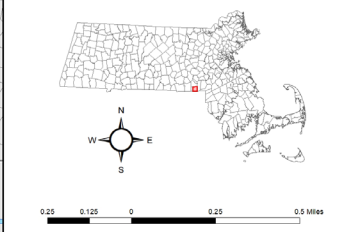
□ Town Boundaries — Streams — Regionwide Evacuation Routes
 ■ Structures — Roads
 ■ Water Bodies

Dams (2/2012)

- Significant Hazard
- Low Hazard
- N/A

Locally Defined

- Critical Infrastructure
- Critical Infrastructure
- Critical Infrastructure



Data provided by participating municipalities, OMBPC, massDOT, MassGIS, FEMA and NOAA.
 Information depicted on this map is for planning purposes only. This information is not intended to be used for regulatory purposes. No warranty is made as to the accuracy, reliability, or completeness of the data. The user assumes all responsibility for any use of this information.
 Prepared by the Central Massachusetts Regional Planning Commission
 One Worcester St., Suite 202, Worcester, MA 01608
 Date: 6/20/24 | Document Path: H:\Projects\GIS\0204\mapserver\map1\FMPC_P1_Land_Use_Map_1.mxd

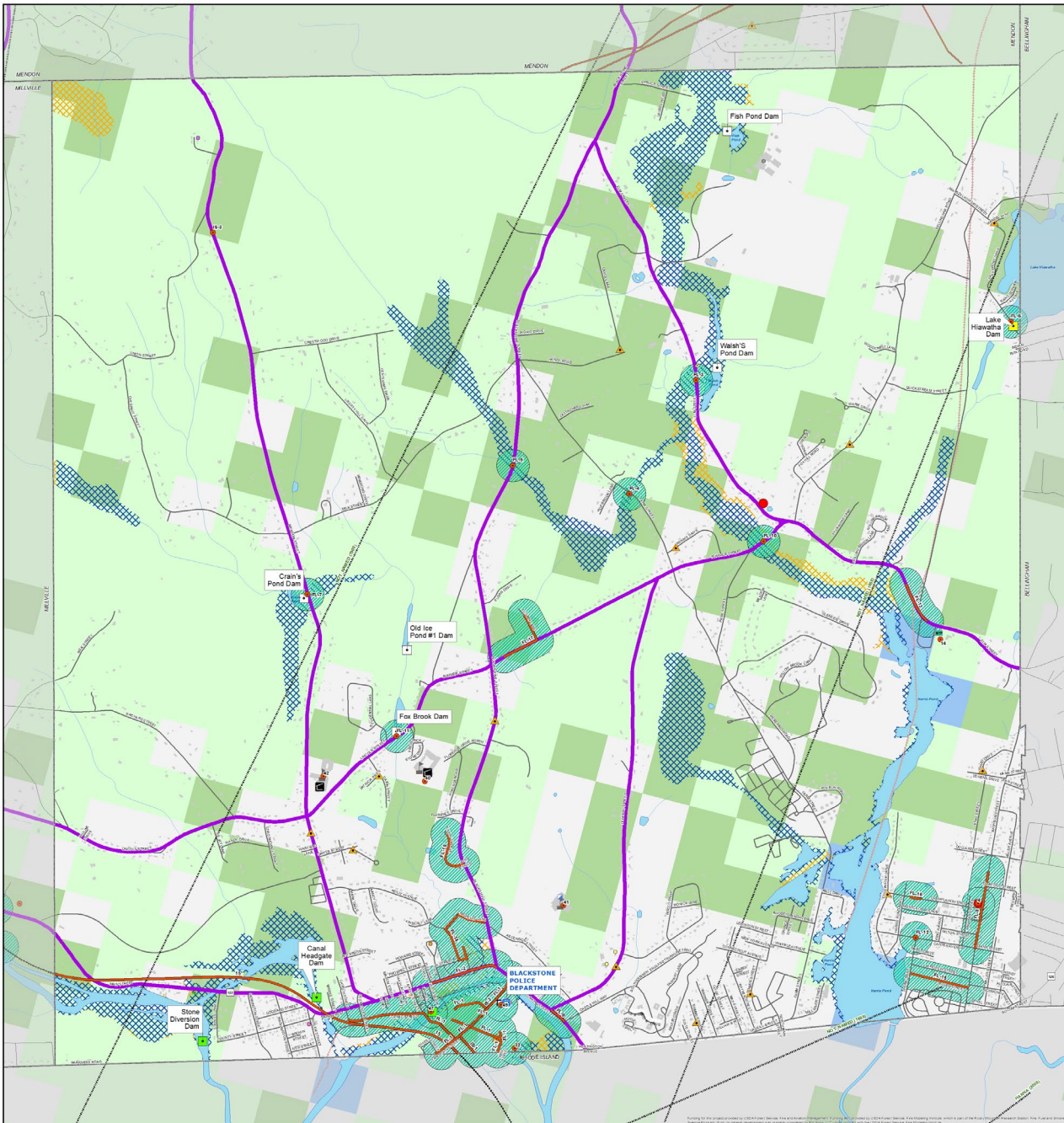
Hazard Mitigation Plan

Map 2

Hazards

Town of Blackstone, Massachusetts

