TOWN OF DALTON, MA
HAZARD MITIGATION PLAN UPDATE
APRIL 2024

Town of Dalton

462 Main Street

Dalton, MA 01226

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HAZARD MITIGATION PLAN UPDATE

April 2024

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Dalton, MA 01226

https://dalton-ma.gov

Prepared by:

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- Jeff Burch, Building and Grounds, Town of Dalton
- Jason Dion, Director of Facilities, Central Berkshire Regional School District
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- Tyler Miller, Police Department, Town of Dalton
- Cheryl Rose, Conservation Commission Chair, Town of Dalton
- Henry Rose, Conservation Commission, Town of Dalton
- Janko Tomasic, Town Planner, Town of Dalton
- Agnes Witkowski, Health Inspector, Town of Dalton
- Pattie Yates, Senior Center, Town of Dalton

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

Local Adoption Resolution

TOWN OF DALTON

Select Board
462 Main St. Dalton, MA 01226
413-684-6111 x204
Robert W. Bishop, Jr., Chair
Daniel E. Esko, Vice-Chair

TOWN OF DALTON, MASSACHUSETTS
SELECT BOARD

A RESOLUTION ADOPTING THE
TOWN OF DALTON, MA HAZARD MITIGATION PLAN UPDATE

RESOLUTION NO. 1, 2024

WHEREAS the Town of Dalton recognizes the threat that natural hazards pose to people and property within the Town of Dalton; and

WHEREAS the Town of Dalton has prepared a multi-hazard mitigation plan, hereby known as TOWN OF DALTON, MA HAZARD MITIGATION PLAN UPDATE in accordance with federal laws, including the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended; the National Flood Insurance Act of 1968, as amended; and the National Dam Safety Program Act, as amended; and

WHEREAS the TOWN OF DALTON, MA HAZARD MITIGATION PLAN UPDATE identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the Town of Dalton from the impacts of future hazards and disasters; and

WHEREAS adoption by the Town of Dalton Select Board demonstrates its commitment to hazard mitigation and achieving the goals outlined in the TOWN OF DALTON, MA HAZARD MITIGATION PLAN UPDATE.

NOW THEREFORE, BE IT RESOLVED BY THE TOWN OF DALTON, MA, THAT:

Section 1. In accordance with M.G.L. c. 40, the Town of Dalton Select Board adopts the TOWN OF DALTON, MA HAZARD MITIGATION PLAN UPDATE. While content related to the Town of Dalton may require revisions to meet the plan approval requirements, changes occurring after adoption will not require Town of Dalton to re-adopt any further iterations of the plan. Subsequent plan updates following the approval period for this plan will require separate adoption resolutions.

ADOPTED by a vote of 4 in favor and 0 against, and – abstaining, this 19th day of Aug., 2024.

By: Robert W. Bishop, Jr. Robert W. Bishop, Jr., Chair, Dalton Select Board

ATTEST: By: Heather A. Hunt Heather Hunt, Town Clerk

Record of Changes

This Town of Dalton, MA Hazard Mitigation Plan Update will be reviewed and approved on a biannual basis by the HMPC and following any major disasters. All updates and revisions to the plan will be tracked and recorded in the following table. This process will ensure the most recent version of the plan is disseminated and implemented by the Town.

Table 1. Summary of Changes.

Date of Change	Entered By	Summary of Changes

Chapter 1. Introduction

The Federal Emergency Management Agency (FEMA) defines hazard mitigation per the Code of Federal Regulations (CFR) 44 Section 201.2 as "any **sustained** action taken to reduce **or eliminate** the **long-term risk** to human life and property from hazards."

"Disaster Mitigation Act (DMA) 2000 (Public Law 106-390)[1] provides the legal basis for FEMA mitigation planning requirements for State, local and Indian Tribal governments as a condition of mitigation grant assistance. DMA 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act by repealing the previous mitigation planning provisions and replacing them with a new set of requirements that emphasize the need for State, local, and Indian Tribal entities to closely coordinate mitigation planning and implementation efforts."[2]

The Town of Dalton, Massachusetts created this plan as part of an ongoing effort to reduce the negative impacts and costs from damages associated with natural hazards, such as nor'easters, floods, and hurricanes. This plan meets the requirements of the Disaster Mitigation Act 2000. More importantly, the plan was created to reduce loss of life, land, and property due to natural hazards that affect the Town of Dalton. It is difficult to predict when natural hazards will impact the planning area, but it is accurate to say that they will. By implementing the mitigation actions listed in this plan, the impact of natural hazards will be lessened.

Local Mitigation Plans must be updated at least once every five years to remain eligible for FEMA hazard mitigation project grants. A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five (5) years to continue to be eligible for mitigation project grants.

Purpose of the Plan

The purpose of the Local Hazard Mitigation Plan is to provide the Town of Dalton with a comprehensive examination of all natural hazards affecting the area, as well as a framework for informed decision-making regarding the selection of cost-effective mitigation actions. When implemented, these mitigation actions will reduce the Town's risk and vulnerability to natural hazards.

This plan is a result of a collaborative effort between the Town of Dalton and the surrounding communities. Throughout the development of the plan, the Hazard Mitigation Planning Committee (HMPC) consulted the public and key stakeholders for input regarding identified goals, mitigation actions, risk assessment, and mitigation implementation strategy. A sample of key stakeholders who

---

[1] Disaster Mitigation Act of 2000, Pub. L. 106-390, as amended

[2] Disaster Mitigation Act of 2000. https://www.congress.gov/106/plaws/publ390/PLAW-106publ390.pdf

participated, included the Massachusetts Emergency Management Agency (MEMA), the Berkshire Regional Planning Commission (BRC), and the Central Berkshire Regional School District.

Guiding principles for plan development

The HMPC adhered to the following guiding principles in the plan's development.[3]

- Plan and invest for the future.
- Collaborate and engage early.
- Integrate community planning.

This plan update meets the requirements outlined 44 CFR § 201.6(d)(3). These requirements are included in the plan in the green call-out boxes, like the one below.

> A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within 5 years in order to continue to be eligible for mitigation project grant funding.

Yellow call-out boxes like the one to the right, are definitions taken from the Federal Emergency Management Agency Local Policy Guide, April 2023. These are included throughout the plan for reference and explanation.

The HMPC prioritized mitigating impacts of climate change, mitigating risk to vulnerable communities, and protecting the built environment both today and in the future.

> ***COMMUNITY RESILIENCE*** *is the ability of a community to prepare for anticipated hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions. Activities such as disaster preparedness (which includes prevention, protection, mitigation, response and recovery) and reducing community stressors (the underlying social, economic and environmental conditions that can weaken a community) are key steps to resilience.*[1]

The HMPC identified the following list of hazards to profile:

- Droughts
- Earthquakes
- Extreme Temperatures
- Floods
- Hurricanes/Tropical Storms
- Invasive Species

[3] Federal Emergency Management Agency. (April 19, 2022). Local Mitigation Planning Policy Guide, p.13.

- Landslides
- Other Severe Weather
- Severe Winter Storms
- Tornadoes
- Wildfires or Brush Fires

Mitigation Strategy

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

The hazard mitigation strategy is the culmination of work presented in the Planning Area Profile (Chapter 2), Risk Assessment (Chapter 4), and Capability Assessment (Chapter 5). It is also the result of multiple meetings and sustained public outreach. The HMPC developed the goals shown below. The goals from the previous Town of Dalton Hazard Mitigation Plan 2018 and the Town's Municipal Vulnerability Preparedness Plan 2019 were revised to develop this current list. Information about the goal development process is in Chapter 6: Mitigation Strategy. The goals are considered "broad policy-type statements"[4] that represent the long-term vision for mitigating risk to natural hazards in the Town of Dalton.

[4] Federal Emergency Management Agency. (2013). *Local Mitigation Planning Handbook,* p. 6.

Save Lives and Property

- Reduce risk to people and property from natural hazards and climate change.

Infrastructure

- Mitigate risk to critical facilities and infrastructure from natural hazards and climate change.

Capacity

- Expand the Town's capacity to mitigate risk by adopting a culture of hazard mitigation through regulations, planning, and regional collaboration.

Natural Resources

- Implement actions that minimize risk from climate change and natural hazards to preserve or restore the functions of natural systems.

Education

- Educate all stakeholders about the value of hazard mitigation and how to implement it in their work, businesses, and homes.

Figure 1. Goal Statements.

Land Use and Development

Changes in Development

E1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))

Dalton has not seen many changes in development since the last plan update in 2018. This is primarily due to the general lack of new construction and population growth in the community. In fact, Dalton has experienced a slow but steady population decrease over the last few decades, including a 6 percent decline between 2010 and 2020. This trend of little population growth is projected to continue over the decades ahead, as population projections from the UMass Donahue Institute estimate that Dalton have nearly the same population in the year 2050 as it does today.

***CHANGES IN DEVELOPMENT** means recent development (for example, construction completed since the last plan was approved), potential development (for example, development planned or under consideration by the jurisdiction), or conditions that may affect the risks and vulnerabilities of the jurisdictions (for example, climate change, declining populations or projected increases in population, or foreclosures) or shifts in the needs of underserved communities or gaps in social equity. This can also include changes in local policies, standards, codes, regulations, land use regulations and other conditions.*

New development of residential, commercial, and industrial uses is also fairly constrained in Dalton due to its existing development patterns as well as the topology of the land and the amount of land that is protected. Approximately 54% of all land within Dalton is protected in some way. This includes land protected by the state or federal agencies, as well as significant acreage owned by the City of Pittsfield's Water Department. Many of the Town's other undeveloped areas are protected by its strong planning and regulatory framework which has a long history of conserving and protecting natural resources and environmentally sensitive areas. As further described in Chapter 5 (Capability Assessment), land use in Dalton is regulated through the Town's zoning bylaw and other regulations, including several overlay zones governing various items such as open space, floodplains, and scenic mountain areas. Finally, some residents in Dalton have chosen to protect their properties through Massachusetts Chapter 61. Through this state program, landowners receive reduced property taxes in exchange for the protection of land from future development.

The types of development that has occurred recently in Dalton largely include (1) single family homes along rural roadways outside the town center, often carving a housing site out of forest, or (2) small subdivisions, again often carving housing sites out of forested areas. This could potentially increase the vulnerability of some development to wildfire, as several residential structures were found in the risk assessment to be in higher probability burn areas. Recent housing developments are also reaching outwards into more steeply sloped areas, though to date they have not typically advanced into areas that are modeled to be unstable or at high risk to landslides.

Aside from the few instances of development within or near hazard-prone areas described above, there is no recent development or potential development in Dalton that is believed to be increasing the risks and vulnerabilities of the community to hazards. However, as described in Chapter 4 (Risk Assessment), it is anticipated that climate change and projected future conditions will increase the threats posed by multiple hazards. Among the greatest concerns for Dalton is the expected increase in the frequency and/or severity of flooding caused by extreme rainfall events and ice or snow melt, along with extreme heat and other severe weather events. Increasing risks associated with these hazards could result in more frequent and/or more severe impacts to the community and especially those populations considered to be more vulnerable to their effects as described in Chapter 4.

Many of the Town's ongoing mitigation efforts are focused on existing versus new development and are likely to result in overall decreases in future hazard vulnerability. Examples include the use of rain gardens and other and stormwater Best Management Practices (BMPs) installed for the new high school, and the implementation of proposed flood mitigation project(s) based on the preliminary engineering study for Walker Brook. Identifying the best way to mitigate potential future flooding to Pomeroy Manor also remains a high priority action for this plan. In addition, the Town's focus on maintaining and improving existing infrastructure, especially as it relates to stormwater drainage systems, versus the expansion of such assets to accommodate future growth should lead to aggregate decreases in flood hazard vulnerability. Along with this Hazard Mitigation Plan, the strategies and actions outlined in Dalton's Master Plan, Green Infrastructure Plan, and Open Space and Recreation Plan are consistent in terms aiming to reduce risk and decrease the community's overall vulnerability.

Progress in Mitigation Efforts

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

This plan update includes the Town of Dalton's priorities to address flooding issues and increase communication with the public. These priorities are consistent with the Town's previous Hazard Mitigation Plan.

The status of each mitigation action from the Town of Dalton Hazard Mitigation Plan 2018 is included in Chapter 6: Mitigation Strategy. The text in this chapter includes a designation of Completed, Completed & To Be Continued, Partially Completed/In Progress, Delayed, or Cancelled with a description. In addition, if the mitigation action has moved forward to this Plan's list of actions that is indicated.

The Town of Dalton integrated information from the 2018 Hazard Mitigation Plan into several planning mechanisms. The Town's Stormwater Management Program (SWMP) created in 2019 and updated in 2022 includes concepts of public education and outreach regarding water quality and hazard mitigation, it also calls for new development and redevelopment properties to mitigate risks of drought with the use of impervious surfaces and climate change by allowing for green infrastructure. The 2020 Dalton Open Space and Recreation Plan's Goal 2 is "maintain and improve the quality of water resources and riparian habitat." This is consistent with mitigation measures to increase storage capacity and lessen risk of sedimentation downstream during storm events. The Dalton Green Infrastructure Plan 2021 includes a section describing the benefits of green infrastructure to mitigate flood risk. The plan then describes potential green infrastructure projects as well as updates to the Town's stormwater bylaws. This plan refers to FEMA HMGP, FMA, and BRIC grant funding sources. The Towns 2019 Municipal Vulnerability Preparedness Plan specifically states in its opening paragraph that the plan builds on the Town's findings and proposed projects in the Hazard Mitigation Plan. The MVP was carefully reviewed and referenced throughout this Plan.

Authority and Assurances

The Town of Dalton will continue to comply with all applicable Federal laws and regulations during the periods for which it receives grant funding, in compliance with 44 CFR 201.6. It will amend its plan whenever necessary to reflect changes in City, State or Federal laws and regulations, as required in 44 CFR 201.6. The list of laws and regulations the Town with adhere to is below.

- Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended.
- National Flood Insurance Act of 1968, as amended.

- National Dam Safety Program Act (Pub. L. 92-367), as amended.
- 44 CFR Part 201 Mitigation Planning.
- 44 CFR, Part 60, Subpart A, including § 60.3 Flood plain management criteria for flood-prone areas.
- 44 CFR Part 77 Flood Mitigation Grants[10].
- 44 CFR Part 206 Subpart N. Hazard Mitigation Grant Program.

Plan Adoption

The Town of Dalton will adopt the Plan when it has received "approved-pending adoption" status from the Federal Emergency Management Agency (FEMA). The Certificate of Adoption is included on page 7.

Document Overview

Below is a summary of the Town of Dalton, MA Hazard Mitigation Plan Update chapters, including appendices. The planning process closely adhered to FEMA guidelines and to the intent of those guidelines.

Chapter 2: Planning Area Profile
The Planning Area Profile chapter describes the Town of Dalton, including history, population, government, and infrastructure. Included in this chapter is a list of critical facilities identified by the HMPC.

Chapter 3: Planning Process
The Planning Process chapter documents the methodology and approach of the hazard mitigation planning process. The chapter summarizes the HMPC meetings and the public outreach process (including public meetings). This chapter guides the reader through the process of generating this plan and reflects its open and inclusive public involvement process.

Chapter 4: Risk Assessment
The Risk Assessment identifies the natural hazard risks to the Town of Dalton and its residents. The risk assessment looks at current and future vulnerabilities based on land use development including structures and infrastructure.

Chapter 5: Capability Assessment
The Capability Assessment looks at the Town's ability to mitigate risk prior to and following disaster. This chapter is structured around the following four categories: planning and regulatory, administrative, and technical, financial, as well as education and outreach. The chapter concludes with information regarding the National Flood Insurance Program (NFIP).

Chapter 6: Mitigation Strategy

This chapter provides a blueprint for reducing losses identified in the Risk Assessment. The chapter presents the hazard mitigation goals and identifies mitigation actions in priority groupings. Each mitigation action includes essential details, such as Town lead, potential funding sources, and implementation timeframe.

Chapter 7: Plan Implementation and Maintenance

The Plan Implementation and Maintenance establishes a system and mechanism for periodically monitoring, evaluating, and updating the Town of Dalton Hazard Mitigation Plan Update. It also includes a plan for continuing public outreach and monitoring the implementation of the identified mitigation actions.

Appendices

The Appendices includes documentation regarding the planning process, the list of mitigation actions and the *Hazus* Reports.

Chapter 2: Planning Area Profile

The Town of Dalton, with a population of 6,330[5], is in central Berkshire County. Dalton is bordered by Cheshire to the north, Washington to the south, Windsor and Hinsdale to the east, and Pittsfield and Lanesborough to the west. Outside of an established center of Town, Dalton is "constrained" by steep slopes, bedrock, and wetlands.[6] Dalton is characterized as "a forested, mountainous landscape historically suited to the development of water-powered mill industries, along the swift-moving Housatonic river and its tributaries. The well drained, glacial soils provide rich farmland to the Town's interior, and the many tributaries, floodplains, reservoirs, and wetland areas provide the Town with natural beauty, recreational opportunities, and access to ample water resources."[7] The figure below shows the boundaries of the Town of Dalton and its location in Massachusetts.

[5] QuickFacts Dalton town, Berkshire County, Massachusetts. (2022). United States Census Bureau.

[6] Open Space and Recreation Plan. (2020). Town of Dalton, Massachusetts.

[7] Town of Dalton Multi-Hazard Mitigation Plan Update. (2018). Town of Dalton, Massachusetts.

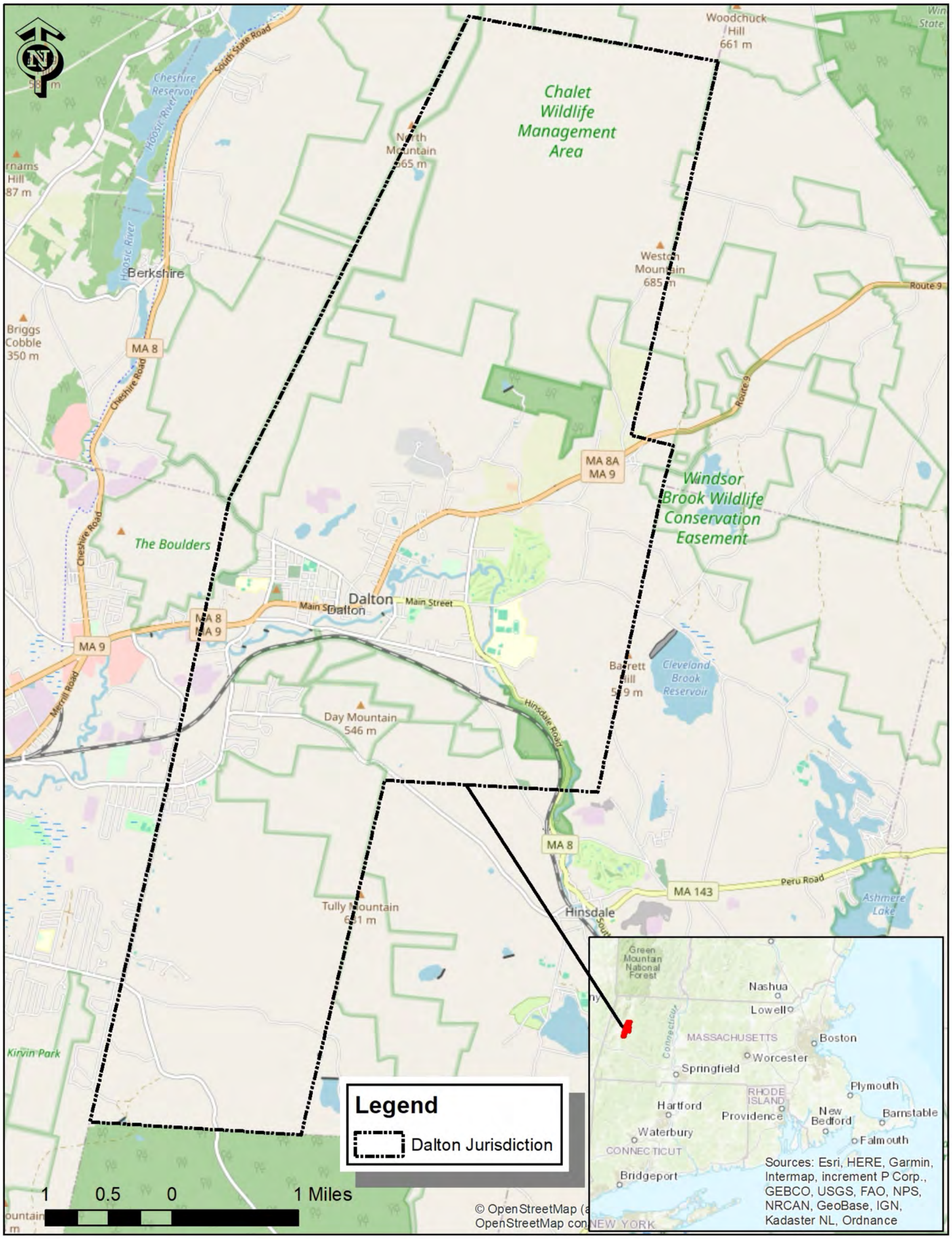

Figure 2. Town of Dalton Base Map.

The original settlement of Dalton was a parcel called "Ashuelot Equivalent" that was granted by the State to Colonel Oliver Partridge and his associates in 1743. In 1785, the Town was later named after the Speaker of the Massachusetts House of Representation, Tristam Dalton.[8]

The Town became a rural industrial community due to the presence of the East Branch of the Housatonic River, with several neighborhoods built to house mill owners and their employees. The river as well as the rail line that was constructed between Boston and Albany aided in making Dalton a "prosperous mill town." In 1829, the Town had three paper mills, a gristmill, and five sawmills. Farmland was limited in comparison to neighboring communities due to Dalton's mountainous landscape, but some farmland remains, such as the Holiday Brook Farm.[9]

Papermaking, Dalton's largest industry, was started by Zenas Crane in 1801. The company succeeded in providing United States paper currency and is still the largest company in Dalton today. The Town is also home to the Fitch-Hoose House, which was built in 1846. The house was bought by Charles Hoose in 1858 to provide a haven for his family. The Fitch-Hoose, located on Gulf Road, was said to be part of the Underground Railroad and the surrounding area housed a small community of African Americans who fled slavery and felt the area was safe to stay in. Both the house and Gulf Road are part of the Upper Housatonic Valley African American Heritage Trail.[10]

Gulf Road also happens to be one of the oldest roads in the Town and dates to 1794 and has a formation of rocks called "Wizard's Glen." The road was used to travel from Westfield, Massachusetts to Vermont.[11]

The Town has a Town Manager-Selectboard form of government. There are five selectboard members with staggered three-year terms. The Selectboard works with the Town Manager, Town Counsel, and an Executive Assistant to manage Town business.[12]

People

As of 2020, 94.7% of the Town identified as White, 0.3% identified as Black or African American, 1.2% identified as Asian, and 2.9% identified as Hispanic or Latino. The foreign-born population in Town is 3.2%. There are approximately 2,884 households in Dalton and the median household income is $76,198. The number of people living in poverty is 7.9%. Forty-one percent of the Town, aged 25 years or older, have a high school or higher diploma.[13]

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[8] Open Space and Recreation Plan. (2020). Town of Dalton, Massachusetts.

[9] Open Space and Recreation Plan. (2020). Town of Dalton, Massachusetts.

[10] Open Space and Recreation Plan. (2020). Town of Dalton, Massachusetts.

[11] Open Space and Recreation Plan. (2020). Town of Dalton, Massachusetts.

[12] "Select Bard." (2023). Town of Dalton, Massachusetts.

[13] QuickFacts Dalton Town City, Massachusetts. (2022). United States Census Bureau.

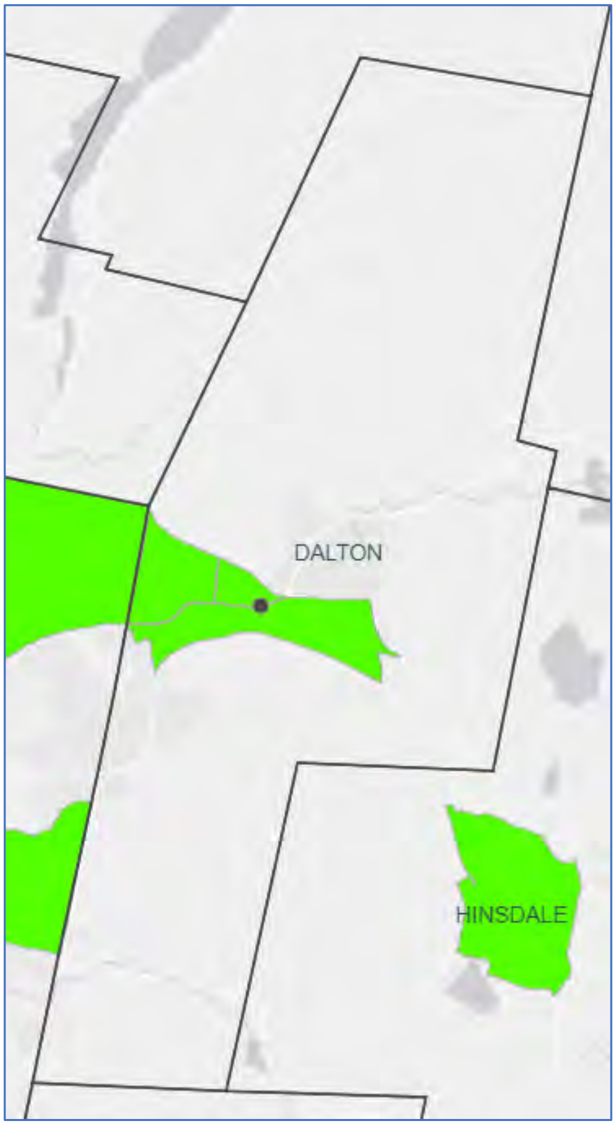

Figure 3. Dalton Environmental Justice Communities.

The State of Massachusetts' defines "Environmental Justice Populations" as areas of a community where at least one of the following criteria it true:

1. Annual median household income is 65% or less of the state's annual median household income.
2. Minorities make up 40% or more of the city or town's population.
3. Twenty-five percent or more of households speak English "less than very well."
4. Minorities make up 25% or more of the population *and* the annual median household income of the municipality where the neighborhood is located does not exceed 150% of the statewide annual median household income.[14]

These populations are more vulnerable due to being disproportionately affected by the negative impacts of natural hazards nationwide. The data for identifying Environmental Justice Populations comes from the Executive Office of Energy and Environmental Affairs (EEA) who uses American Community Survey data.[15]

The central part of Dalton has three census block groups that fit the "Income" Environmental Justice Criteria. The median household income in these three areas is 58-60% of the Massachusetts' Median Household Income.[16] A map of the Environmental Justice Populations is shown in Figure 3.

Land Use and Development (Structures)

Dalton is defined as having "a rough mountain wilderness exterior with a gentle rolling plain along the Housatonic River that allows for a strong town nucleus." On each side of the valley, Tully Mountain in

[14] "Environmental Justice Populations in Massachusetts." (2024). Commonwealth of Massachusetts. https://www.mass.gov/info-details/environmental-justice-populations-in-massachusetts

[15] "Environmental Justice Populations in Massachusetts." (2024). Commonwealth of Massachusetts. https://www.mass.gov/info-details/environmental-justice-populations-in-massachusetts

[16] "Massachusetts 2020 Environmental Justice Populations Map Viewer." (2022). State of Massachusetts.

the south, and Weston Mountain in the north rise over 2,000 feet. Due to the proximity of the mountains, about 70% of the Town's land has slopes of 15% or greater. [17] The steep slopes in Dalton have led to landslides and water run-off, negatively impacting the built and natural environments. Geographic Information Systems (GIS) data from 2016 identified 11,587 acres of forest and 240 acres of residential development in Dalton. Additionally, the Town has approximately 1,333 acres of "developed open space" and "grasslands," but due to inconsistent mapping technology, it is difficult to track land use changes historically in the Town.[18]

The earliest structures in Dalton that were built prior to 1900, were in the downtown between Housatonic Street and High Street and in areas off North Street. A large influx of development occurred between 1901 and 1950 when over 1,200 buildings were constructed. This development was predominantly in-fill development around Main Street and North Street. After 1950, "dense development spread throughout the Town and along outlying roadways." From 1951-1975, several subdivisions were developed off South Street, Grange Hall Road, Tower Road, Orchard Street, and East Housatonic Street. Sprawl has continued throughout the community with scattered developments across Dalton. There is a large block of undeveloped land on Grange Hall Road, that has been subdivided with plans for additional residential development.[19]

Dalton has nine zoning districts with four being residential and five being for commercial development along with several special districts which include an Open Space and Residential District, Floodplain Overlay District, Design Standard Overlay, and Scenic Mountain Act.[20] The Town's zoning was originally created in 1954 but has since been updated and recodified within the past decade.[21] The Town's Zoning Map can be in Figure 4.

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[17] Open Space and Recreation Plan. (2020). Town of Dalton, Massachusetts.

[18] Open Space and Recreation Plan. (2020). Town of Dalton, Massachusetts.

[19] Open Space and Recreation Plan. (2020). Town of Dalton, Massachusetts.

[20] Town of Dalton Master Plan. (2016). Town of Dalton, Massachusetts.

[21] Open Space and Recreation Plan. (2020). Town of Dalton, Massachusetts.

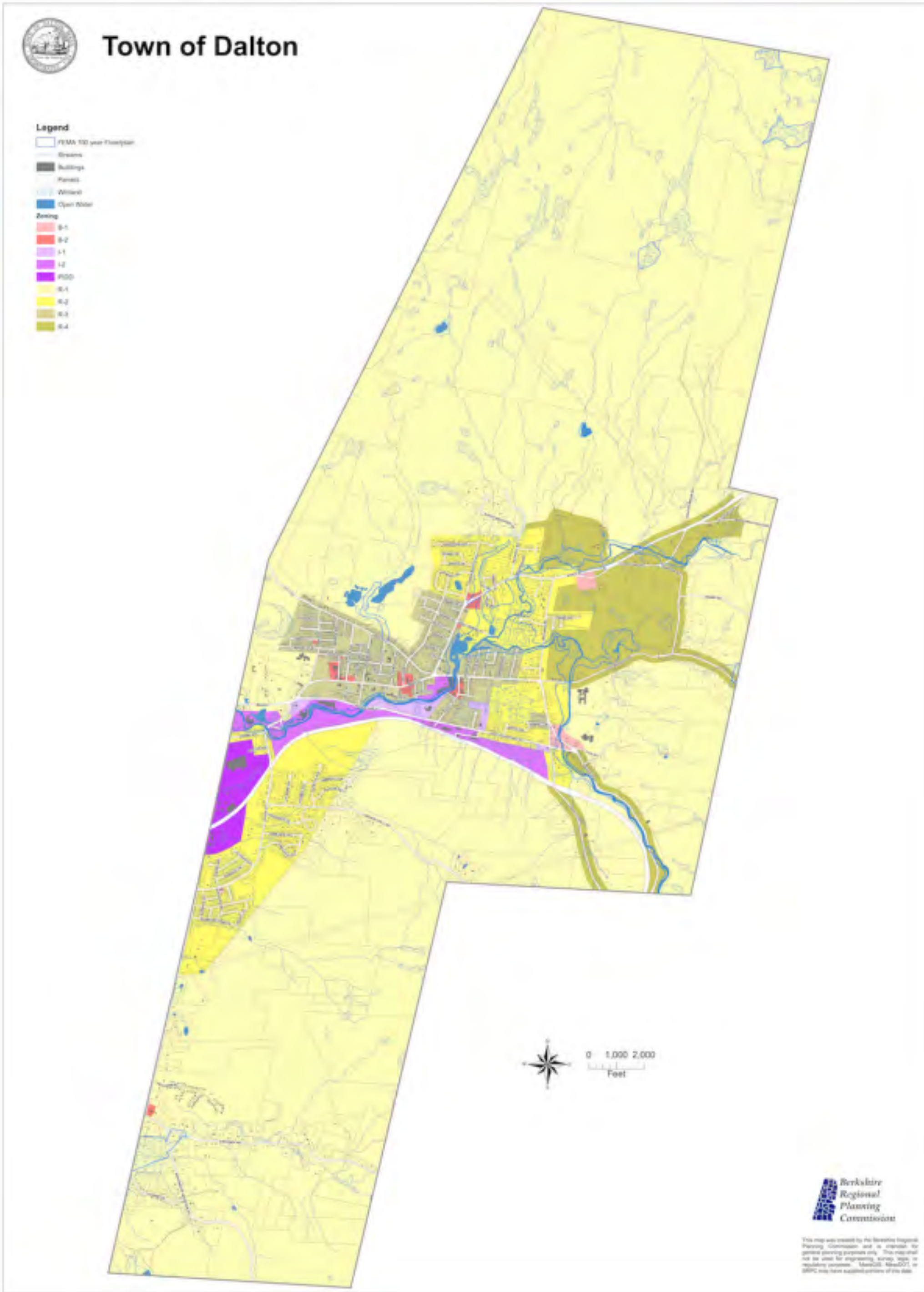

Figure 4. Town of Dalton Zoning Map. [22]

Natural Resources

Natural resources provide habitats for plants and animals, increase biodiversity, and support various ecosystems while also providing recreational opportunities and access to the natural environment. Natural resources include features such as bodies of water like rivers and wetlands and open space like forests and parks. These features play an important part in maintaining environmental sustainability and life, but they are also threatened by natural hazards and climate change. As a result, they need to be protected and managed to mitigate risk to people and the built environment, prevent irreparable damage to the resources themselves, and lessen the impacts of major threats such as floods or drought.

Rivers & Watersheds

The East Branch Housatonic River is a major river within Dalton. It is actively used for recreation, agriculture, and industry. There are several streams in Town that drain into the Housatonic River. Water flows from the headwaters and tributaries of the East Branch Housatonic River as it enters a broad floodplain area. It then joins upstream of Center Pond in downtown Dalton. Dalton is almost completely within the Housatonic River Watershed, but the northernmost part of Town is within the Hudson River Watershed.[23]

Figure 5. Housatonic River.

Wetlands

The Town has a few large wetland areas. According to 2012 Mass GIS Wetlands Data from the Department of Environmental Protection, there are approximately 400 acres of wetlands in Dalton which amounts to 3% of Dalton's land mass. The dominant wetland types are Wooded Swamp Deciduous, Shrub Swamp, and Wooded Swamp Coniferous. It is important to note that the GIS Data only recognizes larger wetlands, so the number of total wetlands is likely higher than 400 acres.[24] Most of the wetlands are part of floodplain areas in Town.

Critical Facilities and Infrastructure

Critical facilities and infrastructure are considered community lifelines; towns rely on these facilities before, during, and after a disaster. Critical facilities and infrastructure are important to identify and manage because of the services and access they provide daily. Mitigating risks related to natural hazards and climate change improves a town's resilience and economic vitality.

Water & Sewer Service

Water supply systems

Ninety-four percent of Dalton's potable water comes from the Cleveland Brook Reservoir in neighboring Hinsdale. The remaining 6% of water for residences outside of the existing water system comes from private wells. As a result, the Town relies solely on the water supplied from the Cleveland Reservoir

[23] Open Space and Recreation Plan. (2020). Town of Dalton, Massachusetts.

[24] Open Space and Recreation Plan. (2020). Town of Dalton, Massachusetts.

which is owned and operated by the City of Pittsfield. For emergencies, the Town has two 1.2-million-gallon storage tanks which are located off Reservoir Road and Pinecrest Drive.[25]

Wastewater systems

Over 90% of the Town is served by a sewer system that collects wastewater from Dalton and Hinsdale and then directs it to the Pittsfield Wastewater Treatment Facility.[26]

Stormwater System

The Town has an "extensive" stormwater drainage system. Dalton is an Environmental Protection Agency (MA EPA) designated "National Pollutant Discharge Elimination System" (NPDES) community which requires the Town to meet guidelines on stormwater discharges into streams and rivers. Dalton has a Stormwater Management Committee that oversees the implementation of its Stormwater Management Plan. In the future, the Town intends to develop storm drain mapping, partner with the Housatonic Valley Association to conduction monitoring, education and storm drain stenciling, and conduct an "Illicit Discharge Detection and Elimination Program."[27]

Energy

Dalton is working on a privately-owned solar array development on the old landfill located off Bridle Road. The Town would enter into a 20-year lease and purchase power agreement to reduce the cost of electricity for municipal buildings.[28]

The Town has been designated as a "Green Community" which includes a pledge to cut municipal energy use by 20% over five years and to meet the four other criteria established in the Green Communities Act.[29] The five criteria in the Green Communities Act include:

1. "Passing zoning in designated locations for the as-of-right siting of renewable or alternative energy generating facilities, research and development facilities, or manufacturing facilities."
2. "Adopting an expedited process and permitting of one year at most, under which facilities interested in locating their facility in a designated renewable zone may be sited within the municipality."
3. "Establish an energy use baseline inventory for municipal buildings and facilities (which can include schools, water, wastewater treatment plants and pumping stations, and open space), street and traffic lighting, and vehicles" and "adopt an Energy Reduction Plan (ERP) demonstrating a reduction of 20 percent of energy use after five years of implementation."

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[25] Open Space and Recreation Plan. (2020). Town of Dalton, Massachusetts.

[26] Open Space and Recreation Plan. (2020). Town of Dalton, Massachusetts.

[27] Open Space and Recreation Plan. (2020). Town of Dalton, Massachusetts.

[28] Open Space and Recreation Plan. (2020). Town of Dalton, Massachusetts.

[29] "Becoming a Designated Green Community." (n.d.). Commonwealth of Massachusetts.

4. "All departments within a Green Community to purchase fuel-efficient vehicles for municipal use, whenever such vehicles are commercially available and practicable."
5. "Minimize the life-cycle cost of all newly constructed homes and buildings. DOER recommends communities do this by adopting the Stretch Code (225 CMR 22 and 23). Buildings constructed to the Stretch Code use significantly less energy than buildings built to other current and previous building codes."[30]

Dalton has installed a charger for electric vehicles in addition to pursuing energy efficiency upgrades in the Town Hall. Other efforts include purchasing electric vehicles to be used by the Town Manager and departments that conduct inspections throughout the community, as well as a hybrid vehicle that will be used by the Police Chief. In 2018, the Town worked with the Green Dalton Committee and the Planning Department to install LED lights in their streetlights which has provided additional savings related to electricity costs for the Town.[31]

Telecommunications

Dalton approved the installation of two cellular phone towers, one of which will be owned by Time Warner Cable and the other by American Cable. Both towers are within the Chalet Wildlife Management Area. In addition to the two approved cell towers, the Town has one more located just outside of downtown on the Dalton American Legion property.[32]

Critical Facilities

The term "critical facilities" is often used to describe structures necessary for a community to respond and recover in emergency situations. These facilities often include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can

> The Local Mitigation Planning Handbook (FEMA, 2013) explains that *"Critical facilities are structures and institutions necessary for a community's response to and recovery from emergencies. Critical facilities must continue to operate during and following a disaster to reduce the severity of impacts and accelerate recovery. When identifying vulnerabilities, it is important to consider both the structural integrity and content value of critical facilities and the effects of interrupting their services to the community."*

[30] "Becoming a Designated Green Community." (n.d.). Commonwealth of Massachusetts.

[31] Open Space and Recreation Plan. (2020). Town of Dalton, Massachusetts.

[32] Open Space and Recreation Plan. (2020). Town of Dalton, Massachusetts.

impair search and rescue, emergency medical care, and even access to damaged areas.

The number and nature of critical facilities in a community can differ greatly from one jurisdiction to another, and usually includes both public and private facilities. Each community needs to determine the relative importance of the publicly and privately owned facilities that deliver vital services, provide important functions, and protect special populations.

A list of the critical facilities in Dalton is provided in the table below. This list was obtained from the previous edition of the hazard mitigation plan and the MVP-funded Community Resilience Building (CRB) plan; and reviewed by the HMPC throughout the planning process.

Of the thirty-six critical facilities, several have back-up power, indicated by an asterisk by the critical facility in the table below. The significant number of facilities with back-up power highlights the preparedness of the Town.

Table 2. Critical Facilities in the Town of Dalton.

Name	Address
Town Hall/Library*	462 Main Street
Dalton Fire Station*	20 Flansburg Avenue
Dalton Police Station*	462 Main Street
Department of Public Works	40 Gulf Road
Council on Aging	40 Field Street
Nessacus Middle School*	35 Fox Road
Wahconah High School*	150 Old Windsor Road
Craneville Elementary School	71 Park Avenue
St. Agnes Academy	30 Carson Avenue
Pomeroy Manor Housing	35 East Deming Street
Craneville Place at Dalton*	265 Main Street
Pine Grove Manor	293 High Street
River Run Apartments	600 Main Street
Sugar Hill Assisted Living*	45 Main Street
Dalton Senior Manor*	83 Curtis Avenue
Verizon Substation (MA843107)*	50 South Carson Avenue
Dalton Cooperative Nursery School	400 Main Street
Pittsfield Bear Care, Inc.	1080 South Street
Dalton Community Recreation Center	400 Main Street
American Legion Post #155	258 North Street
Stationery Factory	63 Flansburg Ave
Cleveland Reservoir*	Old Windsor Road

Name	Address
Bay State Mill Pump Station	30 Main Street
Housatonic Street Pump Station #1*	130 Housatonic Street
Housatonic Street Pump Station #2*	130 Housatonic Street
Pumping Station*	North Street
Wahconah Falls Well Site*	Wahconah Falls Road
Washington Mountain Road Pump Station*	100 Washington Mountain Road
Day Mountain Tower	Flinstone Road
American Legion Post #155	258 North Street
Tower	Housatonic Street
Windsor Mountain Tower	Crane Road
Monehan Road Tower	15 Monehan Road
Reservoir Road Water Tower*	Reservoir Road
Pinecrest Drive Water Tower*	Pinecrest Drive
Water Department Stockhouse*	Old Windsor Road

Critical Transportation Infrastructure

Dalton has two major regional roadways. Route 8 runs north from Hinsdale and then heads west to Pittsfield after entering Dalton's downtown. Route 9 travels along Route 8 from Pittsfield as it enters Dalton's downtown and then turns north into Windsor. Regional roadways are under the jurisdiction of the Massachusetts Department of Transportation (MassDOT) who maintains about 6.6 miles of roadways in Town.[33]

The Town has several collector roads that connect local access roads to arterial roads. These roads include "South Street, East and West Housatonic Street, Dalton Division Road, Grange Hall Road, Park Street, High Street, Glennon Avenue, Depot Street and Orchard Road." The Town maintains 39.9 miles of roadways. In addition, Dalton has 4.2 miles of privately-owned and privately maintained roads. [34]

For public transit, Dalton has one bus route that is available through the Berkshire Regional Transit Authority (BRTA). BRTA also has a paratransit service that provides transportation for elderly and disabled residents via an on-demand ride service. The Council on Aging also provides a van service to those over 60 or who are disabled.[35]

[33] Open Space and Recreation Plan. (2020). Town of Dalton, Massachusetts.

[34] Open Space and Recreation Plan. (2020). Town of Dalton, Massachusetts.

[35] Open Space and Recreation Plan. (2020). Town of Dalton, Massachusetts.

Dams

Dalton has one high hazard (Egypt Reservoir) and two significant hazard dams (Byron Weston Dams #1 and #2). There is also one low hazard dam and six dams which have not been assigned a hazard level. Out of the ten dams in Town, half are privately-owned, and half are publicly owned. There are also several beaver dams. The dams are listed below in alphabetical order:

1. Ashey Lower Reservoir (OLD) Dam - Public
2. Bay State Pond Dam - Private
3. Byron Weston Dam #1 - Private
4. Byron Weston Dam #2 - Private
5. Dalton Water Supply Dam #1 - Public
6. Egypt Reservoir - Public
7. Hathaway District Dam - Public
8. Old Berkshire Mill Dam - Private
9. Sackett District Dam - Public
10. Upper Pioneer Pond Dam – Private.

Figure 6. Cleveland Dam.

Economy

As of 2020, Dalton's top three industries by occupation according to the United States Census include:

1. Educational services, healthcare and social assistance
2. Professional, scientific, and management, and administrative and waste management services
3. Retail trade.[36]

Historic and Cultural Resources

Historic and cultural resources shape a community's character and identity while also creating a sense of place for residents and visitors. Many New England cities and towns are home to significant sites and structures that capture the history and heritage of an area. Some resources may date back centuries, like burial grounds, while others can be more recent, like newly designated historic districts. Their importance lies in what they mean to a community and how they represent its people and place. Historic and cultural resources can be at risk due to the negative impacts of natural hazards and climate change. This plan identifies these resources so the HMPC may consider their vulnerability and potential need for mitigation.

[36] "Industry By Occupation for the Civilian Employed Population 16 Years and Over ACS 5-Year Estimates." (2020). United States Census Bureau.

Dalton's historic paper mill heritage can be seen along Main Street. Many of the "stately brick homes" were built by members of the Crane family, a prominent family in Town. In 1907, Sugar Hill, currently an extended care facility, was originally built for Senator Winthrop Crane. Model Farm was built in 1806 which is now owned by an investment firm. The Town is also home to the Crane Museum which shares history about the Crane Family and how paper was made; however, the original museum location has closed. [37]

The Town has more than 760 buildings, monuments, and other historic resources listed in the Massachusetts Cultural Resource Information System database (MCRIS). There are several sites that are on the National Register of Historic Places, and they include:

- Craneville Historic District
- Dalton Grange Hall site
- Crane Museum (Old Stone Mill Rag Room)
- Fitch-Hoose House
- East Street Cemetery
- Main Street Cemetery
- Fairview Cemetery.[38]

The Craneville Historic District includes 264 buildings that are spread over 154 acres. The Fitch-Hoose House is in an area of Town called "The Gulf," which is an African American enclave that sheltered individuals who fled from slavery. The restored home is now an interpretive museum that "honors the families that came to the area for safety and freedom." The House and Gulf Road where it is located are part of the Upper Housatonic Valley African American Heritage Trail and are also believed to have been part of the Underground Railroad. [39]

Additional significant sites include the Appalachian National Scenic Trail (AT) which travels through Dalton and has several access points throughout the Town and neighboring communities. Hikers traveling the AT are a familiar sight in Dalton as they visit the local motel, shops, and restaurants to rest and restock supplies.[40]

All these historical and cultural resources must be considered in future hazard mitigation planning due to the risk of the Town's significant districts, sites, and structures being damaged or threatened by natural hazards and climate change.

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[37] Open Space and Recreation Plan. (2020). Town of Dalton, Massachusetts.

[38] Open Space and Recreation Plan. (2020). Town of Dalton, Massachusetts.

[39] Open Space and Recreation Plan. (2020). Town of Dalton, Massachusetts.

[40] Open Space and Recreation Plan. (2020). Town of Dalton, Massachusetts.

Chapter 3. Planning Process

The planning process was developed in full compliance with the current planning requirements of the Federal Emergency Management Agency (FEMA) per the following rules and regulations:

- Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288), as amended by the Disaster Mitigation Act of 2000
- Code of Federal Regulations – Title 44, Chapter 1, Part 201 (§201.6: Local Mitigation Plans)
- Federal Emergency Management Agency Local Mitigation Planning Policy Guide, (Released April 19, 2022, Effective April 19, 2023)
- In addition, the plan was prepared with the suggestions found in the Demonstrating Good Practices Within Local Hazard Mitigation Plans, FEMA Region 1, January 2017.

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

A priority through the planning process was equity, which FEMA defines as the "consistent and systematic fair, just and impartial treatment for all individuals." This was a central theme throughout the planning process and effort was made to develop an inclusive planning process. The whole community (individuals, communities, private and nonprofit sectors, faith-based organizations, and all levels of government) were given an opportunity to participate.

The planning process for this updated mitigation plan began in September 2023 and concluded in April 2024 (this does not include the months of plan review and adoption). The Town developed a 2019 Municipal Vulnerability Preparedness (MVP) Program Summary of Findings. This planning effort contributed to the update of the mitigation plan. Below is a graphical display of the plan development timeline.

Table 3. Planning Process Schedule.

	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Task 1. Convene Local HMPC	Kick-off Meeting	HMPC Meeting	HMPC Meeting & Public Meeting		HMPC Meeting	HMPC Meeting	Public Meeting	
Task 2. Update Hazard Profiles								

	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Task 3. Update Critical Facility Inventory								
Task 4. Update Mitigation Goals								
Task 5. Update Mitigation Actions								
Task 6. Plan Review, Evaluation, and Implementation							Complete Draft for HMPC Review	
Task 7. Public Review of Draft							Public Review	
Task 8. Review and Approval								Submit Plan to MEMA

Hazard Mitigation Planning Committee

The Emergency Management Director, Glenn Lagerwall, developed the Hazard Mitigation Planning Committee (HMPC) and was the point of contact for the Consulting Team. The HMPC included Town employees and residents who represented six sectors of the community shown in the table below. A full list of HMPC members is shown in the table after that. The HMPC met four times, October 25, 2023, November 29, 2023, January 24, 2024, and February 29, 2024. All the meetings were conducted via Zoom, however sometimes Town employees gathered at the Town office. A list of participants at each of these meetings is included in Appendix A.

Table 3. Sectors of the Community Represented on the HMPC.

Sectors of the Community	HMPC Members
• Emergency Management	• Emergency Management Director • Firefighter/Emergency Medical Technician • Police Department • Safety Coordinator (Crane Currency)
• Economic Development	• Town Manager

Sectors of the Community	HMPC Members
	• Town Planner
• Land Use and Development	• Building and Grounds • Building Inspector • Conservation Commission Chair • Conservation Commission Member • Dalton Green Committee • Department of Public Works Superintendent • Senior Planner – Public Health (Berkshire Regional Planning Commission) • Town Manager • Town Planner • Water Department
• Health and Social Services	• Director of Facilities (Central Berkshire Regional School District) • Emergency Management Director • Firefighter/Emergency Medical Technician • Health Inspector • Police Department • Senior Center • Senior Planner – Public Health (Berkshire Regional Planning Commission) • Safety Coordinator (Crane Currency)
• Infrastructure	• Building and Grounds • Building Inspector • Department of Public Works Superintendent • Town Manager • Town Planner • Water Department

Sectors of the Community	HMPC Members
• Natural Resources	• Conservation Commission Chair • Conservation Commission Member • Dalton Green Committee

Table 4. HMPC Members.

First Name	Last Name	Title	Affiliation	Phone	Email
Bob	Benlien	Water Department	Town of Dalton	413-684-6118	Bob.Benlien@daltonfiredistrict.org
Matthew	Bryan	Senior Planner (Public Health)	Berkshire Regional Planning Commission - Public Health	413-442-1521 x30	mbryan@berkshireplanning.org
Jeff	Burch	Building and Grounds	Town of Dalton	413-684-6111 x115	jburch@dalton-ma.gov
Jason	Dion	Director of Facilities	Central Berkshire Regional School District (CBRSD)	413-684-0320	jdion@cbrsd.org
Brian	Duval	Building Inspector	Town of Dalton	413-684-6111 x301	bduval@dalton-ma.gov
Bud	Hall	Department of Public Works Superintendent	Town of Dalton	413-684-6115 x501	bhall@dalton-ma.gov
Mike	Higgins	Safety Coordinator	Crane Currency	413-684-2600	Michael.Higgins@cranecurrency.com
Tom	Hutcheson	Town Manager	Town of Dalton	413-684-6111 x201	thutcheson@dalton-ma.gov
Glenn	Lagerwall	Emergency Management Director	Town of Dalton	413-684-6111 x116	em@dalton-ma.gov
Todd	Logan	Green Dalton Committee	Town of Dalton	413-242-4410	todd.c.logan@gmail.com
Morgan	McDonough	Firefighter/EMT	Dalton Fire	413-684-6118	cmcd22@gmail.com
Tyler	Miller	Police Department	Town of Dalton	413-684-0300	tmiller@dalton-ma.gov

First Name	Last Name	Title	Affiliation	Phone	Email
Cheryl	Rose	Conservation Commission Chair	Town of Dalton	413-684-611 x221	conservationcommission@dalton-ma.gov
Henry	Rose	Conservation Commission Member	Town of Dalton	413-684-611 x221	rosehenryj@gmail.com
Janko	Tomasic	Town Planner	Town of Dalton	413-684-6111 x304	jtomasic@dalton-ma.gov
Agnes	Witkowski	Health Inspector	Town of Dalton	413-684-6111 x302	awitkowski@dalton-ma.gov
Pattie	Yates	Senior Center	Town of Dalton	413-992-7652	yankspatti63@yahoo.com
Jeffrey	Zukowski	Hazard Mitigation Planner	MA Emergency Management Agency	508-820-1422	jeffrey.zukowski@state.mas.us

A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))

The first HMPC Meeting was held on October 25, 2023, and provided an opportunity for the consulting team and the Emergency Management Director to introduce the HMPC to the mitigation planning process. After an introduction to the plan, the HMPC identified natural hazards and critical facilities noting that the Senior Center can act as a cooling or warming center; however, it cannot accommodate a generator. It was then discussed that Wahconah High School can take on that role in the future. Other critical facilities that were highlighted include the Crane Company buildings, the Community Recreation Center, the Library, Elder Care Services, and the Middle School.

Regarding natural hazards, flooding has been a concern, but the Town has Emergency Action Plans in place for all four dams located in Dalton alongside a Spill Prevention Plan. Flooding does still occur at the high school, along the river, the local golf course, and at Pomeroy Manor, a residential housing development, which has required residents to temporarily evacuate the area in the past. The HMPC also discussed a severe winter storm in 2023 that led to severe tree damage and widespread outages. The storm cleanup took over three weeks.

The Town Planner and the Planning Board regulate development in the Town of Dalton. The HMPC members noted that there have been a few changes in development. The first includes a large project in Walker Brook that has previously been prone to flooding. Dalton has also built a new high school (Wahconah High School) that has incorporated rain gardens into its landscape design. After this discussion, the HMPC identified the Town's priorities as managing flooding, improving communication with Town residents, and improving the center of Town.

The second HMPC meeting, held on November 29, 2023, began with a discussion of the Town's capabilities. The HMPC stated that the Town's maps are old and need updating, and that education and outreach need to be improved. There have been increased efforts to update the Town's website. The meeting then went on to discuss each natural hazards and reviewed impacts over the last five to ten years. The main hazards that were discussed focused on flooding once again, primarily at the Wahconah Country Club and Wahconah High School, as well as Pomeroy Manor and the Dalton Housing Authority which are affected frequently. Additional hazards include landslide risks due to unstable stream embankments, wildfire risks due to railroad tracks sparking brush fires, and ensuring dams are well managed to avoid dam breaches that would affect the Town.

The focus for the third HMPC meeting, held on January 24, 2024, began with a discussion on communication capabilities and how the Town should improve its communication with a newsletter, email blast program, and upgrading the Town's website. The HMPC then outlined their public outreach strategy for their second public meeting which included increasing publicity by sharing flyers, posting on social media, placing advertisements around Town, and choosing an accessible day and time. The previous meeting was held during the evening but was not well attended, so a daytime was recommended.

The meeting then went onto a discussion of hazards, hazard rankings, and the creation of mitigation actions. The HMPC noted a concern with illness and public health emergencies as they relate to natural hazards. Regarding hazards and managing the natural environment, the Town has implemented a Municipal Wetlands Bylaw as of 2023. The HMPC discussed the need for alternative power sources during severe storm events which require additional education, awareness, and staffing. The Town said they planned to incorporate the Community Emergency Response Team (CERT) Program by summer.

The HMPC stated for implementation of the Hazard Mitigation Plan Update, the Emergency Management Director will schedule a meeting twice a year and meetings post-disaster.

The focus for the fourth HMPC meeting, held on February 29, 2024, was planning their second public meeting. The HMPC wanted to work on advertising the meeting better so that more people could attend. One HMPC member requested the meeting be held on a Sunday afternoon, but the rest of the committee did not agree to this time. Further discussion was had regarding the public plan review. The HMPC agreed to stage hard copies of the plan at the Library, Senior Center, Community Recreation Association, and Town Hall, as well as making it available online. The meeting ended with a discussion on private burning to eliminate debris which could cause air quality issues. The Composting Sub-Committee also discussed how to manage compost in the Town.

The Emergency Management Director then discussed a meeting he had with the neighboring Town of Hinsdale where they discussed hazards related to the river, flooding, and dams. They also discussed the railway that passes through the area and potential risks that come with that. There was also mention of increasing collaboration and going out for grants to fund projects on a regional basis.

The HMPC also participated in two public meetings, one on November 27, 2023, and one on March 8, 2024. Finally, the HMPC reviewed the draft Town of Dalton, MA Hazard Mitigation Plan Update prior to sending it to the Massachusetts Emergency Management Agency (MEMA) for their review in April 2024.

Public Outreach

A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))

The Public Outreach Strategy was designed to involve the whole community in the mitigation planning process. The public was engaged in the planning process during the drafting of the plan and prior to plan approval through two public workshops (a flyer for the first workshop is shown below). Both public meetings were held in a hybrid format, in-person and on Zoom. The public was also given a chance to look over the plan and provide feedback prior to its review by MEMA or FEMA. The purpose of public engagement was to:

- Generate public interest in mitigation planning.
- Identify and accommodate special populations.
- Solicit public input.
- Engage local stakeholders.
- Create opportunities for public and local stakeholders to be actively involved in the mitigation planning process.

Each public meeting included a PowerPoint presentation and plenty of opportunity for questions and discussion. In addition, Mentimeter was used to facilitate input from meeting participants in the first public meeting. This has proven to be an effective tool when engaging people who may not be comfortable speaking up in a virtual meeting. The HMPC participated in each meeting.

__COMMUNITY LIFELINES__ are the most fundamental services in the community that, when stabilized, enable all other aspects of society.

Representatives from all community lifelines were included in public engagement efforts. Community lifelines are a driving force behind FEMA's strategic goals for building a culture of preparedness and readying the nation for catastrophic disasters. The eight community lifelines can be a powerful tool for local governments when evaluating risk and developing mitigation actions. The HMPC considered the eight community lifelines when conducting outreach through this planning process. The eight community lifelines and their respective components are shown in the figure below.

Figure 7. Community Lifelines.

Outreach for the public meetings and for plan review was sent via press release, email blasts, flyer postings, and reaching out to adjacent communities. The Town website (https://dalton-ma.gov) included announcements for meetings, the press releases were sent to local organizations and posted around the Town at frequented buildings including churches, the Town Library, Senior Center, Community Recreation Association. The Selectboard posted announcements to Facebook.

To reach underserved communities and vulnerable populations the HMPC relied on assistance from the school district, the Council on Aging, and postings at the Public Library. The Town Manager and Town Planner assisted with this outreach.

Information gathered during the public meetings contributed to the plan's development. The first public meeting was held on **November 27, 2023,** in conjunction with a Select Board meeting.

The meeting asked participants a series of questions to engage them and help them understand the process of developing a hazard mitigation plan. The questions are listed below.

- Who lives and works in your community?
- What buildings and infrastructure are critical to your community?
- What weather related hazards can impact your community?
- Name specific locations in your community that flood or are vulnerable to natural hazards.
- What can be done to mitigate risks you have identified? Think of activities to protect the people, buildings, and infrastructure named previously.

Figure 8. Public Meeting Flyer.

When asked "What are the characteristics of Dalton that you like best?" a Word Cloud generated from the responses can be seen in the figure below:

Figure 9. Word Cloud from Public Meeting.

When asked about concerns about natural hazards in the Town of Dalton the following responses were provided:

- Flooding
- Drought
- Extreme Cold
- Heavy Winter Storms and Snow
- River Overflow
- Forest Fires, Fires, and Wildfires
- Heat
- Chemical Trains

The meeting participants also discussed several critical facilities that they believed the Town relies on before, during, and after a disaster. Many of the facilities aligned with what the HMPC had discussed in previous meetings and included:

- Senior Center
- Fire Station
- Town Hall
- Stationary Factory
- Schools
- Library
- American Legion
- Church
- Wastewater Treatment Facility
- Transfer Station
- Shelters
- Dalton Community Recreation Association
- Department of Public Works
- Code Red Communications
- Education

The second public meeting was held on **March 8, 2024,** during the day to attract an audience who would not attend an evening meeting. Attendance was small and included a reporter who developed an article after the meeting (shown in Appendix B). In addition to the presentation, discussion was centered Town By-Laws as well as the Town potentially trying for Accessory Dwelling Units (ADUs) and single family housing developments. The conversation then went onto the next steps for implementing the plan and how to review the draft plan.

Contributions from the HMPC and public engagement impacted the plan in multiple ways. The table below indicates some of the contributions, others are included above and throughout the plan.

Table 5. Areas Where the HMPC and the Public Informed the Planning Process.

Area of the Plan Impacted	Contributions
Planning Area Profile	• The HMPC updated the list of critical facilities, shown in Appendix B. They also contributed information regarding current land use practices and priorities. • The public communicated the priorities of protecting natural resources.
Planning Process	• Participated in every aspect of the planning process and made recommendations regarding how to engage the public and key stakeholders. • Community engagement and transparency between the Town and residents was communicated as a priority by two Town residents.
Risk Assessment	• Described extent of hazard impacts based on previous events. • Offered first-hand insight and experiences of Town residents. • Added the qualitative review to the risk analysis for determination of the hazard risk ranking.
Capability Assessment	• Contributed plans, bylaws, and reports for review. • Completed three Capability Assessment questionnaires including the National Flood Insurance survey and the Safe Growth survey.
Mitigation Strategy	• Identified and prioritized mitigation actions based on their concerns. • Focused on the concerns raised by community members.
Implementation Plan	• Committed to integrating this plan more thoroughly throughout Town government and to posting the plan on the Town's website and increasing awareness of hazard mitigation.

List of Key Stakeholders Invited to Public Meetings

The following groups were considered "key stakeholders" and invited to public meetings and to review the draft plan.

- Members of all Dalton Committees
- Members of all Dalton Boards

- Town of Dalton Employees
- Town of Cheshire
- Town of Washington
- Town of Windsor
- Town of Hinsdale
- Town of Pittsfield
- Town of Lanesborough
- Berkshire Regional Planning Commission
- Central Berkshire Regional School District

Review of Draft Plan

The Town made the plan available for public review in April 2024. A press release announcing the availability to review the plan was sent and flyers were posted throughout Town. An announcement was posted to the Town's website. The HMPC sent emails to all Town Boards, Committees, and employees. Email announcements were also sent to Berkshire Regional Planning Commission, Central Berkshire Regional School District, and the adjacent towns of Cheshire, Washington, Windsor, Hinsdale, Pittsfield, and Lanesborough. Hard copies of the plan were kept in the Emergency Management Director's Office and Town Hall. Comments from the public were collected by the Emergency Management Director. The one comment received included specifying that evacuation exercises would be conducted with both Pine Grove Manor residents and Pomeroy Manor residents (Mitigation Action #2).

Chapter 4. Risk Assessment

Hazard Identification

> ***RISK** for the purpose of hazard mitigation planning, is the potential for damage or loss created by the interaction of natural hazards with assets, such as buildings, infrastructure, or natural and cultural resources.*

The first step in the risk assessment was to revisit and evaluate the hazards identified for study and inclusion in the Town's previous draft hazard mitigation plan. This was a key topic of discussion at the first Hazard Mitigation Planning Committee (HMPC) meeting, along with the consideration of any additional hazards to include in the updated risk assessment. While only natural hazards are required to be addressed by FEMA, other hazards such as technological and human-caused hazards may be included if they are of significant concern to the community and determined to be a mitigation priority.

In completing the updated hazard identification process, the HMPC considered the results of the Town's Municipal Vulnerability Preparedness (MVP) planning effort (completed in 2019), as well as the "ResilientMass Plan" (2023[41]) which is the formal update to the 2018 State Hazard Mitigation and Adaptation Plan (SHMCAP). As a result of this process all hazards from the prior hazard mitigation plan (adopted in 2018) remain in this updated risk assessment. Coastal hazards are not included because Dalton is a land-locked community in Western Massachusetts. For this updated assessment, some hazards have been consolidated or renamed to be consistent with the ResilientMass Plan, as further described below. The top natural hazards identified for the MVP effort are thoroughly covered in this assessment. Invasive species as a hazard was added to reflect the concern for this becoming a more prevalent challenge with projected climate change; and to ensure that the risk assessment is aligned with the ResilientMass Plan. The profiled hazards are as follows:

- Average/Extreme Temperatures
- Drought
- Earthquakes
- Flooding from Precipitation and Dam Overtopping
- Hurricanes and Tropical Storms
- Invasive Species
- Landslides
- Other Severe Weather

[41] https://www.mass.gov/doc/resilientmass-plan-2023

- Severe Winter Storms
- Tornadoes
- Wildfires

One "hazard" profiled in the ResilientMass Plan – "changes in groundwater" – is included as appropriate in the flood and drought hazard profiles in this plan.

Massachusetts Emergency Declarations

The Town of Dalton has been subject to numerous federal disaster declarations along with the entirety of Berkshire County. Some of these disaster declarations correspond to emergency declarations in portions of Massachusetts. The following table cross-references the 13 Massachusetts emergency declarations starting in 2011 with the corresponding federal disaster declarations. All the Massachusetts emergency declarations corresponding to Dalton have involved natural hazards addressed in this plan except for the shelter capacity crisis, which is not a natural hazard and not profiled in this plan. Hazards that do not appear in this table (i.e., earthquakes) have not been subject to Massachusetts emergency declarations.

Table 4. Massachusetts Emergency Declarations.

Massachusetts Emergency	Start	Termination	Corresponding Federal Disaster Declaration	FEMA Public Assistance Available	Applicable to Dalton?
Storm Lee	9/15/2023	9/16/2023	Not applicable	Not applicable	Yes
Severe Weather and Flooding	9/12/2023	9/16/2023	Not applicable	Not applicable	Yes
Shelter Capacity Crisis	8/8/2023	Pending	Not applicable	Not applicable	Yes, but not a natural hazard and not a FEMA declaration for Massachusetts
COVID-19	3/10/2020	5/11/2023	DR-4496-MA	All counties	Yes
Merrimack Valley Gas Explosion	9/14/2018	10/4/2018	Not applicable	Not applicable	No

Massachusetts Emergency	Start	Termination	Corresponding Federal Disaster Declaration	FEMA Public Assistance Available	Applicable to Dalton?
Coastal Storm	3/3/2018	3/6/2018	DR-4372-MA	Essex, Norfolk, Plymouth, Bristol, Barnstable, and Nantucket Counties	No
Winter Storm	2/9/2015	2/25/2015	Not applicable	Not applicable	No
Winter Storm	1/26/2015	1/28/2015	DR-4214-MA	Worcester County and eastward	No
Winter Storm	2/8/2013	2/13/2013	DR-4110-MA	All counties	Yes
Hurricane Sandy	10/27/2012	11/1/2012	DR-4097-MA	Suffolk, Bristol, Plymouth, Barnstable, Dukes, and Nantucket Counties	No
Nor'easter	10/29/2011	11/7/2011	DR-4051-MA	Berkshire, Franklin, Hampshire, Hampden, Worcester, and Middlesex Counties	Yes
Hurricane Irene	8/26/2011	9/6/2011	DR-4028-MA	Berkshire, Franklin, Hampshire, Hampden, Norfolk, Bristol, Plymouth, Barnstable, and Dukes Counties	Yes

Massachusetts Emergency	Start	Termination	Corresponding Federal Disaster Declaration	FEMA Public Assistance Available	Applicable to Dalton?
Tornadoes	6/1/2011	6/19/2011	DR-1994-MA	Hampden and Worcester Counties	No

Link to Massachusetts Climate Change Assessment

The *2022 Massachusetts Climate Change Assessment* report was issued in December 2022 (https://www.mass.gov/info-details/massachusetts-climate-change-assessment#read-the-report-). This report provided statements about the impacts of climate change in five sectors within each of seven designated regions of Massachusetts. Dalton is in the “Berkshires and Hilltowns” region shown in dark green in the figure below.

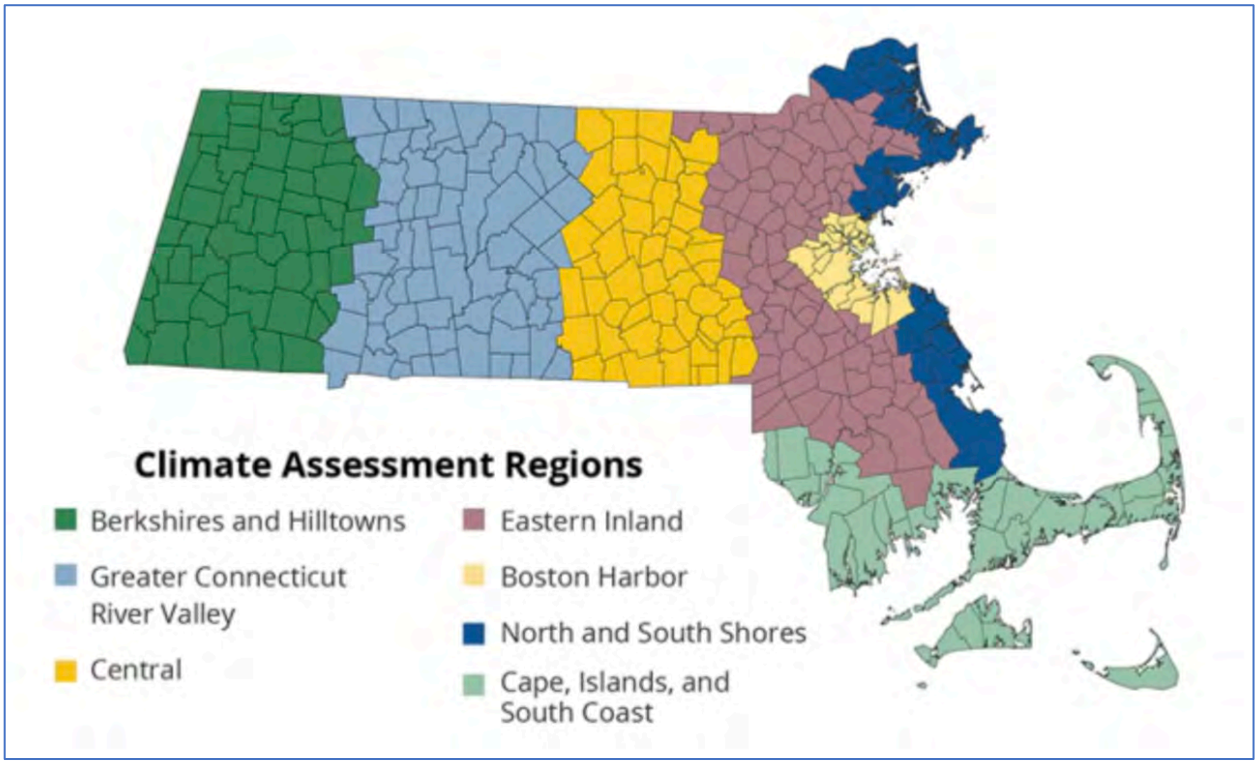


Figure 10. Climate Assessment Regions. Dalton is in the Berkshires and Hilltowns Region.

The table below lists the top two or three impacts of climate change in each of the five sectors within this region.

Table 5. Top Impacts of Climate Change per Sector in Berkshires and Hilltowns Region.

Sector	Top Impacts per Sector	Comments
Human	Increase in vector-borne disease incidence and bacterial infections	Including West Nile Virus and Lyme due to favorable conditions for mosquitos and ticks
	Reduction in food safety and security	Causes are production and supply chain issues as well as spoilage during outages
Infrastructure	Damage to buildings	Causes are heavy rainfall and overwhelmed drainage
	Reduction in clean water supply	Causes are changes in precipitation, flooding of surface water supplies, risks to dams, and droughts
	Damage to electric transmission and distribution	From heat stress and extreme storms
Natural Environment	Freshwater ecosystem degradation	Causes are warming waters, drought, and runoff
	Forest health degradation	Causes are warming temperatures, changing precipitation, wildfire frequency, and increasing pests
Governance	Increase in costs of responding to climate migration	Includes planning for abrupt increases in local populations
	Increase in demand for State and municipal services	Emergency response, food assistance, and health care
Economy	Reduction in availability of affordably priced housing	Direct damage (floods) and scarcity caused by demand
	Damage to tourist attractions and amenities, particularly those associated with seasons	All hazards may impact seasonal tourism, from flooding to droughts, and from invasive species to wildfires. Changes in temperatures and winter storms will affect winter recreation.

The Town proposes to incorporate these top climate change impacts in this edition of its plan as outlined below.

Table 6. How This Plan Addresses the Top Impacts of Climate Change per Sector.

Sector	Top Impacts per Sector	Approach to Incorporating Impacts
Human	Increase in vector-borne disease incidence and bacterial infections	Vector-borne and infectious diseases are a hazard profiled in this plan.
	Reduction in food safety and security	Local droughts that impact food security will be addressed. Food safety and security nationwide will not be directly addressed, but the capability assessment will help describe town wide capabilities for food security.
Infrastructure	Damage to buildings	Damage to buildings is addressed in the vulnerability assessment for each hazard.
	Reduction in clean water supply	Droughts are profiled in this plan. Hazards that can secondarily affect water supply such as invasive species and severe storms (which can cause power outages) are also profiled.
	Damage to electric transmission and distribution	Severe weather events that damage transmission and distribution are hazards profiled in this plan.
Natural Environment	Freshwater ecosystem degradation	Changes in precipitation, drought, and invasive species are all hazards addressed in this plan.
	Forest health degradation	Extreme temperatures, changing precipitation, wildfires, and invasive species are all hazards addressed in this plan.
Governance	Increase in costs of responding to climate migration	The capability assessment and related mitigation actions will help address response functions.
	Increase in demand for State and municipal services	The capability assessment and related mitigation actions will help address increased demands for municipal services.
Economy	Reduction in availability of affordably priced housing	The individual hazards addressed in this plan can reduce the availability of affordably priced housing, and the specific actions for each hazard will help protect housing options and opportunities.

Sector	Top Impacts per Sector	Approach to Incorporating Impacts
	Damage to tourist attractions and amenities, particularly those associated with seasons	The hazards that may impact seasonal tourism are discussed in this plan.

Hazard Profiles

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)(s)(i))

B2. Does the plan include a summary of the jurisdiction's vulnerability and the impacts on the community from the identified hazards? Does the summary also address NFIP-insured structures that have been repetitively damaged by floods? (Requirement 44 CFR §201.6(c)(s)(ii))

***IMPACTS** are the consequences or effects of each hazard on the participant's assets identified in the vulnerability assessment. For example, impacts could be described by referencing historical disaster damages with an estimate of potential future losses (such as percentage of damage vs. total exposure).*

The risk assessment for the ResilientMass Plan describes the natural hazards that have the potential to impact the Commonwealth and provides the underlying narrative for this hazard profile for the Town. Because this section repeats information from the ResilientMass Plan, some citations have been removed for brevity. The original citations can be found in the ResilientMass Plan.

Profiles have been developed for each identified hazard, organized by primary climate change interaction. Hazard profiles include the following sections: Hazard Description, Location, Previous Occurrences, Extent, Probability of Future Events, and Vulnerability Assessment; these are described in the table below.

Table 7. Hazard Characterization.

Category/Method	Definition
Description	Description of hazard, its characteristics, and potential effects.
Location	Describes geographic areas within the town that are affected by the hazard.

Category/Method	Definition
Previous Occurrences	Provides information on the history of previous hazard events for the region, including their impacts on people and property.
Extent	Describes potential strength or magnitude of a hazard. Where possible, extent is described using established scales.
Probability of Future Events	Describes likelihood of future hazard occurrences in the town based on best available and climate-informed science.
Vulnerability Assessment	Describes potential impact on the community, including estimated potential losses and the anticipated effects of climate change.

To describe previous occurrences, this plan update highlights major events from history but relies primarily on a roughly ten-year lookback (2014 through 2023) ending with any events from the date of plan development (2023-2024). This helps maintain a concise narrative. Where applicable, narratives about warning times (i.e., floods, heat advisories, and wildfires) are incorporated into the *"Extent"* subsections.

***VULNERABILITY** is a description of which assets, including structures, systems, populations and other assets as defined by the community, within locations identified to be hazard prone, are at risk from the effects of the identified hazard(s).*

The vulnerability assessment characterizes how hazards have impacted and may impact the different aspects of the community. In the vulnerability assessment sub-sections, the magnitude and likelihood of a hazard event are evaluated, and impacts are quantified using hazard models. Some hazards, like earthquakes and winter storms, will impact the entire community while other hazards, like floods and landslides, impact specific locations in the community. The areas that could be impacted are defined as the community's exposure. The results of the vulnerability assessment are used to help identify mitigation measures the community may take to lessen the impact and better understand their benefits.

Average and Extreme Temperatures

The Town of Dalton Community Resilience Building Workshop Summary of Findings (2019) lists "change in temperature" as one of the top hazards of concern.

According to the ResilientMass Plan, extreme heat for Massachusetts is usually defined as daily high temperatures above 90 degrees Fahrenheit (°F) which may be accompanied by high humidity. Extreme cold is also considered relative to the normal climatic lows in a region. Extreme cold is a period of excessively low temperatures, particularly with the addition of wind chill. The ResilientMass Plan notes that typically in Massachusetts the highest temperatures are experienced in the southeast while the coldest are typically in the northwest where Dalton is located.

Description

Extreme cold is a dangerous situation that can result in health emergencies for susceptible or vulnerable people, such as those without shelter or who are stranded or who live in homes that are poorly insulated or without heat. Extreme cold events are events when temperatures drop well below normal in an area. When winter temperatures drop significantly below normal, staying warm and safe can become a challenge. Extremely cold temperatures often accompany a winter storm, which may also cause power failures and icy roads. During cold months, carbon monoxide may be high in some areas because the colder weather makes it difficult for car emission control systems to operate effectively, and temperature inversions can trap the resulting pollutants closer to the ground.

Likewise, extreme heat is a dangerous situation that can result in health emergencies for susceptible and vulnerable people, such as those without shelter or who are stranded or who live in homes that are poorly insulated or without adequate cooling.

A heat wave is defined as three or more days of temperatures of 90°F or above. A basic definition of a heat wave implies that it is an extended period of unusually high atmosphere-related heat stress, which causes temporary modifications in lifestyle, and which may have adverse health consequences for the affected population. Heat waves cause more fatalities in the U.S. than the total of all other meteorological events combined. According to the EPA, more than 11,000 Americans have died from heat-related causes (EPA, 2016) since 1979.[42]

Heat impacts can be particularly significant in urban areas. Buildings, roads, and other infrastructure replace open land and vegetation. Dark-colored asphalt and roofs also absorb more of the sun's energy. These changes cause urban areas to become warmer than the surrounding areas. This forms "islands" of higher temperatures, often referred to as "heat islands." Heat islands can affect communities by increasing peak energy demand during the summer, air conditioning costs, air pollution and greenhouse gas emissions, heat-related illness and death, and water quality degradation (EPA).

Many conditions associated with heat waves or more severe events (including high temperatures, low precipitation, strong sunlight, and low wind speeds) contribute to a worsening of air quality in several ways. High temperatures can increase the production of ozone from volatile organic compounds and other aerosols. Weather patterns that bring high temperatures can also transport particulate matter air pollutants from other areas of the continent. Additionally, atmospheric inversions and low wind speeds allow polluted air to remain in one location for a prolonged period of time.

[42] https://www.epa.gov/climate-indicators/climate-change-indicators-heat-related-deaths#:~:text=Some%20statistical%20approaches%20estimate%20that,set%20shown%20in%20Figure%201.

Location

The Massachusetts Climate Assessment (2022) explains that recent efforts to characterize extreme heat have underscored that risks are present throughout the entire commonwealth. Therefore, the entire Town of Dalton is subject to extreme heat. As with the entire commonwealth, Dalton is also exposed to extreme cold temperatures.

Previous Occurrences

Extreme Cold: The ResilientMass Plan notes that since 1995, there have been 120 cold weather events within the Commonwealth, ranging from Cold/Wind Chill to Extreme Cold/Wind Chill events. The NOAA Storm Events database (https://www.ncdc.noaa.gov/stormevents/) for Berkshire County lists numerous extreme cold and/or wind chill events for the area of Dalton during the timeframe 2014-2023, with 37 separate dates listed from all years except 2020.

Extreme Heat: The ResilientMass Plan notes that according to the NOAA's Storm Events Database there have been 118 warm weather events (Heat to Excessive Heat events) between 2010 and 2022. Excessive heat results from a combination of temperatures well above normal and high humidity. Whenever the heat index values meet or exceed locally or regionally established heat or excessive heat warning thresholds, an event is reported in the database.

In 2012, Massachusetts temperatures broke 27 heat records. Most of these records were broken between June 20 and June 22, 2012, during the first major heat wave of the summer to hit Massachusetts and the East Coast. In July 2013, a long period of hot and humid weather occurred throughout New England. One fatality occurred on July 6, when a postal worker collapsed as the Heat Index reached 100°F. August 2022 was the hottest August on record for the Commonwealth, and 2020 and 2022 were the two hottest records for the state. Boston experienced two six-day heat waves and 17 days above 90 degrees in 2022.

The NOAA Storm Events database (https://www.ncdc.noaa.gov/stormevents/) for Berkshire County lists numerous extreme heat events for the area of Dalton in the timeframe 2014-2023. These are listed below, with notations for temperatures and dates differing from entry to entry as reported by the various contributors.

Table 8. NCEI Severe Storm Database Entries Covering Heat in Dalton.

Date	Description
7/1/18	A hot and humid airmass brought excessively high heat indices to western Massachusetts during the beginning of July. Temperatures soared as high as the mid to upper 90s on July 1st, the hottest day of the stretch. Combined with dewpoints in the mid-70s, heat indices reached near 105 degrees in the warmest areas. July 4th marked the fourth consecutive day with a high temperature in the 90s at Pittsfield. In addition to the hot daytime temperatures, overnight low temperatures only falling into the 70s was

Date	Description
	common, which exacerbated heat-related problems. The extensive heat prompted the opening of many cooling centers across the region.
8/29/18	Hazy, hot and humid conditions enveloped the region from Tuesday, August 28th through Wednesday, August 29th. This prompted a heat advisory to be issued both days for all locations below 1000 feet. Maximum heat index values ranged from the low 90's to the low 100's.
9/3/18	A late-season heat wave impacted western Massachusetts during the first week of September. A persistent warm and moist airmass characterized by daytime highs in the upper 80s to low 90s and dewpoints in the 70s resulted in heat index values reaching 90-100 degrees during the afternoon hours. This heat wave coincided with the first week of school for many, and the heat prompted some schools to dismiss classes early and postpone or cancel sports practices.
7/19/19	A heat wave gripped western Massachusetts from July 19th through the 21st. Temperatures soared to the low 90s with dewpoints in the low to mid-70s. This resulted in heat index values in the 95 to 105 range in the warmest valleys. Saturday, July 20th was the hottest day for most areas. Due to the excessive heat, cooling centers were opened and pool hours were extended. The hot and humid airmass provided fuel for thunderstorms that formed along the Lake Ontario shoreline during the late afternoon of the 20th. One storm advanced into Berkshire County in the evening, resulting in a report of wind damage.
7/19/20	Temperatures soared into the 90s throughout the lower elevations of western Massachusetts on July 19th, reaching as high as the mid-90s. The combination of the heat and a humid airmass brought heat indices into the 95 to 105 degree range. Heat indices exceeded 95 degrees again in some of the lower elevations again on July 20th but were not quite as high as the previous day.
7/27/20	Another hot and humid airmass impacted western Massachusetts on the 27th, with heat indices reaching 95 degrees in some portions of Berkshire County.
6/28/21	A hot and humid airmass developed over western Massachusetts on June 28th and persisted through June 30th. Heat indices ranged between 95F to 105F.
8/11/21	A dome of high pressure settled across western Massachusetts bringing high heat and humidity each day, mainly during the afternoon hours. Heat indices reached 95 to 102 degrees each of these days.

Date	Description
8/26/21	A hot and humid air mass developed ahead of an approaching cold front across western Massachusetts. Heat indices reached 95 to 101 degrees across Berkshire County during the afternoon hours.
8/422 - 8/8/22	A dome of high pressure brought a stretch of hot and humid weather resulting in heat indices reaching between 95F and 104F degrees across western Massachusetts on both August 4 and August 8, 2022.

Evidence demonstrates that several extreme heat events occurred in Dalton in July-August 2022 and July-August 2023. However, the Town did not need to open its cooling centers (the Senior Center and the Community Recreation Association [CRA]) in 2022 or 2023.

Cold events are typically reported with winter storms and will be described in the winter storm section of this chapter.

USDA declares agricultural disasters as needed for a variety of hazards. Information can be found at https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/disaster-designation-information/index. The events related to extreme temperatures in Berkshire County are listed below.

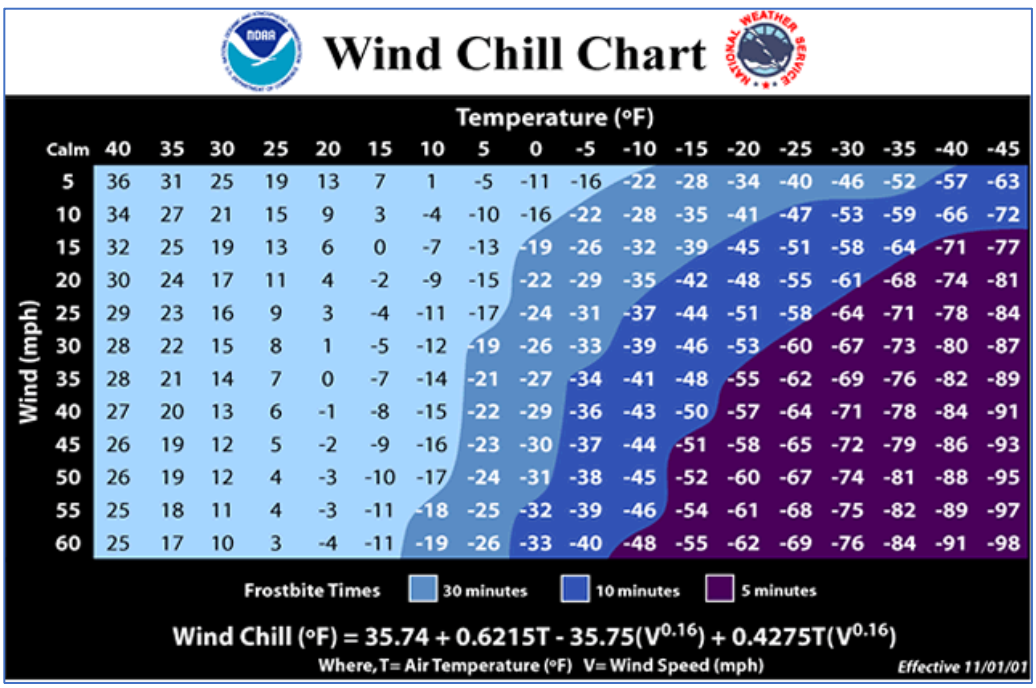
Table 9. USDA Disasters Events That Refer to Extreme Temperatures.

Year	Event	Event “Begin Dates”
2019	Cool/Cold, Below-normal Temperatures	4/1/2019
2016	Frost, Freeze	2/10/2016, 2/12/2016, 2/14/2016
2016	Drought, Wind/High Winds, Fire/Wildfire, Heat, Excessive Heat, High Temp., Insects	7/5/2016
2015	Frost, Freeze, Winter Storms, Ice Storms, Snow, Blizzard	1/1/2015
2014	Frost, Freeze	12/22/2014
2013	Frost, Freeze	5/13/2013
2013	Excessive rain, moisture, humidity, Heat, Excessive heat High temp. (incl. low humidity)	5/8/2013

Year	Event	Event "Begin Dates"
2012	Frost, Freeze	3/1/2012
2012	Drought, Heat, Excessive heat High temp. (incl. low humidity)	6/2/2012

Extent

Extreme Cold: The extent (severity or magnitude) of extreme cold temperatures is generally measured through the Wind Chill Temperature Index. Wind Chill Temperature is the temperature that people and animals feel when they are outside, and it is based on the rate of heat loss from exposed skin by the effects of wind and cold. As the wind increases, the body loses heat at a faster rate, causing the skin's temperature to drop. The National Weather Service (NWS) issues a Wind Chill Advisory if the Wind Chill Index is forecast to dip to –15°F to – 24°F for at least 3 hours, based on sustained winds (not gusts). The NWS issues a Wind Chill Warning if the Wind Chill Index is forecast to fall to –25°F or colder for at least 3 hours. On November 1, 2001, the NWS implemented a Wind Chill Temperature Index (Figure 11) designed to more accurately calculate how cold air feels on human skin.



Wind Chill Chart

Temperature (°F)

Wind (mph) / Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes; 10 minutes; 5 minutes

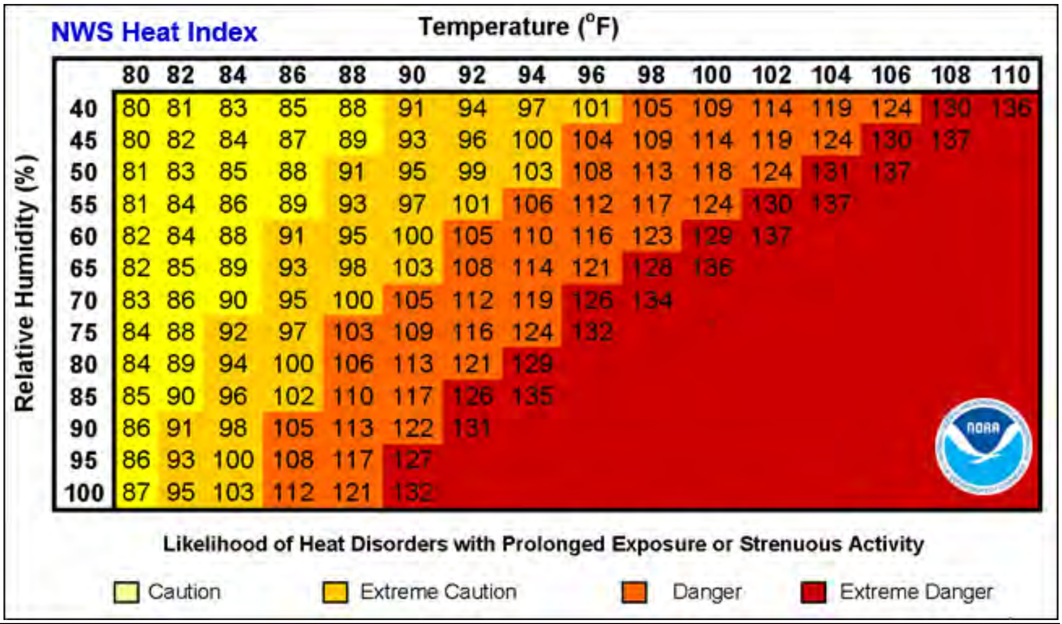
$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T = Air Temperature (°F) V = Wind Speed (mph)

Effective 11/01/01

Figure 11. NWS Wind Chill Temperature Index and Frostbite Risk.

Extreme Heat: The NWS issues a Heat Advisory when the NWS Heat Indices are between 95 and 99 degrees for two or more hours or two consecutive days, or if they are between 100 and 104 degrees for two or more hours in a single day. The NWS issues an Excessive Heat Warning if the Heat Index is forecast to reach 105°F or higher for 2 or more hours. The NWS Heat Index is based both on temperature and relative humidity and describes a temperature equivalent to what a person would feel at a baseline humidity level. It is scaled to the ability of a person to lose heat to their environment. Exposure to full sunshine can increase heat index values by up to 15°F. Also, strong winds, particularly with very hot, dry air, can increase the risk of heat-related impacts.


NWS Heat Index

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution · Extreme Caution · Danger · Extreme Danger

Figure 12. NWS Heat Index Chart.

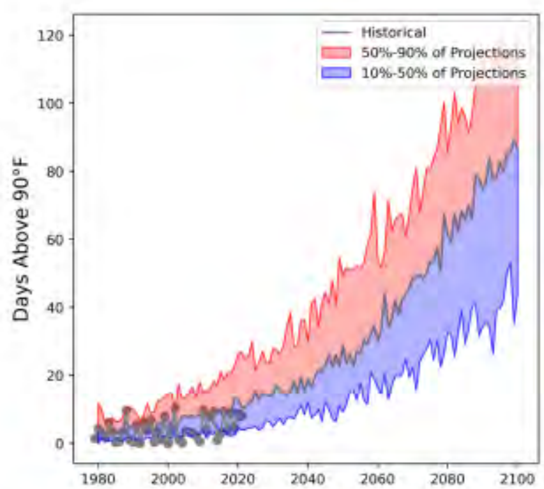
Probability of Future Events

The ResilientMass Plan notes that Massachusetts averaged three declared cold weather events and two extreme cold weather events annually between January 2018 and October 2022. The years 2018 and 2019 were particularly notable, with 10 cold weather events in each year, including five extreme cold/wind chill events in 2018 and six in 2019. The ResilientMass Plan also notes that there was an average of 3.6 heat events and two excessive heat events between January 2018 and December 2022. Many practitioners believe that some heat wave related circulation patterns are occurring more frequently due to climate change.

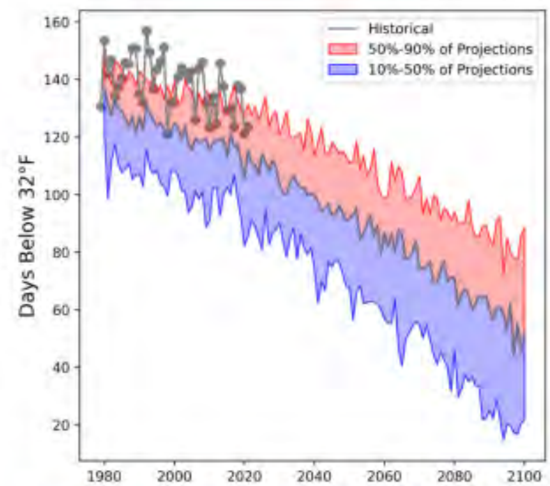
There are a number of climatic phenomena that determine the number of extreme weather events in a specific year. However, there are significant long-term trends in the frequency of extreme hot and cold events. Since 2010, U.S. daily record high temperatures have occurred over eight times as often as record low. This is compared to a nearly 1:1 ratio in the 1950s. Models suggest that this ratio could climb to 20:1 by midcentury, if GHG emissions are not significantly reduced (C2ES, n.d.).

Various climate forecasts support the trends of an increased frequency of extreme hot weather events and a decreased frequency of extreme cold weather events. High, low, and average temperatures in Massachusetts are all likely to increase significantly over the next century as a result of climate change.

The graphics below (from resilient MA, 2018) show the projected annual days with maximum temperature above 90 degrees and projected annual days with minimum temperature below 32 degrees.



Source: CMIP6 downscaled projections (Thrasher et al., 2022), warming scenario SSP 5-8.5, historical data from GridMET.



Source: CMIP6 downscaled projections (Thrasher et al., 2022), warming scenario SSP 5-8.5, historical data from GridMET.

Figure 13. Projected Annual Days with Temperatures above 90 Degrees (left) and below 32 degrees (right).

Vulnerability Assessment

Exposure

Extreme temperatures are not a hazard with a defined geographic boundary. The entire Town should be considered exposed to the hazard. Excessive heat can occur at any time during the year, but is most dangerous during the summer between June and August when average temperatures are at their highest.

Built Environment Impacts

The impact of excessive heat is most prevalent in developed areas, where the Town lacks a tree canopy. Secondary impacts of excessive heat are severe strain on the electrical power system and potential brownouts or blackouts. Extreme heat can have a negative impact on transportation. Highways and roads are damaged by excessive heat as asphalt roads soften and concrete roads expand and can buckle, crack, or shatter. Moreover, concrete has been known to "explode," lifting chunks of concrete and putting those nearby at serious risk. Stress is also placed on automobile cooling systems, diesel trucks, and railroad locomotives which lead to an increase in mechanical failures. Steel rails are at risk of overheating and warping which can lead to train derailments.

Extreme cold weather poses a significant threat to utility production, which in turn threatens facilities and operations that rely on utilities, specifically climate stabilization. As temperatures drop and stay low, increased demand for heating places a strain on the heating system, which can lead to temporary outages. These outages can impact operations throughout the Town, which can result in interruptions and delays in services. Broken pipes may cause flooding in buildings, causing property damage and loss of utility service. Some of the secondary effects presented by extreme/excessive cold include dangerous conditions to livestock and pets.

Climate change will increase the probability of extreme temperatures which may impact utilities, transportation, and especially older structures. Future development should consider keeping more mature trees, less dark asphalt areas, and more natural areas.

Population Impacts

Extreme cold events are predicted to decrease in the future, while extreme heat days, as well as average temperatures are projected to increase. The projected increase in extreme heat and heat waves is the source of one of the key health concerns related to climate change. Prolonged exposure to high temperatures can cause heat-related illnesses, such as heat cramps, heat exhaustion, heat stroke, and death. Heat exhaustion is the most common heat-related illness and if untreated, it may progress to heat stroke. People who perform manual labor, particularly those who work outdoors, are at increased risk for heat-related illnesses. Prolonged heat exposure and the poor air quality and high humidity that often accompany heat waves can also exacerbate pre-existing conditions, including respiratory illnesses, cardiovascular disease, and mental illnesses.

The greatest danger from extreme cold is to people, as prolonged exposure can cause frostbite or hypothermia, and can become life threatening. Body temperatures that are too low affect the brain, making it difficult for the victim to think clearly or move well. This makes hypothermia particularly dangerous for those suffering from it, as they may not understand what is happening to them or what to do about it. Hypothermia is most likely at very cold temperatures but can occur at higher temperatures (above 40 degrees Fahrenheit) if the person exposed is also wet from rain, sweat, or submersion. Warning signs of hypothermia include shivering, exhaustion, confusion, fumbling hands, memory loss, slurred speech, or drowsiness. In infants, symptoms include bright red, cold skin and very low energy. A person with hypothermia should receive medical attention as soon as possible, as delays in medical treatment may result in death.

Older adults are often at elevated risk due to a high prevalence of pre-existing and chronic conditions. In Dalton, 26.4% of the population is over age 64. People who live in older housing stock and in housing without air conditioning have increased vulnerability to heat-related illnesses. Power failures are more likely to occur during heat waves, affecting the ability of residents to remain cool during extreme heat. Individuals with pre-existing conditions and those who require electric medical equipment may be at increased risk during a power outage. Heat impacts are more likely to be felt by residents without air conditioning, by those who work outdoors, and those with underlying health conditions.

Extreme heat can pose severe and life-threatening problems for people. According to the NWS, it is one of the leading weather-related killers in the United States, resulting in hundreds of fatalities each year and even more heat-related illnesses. Extreme heat has a special impact on the most vulnerable segments of the population - the elderly, young children and infants, impoverished individuals, and persons who are in poor health. The high-risk population groups with specific physical, social, and economic factors that make them vulnerable include:

- Older persons (age > 65)
- Infants (age < 1)
- Homeless population
- Very low- and low-income persons
- People who are socially isolated
- People with mobility restrictions or mental impairments
- People taking certain medications (e.g., for high blood pressure, depression, insomnia)
- People engaged in vigorous outdoor exercise or work or those under the influence of drugs or alcohol.

Climate change will increase the rate of heat illness and need for cool spaces. Outdoor workers and vulnerable populations will need to be considered during extreme heat events.

Environment Impacts

Extreme heat can lead to water quality issues, wildlife concerns, and impact vegetative growth when combined with drought.

Problem Statements for Extreme Temperatures.

Problem statements summarize risk and vulnerability and are included following each hazard profile. The problem statements were developed to bridge the gap between identified hazard and development of the mitigation actions. Problem statements are included in each hazard profile section.

Table 10. Problem Statements for Extreme Temperatures.

Assets	Problems Associated with Extreme Temperatures
People (including underserved communities and socially vulnerable populations)	• Extreme heat will be a significant public health threat to all residents, but especially for vulnerable populations living in older homes or homes without air conditioning. • The elderly and those with mobility issues may not be able to leave their homes and travel safely. • People working in businesses without air conditioning may be at risk of heat illness. • First responders may also be impacted by extreme temperatures. • Pets may be adversely impacted by extreme heat. • The Town currently does not have a designated facility that can reliably act as a warming or cooling center, particularly during a power outage. The senior center electrical system cannot accommodate a generator, and therefore cannot always be reliable. The Town should seek to upgrade electrical at the senior center and install a generator, or explore options for designating a more reliable temperature refuge center.
Structures (including facilities, lifelines, and critical infrastructure)	• Older homes without insulation and single-pane glass are difficult to heat and cool and may not provide safe living conditions. • Businesses that require refrigerated trucks or refrigeration units may see business losses and increased utility costs. • The electric grid may become stressed and fail during extreme heat events.
Systems (including networks and capabilities)	• Extreme heat mitigation and adaptation has not been fully integrated into existing local plans and regulations for new development, though progress is being made.
Natural, historic, and cultural resources	• Extreme heat may lead to, or exacerbate, impacts to natural systems related to wildfires and invasive species (refer to those sections). • Extreme heat may lead to water quality concerns.

Assets	Problems Associated with Extreme Temperatures
Activities that have value to the community	• Recreational activities may be adversely impacted by extreme heat.

Droughts

Droughts are typically defined as periods of deficient precipitation. How this deficiency is experienced can depend on factors such as land use, the existence of dams, and water supply withdrawals or diversions. Droughts can vary widely in duration, severity, and local impact.

Description

The National Drought Mitigation Center references five common, conceptual definitions of drought:

1. Meteorological drought is a measure of departure of precipitation from normal.
2. Hydrological drought is related to the effects of precipitation shortfalls on stream flows and on reservoir and groundwater levels.
3. Agricultural drought links various characteristics of meteorological and hydrological drought to agricultural impacts and occurs when there is not enough water available for a particular crop to grow at a particular time.
4. Socioeconomic drought is associated with the supply and demand of economic goods with elements of meteorological, hydrological, and agricultural drought.
5. Ecological drought is an episodic deficit in water availability that drives ecosystems beyond thresholds of vulnerability and impacts ecosystem services.