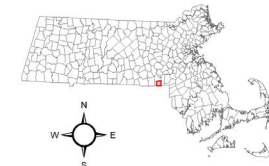
June 2024



- Legend**
- Assisted Living
 - Elderly Housing
 - 🏠 Emergency Shelters
 - 🏠 End of Life Facilities
 - Misc Data
 - 🏠 Nursing/Rest Homes
 - ⚡ Power Plant
 - 🏠 Daycare
 - ⚡ Electric Distribution
 - ⚡ Electric Substation
 - 🏠 EOC
 - 🏠 Water Treatment Plant
 - 🏠 Town Halls
 - 👮 Local Police
 - 🚒 Fire Station
 - 🎓 Schools (Pre-K through High School)
 - Active Rail Line
 - Out of Service/Abandoned Rail Line
 - ▭ Town Boundaries
 - ▭ Structures
 - ▭ Water Bodies
 - Streams
 - Roads
 - Regionwide Evacuation Routes

- Hazards**
- Dams (2/2012)
 - High Hazard
 - ⊖ N/A
 - FEMA DFIRM Flood Zones
 - ▨ 100-year Flood Area*
 - ▨ 500-year Flood Area
 - Repetitive Loss Property Areas
 - NOAA Historic Hurricane Tracks (1842-2022)
 - USDA Wildfire Hazard Potential, Version 2020 Classified
 - Very Low
 - Moderate
 - Low
 - High
 - Very High
 - Non-burnable
 - Water

- Locally Defined Hazards**
- Hazard
 - Hazard
 - ▨ Possible Flood Area
 - ▨ Hazard