Drought conditions can cause a shortage of water for human consumption and reduce local firefighting capabilities. Public water suppliers may struggle to meet system demands while maintaining adequate pressure for fire suppression and meeting water quality standards. The Massachusetts Department of Environmental Protection (DEP) requires all public water systems (PWSs) to maintain an emergency preparedness plan.

The Dalton Fire and Water District provides public drinking water to the vast majority of Dalton residents and businesses. The District has approximately 2,800 water connections, of which 2,657 are residential customers and the rest are commercial or industrial. Nevertheless, hundreds of private wells are believed present in Dalton. Private well owners can be vulnerable to droughts. With declining groundwater levels, well owners may experience dry wells or sediment in their water due to the more intense pumping required to pull water from the bedrock or overburden aquifer. Wells may also develop a concentration of pollutants, which may include nitrates and heavy metals depending on local geology.

The loss of clean water for consumption and for sanitation cause significant impacts depending on the affected population's ability to quickly drill a deeper or a new well or to relocate to unaffected areas. During a drought, dry soil and the increased prevalence of wildfires can increase the amount of irritants (such as pollen or smoke) in the air. Reduced air quality can have widespread deleterious health impacts but is particularly significant to the health of individuals with pre-existing respiratory health conditions like asthma (Centers for Disease Control [CDC]).

Lowered water levels can result in direct environmental health impacts, as the concentration of contaminants in swimmable bodies of water will increase when less water is present. Harmful algal blooms may occur, closing recreational areas.

One primary hazard in this plan that is commonly associated with drought is wildfire. A prolonged lack of precipitation dries out soil and vegetation, which becomes increasingly susceptible to ignition as the duration of the drought extends. A drought may increase the probability of a wildfire occurring.

Location

Massachusetts Drought Management Plan (DMP, 2019) assesses drought conditions in seven regions: Western, Connecticut River Valley, Central, Northeast, Southeast, and Cape Cod, and Islands. A regional approach allows customization of drought actions and conservation measures to address situations in each region; and allows for the determination of a drought on a watershed basis. This approach recognizes that parts of Massachusetts can experience significantly different weather patterns due to topography, distance from coastal influence, as well as a combination of regional, national, and global weather patterns. Droughts have the potential to impact the entirety of Dalton, which is located in the Western region.

Previous Occurrences

The Commonwealth of Massachusetts has never received a Presidential Disaster Declaration for a drought-related disaster. However, several substantial droughts have occurred over the past 100 years. Massachusetts experienced its most significant drought on record in the 1960s. The severity and duration of the drought caused significant impacts on both water supplies and agriculture.

Although short or relatively minor droughts occurred over the 50 years following the drought of the 1960s, the next long-term event began in March 2015 when Massachusetts began experiencing widespread abnormally dry conditions. In July 2016, based on a recommendation from the Drought Management Task Force (DMTF), the Secretary of the Executive Office of Energy and Environmental Affairs (EOEEA) declared a Drought Watch for Central and Northeast Massachusetts and a Drought Advisory for Southeast Massachusetts and the Connecticut River Valley. Drought warnings were issued in five out of six drought regions of the state. Many experts stated that this drought was the worst in more than 50 years. DMTF declared an end to the drought in May 2017 with a return to wetter-than-normal conditions.

The previous edition of this plan includes a narrative description of the Town's experience during the 2015-2017 drought. The Dalton Fire and Water District did not issue a voluntary water restriction. This is because the District follows the City of Pittsfield's lead, and in this instance the City did not issue a voluntary restriction. Town officials stated that a resident with a private well on Yvonne Drive reported that their well dried up during the drought period, but this is the only report that was brought to the Town during this drought.

USDA declares agricultural disasters as needed for a variety of hazards. Information can be found at https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/disaster-designation-information/index. The line items related to droughts in Berkshire County are listed below, corresponding to 2015-2016, 2020, and 2020.

Table 11. USDA Disasters Events That Refer to Drought.

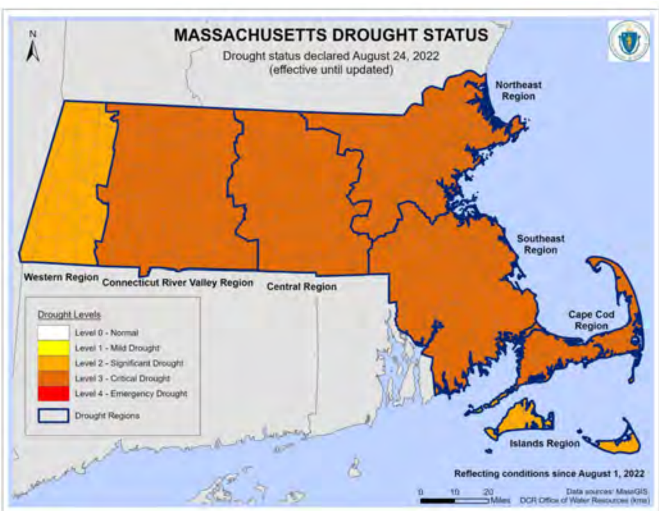
Year	Event	Event "Begin Dates"
2020	Drought	6/1/2020, 8/18/2020, 9/22/2020, 9/29/2020
2017	Drought	3/3/2017
2016	Drought, Wind/High Winds, Fire/Wildfire, Heat, Excessive Heat, High Temp., Insects	7/5/2016
2016	Drought	4/26/2016
2015	Drought	4/1/2015, 6/1/2015
2012	Drought, Heat, Excessive heat High temp. (incl. low humidity)	6/2/2012

The drought of 2020, a so-called "flashy drought" that impacted southern New England, was sufficiently impactful in Berkshire County to be included in the USDA data table above. Flashy droughts are described below under *Extent*.

Applying the same ten-year lookback as the severe storms database review, USDA payments to Massachusetts agricultural sectors for drought impacts associated with events from 2012 through 2022 were reviewed. This timeframe includes the droughts of 2015-2017 and 2020. USDA reimbursements for droughts have not been distributed in Dalton.

The severity of a drought depends on the degree of moisture deficiency, duration, spatial extent, and location relative to resources or assets. The drought of the 1960s is the drought of record because duration, spatial extent, moisture deficiency, and impact all contributed to historic levels. In contrast, the severity of the 2016-2017 drought was due to impacts on natural resources (record low stream flows and groundwater levels), many water supplies, farms, and agriculture and to the swift onset of the drought.

The drought of 2022 is typical of a flashy drought. The NCEI Severe Storm Database reported on 8/16/22 that "The United States Drought Monitor indicated severe drought conditions across much of Berkshire County in Massachusetts starting on August 16, 2022. The previous 30 days had seen less than half of normal rainfall with below normal precipitation persisting since the start of June. A period of hot and dry weather, especially during the first several days of August, contributed to this rapid deterioration of drought conditions. Severe drought in this region continued into the month of September. The Massachusetts Drought Management Task Force issued a Level 2 (Significant Drought) Declaration for Berkshire County starting on August 24. Residents and businesses were urged to be extremely mindful of their overall water use. Mandatory water use restrictions were declared in the communities of Cheshire, Williamstown, Dalton, Adams, and Hinsdale." The drought of 2022 was most severe in August, but alleviated by rainfall in September 2022.



Extent

Drought is defined by a combined look at several indices as detailed in the Massachusetts DMP (EOEEA and MEMA, 2019). The indices are:

- Precipitation: The Standard Precipitation Index, which is widely used, is based on monthly precipitation totals from Massachusetts Department of Conservation and Recreation's (DCR) Precipitation Program and the NWS.
- Streamflow: Is an early indicator of impacts to rivers, streams, wetlands, and other riparian habitats.
- Groundwater: This provides information on impacts over a longer period of time due to groundwater recharge rates.
- Lakes and Impoundments: Captures the effects on surface water including lakes, ponds, water supply, and flood control reservoirs.
- Fire Danger: The Keetch Byram Drought Index indicates fire potential and flammability of organic matter.
- Evapotranspiration: The Crop Moisture Index is used to assess short-term or current conditions of dryness or wetness relative to agricultural crops.

These indices are monitored weekly to generate a monthly hydrological conditions report and used to determine the onset, severity, and end of droughts. Five levels of increasing drought severity are defined in the DMP: *Normal, Mild, Significant, Critical,* and *Emergency*. The drought levels are associated with actions outlined in the DMP.

Recommendations of drought levels are made by the DMTF to the Secretary of the EEA, who then declares the drought level for each region of the state.

Other entities may measure drought conditions by these or other criteria more relevant to their operations. For example, water utilities may calculate the days of supply remaining. Farmers may assess soil moisture and calculate the water deficit for specific plants to determine irrigation needs or decide to change their crop based on the deficit or harvest early for non-irrigated crops.

The five drought levels in the 2019 DMP provide a basic framework for taking actions to assess, communicate, and respond to drought conditions. Under the "Normal" condition, data are routinely collected, assessed, and distributed. When drought conditions are identified, the four drought levels escalate moving to heightened action, which may include increased data collection and assessment, interagency communication, public education and messaging, recommendations for water conservation measures, and a state of emergency issued by the Governor. At the "Emergency" level, mandatory water conservation measures may be enacted. These regionally declared drought levels and associated state actions are intended to communicate and provide guidance to the public and stakeholders across industries to enable them to respond early and effectively and to reduce impacts. Individual public water suppliers may have their own drought management plan, drought levels, and associated actions, which they may follow at all levels except at the Emergency level when mandatory actions may be required.

NOAA and others are advancing the science of early warning for droughts like the early warnings for floods and earthquakes to better project flashy, or fast-onset, droughts. Based on projected climate change, the distributions of precipitation events will continue to become more extreme, with periods of minimal rain alternating with extreme rain events. Therefore, developing ways to project and adapt to flash droughts may be critical for sectors such as agriculture and water supply.

The Massachusetts Water Resources Commission publishes the hydrologic condition report monthly, which includes the six drought indices and the National Climate Prediction Center's U.S. Monthly and Seasonal Drought Outlooks. The National Drought Mitigation Center produces a weekly Drought Monitor map. In accordance with the DMP, drought declarations are made monthly.

Probability of Future Events

Climate change will increase the probability of droughts. The Massachusetts Climate Change Assessment notes that the region will experience slight increases in the number of consecutive dry days and the number of days without rain from 2050 onward. By 2090 the number of consecutive dry days per year will increase to 33, compared to the annual statewide baseline of 31 days from 1986 to 2005. Table 12 summarizes this data and indicates the projected number of consecutive dry days according to the "high" and "low" limits of the Northeast Climate Adaptation Science Center (NE CASC) data. The Town of Dalton is represented by the Berkshires and Hilltowns region.

Table 12. Number of Consecutive Dry Days (CDD) and Days without Rain (DWR) per Year.

Region	Baseline		2030		2050		2070		2090	
	CDD	DWR	CDD	DWR	CDD	DWR	CDD	DWR	CDD	DWR
Berkshire and Hilltowns	29	159	29	161	30	165	30	167	31	170
Greater Connecticut River Valley	31	171	31	172	32	175	32	178	33	181
Central	32	180	32	182	32	185	33	188	33	192
Eastern Island	32	186	32	181	32	185	33	188	33	193
Boston Harbor	31	192	31	185	32	192	32	194	33	198
North and South Shores	31	184	31	182	32	187	32	190	33	195
Cape, Islands, and South Coast	31	186	31	182	32	187	32	191	33	194
Statewide	**31**	**176**	**31**	**175**	**31**	**179**	**32**	**182**	**33**	**187**

CDD = Consecutive Dry Days per Year (ResilientMass, Steinschneider & Najibi (2022))
DWR = Days Without Rain per Year (MA Climate Assessment (Commonwealth of Massachusetts, 2022))

These projections suggest that the days without precipitation are likely to increase across the Commonwealth, while the number of consecutive dry days will vary across the state while increasing over the coming decades.

Vulnerability Assessment

Exposure

Drought is a gradual phenomenon, and its condition occurs naturally in a broad geographic area. The entire Town would be exposed to drought conditions.

Built Environment Impacts

Major water users are more susceptible to drought, and these include water utilities and some commercial users.

With an increased probability of drought and drought magnitude, water utilities should consider reviewing or developing extreme drought scenarios.

Population Impacts

Populations considered most vulnerable to drought impacts are identified based on a number of factors including their physical and financial ability to react or respond during a hazard. Senior and low-income populations are particularly susceptible. The Town should be aware of the potential needs of residents within these population segments in the event of a hazard occurrence.

Socioeconomic impacts of the drought may also include anxiety and depression about economic impact, health problems associated with poor water quality, fewer recreational activities, higher incidents of heat stroke, and even loss of human life.

With an increased probability of drought and increased drought magnitude, and the potential of increased water costs, vulnerable populations may be more severely impacted in the future.

Environment Impacts

Although agriculture is limited in the Town, there are some natural areas which may be adversely impacted by drought. Drought amplifies the risk of loss of biodiversity and affects animal and plant species. Economic impacts include higher food and lumber prices. Drought can shrink the food supplies of animals and plants dependent on water and damage their habitats. Sometimes the environmental damage caused by a drought is temporary, and other times it is irreversible.

Problem Statements for Drought

Table 13. Problem Statements for Drought.

Assets	Problems Associated with Drought
People (including underserved communities and socially vulnerable populations)	• Vulnerable communities may have difficulty accessing potable water during an emergency drought event. If the water sources are at emergency levels, having a plan to get vulnerable people water should be considered. If rates are increased to lower water demand, this may also adversely impact underserved and vulnerable communities. • At least one private well has been affected by droughts.
Structures (including facilities, lifelines, and critical infrastructure)	• Water supply infrastructure may need to be shut down and water quality may become substandard. Businesses requiring water for daily operations may have their operations limited due to water restrictions.
Systems (including networks and capabilities)	• Outdoor water use restrictions and other water conservation measures during periods of extreme drought can be challenging to enforce, even when mandated through local declaration. • A public water supply well in Dalton (serving the Wahconah Falls Road area) has been affected by droughts, increasing its run time.

Assets	Problems Associated with Drought
Natural, historic, and cultural resources	• Water quality may be adversely impacted by major droughts.
Activities that have value to the community	• None applicable.

Earthquakes

An earthquake is the vibration of the Earth's surface that follows a release of energy in the Earth's crust. New England experiences intraplate earthquakes because it is located within the interior of the North American plate. Although damaging earthquakes are rare in Massachusetts, low-magnitude earthquakes occur regularly in the state.

Description

An earthquake is a sudden rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. Earthquakes can cause buildings and bridges to collapse; disrupt gas, electric, and telephone lines; and often cause landslides, flash floods, fires, avalanches, and tsunamis. Earthquakes can occur at any time without warning.

The underground point of origin of an earthquake is called its focus; the point on the surface directly above the focus is the epicenter. Earthquakes are described based on their magnitude and intensity as explained below under *Extent*.

New England's earthquakes appear to be the result of the cracking of the crustal rocks due to compression as the North American Plate is being very slowly squeezed by the global plate movements. As a result, New England epicenters do not follow the major mapped faults of the region, nor are they confined to particular geologic structures or terrains. Because earthquakes have been detected all over New England, seismologists suspect that a strong earthquake could be centered anywhere in the region. Furthermore, the mapped geologic faults of New England currently do not provide any indications detailing specific locations where strong earthquakes are most likely to be centered.

In addition to earthquakes occurring within the Commonwealth, earthquakes in other parts of New England can impact widespread areas. Large earthquakes in Canada, which is more seismically active than New England, can affect buildings in Massachusetts. This is due in part to the fact that earthquakes in the eastern U.S. are felt over a larger area than those in the western U.S. The difference between seismic shaking in the East versus the West is primarily due to the geologic structure and rock properties that allow seismic waves to travel farther without weakening (United States Geological Survey [USGS], 2012).

In some places in New England, including locations in Massachusetts, small earthquakes seem to occur with some regularity. In articles appearing in 2016, John Ebel Ph.D., a Senior Research Scientist at the Weston Observatory, was quoted as saying “The Acton, Boxborough and Littleton areas are actually sporadically active… We tend to get a small earthquake once every three-to-five years.” It is not clear why some localities experience such clustering of earthquakes, but clusters may indicate locations where there is an increased likelihood of future earthquake activity.

Location

Given the above discussion, the potential exists for earthquakes to occur within Dalton or to occur elsewhere and be felt in Dalton.

Previous Occurrences

According to the previous edition of this plan, no documented earthquakes have been centered in the Town of Dalton. The largest earthquake since 1900 to strike Massachusetts was a magnitude 3.9 located east of the Quabbin Reservoir in 1994. Two recent earthquakes with epicenters close to the Berkshires included a magnitude 3.3 in the area around Westfield in 2000, and a magnitude 1.9 in the area around Northampton in 2012. To the west, a magnitude 3.1 struck in the Catskills region of New York in 2009.

To determine whether earthquakes have occurred more recently near or in Dalton, all events listed by Weston Observatory were reviewed for all towns in Massachusetts since the date of last edition of this plan. Listed earthquakes above magnitude 2.0 include the following very minor earthquakes, and none were near Dalton:

- 12/21/18 – 3 km WSW of Gardner, MA, 2.1/2.1 [Mn*/Mc**]
- 8/21/19 – 2 km SSE of Wareham, MA, 1.7/2.4
- 12/3/19 – 4 km SSE of Plymouth, MA, 1.6/2.2
- 11/8/20 – 11 km SW of New Bedford, MA, 3.8/3.4
- 11/22/20 – 12 km WSW of New Bedford, MA, 1.7/2.6
- 7/25/21 – 5 km W of Peabody, MA, 1.4/2.5
- 1/1/22 – 13 km N of Rockport, MA, 2.3/3.0
- 3/4/22 – 5 km WSW of Orange, MA, 2.2/2.7
- 3/19/22 – 36 km ENE of Rockport, MA, 1.4/2.2

*Mn is the Nuttli Magnitude (see *Extent* below)
**Mc is the Coda Duration Magnitude (see *Extent* below)

A magnitude 4.8 earthquake in New Jersey on April 5, 2024, was felt in Massachusetts. Residents in the Berkshire region reporting feeling the earthquake as well as a strong aftershock later in the day.

Extent

Magnitude is an estimate of the relative size or strength of an earthquake and is related to the amount of seismic energy released at the hypocenter of the earthquake. It is based on the amplitude of earthquake waves recorded on instruments that have a common calibration. The magnitude of an earthquake is thus represented by a single instrumentally determined value recorded by a seismograph, which records the varying amplitude of ground oscillations.

The Richter scale was developed in 1935 and was used exclusively until the 1970s. The scale set the magnitude of an earthquake based on the logarithm of the amplitude of recorded waves. Being logarithmic, each whole number increase in magnitude represents a tenfold increase in measured strength. Earthquakes with a magnitude of about 2.0 or less are usually called "microearthquakes" and are generally only recorded locally. Earthquakes with magnitudes of 4.5 or greater are strong enough to be recorded by seismographs all over the world.

As more seismograph stations were installed around the world following the 1930s, it became apparent that the method developed by Richter was valid only for certain frequency and distance ranges, particularly in the southwestern United States. New magnitude scales that are an extension of Richter's original idea were developed for other areas. In particular, the Moment magnitude scale (Mw) was developed in the 1970s to replace the Richter scale and has been in official use by the USGS since 2002.

According to USGS, these multiple methods are used to estimate the magnitude of an earthquake because no single method is capable of accurately estimating the size of all earthquakes. Some magnitude types are calculated to provide a consistent comparison to past earthquakes, and these scales are calibrated to the original Richter scale. However, differences in magnitude of up to 0.5 can be calculated for the same earthquake through different techniques. In general, Moment magnitude provides an estimate of earthquake size that is valid over the complete range of magnitudes and so is commonly used today.

Although Moment magnitude is the most common measure of earthquake size for medium and larger earthquakes, the USGS does not calculate Mw for earthquakes with a magnitude of less than 3.5 which is the more common situation for Massachusetts. Localized Richter scales or other scales are used to calculate magnitudes for smaller earthquakes.

Regionally, the Weston Observatory utilizes two scales to track the magnitude of earthquakes. These include the Nuttli magnitude (Mn) for North America east of the Rocky Mountains and is more appropriate for the relatively harder continental crust in Connecticut compared to California. Weston Observatory also utilizes the Coda Duration magnitude (Mc), which is based on the duration of shaking at a particular station. The advantages of the Coda Duration magnitude are that this method can quickly estimate the magnitude before the exact location of the earthquake is known.

The effect of an earthquake on the earth's surface is called the intensity. The Modified Mercalli Intensity Scale consists of a series of key responses such as people awakening, movement of furniture, damage to chimneys, and total destruction. This scale, composed of 12 increasing levels of intensity that range from imperceptible shaking to catastrophic destruction, is designated by Roman numerals. It is an arbitrary ranking based on observed effects.

Table 14. Modified Mercalli Intensity.

Modified Mercalli Intensity	Description
I	Not felt except by a very few under especially favorable conditions
II	Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.
III	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration similar to the passing of a truck. Duration estimated.
IV	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Felt by nearly everyone; many awakened. Some dishes and windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
XI	Few, if any (masonry), structures remain standing. Bridges destroyed. Rails bent greatly.
XII	Damage total. Lines of sight and level are distorted. Objects thrown in the air.

Source: USGS

A comparison of Richter magnitude to typical Modified Mercalli intensity is presented below.

Table 15. Modified Mercalli Intensity and Moment Magnitude.

Moment Magnitude	Typical Maximum Modified Mercalli Intensity
1.0 to 3.0	I
3.0 to 3.9	II to III
4.0 to 4.9	IV to V
5.0 to 5.9	VI to VII
6.0 to 6.9	VII to IX
7.0 and above	VIII or higher

Source: USGS

Probability of Future Events

Earthquake location and magnitude probabilities are exceptionally difficult to predict in Massachusetts. Minor earthquakes are relatively common in New England, but damaging earthquakes are not. Therefore, USGS instead characterizes the probability of ground acceleration rather than estimating a probability of magnitude. The Seismic Hazard Map for the state of Massachusetts (USGS) shows a peak ground acceleration of 8% to 10% of gravity in Dalton having a 2% probability of being exceeded in 50 years.

Vulnerability Assessment

Exposure

A major earthquake could cause severe damage to buildings in Dalton, including older structures that were built before a 1975 law requiring new buildings to withstand earthquakes. Other associated concerns are debris management issues including debris removal and identification of disposal sites.

Built Environment Impacts

Historic data for earthquake events indicate that between 1991 and 2022, no major (>5.0 magnitude) earthquakes were recorded in Berkshire County during this period, causing no damage to property. The entire built environment of Dalton is vulnerable to earthquakes. Older, unreinforced masonry buildings are very susceptible to earthquakes.

To identify built environment impacts to the Town, FEMA's risk assessment software, Hazus, was implemented. The economic loss results of the 1500-year event are shown in Table 16 while the results for the 2500-year event are shown in Table 17. The Town's Average Annual Loss (AAL) is modeled to be $6,520.

Table 16. Building Loss for a 1500-Year Scenario

Loss Type	Residential ($Million)	Commercial ($Million)	Other Occupancy ($Million)	Total ($Million)
Building Loss	0.95	0.42	0.46	**1.83**
Content Loss	0.23	0.14	0.18	**0.55**
Business Inventory Loss	0.00	0.01	0.02	**0.03**
Business Income Loss	0.01	0.10	0.01	**0.12**
Business Relocation Loss	0.08	0.09	0.08	**0.25**
Rental Income Loss	0.06	0.07	0.01	**0.14**
Wage Loss	0.04	0.10	0.03	**0.17**
Total	**1.37**	**0.93**	**0.79**	**3.09**

Table 17. Building Loss for a 2500-Year Scenario

Loss Type	Residential ($Million)	Commercial ($Million)	Other Occupancy ($Million)	Total ($Million)
Building Loss	2.00	0.84	0.94	**3.78**
Content Loss	0.56	0.34	0.43	**1.33**
Business Inventory Loss	0.00	0.03	0.04	**0.07**
Business Income Loss	0.03	0.18	0.02	**0.23**
Business Relocation Loss	0.15	0.15	0.15	**0.45**
Rental Income Loss	0.10	0.12	0.02	**0.24**
Wage Loss	0.06	0.18	0.06	**0.30**
Total	**2.90**	**1.84**	**1.66**	**6.40**

Population Impacts

Populations considered most vulnerable to earthquake impacts are identified based on a number of factors including their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing. Senior and low-income populations are particularly susceptible. The Town should be aware of the potential needs of residents within these population segments in the event of a hazard occurrence.

Hazus was used to model injuries and fatalities for the 1500- and 2500-year events. For the 1500-year event, there are fewer than 5 injuries and no injuries requiring medical attention. For the 2500-year event there are up to 5 minor injuries with no injuries requiring medical attention.

Environment Impacts

The environment may be impacted by cascading impacts from the earthquake, such as a truck accident or train derailment caused by track or road damage, landslide, or dam breach. This could result in a hazardous material release.

Problem Statements for Earthquakes

Table 18. Problem Statements for Earthquakes.

Assets	Problems Associated with Earthquakes
People (including underserved communities and socially vulnerable populations)	• Vulnerable populations located in unreinforced masonry structures may sustain injuries. • Elderly people may fall during events.
Structures (including facilities, lifelines, and critical infrastructure)	• Unreinforced masonry and utility lifelines impacted. • Utility systems impacted.
Systems (including networks and capabilities)	• None apparent or projected.
Natural, historic, and cultural resources	• Historical buildings constructed out of unreinforced masonry are susceptible and may be impacted.
Activities that have value to the community	• None apparent or projected.

Flooding from Precipitation and Dam Overtopping

Nationally, flooding causes more damage annually than any other severe weather event. Flooding in Massachusetts is often the direct result of frequent weather events such as coastal storms, nor'easters, tropical storms, hurricanes, heavy rains, and snowmelt. Increases in precipitation and extreme storm events will result in increased inland flooding. Common types of flooding are described below.

> The Town of Dalton Community Resilience Building Workshop Summary of Findings (2019) lists "flood" as one of the top hazards of concern.

Description

River and Stream Flooding: River and stream flooding often occurs after heavy rain. Areas of the state with high slopes and minimal soil cover (such as found in western Massachusetts) are particularly susceptible to flash flooding caused by rapid runoff that occurs in heavy precipitation events and in combination with spring snowmelt, which can contribute to riverine flooding. Frozen ground conditions can also contribute to low rainfall infiltration and high runoff events that may result in riverine flooding. Some of the worst riverine flooding in Massachusetts' history occurred because of strong nor'easters and tropical storms in which snowmelt was not a factor. Tropical storms can produce very high rainfall rates and volumes of rain that can generate high runoff when soil infiltration rates are exceeded.

Floodplains are the low, flat, and periodically flooded lands adjacent to rivers, lakes, and oceans. These areas are subject to geomorphic and hydrologic processes. Floodplains may be broad, as when a river crosses an extensive flat landscape, or narrow, as when a river is confined. These areas form a complex physical and biological system that supports a variety of natural resources and flood storage.

Drainage-Related Flooding: Drainage systems are designed to remove surface water from developed areas as quickly as possible to prevent localized flooding on streets and adjacent properties. They make use of a conveyance system that channels water away from a developed area to surrounding streams, bypassing natural processes of water infiltration into the ground, groundwater storage, and evapotranspiration. Flooding from overwhelmed drainage entails floods caused by increased water runoff due to development and drainage systems that are not capable of conveying high flows. Since drainage systems reduce the amount of time the surface water takes to reach surrounding streams, flooding can occur more quickly and reach greater depths than if there were no urban development at all. In almost any community with some degree of development, basement, roadway, and infrastructure flooding can result in significant damage due to poor or insufficient stormwater drainage.

Dam Overtopping: Dam overtopping is caused by floods that exceed the capacity of the dam, and it can occur as a result of inadequate spillway design, settlement of the dam crest, blockage of spillways, and other factors. Overtopping accounts for one-third of all dam failures in the U.S. The two primary types of dam failure are catastrophic failure (characterized by the sudden, rapid, and uncontrolled release of impounded water) and design failure (which occurs as a result of minor overflow events). There are a number of ways in which climate change could alter the flow behavior of a river, causing conditions to deviate from what a dam was designed to handle. For example, more extreme precipitation events could increase the frequency of intentional discharges. Many other climate impacts, including shifts in seasonal and geographic rainfall patterns, could also cause the flow behavior of rivers to deviate from previous hydrographs. When flows are greater than expected, spillway overflow events (often referred to as "design failures") can occur. These overflows result in increased discharges downstream and increased flooding potential. Therefore, although climate change will not increase the probability of catastrophic dam failure, it may increase the probability of design failures.

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

Ice Jam: An ice jam is an accumulation of ice that acts as a natural dam and restricts the flow of a body of water. A freeze-up jam usually occurs in early winter to midwinter during extremely cold weather when supercooled water and ice formations extend to nearly the entire depth of the river channel. This type of jam can act as a dam and begin to back up the flowing water behind it. A breakup jam, forms as a result of the breakup of the ice cover at ice-out, causing large pieces of ice to move downstream, potentially piling up at culverts, around bridge abutments, and at curves in river channels. Breakup ice jams occur when warm temperatures and heavy rains cause rapid snowmelt. The melting snow, combined with the heavy rain, causes frozen rivers to swell. The rising water breaks the ice layers into large chunks, which float downstream and often pile up near narrow passages and obstructions (bridges and dams). Ice jams may build up to a thickness great enough to raise the water level and cause flooding upstream of the obstruction.

Secondary Hazards: The most problematic secondary hazards for flooding are fluvial erosion, riverbank erosion, and landslides affecting infrastructure and other assets located within floodplains. Without the space required along river corridors for natural physical adjustment, such changes in rivers after flood events can be more harmful than the actual flooding. The impacts from these secondary hazards are especially prevalent in the upper courses of rivers with steep gradients, where floodwaters may pass quickly and without much damage, but scour the banks, edging buildings, and structures closer to the river channel or cause them to fall in. Landslides can occur following flood events when high flows oversaturate soils on steep slopes, causing them to fail. These secondary hazards also affect infrastructure.

Roadways and bridges are impacted when floods undermine or wash out supporting structures. Dams may fail or be damaged, compounding the flood hazard for downstream communities. Failure of wastewater treatment plants from overflow or overtopping of hazardous material tanks and the dislodging of hazardous waste containers can occur during floods as well, releasing untreated wastewater or hazardous materials directly into storm sewers, rivers, or the ocean. Flooding can also impact public water supplies and the power grid in similar ways, through inundation and/or erosion.

Location

Heavy rainfall events occur regularly in Massachusetts. As a result, inland flooding such as riverine and drainage-related flooding affect most of the communities in the Commonwealth, including Dalton. A few dams are located in and upstream of Dalton. Ice jams have reportedly occurred along the East Branch Housatonic River. Therefore, all flood-related hazards (riverine floods, stormwater flooding, dam overtopping, and ice jams) are relevant to the Town of Dalton.

The previous edition of this plan includes a concise but detailed description of the locations where flood risks are present. This narrative is presented below:

- The Town is bisected by the East Branch of the Housatonic River, which runs through the Town center. There are also several small ponds in Town, including Egypt Reservoir and Little Egypt Reservoir, which are backup water supplies for the Town, Duncan Brook Pool, Gore Pond and Anthony Pond. There are several streams in Town that eventually lead to the Housatonic River, including Anthony Brook, Egypt Brook, Duncan Brook, Wahconah Falls Brook, Cleveland Brook, Walker Brook, Barton Brook, Brattle Brook, Sackett Brook and Hathaway Brook.
- The Town of Dalton has relatively little floodplain areas. The floodplains of note are associated with the Housatonic River and its tributaries Cleveland, Wahconah Falls and Anthony Brooks. Having descended hilly terrain, the three streams enter a broad open area of floodplain and wetland. Floodplains are present on Wahconah Golf Course where Cleveland Brook joins the East Branch Housatonic River.
- The Center Pond floodplain/wetland complex is surrounded by residential development, most densely on the west and southern boundaries. Center Pond itself is an impoundment within the East Branch Housatonic River, the result of a dam owned by Crane Company. The pond is owned by Berkshire Natural Resources Council, a regional land trust.
- Center pond is the area where the confluence of the Housatonic River and the Cleveland, Wahconah Falls and Anthony Brooks join together. Developed properties along North Main Street and East Deming Street experience periodic flooding. When large precipitation events are predicted, dam owners upstream in all of these watersheds release water in advance of the storms to create storage capacity. Although precautionary in nature, this release of water can create flood conditions downstream if water levels in waterways are already high from spring melt or previous precipitation events. Releases can come from dam owners at Lake Ashmere, Plunkett, Belmont and Cleveland Reservoirs in Hinsdale, Windsor Reservoir in Hinsdale/Windsor.
- From Center Pond the Housatonic River flows through a steeply incised channel that lacks a floodplain until it reaches the South Street/Crane Avenue area. There are also floodplain areas along the lowlands of Sackett Brook near Washington Mountain Road and to the north of Crane Avenue.

Previous Occurrences

Floods

The Coltsville USGS stream gauge #01197000 is located on the East Branch Housatonic River on the Dalton/Pittsfield municipal border and reflects the flood events experienced in the Town of Dalton. The previous edition of this plan notes that 15 flood events exceeded flood stage at this gauging station from 1936 to the date of the plan preparation (approximately 2018). The flood event of record with the highest water level was the flood of 1938. Seven out of the 15 events occurred since the 1970s and five of the 15 have occurred since 2000.

Since the previous edition of this plan, the water level at the gauge has exceeded flood stage once in 2021 and twice in 2023 (July 10 and December 19). Town staff confirmed that flooding along the river occurred several times in 2023.

The previous edition of this plan includes narratives about areas of flooding:

- An area of great concern is Walker Brook, which used to flow through a natural channel into the East Branch of the Housatonic River. The brook has been captured in underground pipes beginning at High Street, from where it flows underground until shortly before its confluence with the Housatonic at Main Street. The High Street area where Walker Brook goes underground periodically floods due to the pipe being undersized. The flooding will cross High Street and occasionally flood Field Street Extension. The Old High School building and the Senior Center are impacted by flooding from Walker Brook. The Town of Dalton has been actively working to mitigate flooding in this area.
- Chamberlain Park, off of Chamberlain Avenue, occasionally floods. Flooding at this site is exacerbated by beaver activity. Periodic trapping of beavers alleviates the amount of flooding, but the playground area continues to flood during severe rain storms.
- Other areas prone to flooding are scattered across Dalton, the majority of which are road stream crossings. The Orchard Road crossing of the East Branch Housatonic occasionally floods. Old Windsor Road had two road crossings that flooded. The first was an undersized culvert that kept washing out, but this has been repaired. The second is the bridge near Wahconah High School, which has a low clearance over the Housatonic River, and is threatened with high flood flows and ice jams.
- There are several areas in Dalton where flooding occurs in areas that are not floodplain areas. The fields and parking lot of Wahconah High School occasionally floods. The school itself has not been flooded, but flood waters have come close to the building. Likewise, some flooding has occurred on portions of Nessacus Middle School property, but the school has not experienced flooding. North Street at Brayburn occasionally floods. Kirchner Road occasionally floods where it crosses Sackett Brook in two areas upstream of the brook’s floodplain.

In addition, the previous edition of this plan describes significant flooding associated with Tropical Storm Irene in August 2011:

- Several areas were flooded, including residential properties and roads. Pomeroy Manor, the Dalton Housing Authority’s housing for the elderly, was of greatest concern, with floodwaters from Legion Pond entering Units 4 and 5 and was threatening others. For safety the electricity was shut off at the complex and residents advised to leave. Wahconah Falls Road was flooding and residents along sections of North Street, Anthony Road and Orchard Road advised to evacuate. A home on North Street was flooded, deemed unsafe, and residents evacuate; water in the basement was up to the floor rafters of the basement and the oil tank ruptured; becomes hazardous materials site. Most residents sheltered with family, but a few are transported to and shelter at regional shelter at Reid Middle School in Pittsfield.

- The High Street bridge over Walker Brook flooded the road, water threatened the Senior Center, and water entered the old high school building. Center Pond was rising, so Crane Company agreed to open the spillways for the Weston dam #1 and others downstream to relieve floodwaters; the Pittsfield EOC informed of released water.
- Water was released from Windsor Reservoir to relieve pressure on dam; the reservoir refilled in eight hours. Roads that had to be rebuilt included Wahconah Falls, Fox and Johnson Roads. T.S. Irene is listed as a 50-year recurrence interval at the Coltsville stream gage on the Housatonic River.

Figure 14. Flooding at the Wahconah Regional High School.

The Town's Community Resilience Building Report (2019) provides additional information about flooding. The report explains that "while no major damaging event have occurred yet, flooding at Walker Brook affects the newly constructed Senior Center property, which is proposed to serve as shelter and a cooling center as temperatures rise. The public space around the Senior Center presents an excellent opportunity for rain gardens along a newly daylighted Walker Brook. Daylighting is the process of uncovering and restoring streams and rivers as community and environmental assets that were historically piped underground." Furthermore, "Pomeroy Manor flooding from Center Pond was another major concern in terms of flooding, along with other housing occupied by the Town's elderly population. Overall, Dalton needs to update infrastructure to handle more water due to climate change."

As noted earlier, this plan update relies primarily on a roughly ten-year lookback (2014 through 2023). The NOAA Storm Events database (https://www.ncdc.noaa.gov/stormevents/) for Berkshire County lists two flood events impacting the Dalton area for the period 2014-2023.

Table 19. NCEI Severe Storm Database Entries Covering Floods in Dalton.

Date	Description	Losses Reported
6/25/14	*Flash Flood.* A very moist and humid air mass was in place across the region on Wednesday, June 25th. As a slow moving cold front approached from the west, bands of heavy rain showers and	---

Date	Description	Losses Reported
	thunderstorms developed ahead of the boundary. As these showers and thunderstorms repeatedly passed over the same locations, the heavy rainfall led to significant runoff, which caused flash flooding in some areas. Many roads were closed due to the flooding and some homes were affected by water as well. The threat for heavy rainfall and flooding ended late on the evening of June 25th, as the storm's cold front passed through the region from west to east. Several minor roads were washed out in the hills around Dalton as a result of flash flooding from thunderstorm heavy rainfall.	
7/27/14	*Flash Flood.* A strong area of low pressure was situated over the Great Lakes region on Sunday, July 27th. An upper level shortwave, combined with an approaching warm front, allowed for a cluster of strong to severe thunderstorms to break out during the afternoon hours on July 27th over eastern New York, which spread into western Massachusetts during the late afternoon hours. In addition to straight-line wind damage and large hail, the area of thunderstorms also produced an EF1 tornado in Dalton, causing damage to trees and homes. Heavy rainfall from thunderstorms led to flash flooding. As the strong area of low pressure moved across upstate New York on Monday, July 28th, some additional thunderstorms occurred during the afternoon hours. With additional heavy rainfall occurring, flash flooding was renewed in some parts of the Berkshires once again, as two day rainfall totals were in excess of three inches in the Pittsfield area.	--- [tornado losses are addressed later in this chapter]
7/10/23	*Flood.* A strong upper-level system brought widespread rounds of showers and thunderstorms to western Massachusetts on July 9-10, 2023. The steadiest and heaviest rainfall occurred during the early morning hours on July 10 which resulted in areas of flooding. Rainfall totals were generally in the 1.5 to 4.0 inch range. Areas receiving flooding included the City of North Adams and the towns of Clarksburg, Becket, Sheffield, Washington and Great Barrington mainly consisting of closed and/or washed out roads and flooded homes/basements. A State of Emergency was issued for North Adams, Becket, Hinsdale, and Clarksburg due to the flooding.	$1.5 million in other communities

Ice Jams

Ice jams are known to have occurred in and near Dalton. According to the previous edition of this plan, the most recent such occurrence was in January 2018, when two inches of rain and an unusually warm weather of 50 F, which followed a period of prolonged and unusually cold weather, caused flooding from snow and ice melt across Berkshire County. Ice jams spread blocks of ice over the banks of the East Branch Housatonic River on the golf course at Wahconah Country Club. Fortunately, buildings were not threatened in this area.

This same weather pattern caused an ice jam in Kitchen Brook in the neighboring Town of Cheshire, which subsequently flooded and deposited large chunks of ice on Route 8, a major north-south arterial road in the county. The same event caused the Town of Stockbridge to declare a local disaster due to concerns that a massive buildup of ice and rising flood water could damage the Rt. 7 bridge over the Housatonic River and/or the natural gas main pipeline that serves as the only gas supply to the neighboring Town of Great Barrington.

Dam Overtopping

Dams upstream of Dalton and in Dalton have not overtopped. However, according to Town staff, a rain event several years ago contributed to rapid siltation in Windsor Reservoir and spillway abutments were almost overtopped. The spillway was redesigned and now it is considered capable of more safely conveying flood flows. Furthermore, Emergency Action Plans (EAPs) have been prepared for the high hazard dams that, if failure occurred, they would impact Dalton.

Extent

The frequency and severity of flooding are measured using a discharge probability, which is the probability that a certain river discharge (flow) will be equaled or exceeded in a given year. Flood studies use historical records to determine the probability of occurrence for the different discharge levels. The flood frequency equals 100 divided by the discharge probability. For example, the “100-year discharge” has a 1 percent chance of being equaled or exceeded in any given year. The “annual flood” is the greatest flood event expected to occur in a typical year. These measurements reflect statistical averages only; it is possible for two or more floods with a 100-year or higher recurrence interval to occur in a short time period. The same flood can have different recurrence intervals at different points on a river.

The 1% annual chance flood is the standard used by most federal and state agencies. It is used by the National Flood Insurance Program (NFIP) to guide floodplain management and determine the need for flood insurance. The extent of flooding associated with a 1% annual probability of occurrence (the base flood or 100-year flood) is called the 100-year floodplain, which is used as the regulatory boundary by many agencies. Also referred to as the Special Flood Hazard Area (SFHA), this boundary is a convenient tool for assessing vulnerability and risk in flood-prone communities. The term “500-year flood” is the flood that has a 0.2% chance of being equaled or exceeded each year. Base flood elevations and the boundaries of the 1% annual chance (100-year) and the 0.2% annual chance (500-year) floodplains are shown on Flood Insurance Rate Maps (FIRMs), which are the principal tools for identifying the extent and location of the flood hazard.

Both the 100-year and the 500-year floodplains are determined based on past events. As a result, the flood maps do not reflect projected changes in precipitation events.

Flooding in Massachusetts is forecast and classified by the National Weather Service (NWS) Northeast River Forecast Center as minor, moderate, or severe based upon the types of impacts that occur. Minor flooding is considered "disruptive" flooding that causes impacts such as road closures and flooding of recreational areas and farmland. Moderate flooding can involve land with structures becoming inundated. Major flooding is a widespread, life-threatening event. River forecasts are made at many locations in the state containing USGS river gauges with established flood elevations and levels that correspond to each of the degrees of flooding.

Due to the pattern of meteorological conditions needed to cause serious flooding, it is unusual for a flood to occur without warning. Flash flooding, which occurs when excessive water fills either normally dry creeks or riverbeds or dramatically increases the water surface elevation on currently flowing creeks and rivers, can be less predictable. However, potential hazard areas can be warned in advance of potential flash-flooding danger. Flooding is more likely to occur due to a rainstorm when the soil is already wet and/or streams are already running high from recent previous rains. NOAA's Northeast River Forecast Center provides flood warnings for Massachusetts, relying on monitoring data from the USGS stream gauge network. Notice of potential flood conditions is generally available several days in advance. State agency staff also monitor river, weather, and forecast conditions throughout the year. Notification of potential flooding is shared among state agency staff, including the Massachusetts Emergency Management Agency (MEMA) and the Office of Dam Safety. The NWS provides briefings to state and local emergency managers and provides notifications to the public via traditional media and social networking platforms.

Probability of Future Events

Although it can be complex to forecast, scientists expect that there will be an overall increase of precipitation on an annual basis across Massachusetts. It is expected that precipitation patterns will become more variable over time, with fewer days with precipitation, but heavier and more intense events when it does rain or snow. Most areas across the state are expected to have small increases in annual total precipitation, but a substantial change in seasonal precipitation patterns.

Climate change will increase the probability of flooding caused by intense precipitation. The National Climate Assessment and NCEI both project more fall, winter, and spring precipitation as well as more intense precipitation. As noted in the ResilientMass Plan, extreme river flow events are projected to increase, elevating the probability of damaging floods. In addition, smaller flood events are likely to occur more frequently. For example, the current 24-hour 10-year storm (about 3 inches) could double in frequency by 2050 in western and central Massachusetts and triple in frequency in coastal regions.

Vulnerability Assessment

Exposure

In Dalton, the 1% annual chance floodplain (100-year floodplain) covers about 421.6 acres, or approximately 3.0 percent of Dalton. In addition to the 100- year floodplains, stormwater has the potential to cause localized flooding.

The senior center, pump stations at Bay State Mill and Housatonic Street, communications tower at the American Legion Post, and housing authority buildings are exposed to flooding. The water levels have come close to reaching Wahconah High School. There are approximately eighty-five buildings in the floodplain including single family homes, multi-family homes, mobile home, commercial, government, non-profit/religious, and industrial buildings. Additionally, several roads and areas experience flooding including Holiday Brook Area/North Street at Braeburn Rd., Walker Brook Area/High St. at Field St. Ext., Pomeroy Manor/Center Pond, Deming St. Ext., Cuverwell Field/Chamberlain Ave to Judith Drive, and Housatonic River Basin. The railroad also crosses the floodplain and may be impacted. There are four structures listed on the National Register of Historic Places in the floodplain including the Crane Museum, 190 South St., 5 Crane Ave., and 9 Crane Ave. According to EPA's Toxic Release Inventory (TRI) database, there are five facilities which contain hazardous materials in the 100-year floodplain: 339 North Street, Berkshire Motor Cars LTD, Byron Weston Company, Crane Byron Weston Paper Mill, and S&W Auto Performance. Of the eighty-five buildings in the floodplain, seven are part of an environmental justice community. Table 20 shows the types of buildings exposed to the flood and their value. The number in parathesis shows the total number of buildings and building values for the Town.

Table 20. Buildings in 100-Year Floodplain.

Building Type	Number of Buildings (Total in City)	Building Value (Total in City)
Single Family	59 (2,846)	$9,047,300 ($461,247,300)
Mobile Home	1 (6)	$12,700 ($225,300)
Multi-Family	7 (446)	$1,180,900 ($86,014,900)
Mixed-Use	0 (24)	$0 ($4,306,900)
Commercial	4 (116)	$16,120,900 ($174,879,975)
Educational	0 (5)	$0 ($9,389,400)
Government	10 (63)	$8,177,700 ($265,621,400)
Religious/Non-Profit	1 (33)	$581,400 ($19,965,500)
Industrial	2 (46)	$9,019,600 ($70,455,300)
Garage/Outbuilding	0 (10)	$0 ($108,400)
Vacant	1 (11)	$0 ($30,500)
Total	**85 (3,606)**	**$44,140,500 ($1,092,244,875)**

The population exposed to the 100-year floodplain is shown in Table 21. The column on the left shows the population in and around the floodplain (wherever the Census Block overlapped with the floodplain boundary) while the column on the right shows the total population numbers for the Town. The population exposed to the flood hazard is similar to that in the Town as a whole.

Table 21. Population Exposed to 100-Year Floodplain (2020 U.S. Census).

Demographics	Population in and Adjacent to Floodplain	Total Population
Population	2,545	6,330
Households	1,248	2,928
White	2,358 (92.6%)	5,852 (92.4%)
Black	18 (0.7%)	61 (1.0%)
American Indian	4 (0.2%)	7 (0.1%)
Asian	18 (0.7%)	61 (1.0%)
Pacific Islander	0 (0.0%)	0 (0.0%)
Other Race	21 (0.8%)	58 (0.9%)
Two or More Races	126 (5.0%)	291 (4.6%)
Hispanic or Latino:	65 (2.6%)	161 (2.5%)
Population under 18:	477 (18.7%)	1,020 (16.1%)
Population over 64:	568 (22.3%)	1,671 (26.4%)
Annual Income < $30K/year	198 (15.9%)	491 (16.8%)
Population in EJ Zone*	450 (17.7%)	2,254 (35.6%)

**Massachusetts Office of Energy and Environmental Affairs, 2022*

The 100-year Floodplain (FEMA) with the Town's critical facilities is shown in Figure 16. The senior center, pump stations at Bay State Mill and Housatonic Street, communications tower at the American Legion Post, and housing authority buildings are exposed to flooding. Train tracks do cross the 100-year floodplain and may be vulnerable to flooding.

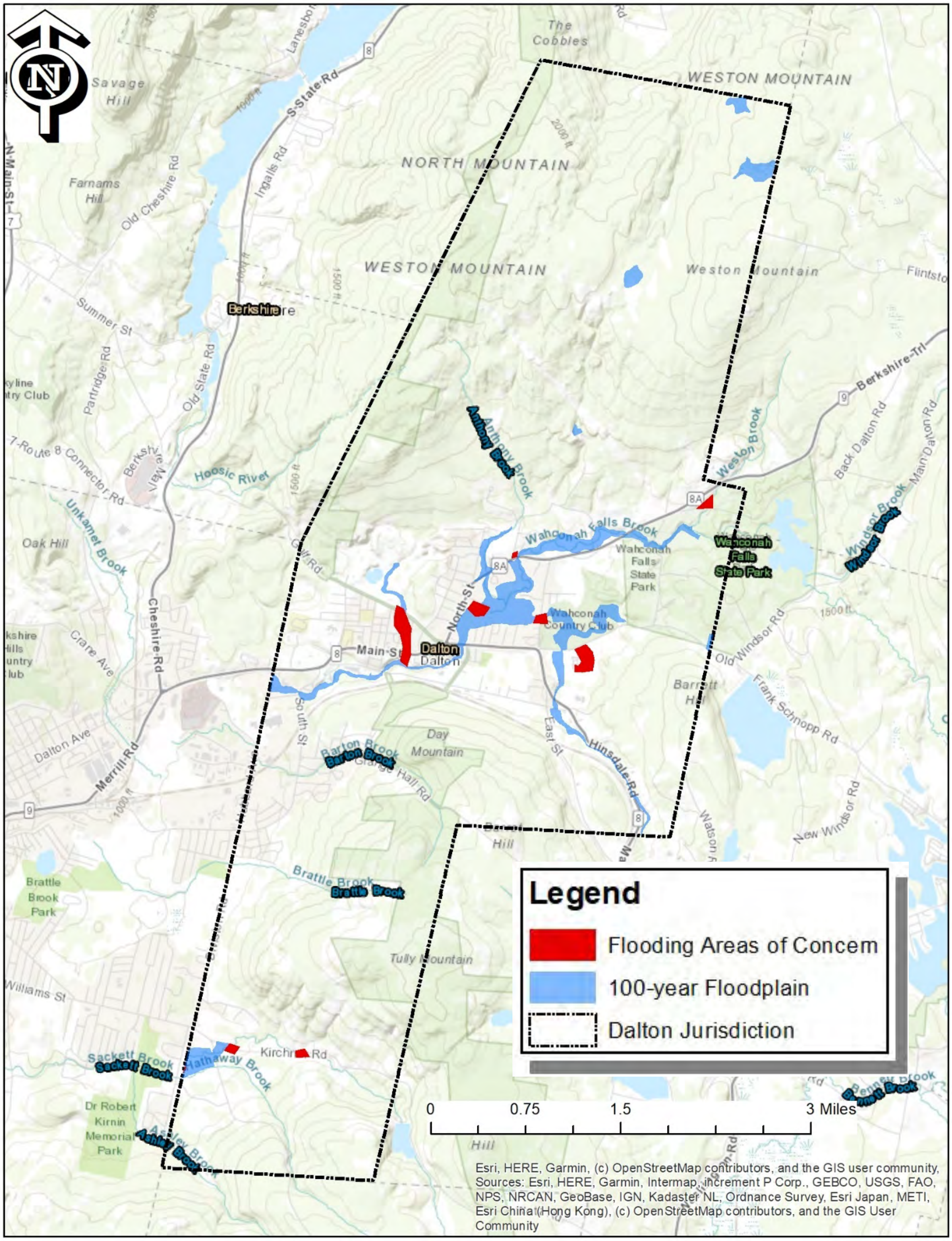


Figure 15. Dalton Critical Facilities and 100-Year Floodplain.