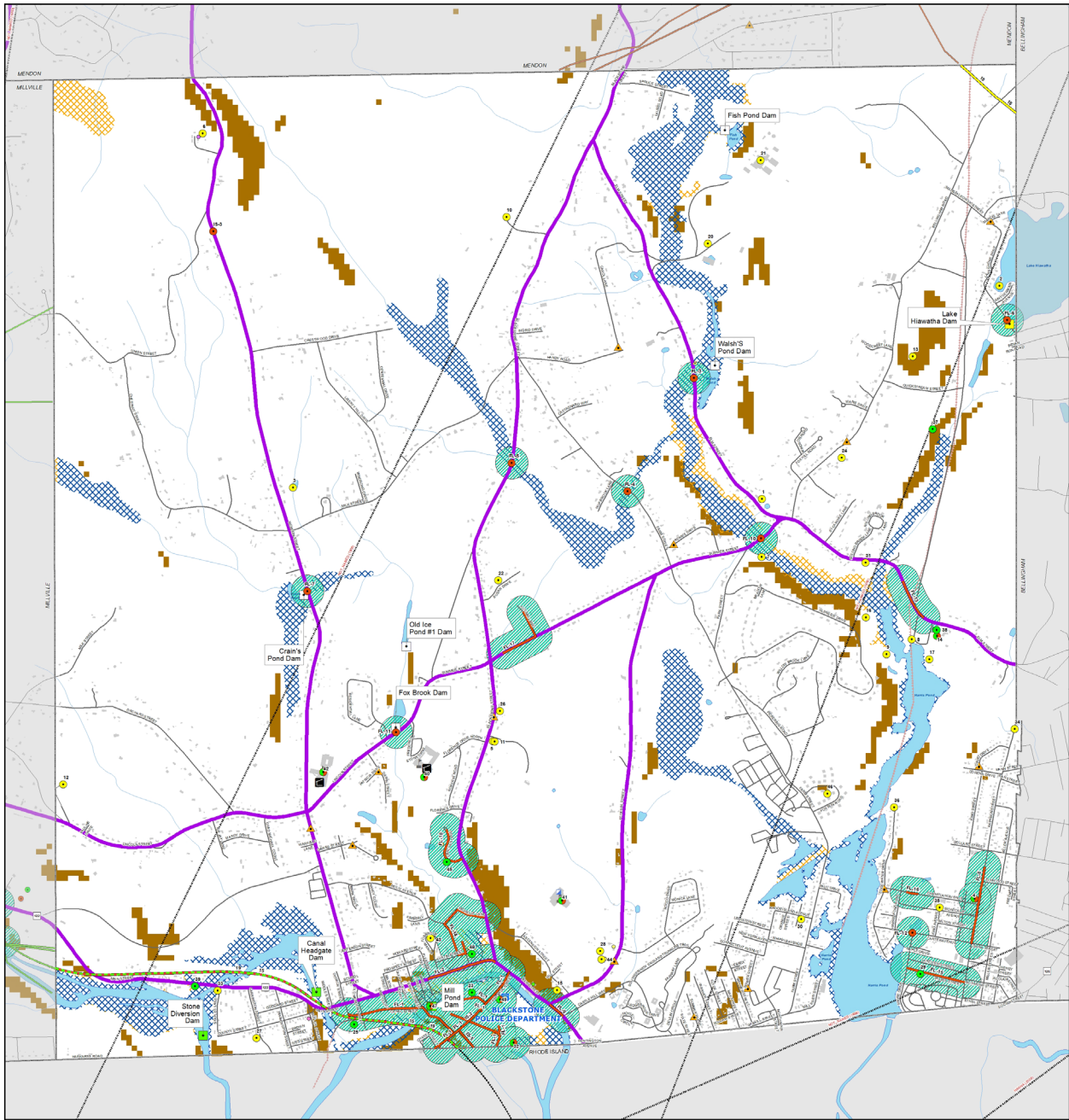
Data provided by participating municipalities, CMRPC, MassDOT, MassGIS, FEMA and NOAA. Information displayed on this map is for planning purposes only. This information is not adequate for legal liability, scientific, regulatory, engineering, or parcel-level analysis. Use caution interpreting potential boundaries.

Produced by the Central Massachusetts Regional Planning Commission. One Mechanics St., Suite 302, Worcester, MA 01608

Date: 6/20/24 Document Path: R:\Projects\PLS_GIS\map\posting\MP_02_Land_Hazards_Map4.mxd



Hazard Mitigation Plan Map 3 Vulnerable Critical Infrastructure and Facilities Town of Blackstone, Massachusetts June 2024



Legend

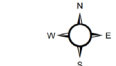
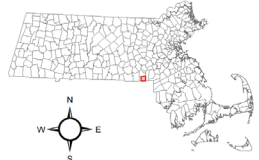
- Assisted Living
- Elderly Housing
- Emergency Shelters
- End Of Life Facilities
- Misc Data
- Nursing/Rest Homes
- Power Plant
- ▲ Daycare
- ▲ Electric Distribution
- ▲ Electric Substation
- ▲ EOC
- Water Treatment Plant
- Town Halls
- Local Police
- Fire Station
- Schools (Pre-K through High School)
- Active Rail Line
- Out of Service/Abandoned Rail Line
- ▭ Town Boundaries
- ▭ Structures
- ▭ Water Bodies
- ▭ Streams
- ▭ Roads
- ▭ Regionwide Evacuation Routes

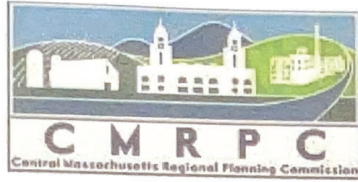
Hazards

- Dams (2/2012)
- Significant Hazard
- Low Hazard
- N/A
- FEMA DFIRM Flood Zones
- 1% Annual Chance Flood Hazard or Regulatory Floodway
- 0.2% Annual Chance Flood Hazard
- High Slope (15% and above)
- Repetitive Loss Property Areas
- IBTACS Historical Hurricane Tracks (1842-2020)

Locally Defined

- Hazard
- Vulnerable Critical Infrastructure
- Vulnerable Critical Infrastructure/Hazard
- Non-vulnerable Critical Infrastructure
- Non-vulnerable Critical Infrastructure/Hazard
- Hazard
- Vulnerable Critical Infrastructure
- Vulnerable Critical Infrastructure/Hazard
- Non-vulnerable Critical Infrastructure
- Possible Flood Area
- Hazard
- Vulnerable Critical Infrastructure
- Non-vulnerable Critical Infrastructure





Meeting Name:
Blackstone Hazard Mitigation Plan
Board of Selectmen Meeting Public
Presentation

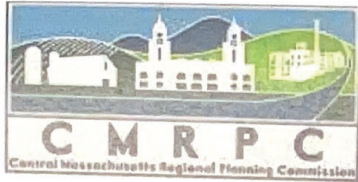
Community: Blackstone

Location: Blackstone Town Hall, 15 Saint
Paul Street, Blackstone, MA

Date: June 25th, 2024

Meeting Time: 6:30 PM

| Participant Name | Organization | Title | E-mail |
|-------------------|--------------------|-----------|----------------------------------|
| Tanya Polak | Town of Blackstone | Selectman | tpolak@townofblackstone.org |
| Michael J Sweeney | Town of Blackstone | Selectmen | mikesweeney@Townofblackstone.org |
| Brian Scantun | Town of Blackstone | Selectman | |
| Daniel P Keek | Town of Blackstone | Selectman | |
| Mary Bulso | Town of Blackstone | Selectman | |
| | | | |
| | | | |
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| | | | |



Meeting Name:
 Blackstone Hazard Mitigation Plan
 Board of Selectmen Meeting Public
 Presentation

Community: Blackstone

Location: Blackstone Town Hall, 15 Saint
 Paul Street, Blackstone, MA

Date: June 25th, 2024

Meeting Time: 6:30 PM

| Participant Name | Organization | Title | E-mail |
|------------------|--------------|-------------------|----------------------------|
| GARY JOLICOEUR | | | Diamonds@comcast.net |
| Gregory Gilmore | Police Dept | Chief | chief@blackstonepolice.org |
| Lisa Cheever | Library Dept | Director | lcheever@rwma.org |
| Lori Poirier | Zoning Dept | Vice Chair | poirierlori83@gmail.com |
| Andrew Loew | CMRPC | | aloew@cmrpc.org |
| Will Talbot | CMRPC | Assistant Planner | wtalbot@cmrpc.org |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

APPENDIX E

Community Outreach 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))*

HAZARD MITIGATION PLANNING

What is a Hazard Mitigation Plan?

- A Hazard Mitigation Plan (HMP) is a document describing how a jurisdiction will prepare for and mitigate against natural and related hazards.
- It is a 5-year planning document which is approved by the Town, State, and Federal Government.
- It is a key to unlocking federal grant funding for resiliency and infrastructure projects.

How Does Hazard Mitigation Planning Affect Me?

- You can have a direct impact on your town's hazard mitigation plan by letting us know what concerns you have for your Town's future.
- This plan will determine what course of action your town will take to mitigate the effects of natural disasters and climate change.

What Disasters are Addressed in the Plan?

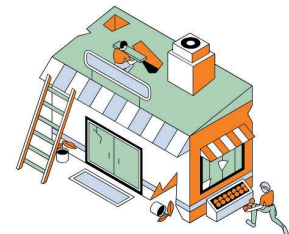
Hazard mitigation plans address a wide variety of natural disasters. For example, this plan being worked on for your town covers:



- Flooding
- Winter Storms
- Invasive Species
- Wildfires
- Tornados
- Earthquakes
- Thunderstorms
- High Wind Events
- Dam Failures
- Drought
- Landslides
- Other Natural Hazard Events

How Can I Help Plan for Hazards?

- You can help by providing a comment in the drop box below about your town's plan:
 - Anything from strategies for mitigating these disasters to notable events you have experienced in town are welcome!
- Increase your preparedness for natural hazards by signing up to receive updates from your Town's emergency management services and going to Ready.gov for information on personal preparedness.