Although dams and their associated impoundments provide many benefits to a community, such as water supply, recreation, hydroelectric power generation, and flood control, they also pose a potential risk to lives and property. Dam failure is not a common occurrence, but dams do represent a potentially disastrous hazard. When a dam fails, the potential energy of the stored water behind the dam is instantly released, oftentimes with catastrophic consequences as the water rushes in a torrent downstream flooding an area known as an “inundation area.” The number of casualties and the amount of property damage will depend upon the timing of the warning provided to downstream residents, the number of people living or working in the inundation area, and the number of structures in the inundation area.

There is one high hazard and two significant hazard dams in Dalton with four high hazard dams located adjacent to the Town. There is one low hazard and six dams which have not been assigned a hazard level. Table 22 identifies the dams within the Town.

Table 22. Dams in Vicinity.

Name	Ownership	Hazard Type
Egypt Reservoir	Public	High
Byron Weston Dam #1	Private	Significant
Byron Weston Dam #2	Private	Significant
Upper Pioneer Pond Dam	Private	Low
Ashley Lower Reservoir (OLD) Dam	Public	N/A
Bay State Pond Dam	Private	N/A
Dalton Water Supply Dam #1	Public	N/A
Hathaway District Dam	Public	N/A
Old Berkshire Mill Dam	Private	N/A
Sackett District Dam	Public	N/A

The Town’s dams are shown in Figure 16. Additionally, there are several beaver dams which may cause issues in the Town if breached.

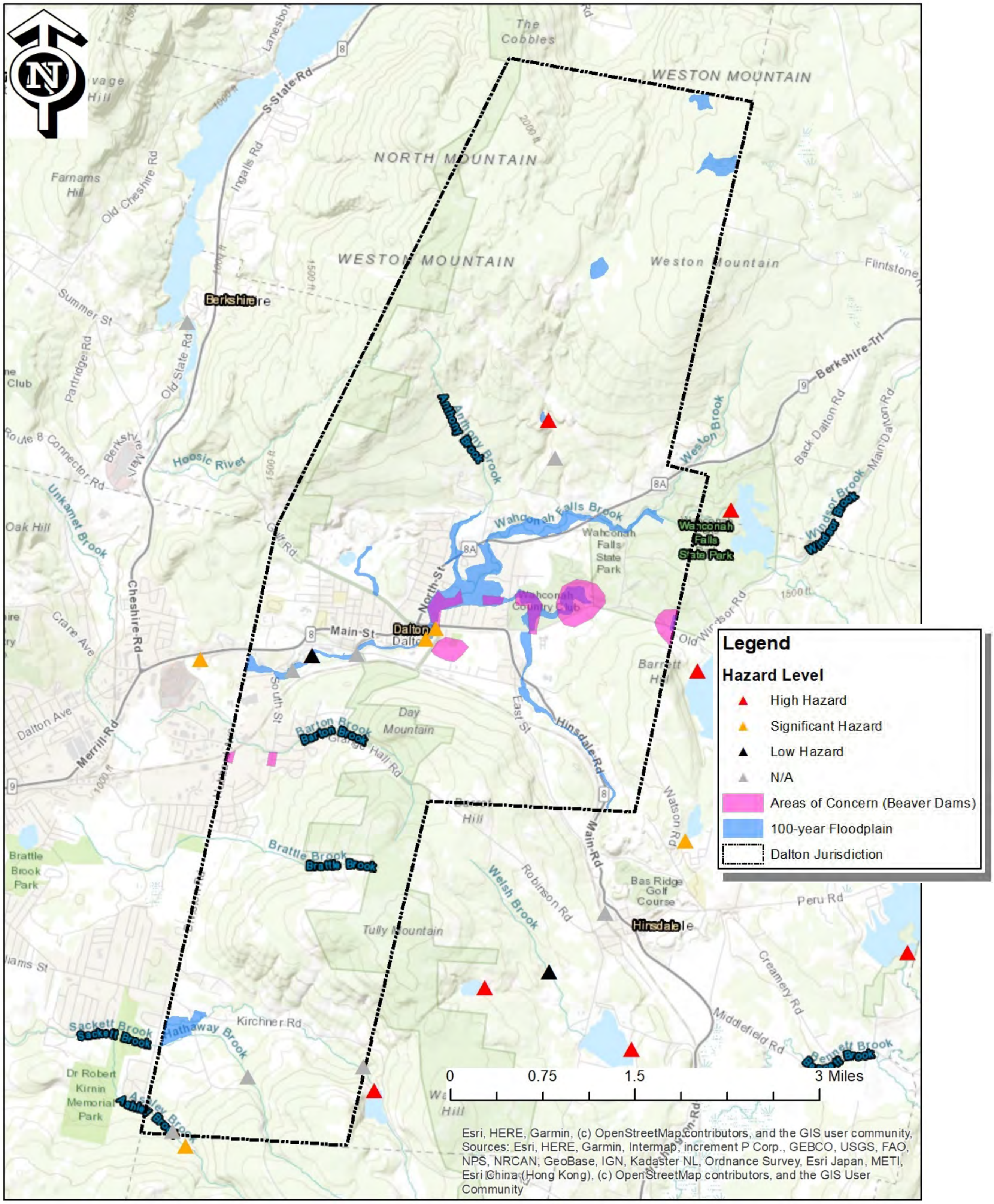


Figure 16. Dalton Dam Locations.

Built Environment Impacts

To identify built environment impacts to the Town, FEMA's risk assessment software, Hazus, was implemented. Building footprint data and parcel data was used to update the model while the latest floodplain was also integrated into the software. The economic loss results of the 100-year event are shown in Table 23. The Town's Average Annual Loss (AAL) is calculated to be $173,500.

Table 23. Building Loss for the 100-Year Flood Scenario.

Loss Type	Residential ($Million)	Commercial ($Million)	Other Occupancy ($Million)	Total ($Million)
Building Loss	2.04	0.43	0.50	**2.97**
Content Loss	1.01	1.52	1.79	**4.32**
Business Inventory Loss	0.00	0.04	0.10	**0.14**
Business Income Loss	0.09	2.22	0.30	**2.61**
Business Relocation Loss	0.56	0.20	0.26	**1.02**
Rental Income Loss	0.23	0.17	0.07	**0.47**
Wage Loss	0.20	1.80	3.82	**5.82**
Total	**4.13**	**6.38**	**6.84**	**17.35**

Climate change will increase the probability and magnitude of flood impacts to the built environment. Future floodplains may be larger than the current FEMA modeled floodplain and new development, including the Enclave development should consider these projected conditions. These new developments may cause additional stormwater issues which should be considered too.

Population Impacts

The Town should be aware that senior and low-income segments of Dalton's population may be more vulnerable to hazard events due to a number of factors. Senior and low-income populations may be physically or financially unable to react and respond to a hazard event and require additional assistance. Access to information about the hazard event may be lacking, as well as access to transportation in the case of an evacuation. The location and construction quality of housing can also pose a significant risk. The Town should be aware of the potential needs of residents within these population segments in the event of a hazard occurrence.

Using the Hazus software, the 100-year flood scenario results showed that there would be approximately 56 displaced households and 33 people seeking public shelter.

Climate change will increase the probability and magnitude of flood impacts to the population. Future floodplains may be larger than the current FEMA modeled floodplain and new development should consider these projected conditions. Vulnerable populations should be considered when development near the current floodplain is planned.

Environment Impacts

One of the major environmental impacts of a major flood would be the potential release of hazardous materials. According to EPA's Toxic Release Inventory (TRI) database, there are five facilities which contain hazardous materials in the 100-year floodplain: 339 North Street, Berkshire Motor Cars LTD, Byron Weston Company, Crane Byron Weston Paper Mill, and S&W Auto Performance. However, there are several facilities which contain hazardous materials that are adjacent to the floodplain.

Climate change will increase the probability and magnitude of flood impacts which may include environmental impacts due to hazardous materials release. Facilities which contain hazardous materials should be considered when new development is planned.

Problem Statements for Flood

Table 24. Problem Statements Related to Flooding.

Assets	Problems Associated with Flood
People (including underserved communities and socially vulnerable populations)	• Older populations in the floodplain may have difficulty evacuating. • The senior center and Housing Authority buildings are exposed to the 100-year floodplain. • The water levels have come close to reaching Wahconah High School.
Structures (including facilities, lifelines, and critical infrastructure)	• The senior center, pump stations at Bay State Mill and Housatonic Street, communications tower at the American Legion Post, and housing authority buildings are exposed to flooding. • There are approximately eighty-five buildings in the floodplain including single family homes, multi-family homes, mobile home, commercial, government, non-profit/religious, and industrial buildings. Golf course also impacted by flooding. • There are some undersized culverts.

Assets	Problems Associated with Flood
Systems (including networks and capabilities)	• Road closures may interrupt community systems including North Street at Braeburn Rd., High St. at Field St. Ext., Deming St. Ext., and Chamberlain Ave to Judith Drive. • The Town is currently precluded from adopting higher regulatory standards to protect against flooding (must comply with State Building Code).
Natural, historic, and cultural resources	• According to EPA's Toxic Release Inventory (TRI) database, there are five facilities which contain hazardous materials in the 100-year floodplain: 339 North Street, Berkshire Motor Cars LTD, Byron Weston Company, Crane Byron Weston Paper Mill, and S&W Auto Performance. • There are four structures listed on the National Register of Historic Places in the floodplain including the Crane Museum, 190 South St., 5 Crane Ave., and 9 Crane Ave.
Activities that have value to the community	• Several road closures may disrupt community events.

Hurricanes and Tropical Storms

Flooding in Massachusetts is often the direct result of tropical storms and hurricanes. These powerful storms can also cause significant widespread damage due to high winds. The impacts from high winds are the primary concern of this section.

> The Town of Dalton Community Resilience Building Workshop Summary of Findings (2019) lists "wind" as one of the top hazards of concern.

Description

Tropical cyclones (tropical depressions, tropical storms, and hurricanes) that affect New England form over the warm, moist waters of the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico. Tropical systems customarily come from a southerly direction and when they accelerate up the East Coast of the U.S., most take on a distinct appearance that is different from a typical hurricane. Although rain is often limited in the areas south and east of the track of the storm, these areas can incur the worst winds and storm surge. Dangerous flooding occurs most often to the north and west of the track of the storm. An additional threat associated with a tropical system making landfall is the possibility of tornado generation. Tornadoes would generally occur in the outer bands to the north and east of the storm, a few hours to as much as 15 hours prior to landfall.

Hurricane season runs from June 1 to November 30. In New England, these storms are most likely to occur in August, September, and the first half of October. The ResilientMass Plan notes that this is due in large part to the fact that it takes a considerable amount of time for the waters south of Long Island to warm to the temperature necessary to sustain the storms this far north. Also, as the region progresses into the fall months, the upper-level jet stream steering winds might flow from the Great Lakes southward to the Gulf States and then back northward up the eastern seaboard. This pattern is conducive for capturing a tropical system over the Bahamas and accelerating it northward.

Location

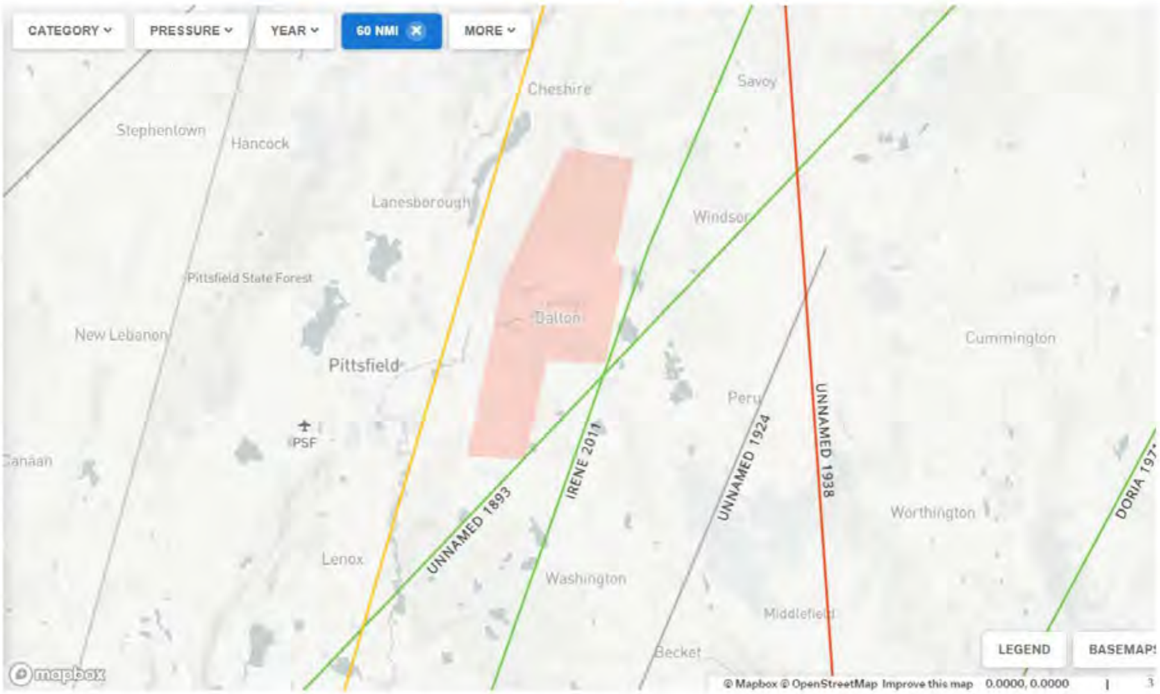
Tropical storms and hurricanes can affect the entirety of Massachusetts, including the geographic extent of Dalton.

Previous Occurrences

Figure 17. High Winds Destroyed Trees on Orchard Road.

The ResilientMass Plan notes that hurricanes and tropical storms occur somewhat regularly in Massachusetts. Recent notable events include Tropical Storm Isaias (2020), Tropical Depression Henri (2021), and Tropical Storm Else (2021). Historical tropical system tracks near and through are depicted on the following page. This mapping is available from NOAA and updated continuously.

Historical Tropical Storm Tracks in the Town of Dalton



Graphic courtesy of NOAA

A handful of tropical storms and hurricanes have passed near or through Dalton since recordkeeping began. Unnamed storms passed near the town in 1893 (two storms, including the orange line above which represents a Category 1 storm), 1899, and 1924; only the August 1893 storm may have resulted in widespread damage in Dalton. The 1938 hurricane (red line) was one of the most destructive in the history of New England, with extensive wind damage throughout the region. Storms Doria (1971) and Irene (2011) caused little wind damage but produced significant flooding in the region.

Figure 18. Historical Tropical Storm Tracks In Dalton.

As noted elsewhere, this Plan update relies primarily on a ten-year lookback (2014 through 2023) ending with the date of plan development. During that ten-year period, only one Massachusetts emergency declaration (Storm Lee of September 2023) was associated with a tropical system, but it is not yet in the NCEI database of severe storms for Berkshire County. T.S. Isaias of 2020 is the sole tropical storm appearing in the inventory for Berkshire County for the last ten years:

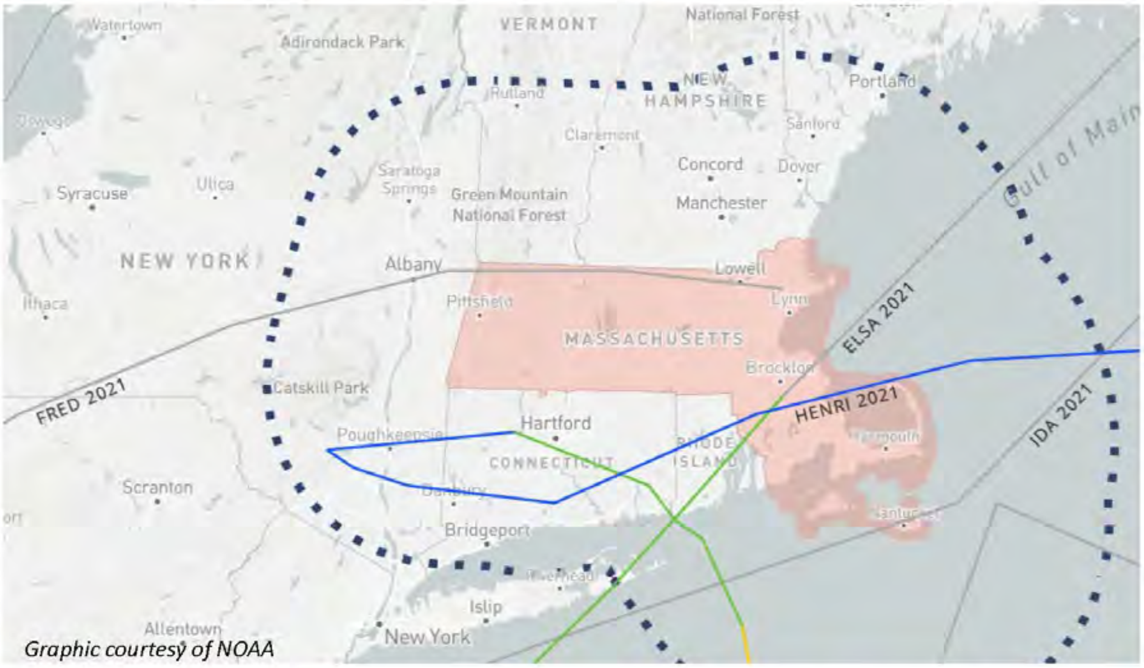
- August 4, 2020: Tropical Storm Isaias tracked northeast from the eastern Carolinas across the mid-Hudson Valley and into New England. The center of the storm passed close to Albany, NY on August 4th. This storm brought tropical storm force winds and moderate rainfall to western Massachusetts through the period. These winds caused widespread damage with numerous reports of downed trees and wires across Massachusetts. Power outages were also widespread with over 15,000 outages across Berkshire County and over 75,000 state-wide. Every town in the county had some power outages. The Town of Sandisfield was particularly hard-hit, with over 70% of the town losing power and 45 reports of trees down on wires. A Sandisfield resident was critically injured when a tree fell on her car. Trees were downed in the Town of Pittsfield, Peru, Hinsdale and northwest of Dalton. Large tree limbs were also downed in the Town of Richmond.

Dalton was moderately impacted by the series of tropical and post-tropical storm systems that impacted Massachusetts in 2021. These storms occurred in July, August, and September 2021 as follows:

- T.S. Elsa - July 9, 2021
- T.S. Fred - August 19, 2021
- T.S. Henri - August 22-23, 2021
- T.D. Ida - September 1, 2021

Although Dalton experienced precipitation impacts from these events, the local planning team noted that flooding did not result from any of the four named storms in 2021.

Impacts of the 2021 Hurricane Season on Massachusetts



T.S. Elsa crossed eastern Massachusetts on July 9, delivering wind and flooding rains while transitioning to an extratropical storm later that day. Approximately 2 to 4 inches of rain were recorded in many towns. MBTA commuter rail trains were delayed on the Worcester line due to flooding, and Route 146 was flooded. About 11,000 Eversource customers in Massachusetts lost power.

Extratropical Storm Fred crossed northern Massachusetts lengthwise on August 19 and 20, delivering flooding rains to parts of southern New England. Flooding in Massachusetts was worst in the Worcester area. Approximately 2 to 4 inches of rain were recorded in many towns.

T.D. Henri crossed eastern Massachusetts on August 24, delivering flooding rains to parts of southern New England. Prior to crossing Massachusetts, the storm looped through Connecticut and New York on August 22-24. The path and slow movement of the storm contributed to widespread flooding in all three states, made worse due to the conditions caused by storm Fred only a few days before. Approximately 1 to 4.5 inches of rain were recorded in many towns. About 12,000 Eversource customers in Massachusetts lost power.

Extratropical Storm Ida passed south of New England and crossed Nantucket on September 2, delivering flooding rains to parts of southern New England. The precipitation from Ida was more intense than expected, and it caused widespread flooding. Approximately 2 to 6 inches of rain were recorded in many towns. About 4,000 people in Massachusetts lost power.

Figure 19. Tracks for Tropical Storms that Impacted Massachusetts 2021.

Even without the presence of a catastrophic hurricane striking Dalton recently, less severe tropical storms and remnants such as those described above have created disruptions and necessitated public expenditures to deal with outages and debris.

Extent

Hurricanes are measured according to the Saffir-Simpson scale, which categorizes or rates hurricanes from 1 (minimal) to 5 (catastrophic) based on their intensity. This is used to give an estimate of the potential property damage and flooding expected along the coast from a hurricane landfall. Wind speed is the determining factor in the scale, inherently leaving out any measure of precipitation and flooding.

Table 25. Saffir-Simpson Scale.

Saffir-Simpson Hurricane Wind Scale

	Sustained Winds	Types of Damage Due to Hurricane Winds
1	74-95 mph 64-82 kt 119-153 km/h	**Damaging winds will produce some damage:** Well-constructed framed homes could have damage to roof, shingles, vinyl siding, and gutters. Large branches of trees will snap, and shallow-rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110 mph 83-95 kt 154-177 km/h	**Very strong, damaging winds will cause widespread damage:** Well-constructed framed homes could sustain major roof and siding damage. Many shallow-rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3 (major)	111-129 mph 96-112 kt 178-208 km/h	**Dangerous winds will cause extensive damage:** Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4 (major)	130-156 mph 113-136 kt 209-251 km/h	**Extremely dangerous winds will cause devastating damage:** Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5 (major)	157 mph or higher 137 kt or higher 252 km/h or higher	**Catastrophic damage will occur:** A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: National Hurricane Center, NOAA

Tropical storms and tropical depressions, while generally less dangerous than hurricanes, can be deadly. The winds of tropical depressions and tropical storms are usually not the greatest threat; rather, the rains, flooding, and severe weather associated with the tropical storms are what customarily cause more significant problems. Nevertheless, serious power outages can also be associated with these types of events.

The NWS issues a hurricane warning when sustained winds of 74 mph or higher are expected in a specified area in association with a tropical, subtropical, or post-tropical cyclone. A warning is issued 36 hours in advance of the anticipated onset of tropical-storm-force winds. A hurricane watch is announced when sustained winds of 74 mph or higher are possible within the specified area in association with a tropical, subtropical, or post-tropical cyclone. A watch is issued 48 hours in advance of the anticipated onset of tropical-storm-force winds (NWS, 2013).

Probability of Future Events

The ResilientMass Plan explains that Massachusetts experiences a tropical storm or hurricane about once every two years on average, with NOAA estimating the recurrence of any category hurricane between 13 to 30 years, and a Category 3 hurricane occurrence every 50 to 60 years.

Some researchers have suggested that the intensity of tropical cyclones has increased over the last 40 years, with some believing that there is a connection between this increase in intensity and climate change. While most climate simulations agree that greenhouse warming enhances the frequency and intensity of tropical storms, models of the climate system are still limited by resolution and computational ability. Given the history of major storms and the possibility of increased frequency and intensity of tropical storms due to climate change, it is prudent to expect that there will be hurricanes impacting Dalton in the future that may be of greater frequency and intensity than in the past.

Vulnerability Assessment

Exposure

High winds and heavy rain and/or hail associated with hurricanes and tropical storms can cause damage to utilities, structures, roads, trees (potentially causing vehicle accidents) and injuries and death. Other associated concerns are debris management issues including debris removal and identification of disposal sites. All assets in Dalton should be considered exposed to high winds while specific areas are exposed to hurricane surge. Figure 20 shows the 100-year windspeeds identified in the ASCE 7-98 publication.

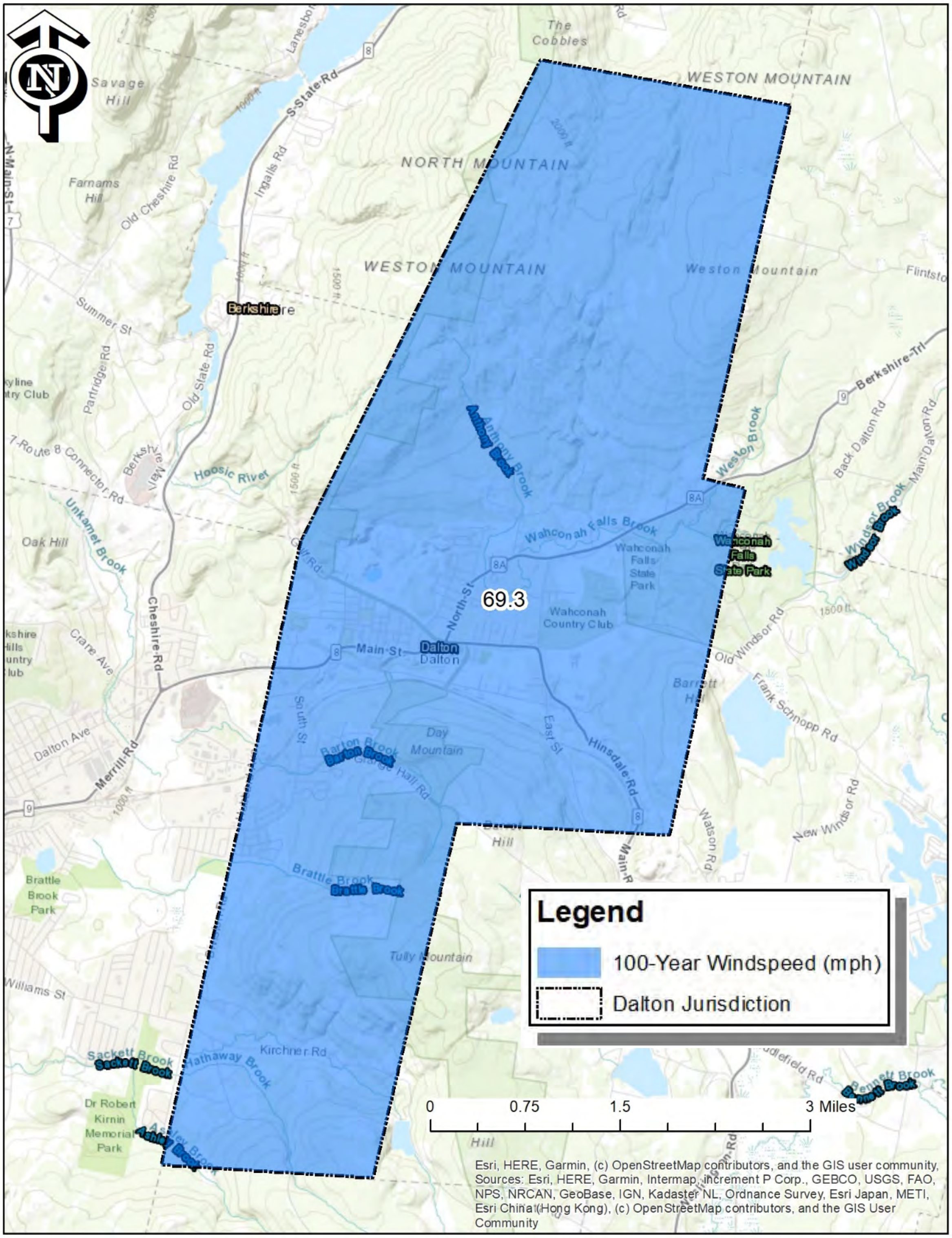


Figure 20. 100-Year Windspeeds (ASCE 7-98).

Built Environment Impacts

To identify built environment impacts to the Town resulting from wind damage, FEMA's risk assessment software, Hazus, was implemented. The economic loss results of the 500-year event are shown in Table 26 while the results for the 1000-year event are shown in Table 27. The Town's Average Annual Loss (AAL) is calculated to be $128,169.

Buildings that are permanently open with bays or open sides are susceptible to wind damage since the building envelope can't be maintained. Family lumber has an open wall, there is a pavilion on Mill Street, and the Town gazebo also has open walls and may be more susceptible to high winds.

Table 26. Building Losses Due to Wind for a 500-Year Scenario.

Loss Type	**Residential ($Million)**	**Commercial ($Million)**	**Other Occupancy ($Million)**	**Total ($Million)**
Building Loss	7.66	0.24	0.25	**8.15**
Content Loss	3.00	0.02	0.05	**3.07**
Business Inventory Loss	0.00	0.00	0.01	**0.01**
Business Income Loss	0.00	0.00	0.00	**0.00**
Business Relocation Loss	0.17	0.01	0.00	**0.18**
Rental Income Loss	0.11	0.00	0.00	**0.11**
Wage Loss	0.00	0.00	0.00	**0.00**
Total	**10.94**	**0.27**	**0.31**	**11.52**

Table 27. Building Losses Due to Wind for a 1000-Year Scenario.

Loss Type	**Residential ($Million)**	**Commercial ($Million)**	**Other Occupancy ($Million)**	**Total ($Million)**
Building Loss	11.19	0.44	0.50	**12.13**
Content Loss	4.45	0.06	0.15	**4.66**
Business Inventory Loss	0.00	0.01	0.02	**0.03**
Business Income Loss	0.00	0.03	0.01	**0.04**
Business Relocation Loss	0.26	0.04	0.02	**0.32**
Rental Income Loss	0.18	0.02	0.00	**0.20**

Wage Loss	0.00	0.02	0.02	**0.04**
Total	**16.08**	**0.62**	**0.72**	**17.42**

Population Impacts

Populations considered most vulnerable to hurricane and tropical storm impacts in Dalton are identified based on a number of factors including their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing. For high windspeeds, it's important to maintain the building envelope during the event. If a window or door fails, damage to the structure will be much greater. The senior and low-income populations in Dalton are particularly susceptible to extreme winds and it should be noted that there may be overlap within the two categories. The Town should be aware of the potential needs of residents within these population segments in the event of a hazard occurrence.

For the 500-year event, Hazus predicts that there will be no displaced households and nobody seeking public shelter from the high windspeeds. For the 1000-year event, Hazus predicts that there will be up to five displaced households and nobody seeking public shelter from the high windspeeds.

Environment Impacts

Hurricanes can cause damage to parks and other natural areas. Some areas of the Town may be out of service until trees are removed.

Problem Statements for Hurricanes/Tropical Storms

Table 28. Problem Statements for Hurricanes/Tropical Storms.

Assets	Problems Associated with Hurricanes and Tropical Storms
People (including underserved communities and socially vulnerable populations)	• Vulnerable populations may need to be evacuated and could be displaced from their homes.
Structures (including facilities, lifelines, and critical infrastructure)	• Wind may cause trees to fall into structures and infrastructure, and roadways. • Wind damage to wind-susceptible buildings such as carports, greenhouses, pavilions, gazebos, and open-walled buildings. Additional damage to commercial buildings with HVAC located on roofs.

Assets	Problems Associated with Hurricanes and Tropical Storms
	• The electric grid may go down during high wind event.
Systems (including networks and capabilities)	• First responders may have difficulty reaching people if roads are closed due to tree debris.
Natural, historic, and cultural resources	• Historic buildings may experience damage during high wind events, especially the roofing and windows. Water entering these buildings could impact important historic and cultural artifacts.
Activities that have value to the community	• A severe hurricane wind and rain event could negatively impact outdoor activities in the Town.

Invasive Species

The ResilientMass Plan defines invasive species as non-native species that cause or are likely to cause harm to ecosystems, economies, and/or public health (USDA). The focus of this section is on invasive terrestrial plants, as this is the most studied and managed type of invasive; information for invasive aquatic flora and fauna is also provided when relevant.

The Town of Dalton Community Resilience Building Workshop Summary of Findings (2019) lists "pests" as one of the top hazards of concern.

Description

The Massachusetts Invasive Plant Advisory Group (MIPAG), a collaborative representing organizations and professionals concerned with the conservation of the Massachusetts landscape, is charged by EOEEA to provide recommendations to the Commonwealth to manage invasive species. MIPAG defines invasive plants as "non-native species that have spread into native or minimally managed plant systems in Massachusetts [causing] economic or environmental harm by developing self-sustaining populations and becoming dominant and/or disruptive to those systems." These species have biological traits that provide them with competitive advantages over native species, particularly because in a new habitat they are not restricted by the biological controls of their native habitat. As a result, these invasive species can monopolize natural communities, displacing many native species and causing widespread economic and environmental damage.

Some examples of invasive insect species include:

- Nantucket Pine Tip Moth (native pest) is a moth with heads, bodies, and appendages covered with gray scales with mottled rusty-red markings. Larvae cause damage to young trees (up to five years old) by feeding inside growing shoots, buds, and conelets. The preferred host is the loblolly pine.

- Bark Beetles (native pest) include more than 600 species of beetles which serve in important ecological roles in small numbers where they live in dead, weakened, and dying host conifer trees.
- Forest Tent Caterpillar (native pest) has the biggest footprint of any indigenous tent caterpillar in North America (Furniss and Carolin 1977) and is a major defoliator of a variety of deciduous hardwood trees. The caterpillars spin silken mats on the trunks and large branches of trees where they molt and feed. Forest Tent Caterpillars can reach outbreak proportions causing massive defoliation of host trees and becoming a nuisance to people.
- Pine Reproduction Weevils (native pest) is a very dark, elongate, oval insect up to 1/2 inch long with indistinct to distinct gray or pale orange spots of scales on the wings and thorax. They feed at night on the conifer seedlings or near the tips of branches of larger plants. Females lay their eggs on the roots of these trees. The weevils breed in all species of pines, hemlocks, junipers, spruces, firs, and cedars.
- Hardwood Borers (native pest) usually attack hardwoods experiencing some kind of stress although the clear-wing moths attack healthy trees. These insects attack the tree year after year and may eventually weaken it enough that it is prone to wind breakage. Some borers develop in the root system damaging young trees.
- Hemlock Wooly and Balsam Wooly Adelgid (non-native pest) is a very small, invasive, aphid-like insect that attacks North American hemlocks (Hemlock Wooly) and firs (Balsam Wooly). They can be identified by the white wooly masses that form on the underside of branches at the base of the tree's needles. They stay at this location for the rest of their lives. Their feeding disrupts the flow of nutrients to the tree twigs and needles leading to a decline in tree health and mortality in 4 to 10 years.
- Gypsy Moth (non-native pest) is an insect which feeds on a large variety of tree leaves from oak, maple, apple, crabapple, hickory, basswood, aspen, willow, birch, pine, spruce, hemlock, and others. It does prefer oak tree leaves, however. Periodically, large populations can cause defoliation damaging and killing trees they are feeding on.
- Spotted Lanternfly (non-native pest) is an invasive insect first detected in the U.S. in 2014. It feeds on a variety of fruit, ornamental, and wood trees and could seriously impact the grape, orchard, and logging industries.

Location

The entire Commonwealth is vulnerable to invasive species. Types of species can vary by location, elevation, ecosystem, and habitat type, as well as land and water use. Furthermore, the ability of invasive species to travel distances (either via natural mechanisms or accidental human interference) allows these species to propagate rapidly over a large geographic area. Similarly, in open freshwater and marine ecosystems, invasive species can quickly spread once introduced, as there are generally no physical barriers to prevent establishment, outside of physiological tolerances, and multiple opportunities for transport to new locations (by boats, for example). The entire geographic area of Dalton is believed at risk for invasive species propagation.

Previous Occurrences

Invasive species do not represent a singular event but rather an ongoing or emerging problem, so it is difficult to measure the frequency of occurrences. A comprehensive list of invasives can be found at https://www.massnrc.org/mipag/invasive.htm. Invasives of current concern to forest health (https://www.mass.gov/service-details/current-forest-health-threats) in Berkshire County are reportedly:

- Gypsy Moth
- Winter Moth
- Hemlock Woolly Adelgid
- Southern Pine Beetle
- Emerald Ash Borer
- White Pine Needlecast

The annual budget to address invasive species in Massachusetts has fluctuated over time but, in general, appears to have decreased. This likely implies a lack of resources rather than a decrease in risk. The following figures are from https://budget.digital.mass.gov/summary/fy22/enacted/energy-and-environmental-affairs/environmental-affairs/20000100.

Table 29. Statewide Budgets for Addressing Invasive Species.

FY Year	Budget
2022	$277,838
2021	$146,348
2020	$4,150,000
2019	$3,831,135
2018	$4,347,000
2017	$6,046,870

The Community Resilience Building Report (2019) noted that “Dalton prioritizes addressing invasive species and growing insect populations because they know the potential damages first-hand. Dalton was the first place the emerald ash borer was discovered in Massachusetts in 2012. The emerald ash borer is native to Asia, leaving ash trees in the United States without natural defenses. Entire neighborhoods and cities lost their street trees due to the emerald ash borer as it spread across the state. As is the case for the tick population, emerald ash borer mortality is dependent on temperature. The Northeast United States depends on temperatures dropping low enough to kill of insects and check their population numbers."

Over the course of the meetings held during the development of this plan, Town staff and Green Committee members explained that vector borne diseases are a significant concern in Dalton. While the ticks and mosquitos that harbor these diseases are not considered invasive species according to the criteria discussed below under *Extent*, they are believed increasing in number due to climate change.

Extent

MIPAG recognizes 74 plant species as "Invasive," "Likely Invasive," or "Potentially Invasive." The criteria for an "Invasive" species are listed below; the other assigned categories are associated with lower scores on the criteria checklist. The criteria for invasive animal species are less well-defined, but many of the same characteristics (including a non-Massachusetts origin and the ability to out-compete native species) are similar. In order to be considered "Invasive" by MIPAG, a plant species must meet the following complex set of criteria:

1. Be nonindigenous to Massachusetts.
2. Have the biologic potential for rapid and widespread dispersion and establishment in minimally managed habitats.
3. Have the biologic potential for dispersing over spatial gaps away from the site of introduction.
4. Have the biologic potential for existing in high numbers away from intensively managed artificial habitats.
5. Be naturalized in Massachusetts (persists without cultivation in Massachusetts).

If a species meets criteria 1–4 and criterion 5, it may be considered "invasive" or "likely invasive" in Massachusetts. If it does not meet criterion 5, it may be considered "potentially invasive" if it meets criteria 13–15 below.

6. The species is widespread in Massachusetts, or common in a region or habitat type(s) in the state.
7. The species has many occurrences in Massachusetts that have high numbers of individuals in minimally managed habitats.
8. The species is able to outcompete other species in the same natural plant community.
9. The species has the potential for rapid growth, for high seed or propagule production and dissemination, and for establishment in natural plant communities.

If a species meets the initial five criteria and criteria 6–9 at this time, it may be considered a "likely invasive" species in Massachusetts if it also meets at least one of the following three criteria:

10. The species has at least one occurrence in Massachusetts that has high numbers of individuals forming dense stands in minimally managed habitats.
11. The species has the potential, based on its biology, colonization history outside its native range, and likelihood of range expansion or change in biologic potential from climate change predictions, to become invasive in Massachusetts.
12. The species is acknowledged to be invasive in nearby states, but its status in Massachusetts is unknown or unclear. This may result from lack of field experience with the species or from difficulty in species determination or taxonomy.

If the species meets the basic criteria for invasiveness (criteria 1–4) but is not naturalized in Massachusetts (criterion 5), the species may be considered "potentially invasive" in Massachusetts if it meets the following three criteria (criteria 13–15):

13. The species, if it becomes naturalized in Massachusetts, based on its biology and biologic potential, would pose an imminent threat to the biodiversity of Massachusetts and
14. Its naturalization in Massachusetts is anticipated, and
15. The species has a documented history of invasiveness in other areas outside its native range including expansion of range and/or change in biological potential from climate change predictions

The MIPAG has developed a list of Early Detection plant species according to an established set of criteria that includes MIPAG classification as an *invasive, likely invasive,* or *potentially invasive* ecological threat and one of these three criteria: *limited prevalence in Massachusetts, partial containment potential,* or *public health threat.* The Early Detection table includes the documented distribution of a species by county.

Table 30. Early Detection Information for Addressing Invasive Species.

Species	Common Name	Current County of Distribution (November 2010)	Notes
Arthraxon hispidus	Hairy joint grass; jointhead; small carpetgrass	Franklin (historically)	This species is not currently known in Massachusetts; it was last collected in Deerfield in 1973. This is an annual grass that co-occurs with Japanese stilt grass further south.

Species	Common Name	Current County of Distribution (November 2010)	Notes
Butomus umbellatus	Flowering rush	Essex, Middlesex	*Butomus umbellatus* is an aquatic perennial herb which reproduces by seed dispersal or vegetatively by bulbils
Carex kobomugi	Japanese sedge; Asiatic sand sedge	Barnstable (historically)	Native to northeastern Asia, Carex kobomugi is an invasive plant that invades coastal sand dunes and can outcompete native dune-binding grasses. This species was last collected in 1973.
Egeria densa	Brazilian waterweed; Brazilian elodea	Essex, Middlesex, Norfolk, Plymouth, Worcester	This species is often confused with Hydrilla and native *Elodea* spp. but has larger, nickel-sized flowers. This is a submerged aquatic species whose rapid growth often leads to dense mats on the water surface, which crowds out native plants and damages fish and aquatic habitat. The mats can also impede boat traffic.
Glyceria maxima	Tall mannagrass; reed mannagrass	Essex	This perennial grass invades low shrub-swamps and other wetland
Heracleum mantegazzianum	Giant hogweed	Berkshire, Franklin, Hampden, Hampshire, Middlesex, Norfolk, Suffolk, Worcester	Giant hogweed is a federal noxious weed that is currently being eradicated under the U.S. Department of Agriculture's authority. This is a perennial herb that can cause painful burns and permanent scarring to humans if they touch the plant.
Hydrilla verticillata	Hydrilla; water-thyme; Florida elodea	Barnstable, Plymouth, Worcester	Hydrilla is an invasive non-native submerged plant. This plant grows and reproduces rapidly, displacing native species, hampering recreational uses, and slowing water flow. Hydrilla, once

Species	Common Name	Current County of Distribution (November 2010)	Notes
			established, can replace native vegetation and affect fish populations.
Myriophyllum aquaticum	Parrot-feather; water-feather; Brazilian watermilfoil	Norfolk	Parrot-feather is a perennial aquatic plant native to South America. This plant typically grows in freshwater, with a preference for areas with high nutrient contents. Parrot-feather has been introduced worldwide for use in indoor and outdoor aquaria.
Nymphoides peltata	Yellow floating heart	Hampden, Middlesex, Worcester	Yellow floating heart is native to Asia and now is found in over 15 states in the U.S. This plant forms dense mats on the water surface, restricting light penetration into the water and decreasing air exchange between the water's surface and the atmosphere. Algae can be shaded out by this plant, resulting in food chain disruptions for an entire lake.
Persicaria perfoliata syn.: Polygonum perfoliatum	Mile-a-minute vine or weed; Asiatic tearthumb	Barnstable, Essex, Franklin, Norfolk, Plymouth, Suffolk	Mile-a-minute vine is a barbed vine that can grow up to 6 inches a day. This vine smothers other herbaceous plants, shrubs, and even trees by growing over them and blocking their access to sunlight.
Peuraria montana ssp. lobata	Kudzu; Japanese arrowroot	Barnstable, Bristol, Essex, Middlesex, Plymouth, County	Kudzu is native to Japan and southeast China and was introduced to the U.S. during the Philadelphia Centennial Exposition in 1876. Once established, kudzu can grow at a rate of a foot per day, with mature vines as long as 100 feet.

Species	Common Name	Current County of Distribution (November 2010)	Notes
Senecio jacobaea	Tansy ragwort; stinking Willie; stinking Billy	Essex County Suffolk County Worcester County	This biennial herb is a weedy plant that infests woodlands, pastures, and hayfields. This plant is toxic to all classes of livestock but most toxic to cattle and horses. The plant can cause chronic liver disease, and affected animals usually die within a few weeks after ingesting it
Trapa natans	Water chestnut	Berkshire, Bristol, Essex, Franklin, Hamden, Hampshire, Middlesex, Suffolk, Worcester	Water chestnut is an annual aquatic species with both floating and submerged leaves.

Probability of Future Events

Once established, invasive species often escape notice for years or decades. Introduced species that initially escaped many decades ago are only now being recognized as invasives. Because these species can occur anywhere (on public or private property), new invasive species often escape notice until they are widespread, and eradication is impractical. As a result, early and coordinated action between public and private landholders is critical to preventing widespread damage from an invasive species.

The USDA Animal and Plant Health Inspection Service (APHIS) manages the Plant Protection and Quarantine (PPQ) Program which safeguards U.S. agriculture and natural resources from the introduction, establishment, and spread of plant pests and noxious weeds. PPQ is the lead federal agency for plant health emergencies and works closely with federal, state, and local agencies; universities; industries; and private entities in developing and implementing science-based framework designed to protect against invasive pests and diseases.

Massachusetts has a variety of laws and regulations in place that attempt to mitigate the impacts of these species. The Department of Agricultural Resources (DAR) maintains a list of prohibited plants for the state, which includes federally noxious weeds as well as invasive plants recommended by MIPAG and approved for listing by DAR. Species on the DAR list are regulated with prohibitions on importation, propagation, purchase, and sale in the Commonwealth. Additionally, the Massachusetts Wetlands Protection Act (310 CMR 10.00) includes language requiring all activities covered by the Act to account for, and take steps to prevent, the introduction or propagation of invasive species.

In 2002, Massachusetts passed an Aquatic Invasive Species Management Plan, making the Commonwealth eligible for federal funds to support and implement the plan through the federal Aquatic Nuisance Prevention and Control Act. MassDEP, DCR, CZM, and Massachusetts Institute of Technology Sea Grant College Program are part of the Northeast Aquatic Nuisance Species Panel, which was established under the federal Aquatic Nuisance Species Task Force. This panel allows managers and researchers to exchange information and coordinate efforts on the management of aquatic invasive species. The Commonwealth also has several resources pertaining to terrestrial invasive species, such as the Massachusetts Introduced Pest Outreach Project, although a strategic management plan has not yet been prepared for these species. All these efforts are aimed at reducing the probability of future occurrences.

Notwithstanding the above efforts, the presence of invasive species is ongoing, and it is difficult to quantify the future frequency of these occurrences. Increased rates of global trade and travel have created many new pathways for the dispersion of exotic species. As a result, the frequency with which these threats have been introduced has increased significantly. Increased international trade in ornamental plants is particularly concerning because many of the invasive plant species in the U.S. were originally imported as ornamentals. Furthermore, they are expected to be an increasing problem due to a changing climate and projected increases in non-native plant and animal infestations. For this reason and based on the fact invasive species are already an ongoing issue for the region, this hazard has been assigned a probability of highly likely.

Vulnerability Assessment

Exposure

The entire Town of Dalton has the potential to be exposed to invasive pests. Climate change will make the area more attractive to pests who have not been found there traditionally.

Built Environment Impacts

Although the built environment is not as susceptible to pests as the natural environment, it can help spread the invasive species. This includes trains and vehicles that could move the species from one location to another. Trees, which are damaged or killed by invasive pests, can become hazards to people, property, utility lines, and roadways when they fall. Many dead trees in one area can also become fuel for wildfires interconnecting the two hazards.

Population Impacts

The direct population impacts are minimal. However, the indirect impacts could destroy livelihoods.

Environment Impacts

Most of the natural features in the Town have some susceptible pests including the parks and other forested areas. Trees that have been damaged by other events such as fire, wind, flooding, and animal browsing are more susceptible to diseases and pests. Certain species of trees are more susceptible based on the need of the damaging organism. Climate change will increase the probability of invasive pests which will pose increased environmental impacts in the future.

Problem Statements for Invasive Species

Table 31. Problem Statements for Invasive Species.

Assets	Problems Associated with Invasive Species
People (including underserved communities and socially vulnerable populations)	• Vector borne disease incidence may increase with climate change, adversely impacting vulnerable people.
Structures (including facilities, lifelines, and critical infrastructure)	• None apparent or projected.
Systems (including networks and capabilities)	• Additional DPW resources may be required in critical areas.
Natural, historic, and cultural resources	• Invasive species are problematic throughout the Town and have been verified at East Branch Housatonic River Reservoir, Day Mountain Wildlife Management Area, near the Appalachian Trail entrance, and along the rail line. • Emerald ash borer continues to be a challenge for Dalton.
Activities that have value to the community	• Recreational activities may be adversely impacted, depending on location, and especially in parks and natural areas.

Landslides

The term “landslide” includes a wide range of ground movements such as rock falls, deep failure of slopes, and shallow debris flows. The most common types of landslides in Massachusetts include translational debris slides, rotational slides, and debris flows. Most of these events are caused by a combination of unfavorable geologic conditions (silty clay or clay layers contained in glaciomarine, glaciolacustrine, or thick till deposits), steep slopes, and/or excessive wetness leading to excess pore pressures in the subsurface.

Description

Historical landslide data for the Commonwealth suggests that most landslides are preceded by two or more months of higher-than-normal precipitation, followed by a single, high-intensity rainfall of several inches or more (Mabee and Duncan, 2013). This precipitation can cause slopes to become saturated. Landslides associated with slope saturation occur predominantly in areas with steep slopes underlain by glacial till or bedrock. Bedrock is relatively impermeable relative to the unconsolidated material that overlies it. Similarly, glacial till is less permeable than the soil that forms above it. Thus, there is a permeability contrast between the overlying soil and the underlying, and less permeable, unweathered till and/or bedrock. Water accumulates on this less permeable layer, increasing the pore pressure at the interface, leading to a failure or slide.

Occasionally, landslides occur as a result of geologic conditions and/or slope saturation. Adverse geologic conditions exist wherever there are lacustrine or marine clays, as clays have relatively low strength. These clays often formed in the deepest parts of the glacial lakes that existed in Massachusetts following the last glaciation. These lakes include Bascom, Hitchcock, Nashua, Sudbury, Concord, and Merrimack, among many other unnamed glacial lakes. When oversteepened or exposed in excavations, these vulnerable areas often produce classic rotational landslides.

Landslides can also be caused by external forces, including both undercutting (due to flooding or wave action) and construction. Undercutting of slopes during flooding or coastal storm events is a major cause of property damage. Streams and waves erode the base of the slopes, causing them to oversteepen and eventually collapse.

USGS provides the following graphic to depict different types of landslides. The images on the left side represent starting conditions whereas the images on the right represent conditions at the end of the slide event. Numbers 1, 2, 3, and 8 are considered most frequent in Massachusetts.

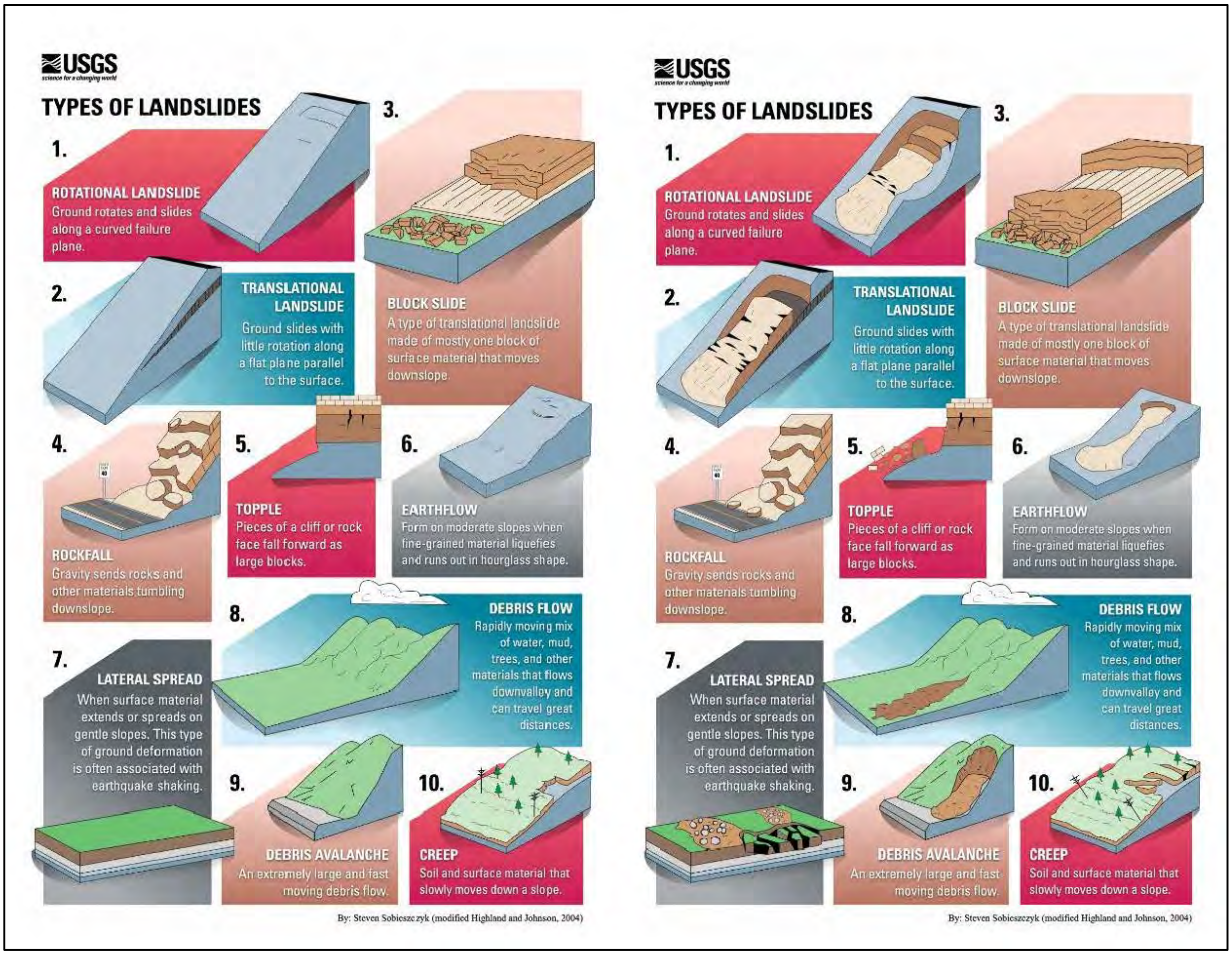


Figure 21. Types of Landslides.

Location

In 2013, the Massachusetts Geological Survey and University of Massachusetts Amherst published a Slope Stability Map of Massachusetts (Figure 22). This project, funded by the FEMA Hazard Mitigation Grant Program, was designed to provide statewide mapping and identification of landslide hazards that can be used for community level planning as well as prioritizing high-risk areas for mitigation. The maps produced from this project should be viewed as a first-order approximation of potential landslide hazards across the state.

The Slope Stability Map (below) categorizes areas of Massachusetts into stability zones, and the categorization is correlated to the probability of instability in each zone. The probability of instability metric indicates how likely each area is to be unstable, based on the parameters used in the analysis. According to the map, these unstable areas are located throughout the Commonwealth. Landslide risk is therefore assumed present in Dalton.

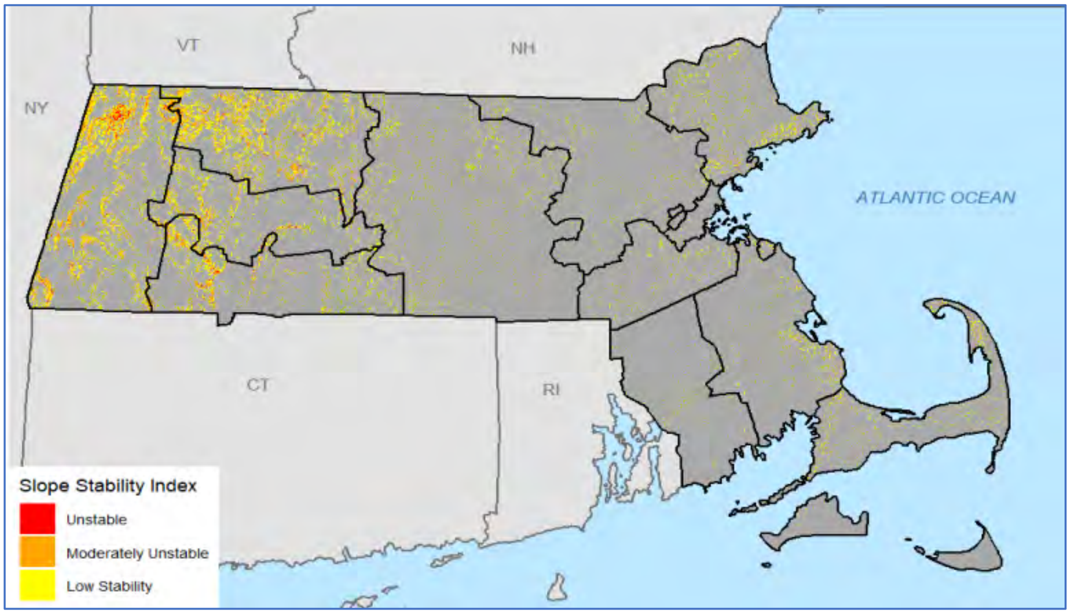


Figure 22. Slope Stability Map of Massachusetts (Created by ERG using data from Mabee & Duncan (2013)).

Previous Occurrences

Nationwide, landslides constitute a major geologic hazard because they are widespread, occur in all 50 states, and cause approximately $1 billion to $2 billion in damages and more than 25 fatalities on average each year. In Massachusetts, landslides tend to be more isolated in size and pose threats to highways and structures that support fisheries, tourism, and general transportation. According to the U.S. Landslide Inventory, there were 14 landslide incidents between 2008 and 2017. During this timeframe the Massachusetts Geological Survey reported three landslides or mudflows that resulted in infrastructural damage.

Landslides commonly occur shortly after other major natural disasters, such as earthquakes and floods, which can exacerbate relief and reconstruction efforts. Many landslide events may have occurred in remote areas, causing their existence or impact to go unnoticed. Expanded development and other land uses may contribute to the increased number of landslide incidences and/or the increased number of reported events in the recent record.

While numerous landslides have occurred in the Berkshire region of Massachusetts, significant landslides have not occurred in Dalton. Town staff have noted that some minor slides have occurred along streambanks. The Community Resilience Building Summary Report for Dalton implies that landslides may be a challenge via the recommendation to "address erosion issues, including that caused by ATV use and large-scale landslides through mapping and problem area identification working with HVA, BNRC, Town, Farmers and other landowners." While Town staff and committee members are concerned about clear-cutting on slopes, none have yet contributed to a landslide.

Extent

Variables that contribute to the extent of potential landslide activity in any area include soil properties, topographic position and slope, and historical incidence. Predicting a landslide is difficult, even under ideal conditions. As a result, estimations of the potential severity of landslides are informed by previous occurrences as well as an examination of landslide susceptibility. Information about previous landslides, such as the information and images from landslides after Tropical Storm Irene can provide insight as to both where landslides may occur and what types of damage may result. It is important to note, however, that landslide susceptibility identifies only areas potentially affected and does not imply a time frame when a landslide might occur. The distribution of susceptibility across the Commonwealth is depicted on the Slope Stability Map (Figure 22, with areas of higher slope instability considered to also be more susceptible to the landslide hazard.

Characterizing the warning time before landslides can be challenging. Mass movements can occur suddenly or slowly. The velocity of movement may range from a slow creep of inches per year to many feet per second, depending on slope angle, material, and water content. Some methods used to monitor mass movements can provide an idea of the type of movement and the amount of time prior to failure. It is also possible to determine the areas that are at risk during general time periods. Assessing the geology, vegetation, and amount of predicted precipitation for an area can help in these predictions. However, there is no practical warning system for individual landslides. The current standard operating procedure is to monitor situations on a case-by-case basis and respond after the event has occurred. Generally accepted warning signs for landslide activity include the following:

- Springs, seeps, or saturated ground in areas that have not typically been wet before
- New cracks or unusual bulges in the ground, street pavements, or sidewalks
- Soil moving away from foundations
- Ancillary structures, such as decks and patios, tilting and/or moving relative to the main house
- Tilting or cracking of concrete floors and foundations
- Broken waterlines and other underground utilities
- Leaning telephone poles, trees, retaining walls, or fences
- Offset fence lines
- Sunken or down-dropped road beds
- Rapid increase in creek water levels, possibly accompanied by increased turbidity (soil content)
- Sudden decrease in creek water levels even though rain is still falling or has just recently stopped
- Sticking doors and windows, and visible open spaces indicating jambs and frames out of plumb
- A faint rumbling sound that increases in volume as the landslide nears
- Unusual sounds, such as trees cracking or boulders knocking together

Probability of Future Events

The probability of future occurrences is generally defined by the number of events over a specified period of time. The ResilientMass Plan notes that between 2008 and 2017, there were at least 14 reported landslide occurrences. However, because many landslides are minor and occur unobserved in remote areas, the true number of landslide events is probably higher. Generally speaking, landslides are most likely to occur during periods of higher than average or extreme precipitation, particularly in areas that have experienced disturbance from wildfire, drought, invasive species, recent development, or vegetation or tree removal. For these reasons, the probability of future occurrence is believed moderate to high.

Vulnerability Assessment

Exposure

While landslides are rare, their impacts can be devastating, including loss of property, disruption to infrastructure, and injury and death. Continued development, particularly on steep slopes or unstable soils, increases the chances that landslides will be a danger. Other associated concerns are debris management issues including debris removal and identification of disposal sites.

To help identify potential landslide areas for the Town, the slope stability index developed by the Massachusetts Geological Survey was used. The unstable and moderately unstable regions were queried out of the data and overlaid with the critical facilities and other buildings. There were no critical facilities found in the unstable or moderately unstable area.

The other building data was overlaid with the unstable and moderately unstable areas. There were eighteen buildings found in the moderately unstable area and no buildings found in the unstable areas. Table 32 shows the result of this analysis.

Table 32. Buildings in Moderately Unstable Area.

Building Type	Number of Buildings (Total in Town)	Building Value (Total in Town)
Single Family	14 (2,846)	$1,724,900 ($461,247,300)
Mobile Home	0 (6)	$0 ($225,300)
Multi-Family	1 (446)	$151,600 ($86,014,900)
Mixed-Use	0 (24)	$0 ($4,306,900)
Commercial	0 (116)	$0 ($174,879,975)
Educational	1 (5)	$543,000 ($9,389,400)
Government	0 (63)	$0 ($265,621,400)
Religious/Non-Profit	1 (33)	$3,329,100 ($19,965,500)
Industrial	1 (46)	$8,634,900 ($70,455,300)
Garage/Outbuilding	0 (10)	$0 ($108,400)
Vacant	0 (11)	$0 ($30,500)
Total	**18 (3,606)**	**$14,383,500 ($1,092,244,875)**

Eleven of the structures in the moderately unstable areas also have environmental justice concerns.

Figure 23 shows the landslide susceptibility map for the Town. The red and pink areas are more susceptible to landslides.

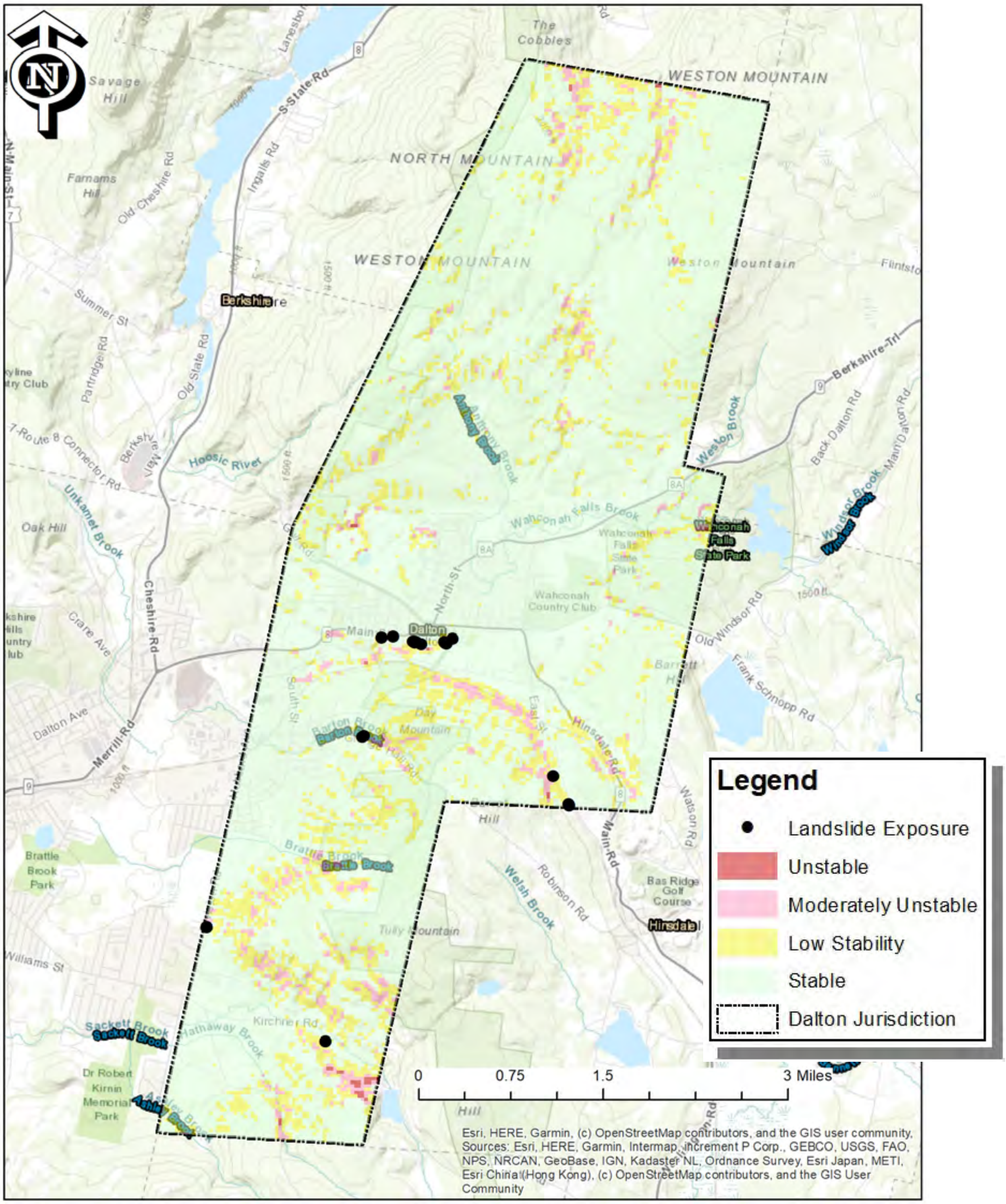


Figure 23. Landslide Map.

Built Environment Impacts

Historic data for landslide events indicate that between 1993 and 2022, no landslide events were recorded in Dalton. Still, there is a likelihood even if it's slight. Assuming a total loss for a building due to a 100-year landslide event, and the average value of a building in the moderately susceptible zone is $799,083, this would result in an AAL of $7,991.

Population Impacts

Populations considered most vulnerable to landslide impacts are identified based on a number of factors including their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing. The Town should be aware of the potential needs of residents within the elderly and low income population segments in the event of a hazard occurrence.

Environment Impacts

There are few unstable and moderately unstable areas around the transportation routes (roads and train tracks) used to move hazardous materials.

Problem Statements for Landslides

Table 33. Problem Statements for Landslides.

Assets	Problems Associated with Landslides
People (including underserved communities and socially vulnerable populations)	• Vulnerable populations in isolated areas may be cut off if a landslide impacts specific roads.
Structures (including facilities, lifelines, and critical infrastructure)	• Some residential and other structures reside adjacent to moderately unstable areas and could be impacted.
Systems (including networks and capabilities)	• Roads and rail may be impacted and could cause a hazardous material spill.
Natural, historic, and cultural resources	• Parks and other natural areas reside in or adjacent to the unstable or moderately unstable areas. • Increased precipitation intensity and invasive species' impacts to forests may influence future landslide risks.
Activities that have value to the community	• None apparent or projected

Other Severe Weather

Several frequent natural hazards in Massachusetts – particularly strong winds and extreme precipitation events – occur outside of notable storm events. This section discusses the nature and impacts of these hazards, as well as ways in which they are likely to respond to climate change. Winter storms and tornadoes are addressed in later sections.

> The Town of Dalton Community Resilience Building Workshop Summary of Findings (2019) lists "wind" as one of the top hazards of concern.

Description

Thunderstorms: A thunderstorm is a storm originating in a cumulonimbus cloud. Cumulonimbus clouds produce lightning, which locally heats the air to 50,000 degrees Celsius, which in turn produces an audible shock wave known as thunder. Frequently during thunderstorm events, heavy rain and gusty winds are present. Less frequently, hail is present, which can become very large in size. Tornadoes can also be generated during these events. An average thunderstorm is 15 miles across and lasts 30 minutes, but severe thunderstorms can be much larger and longer.

Three basic components are required for a thunderstorm to form: moisture, rising unstable air, and a lifting mechanism. The sun heats the surface of the earth, which warms the air above it. If this warm surface air is forced to rise, it will continue to rise as long as it weighs less and stays warmer than the air around it. As the warm surface air rises, it transfers heat from the surface of the earth to the upper levels of the atmosphere (the process of convection). The water vapor it contains begins to cool, releasing the heat, and the vapor condenses into a cloud. The cloud eventually grows upward into areas where the temperature is below freezing. Some of the water vapor turns to ice, and some of it turns into water droplets. Both have electrical charges. When a sufficient charge builds up, the energy is discharged in a bolt of lightning, which causes the sound waves we hear as thunder.

Downbursts: A downburst is a severe localized wind blasting down from a thunderstorm. They are more common than tornadoes. Depending on the size and location of downburst events, the destruction to property may be significant. Downbursts fall into two categories:

1. Microbursts affect an area less than 2.5 miles in diameter, last 5 to 15 minutes, and can cause damaging winds up to 168 mph.
2. Macrobursts affect an area at least 2.5 miles in diameter, last 5 to 30 minutes, and can cause damaging winds up to 134 mph.

An organized, fast-moving line of microbursts traveling across large areas is known as a "derecho." These occasionally occur in Massachusetts. Downburst activity is, on occasion, mistaken for tornado activity. Both storms have very damaging winds (downburst wind speeds can exceed 165 mph) and are very loud. These "straight line" winds are distinguishable from tornadic activity by the pattern of destruction and debris such that the best way to determine the damage source is to fly over the area.

Hail: Hailstones are chunks of ice that grow as updrafts in thunderstorms keep them in the atmosphere. Most hailstones are smaller in diameter than a dime, but stones weighing more than 1.5 pounds have been recorded. NOAA has estimates of the velocity of falling hail ranging from 9 meters per second (m/s) (20 mph) for a 1-centimeter (cm)-diameter hailstone to 48 m/s (107 mph) for an 8 cm, 0.7 kilogram stone.

Lightning: Lightning is a discharge of electricity that occurs between the positive and negative charges within the atmosphere or between the atmosphere and the ground. According to NOAA, the creation of lightning during a storm is a complicated process that is not fully understood. In the initial stages of development, air acts as an insulator between the positive and negative charges. However, when the potential between the positive and negative charges becomes too great, a discharge of electricity (lightning) occurs. In-cloud lightning occurs between the positive charges near the top of the cloud and the negative charges near the bottom. Cloud-to-cloud lightning occurs between the positive charges near the top of the cloud and the negative charges near the bottom of a second cloud. Cloud-to-ground lightning is the most dangerous. In summertime, most cloud-to-ground lightning occurs between the negative charges near the bottom of the cloud and positive charges on the ground.

Location

High wind events, thunderstorms, lightning, and hail can affect the entirety of Massachusetts, including the geographic extent of Dalton.

Previous Occurrences

The NOAA Storm Events database (https://www.ncdc.noaa.gov/stormevents/) for Berkshire County lists numerous severe storms affecting the area of Dalton from 2014 through 2023. The individual damage figures for these events appear nominal but given the frequency of events, the overall losses from severe storms are striking.

Table 34. NCEI Severe Storm Database Entries Covering Other Severe Storms in Dalton.

Date	Description	Losses Reported
9/8/12	*Thunderstorm Wind.* Trees were reported down due to thunderstorm winds in Dalton.	---
7/7/14	*Thunderstorm Wind.* Trees were reported down due to thunderstorm winds in Dalton.	---
7/27/14	*Thunderstorm Wind.* A strong area of low pressure was situated over the Great Lakes region on Sunday, July 27th. An upper level shortwave, combined with an approaching warm front, allowed for a cluster of strong to severe thunderstorms to break out during the afternoon hours on July 27th over eastern New York, which	--- [tornado losses are addressed later in this chapter]

Date	Description	Losses Reported
	spread into western Massachusetts during the late afternoon hours. In addition to straight-line wind damage and large hail, the area of thunderstorms also produced an EF1 tornado in Dalton, causing damage to trees and homes.	
8/14/15	*Hail.* A warm air mass was situated over the region on Tuesday, August 4th. An upper level disturbance was located north of the region over eastern Canada, while a surface cold front was slowly moving towards western Massachusetts from the west. Ahead of this cold front, clusters of thunderstorms developed over eastern New York and spread into the Berkshires during the afternoon hours. With cooler temperatures moving in aloft, the thunderstorms were prone to developing hail, with some hailstones as large as one inch in diameter. Thunderstorms ended by the early evening hours, as the front crossed the region from the west. Quarter size hail was reported during a thunderstorm in Dalton.	
10/7/20	*Thunderstorm Wind.* A high-end severe weather event unfolded across the Northeast. A line of thunderstorms originated across New York state and moved eastward into New England during the afternoon hours, producing widespread damage. Over a dozen reports occurred across Berkshire County. Both the Harriman-and-West and Pittsfield Municipal airports measured a wind gust of 60 mph as the line moved through. One man was killed when a tree fell onto him on a golf cart at the Wyantenuck Country Club. This event was classified as a serial derecho based on the 320 mile long damage swath and distribution of significant wind gusts (75 mph and above). The fact that trees across the region were fully leafed exacerbated the resulting wind damage and produced widespread power outages. There were over 2,500 power outages across western Massachusetts. A large tree limb was downed in Dalton.	Damage of $250
10/16/21	*Thunderstorm Wind.* There were an area of extensive wind damage in and around Dalton. A NWS Storm Survey confirmed a two-mile path of occasional wind damage with maximum estimated winds of 90 mph. Numerous trees were downed across the region, some of which fell onto homes and cars. Damage occurred to structures along the path as well. The local utility company reported roughly 1000 customers without power as a	---

Date	Description	Losses Reported
	result of the storm. There was sporadic damage in a southwest/northeast oriented path from just southeast of the center of Dalton to around two miles northeast of the center. The damage started at a lumber yard on West Housatonic Street where fiberglass sheathing and other debris was blown onto the roadway. Nearby, a large tree was downed on a fence near Chamberlain Park. Continuing northeastward, several large trees and limbs were downed on the grounds of Wahconah Country Club. The most concentrated damage occurred along Orchard Road and its intersections with Appletree Lane and Pease Avenue. Several large hardwood and softwood trees were uprooted, and one large spruce tree was snapped, crushing a wooden pool house. Fence panels were blown in at two separate residences on Appletree Lane. There was also minor damage to roofs with some shingles missing at a couple of residences and one chimney damaged. The damage continued at Route 9 and Cleveland Avenue where trees were downed blocking both roads. The end of the visible damage swath occurred at Holiday Brook Farm, where the wind ripped off a couple of panels of aluminum roofing, tore a hole in a plastic greenhouse covering, and knocked over a wooden playset. The trees were all downed in a south/north or southwest/northeast orientation, suggesting that the damage was due to strong straight-line winds. There was one tree downed onto a house and one onto a car, but no injuries were reported.	
3/7/22	*Thunderstorm Wind.* A line of severe thunderstorms with damaging winds pushed through western Massachusetts during the evening hours of March 7, 2022 resulting in numerous reports of downed trees and powerlines. Around 1,900 customers lost power. A large tree branch was reported down blocking Old Windsor Rd.	---

The entry for October 2021 provides an unusual level of detail for a thunderstorm wind event.

USDA declares agricultural disasters as needed for a variety of hazards. Information can be found at https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/disaster-designation-information/index. The line items for events related to severe winds and hail in Berkshire County are listed below.

Table 35. USDA Disasters Events That Refer to Severe Storms.

Year	Event	Event "Begin Dates"
2016	Drought, Wind/High Winds, Fire/Wildfire, Heat, Excessive Heat, High Temp., Insects	7/5/2016
2014	Flood, Flash Flood, Hail, Wind, High Wind, Excessive rain, moisture, humidity	4/1/2014
2013	Flood, Flash flooding, Excessive rain, moisture, humidity, Hail, Wind High Winds	5/1/2013
2012	Excessive rain, moisture, humidity, Wind, high winds	8/10/2012

Extent

The strength of thunderstorms is typically measured in terms of its effects, namely the speed of the wind, the presence of significant lightning, and the size of hail. High winds are defined by the NWS as sustained non-convective winds of 35 knots (40 mph) or greater lasting for 1 hour or longer, or gusts of 50 knots (58 mph) or greater for any duration (NCDC, 2018). A thunderstorm is classified as "severe" when it produces damaging wind gusts in excess of 58 mph (50 knots), hail that is 1 inch in diameter or larger (quarter size), or a tornado (NWS, 2013).

Probability of Future Events

According to the NWS, an average of 100,000 thunderstorms per year occur in the United States. The ResilientMass Plan notes that over the 15-year period between January 1, 2008, and December 31, 2022, a total of 911 high wind events occurred in Massachusetts on 198 days, and an annual average of 61 events occurred per year. Southern New England typically experienced 10 to 15 days a year with severe thunderstorms, with Massachusetts experiencing between nine and 27 thunderstorm days per year. Climate models show projections that the frequency and intensity of severe thunderstorms (which include tornadoes, hail, and winds) will increase (USGCRP, 2017). Furthermore, the ResilientMass Plan reports that, according to the Localized Constructed Analog's climate change models, thunderstorm event frequency is expected to slightly increase as a result of climate change.

NOAA reports that there are ten downburst reports for every tornado report in the United States. This implies that there are approximately 10,000 downbursts reported in the United States each year and further implies that downbursts occur in approximately 10% of all thunderstorms in the United States annually. This figure suggests that downbursts are a relatively uncommon yet persistent hazard.

An average of 21 people per year died from lightning strikes in the United States from 2013 to 2023. Most lightning deaths and injuries occur outdoors, with 45% of lightning casualties occurring in open fields and ballparks, 23% under trees, and 14% involving water activities. The ResilientMass Plan notes that 8 fatalities and 148 injuries have occurred in Massachusetts as a result of lightning events between

1990 and 2022 (NOAA, 2022). Given that thunderstorm event frequency is expected to slightly increase as a result of climate change, it is likely that risks associated with lightning may increase.

According to NOAA's National Weather Service, hail caused two deaths and an average of 27 injuries per year in the United States from 2004 to 2013. Given that thunderstorm event frequency is expected to slightly increase as a result of climate change, it is likely that risks associated with hail may increase.

Vulnerability Assessment

Exposure

The entire built environment of Dalton is vulnerable to the high winds and/or flooding from a severe weather event.

Built Environment Impacts

Severe thunderstorms, and their associated hail and lightning events, brought about property damage in Dalton and adjacent towns in previous years. From 2014 until 2022, there was $313,000 in property damage to Dalton and adjacent towns. This equates to an AAL of $34,778.

Population Impacts

Some traffic accidents associated with storm events include injuries and deaths. However, the number of injuries and deaths reported for accidents is generally low. Populations considered most vulnerable to tornado, microburst and thunderstorm impacts in Dalton are identified based on a number of factors including their physical and financial ability to react or respond during a hazard. Senior and low-income populations in Dalton are particularly susceptible to storms. The Town should be aware of the potential needs of residents within these population segments in the event of a hazard occurrence.

Environment Impacts

Thunderstorms and microbursts can cause damage to parks and other, natural areas. Some areas of the Town may be out of service until trees are removed.

Problem Statements for Other Severe Weather

Table 36. Problem Statements for Other Severe Weather.

Assets	Problems Associated with Other Severe Weather
People (including underserved communities and socially vulnerable populations)	• People in Dalton have been frequently disrupted by severe weather events and other more frequent wind and thunderstorm events. Vulnerable populations may be isolated if roads are closed.

Assets	Problems Associated with Other Severe Weather
Structures (including facilities, lifelines, and critical infrastructure)	• The individual damages for frequent severe weather events appear nominal, but given the frequency of events in and around Dalton, the impacts occur often and can occur anywhere in the Town.
Systems (including networks and capabilities)	• First responders may have difficulty reaching people if roads are closed due to tree debris.
Natural, historic, and cultural resources	• These can be adversely impacted depending on the specific locations of damage.
Activities that have value to the community	• These can be adversely impacted depending on the specific locations of damage.

Severe Winter Storms

The Town of Dalton Community Resilience Building Workshop Summary of Findings (2019) lists "ice and snow" (winter storms) as a top hazard of concern.

Severe winter storms include ice storms, nor'easters, heavy snow, blowing snow, and other extreme forms of winter precipitation. These are often accompanied by very low temperatures, which were previously addressed.

Description

Blizzard: A blizzard is a winter snowstorm with sustained or frequent wind gusts to 35 mph or more, accompanied by blowing snow that reduces visibility to or below a quarter of a mile (NWS, 2018). These conditions must be the predominant condition over a 3-hour period. Extremely cold temperatures are often associated with blizzard conditions but are not a formal part of the definition. However, the hazard created by the combination of snow, wind, and low visibility increases significantly with temperatures below 20ºF. A severe blizzard is categorized as having temperatures near or below 10°F, winds exceeding 45 mph, and visibility reduced by snow to near zero.

Storm systems powerful enough to cause blizzards usually form when the jet stream dips far to the south, allowing cold air from the north to clash with warm air from the south. Blizzard conditions often develop on the northwest side of an intense storm system. The difference between the lower pressure in the storm and the higher pressure to the west creates a tight pressure gradient, resulting in strong winds and extreme conditions due to the blowing snow. Blowing snow is wind-driven snow that reduces visibility to 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.

Ice Storms: Ice storm conditions are defined by liquid rain falling and freezing on contact with cold objects, creating ice buildups of one-fourth of an inch or more. These can cause severe damage to vegetation, utilities, and structures. An ice storm warning, which is now included in the criteria for a winter storm warning, is issued when a half inch or more of accretion of freezing rain is expected. This may lead to dangerous walking or driving conditions and the pulling down of power lines and trees. Ice pellets are another form of freezing precipitation, formed when snowflakes melt into raindrops as they pass through a thin layer of warmer air. The raindrops then refreeze into particles of ice when they fall into a layer of subfreezing air near the surface of the earth. Finally, sleet occurs when raindrops fall into subfreezing air thick enough that the raindrops refreeze into ice before hitting the ground. The difference between sleet and hail is that sleet is a wintertime phenomenon whereas hail falls from convective clouds (usually thunderstorms), often during the warm spring and summer months.

<u>Nor'easters</u>: A nor'easter is a storm that occurs along the East Coast of North America. A nor'easter is characterized by a large counterclockwise wind circulation around a low-pressure center that often results in heavy snow, high winds, and rain. A nor'easter gets its name from its continuously strong northeasterly winds blowing in from the ocean ahead of the storm and over the coastal areas.

Nor'easters are among winter's most ferocious storms. These winter weather events are notorious for producing heavy snow, rain, and oversized waves that crash onto Atlantic beaches, often causing beach erosion and structural damage. These storms occur most often in late fall and early winter. The storm radius is often as much as 100 miles, and nor'easters often sit stationary for several days, affecting multiple tide cycles and causing extended heavy precipitation. Sustained wind speeds of 20 to 40 mph are common during a nor'easter, with short-term wind speeds gusting up to 50 to 60 mph.

Location

Although the entire Commonwealth may be considered at risk to the hazard of severe winter storms, higher snow accumulations appear to be prevalent at higher elevations in Western and Central Massachusetts, and along the coast where snowfall can be enhanced by additional ocean moisture. Ice storms occur most frequently in the higher-elevation portions of Western and Central Massachusetts. Coastal communities of the Commonwealth are more susceptible to the impacts of a Nor'easter, which can bring heavy snow. Overall, winter storms can affect the entirely of Massachusetts, including the geographic extent of Dalton.

Previous Occurrences

Winter storms occur somewhat regularly in Massachusetts. Five of the disasters declared in Massachusetts from 2012 through 2022 were associated with winter storms, although only one covered Berkshire County and therefore the Town of Dalton:

- Massachusetts Severe Winter Storm, Snowstorm, and Flooding (DR-4110-MA)
  Incident Period: February 8, 2013 – February 9, 2013
  Public Assistance (PA) reimbursements eligible for entire state

DR-4110 was likewise subject to a concurrent emergency declaration in Massachusetts. The PA assistance reimbursements associated with DR-4110 for the Town totaled approximately $31,000. This indicates that severe winter storms comprise a notable expenditure for Dalton.

The NOAA Storm Events database (https://www.ncdc.noaa.gov/stormevents/) for Berkshire County lists numerous severe winter storm events impacting Dalton for the period 2014-2023. A selection of events is provided below. No losses were reported for these incidents.

Table 37. NCEI Severe Storm Database Entries Covering Winter Storms in Dalton.

Date	Description
12/14/13	Snow fell at rates in excess of one inch per hour over much of the region. During the overnight hours, some sleet mixed in with the snow, especially across southern parts of Berkshire County. By the end of the storm, snowfall amounts ranged from nearly around 6 inches in Pittsfield.
2/5/14	A widespread snowfall occurred across all of western Massachusetts on Wednesday, February 5th. By the time the storm finished, the entire region received a widespread 6 to 12 inches of snow. The heaviest amounts occurred across the high terrain of the Berkshires.
2/13/14	An exceptional winter storm impacted all of western Massachusetts between Thursday, February 13th and the morning of Friday, February 14th. By the time snow ended, 9 to 21 inches of snow was reported in Berkshire County. The highest amounts were across the high terrain of the Berkshires. Very strong winds, gusting as high as 40 mph, occurred as the storm pulled away. This led to significant blowing and drifting of the snowfall through the entire day on February 14th.
2/1/15	Most areas in the Berkshires received around a foot of snowfall.
2/7/15	A three day period of snowfall impacted all of western Massachusetts between February 7th and 9th, 2015. By the time all of the snow ended, amounts ranged between 6 and 16 inches across the area, with the heaviest amounts in the higher terrain of the northern Berkshires.
2/12/17	Two low pressure systems approached the northeastern US on Sunday, February 12. The snow was heavy at times during the morning and early afternoon, with accumulation rates of 1 to locally 2 inches per hour at times. In total, 7 to 12 inches of snowfall occurred through most of western Massachusetts, with lesser totals over southern portions where sleet occurred.
3/7/18	A weakening low pressure system brought some light snow to western Massachusetts during the early to mid-morning hours of March 7th, 2018. Meanwhile, a Nor'easter strengthened rapidly along the Atlantic Coast, which resulted in increasing snow intensity during the afternoon and evening hours. Heavy snow bands rotated northwestward and

Date	Description
	stalled across the area, resulting in one to two and a half feet of accumulation in most areas by the morning of March 8th. The snow led to very difficult travel conditions and resulted in numerous school closures.
2/12/19	A winter storm brought widespread wintry precipitation to Massachusetts on Tuesday, February 12th through Wednesday, February 13th, 2019. Precipitation started out as snow but then quickly transitioned to a period of sleet and then freezing rain throughout the event. This mix of wintry precipitation resulted in hundreds of closings and delays. Strong winds followed, especially across the Berkshires, which led to power outages across the region.
3/23/20	A late season snowfall impacted western Massachusetts. This was brought on by an anomalously cold air mass interacting with a coastal low pressure system. Snowfall totals ranged from one inch in southeast Berkshire County up to almost nine inches in northeast Berkshire County.
12/16/20	An area of low pressure tracked northward off the East Coast toward New York City on Wednesday, December 16, then eastward to just off Cape Cod on Thursday, December 17. As a result, cold enough air north of this low led to moderate to heavy snowfall across all of eastern New York and western New England. Bands of heavy snow occurred with snowfall rates of 1 to 2 inches per hour reported at times. Total snowfall across western Massachusetts generally ranged between 12 to 24 inches with the higher amounts across the northern Berkshires. Most area school districts across Berkshire County along with businesses and services were closed on December 17. More than 11,000 power outages occurred in Pittsfield, Lee, Dalton and Laneborough, most of which were short-lived. Key impacts: transportation delays, traffic accidents, power outages, school closures.
1/6/22	A winter storm dumped anywhere from a few inches over the lower elevations in the eastern parts of the Berkshires to 16 inches of snow over the higher terrain over the western parts of the Berkshires in western Massachusetts January 16-17. This resulted in snow emergencies over parts of the area. It was also windy with gusts between 30-45 mph.
12/11/22	A low pressure system brought widespread accumulating snowfall across western Massachusetts on December 11, 2022 before tapering off during the early morning hours on December 12, 2022. Bands of moderate to heavy snow developed during the late afternoon and evening hours bringing a widespread 6 to 10 inches of accumulation to the area.
12/15/22	A high-impact, long-duration winter storm affected the region from December 15-17, 2022. This was an elevation-dependent storm with heavy snowfall for the higher elevations and a

Date	Description
	mix of rain and snow in the valleys. Snowfall totals of 10-20 inches were common across areas above 1000 feet with mainly 6 inches or less below. This was a heavy, wet snow and the weight of the snow caused downed trees and power lines resulting in scattered power outages.
3/13/23	A powerful Nor'easter resulted in widespread heavy wet snow and gusty northwest winds between 35-50 mph across western Massachusetts March 13-March 15, 2023. Anywhere from 15 to 30 inches of snow with locally higher amounts in excess of 30 inches fell over the higher terrain of the Berkshires. Valley locations received lesser amounts with totals generally ranging between 7 to 15 inches. Numerous downed trees and powerlines resulted in widespread power outages. Some locations were without power for at least 1 or 2 days. Portions of some communities were inaccessible due to the snow. Several warming stations opened to assist those without power. Overall, this event led to the closing of many school districts, and resulted in chain up laws and bans of empty tractor trailers and/or tandems on some area interstates. A State of Emergency was issued for several jurisdictions as a result of the storm.

Extent

Snowfall is a component of multiple hazards, including nor'easters and severe winter storms. Two scores, the *Regional Snowfall Index (RSI) and the NESIS*, are described in this section.

Since 2005, the RSI has become the descriptor of choice for measuring winter events that impact the eastern two-thirds of the U.S. The RSI ranks snowstorm impacts on a scale system from 1 to 5. The RSI is like the Fujita scale for tornadoes or the Saffir-Simpson scale for hurricanes, except that it includes an additional variable: population. The RSI is based on the spatial extent of the storm, the amount of snowfall, and population (NOAA, n.d.).

The RSI is a regional index. Each of the six climate regions (identified by the NOAA National Centers for Environmental Information) in the eastern two-thirds of the nation has a separate index. The RSI incorporated region-specific parameters and thresholds for calculating the index. The RSI is important because, with it, a storm event and its societal impacts can be assessed within the context of a region's historical events. Snowfall thresholds in Massachusetts (in the Northeast region) are 4, 10, 20, and 30 inches of snowfall, while thresholds in the Southeast U.S. are 2, 5, 10, and 15 inches.

Table 38. RSI Scale.

Category	RSI Value	Event Description
1	1 to 3	Notable
2	3 to 6	Significant
3	6 to 10	Major
4	10 to 18	Crippling
5	18+	Extreme

Source: NOAA

Prior to the use of the RSI, the Northeast Snowfall Impact Scale, developed by Paul Kocin of The Weather Channel and Louis Uccellini of the NWS, was used to characterize, and rank high- impact northeast snowstorms with large areas of 10-inch snowfall accumulations and greater. In contrast to the RSI, which is a regional index, NESIS is a quasi-national index that is calibrated to Northeast snowstorms. NESIS has five categories. The RSI and NESIS approaches do not include separate scales for ice storms; in general, ice storm extent is expressed on a case-by-case basis, and forecasts will provide the information needed to determine how to prepare and respond.

Meteorologists can often predict the likelihood of a severe storm or nor'easter. This can give several days of warning time. The NOAA's NWS monitors potential events and provides extensive forecasts and information several days in advance of a winter storm to help the state to prepare for the incident.

Probability of Future Events

The ResilientMass Plan notes that Massachusetts experiences high-impact snowstorms at approximately the rate of three per year over the past 50 years, although there is significant interannual variability in the frequency and severity of winter storms. The Town of Dalton should assume that winter storms are likely, even if the impacts of climate change will shift the timing to a shorter winter season. Heavy wet snowfall may be more common in the future. The overall probability of winter storms of all kinds, including blizzards and ice storms, is believed high.

Vulnerability Assessment

Exposure

Heavy snowfall coupled with low temperatures often results in increases in traffic accidents; disruptions in transportation, commerce, government, and education; utility outages due to falling trees, branches, and other objects; personal injuries associated with slippery surfaces and freezing temperatures; and numerous other problems. Specific damages associated with severe winter storm (snow) events include:

- Injuries and fatalities associated with accidents, low temperatures, power loss, falling objects and accidents associated with frozen and slippery surfaces and snow accumulation

- Increases in the frequency and impact of traffic accidents, resulting in personal injuries
- Ice-related damage to trees, building and infrastructure inventory, and utilities (power lines, bridges, substations, etc.)
- Roads damaged through freeze and thaw processes
- Stress on the local shelters and emergency response infrastructure
- Lost productivity that occurs when people cannot go to work, school, or stores due to inclement conditions

The entire Town should be considered exposed to the severe winter storm hazard.

Built Environment Impacts

The entire built environment of Dalton is vulnerable to a severe winter storm. New England's climate offers no immunity to the potential damaging effects of severe winter storms. Some minimum damage is anticipated annually, with potential extensive damage occurring about once every 10 years.

Since Hazus doesn't support severe winter storms and there aren't other readily available severe winter storm models, historical data was used to determine potential losses and probabilities. From 2014 until 2023, there was $1,000 in storm damage in and around Dalton. This equates to an AAL of $100.

Population Impacts

As discussed above, some traffic accidents associated with storm events include injuries and in limited cases, deaths. However, the number of injuries and deaths reported for accidents is generally low. Populations considered most vulnerable to severe winter storm impacts are identified based on a number of factors including their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing. Senior and low-income populations in Dalton are particularly susceptible and the Town should be aware of the potential needs of residents within these population segments in the event of a hazard occurrence.

Environment Impacts

Severe winter storms can cause damage to parks and other, natural areas. Some areas of the Town may be out of service until roads are cleared and trees are removed.

Problem Statements for Severe Winter Storms

Table 39. Problem Statements for Severe Winter Storms.

Assets	Problems Associated with Severe Winter Storms
People (including underserved communities and socially vulnerable populations)	• Vulnerable populations may be stranded during a winter storm event and may not be able to travel to emergency services.
Structures (including facilities, lifelines, and critical infrastructure)	• Roof ice dams may cause damage to structures. • Severe winter storms comprised a substantial expenditure for Dalton over the course of the last decade. • The electrical grid and roadways are susceptible to failure and loss of use during storms.
Systems (including networks and capabilities)	• First responders may have difficulty reaching people if roads are closed due to road closures.
Natural, historic, and cultural resources	• Severe storms may damage trees in natural areas, and historical and cultural sites.
Activities that have value to the community	• Outdoor activities may be adversely impacted by severe winter storms.

Tornadoes

The Town of Dalton Community Resilience Building Workshop Summary of Findings (2019) lists "wind" as one of the top hazards of concern.

Tornadoes are a relatively infrequent occurrence but can be very destructive when they occur. While small tornadoes in outlying areas cause little to no damage, larger tornadoes in populated sections of Massachusetts have historically caused significant damage, injury, and death through the destruction of trees, buildings, vehicles, and power lines.

Description

A tornado is a narrow rotating column of air that extends from the base of a cumulonimbus cloud to the ground. The observable aspect of a tornado is the rotating column of water droplets, dust, and debris caught in the column. Tornadoes are the most violent of all atmospheric storms.

Tornadoes can form from individual cells within severe thunderstorm squall lines. They can also form from an isolated supercell thunderstorm. They can be spawned by tropical cyclones or the remnants thereof, and weak tornadoes can even occur from little more than a rain shower if air is converging and spinning upward.

Most tornadoes occur in the late afternoon and evening hours when the heating is the greatest. The most common months for tornadoes to occur are June, July, and August, although the Great Barrington tornado occurred in May 1995 and caused extensive damage.

A waterspout is a rapidly rotating column of air extending from the cloud base (typically a cumulonimbus thunderstorm) to a water surface, such as a bay or the ocean. They can be formed in the same way as regular tornadoes or can form on a clear day with the right amount of instability and wind shear. Tornadic waterspouts can have wind speeds of 60 to 100 mph, but since they do not move very far, they can often be navigated around. They can become a threat to land if they drift onshore.

Location

The U.S. experiences an average of 1,230 tornadoes per year from 1991 to 2020, more than any other country (NOAA, n.d.). Because Massachusetts experiences fewer tornadoes than other parts of the country, residents may be less prepared to react to a tornado. The ResilientMass Plan notes that Massachusetts is located within the FEMA Wind Zone II, with Zone IV typically experiencing the greatest number and strongest tornadoes. According to the FEMA National Risk Index most of the state has a “relatively low” risk of strong wind, with the exception of Worcester County which has a “relatively moderate” risk. The ResilientMass Plan notes that the area at greatest risk for a tornado touchdown runs from central to northeastern Massachusetts. Dalton is outside of this area.

Previous Occurrences

The most devastating tornado to occur in New England was the Worcester Tornado of July 9, 1953, a category F4 tornado. The tornado passed through Barre, Rutland, Holden, Worcester, Shrewsbury, Westborough, and Southborough causing 90 deaths and over 1,300 injured. Damage estimates were placed at more than $52 million. The National Storm Prediction Center has ranked this as one of the deadliest tornadoes in the nation's history.

The most recent severe tornado to impact Massachusetts occurred June 1, 2011, affecting communities in Hampden and Worcester Counties. The EF3 tornado touched down in Westfield and traveled through West Springfield, Springfield, Wilbraham, Monson, Brimfield, and Sturbridge. The tornado caused extensive property damage and resulted in a FEMA disaster declaration.

The previous edition of this plan noted that 18 tornadoes have occurred in Berkshire County between 1950 and 2016. The NOAA Storm Events database (https://www.ncdc.noaa.gov/stormevents/) for Berkshire County lists two tornadoes for the period 2014-2023. Adding the single recent tornado (2020) to the 18 tornadoes between 1950 and 2016, a total of 19 have occurred in Berkshire County since 1950.

Table 40. NCEI Severe Storm Database Entries Covering Tornadoes in Berkshire County.

Date	Description	Losses Reported
7/27/14	A strong area of low pressure was situated over the Great Lakes region on Sunday, July 27th. An upper level shortwave, combined with an approaching warm front, allowed for a cluster of strong to severe thunderstorms to break out during the afternoon hours on July 27th over eastern New York, which spread into western Massachusetts during the late afternoon hours. In addition to straight-line wind damage and large hail, the area of thunderstorms also produced an EF1 tornado in Dalton, causing damage to trees and homes. As the strong area of low pressure moved across upstate New York on Monday, July 28th, some additional thunderstorms occurred during the afternoon hours. Trees were downed due to thunderstorms winds across parts of Berkshire County, as the storm's cold front moved through the area. A NWS Storm Survey determined that an EF1 tornado occurred in the Greenridge section of Dalton. The tornado began in Greenridge park on South Street and moved southeast up a hill for one-quarter of a mile, before lifting behind residences on Lindsay Drive. The tornado downed a path of trees through a forest, clearing an area that was 10 to 20 yards wide.	---
8/2/20	A NWS survey team concluded that a weak, narrow, but relatively long tornado occurred during the evening on Sunday, August 2 in western Massachusetts. It began in the southeast part of Sandisfield just west of south Main Street in Berkshire County just before crossing into Hampden County. The tornado continued for a total path length of 7.8 miles with a maximum path width of 100 yards. In Sandisfield, some tree damage was observed on Carpenter Lane and on South Main street at and just north of the Mile 4 marker. A home there had its upper window blown in, shingles ripped off, and the portico was lifted upward, enabling the supporting post to be shifted outward. Some corn stalks were flattened and a neighbor's fence was blown down. The EF-scale rating was EF-0, with estimated maximum wind speeds of 80 mph.	$9,000

The previous edition of this plan provides slightly more information about the tornado of 2014. The storm caused downed trees and powerlines across the area, temporarily closing local roads. The tornado caused structural damage on at least one home and cut a path through the woods behind Greenridge Park. A home on Norwich Drive sustained extensive damage, as the tornado lifted the roof off the house, shifted the chimney and ripped vents and siding. At this same house a large tree smashed through the back of the house and broke windows. Other local homeowners suffered minor damages.