Blackstone Hazard Mitigation Plan: Draft Findings

Hazards of Concern in Blackstone

- Flooding
- Invasive Species
- Wildfires
- Rooftop snow loads
- A lack of backup generators
- Thunderstorms
- Winter Storms
- Drought

Critical Infrastructure in Blackstone

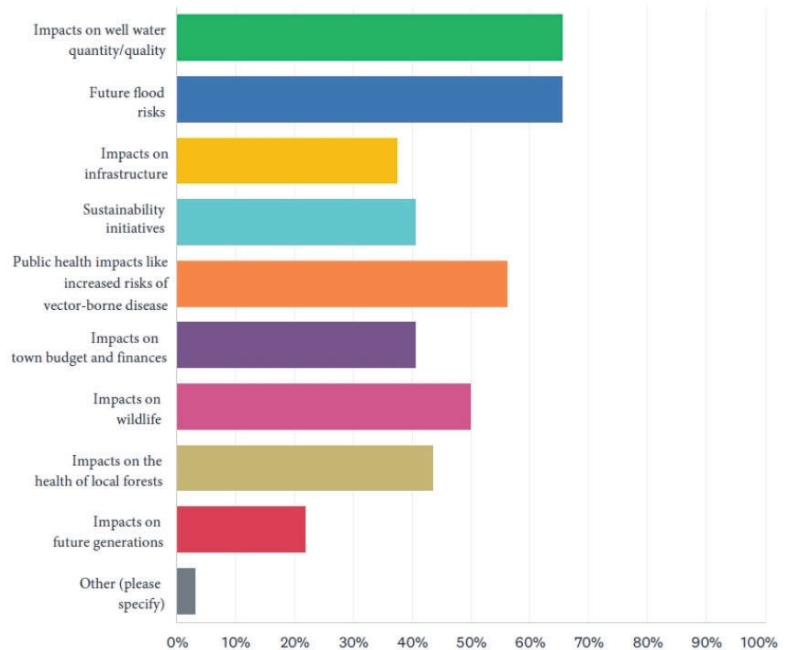
- Department of Public Works infrastructure (water and sewer)
- Public safety infrastructure (fire and police), communications infrastructure, and energy infrastructure,
- Public service buildings (libraries, schools, daycares)
- Public and elderly housing

Selected High-Priority Draft Mitigation Strategies

- Conduct a townwide stormwater drainage improvement study.
- Continue drainage and structural resiliency improvements near the town hall / public safety / senior center building.
- Coordinate with hydropower plant in Rhode Island to prevent flooding near the Blackstone Valley Boys and Girls Club.
- Plan and site new wells to supply the town water system.
- Increase education and outreach on all hazards, on social media and through schools and the senior center.

Sample of Survey Results

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.



We would like to hear your thoughts on these draft hazard mitigation plan findings! Feel free to leave an anonymous comment in the box below or reach out to us at wtaibot@cmrpc.org or mgranato.cmrpc.org with your comments and suggestions.



APPENDIX F: Public Comment Period Materials

Appendix F 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))*



Town of Blackstone, Massachusetts

12h · 🌐

The Town of Blackstone has prepared a draft hazard mitigation plan update with the assistance of the Central Massachusetts Regional Planning Commission to plan to reduce the impacts of floods, winter storms, and other natural hazards in town. The town encourages residents and other town stakeholders to review the plan over a two-week public comment period. Please send any comments on the plan to Will Talbot at wtalbot@cmrpc.org by July 24, 2024.

<https://www.townofblackstone.org/CivicAlerts.aspx?AID=37>



CONGRESS PASSED THE DISASTER MITIGATION ACT OF 2000 (DMA 2000) ON OCTOBER 10, 2000...

THE REGULATIONS MANDATED THAT COMMUNITIES MUST ESTABLISH A HAZARD MITIGATION PLAN TO BE ELIGIBLE FOR FEDERAL DISASTER MITIGATION GRANTS AFTER A PRESIDENTIAL DISASTER DECLARATION.

THE TOWN OF BLACKSTONE HAS PREPARED A DRAFT HAZARD MITIGATION PLAN UPDATE WITH THE ASSISTANCE OF THE CENTRAL MASSACHUSETTS REGIONAL PLANNING COMMISSION TO PLAN TO REDUCE THE IMPACTS OF FLOODS, WINTER STORMS AND OTHER NATURAL HAZARDS IN TOWN. THE TOWN ENCOURAGES RESIDENTS AND OTHER TOWN STAKEHOLDERS TO REVIEW THE PLAN OVER A TWO-WEEK PUBLIC COMMENT PERIOD. PLEASE SEND ANY COMMENTS ON THE PLAN TO WILL TALBOT AT WTALBOT@CMRPC.ORG BY JULY 24, 2024



Posted on: July 10, 2024

Draft Blackstone Hazard Mitigation Plan

CONGRESS PASSED THE DISASTER MITIGATION ACT OF 2000 (DMA 2000) ON OCTOBER 10, 2000...

THE REGULATIONS MANDATED THAT COMMUNITIES MUST ESTABLISH A HAZARD MITIGATION PLAN TO BE ELIGIBLE FOR FEDERAL DISASTER MITIGATION GRANTS AFTER A PRESIDENTIAL DISASTER DECLARATION.

THE TOWN OF BLACKSTONE HAS PREPARED A DRAFT HAZARD MITIGATION PLAN UPDATE WITH THE ASSISTANCE OF THE CENTRAL MASSACHUSETTS REGIONAL PLANNING COMMISSION TO PLAN TO REDUCE THE IMPACTS OF FLOODS, WINTER STORMS AND OTHER NATURAL HAZARDS IN TOWN. THE TOWN ENCOURAGES RESIDENTS AND OTHER TOWN STAKEHOLDERS TO REVIEW THE PLAN OVER A TWO-WEEK PUBLIC COMMENT PERIOD. PLEASE SEND ANY COMMENTS ON THE PLAN TO WILL TALBOT AT WTALBOT@CMRPC.ORG BY JULY 24, 2024.

[/DocumentCenter/View/1480](#)



Community Lifeline Comments on Blackstone HMP

From Mendon

“Due to their close proximity, the Town of Blackstone and the Town of Mendon share some of the same potential natural disasters requiring hazard mitigation.

Two key areas that affect both communities are evacuation routes and dam safety.

Dam Safety and Flooding - The Mill River flows through the Town of Hopedale into the Spindleville Pond (located at the intersection of Green Street and Mill Street in Hopedale). The Spindleville Pond Dam (referenced as the Mill River Dam) is under the control of the Hopedale Emergency Management Agency and restricts the flow of the Mill River as it travels south through the towns of Mendon and Blackstone. As the Mill River flows out of Hopedale, it crosses under Hartford Avenue East and Bellingham Street and continues into Blackstone. The Mill River has been the cause of flooded roadways and impacted the Bellingham Street bridges on multiple occasions before the addition of the dam at Spindleville Pond. That dam is currently under review by the Town of Hopedale and MEMA for further upgrades.

The two evacuation routes affecting both communities are Blackstone Street in Mendon, to Mendon Street in Blackstone, and Providence Street in Mendon, to Blackstone Street in Blackstone. Both routes are subject to flooding in their lowest points and are currently under review by Mendon's DPW Director and the MEMA Hazard Mitigation Team for future improvements.

The Town of Blackstone should be commended on their comprehensive plan to safely navigate any potential hazards affecting their community.”

From Early Village

“I am providing comments and feedback on the Blackstone Hazard Mitigation Plan on behalf of Early Village Apartments in Blackstone, MA.

First, some important corrections. In this plan, Early Village Apartments is incorrectly listed as being part of Blackstone Housing Authority. Early Village Apartments is operated through Blackstone Housing Corporation, which is a different, private organization providing low-income housing in connection with HUD. Early Village Apartments is also incorrectly listed on P. 28 as being on Alice Avenue off of Blackstone Street. Early Village Apartments is located on Early Village Drive off of Blackstone Street.

There is more incorrect information regarding Early Village Apartments on P. 81, under the Generator program measure. Under the action column, it states that generators were installed at Early Village within the past 2 years. This is incorrect and currently the complex does not have generators, so when power goes out, there is no backup power source.

To the point about power going out and not having backup power, this was relevant recently, as on July 23, 2024, a tree fell within the complex, blocking entrance into and exit out of the complex, and knocking out electricity for ~8 hours. This is especially risky for Early Village Apartments, which is a complex serving low-income elderly and disabled residents. Residents here may be unable to drive, more likely to have medical emergencies requiring emergency vehicles to enter to complex, and

could face especially burdensome hardship from food or medication spoilage due to power outages. Early Village Apartments is also located within a flood hazard zone per Hazard Maps 2 & 3 in the plan, so there are particular concerns for this complex since per the first criteria point on P. 32, this complex serves an EJ/vulnerable population group.