Prior to the 2014 tornado in Dalton, the Town was hit by a tornado in the 1970s. According to the previous edition of this plan, local residents remember a storm event that landed on the Berkshire Bridge property, bounced across East Main Street, through Wahconah Country Club property and up to North Street before heading towards Windsor. John Boyle, Dalton resident and Selectman, recalled that the sky was a greenish color and that noise that sounded like a train accompanied the tornado. The tornado landed on the Berkshire Bridge property behind the Boyle's home and bounced across East Main Street and through the Wahconah Country Club property to North Street. This event destroyed a garage and outdoor swing set, moved a 300+-pound concrete bench, and caused some damage to Anne's Mahogany Room restaurant.

Extent

The NWS rates tornadoes using the Enhanced Fujita scale (EF scale), which does not directly measure wind speed but rather the amount of damage created. This scale derives 3-second gusts estimated at the point of damage based on the assignment of 1 out of 8 degrees of damage to a range of different structure types. These estimates vary with height and exposure. This method is considerably more sophisticated than the original Fujita scale, and it allows surveyors to create more precise assessments of tornado severity.

Table 41. Enhanced Fujita Scale.

EF Rating	Wind Speeds	Expected Damage		
EF-0	65-85 mph	'Minor' damage: shingles blown off or parts of a roof peeled off, damage to gutters/siding, branches broken off trees, shallow rooted trees toppled.		
EF-1	86-110 mph	'Moderate' damage: more significant roof damage, windows broken, exterior doors damaged or lost, mobile homes overturned or badly damaged.		
EF-2	111-135 mph	'Considerable' damage: roofs torn off well constructed homes, homes shifted off their foundation, mobile homes completely destroyed, large trees snapped or uprooted, cars can be tossed.		
EF-3	136-165 mph	'Severe' damage: entire stories of well constructed homes destroyed, significant damage done to large buildings, homes with weak foundations can be blown away, trees begin to lose their bark.		
EF-4	166-200 mph	'Extreme' damage: Well constructed homes are leveled, cars are thrown significant distances, top story exterior walls of masonry buildings would likely collapse.		
EF-5	> 200 mph	'Massive/incredible' damage: Well constructed homes are swept away, steel-reinforced concrete structures are critically damaged, high-rise buildings sustain severe structural damage, trees are usually completely debarked, stripped of branches and snapped.		

Source: National Weather Service

Tornado watches and warnings are issued by the local NWS office. A tornado watch is released when tornadoes are possible in an area. A tornado warning means a tornado has been sighted or indicated by weather radar. The current average lead time for tornado warnings is 13 minutes. Occasionally, tornadoes develop so rapidly that little, if any, advance warning is possible.

Probability of Future Events

According to the ResilientMass Plan, the Commonwealth experienced 190 tornadoes from 1950 to 2021, or an average annual occurrence of 2.6 tornado events per year. From 1995 to 2021, the average frequency of these events has been 2.06 events per year (NOAA, 2018). Massachusetts experienced an average of 1.4 tornadoes per 10,000 square feet annually between 1991 and 2010, less than half of the national average of 3.5 tornadoes per 10,000 square feet per year (NOAA, n.d.). As highlighted in the National Climate Assessment, tornado activity in the U.S. has become more variable, and increasingly so in the last two decades. While the number of days per year that tornadoes occur has decreased, the number of tornadoes on these days has increased. Climate models show projections that the frequency and intensity of severe thunderstorms (which include tornadoes, hail, and winds) will increase (USGCRP, 2017). Overall, it is unclear if tornado frequency will increase with climate change given the difficulty to draw conclusions based on thunderstorm statistics and the difficulty in identifying long-term trends.

Vulnerability Assessment

Exposure

High winds, heavy rain, lightning and/or hail associated with tornados, thunderstorms and microbursts can cause damage to utilities, structures, roads, trees (potentially causing vehicle accidents) and injuries and death. The entire Town should be considered exposed to the tornado hazard.

Built Environment Impacts

Since Hazus doesn't support tornadoes and there aren't other readily available tornado models, historical data will be used to determine potential losses and probabilities. From 1955 until 2023, there was no property damage to Dalton due to tornadoes. However, there were sixteen events in Berkshire County which produced $28.454M in property damage, seven deaths, and sixty injuries. The county's average annual loss would be $418K.

Population Impacts

Populations considered most vulnerable to tornado impacts in Dalton are identified based on a number of factors including their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing. Senior and low-income populations in Dalton. It should be noted that there may be overlap within the two categories, so that the total number of persons exposed may be lower than what is shown in the table. However, the Town should be aware of the potential needs of residents within these population segments in the event of a hazard occurrence.

Environment Impacts

Tornadoes can cause damage to parks, and other, natural areas. Some areas of the Town may be out of service until trees are removed.

Problem Statements for Tornadoes

Table 42. Problem Statements for Tornadoes.

Assets	Problems Associated with Tornadoes
People (including underserved communities and socially vulnerable populations)	• Vulnerable populations may need support seeking protected shelter. Those without cell phones may not get weather alerts. • People without basements are susceptible to tornado impacts.

Assets	Problems Associated with Tornadoes
Structures (including facilities, lifelines, and critical infrastructure)	• Structures and critical infrastructure can all be impacted by tornadoes. • Roadways may be blocked due to downed trees and other debris.
Systems (including networks and capabilities)	• The electric grid may be impacted by winds and downed trees.
Natural, historic, and cultural resources	• Historic and cultural resources may be impacted by tornado winds. • Winds may damage trees and cause natural areas to close for cleanup.
Activities that have value to the community	• Outdoor events could be impacted by potential tornado activity.

Wildfires/Brushfires

The Town of Dalton Community Resilience Building Workshop Summary of Findings (2019) lists "wildfires" as a top hazard of concern.

A wildfire can be defined as any non-structure fire that occurs in vegetative wildland that contains grass, shrub, leaf litter, and forested tree fuels. Wildfires in Massachusetts are caused by natural events, human activity, or prescribed fire. Wildfires often begin unnoticed but spread quickly, igniting brush, trees, and potentially homes.

Description

The wildfire season in Massachusetts usually begins in late March and typically culminates in early June, corresponding with the driest live fuel moisture periods of the year. April is historically the month in which wildfire risk is the highest. Drought, snowpack level, and local weather conditions can impact the length of the fire season.

According to the National Fire Protection Agency, several elements (known as the fire tetrahedron) must be present in order to have any type of fire:

- Fuel: Without fuel, a fire will stop. Fuel can be removed naturally (when the fire has consumed all burnable fuel) or manually by mechanically or chemically removing fuel from the fire. In structure fires, removal of fuel is not typically a viable method of fire suppression. Fuel separation is important in wildfire suppression and is the basis for controlling prescribed burns and suppressing other wildfires. The type of fuel present in an area can help determine overall susceptibility to wildfires. According to the Forest Encyclopedia Network, four types of fuel are present in wildfires:

- Ground Fuels: organic soils, forest floor duff, stumps, dead roots, buried fuels
- Surface Fuels: the litter layer, downed woody materials, dead and live plants to 2 meters tall
- Ladder Fuels: vine and draped foliage fuels
- Canopy Fuels: tree crowns

- Heat: Without sufficient heat, a fire cannot begin or continue. Heat can be removed through the application of a substance, such as water, powder, or certain gasses, that reduces the amount of heat available to the fire. Scraping embers from a burning structure also removes the heat source.
- Oxygen: Without oxygen, a fire cannot begin or continue. In most wildland fires, this is commonly the most abundant element of the fire triangle and is therefore not a major factor in suppressing wildfires.
- Uninhibited Chain Reaction: The chain reaction is the feedback of heat to the fuel to produce the gaseous fuel used in the flame. In other words, the chain reaction provides the sustained heat necessary to maintain the fire. Fire suppression techniques, such as dry chemical extinguishers, break up the uninhibited chain reaction of combustion to stop a fire.

Location

The ResilientMass Plan identified areas in Barnstable, Essex, and Plymouth counties with the highest wildfire potential in the state. The ecosystems that are most susceptible to the wildfire hazard Include pine barrens in the Connecticut River Valley, marshes inundated with *Phragmites*, pine barrens and maritime grasslands in Martha's Vineyard, Nantucket, and Cuttyhunk, and the Myles Standish State Forest. Other portions of the Commonwealth are also susceptible to wildfire, particularly at the urban-wildland interface. Notwithstanding the location of Dalton in western Massachusetts, the presence of wildland interface and vast rural areas makes Dalton a location with wildfire risk.

Previous Occurrences

Several notable wildfires have occurred in Massachusetts history, although none has ever resulted in a FEMA disaster declaration. Smaller fires such as brush fires are somewhat easier to characterize. According to statewide data sets (https://www.mass.gov/service-details/fire-data-and-statistics), the number of brush fire events per year from 2012 through 2019 ranged from about 3,000 in 2019 to almost 8,000 in the drought year of 2016.

Table 43. Statewide Brush Fire Counts.

Year	Total # of Events	Injuries/deaths (civilians and fire service)	Losses
2019	2,974	12/0	$136,357
2018	3,253	1/5	$493,145

Year	Total # of Events	Injuries/deaths (civilians and fire service)	Losses
2017	4,206	20/0	$215,156
2016	7,834	40/0	$1,526,654
2015	6,962	35/0	$323,211
2014	4,627	25/0	$209,857
2013	4,968	31/3	$297,854
2012	5,857	38/0	$705,457

According to this statewide data set, fire event counts back to 2012 were as follows for Dalton:

Table 44. Outdoor and Total Fire Event Figures for Dalton.

Year	Total Outdoor Fires	Total Fire Events	Reported Losses for Outdoor Fires
2012	4	23	$196,020
2013	5	13	$33,000
2014	7	21	$95,550
2015	6	18	$28,500
2016	5	25	$249,000
2017	5	19	$105,000
2018	5	17	$0
2019	4	10	$12,000
2020	9	16	Not available
2021	5	13	Not available

Applying the fraction of outdoor fire incidents that are typically brush fires in Massachusetts (52%) and the fraction of fire losses that are typically from brush fires in Massachusetts (0.2%), an alternate set of figures for brush fires in Dalton is presented below. The right hand side of the table lists the figures presented in the previous edition of this plan, for comparison.

Table 45. Estimated Brush Fire Event Figures for Dalton.

Year	Estimated Brush Fires	Estimated Brush Fire Losses	Wildfires Listed in 2018 Hazard Mitigation Plan for Dalton
2012	2	$372	3
2013	3	$63	5
2014	4	$182	2
2015	3	$54	4
2016	3	$473	5
2017	3	$200	--
2018	3	$0	--
2019	2	$23	--
2020	5	$976*	--
2021	3	$266*	--

*Estimated from Countywide figures

The above estimates compare reasonably well to the figures reported in the previous edition of this plan. Overall, Dalton experiences a small number of brush fires and wildfires each year. The previous edition of this plan additionally noted that the average acreage burned per year in Dalton is two acres.

USDA declares agricultural disasters as needed for a variety of hazards. Information can be found at https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/disaster-designation-information/index. The single line item related to wildfires in Berkshire County is listed below; this line corresponds to the drought of 2016.

Table 46. USDA Disasters Events That Refer to Wildfires.

Year	Event	Event "Begin Dates"
2016	Drought, Wind/High Winds, Fire/Wildfire, Heat, Excessive Heat, High Temp., Insects	7/5/2016

During the meetings that were convened for this plan update, Town staff noted that Dalton has not experienced damaging wildfires. Notwithstanding the significant dead wood and vegetation available for a wildfire, the Town believes that the Department of Conservation and Recreation (DCR) land in Dalton (about 800 acres) is at risk, along with Town-owned forest lands such as The Pines.

Extent

Unfragmented and heavily forested areas of the state are vulnerable to wildfires, particularly during droughts. The greatest potential for significant damage to life and property from fire exists in areas designated as wildland-urban interface areas. A wildland-urban interface area defines the conditions where highly flammable vegetation is adjacent to developed areas.

Fires can be classified by physical parameters such as their fireline intensity, or Byram's intensity, which is the rate of energy per unit length of the fire front (BTU [British thermal unit] per foot of fireline per second) (NPS, n.d.). Following a fire event, the severity of the fire can be measured by the extent of mortality and survival of plant and animal life aboveground and belowground and by the loss of organic matter (NPS, n.d.).

The National Wildfire Coordinating Group defines seven classes of wildfires:

- Class A: 0.25 acre or less
- Class B: more than 0.25 acre, but less than 10 acres
- Class C: 10 acres or more, but less than 100 acres
- Class D: 100 acres or more, but less than 300 acres
- Class E: 300 acres or more, but less than 1,000 acres
- Class F: 1,000 acres or more, but less than 5,000 acres
- Class G: 5,000 acres or more

Early detection of wildfires is a key part of the overall efforts of the Massachusetts Bureau of Forest Fire Control. Early detection is achieved by trained Bureau observers who staff 22 of the 42 operating fire towers statewide. During periods of high fire danger, the Bureau conducts county-based fire patrols in forested areas. These patrols assist cities and towns in prevention efforts and allow for the quick deployment of mobile equipment for suppression of fires during their initial stage. If a fire breaks out and spreads rapidly, residents may need to evacuate within days or hours. Once a fire has started, fire alerting is reasonably rapid in most cases. The rapid spread of cellular and two-way radio communications in recent years has further contributed to a significant improvement in warning time.

Probability of Future Events

It is difficult to predict the likelihood of wildfires in a probabilistic manner because a number of factors affect fire potential and because some conditions (e.g., ongoing land use development patterns, location, and fuel sources) exert changing pressure on the wildland-urban interface zone. The Massachusetts Climate Change Assessment report suggests that wildfire risk will increase over time in association with extreme heat events and changing precipitation and droughts. The following discussion helps characterize the risk further for Dalton.

Vulnerability Assessment

Exposure

To help identify potential wildfire areas for Dalton, the U.S. Forest Service's Wildfire Risk to Communities spatial data was downloaded. This data was developed in 2020 using the vegetation and wildland fuels from the LANDFIRE 2014 model with the burn probability coming from the Forest Service Fire Simulation System (FSim). To create a product with a finer resolution, the data was upsampled to the native 30m resolution of the LANDFIRE fuel and vegetation data spreading the values of the modeled burn probability into developed areas represented in LANDFIRE fuels as non-burnable. The areas with a 0.02% annual probability of burning were identified and overlaid with the critical facilities and other buildings. There was one critical facility, Dalton Sewer and Highway Department building found adjacent to the 0.02% burn probability areas and thirty buildings including single family home, commercial, government, and industrial buildings found there. Additionally, the Pine Grove Manor Dalton Housing Authority (north of High St.) is adjacent to forested land to the north. Table 47 shows the result of this analysis.

Table 47. Buildings in 0.02% Annual Chance Area.

Building Type	Number of Buildings (Total in Town)	Building Value (Total in Town)
Single Family	22 (2,846)	$5,735,600 ($461,247,300)
Mobile Home	0 (6)	$0 ($225,300)
Multi-Family	0 (446)	$0 ($86,014,900)
Mixed-Use	0 (24)	$0 ($4,306,900)
Commercial	4 (116)	$358,400 ($174,879,975)
Educational	0 (5)	$0 ($9,389,400)
Government	2 (63)	$292,800 ($265,621,400)
Religious/Non-Profit	0 (33)	$0 ($19,965,500)
Industrial	2 (46)	$68,800 ($70,455,300)
Garage/Outbuilding	0 (10)	$0 ($108,400)
Vacant	0 (11)	$0 ($30,500)
Total	**30 (3,606)**	**$6,455,600 ($1,092,244,875)**

The population exposed to the 0.02% probability area is shown in Table 48. The column in the left shows the population in and around the 0.02% probability wildfire area (wherever the Census Block overlapped with the wildfire area) while the column on the right shows the total population numbers for the Town. There is an older population exposed to the wildfire hazard.

Table 48. Population Exposed to 0.02% Annual Chance Wildfire (2020 U.S. Census).

Demographics	Population in and Adjacent to 0.02% Wildfire Area	Total Population
Population	182	6,330
Households	130	2,928
White	172 (94.5%)	5,852 (92.4%)
Black	0 (0.0%)	61 (1.0%)
American Indian	0 (0.0%)	7 (0.1%)
Asian	3 (1.6%)	61 (1.0%)
Pacific Islander	0 (0.0%)	0 (0.0%)
Other Race	0 (0.0%)	58 (0.9%)
Two or More Races	7 (3.9%)	291 (4.6%)
Hispanic or Latino:	0 (0.0%)	161 (2.5%)
Population under 18:	33 (18.1%)	1,020 (16.1%)
Population over 64:	63 (34.6%)	1,671 (26.4%)
Annual Income < $30K/year	13 (10.0%)	491 (16.8%)
Population in EJ Zone*:	0 (0.0%)	2,254 (35.6%)

**Massachusetts Office of Energy and Environmental Affairs, 2022*

Figure 24 shows the burn probability map from the USFS overlaid on the Town.

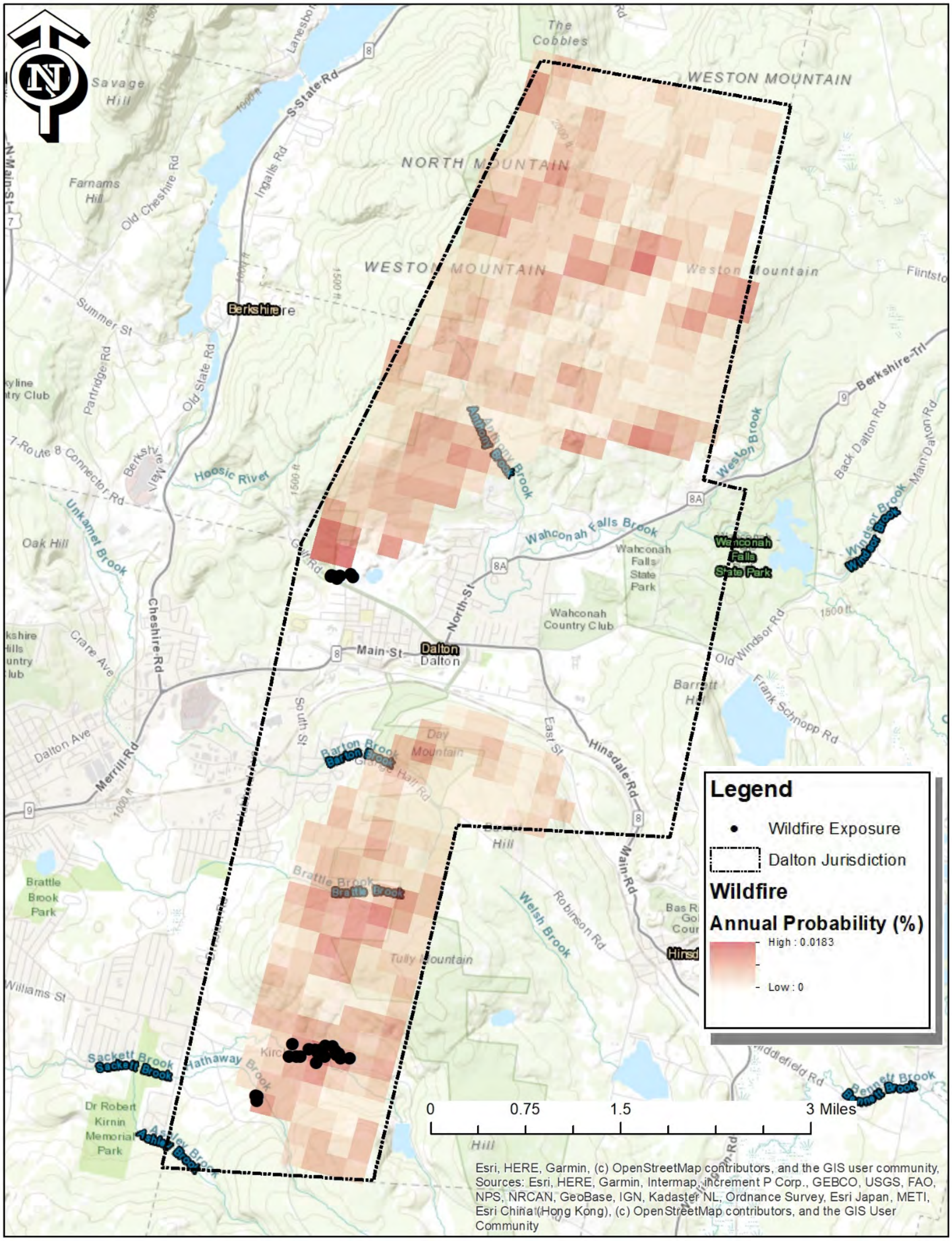


Figure 24. Wildfire Burn Probability Map.

Built Environment Impacts

A major out-of-control wildfire can damage property, utilities and forested land; create smoke that can cause breathing problems; and injure or kill people. Other associated concerns are debris management issues including debris removal and identification of disposal sites.

No property damage, injuries or deaths have been recorded for the reported for major wildfires in Dalton between 2004 and 2022. Using the wildfire probabilities and building values, a loss estimate was produced for the 0.02% scenario. The losses are $6,455,600 for the .02% event and the AAL will be $3,049.

Climate change will increase the probability of brushfires which could lead to additional property damage. Future development in forested and other high-fuel areas also could lead to additional increases in the probability of brushfires.

Population Impacts

Populations considered most vulnerable to wildfire impacts are identified based on a number of factors including their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing. Senior and low-income populations in Dalton are particularly susceptible to wildfires. The Town should be aware of the potential needs of residents within these population segments in the event of a hazard occurrence.

With the increased probability of brushfires outside of the Town in the future due to climate change, populations may be impacted more often due to air quality issues.

Environment Impacts

Many of the natural features in the Town are susceptible to wildfire, including the trees and parks.

Problem Statements for Wildfires

Table 49. Problem Statements for Wildfires.

Assets	Problems Associated with Wildfires
People (including underserved communities and socially vulnerable populations)	• Populations with severe asthma may be adversely impacted by wildfires in the vicinity.

Assets	Problems Associated with Wildfires
Structures (including facilities, lifelines, and critical infrastructure)	• Residential structures are found in the higher probability burn areas and areas of high risk such as 52 residential structures bordering the Pines. Structures without defensible zones are more susceptible to wildfires and brush fires.
Systems (including networks and capabilities)	• Wildfires often cause roads to be closed requiring detours impacting emergency services.
Natural, historic, and cultural resources	• Wildfires may adversely impact forested and other vegetated areas of Dalton. • DCR land in Dalton is believed at most risk, although this is a relatively smaller area in the Town.
Activities that have value to the community	• Recreational activities may be adversely impacted by wildfires, depending on location.

National Flood Insurance Repetitive Loss Properties

B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))

***REPETITIVE LOSS STRUCTURE** means a structure covered under an NFIP flood insurance policy that (1) has incurred flood-related damage on two occasions, in which the cost of repair, on average, equaled or exceeded 25% of the value of the structure at the time of each such flood event; and (2) at the time of the second incidence of flood-related damage, the contract for flood insurance contains increased cost of compliance coverage.*

According to FEMA, repetitive loss properties are those for which two or more losses of at least $1,000 each have been paid under the National Flood Insurance Program (NFIP) within any 10-year period since 1978. Severe repetitive loss properties are residential properties that have at least four NFIP payments over $5,000 each and the cumulative amount of such claims exceeds $20,000, or at least two separate claims payments with the cumulative amount exceeding the market value of the building.

According to data provided by MEMA, two repetitive loss property have experienced seven loss events, with $21,891.16 total building payments and $11,454.67 total content payments. Both properties are single family homes.

***SEVERE REPETITIVE LOSS** structure means a structure that is covered under an NFIP flood insurance policy and has incurred flood-related damage (1) for which four or more separate claims have been made under flood insurance coverage, with the amount of each claim (including building and contents payments) exceeding $5,000 and with the cumulative amount of such claims payments exceeding $20,000; or (2) for which at least two separate flood insurance claims payments (building payments only) have been made, with cumulative amount of such claims exceeding the value of the insured structure.*

A summary of the Town's participation and compliance with the NFIP, including current policy and historical claims statistics, is provided in Table 7 of Chapter 5 (Capability Assessment).

Hazard Ranking

Ranking hazards helps the town set goals and mitigation priorities. To compare the risk of different hazards, and prioritize which are more significant, requires a scoring system for equalizing the units of analysis. As not all hazards assessed in this plan have precisely quantifiable probability or impact data, a scoring system based on multi-criteria decision analysis (MCDA) methodology was developed to rank all the hazards. This multi-criteria ranking analysis approach prioritizes hazard risk based on a blend of quantitative factors from the available data, such as historical data, local knowledge, public survey, and Hazus assessment. This hazard ranking analysis assigns varying degrees of risk to five categories for each of the hazards, including: probability (how often it can occur), impact (economic, social, and environmental loss), spatial extent (the size of the area affected), warning time (how long does a community have to prepare for the event), and duration. Each degree of risk was assigned a value ranging from 1 to 4. The weighting factor derived from a review of best practice plans. Some of these hazard characteristics, like probability and impact, are more important than others and are weighted more heavily.

To calculate a rank score value for a given hazard, the assigned risk value for each category was multiplied by the weighting factor. The sum of all five categories represents the final rank score, as demonstrated in the following equation:

Hazard Score Value = [(Probability x 30%) + (Impact x 30%) + (Spatial Extent x 20%) + (Warning Time x 10%) + (Duration x 10%)]

Table 50 provides the hazard characteristic, level description, level criteria, level index value, and weighting value.

Table 50: Hazard Ranking Criteria

Hazard Characteristic	Degree of Risk			Assigned Weighting Factor
	Level	Criteria	Index Value	
Probability	Unlikely	Less than 1% annual probability	1	30%

Hazard Characteristic	Degree of Risk			Assigned Weighting Factor
	Level	Criteria	Index Value	
	Possible	Between 1 and 10% annual probability	2	
	Likely	Between 10 and 100% annual probability	3	
	Highly Likely	100% annual probability	4	
Impact	Minor	Very few injuries, if any. Only minor property damage and minimal disruption to quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries only. More than 10% of property in the affected areas damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths/injuries possible. More than 25% of property in affected areas damaged or destroyed. Complete shutdown of critical facilities for more than one week.	3	
	Catastrophic	High number of deaths/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1 and 10% of area affected	2	
	Moderate	Between 10 and 50% of area affected	3	
	Large	Between 50 and 100% of area affected	4	
Warning Time	Long	More than 24 hours	1	10%
	Moderate	12 to 24 hours	2	
	Short	6 to 12 hours	3	
	Very short or no warning	less than 6 hours	4	
Duration	Very short	Less than 6 hours	1	10%
	Short	Less than 24 hours	2	
	Moderate	Less than one week	3	
	Long	More than one week	4	

Table 51 provides the final hazard ranking for Dalton. Each hazard characteristic is assigned a value between 1 (lowest value) and 4 (highest value). When the risk values were calculated, if the value was greater than 2.7, it was assigned as a high risk hazard. If the value was greater than 2 and less than or equal to 2.7, it was assigned as a moderate risk. If the value was less than or equal to 2, it was assigned as a low risk hazard. The flood, severe winter storms, and average and extreme temperatures hazards were ranked highest. The wildfires/brushfires, hurricanes/tropical storms, invasive species, droughts, landslides, and tornadoes were all ranked as moderate. The earthquake hazard is ranked as low.

Table 51. Final Hazard Ranking of Hazards for Dalton.

Hazards	Probability	Impact	Spatial Extent	Warning Time	Duration	Value	Rank
Flooding from Precipitation and Dam Overtopping	4	3	2	3	2	3	High
Severe Winter Storms	4	2	4	1	3	3	High
Average and Extreme Temperatures	3	2	4	1	2	2.6	High
Invasive Species	3	2	2	3	4	2.6	Mod.
Other Severe Weather	3	2	4	2	1	2.6	Mod.
Wildfires/Brushfires	2	3	3	3	3	2.6	Mod.
Droughts	2	2	4	1	4	2.5	Mod.
Tornadoes	2	4	1	3	1	2.4	Mod.
Hurricanes/Tropical Storms	2	2	4	1	2	2.3	Mod.
Landslides	2	2	1	4	2	2	Mod.
Earthquakes	1	1	4	4	1	1.9	Low

The following table summarizes changes in population patterns and land use and development and how those impact hazards.

Table 52. Impacts from Population and Land Use.

Hazards	Changes in Population Patterns	Changes in Land Use and Development
Flooding Including Dam Failures and Ice Jams	There is a growing elderly population exposed to the floodplain: • North of High St. along Walker Brook • North of Main St. and south of North St.	Existing codes and regulations in the SFHA will help to keep flood impacts low. New development areas may produce additional flooding due to the addition of impervious surfaces.

Hazards	Changes in Population Patterns	Changes in Land Use and Development
Droughts	The Town's elderly population has increased from 17.1% in 2010 to 25.5% in 2020. The number of people living below the poverty line has decreased from 2010 to 2020.	All new developments will create more demand for limited water resources.
Landslides	There is a growing elderly population east of Day Mountain and west of East St. exposed to moderate landslide susceptibility.	Existing land use regulations will help to keep development out of landslide-prone areas.
Extreme Temperatures	The Town's elderly population has increased from 17.1% in 2010 to 25.5% in 2020. The number of people living below the poverty line has decreased from 2010 to 2020.	All new developments will exacerbate heat island effect if the development includes tree removal and adding black surfaces such as asphalt and roofs.
Wildfires	There is a growing elderly population in Pine Grove Manor and bordering the Pines, and near Wahconah Falls State Park with a moderate wildfire susceptibility.	Development in or adjacent to a forested or brushland area can lead to a higher risk of wildfire, including development near the Pines.
Infectious Diseases	The Town's elderly population has increased from 17.1% in 2010 to 25.5% in 2020. The number of people living below the poverty line has decreased from 2010 to 2020.	Shouldn't be impacted by changes in land use and development.
Invasive Species	Shouldn't be impacted by population changes.	Shouldn't be impacted by changes in land use and development.

Hazards	Changes in Population Patterns	Changes in Land Use and Development
Hurricanes and Tropical Storms	The Town's elderly population has increased from 17.1% in 2010 to 25.5% in 2020. The number of people living below the poverty line has decreased from 2010 to 2020.	Shouldn't be impacted by changes in land use and development.
Severe Winter Storms	The Town's elderly population has increased from 17.1% in 2010 to 25.5% in 2020. The number of people living below the poverty line has decreased from 2010 to 2020.	Shouldn't be impacted by changes in land use and development.
Tornadoes	The Town's elderly population has increased from 17.1% in 2010 to 25.5% in 2020. The number of people living below the poverty line has decreased from 2010 to 2020.	Shouldn't be impacted by changes in land use and development.
Other Severe Weather	The Town's elderly population has increased from 17.1% in 2010 to 25.5% in 2020. The number of people living below the poverty line has decreased from 2010 to 2020.	Shouldn't be impacted by changes in land use and development.
Earthquakes	Not considered.	Not considered.

Problem Statements Summary

The following problem statements reflect a summary of the problem statements included at the end of each hazard profile. They were designed to briefly summarize the key hazard risks and vulnerabilities to the community based on potential impacts and losses from future events. They are among the issues of greatest concern and were used to assist in the identification and analysis of potential mitigation actions for Chapter 6 (Mitigation Strategy). These problem statements will be reviewed and revised as needed during plan updates to reflect the most current information resulting from the risk assessment.

Table 53. Problem Statements Summary.

Hazard	Problem Summary
Flood	• Older populations in the floodplain may have difficulty evacuating. • The senior center, pump stations at Bay State Mill and Housatonic Street, communications tower at the American Legion Post, and housing authority buildings are exposed to flooding. • There are approximately eighty-five buildings in the floodplain including single family homes, multi-family homes, mobile home, commercial, government, non-profit/religious, and industrial buildings. Golf course also exposed to flooding. • The water levels have come close to reaching Wahconah High School. • Road closures may interrupt community systems including North Street at Braeburn Rd., High St. at Field St. Ext., Deming St. Ext., and Chamberlain Ave to Judith Drive. • According to EPA's Toxic Release Inventory (TRI) database, there are five facilities which contain hazardous materials in the 100-year floodplain: 339 North Street, Berkshire Motor Cars LTD, Byron Weston Company, Crane Byron Weston Paper Mill, and S&W Auto Performance.
Severe Winter Storms	• Vulnerable populations may be stranded during a winter storm event and may not be able to travel to emergency services. • The electrical grid and roadways are susceptible to failure and loss of use during storms. • First responders may have difficulty reaching people if roads are closed due to road closures.
Average and Extreme Temperatures	• Extreme heat will be a significant public health threat to all residents, but especially for vulnerable populations living in older homes or homes without air conditioning. • The electric grid may become stressed and fail during extreme heat events.

Hazard	Problem Summary
	• The elderly and those with mobility issues may not be able to leave their homes and travel safely. • People working in businesses without air conditioning may be at risk of heat illness. • Contributes to higher wildfire risk due to the drying of fuels in the forest including below-ground root dry out. • The Town currently does not have a designated facility that can reliably act as a warming or cooling center, particularly during a power outage. The senior center electrical system cannot accommodate a generator, and therefore cannot always be reliable. The Town should seek to upgrade electrical at the senior center and install a generator or explore options for designating a more reliable temperature refuge center.
Other Severe Weather	• First responders may have difficulty reaching people if roads are closed due to tree debris. • Storm damage to wind-susceptible buildings such as carports, greenhouses, and open-walled buildings. Additional damage to commercial buildings with HVAC located on roofs. • The electric grid may go down during high wind event.
Wildfires/Brushfires	• Populations with severe asthma may be adversely impacted by wildfires in the vicinity. • Several residential structures are found in the higher probability burn areas as well as bordering specific areas of risk such as the Pines. Structures without defensible zones are more susceptible to wildfires and brush fires. • Wildfires often cause roads to be closed requiring detours impacting emergency services. • DCR land in Dalton is believed at risk, although this is a relatively smaller area within the Town. • Transmission of embers over long distances, especially under high-wind conditions, is a major source of wildfires.

Hazard	Problem Summary
Droughts	• Vulnerable communities may have difficulty accessing potable water during an emergency drought event. • Water supply infrastructure may need to be shut down and water quality may become substandard. Businesses requiring water for daily operations may have their operations limited due to water restrictions. • A public water supply well in Dalton (serving the Wahconah Falls Road area) has been affected by droughts, increasing its run time. • Outdoor water use restrictions and other water conservation measures during periods of extreme drought can be challenging to enforce, even when mandated through local declaration. • Contributes to higher wildfire risk due to the drying of fuels in the forest including below-ground root dry out. • At least one private well has been affected by droughts.
Tornadoes	• Vulnerable populations may need support seeking protected shelter. Those without cell phones may not get weather alerts. • Structures and critical infrastructure can all be impacted by tornadoes. • Roadways may be blocked due to downed trees and other debris. • The electric grid may be impacted by winds and downed trees.
Hurricanes/Tropical Storms	• Wind may cause trees to fall into structures and infrastructure, and roadways. • Wind damage to wind-susceptible buildings such as carports, greenhouses, and open-walled buildings. Additional damage to commercial buildings with HVAC located on roofs. • The electric grid may go down during high wind event.
Invasive Species	• Invasive species are problematic throughout the Town and have been verified at East Branch Housatonic River Reservoir, Day Mountain Wildlife Management Area, near the Appalachian Trail entrance, and along the rail line.

Hazard	Problem Summary
	• Emerald ash borer continues to be a challenge for Dalton. • Additional DPW resources may be required in critical areas. • Vector borne disease incidence may increase with climate change, adversely impacting vulnerable people.
Landslides	• Vulnerable populations in isolated areas may be cut off if a landslide impacts specific roads. • Some historical, residential, commercial, and other structures reside adjacent to moderately unstable areas and could be impacted. • Roads and rail may be impacted and could cause a hazardous material spill. • Increased precipitation intensity and invasive species' impacts to forests may influence future landslide risks.
Earthquakes	• Elderly population may fall during an event. • Unreinforced masonry and utility lifelines impacted.

Chapter 5: Capability Assessment

Overview

The capability assessment is an evaluation of the existing tools and resources available to the Town of Dalton for increasing its resilience to hazards, with the primary purpose of identifying opportunities to improve or enhance these capabilities. Coupled with the risk assessment, the capability assessment serves as the foundation for designing an actionable and effective hazard mitigation strategy.

As in any planning process, it is important to establish which goals or actions are feasible based on the organizational capacity of those agencies or departments tasked with plan implementation. This capability assessment helps determine which types of mitigation actions are practical and likely to be completed over time based on Dalton's existing authorities, policies, programs, and resources available to support them. It also helps identify any critical capability gaps or limitations to address through corrective actions, as well the key strengths or positive measures in place that should continue to be supported or expanded upon to improve local mitigation capabilities.

This capability assessment was completed to not only help establish the goals and actions for the Town of Dalton's hazard mitigation plan, but to also help ensure that those goals and actions are realistically achievable under current local conditions. As highlighted in FEMA's 2022 Local Mitigation Planning Policy Guide, *"describing the current capabilities provides a rationale for which mitigation projects can be undertaken to address the vulnerabilities identified in the Risk Assessment."* [43]

The capability assessment for the Town of Dalton includes a comprehensive examination of several components as summarized in Table 54. It was prepared using the latest guidance and worksheets provided in FEMA's 2023 Local Mitigation Planning Handbook.[44]

Table 54. Capability Assessment Components.

Components	**Description**
Planning and Regulatory Capabilities	Local plans, policies, codes, and ordinances that are relevant to reducing the potential impacts of hazards.
Administrative and Technical Capabilities	Local human resources and their skills/tools that can be used to support mitigation activities.
Financial Capabilities	Fiscal resources the community has access to for helping to fund hazard mitigation projects.

[43] Local Mitigation Planning Policy Guide. FEMA. April 2022. P. 25.

[44] Local Mitigation Planning Handbook. FEMA. May 2023. PP. 79-92 and Worksheets 4-5.

Components	Description
Education and Outreach Capabilities	Local programs and methods already in place that can be used to support mitigation activities.
NFIP Participation and Compliance	Summary of information relevant to the community's participation in the NFIP and continued compliance with NFIP requirements.

Review and Incorporation of Existing Plans, Studies, and Reports

A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))

The first step in completing the updated capability assessment was to gather and review any relevant local plans, studies, or reports completed or updated since the previous hazard mitigation plan was adopted in 2018. This information was used to help gain a current understanding of the Town's current ability to mitigate risk, and how local capabilities may have changed over the past five years. The 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan (the "ResilientMass" Plan), as well as other plans adopted by the Town of Dalton in the recent past, were reviewed for consistency as well as opportunities for plan integration. The goal of this review was to support updates to this plan that easily align with and possibly incorporate key aspects of relevant plans at the state and local level.

Table 55 provides a summary of the most relevant plans, studies, reports, or sources of other technical information consulted as part of this process and how they were incorporated into this plan update.

Table 55. Relevant Plans, Studies, and Reports for Incorporation.

Plan / Study / Report	Summary Description / Incorporation
ResilientMass Plan: The Massachusetts State Hazard Mitigation and Climate Adaptation Plan (2023)	The 2023 ResilientMass Plan is an update to the Commonwealth's innovative State Hazard Mitigation and Climate Adaptation Plan (SHMCAP) that was developed in a highly collaborative manner to fully integrate a hazard mitigation plan and a climate change adaptation plan. The ResilientMass Plan identifies strategies and specific, measurable actions that state agencies can take—individually or through interagency partnerships—to address risks to the human health and safety, communities, critical assets and infrastructure, natural resources, governance, and economy of the Commonwealth. The ResilientMass Plan aims to ensure the Commonwealth is prepared to withstand, rapidly recover from, adapt to, and mitigate natural hazard events.

Plan / Study / Report	Summary Description / Incorporation
	Through the ResilientMass Plan, the Commonwealth is advancing its mission to increase its capacity for addressing natural and other hazards and climate impacts through preparation, mitigation, adaptation, and risk reduction. The ResilientMass Plan includes six (6) overarching goals which were developed through a collaborative process involving the interagency ResilientMass Action Team (RMAT) and local, regional, and community partners. It also integrates the findings of the 2022 Climate Assessment with additional analysis on all current hazards that may impact the Commonwealth, as well as future risks that will increase the likelihood, frequency, and duration of hazards. Of perhaps most relevance to local communities, the ResilientMass Plan identifies the most urgent priority impacts of these risks to various regions across the Commonwealth. The ResilientMass Plan was incorporated as a key source of information for this plan update. This included the integration and consideration of the latest climate data and information for 15 hazards impacting the Commonwealth now and, in the future, with particular emphasis on those unique impacts determined for the Berkshires and Hilltowns region. In addition, the goals and actions included in Chapter 7 (State Strategy, Actions, and Implementation Plan) were reviewed and considered as part of the update process for Dalton's Hazard Mitigation Plan to help ensure the Town's own goals and objectives are in alignment with and can be mutually supportive of the Commonwealth's overall strategy. As can be seen in Chapter 6 of this plan. several of the goals and actions identified for Dalton's updated plan address the key themes identified in the ResilientMass Plan.
Town of Dalton Municipal Vulnerability Preparedness (MVP) / Community Resilience Building (CRB) Summary of Findings Report (2019)	The Commonwealth's Municipal Vulnerability Preparedness (MVP) program provides support for cities and towns in Massachusetts to plan for resiliency and implement key climate change adaptation actions for resiliency. In 2018, Dalton was awarded an MVP Planning Grant to assess its vulnerability to and prepare for climate change impacts, build community resilience, and receive designation from the Executive Office of Energy and Environmental Affairs (EEA) as an MVP Community. Communities with this designation become eligible for MVP Action Grant funding and other opportunities to support the implementation of priority climate adaptation actions. In completing the MVP planning process, the Town of Dalton followed the Community Resilience Building (CRB) framework with technical assistance provided by the Berkshire Regional Planning Commission, a state-certified MVP Provider. The CRB methodology is an "anywhere at any scale" format

Plan / Study / Report	Summary Description / Incorporation
	that draws on stakeholders' wealth of information and experience to foster dialogue about a community's strengths and vulnerabilities. A day long CRB Workshop was held on April 25, 2019, with the following central objectives: 1. Define top local natural and climate-related hazards of concern. 2. Identify existing and future strengths and vulnerabilities. 3. Develop prioritized actions for Dalton. 4. Identify immediate opportunities to collaboratively advance actions to increase resilience. The resulting Summary of Findings Report and supporting materials served as a primary source of information and community-based input for incorporation into the update of this plan. These inputs include the identification of top climate-influenced hazards (Flood, Ice/Snow, Wind, Change in Temperature, and Pests) and vulnerable areas or community assets (infrastructural, societal, and environmental), current community concerns and challenges presented by these hazards, current strengths and assets, and specific, prioritized recommendations to improve resilience in Dalton.
Master Plan (2016)	Dalton's Master Plan was developed in 2016 to guide growth, policy, and investment decisions for the next 10 to 20 years. The considers all aspects of the community to create a consistent strategy for how each should progress in the future - including land use, housing, economy, natural and cultural resources, open space and recreation, services, infrastructure, and transportation. Thus, the Master Plan served as a primary source of information across a broad range of topics. Any relevant land use, natural hazard, or mitigation-related content was reviewed and incorporated into this plan as deemed applicable by the HMPC. Opportunities to improve the integration of the Hazard Mitigation Plan with future updates to the Master Plan were also discussed with the HMPC. The 2016 Master Plan doesn't explicitly address hazards other than some reference to flooding and stormwater hazards. It includes a goal focused on maintaining and improving water, sewer, and stormwater infrastructure, with a specific objective to make improvements to the stormwater system. Recommended actions include but are not limited to mapping the system and developing regulations for green roofs, infiltration practices, and other preventative solutions. Another objective seeks to guide development to areas where growth can be accommodated by existing versus new infrastructure. The Transportation element introduces the subject of climate change adaptation, noting how the Town's existing infrastructure (roadways,

Plan / Study / Report	Summary Description / Incorporation
	culverts, and bridges) may be undersized and unable to accommodate future climate conditions such as increases in storms and precipitation, leading to higher likelihood of damages. It also suggests the Town consider their road infrastructure as among the key ways to best adapt to future climate change.
Dalton Open Space and Recreation Plan (2021)	The Town's Open Space and Recreation Plan (OSRP) presents recommendations and actions for Dalton to maintain the character of the community by strengthening the tax base, identifying threatened resources in need of protection, improving management of existing protected lands, and guiding appropriate future development. The OSRP notes existing resources and describes key trends and issues regarding open space and outdoor recreation. It also establishes the Town's work plan for goals, objectives, and actions to achieve its vision for maintaining and enhancing natural and recreational amenities for the community. The OSRP served as a key source of information related to Dalton's natural and built environment, with specific content regarding natural hazards and mitigation activities being incorporated into this updated plan. This includes details on environmental challenges such as local flooding hazards, stormwater runoff, and forestry issues (including invasive species) for the risk assessment, and information on existing goals and recommended or planned activities that will help the community to mitigate hazards or adapt to climate change for the mitigation strategy.
Dalton Green Infrastructure Plan (2022 Update)	The Dalton Green Infrastructure plan was created in response to repeated flooding in the lower Walker Brook watershed. As part of a study funded by the Massachusetts Executive Office of Energy & Environmental Affairs (EEA), the Town worked with the Berkshire Regional Planning Commission and engineering consultants, Comprehensive Environmental Inc., to explore areas where green infrastructure best management practices (BMPs) could be installed both within the Walker Brook watershed as well as throughout developed areas townwide. The goal was to help Dalton better prepare for the growing likelihood of flood events due to climate change and increased precipitation. This plan is broken into four main sections. The first provides general background information on green infrastructure; the second outlines the potential green infrastructure projects identified throughout Dalton, including more detailed background information on the proposed site designs; the third identifies some suggested policies & initiatives with

Plan / Study / Report	Summary Description / Incorporation
	examples of how green infrastructure can be promoted through Dalton regulation; and the fourth is focused on Funding & Technical Assistance opportunities to assist with green infrastructure implementation as well as additional resources on green infrastructure. The potential projects, policies and initiatives described in this plan were reviewed and incorporated into the plan update process by discussing them with the HMPC and helping to ensure the Town's current top priorities for green infrastructure implementation were integrated into the updated Mitigation Strategy as appropriate.
Walker Brook Preliminary Engineering Study (Flood Mitigation) – Summary of Potential Flood Mitigation Options (2022 Memorandum)	This memorandum, prepared for the Town of Dalton by GZA GeoEnvironmental, Inc. (GZA), summarizes the benefits, drawbacks, and other pertinent considerations to enable selection of the preferred mitigation options for Walker Brook. It provided background and technical information on the site and source of chronic flooding concerns as well as the options available for the Town to address recurring flooding that occurs in the residential area around Walker Brook. This information was reviewed and incorporated into the risk assessment and mitigation strategy phases of the plan update process as needed to describe the current situation and update the mitigation actions to mitigate flooding along Walker Brook.
FEMA Flood Insurance Study for Berkshire County (1982)	Last published by FEMA on July 5, 1982, this report constitutes the currently effective Flood Insurance Study (FIS) report for Berkshire County. The FIS provides information on the existence and severity of flood hazards for the study area, which includes the Town of Dalton. The studies described in this report provide flood hazard data that are used to establish actuarial flood insurance rates and to assist communities in efforts to implement sound floodplain management. Although considered very outdated, the FIS and accompanying Flood Insurance Rate Maps (FIRMs) include relevant data and information on flood hazards for Dalton, including but not limited to descriptions of principal flood problems, flooding sources, FEMA flood zone designations, base flood elevations, and discharge rates of flooding sources. This data and information were reviewed and incorporated into the plan update process by informing the risk assessment, especially as it relates to the hazard profile and vulnerability assessment that was prepared for the flood hazard.

In addition to the above plans which were determined to be most relevant for incorporation into the hazard mitigation plan update, the following plans, studies, reports, and other technical documents were reviewed to gain a clearer understanding of local capabilities and their existing or potential effects on hazard risk reduction. More information on some of these documents is provided in Table 56 in the next section.

- ***Stormwater Management Program (2022)*** – The Town's Stormwater Management Plan (SWMP) is maintained in compliance with MS4 permit requirements as administered by the U.S. Environmental Protection Agency and Massachusetts Department of Environmental Protection (MassDEP). The SWMP describes and details the activities and measures that will be implemented to meet the terms and conditions of the MS4 permit. It is focused on reducing pollutants in stormwater runoff versus mitigating flood hazards. The main elements of the Town's stormwater management program are (1) a public education program in order to affect public behavior causing stormwater pollution, (2) an opportunity for the public to participate and provide comments on the stormwater program, (3) a program to effectively find and eliminate illicit discharges within the MS4 (4) a program to effectively control construction site stormwater discharges to the MS4, (5) a program to ensure that stormwater from development projects entering the MS4 is adequately controlled by the construction of stormwater controls, and (6) a good housekeeping program to ensure that stormwater pollution sources on municipal properties and from municipal operations are minimized.
- ***Continuity of Operations Plan (2022)*** – Dalton's Continuity of Operations Plan (COOP) is designed to help the Town effectively resume its day-to-day core services and functions following a disaster. It outlines the procedures for ensuring for the continuity of Town services following an emergency situation, enabling offices which provide community services to resume minimum essential operations within 12 hours of an emergency, with or without warning, and to sustain emergency operations for up to 30 days. Similar to and in support of the Town's CEMP (described below), the COOP is focused on activities related to the Town's preparedness and response to an emergency or disaster event versus pre-disaster mitigation actions.
- ***Comprehensive Emergency Management Plan (2021)*** – The Town's Comprehensive Emergency Management Plan (CEMP) provides a framework for a community-wide emergency management system to ensure a coordinated response to emergencies and coordinated support of certain pre-planned events. The CEMP addresses the roles and responsibilities of all community departments, agencies, government organizations, volunteers, and other community partners that may be involved in response operations, and identifies how regional, state, federal, private sector, and other resources may be activated to address disasters and emergencies in the community. Although the plan is focused on actions and activities in response to an emergency or disaster event, it does provide general guidance on the roles and responsibilities of Town departments and partners for the prevention and mitigation of anticipated incidents. The CEMP also includes a summary of a threat, hazard, and vulnerability analysis completed by Town that is reviewed on a regular basis with a 5 year date for revision.
- ***Emergency Action Plans (2023)*** – The latest Emergency Action Plans (EAPs), flood inundation maps, and related technical documents were reviewed for dams located in the planning area, including Byron Weston Dams Number 1 and 2 (in Dalton), and those within proximity to the planning area, including but not limited to Ashley Lake Dam (in Washington) and the Cleveland

Brook Reservoir and Upper Sackett Reservoir Dams (in Hinsdale). Applicable content was considered and incorporated into the risk assessment update as deemed appropriate.

- ***Forest Management Plan (2023) -*** This forest stewardship plan covers approximately 41 acres of Town-owned land in Dalton known as "The Pines," an entirely forested property that is directly adjacent to several residential neighborhoods along High Street and Pleasant Street. The plan includes an overview of the area and identifies an overall goal for Dalton to "manage/steward and preserve the forest for improved access for walking, recreation, education, and appreciation of the resource," in addition to more specific goals of importance to the Town such as to preserve/improve scenic beauty, protect special features, minimize damage from forest pests, and suppress or eradicate invasive plants. The plan also recommends forest management practices to be done within the next 10 years to help achieve these goals to protect or increase the environmental values of the forest while providing social or economic benefits. Although this plan is considered an area of concern for increasing wildfire risk, the plan does not address this threat or include any recommendations related to wildfire mitigation practices such as the monitoring and/or treatment of dry fuels.