To the point on P. 38 about a reduction in availability of affordably priced housing, it should be noted that Early Village Apartments is currently operating a 4-6 year long waiting list. Otherwise, I have a few questions regarding various points in the plan. To the planning committee itself, particularly in devising estimates for things like hazard risks, was there any inclusion of or partnership with local research institutions or researchers (e.g. through UMass)? P. 97 mentions a mitigation strategy of installing central air conditioning in town schools to protect children from impacts of increasing heat. Are there any mitigation strategies aimed at protecting elderly and/or disabled residents? To the agenda for Local Planning Team Meeting # 2, for the question under agenda item 3, why not include community lifelines throughout the planning process? This seems especially critical for identifying social threats/impacts from natural disasters and climate change.

Some methodology questions and concerns remain. It was noted that the public survey was posted in several high traffic areas, and that meetings were televised to increase access. While these are a great start, could you say more about efforts to recruit among specific EJ/vulnerable population groups? 33 respondents seems like a low response rate. Beyond the public survey, if feasible, it could be wise to plan for focus groups with specific vulnerable population groups, in addition to open town hall meetings. I also wonder what accessibility measures were implemented for the survey and community meetings (e.g. for hard of hearing or vision impaired residents)? For the vulnerability scale listed in section 4.2.8 on P. 40, I would advise reversing the numbering for the risk scale. To reduce potential confusion, the lowest number should be associated with the lowest risks (especially since this is the case for other disaster scales, like hurricane categorization).

Finally, while I appreciate that this is a draft and not a final plan, I advise heavily editing this document throughout for spelling, capitalization, incomplete sentences, and grammar errors. There were many errors throughout, which impacted readability at times. Also, to increase public engagement and awareness, it may be wise to shorten this document, or to communicate this plan in a variety of formats, as it may be onerous for some town residents to comment on a 100+ plus document containing specialized jargon and information."

APPENDIX
G: Glossary

APPENDIX G

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.

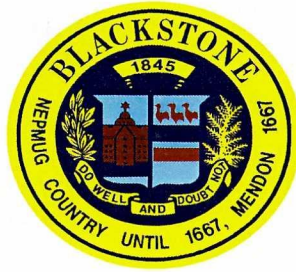
Wind Chill - The wind chill is based on the rate of heat loss from exposed skin caused by the combined effects of wind and cold. As the wind increases, heat is carried away from the body at an accelerated rate, driving down the body temperature. This temperature is the reading the body "feels" given 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.

APPENDIX H:

Certificate of

Adoption

Office of the
TOWN ADMINISTRATOR
Chad T. Lovett



Telephone: (508) 883-1500
Fax: (508) 883-7043
clovett@townofblackstone.org

TOWN OF BLACKSTONE

Blackstone Municipal Building
15 St. Paul Street
Blackstone, MA 01504

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)).

CERTIFICATE OF ADOPTION BOARD OF SELECTMEN TOWN OF BLACKSTONE, MASSACHUSETTS


- A RESOLUTION ADOPTING THE *BLACKSTONE HAZARD MITIGATION PLAN*
- WHEREAS, the Town of Blackstone established a committee to prepare the 2026 update of the *Blackstone Hazard Mitigation Plan*; and
- WHEREAS, the updated *Blackstone Hazard Mitigation Plan* contains several potential future projects to mitigate potential impacts from natural hazards in the Town of Blackstone; and
- WHEREAS, duly noted public meetings were held by the LOCAL HAZARD MITIGATION PLANNING TEAM on June 25th, 2024, and February 24, 2026; and
- WHEREAS, the Town of Blackstone authorizes responsible departments and/or agencies to execute their responsibilities demonstrated in the plan.
- NOW, THEREFORE BE IT RESOLVED that the Town of Blackstone BOARD OF SELECTMEN adopts the 2026 update of the *Blackstone Hazard Mitigation Plan*, in accordance with M.G.L. 40 or the charter and bylaws of the Town of Blackstone.
- ADOPTED AND SIGNED this 24th day of February 2026.


Daniel P. Keefe, Chairman


Edward W. Castonguay


Michael Sweeney, Vice Chairman


Mary Bulso, Member


Gino Oraes, Member