Planning and Regulatory Capabilities

C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))

Table 56 is based off Worksheet 4 from FEMA's Local Mitigation Planning Handbook. It was used by the HMPC to document and review the current planning and regulatory capabilities of the Town including local plans, policies, codes, and ordinances that are relevant to reducing the potential impacts of hazards. Some additional information on how effectively these plans and regulatory tools are being used for hazard mitigation purposes can be found under the Safe Growth Survey and NFIP Participation and Compliance sections of this chapter.

Table 56. Planning and Regulatory Findings.

Planning/Regulatory Tool	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
Plans		
Master/Comprehensive Plan	Yes	See Table 55 for full description. Although adopted back in 2016, the Town's Master Plan is still effectively used by the Town as a guide for managing future growth and development. Implementation can still be a struggle as the plan identifies a lot of recommended

Planning/Regulatory Tool	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
		policies and actions. Currently, natural hazards are more directly and effectively addressed by the Town though other local plans (MVP, HMP, etc.).
Open Space & Recreation Plan	Yes	See Table 55 for full description. Updated in 2021, the Town's OSRP is an effective tool for supporting Dalton's open space preservation goals while also addressing some specific natural hazards identified in the plan, such as local flooding hazards, stormwater runoff, and invasive species. While the focus of the OSRP is not risk reduction the co-benefits of natural resource protection and natural hazard mitigation are recognized and described accordingly and should continue to do so in plan updates.
Climate Adaptation Plan	No	Although technically not a full climate adaptation plan per se, the Town's 2019 MVP Summary of Findings Report does include a basic assessment of key strengths and vulnerabilities and identifies a series of recommended actions to reduce the impacts of Dalton's top climate-influenced hazards (flood, ice/snow, wind, change in temperature, and pests). See Table 55 for more details on the MVP report. Effective in terms of identifying and prioritizing actions to build community resilience for specific hazards through continued coordination and integration with this hazard mitigation plan.
Floodplain Management Plan	No	No stand-alone plan, but floodplain management is addressed as a key component of this Hazard Mitigation Plan.
Stormwater Management Plan	Yes	Updated in 2021, the Town's Stormwater Management Plan (SWMP) is effective in terms of MS4 permit compliance (i.e., reducing pollutants in stormwater runoff) but could be enhanced to address flood risk and flood risk reduction more specifically, particularly as it relates to projected increases in the frequency and severity of heavy precipitation events due to climate

Planning/Regulatory Tool	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
		change. More details on the SWMP are provided in the previous section following Table 55.
Capital Improvements Plan	No	Capital projects are included and funded through the Town's annual budget process, but the Town does not currently maintain a separate CIP.
Housing Production Plan	No	The Town has not prepared a Housing Production Plan; however, it does maintain a dedicated chapter on Housing as part of its Master Plan (Chapter 6) as described above.
Transportation Plan	No	The Town has not prepared a Transportation Plan; however, it does maintain a dedicated chapter on Transportation as part of its Master Plan (Chapter 7) as described above.
Economic Development Plan	No	The Town has not prepared an Economic Development Plan; however, it does maintain a dedicated chapter on the Economy as part of its Master Plan (Chapter 3) as described above.
Historic Preservation Plan	No	The Town has not prepared a Historic Preservation Plan; however, it does maintain a dedicated chapter on the Natural and Cultural Resources, including historic resources, as part of its Master Plan (Chapter 3) as described above. In addition, the Dalton Historical Commission is dedicated to preserving Town's rich history with the goal of protecting and preserving the historic, cultural, and environmental features that are important components of Dalton's heritage.
Emergency Operations Plan	Yes	The Town's Comprehensive Emergency Management Plan (CEMP) is focused on actions and activities in response to an emergency or disaster event; however, it does provide general guidance on the roles and responsibilities of Town departments and partners for the prevention and mitigation of anticipated incidents. Not considered an effective plan for long-term risk reduction but should continue to cross-reference this hazard mitigation plan in future updates. More details

Planning/Regulatory Tool	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
		on the CEMP are provided in the previous section following Table 55.
Continuity of Operations Plan	Yes	Similar to the CEMP (described above), the Town's COOP is focused on activities related to the preparedness and response to an emergency or disaster event versus pre-disaster mitigation actions. Not considered an effective plan for long-term risk reduction but should continue to cross-reference this hazard mitigation plan in future updates. More details on the COOP are provided in the previous section following Table 55.
Community Wildfire Protection Plan	No	N/A
Other special plans?	No	N/A
Building Code, Permitting, and Inspections		
Building Code	Yes	Version/Year: MA State Building Code (780 CMR), Ninth Edition, 2017
ISO Building Code Effectiveness Grading Schedule (BCEGS®) Classification	Yes	BCEGS Commercial Class: 4 BCEGS Residential Class: 5
ISO Public Protection Classification (PPC©)		
Special Permit / Site Plan Review Requirements	Yes	Per the Town's Zoning Bylaw (Chapter 350), any application for a special permit shall be accompanied by a site plan. Site plans may be required to be prepared and signed by a Massachusetts licensed land surveyor and drawn to scale indicating the location, size and height of proposed buildings, site improvements, easements and containing such other information as may be required. Can be an effective tool for identifying and considering hazard risks and hazard risk reduction measures as part of the special

Planning/Regulatory Tool	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
		permit process which includes reviews by multiple Town departments, boards, and commissions.
Zoning, Land Use, and Development Regulations		
Zoning Bylaw	Yes	The Town's Zoning Bylaw (Chapter 350) includes a series of regulations enacted to promote public health, safety and welfare, with relevant objectives that include but are not limited to (1) safety from fire, flood, panic and other dangers; (2) facilitating adequate provision of drainage, open space and other public requirements; (3) conserving the value of land and buildings, including the conservation of natural resources; and (4) to preserve and increase amenities with regulations designed to protect the Town's significant environmental features such as floodplains, flood-prone areas, wetlands, and more. Effectively administered and enforced in Dalton and a very effective option for integrating hazard risk reduction into community growth and development activities.
Subdivision Regulations	Yes	The Town's Subdivision of Land Bylaw (Chapter 501) includes regulations adopted for the purpose of protecting the safety, convenience, and welfare of Dalton inhabitants by regulating the laying out and construction of ways in subdivisions providing access to the several lots therein, but which have not become public ways, and ensuring sanitary conditions in subdivisions and in proper cases parks and open areas. This includes but is not limited to securing safety in the case of fire, flood, panic, and other emergencies, and for securing adequate provision for water, sewerage, drainage, underground utility services, fire, police, and other similar municipal equipment. Very effective tool for integrating hazard risk reduction considerations into future subdivision reviews and approvals.
Floodplain Regulations	Yes	Adopted via Zoning Bylaw (Chapter 350, Article XV: Floodplain District Regulation). The purposes of the Floodplain District are to protect the public health,

Planning/Regulatory Tool	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
		safety, and general welfare, to protect human life and property from the hazards of periodic flooding, to preserve the natural flood control characteristics, and the flood storage capacity of the floodplain, and to preserve and maintain the groundwater table and water recharge areas within the floodplain. Adopted in compliance with FEMA's NFIP regulations and the State Building Code. Very effective at reducing flood risks to new and improved construction in high risk areas.
Wetlands Protection Regulations	Yes	Adopted via Chapter 340 of the Town Code (Wetlands Protection). Effectively protects the wetlands, related water resources, and adjoining land areas in the community by controlling activities deemed by the Conservation Commission likely to have a significant or cumulative effect upon wetland values, including but not limited to flood control, erosion, and storm damage prevention. Very effective and supportive of flood hazard risk reduction.
Stormwater Management Regulations	Yes	Adopted via Chapter 280 of the Town Code (Stormwater Management and Erosion Control). The relevant objectives of this bylaw include but are not limited to requiring practices that control the volume and rate of stormwater runoff resulting from land disturbing activities; promoting infiltration and recharge of groundwater; and ensuring adequate long-term operation and maintenance of structural stormwater best management practices so that stormwater structures work as designed. This bylaw has been effective at regulating pollutant discharges in compliance with MS4 permit requirements, and much progress has been made to update and expand the regulations to promote green infrastructure and low impact development. This includes the formation of an inter-agency Stormwater Commission, the passage of additional Stormwater Regulations (updated in 2021), and the funding of and/or participation in several stormwater related studies.

Massachusetts State Building Code

All municipalities in the state must adopt and enforce the current Massachusetts State Building Code (MSBC). The MSBC consists of a series of international model codes and any state-specific amendments adopted by the Board of Building Regulations and Standards (BBRS). The BBRS regularly updates the state building codes as new information and technology becomes available and change is warranted.

The MSBC is separated into two distinct volumes: The Residential volume regulates all one- and two-family structures and townhouses that are three stories or less, as well as their accessory structures. The Base volume regulates all structures that are not covered by the Residential regulations.

The current version of the MSBC is the Ninth Edition, which became effective on October 20, 2017. The Town of Dalton began enforcing the Ninth Edition for all applicable projects as required by January 1, 2018. The Ninth Edition code is based on modified versions of the following 2015 codes as published by the International Code Council (ICC).*

- The International Building Code (IBC)
- International Residential Code (IRC)
- International Existing Building Code (IEBC)
- International Mechanical Code (IMC)
- International Energy Conservation Code (IECC)
- International Swimming Pool and Spa Code (ISPSC)
- Portions of the International Fire Code (IFC)

** Although the Ninth Edition of the code is still in effect, members of the BBRS have voted that the next edition of the MSBC will be based on modified versions of the 2021 International Codes. The content of these codes is still under review by the BBRS, but it is anticipated that the Tenth Edition of the code will be available for use in 2024.*

The Commonwealth of Massachusetts requires mandatory enforcement of the MSBC and does not allow local amendments to the residential code. In addition, the Commonwealth adopts a plumbing and electrical code. The Commonwealth also has a program in place for code official certification, which includes taking code classes prior to examination and certification, requires continuing education, and allows consumers to file complaints against inspectors. Massachusetts also requires licensing of general, plumbing, electrical, and roofing contractors; requires licensing candidates to pass an examination prior to licensing; and requires continuing education.

Massachusetts continues to perform well in terms of objective assessments of the MSBC. For example, in its most recent “Rating the States” report, the Insurance Institute for Business and Home Safety (IBHS) ranked Massachusetts 9th (scoring 78 out of a possible 100 points on the IBHS scale). Now in its fourth edition, IBHS's 2021 report evaluates the 18 states along the Atlantic and Gulf coasts, all vulnerable to catastrophic hurricanes, based on building code adoption, enforcement, and contractor licensing.

Lastly, as noted in the table above, the MSBC contains a series of requirements for flood-resistant design and construction that are in accordance with the ASCE 24 standard, which incorporates—and in certain areas exceeds—FEMA's NFIP construction standards. Highlights of ASCE 24 that complement the NFIP minimum requirements include requirements for building performance; flood-damage-resistant materials, utilities and service equipment, and siting considerations. Specific requirements for design flood elevations and the use of flood-resistant materials may be found in the ASCE Tables included in 780 CMR Section 1612.4. For example, a higher regulatory standard that affects development and redevelopment in the Town's mapped special flood hazard areas include a requirement that new or substantially improved buildings must be elevated so that the lowest floor surface is at least 1 foot above the FEMA base flood elevation.

Safe Growth Survey

As part of the assessment for planning and regulatory capabilities, the Town Planner completed a *Safe Growth Survey*. This unique survey instrument was drawn from the Safe Growth Audit concept developed for the American Planning Association (APA) to help communities evaluate the extent to which they are positioned to grow safely relative to natural hazards. The survey covered six topic areas including the following:

- Land Use
- Transportation
- Environmental Management
- Public Safety, Zoning Ordinance
- Subdivision Regulations
- Capital Improvement Program and Infrastructure Policies

While somewhat of a subjective exercise, the Safe Growth Survey was used to provide some measure of how adequately existing planning mechanisms and tools for the Town of Dalton were being used to address the notion of safe growth. In addition, the survey instrument was aimed at further integrating the subject of hazard risk management into the dialogue of local community planning and to possibly consider and identify new actions as it relates to those local planning policies or programs already in place or under development. It is anticipated that the Safe Growth Survey will be used again during plan updates to help measure progress over time and to continue identifying possible mitigation actions as it relates to future growth and community development practices, and how such actions may better be incorporated into local planning mechanisms.

The results of the Safe Growth Survey are summarized in Table 57. This includes describing how strongly the Town's planning staff agrees or disagrees with 25 statements as they relate to Dalton's current plans, policies, and programs for guiding future community growth and development, according to the following scale:

1=Strongly Disagree 2=Somewhat Disagree 3=Neutral 4=Somewhat Agree 5=Strongly Agree

Table 57. Safe Growth Survey Results.

MASTER/COMPREHENSIVE PLAN	
Land Use	
1. The master/comprehensive plan includes a future land use map that clearly identifies natural hazard areas.	$\boxed{1}$ 2 3 4 5
2. Current land use policies discourage development and/or redevelopment within natural hazard areas.	1 2 3 $\boxed{4}$ 5
3. The master/comprehensive plan provides adequate space for expected future growth in areas located outside of natural hazard areas.	1 $\boxed{2}$ 3 4 5
Transportation	
4. The transportation element limits access to natural hazard areas.	1 2 $\boxed{3}$ 4 5
5. Transportation policy is used to guide future growth and development to safe locations.	1 2 $\boxed{3}$ 4 5
6. Transportation systems are designed to function under disaster conditions (e.g., evacuation, mobility for fire/rescue apparatus, etc.).	1 $\boxed{2}$ 3 4 5
Environmental Management	
7. Environmental features that serve to protect development from hazards (e.g., wetlands, riparian buffers, etc.) are identified and mapped.	1 2 3 $\boxed{4}$ 5

MASTER/COMPREHENSIVE PLAN	
8. Environmental policies encourage the preservation and restoration of protective ecosystems.	1 2 $\boxed{3}$ 4 5
9. Environmental policies provide incentives to development that is located outside of protective ecosystems.	1 2 $\boxed{3}$ 4 5
Public Safety	
10. The goals and policies of the master/comprehensive plan are related to and consistent with those in the hazard mitigation plan.	1 2 $\boxed{3}$ 4 5
11. Public safety is explicitly included in the master/comprehensive plan's growth and development policies.	1 2 3 $\boxed{4}$ 5
12. The monitoring and implementation section of the master/comprehensive plan covers safe growth objectives.	1 $\boxed{2}$ 3 4 5
ZONING BYLAWS	
13. The zoning bylaws conform to the master/comprehensive plan in terms of discouraging development and/or redevelopment within natural hazard areas.	1 2 $\boxed{3}$ 4 5
14. The bylaws contain natural hazard overlay zones that set conditions for land use within such zones.	1 2 3 $\boxed{4}$ 5
15. The bylaws require or encourage resilient development through density bonuses, flexibility with setback requirements, or other incentives for projects outside of natural hazard areas.	1 2 $\boxed{3}$ 4 5
16. The bylaws prohibit development within, or filling of, wetlands, floodways, and floodplains.	1 2 $\boxed{3}$ 4 5

MASTER/COMPREHENSIVE PLAN	
SUBDIVISION REGULATIONS	
17. The subdivision regulations restrict the subdivision of land within or adjacent to natural hazard areas.	1 2 $\boxed{3}$ 4 5
18. The regulations provide for conservation subdivisions or cluster subdivisions to conserve environmental resources.	1 $\boxed{2}$ 3 4 5
19. The regulations allow density transfers where natural hazard areas exist.	1 $\boxed{2}$ 3 4 5
CAPITAL IMPROVEMENT PROGRAM AND INFRASTRUCTURE POLICIES	
20. The capital improvement program limits expenditures on projects that would encourage development and/or redevelopment in areas vulnerable to natural hazards.	$\boxed{1}$ 2 3 4 5
21. Infrastructure policies limit the extension of existing facilities and services that would encourage development in areas vulnerable to natural hazards.	$\boxed{1}$ 2 3 4 5
22. The capital improvements program provides funding for hazard mitigation projects identified in the hazard mitigation plan.	1 2 $\boxed{3}$ 4 5
OTHER	
23. Economic development and/or redevelopment strategies include provisions for mitigating natural hazards or otherwise enhancing social and economic resiliency to hazards.	1 2 $\boxed{3}$ 4 5
24. Local plans, policies, or regulations promote the use of green infrastructure, low impact development, or other nature-based solutions for managing stormwater and other climate hazards.	1 2 $\boxed{3}$ 4 5
25. The community considers and addresses potential impacts of its plans, policies, or regulations on Environmental Justice (EJ) neighborhoods or other socially vulnerable populations.	1 2 3 $\boxed{4}$ 5

Administrative and Technical Capabilities

Table 58 is based off Worksheet 4 from FEMA's Local Mitigation Planning Handbook. It was used by the HMPC to document and review the current administrative and technical capabilities of the Town. These include staff and their skills and tools that can be used for mitigation planning and to implement specific mitigation actions.

Table 58. Administrative and Technical Findings.

Administrative/Technical Resource	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
Local Boards/Committees		
Planning Board	Yes	Serves to help ensure that growth and land use changes within Dalton occur in an orderly and planned manner. The Board maintains the Dalton Zoning Bylaws so that they reflect current conditions and promote the goals of the Master Plan. The Planning Board is also responsible for regulating the division of land in Dalton and is the Special Permit Granting Authority (SPGA) for land use issues. The Planning Board is composed of five Dalton residents elected by the general public.
Conservation Commission	Yes	Serves as the local, legal authority to enforce the MA Wetlands Protection Act (WPA), which effectively protects not only wetlands, but other resource areas including floodplains and other lands subject to flooding. Any work proposed to be performed within 100 feet of a wetland, within 200 feet of a perennial stream, in the floodplain, or within 100 feet of other resource areas protected by the WPA must be reviewed by the Commission prior to activity. Review is also required for any work to be performed above 1500 feet elevation per the Town's Berkshire Scenic Mountain Act Regulations. The Commission consists of seven voting members appointed by the Select Board, plus associate members.
Capital Planning Committee	No	N/A (nothing separate from Finance Committee)
Climate Action Committee	Yes	Established in 2013 by the Dalton Select Board, the Green Dalton Committee's mission is to identify, investigate and recommend initiatives that protect the

Administrative/Technical Resource	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
		community's natural resources and enhance environmental health and sustainability in Dalton. The Committee consists of up to seven community members appointed by the Select Board. Effectively focused on the waste and energy side of combating climate change and driving sustainable community goals.
Other relevant boards/committees?	Yes	Board of Appeals, Dalton Redevelopment Authority, Finance Committee, Historical Commission, Open Space and Recreation Committee, Stormwater Commission
Staff		
Community Planner	Yes	The Town Planner works with various Town officials and the community to identify, plan, and carry out activities that advance the quality of life, preserve natural resources, and enhance the economic climate of Dalton. Duties also include working with the Planning Board on land use issues, including development and revisions of the Zoning Bylaws and Subdivision Regulations, and providing technical guidance on Site Plan and Special Permit applications before the Planning Board and the Zoning Board of Appeals. The Town Planner also works with the Dalton Development Industrial Commission and Dalton Redevelopment Authority to promote and develop the industrial resources of the community. The current Town Planner is new to the staff but is learning to use planning for hazard mitigation and has received lots of education recently regarding hazards and hazard mitigation. Also receiving guidance on administration of resources at disposal to be used for hazard mitigation.
Chief Building Official	Yes	The Building Inspector examines submitted applications and plans for new construction, renovations, and alterations, for compliance with all applicable building codes, statues, and zoning bylaws. Approves plans, safety and zoning requirements and issues building, demolition, and other permits. Also inspects new

Administrative/Technical Resource	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
		buildings and/or structures under construction or alteration for compliance with all applicable codes. Issues Certificates of Occupancy for new construction. Very effective in terms of enforcement and interdepartmental coordination for risk reduction.
Civil Engineer	No	N/A
Emergency Manager	Yes (PT)	The Town's Emergency Management Director (EMD) works with town departments and committees along with local businesses and agencies to coordinate the response to emergencies with State (MEMA) and Federal (FEMA) agencies as well as other communities within the area. Provides a prepared and capable emergency management program for the Town of Dalton through training, community education and preparedness by providing information and education to the general public, area emergency responders, and volunteers. The current EMD is certified under MEMA/FEMA and effectively coordinates through all other departments as needed. Currently serving in a part-time position authorized for 1-8 hours per week which is considered inadequate.
Floodplain Administrator	Yes	The Town's Building Inspector is currently designated to serve as the Floodplain Administrator as an auxiliary function, with support coming from the Conservation Commission and Town Planner. The Town's floodplain management capabilities are also supported by the Housatonic Valley Association, a tri-state nonprofit citizen's environmental group that works to protect the natural character and environmental health of the entire Housatonic Watershed.
Sustainability/Climate Coordinator	No	N/A
GIS Coordinator	No	No dedicated position, however, the Town Planner is seeking to fill this role as an auxiliary function once GIS software is secured (pending budget request).

Administrative/Technical Resource	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
Public Information Officer/Specialist	Yes	The Town Manager serves in this role as needed.
Technical		
Grant writing	Yes	Many Town staff write and assist with grant proposals, however there is no designated grant writer for the Town. Some support is also provided by the Berkshire Regional Planning Commission (BRPC).
GIS mapping and analysis	Not Yet	Currently in process, as the Town Planner has included GIS software licenses (ArcGIS Pro) in latest budget request that will move forward.
Hazard data and information	Yes	The Town maintains some information in addition to readily available sources found online, through MEMA, etc.
Maintenance programs to reduce risk *(e.g., tree trimming, drainage clearance)*	Yes	In addition to the routine maintenance of roadways, parks, and other public facilities/infrastructure the Town's Department of Public Works conducts preventative hazard measures such as tree trimming and storm draining cleaning on an annual basis.
Acquisition of land for open space, recreation, and other public use	Not Yet	Currently in process, as an Open Space and Recreation Committee was formed last year to decipher and prioritize possible improvements as outlined in the open space plan. This will include making recommendations to the Select Board and to Town Meeting, including sponsorship of warrant articles, regarding the acquisition and use of lands for conservation, recreation, and open space.
Warning systems/services *(e.g., Reverse 911, outdoor warning signs)*	Yes	The Town utilizes the CodeRed warning system, in addition to other communication methods (website, social media, etc.).
Mutual Aid Agreements	Yes	There are mutual aid agreements in place with surrounding fire and police departments.

Financial Capabilities

Table 59 is based off Worksheet 4 from FEMA's Local Mitigation Planning Handbook. It was used by the HMPC to identify and review the Town's eligibility and access to funding sources that can be used to support the implementation of hazard mitigation projects.

Table 59. Financial Findings.

Financial Tool/Source	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
General funds	Yes	The Town Manager and Select Board confer with department heads, boards, and committees to develop specific budget proposals which they feel will best meet the needs of the Town for the next fiscal year. Budgets are presented to the Finance Committee which then determines the recommendations to be presented at the Annual Town Meeting. Not typically used to fund hazard mitigation projects.
Capital Improvement Program (CIP) funding	No	Capital projects are funded as part of the annual budget process described above, which could include support for hazard mitigation measures if approved through Annual Town Meeting.
Special purpose taxes	No	N/A
Fees for water, sewer, gas, or electric services	Yes	The Dalton Water District oversees all water and operates as a private company. Fees for water are collected by them and separate from the town, and not used for hazard mitigation purposes.
Stormwater utility fee	No	N/A
Development impact fees	No	N/A
General obligation bonds and/or special purpose bonds	Yes	Considered an option but to date has not been used for hazard mitigation purposes.
FEMA Hazard Mitigation Assistance (HMA) funds	Yes	Available through MEMA and coordinated through the Town's EMD and Town Planner. FEMA's current HMA grant programs (BRIC, FMA, HMGP) remain a good source of external funding for implementing eligible and cost-effective mitigation projects.

Financial Tool/Source	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
HUD Community Development Block Grant (CDBG) funds	Yes	The Town is eligible for HUD CDBG and CDBG-DR funding that could be used to support the implementation of hazard mitigation actions.
Other federal funding programs		NOAA, EPA, USACE, and other federal agencies do make grant funding available for a variety of resilience-themed projects and initiatives that the Town may be eligible to pursue in the future. This includes both pre- and post-disaster funding programs that can be very effective in supporting the implementation of cost-effective hazard mitigation projects, many of which are described in FEMA's Mitigation Resource Guide.[45]
Massachusetts Municipal Vulnerability Preparedness (MVP) Action Grant funds	Yes	The MVP Action Grant offers financial resources to communities that are seeking to advance priority climate adaptation actions to address climate change impacts resulting from extreme weather, sea level rise, inland and coastal flooding, severe heat, and other climate impacts. As a designated "MVP Community" the Town is eligible to apply for grants on its own, or as part of a regional partnership of multiple municipalities provided that the lead applicant is MVP-designated.
Massachusetts Community Preservation Act (CPA) funds	No	Not adopted by the Town, but this could be a potential source of funding to support open space preservation and similar mitigation measures if Dalton becomes a CPA community in the future.
Other state funding programs	Yes	The Commonwealth makes a variety of funding programs available on a routine basis to support local risk reduction projects. Some of the most applicable opportunities for the Town include MVP Action Grants and other annual grant programs through EEA, such as the Culvert Replacement Municipal Assistance Grant Program. Others may include Community Compact grants, Green Communities grants, etc. depending on the scope and scale of specific projects.

[45] Mitigation Resource Guide. FEMA. March 2021.

Financial Tool/Source	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
Private or non-profit grants, loans, or funding	No	N/A

Education and Outreach Capabilities

Table 60 is based off Worksheet 4 from FEMA's Local Mitigation Planning Handbook. It was used by the HMPC to identify and review existing education and outreach programs that can be used or expanded upon to support local mitigation activities.

Table 60. Education and Outreach Findings.

Education & Outreach Program/Method	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
Community newsletter(s)	Not Yet	In progress – identified as high priority action item at strategic planning meeting.
Web-based / social media	Yes	The Town maintains an informative website with multiple links supporting education and outreach efforts, in addition to the use of social media (Facebook, etc.).
Public Access TV, radio, etc.	Yes	Dalton Community Television (DCTV)
Community gatherings, festivals, celebrations, or other events	Yes	Dalton Day, CRA 100th Celebration (town supported events), Volunteer Appreciation Brunch, many senior based activities through the Senior Center.
Hazard awareness campaigns *(e.g., Severe Weather Awareness Week)*	Yes	Hazard awareness is posted on the EM website along with the various town plans addressing hazards.
Organizations that represent, advocate for, or interact with underserved or vulnerable populations	Yes	Council on Aging, ADA committee. Also, in the near future Emergency Management will be compiling a database of persons with mobility issues so plans can be made to quickly accommodate them in the event of any sort of emergency.
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, etc.	Yes	Numerous local board and committees, in addition to regional groups such as the Housatonic Valley Association, Central Berkshire Regional Emergency Management Committee, etc. The Town is also working

Education & Outreach Program/Method	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
		on the creation of a formally trained Community Emergency Response Team (CERT).
Ongoing public education or information program *(e.g., responsible water use, fire safety, household preparedness)*	Yes	The Town's Board of Health Agent does outreach programs with the community and works to educate them whenever possible about health and safety concerns.
Natural disaster or safety-related school programs	yes	The Central Berkshire Regional School Safety Committee is chaired by the Police Chief and meets monthly with EMS, police, and school administrators to address safety concerns.
StormReady® certification	No	N/A
Firewise USA® certification	No	N/A
Public-private partnership initiatives addressing disaster-related issues	No	No formal partnerships although the Town routinely coordinates with the BRPC and other regional partners such as the Housatonic Valley Association on issues related to hazard risk reduction.

National Flood Insurance Program (NFIP) Participation and Compliance

C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))

The National Flood Insurance Program (NFIP) is a program created by the United States Congress in 1968. The NFIP has two purposes: to share the risk of flood losses through flood insurance and to reduce flood damages by restricting floodplain development. The program enables property owners in participating communities to purchase insurance protection, administered by the government, against losses from flooding, and requires flood insurance for all federally backed loans or lines of credit that are secured by existing buildings, manufactured homes, or buildings under construction, that are in FEMA-mapped special flood hazard areas in a community that participates in the NFIP. The availability of NFIP policy coverage is limited to communities that adopt adequate land use and control measures with effective enforcement provisions to reduce flood damages by restricting development in areas exposed to flooding. There are now more than 20,000 participating communities across the United States and its territories.

The Town of Dalton has participated in the NFIP since 1982. As summarized in Table 61, the HMPC used Worksheet 5 from FEMA's *Local Mitigation Planning Handbook* to collect information regarding the Town's participation in and compliance with the NFIP. This worksheet, in addition to a separate *NFIP Survey* for the Town Planner and Conservation Commission, helped the HMPC to identify areas for improvement and other ideas that could be potential mitigation actions.

Table 61. NFIP Participation and Compliance Findings.

NFIP Topic	Source of Information	Comments
Insurance Summary		
How many NFIP policies are in the community? What is the total premium and coverage?	FEMA NFIP Services, Flood Insurance Data and Analytics; State NFIP Coordinator	As of December 31, 2023, a total of 4 NFIP policies are in force. The total premium is $5,083 for a total of $775,000 in coverage. The average premium paid per policy is $1,271.
How many claims have been paid in the community? What is the total amount of paid claims? How many of the claims were for substantial damage?	FEMA NFIP Services, Flood Insurance Data and Analytics (HUDEX report)	There has been a total of 11 claims paid since 1982, totaling $46,553 in losses. The average claim amount paid is $4,232. There have been no claims paid for substantial damage.
How many structures are exposed to flood risk within the community?	GIS analysis (FEMA FIRMs + building footprint data)	It is estimated that 85 structures are at risk to the 1-percent annual chance flood (exposed to high risk of flooding).
Are there any repetitive or severe repetitive loss structures in the community?	MEMA / FEMA	Yes, there are 2 repetitive loss properties in Dalton that have experienced a total of 7 insured losses. See Chapter 4 for more details.
Describe any areas of flood risk with limited NFIP policy coverage	HMPC	No address-specific data has been made available by FEMA, but it is generally assumed that owners of property located in special flood hazard areas are underinsured when it comes to flood insurance coverage (based on only 4 current policies under the NFIP in comparison to 85 structures estimated to be exposed to high flood risk).

NFIP Topic	Source of Information	Comments
Staff Resources		
Who is responsible for floodplain management in the community? Do they serve any roles other than Community Floodplain Administrator (FPA)?	Town Planner	The Town's Building Inspector is currently designated to serve as the Floodplain Administrator as an auxiliary function, with support coming from the Conservation Commission and Town Planner.
Is the Community FPA or NFIP Coordinator a Certified Floodplain Manager?	Town Planner	No
Is floodplain management an auxiliary function?	Town Planner	Yes, for the Building Inspector.
Explain NFIP administration services (e.g., permit review, GIS, inspections, engineering capability).	Town Planner, Conservation Commission	All developments in the Town's Floodplain District, including structural and non-structural activities, are reviewed for compliance with the Town's Zoning Bylaw and State Building Code. The Town complies with the NFIP by enforcing these floodplain regulations and providing information to property owners and builders regarding floodplains and building requirements. The Town offers FIRMs and other relevant information for those interested in learning more about flood risk, mitigation options, and the purchase of flood insurance.
What are the barriers to running an effective NFIP program in the community, if any?	Town Planner, Conservation Commission	No major impediments or compliance issues. One of the biggest problems is pre-FIRM structures, and there can be a lack of effective communication channels to provide more education on NFIP topics including but not limited to the promotion of flood insurance.
Compliance History		
Is the community in good standing with the NFIP?	Town Planner, State NFIP Coordinator, FEMA	Yes

NFIP Topic	Source of Information	Comments
Are there any outstanding compliance issues (i.e., current violations)?	Town Planner	No
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	State NFIP Coordinator, FEMA (CIS)	Last CAC was 9/30/2009 Last CAV is unknown
Is a CAV or CAC scheduled or needed?	Town Planner	No
Regulation		
When did the community enter the NFIP?	State NFIP Coordinator, FEMA (CIS)	7/5/1982 (Regular Entry) 11/18/1974 (Emergency Entry)
Are the FIRMs digital or paper?	Town Planner	Digital
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Town Planner	Floodplain regulations are administered through the enforcement of the Town's Zoning Bylaws which follow all current FEMA/NFIP minimum requirements. These regulations will be routinely updated as necessary to maintain compliance with existing NFIP and State minimum standards for floodplain management. As described earlier in this chapter, higher regulatory standards are also met through the Town's enforcement of the Massachusetts State Building Code (CMR 780). Other floodplain development requirements are included in the Town's administration of the Commonwealth's Wetlands Protection Act Regulations (310 CMR 10).
How does the community enforce local floodplain regulations and monitor compliance. Explain the permitting process.	Town Planner, Conservation Commission	Within the Floodplain District no structure or building shall be erected, constructed, substantially improved, or otherwise created or moved; no earth or other materials dumped, filled, excavated, or transferred, unless a special permit is granted by the Board of Appeals.

NFIP Topic	Source of Information	Comments
		Development in floodplain is discouraged and can only be approved via Special Permit.
Community Rating System (CRS)		
Does the community participate in CRS? If so, what is the community's CRS Class?	Town Planner	No
What categories and activities provide CRS points and how can the class be improved?	N/A	N/A
Does the plan include CRS planning requirements	Yes	Yes, many of the planning requirements under CRS Activity 510 are included in the plan update.

Table 62 provides some additional information in response to the updated requirements included in FEMA's 2022 Local Mitigation Planning Policy Guide (Element C2-a):[46]

Table 62. Additional NFIP Participation and Compliance Information.

Required Information	Response
Adoption of NFIP minimum floodplain management criteria via local regulation.	Adopted under the Town's Zoning Bylaw (Chapter 350) in Article 9: Floodplain Districts.
Adoption of the latest effective Flood Insurance Rate Map (FIRM), if applicable.	Adopted under the Town's Zoning Bylaw at (Chapter 350) in Article 9: Floodplain Districts, Part B. Past B establishes the general boundaries of the Floodplain District to include all special flood hazard areas within the Town of Dalton as designated on the Berkshire County Flood Insurance Rate Map (FIRM) dated July 5, 1982.
Implementation and enforcement of local floodplain management regulations to regulate and permit development in SFHAs.	See explanation of the Town's permitting process provided in Table 61.

[46] Local Mitigation Planning Policy Guide. FEMA. April 2022. P. 26.

Required Information	Response
Appointment of a designee or agency to implement the addressed commitments and requirements of the NFIP.	Currently the Town's Building Inspector is tasked with implementing the commitments and requirements of the NFIP, making sure Dalton remains in compliance with all relevant codes and standards for floodplain management.
Description of how participants implement the substantial improvement/substantial damage provisions of their floodplain management regulations after an event.	The Town implements the SI/SD provisions of its floodplain management regulations as required per the NFIP (CFR Title 44, Parts 59 through 65) and Massachusetts State Building Code (780 CMR). The Town will also coordinate with State Flood Hazard Management Program staff to assure that proper practices are followed and that a post-disaster plan will be in place to implement all SI/SD provisions.

Summary and Conclusions

The Town of Dalton is a transition community between the urban and rural portions of Berkshire County with a relatively moderate degree of capabilities and resources to support the implementation of hazard mitigation actions. This chapter provides documentation on the existing local authorities, policies, programs, and resources to support hazard mitigation.

In general, the Town is well served by its planning and regulatory capabilities. The Town benefits from the adoption and routine updating of existing plans that align with hazard risk reduction and climate adaptation, including the 2022 Dalton Green Infrastructure Plan, a recently updated (2021) Open Space and Recreation Plan, and the 2019 Municipal Vulnerability Preparedness (MVP) plan focused on climate hazard resilience. The Town is still implementing its 2016 Master Plan but is already considering methods to integrate resilience-themed content into the next update of that comprehensive planning document, leveraging this Hazard Mitigation Plan in addition to the other relevant plans listed above. The Town has also adopted numerous regulations and procedures that reduce natural hazard risks, such as the Town's recently updated stormwater regulations and other local rules under the zoning bylaw, such as the Dalton Floodplain District which limits and conditions building in high-risk flood zones. In recent years the Town has been quite effective at installing green infrastructure and other stormwater management best practices to minimize flooding, erosion, and other problems associated with new development and increased impervious surfaces.

The Town is also well served by its existing departmental staff, including full-time employees to conduct building and fire code inspections and enforcement, and having recently hired a Town Planner to aid land use permitting boards in reviewing and conditioning permits. The Town also benefits from many part-time or volunteer members of its many local boards and committees. This includes the Town's unique "Dalton Green Committee," established in 2013 to support initiatives that protect the community's natural resources and enhance environmental health and sustainability in the community. The Town does not have a certified floodplain administrator, but development within floodplain areas is overseen through strict state law and local bylaws, combined with knowledgeable staff from various departments to inspect properties, review permit applications, and enforce those regulations. The Town's floodplain management capabilities are also supported by the Housatonic Valley Association, a tri-state nonprofit citizen's environmental group that works to protect the natural character and environmental health of the entire Housatonic Watershed. The Town does not have the demand or resources to maintain an engineer on staff. The Dalton EMD remains very capable but increased hours, funding and training has been identified as an ongoing need for the Town. Technical hazard mitigation data assessment, such as GIS modeling and mapping, will likely continue to be conducted when needed by the Berkshire Regional Planning Commission (BRPC).

The Town's financial capabilities to implement hazard mitigation projects are somewhat limited due to its relatively small tax base to generate revenue, and the annual town budgeting and capital planning process has not typically funded these types of efforts. In recent years the Town has undertaken an inventory of key infrastructure condition and needs but a more formal capital improvement program/process could help bolster the Town's financial capabilities. Staff from various Town departments do pursue external grants for their own programs and projects, and the Town also receives some grant writing support from the BRPC and other partners. However, competitive grants that require a local cash match may not be as accessible to the Town, especially for those larger and more costly capital projects. The Town's capabilities to implement or encourage low-cost mitigation measures across the community are aided by its dedicated staff and volunteers noted above, in addition to several effective methods for conducting local outreach and educational activities with community residents and other stakeholders.

While the Town of Dalton has a moderate degree of capabilities and resources to support hazard mitigation activities, it can expand and improve on the capabilities described in this chapter. Some general and specific opportunities to address existing gaps or limitations in local capabilities to reduce risk have been identified for each capability type and are further described below. Each of these opportunities were then considered by the HMPC during the plan update process as potential new mitigation actions to be included in the Mitigation Strategy.

Opportunities to Expand and Improve on Capabilities to Reduce Risk

Planning and Regulatory Capabilities

- Update Master Plan with resilience considerations and solutions that build off this Hazard Mitigation Plan and other key plans, including the Dalton Green Infrastructure Plan, Open Space and Recreation Plan, and MVP plan.

- Review and update the Town's Floodplain District regulations (Zoning Bylaw, Chapter 350, Article XV) to be in alignment with the State's Model Floodplain Bylaw and other recommended best practices for floodplain management.
- Continue to routinely review and update the Town's Stormwater Regulations based on best practices to better account for projected future conditions, including increased heavy precipitation events, and to continue promoting green infrastructure and other nature-based solutions for flood risk management.
- Review and consider amending other local regulations to reduce impervious surface coverage and promote green infrastructure based on BRPC's review and recommendations provided in Dalton's Green Infrastructure Plan (see page 29 and Appendix E).

Administrative and Technical Capabilities

- Build staff capacity for mitigation activities through increased training and professional development opportunities that are tailored to specific hazard issues in Dalton.
- Build and maintain in-house GIS capabilities to support hazard mitigation and other community planning/project initiatives.
- Leverage Green Dalton Committee in support of climate adaptation initiatives (expanding beyond climate change mitigation activities).
- Increase hours/funding for EMD position.
- Develop system/process for maintaining hazard impact/loss data.

Financial Capabilities

- Develop and integrate hazard mitigation/resilience criteria into the Town's budgeting and capital project planning process.
- Develop a more comprehensive Capital Improvement Program (CIP).
- Explore adoption of MA Community Preservation Act (CPA).
- Prioritize and dedicate resources for pursuing recurring grant funding opportunities to mitigate hazards (FEMA, EEA, etc.).
- Continue to coordinate with BRPC, neighboring communities, non-profits organizations (such as the Housatonic Valley Association, and others on regional risk reduction projects.

Education and Outreach Capabilities

- Leverage the Town's website and community events to promote risk awareness, preparedness, and low-cost/DIY mitigation activities.
- Enhance methods of mass communication with residents through a Town newsletter, social media, and other mediums.

- Identify and seek to address any unmet needs related to targeted outreach/education for the community's more vulnerable populations.
- Expand the EMD and Board of Health's ongoing public education programs to address natural/climate hazards and mitigation topics.

Possible New Actions Related to NFIP Participation and Compliance

- Promote the availability of flood insurance to all property owners and renters, especially those in areas of high to moderate flood risk.
- Use FEMA Elevation Certificates for all floodplain development.
- Use floodplain development review form/checklist to document the review of all activities in the floodplain during the permitting process.
- Develop a Post-Disaster Substantial Damage Plan.
- Review the State's *Local Floodplain Action Guide* (forthcoming in 2024) for possible zoning or administrative improvements.

Chapter 6. Mitigation Strategy

The hazard mitigation strategy is the culmination of work presented in the planning area profile, risk assessment and capability assessment. It is also the result of multiple meetings and thorough public outreach. The work of the Hazard Mitigation Planning Committee (HMPC) was essential in developing the mitigation goals and actions included in this chapter. As described in Chapter 3 (Planning Process), the HMPC worked in a consistent, coordinated manner to identify and prioritize the goals and mitigation actions for this Plan.

Mitigation Goals

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

***GOALS** are broad, long-term policy and vision statements that explain what is to be achieved by implementing the mitigation strategy.*

Mitigation goals represent broad statements that are achieved through the implementation of more specific mitigation actions. These actions include both hazard mitigation policies (such as land use regulations) and hazard mitigation projects (such as structure or infrastructure projects). To develop goals for this Town of Dalton, MA Hazard Mitigation Plan the HMPC reviewed the Dalton Multi-Hazard Mitigation Plan Update 2018 goal statements, the 2019 Municipal Vulnerability Preparedness (MVP) Summary of Findings, goal statements, and the goals of the State's Hazard Mitigation and Climate Adaptation Plan (SHMCAP) 2023.

The HMPC developed the goal statements in the figure below to represent their vision and priorities for the Town of Dalton in terms of hazard mitigation. All the hazards identified in this plan, while not named specifically in the goals, are implied and many are named specifically in the mitigation actions. When achieved by way of implementing the mitigation actions identified in this plan, the Town will mitigate risk posed by all identified hazards.

SAVE LIVES and PROPERTY

- Reduce risk to people and property from natural hazards and climate change.

Infrastructure

- Mitigate risk to critical facilities and infrastructure from natural hazards and climate change.

Capacity

- Expand the Town's capacity to mitigate risk by adopting a culture of hazard mitigation through regulations, planning, and regional collaboration.

Natural Resources

- Implement actions that minimize risk from climate change and natural hazards to preserve or restore the functions of natural systems.

Education

- Educate all stakeholders about the value of hazard mitigation and how to implement it in their work, businesses, and homes.

Figure 25. Goal Statements.

The Dalton Multi-Hazard Mitigation Plan Update 2018 included 26 mitigation actions. For the purposes of this plan, all the actions were reviewed for their status and relevance. The following table shows the previous plan's 26 mitigation actions and the status of each. In addition to their status, if an action was moved forward to this plan the final column (Updated Action Title) indicates the title of the new action.

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

Table 63. Status of Mitigation Actions from2018.

Action #	Action Description	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title (if applicable)
1	Perform engineering study of Walker Brook as it flows underground through town and implement findings.	Completed + To Be Continued	Initial Engineering Study complete.	YES - updated/revised description provided at right, if applicable	Mitigate flood risk to the Walker Brook area.
2	Perform engineering study of Kirchner Road bridge to determine solutions to alleviate flooding.	Cancelled	This bridge is not really a source of a flooding issue and wasn't addressed.	NO - explanation provided at left	
3	Perform engineering study of Orchard Road bridge to determine solutions to alleviate flooding.	Cancelled	This bridge is not really a source of a flooding issue and wasn't addressed.	NO - explanation provided at left	
4	Implement beaver control solutions.	Partially Completed / In Progress	Ongoing process monitored by the town DPW. Only real issue is Chamberlain Park which is monitored and handled on a case-by-case basis	NO - explanation provided at left	
5	Continue to utilize Stormwater Management Committee to	Completed	continuing and ongoing process through meetings	YES - updated/revised description provided at right, if applicable	Continue to utilize Stormwater Management Committee to reduce stormwater runoff.

Action #	Action Description	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title (if applicable)
	reduce stormwater runoff.				Remind residents that there is a stormwater hotline call in number for potential pollution discharges; could be used to also report culverts or storm drains clogged or not properly functioning.
6	Work with the City of Pittsfield to ensure Cleveland Reservoir Dam is in good condition.	Completed	Pittsfield Dam Inundation Plan and Study is up to date.	NO - explanation provided at left	
7	Work with Dalton Fire District to ensure Windsor Dam is in good condition.	Completed	Dam is brand new; inspections are ongoing process with updates from Dalton Fire District	NO - explanation provided at left	
8	Reduce excess dry timber in the surrounding forest lands.	Partially Completed / In Progress	Town has a 2023 Forestry Management Plan, but it does not actively address wildfire risk mitigation. The Pines is a Town-owned forest with a high wildland-urban interface. Majority of forest land in the Town is owned by the State.	YES - updated/revised description provided at right, if applicable	Reduce excess dry timber in the Pines to reduce wildfire risk.

Action #	Action Description	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title (if applicable)
9	Identify historic structures, businesses and critical facilities located in hazard prone areas, including floodplains and dam failure inundation areas.	Partially Completed / In Progress	Inundation studies of the town dams have been completed but effect on infrastructure has not been identified	YES - updated/revised description provided at right, if applicable	Develop a study to Identify historic structures, businesses and critical facilities located in hazard prone areas, including floodplains and dam failure inundation areas.
10	Evaluate sedimentation and loss of storage capacity at Center Pond and potential for dredging or other action.	Cancelled	Center Pond is privately owned by Crane and Co and would be their responsibility	YES - updated/revised description provided at right, if applicable	Identify the best way to mitigate risk to the Dalton Housing Authority and the main housing unit from potential flooding.
11	Consider structural options to protect Pomeroy Manor housing complex from flooding.	Delayed	no action has been taken on any structural options	YES - updated/revised description provided at right, if applicable	Identify the best way to mitigate risk to the Dalton Housing Authority and the main housing unit from potential flooding.
12	Evaluate Craneville Elem, School for possible primary shelter; possible feasibility/cost	Cancelled	A preliminary study showed the cost to be $50-$60k. Too costly for the town at the time.	YES - updated/revised description provided at right, if applicable	Evaluate Craneville Elementary School as a possible primary shelter; conduct a feasibility/cost study

Action #	Action Description	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title (if applicable)
	study; possible wiring of building for portable generator.				that includes wiring of building for a generator.
13	Draft formal MOU with school district.	Completed	Completed	NO - explanation provided at left	
14	Remind residents that there is a stormwater hotline call in number for potential pollution discharges; could be used to also report culverts or storm drains clogged or not properly functioning.	Completed	Number is posted on website and made available to residents	YES - updated/revised description provided at right, if applicable	Continue to utilize Stormwater Management Committee to reduce stormwater runoff. Remind residents that there is a stormwater hotline call in number for potential pollution discharges; could be used to also report culverts or storm drains clogged or not properly functioning.
15	Retrofit Senior Center with backup power.	Partially Completed / In Progress	Quote requested thru local electrical contractor. Awaiting results	YES - updated/revised description provided at right, if applicable	Add a generator to the Senior Center so it can function as a heating and cooling center.
16	Coordinate capital improvement plans between town and water district.	Partially Completed / In Progress	Ongoing process based on the current 20 year improvement plan.	NO - explanation provided at left	

Action #	Action Description	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title (if applicable)
17	Conduct evacuation exercise with Pomeroy Manor residents.	Delayed	Has not been implemented as of this date	YES - updated/revised description provided at right, if applicable	Conduct evacuation exercise with Pomeroy Manor residents.
18	Conduct water conservation program to raise awareness of importance of water supply and reduce water demand; promote MassSave for free water conservation measures.	Partially Completed / In Progress	Annual statistical report includes information provided to residents for water conservation measures	YES - updated/revised description provided at right, if applicable	Utilize the annual statistical water report to promote the water conservation program and to raise awareness of the importance of reducing demand on water and protecting the water supply.
19	Incorporate floodproofing as part of the redesigning of Wahconah High School; consider flood retention on school grounds.	Completed	new school was designed and completed with water mitigation/flood deterrence in place	NO - explanation provided at left	
20	Assess bridges for condition of both bridge structure and	Completed + To Be Continued	MassDOT performs yearly inspections with results provided to the town for consultation	YES - updated/revised description provided at right, if applicable	Establish communication with MassDOT on assessment of bridges

Action #	Action Description	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title (if applicable)
	infrastructure attached.				for condition of both bridge structure and infrastructure attached.
21	Document all town costs associated with response to flood events, including staff time, materials, equipment value and fuel.	Completed + To Be Continued	Town costs are continually monitored, and initial damage assessments are submitted to MEMA as applicable	NO - explanation provided at left	
22	Review town stormwater bylaw for potential to strengthen requirements for on-site retention of stormwater runoff.	Completed	review completed by Berkshire Regional Planning who consults with town for potential changes	NO - explanation provided at left	
23	Increase enrollment in Code Red.	Completed + To Be Continued	Ongoing process of continual updates and system tests	YES - updated/revised description provided at right, if applicable	Increase enrollment and awareness in Code Red.
24	Update online ArcGIS to include all critical facilities and hazard areas of concern; train key staff.	Completed + To Be Continued	completed with the 2022 COOP plan but will need to be updated	YES - updated/revised description provided at right, if applicable	Update online ArcGIS to include all critical facilities and hazard areas of concern; train key staff.

Action #	Action Description	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title (if applicable)
25	Coordinate with City of Pittsfield for emergency response plans.	Completed	Consulted with Pittsfield EMD on completion of 2023 Dalton Evacuation Plan	NO - explanation provided at left	
26	Promote MassSave and other home improvement programs to tighten building envelopes.	Cancelled	Private programs run by Eversource and Berkshire Gas and not applicable to Town	NO - explanation provided at left	

The 2019 Municipal Vulnerability Preparedness (MVP) Summary of Findings includes 117 recommendations. The MVP is part of a Massachusetts state-wide initiative through the Executive Office of Energy and Environmental Affairs (EEA) to provide support to cities and towns to plan for resiliency and implement climate change adaptation actions. The recommendations identified in Dalton's MVP were reviewed and considered when developing mitigation actions for this plan update. Below is the list of MVP Recommendations with notes regarding their status and relevance in the Hazard Mitigation Plan.

Table 64. Status comments on MVP recommendations.

MVP Recommendation	Notes / Comments
Top Recommendations to Improve Resilience	
1. Mitigate flooding at Walker Brook with daylighting and integrating green infrastructure.	RPF has been submitted to the state and are awaiting bids for action.
2. Replace aging stormwater and sewer infrastructure throughout town.	The Town constantly monitors and inspects both storm water and sewer systems. Repairs are made and systems upgraded as needed based on time and budget constraints.
3. Address the flooding that impacts Pomeroy Manor, a public housing facility.	The pond is private and owned by Crane and Company, and current options are under legal review.
4. Initiate public education on emergency preparedness for the whole community.	Implemented a new emergency management web page with updated information.
Highest Priority	
Conduct a Hydrology and Hydraulics (H&H) study for Walker Brook.	Initial engineering has been completed and RPF has been submitted to the state.
Consider alternative routes such as the one privately-owned route that is fenced off but could be accessed.	Too vague to address.
Implement Drills to simulate the closure of the road due address the vulnerability of Dalton only having 1 evacuation point to the west on Route 9/ Housatonic St.	Town passed a new evacuation plan detailing routes and action by residents.
Increase capacity of the aging stormwater systems with green infrastructure (rain gardens), Increase infiltration for point source pollution with green infrastructure.	The Town constantly monitors and inspects both storm water and sewer systems. Repairs are made and systems upgraded as needed based on time and budget constraints.
Review zoning to reduce runoff.	
Sewer system evaluation and repair, retrofitting, and replacement implementation.	The Town constantly monitors and inspects both storm water and sewer systems. Repairs

MVP Recommendation	Notes / Comments
	are made and systems upgraded as needed based on time and budget constraints.
Plan and time sewer upgrade with road projects.	The Town constantly monitors and inspects both storm water and sewer systems. Repairs are made and systems upgraded as needed based on time and budget constraints.
Create green infrastructure requirements for new or renovated municipal and private development - Town should be leader and take initiative, pushstate on green infrastructure options for regular projects like sidewalks, etc.	Town follows state and federal guidelines regarding the incorporation of "green" requirements and suggestions into public and private projects.
Design competition for the area where the school was.	The Town has struggled with this property and though initially voted on by the Town to sell the property for low income housing, this plan has been put off for possible reconsideration.
Naturalize and daylight Walker Brook.	Initial engineering design has been completed and "green" implemented where applicable.
Plant slopes, deep rooted plants. Zoning for runoff/ cascading discharge similar to a waterfall	
Plan and implement I&I study to address the Stormwater infiltration into sewer system	The Town constantly monitors and inspects both storm water and sewer systems. Repairs are made and systems upgraded as needed based on time and budget constraints.
FEMA Hydrologic Study w "Green" solutions. Replace/enlarge culverts and stream crossing structures.	The Town constantly monitors and inspects both storm water and sewer systems. Repairs are made and systems upgraded as needed based on time and budget constraints.
Increase public awareness of flooding.	Addressed on the emergency management website with information and evacuation/inundation plans.
Dredge Center Pond to protect Pomeroy Manor.	The pond is private and owned by Crane and Company, and current options are under legal review.
Provide cooling centers to protect the Elderly population and aging population in Central Dalton, including Pomeroy Manor.	Seeking alternate power for the Senior Center for this purpose.
Natural infrastructure for infiltration, permeable pavement, and rain gardens H+H study to address	Initial engineering design has been completed and "green" implemented where applicable.

MVP Recommendation	Notes / Comments
flooding on Field Street extension where the Senior Center is located.	
Integrate flood proofing into Wahconah High design i.e., Elevation based on +2ft BFE	Done.
Provide climate change education at schools.	Done sporadically in science classes.
Minimize tree removal to reduce cooling costs.	
Encourage self-identification for those who use life supporting equipment.	Eversource provides this and maintains a priority list in the event of power loss.
Have generators ready at shelters.	Seeking alternate power for the Senior Center for this purpose.
Explore micro grids for the Town to prevent the entire region from losing power at once.	Eversource has implemented other backup systems.
Bury power lines to mitigate against ice/snow or wind damage.	Eversource is a private company, and it would be incumbent on them to initialize.
Evaluate potential for power generation at dams such as at Wahconah Falls as well as wind and solar opportunities.	
Evaluate the potential to use methane from Hinsdale Granville Cows as an energy source.	
Encourage alternatives to air conditioners such as passive house design.	This is unclear in terms of the role of the Town.
Explore “Pass the Peak" app or similar user-friendly energy use monitoring tools	
Evaluate use of air source heat pumps.	Unclear if this is for Town buildings or an education suggestion. These units would be ineffective in a severe cold. The Town utilizes some heat pumps in various town buildings.
Plan and require solar where feasible at the landfill behind High Street, at the old substation, on all new buildings.	
Public education on energy efficiency and alternatives (i.e., brochures with electric bills).	Energy evaluations are sent out by Eversource and other energy generators such as Berkshire Gas.
Right size culverts using stream crossing standards "plus" for resilience and animal passage.	The Town constantly monitors and inspects both storm water and sewer systems. Repairs are made and systems upgraded as needed based on time and budget constraints.
Replace sewer infrastructure where needed.	The Town constantly monitors and inspects both storm water and sewer systems. Repairs

MVP Recommendation	Notes / Comments
	are made and systems upgraded as needed based on time and budget constraints.
Assess pipelines carrying gas to prevent property damage.	Berkshire Gas and other providers have an intensive monitoring and inspection systems in place.
Maintain culverts.	The Town constantly monitors and inspects both storm water and sewer systems. Repairs are made and systems upgraded as needed based on time and budget constraints.
Emergency Preparedness	Town emergency management website has been updated to include Emergency preparedness guidelines.
Work with River Run on emergency planning and evacuation planning.	Working on an addendum to the evacuation plan and consulting with River Run in development.
Conduct drills with the fire department and provide emergency kits to tenants in the floodplain.	Fire Department Drills are ongoing. Emergency kits have not been explored.
Annual Outreach and updates on MVP progress to keep the community involved.	That has not happened.
Include sign up tables for CodeRED at town events.	This has been done and continues to be a part of community events.
Coordinate between the Police Department, Fire Department, Council on Aging, Eversource, telephone company, and Dalton Housing Authority to be prepared for addressing the needs of the medically vulnerable in an emergency.	An ongoing process that has been incorporated into the COOP, CEMP, and evacuation plan. Discussions and updates are had and made on a routine basis.
Use online resources to obtain bi-lingual materials on emergency preparedness, Code Red, and other relevant information to prepare for increased hazardous conditions.	That has not happened.
Bolster the School Reunification Plan working with Stationary Factory by organizing exercises and drills. Purchase additional with more supplies needed for reunification i.e.: AED machine, medical supplies, basic food and water.	Have consulted annual drills and real life events to hone the reunification plans. Need to incorporate traffic plan.
Evaluate the need to purchase a trailer for life support and other shelter equipment.	The town does not have an adequate facility for overnight accommodations. Temporary shelter locations have been established in anticipation of transport to the regional facility at Berkshire Community College.

MVP Recommendation	Notes / Comments
Install 110 generators compatible hookups for the buildings utilized for sheltering.	Seeking alternate power for the Senior Center for this purpose.
Ban neonicotinoids in town and on private land, promote planting of beneficial plants and shrubs for bees, and provide education on the use of insecticides and on colony collapse.	That has not happened.
Promote permaculture and sustainable solutions, evaluate use in public spaces.	That has not happened.
Implement agricultural education including chickens.	That has not happened.
Moderate Priority	
Build retention with bioswales and rain gardens and use the garden for educational opportunities.	That has not happened.
Implement tree planting projects.	
Perform hydraulic study.	This is too vague and does not define what area to study.
Consider natural solutions aside from piping.	
Consider permeable pavements for parking lot for Walker Brook to address flooding the Senior Center and River Run.	
Cleveland Brook Reservoir dam should be evaluated and repairs/replacement as needed.	The dam is evaluated according to state guidelines and a report is generated by the City of Pittsfield.
Engineering assessment needed for South Street undersized culverts followed by culvert replacement.	The Town constantly monitors and inspects both storm water and sewer systems. Repairs are made and systems upgraded as needed based on time and budget constraints.
Manage trees along river to prevent debris and preserve the Main Street/Depot Street dam.	Unknown.
Reevaluate how useful dams are along the river.	
Replace undersized culverts for resilience and stream continuity.	The Town constantly monitors and inspects both storm water and sewer systems. Repairs are made and systems upgraded as needed based on time and budget constraints.
Incorporate pervious pavement, rain gardens, retention basins to keep water out of the system.	
Plan a town wide shelter.	Currently working on developing a plan. Alternative power is the main issue as only one building capable of shelter with alternate power is in a flood zone.

MVP Recommendation	Notes / Comments
Support existing evacuation plan for the schools to gather at the Stationary Factory.	Done.
Elevate generators.	Only the Town hall and Wahconah School have generators. Both are elevated based on engineering data.
Drill CodeRED quarterly. Educate members of the community about signing up for codeRED, potentially through regular mailings (such as tax assessments).	Tests have been annually conducted and evaluated for potential upgrades of system.
Distribute preparedness kits, develop educational mailings, information sheets, and town emergency information such as sheltering/community outreach programs.	Information is currently on the Town website and CodeRed is used on an as needed basis.
Use CodeRED to get people to cooling centers and to check on neighbors.	CodeRed, social media, and website are all used for this purpose.
Discuss emergency access with Berkshire Money Management and Crane to increase evacuation and access routes.	That has not happened.
Have police update contact information of seniors.	This has been done and is updated regularly.
Develop fire prevention and response plans that involve mapping, checking, and maintaining access roads regularly and conducting controlled burns to minimize potential kindling or fuel.	
More trail maintenance to address ticks.	Town has appointed an Open Space & Recreation Committee who are addressing trail issues
Identify trees affected by or vulnerable to emerald ash borer due to infestation in neighboring trees and utilize wood from trees, such as for biomass fuel.	
Implement plan and tree planting program with native and resilient trees such as willows, maples, oaks, birch and hickory. The plan should include planting saplings near old trees.	
Develop Forest Stewardship plans.	
Implement public education on moving wood.	That has not happened.
Prevent standing water in or around buildings to prevent mosquito larvae habitat.	

MVP Recommendation	Notes / Comments
Provide education on preventing and detecting West Nile, Lyme's and other tick or mosquito borne diseases.	
Allow and promote chickens in residential areas to combat the tick population.	
Promote bat boxes; building them through school programs and installing them on downtown and public buildings to address mosquito population.	
Encourage young hunters in order to maintain deer population.	Hunting is a generational sport that many do not have the time or finances to invest in. The traditions are not being passed down.
Plan and implement nature-based infrastructure that provide habitat ecosystem services.	
Plant milkweed in bioswales for monarch habitat.	
Work with regulatory authorities to develop a plan to deal with sedimentation in Center Pond.	The pond is private and owned by Crane and Company, and current options are under legal review.
Assess and create a plan for beaver control and invasive plant impacts on recreation areas.	
Consider Conservation overlay or other protective zoning to provide a green corridor through town.	
Determine how water-resistant gas station tanks are, including the height of vents.	
Determine which homes in the floodplain contain oil tanks.	
Lower Priority	
Reestablish and build permanent water crossings to access forest for management and wildfire response.	
Continue maintenance program for new Windsor Reservoir dam.	The dam is inspected according to regulations and reports are maintained by the Fire district.
Address overflow of dam at Center Pond.	The pond is private and owned by Crane and Company, and current options are under legal review.
Acquire dam status list and ensure Pittsfield list has "Good" ratings for condition.	
Move residents from Pomeroy Manor	

MVP Recommendation	Notes / Comments
Dredge Center Pond	The pond is private and owned by Crane and Company, and current options are under legal review.
Conduct a Hydrology and Hydraulics (H&H) study to find a solution to flooding at Orchard Road	
Ensure CSX tracks are maintained and resilient.	CSX conducts track inspections daily.
Engineering study at Center Pond, including dredging and stormwater reduction	The pond is private and owned by Crane and Company, and current options are under legal review.
Restrict and mitigate golf course fertilizers that cause algae growth.	
Build relationship with Eversource; and improve communications to address vulnerabilities in the electric grid.	Eversource provides contact information through their public information office.
Map septic system locations & oil storage tanks.	Dalton Water District maintains a septic system list.
Bury the power and communication cables.	That has not happened.
Install boosters and Fios to increase dependability for access and emergencies.	
Work with MEMA to be better prepared with water and food for emergency situations.	
Continue to publicize CodeRED.	In process.
Continue to work with the nursing homes and assisted living facilities to prepare for emergencies.	In process.
In order to stop the spread of zebra mussels and other aquatic invasive species, provide Information about boat cleaning requirements at any boat launch site, possibly require certificates of boat cleaning. Educate people on why and how fishing gear should be cleaned.	
Plant and protect climate resilient trees.	
In order to avoid a complete loss of trees due to a monoculture being targeted by a pest, require biodiversity in tree planting.	
Work with the state to develop forest management plans.	
Proactively remove old or diseased street trees and plant new trees.	Done on an as needed basis.

MVP Recommendation	Notes / Comments
Engage with CSX formally on hazardous materials transport and bank erosion near the tracks.	Emergency management has discussed hazmat transport and response with CSX and we have conducted tabletop exercises regarding hazmat incidents.
Provide public education on invasive and the impact on tree cover via community cable, newspaper, and flyers.	That has not happened.
Provide public education on ticks and mosquitos via community cable, newspaper, and flyers.	That has not happened.
Prevent growth of mold and mildew in public housing where there is a high-water table with regular inspection and public reports. In the long term solve the flooding issues based on a H&H study findings.	
Address erosion issues, including that caused by ATV use and large-scale landslides through mapping and problem area identification working with HVA, BNRC, Town, Farmers and other landowners.	
Coordinate with relevant agencies - USACE, Mass Wildlife, DEP and Con Comm - to address water Quality issues including siltation, turbidity, bacteria, algae at Center Pond and other water bodies.	The pond is private and owned by Crane and Company, and current options are under legal review.
Work with BNRC and homeowners on knotweed and other invasive plant education and organize volunteer events to invasive removal.	That has not happened.

Comprehensive Range of Mitigation Actions

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 §201.6(c)(3)(ii))

***A MITIGATION ACTION** is a measure, project, plan or activity proposed to reduce current and future vulnerabilities described in the risk assessment.*

Identifying a range of mitigation actions was a process that included identifying and analyzing problem statements developed in Chapter 4 (Risk Assessment) for each hazard profiled. The HMPC considered 5 key assets when defining problem statements for the Town of Dalton. These are:

1. People (including underserved communities and socially vulnerable populations)
2. Structures (including facilities, lifelines, and critical infrastructure)
3. Systems (including networks and capabilities)
4. Natural, historic, and cultural resources
5. Activities that have value to the community

In addition to problem statements, Chapter 4 (Risk Assessment) considered Changes in Population Patterns and Changes in Land Use and Development for each hazard profiled.

Chapter 5 (Capability Assessment) included potential actions in each of FEMA's mitigation action categories (plans and regulations, structure and infrastructure, natural resources protection, and education and awareness).

The HMPC considered the problem statements, changes in population and land use, Capability Assessment recommendations and the status of previously identified mitigation actions and MVP recommendations to develop a list of mitigation actions for this plan update. The HMPC sought to solve problems identified with the mitigation actions.

This process is illustrated in the figure below. The first column Hazards, indicates the natural hazards considered in the plan in the order of High, Medium, or Low Risk, as reviewed in the Risk Assessment (Chapter 4). The second column, Problems to Assets, indicates that the hazards caused problems in the categories of people, structures, systems, natural, historic, and cultural resources, and activities that have value to the community. The third column, Mitigation Actions, shows the four categories of mitigation action.

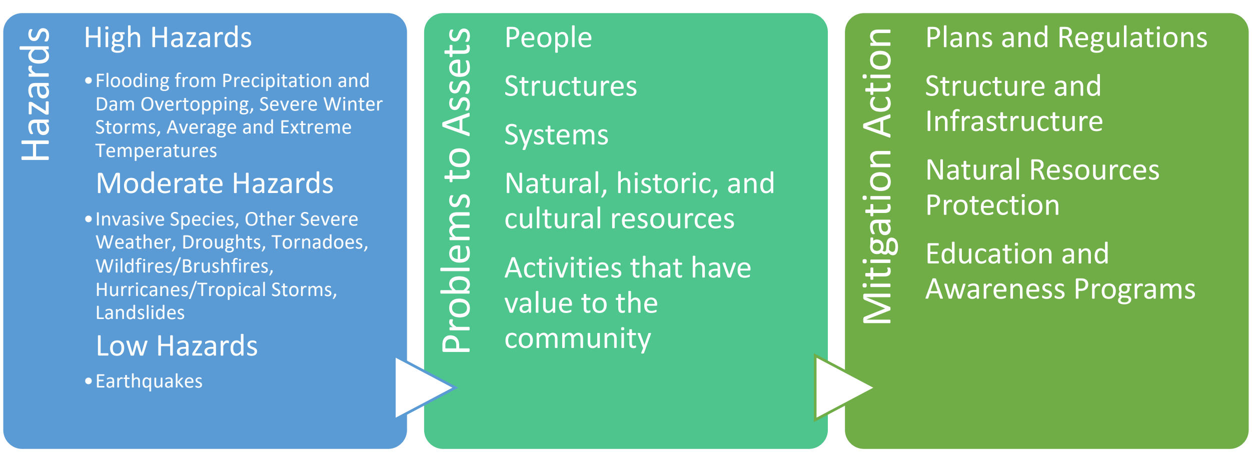


Figure 26. Process of Identifying a Range of Mitigation Actions.

In addition to this quantitative approach to identifying mitigation actions, the HMPC took a qualitative approach through the public outreach and engagement process to identify mitigation actions. Mitigation actions supporting underserved communities and environmental justice communities were specifically considered by the HMPC. They also focused on actions to the built environment both buildings and infrastructure as well as future development or redevelopment. The resulting list of mitigation actions includes at a minimum one action for hazard identified. In several instances multiple actions address an identified hazard and problem. For instance, flooding is addressed through multiple actions. The HMPC and the public considered four mitigation action categories defined in Figure 27 below when considering solutions to identified problems.

Local Plans and Regulations

- Government authorities, policies, or codes that shape how land and buildings are developed and maintained.

Structure and Infrastructure

- Projects modifying existing infrastructure to remove it from a hazard area, or building new structures in ways that reduce the impacts of hazards.

Natural Systems Protection

- Actions that reduce damage and losses, and that preserve or restore the functions of natural systems.

Education and Awareness Programs

- Sustained programs to teach the public and decision makers about hazard risks and community mitigation programs.

Figure 27. Four Types of Mitigation Actions.

Examples of actions in each of the above categories are shown in the table below.

Table 65. Examples of Mitigation Actions.

Mitigation Action Category	Examples of Mitigation Actions
Local Plans and Regulations	• Comprehensive plans • Land use ordinances • Subdivision regulations • Development review • Building codes and enforcement • NFIP Community Rating System • Capital improvement programs • Open space preservation • Stormwater management regulations and master plans

Mitigation Action Category	Examples of Mitigation Actions
Structure and Infrastructure Projects	• Acquisitions and elevations of structures in flood-prone areas • Utility undergrounding • Structural retrofits • Floodwalls and retaining walls • Detention and retention structures • Culverts
Natural Systems Protection	• Sediment and erosion control • Stream corridor restoration • Forest management • Conservation easements • Wetland restoration and preservation
Education and Awareness Programs	• Radio or television spots • Websites with maps and information • Real estate disclosure • Presentations to school groups or neighborhood organizations • Mailings to residents in hazard-prone areas

Potential mitigation actions for each identified hazard and problem identified in the Risk Assessment are shown Table 66 below. Hazards are listed in order of risk. Some of these mitigation actions are included in the Action Plan; some were not included because of cost-benefit-analysis outcomes or inconsistency with Town priorities.

Table 66. Possible Mitigation Actions.

Hazard	**Possible Mitigation Actions**
Flooding from Precipitation and Dam Overtopping	• Mitigate flood risk to the Walker Brook area. • Develop a study to Identify historic structures, businesses and critical facilities located in hazard prone areas, including floodplains and dam failure inundation areas.
Severe Winter Storms	• Upgrade or replace culverts based on annual inspection and need.
Average and Extreme Temperatures	• Add a generator to the Senior Center so it can function as a heating and cooling center.

Hazard	Possible Mitigation Actions
Invasive Species	• Protect open space and water supply areas from invasive species.
Other Severe Weather	• Continue to utilize Stormwater Management Committee to reduce stormwater runoff. Remind residents that there is a stormwater hotline call in number for potential pollution discharges; could be used to also report culverts or storm drains clogged or not properly functioning.
Droughts	• Utilize the annual statistical water report to promote the water conservation program and to raise awareness of the importance of reducing demand on water and protecting the water supply.
Tornadoes	• Develop an education program that includes knowing your neighbors.
Wildfires/Brushfires	• Monitor wooded areas for impacts from invasive species or drought and take action to mitigate wildfire/brushfire risk as needed. • Educate homeowners about need to clear brush away from homes and other wildfire mitigation techniques. • Conduct evacuation exercises for Pine Grove Manor.
Hurricanes/Tropical Storms	• Conduct evacuation exercise with Pomeroy Manor residents.
Landslides	• Educate residents about the local landslide risk and how to identify high hazard areas and mitigate their risk.
Earthquakes	• Evaluate the capacity of critical facilities to withstand small to moderate earthquakes.

Mitigation Action Plan

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

The HMPC then had the job to create a cost-effective mitigation action plan that included projects to address the identified hazards, areas of risk and vulnerable assets. An online Mitigation Action Tracker was developed for the Town to track the implementation of each mitigation action. The Mitigation Action Tracker was an online spreadsheet with separate cells showing each action's essential details. These column labels (essential details) listed below are included to facilitate the Town's ability to sort through the actions as well as to apply for grant funding.

Table 67. Essential Details for Mitigation Actions.

Essential Details	Detail Description
Action Title	Typically, a short description of the mitigation action.
Action Description	A detailed description of the action that includes the purpose or what natural hazard or problem may be mitigated by implementing the mitigation action.
Action Lead	A position in Town government responsible for implementing the action.
Supporting Organizations	A possible list of supporting partners, these may be Town departments, regional organizations, state agencies or adjacent communities.
Potential Funding Source(s)	A list of possible grant sources or the location in the Town's budget for the funding necessary to implement the mitigation action.
Implementation Schedule	A timeline within 5 years (the life of the plan) that the Town hopes to implement the action.
Estimated Cost	An estimated cost designated as high, medium, or low. The Town considered these cost "buckets" because it is impossible to identify an exact cost for each mitigation action.
Hazard(s) Addressed	All the natural hazards that the action may mitigate are listed.

The priority order was chosen based on weighing costs versus benefits. It was imperative for the Town to determine if the costs associated with an action were reasonable compared to the corresponding benefits. To do this, the HMPC developed a prioritization table that included seven categories of criteria; these are detailed in the able below. Each category was assigned points with priority criteria given the highest points. The most points an action could earn was 22. Actions that scored 17-20 points or higher were ranked as High priority. Actions that scored between 12-16 points were considered Medium, and actions that scored 10-11 points were considered low priority.

Table 68. Priority Ranking System.

	Criteria Category	Description	Detailed Ranking and Associated Points
1	Hazards Addressed	What level of hazards does the measure provide protection against?	High (Flooding from Precipitation and Dam Overtopping, Severe Winter Storms, Average and Extreme Temperatures) = 3 Medium (Invasive Species, Other Severe Weather, Droughts, Tornadoes, Wildfires/Brushfires, Hurricanes/Tropical Storms, Landslides) = 2 Low (Earthquakes) = 1
2	Approximate Cost	How much will the measure cost to implement?	Low (Under $10k) = 3 Medium ($10k - $100k) = 2 High over $100k) = 1
3	Implementation Timeline	How long will it take to implement the action?	1-2 Years = 3 3-4 Years = 2 5 or more Years = 1
4	Equity Focus	Does the measure provide support to Environmental Justice (EJ) and other Vulnerable Populations?	Direct Support = 3 Indirect Support = 2 No Support = 0
5	Protection of Lives	How effective is the measure in protecting lives and mitigating injuries resulting from the targeted hazard(s)?	Major Support = 3 Moderate Support = 2 Minor Support = 1 None = 0
6	Protection of Critical Facilities or Infrastructure	Does the measure provide protection of critical facilities and infrastructure?	Yes = 3 No = 0
7	Natural Resource Protection	Does the measure provide protection of natural resources?	Yes = 2 No = 0

	Criteria Category	Description	Detailed Ranking and Associated Points
8	Alignment with Objectives	Does the measure align with the HMP objectives?	Yes =2 No =0

All the actions are listed in Table 69 in order of priority with the action's essential details. Additional tables are included in Appendix B. The breakdown of priority ranking points for each action is included in Appendix B. Readers of this plan must understand that the mitigation action list is aspirational, it does not mean that the HMPC is confident that all actions may be implemented in the span of five years.

Table 69. Dalton Hazard Mitigation Actions.

1	**Collaborate with Crane Company to dredge Center Pond to improve capacity and mitigate the flood risk to Pomeroy Manor.**	
High	**Action Description**	Host meetings with Crane Company, then seek funding to hire a firm for engineering and environmental studies.
	Lead Position	Town Manager
	Supporting Agencies	Board of Selectmen, Conservation Commission, Crane Company
	Cost	High
	Potential Funding Sources	FEMA BRIC, FEMA FMA, MA Executive Office of Economic Development - Inland Dredging Pilot Program Grant, Executive Office of Economic Development - Community Development Block Grant
	Hazards	Flooding, Hurricanes/Tropical Storms, Other Severe Weather, Severe Winter Storms, Tornadoes
	Implementation Schedule	2024-2025

2	**Conduct evacuation exercise with Pomeroy Manor residents and Pine Grove Manor residents.**	
High	**Action Description**	Pomeroy Manor and Pine Grove Manor have a combined total of 70 one-bedroom units for the elderly, disabled, and those with low income. The Town intends to educate residents at each location how to mitigate risk and how to evacuate their home if necessary. They will also be encouraged to register for Code Red.
	Lead Position	Fire Chief
	Supporting Agencies	Emergency Management, Police Department
	Cost	Low
	Potential Funding Sources	Dalton Housing Authority, Dalton Fire Department
	Hazards	Flooding, Extreme Temperatures, Severe Storms, Tornadoes, Wildfires
	Implementation Schedule	2024-2025

3	**Add a generator to the Senior Center so it can function as a heating and cooling center.**	
High	**Action Description**	Locate and engineer a location and rewire the Senior Center to accommodate an emergency switch.
	Lead Position	Emergency Management Director
	Supporting Agencies	Board of Selectmen, Senior Center
	Cost	Medium
	Potential Funding Sources	FEMA BRIC, Capital Improvement, MA Municipal Energy and Technical Assistance Grant (META)
	Hazards	Extreme Temperatures, Earthquake, Hurricane/Tropical Storm, Other Severe Weather, Severe Winter Storms, Tornadoes
	Implementation Schedule	2024

4	**Identify the best way to mitigate risk to the Dalton Housing Authority and the main housing unit from potential flooding.**	
High	**Action Description**	Hire an engineering firm to determine the best way to protect these buildings from flooding. Consider a retaining wall and drainage options.
	Lead Position	Executive Director, Dalton Housing Authority
	Supporting Agencies	Board of Selectmen, Town Manager, Emergency Management
	Cost	High
	Potential Funding Sources	FEMA BRIC, FEMA FMA, Executive Office of Economic Development - Community Development Block Grant
	Hazards	Flooding, Hurricanes/Tropical Storms, Other Severe Weather, Severe Winter Storms, Tornadoes
	Implementation Schedule	2024-2026

5	**Evaluate Craneville Elementary School as a possible primary shelter; conduct a feasibility/cost study that includes wiring of building for a generator.**	
High	**Action Description**	The Town would like to see if the Craneville Elementary School can be used as a primary shelter. Determining this will require an engineering study and funding discussions.
	Lead Position	Emergency Management Director
	Supporting Agencies	Emergency Management, Central Berkshire Regional School District Superintendent, Board of Selectmen, Town Manager
	Cost	High
	Potential Funding Sources	Massachusetts Preservation Projects Fund (MPPF), Central Regional Berkshire School District Budget, MA Department of Energy Resources, Municipal Energy Technical Assistance Grant
	Hazards	Extreme Temperatures, Earthquake, Hurricane/Tropical Storm, Other Severe Weather, Severe Winter Storms, Tornadoes
	Implementation Schedule	2024-2026

6	Develop an education program that includes knowing your neighbors.	
High	Action Description	Host community events in individual neighborhoods promoting inclusion and local education
	Lead Position	Emergency Management Director
	Supporting Agencies	All Town Departments
	Cost	Low
	Potential Funding Sources	Dalton Emergency Management Budget, Council on Aging Budget
	Hazards	Flooding, Other Severe Storms, Severe Winter Storms, Hurricanes/Tropical Storms, Tornadoes
	Implementation Schedule	2024-2025

7	Increase enrollment and awareness in Code Red.	
High	Action Description	The Town wants all residents to be aware of Code Red and to receive notices regarding hazards and emergencies. The Town intends to conduct outreach regarding Code Red via flyers, community events, the Senior Center and the web.
	Lead Position	Emergency Management Director
	Supporting Agencies	All Town Departments
	Cost	Low
	Potential Funding Sources	MEMA Emergency Management Planning Grant
	Hazards	All hazards
	Implementation Schedule	2024-2025

8	Continue to utilize Stormwater Management Committee to reduce stormwater runoff. Remind residents of the stormwater hotline for potential pollution discharges; could also be used to report culverts or storm drains clogged or not properly functioning.	
High	**Action Description**	Promote public education on reporting excessive runoff areas and possible drainage improvements. Develop communication network with the Stormwater Management Committee and the Highway Department.
	Lead Position	Highway Superintendent
	Supporting Agencies	Stormwater Committee
	Cost	Low
	Potential Funding Sources	Stormwater and Highway Department budget, Inland Dredging Pilot Program, Section 319 Nonpoint Source Pollution Grants, MA MVP Action Grant, MA Division of Ecological Restoration, Culvert Replacement Municipal Assistance Grant Program
	Hazards	Flooding, Other Severe Storms, Severe Winter Storms, Hurricanes/Tropical Storms, Tornadoes
	Implementation Schedule	2024-2025

9	Develop a system to effectively communicate with residents so they may understand risks and how to mitigate them.	
Medium	**Action Description**	Create outreach materials and delivery options including a newsletter, update to the Town website, and public information sessions.
	Lead Position	Emergency Management Director
	Supporting Agencies	All Town Departments
	Cost	Low
	Potential Funding Sources	Dalton Emergency Management Budget, Council on Aging Budget
	Hazards	All hazards
	Implementation Schedule	2024-2025

10	Evaluate the capacity of critical facilities to withstand small to moderate earthquakes.	
Medium	Action Description	While earthquakes are a low risk hazard the Town would like to understand the risk to their critical facilities.
	Lead Position	Building Inspector
	Supporting Agencies	Department of Public Works
	Cost	Medium
	Potential Funding Sources	FEMA BRIC
	Hazards	Earthquakes
	Implementation Schedule	2027-2029

11	Mitigate flood risk to the Walker Brook area.	
Medium	Action Description	Move forward with grant applications and bids for work completion on Walker Brook. This project includes measures to reduce frequent flooding such as daylighting Walker Brook and expanding culverts to reduce bottlenecks in stormwater drainage systems.
	Lead Position	Town Manager
	Supporting Agencies	Town Planner, Stormwater Committee
	Cost	High
	Potential Funding Sources	FEMA BRIC, FEMA FMA, Landscape Partnership Grant, Land Use Planning Assistance Grants
	Hazards	Flooding, Extreme Temperatures, Hurricanes/Tropical Storms, Other Severe Weather, Severe Winter Storms
	Implementation Schedule	2024-2027

12	Develop a study to Identify historic structures, businesses and critical facilities located in hazard prone areas, including floodplains and dam failure inundation areas.	
Medium	**Action Description**	Protecting critical facilities and historic structures is a priority in Dalton. The Town would like to secure a grant so a committee may be formed to develop and lead a survey of these facilities.
	Lead Position	Building Inspector
	Supporting Agencies	Emergency Management, Historical Commission
	Cost	Low
	Potential Funding Sources	FEMA BRIC Grant, Massachusetts Preservation Projects Fund (MPPF)
	Hazards	Flooding, Hurricanes/Tropical Storms, Other Severe Weather, Severe Winter Storms, Tornadoes
	Implementation Schedule	2024-2025

13	Upgrade or replace culverts based on annual inspection and need.	
Medium	**Action Description**	Analyze the annual inspection report to set up replacement schedule and secure funding for culvert upgrades or replacement.
	Lead Position	Highway Superintendent
	Supporting Agencies	Stormwater Committee
	Cost	High
	Potential Funding Sources	MA Division of Ecological Restoration, Culvert Replacement Municipal Assistance Grant Program
	Hazards	Flooding, Other Severe Storms, Severe Winter Storms, Hurricanes/Tropical Storms, Tornadoes
	Implementation Schedule	2024-2028

14	**Utilize the annual statistical water report to promote the water conservation program and to raise awareness of the importance of reducing demand on water and protecting the water supply.**	
Medium	**Action Description**	Collaborate with Housatonic Valley Association to to share results of the report and promote water conservation on the Town's website.
	Lead Position	Fire Chief
	Supporting Agencies	Dalton Water Department
	Cost	Low
	Potential Funding Sources	Dalton Fire District budget, MA Department of Environmental Protection, Water Quality Management Planning Grants, Section 604(b) Program
	Hazards	Drought, Invasive Species
	Implementation Schedule	2024-2028

15	**Educate residents about the local landslide risk and how to identify high hazard areas and mitigate their risk.**	
Medium	**Action Description**	The Town is aware of the potential of small to medium size landslides due to periods of heavy precipitation and saturated soils and would like to educate residents of this potential and how to identify high hazard areas and mitigate them on their property.
	Lead Position	Building Inspector
	Supporting Agencies	Conservation Commission
	Cost	Low
	Potential Funding Sources	FEMA BRIC
	Hazards	Landslides
	Implementation Schedule	2026-2028

16	**Monitor wooded areas for impacts from invasive species or drought and take action to mitigate wildfire/brushfire risk as needed.**	
Medium	**Action Description**	The Town is typically wet and not dry. However, due to the changing climate it is possible to experience wildfires or brushfires. The Town will identify and monitor these high hazard areas and take necessary mitigation measures.
	Lead Position	Forest Warden
	Supporting Agencies	Green Committee, Open Space and Recreation Committee, Fire District
	Cost	Low
	Potential Funding Sources	MA MVP Action Grant, FEMA BRIC
	Hazards	Wildfire/Brushfire, Drought, Invasive Species
	Implementation Schedule	2026-2028

17	**Establish communication with MassDOT on assessment of bridges for condition of both bridge structure and infrastructure attached.**	
Low	**Action Description**	Bridges and other infrastructure are frequently impacted by severe weather events. The Town would like to work with MassDOT to conduct inspections, engineering analysis, and retrofits where it is needed.
	Lead Position	Highway Superintendent
	Supporting Agencies	Board of Selectmen
	Cost	High
	Potential Funding Sources	MassDOT Municipal Small Bridge Program
	Hazards	Extreme Temperatures, Earthquake, Hurricane/Tropical Storm, Other Severe Weather, Severe Winter Storms, Tornadoes
	Implementation Schedule	2024-2028

18	Update online ArcGIS to include all critical facilities and hazard areas of concern; train key staff.	
Low	**Action Description**	Schedule training session on ArcGIS and its uses toward implementing various hazard mitigation goals. Update ArcGIS for the changes within the Town's critical facilities.
	Lead Position	Emergency Management Director
	Supporting Agencies	All Town Departments, MassGIS
	Cost	Low
	Potential Funding Sources	Town Planner Budget - FY 25, Berkshire Regional Planning Commission, Massachusetts Emergency Management Agency Performance Grant
	Hazards	All hazards
	Implementation Schedule	2024-2025

19	Protect open space and water supply areas from invasive species.	
Low	**Action Description**	Identify areas with invasive species or at risk to invasive species and develop a plan to mitigate those risks. Implement the recommendations cited in the plan.
	Lead Position	Conservation Commission Chair
	Supporting Agencies	Water Department, Department of Public Works
	Cost	Medium
	Potential Funding Sources	MA MVP Action Grant
	Hazards	Invasive Species
	Implementation Schedule	2025-2028

20	Reduce excess dry timber in the Pines to reduce wildfire risk.	
Low	Action Description	The Town owns the the Pines which is forest land with a high wildland urban interface. The Town will monitor the area for invasive species and make a plan to remove dead wood that may fuel wildfires.
	Lead Position	Green Committee Chair
	Supporting Agencies	Green Committee, Open Space and Recreation Committee, Fire District
	Cost	Medium
	Potential Funding Sources	MA MVP Action Grant
	Hazards	Wildfire/Brushfire, Drought, Invasive Species
	Implementation Schedule	2025-2029

Table 70 shows the mitigation actions that specifically target vulnerable populations and Table 71 shows the mitigation actions that specifically target buildings and infrastructure. Each table lists the actions in order of priority.

Table 70. Actions that Target Vulnerable Populations.

Action #	Action Title
1	Collaborate with Crane Company to dredge Center Pond to improve capacity and mitigate the flood risk to Pomeroy Manor.
2	Conduct evacuation exercise with Pomeroy Manor residents and Pine Grove Manor residents.
3	Add a generator to the Senior Center so it can function as a heating and cooling center.
4	Identify the best way to mitigate risk to the Dalton Housing Authority and the main housing unit from potential flooding.
5	Evaluate Craneville Elementary School as a possible primary shelter; conduct a feasibility/cost study that includes wiring of building for a generator.
6	Develop an education program that includes knowing your neighbors.
7	Increase enrollment and awareness in Code Red.

Table 71. Actions that Target Buildings and Infrastructure.

Action #	Action Title
1	Collaborate with Crane Company to dredge Center Pond to improve capacity and mitigate the flood risk to Pomeroy Manor.

Action #	Action Title
3	Add a generator to the Senior Center so it can function as a heating and cooling center.
4	Identify the best way to mitigate risk to the Dalton Housing Authority and the main housing unit from potential flooding.
5	Evaluate Craneville Elementary School as a possible primary shelter; conduct a feasibility/cost study that includes wiring of building for a generator.
10	Evaluate the capacity of critical facilities to withstand small to moderate earthquakes.
11	Mitigate flood risk to the Walker Brook area.
13	Upgrade or replace culverts based on annual inspection and need.
17	Establish communication with MassDOT on assessment of bridges for condition of both bridge structure and infrastructure attached.

Possible Funding Sources

All the mitigation actions included in this plan have identified one or more potential funding sources. The HMWG focused on projects eligible for MVP Grant funding and FEMA BRIC funding. Below is a list of some of the federal and state funding mechanisms that may assist in implementing mitigation actions.

Federal Emergency Management Agency (FEMA) Mitigation Grants
The Federal Emergency Management Agency (FEMA) makes grant funding available for a range of mitigation activities via several Hazard Mitigation Assistance (HMA) programs. These grant programs provide funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages. They are not intended to fund repair, replacement, or deferred maintenance activities but are rather designed to assist in developing long-term, cost-effective improvements that will reduce risk to natural hazards.

- **Building Resilient Infrastructure and Communities (BRIC)**
  BRIC is a new FEMA hazard mitigation program designed to replace the agency's former HMA Pre-Disaster Mitigation (PDM) grant program, aiming to categorically shift the federal focus away from reactive disaster spending and toward research-supported, proactive investment in community resilience. It is a result of recent amendments made to Section 203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) by Section 1234 of the Disaster Recovery Reform Act of 2018 (DRRA). BRIC will support states, local communities, tribes, and territories as they undertake hazard mitigation projects reducing the risks they face from natural hazards. The BRIC program's guiding principles are supporting communities through capability- and capacity-building; encouraging and enabling innovation; promoting partnerships; enabling large projects; maintaining flexibility; and providing consistency.

- **Hazard Mitigation Grant Program (HMGP)**
  The HMGP is authorized under Section 404 of the Stafford Act. The HMGP provides grants to states, tribes, and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. A key purpose of the HMGP is to ensure that any opportunities to take critical mitigation measures to protect life and property from future disasters are not lost during the recovery and reconstruction process following a disaster. HMGP is typically available only in the months after a federal disaster declaration, as funding amounts are determined based on a percentage of the funds spent on FEMA's Public and Individual Assistance programs.

- **Flood Mitigation Assistance (FMA) Program**
  The FMA program was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the NFIP. FEMA provides FMA funds to assist states and communities with implementing measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the NFIP. The long-term goal of FMA is to reduce or eliminate claims under the NFIP through mitigation activities. One limitation of the FMA program is that it is generally used to provide mitigation for structures that are insured or located in Special Flood Hazard Areas (SFHAs) as mapped by FEMA. Federal funding for this nationally competitive grant program is generally an annual allocation (subject to Congressional appropriation) and eligibility is linked to a community's good standing in the NFIP.

Municipal Vulnerability Preparedness Action Grants[47]
The MVP Action Grant offers financial resources to municipalities seeking to advance priority climate adaptation actions to address climate change impacts resulting from extreme weather, sea level rise, inland and coastal flooding, severe heat, and other climate impacts.

Responses to the RFR may be submitted by municipalities who have received designation from the Executive Office of Energy and Environmental Affairs (EEA) as a Climate Change Municipal Vulnerability Preparedness (MVP) Community, or "MVP Community." All projects are required to provide monthly updates, project deliverables, a final project report, and a brief project summary communicating lessons learned. The municipality is also required to match 25% of total project cost using cash or in-kind contributions. All proposals must include the following:

- Completed application template
- Project budget and deliverables

[47] State of Massachusetts. *MVP Action Grant.* https://www.mass.gov/service-details/mvp-action-grant.

- MVP yearly progress report describing any relevant work toward advancing community priorities since earning MVP designation
- Statement of match
- Letters of support from landowner (if applicable), partners, and the public

Project types include:

- ***Detailed Vulnerability and Risk Assessment*** – In-depth vulnerability or risk assessment of a particular sector, location, or other aspect of the municipality.
- ***Public Education and Communication*** – Projects that increase public understanding of climate change impacts within and beyond the community and foster effective partnerships to develop support.
- ***Local Bylaws, Ordinances, Plans, and other Management Measures*** – Projects to develop, amend, and implement local ordinances, bylaws, standards, plans, and other management measures to reduce risk and damages from extreme weather, heat, flooding, and other climate change impacts.
- ***Redesigns and Retrofits*** – Engineering and construction projects to redesign, plan, or retrofit vulnerable community facilities and infrastructure (e.g., wastewater treatment plants, culverts, and critical municipal roadways/evacuation routes) to function over the life of the infrastructure given projected climate change impacts.
- ***Energy Resilience Strategies*** — Projects that incorporate clean energy generation, such as micro grids, and that are paired with resilience enabling technology to maintain electrical and/or heating and cooling services at critical facilities.
- ***Chemical Safety and Climate Vulnerabilities*** — Projects that seek to engage the business and manufacturing community through assistance or training on identifying vulnerabilities to chemical releases due to severe weather events, reducing use of toxic or hazardous chemicals, outreach to improve operations and maintenance procedures to prevent chemical releases and accidents, outreach to improve emergency and contingency planning, and/or identifying existing contaminated sites that pose chemical dispersion risks during flood events.
- ***Nature-Based Storm-Damage Protection, Drought Mitigation, Water Quality, and Water Infiltration Techniques*** – Projects that utilize natural resources and pervious surfaces to manage coastal and inland flooding, erosion, and other storm damage, such as stormwater wetlands and bio-retention systems, and other Smart Growth and Low Impact Development techniques.
- ***Nature-Based, Infrastructure and Technology Solutions to Reduce Vulnerability to Extreme Heat and Poor Air Quality*** – Projects that utilize natural resources, vegetation, and increasing

pervious surface to reduce ambient temperatures, provide shade, increase evapotranspiration, improve local air quality, and otherwise provide cooling services within the municipality.

- ***Nature-Based Solutions to Reduce Vulnerability to other Climate Change Impacts*** – Nature-based projects that address other impacts of climate change such as extreme weather, damaging wind and power outages, and increased incidence of pests and vector-borne illnesses and other public health issues.

- ***Acquisition of Land to Achieve a Resiliency Objective*** — Land purchases are eligible for grant funding if the parcel has been identified through a climate vulnerability assessment as an appropriate location for a specific eligible adaptation activity to occur, such as accommodating an infrastructure or facility redesign or retrofit project, providing natural flood storage to reduce downstream flooding, or removal of pavement and planting of trees to reduce flooding and heat island effects.

- ***Ecological Restoration and Habitat Management to Increase Resiliency*** — Projects that repair or improve natural systems for community and ecosystem adaptation, such as right-sizing culverts, dam removal, restoration of coastal wetlands, etc.

- ***Subsidized Low Income Housing Resilience Strategies*** — Investments in resiliency measures for affordable housing to protect vulnerable populations that may not have the resources to recover from an extreme climate event.

- ***Mosquito Control Districts*** — Projects to reduce the risk to public health from mosquito-borne illness and to increase mosquito surveillance and control capacity by incentivizing municipalities not in an organized mosquito control project or district to form a new mosquito control district or join an existing mosquito control district. Also funding for municipalities currently in a mosquito control district for new or proactive mosquito control measures.

Chapter 7. Plan Implementation and Maintenance

The Town's Emergency Management Director is the primary point of contact for the Hazard Mitigation Plan's implementation and maintenance. The Hazard Mitigation Planning Committee (HMPC) will implement the mitigation strategy and specific mitigation actions outlined in this plan, and update and maintain the plan according to the guidelines below. The HMPC includes key stakeholders in the Town, who will use the plan's goals, as well as continued analysis of hazard risks and capabilities, to weigh the available resources against the costs and benefits for each mitigation action. The Town understands the value of this plan and its positive mitigation impact and intends to continue updating this plan and implementing its strategies.

Continued Public Participation

D1. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))

Public participation is an integral component of the mitigation planning process and will continue to be essential as this plan is implemented and updated over time. Based on the high level of interest in the mitigation planning process and in the Municipal Vulnerability Preparedness project, Town residents and stakeholders are interested in hazard mitigation and climate adaptation. The HMPC included several education and outreach mitigation actions designed to engage the public. The Town intends to involve the public throughout the five-year implementation of this plan, as well as in the reviewing and updating processes. The Emergency Management Director will take the lead in soliciting participation from the public with support from other Town departments and committees. This participation will take multiple forms, including all of those outlined in the Chapter 3 (Planning Process) of this plan. Efforts to involve the public include:

- Advertising on the Town's website and through standard meeting laws.
- Posting news and announcements on the Town's social media pages and through the Town Newsletter and email blast.
- Conducting outreach to local community organizations and businesses.
- Hosting public presentations and meetings throughout the plan's process to acquire feedback and input from stakeholders.
- Record all meetings to play on the Town's cable channel (Channel 1301) and add links to the Town's website.
- Post copies of the plan on the Town's website and keep a hard copy at the Library, Senior Center, Community Recreation Association, and Town Hall.

- Continue to work with vulnerable populations, local organizations, private industry, regional agencies, and adjacent communities as this plan is implemented.

Method and Schedule for Keeping the Plan Current

D2. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))

The HMPC and the Town of Dalton recognize the importance of keeping the mitigation plan up to date. The HMPC will meet twice a year for the purposes of implementing and maintaining the Hazard Mitigation Plan. This work includes monitoring, evaluating, and updating the plan over a five-year period. Overall, the responsibility for monitoring the Plan rests with the Emergency Management Director.

Process to Track Actions

***MONITORING** means tracking the implementation of the plan over time.*

The Emergency Management Director and the HMPC will maintain the Mitigation Action Tracker (a tool to record the status of each mitigation action). They will send a reminder email with a link to the web-based Mitigation Action Tracker on a semi-annual basis (January and July) to all Department Heads responsible for a mitigation action and to relevant Town committees. They may also distribute the Mitigation Action Progress Worksheet (shown in Appendix C) for Department Heads who prefer a form over a digital spreadsheet.

If the Town experiences a large-scale disaster, the Emergency Management Director will assemble an HMPC meeting to update the list of mitigation actions and review their order based on current priorities.

Process to Evaluate Effectiveness of the Plan

***EVALUATING** means assessing the effectiveness of the plan at achieving its stated purpose and goals.*

The HMPC has agreed to meet on a bi-annual basis to review the implementation of the mitigation plan. The first meeting will take place in July; the second, in January.

At the first meeting (July 2024), the HMPC will review the effectiveness of the planning process, public and stakeholder engagement, risk analysis, and the mitigation strategy, including its implementation. It is recommended that the HMPC use the worksheet provided in Appendix C. Beyond considering the planning process, the HMPC will seek to answer the following questions to determine if the plan is effective at mitigating risk to Town residents, the built environment, and the natural environment.

- Can the HMPC identify success stories of losses avoided because of hazard mitigation measures implemented? Can the HMPC identify political, social, and economic successes?
- Have the mitigation actions implemented achieved benefits beyond the cost of mitigation?
- Have the implemented mitigation actions saved lives or protected property?
- Does the list of mitigation actions coincide with the Town's priorities? Do additional actions need to be added?

Process to Update the Plan

***UPDATING** means reviewing and revising the plan at least once every five years.*

At each semi-annual meeting, the HMPC will review the plan's goal statements and mitigation action status. If necessary, the goal statements and mitigation actions may be revised to reflect current Town priorities. In addition, the HMPC will discuss methods for continuing to integrate the mitigation plan with other plans, processes, and projects in the Town.

They will post any significant updates to the plan to the Town's website and make mention of the updates in the Town Newsletter. The HMPC recognizes the value in keeping the public and key stakeholders informed about the implementation and status of the mitigation plan.

HMPC members will continue to participate in regional and state-based meetings to stay current with best risk-mitigation practices. Such meetings may include the Massachusetts Emergency Management Agency (MEMA), Berkshire Regional Planning Commission (BRPC), and Massachusetts Department of Conservation and Recreation (DCR). The HMPC will also participate in land use planning and mitigation planning meetings with their neighbors, Cheshire, Washington, Windsor, Hinsdale, Pittsfield, Lansesborough.

The Town of Dalton agrees to update and adopt this mitigation plan on a five-year basis. The update will include a comprehensive review and planning process like the one used to develop this mitigation plan update. It will update the mitigation action list, current land use practices, collect and review best available data, review the capability assessment, and engage the public and stakeholders. This process will occur according to FEMA guidelines. The HMPC will seek funding for the development of the plan update **two years** before the plan expires. The plan update process gives the Town the chance to add and/or re-prioritize mitigation actions based on current risk, capabilities, and public/stakeholder suggestions. The Emergency Management Director will serve as the Project Manager for the update process. The figure below illustrates the update timeline.

Year 1	Year 2	Year 3	Year 4	Year 5
•Seek grant funding for mitigation actions •Gather the HMPC in January and July	•Seek grant funding for mitigation actions •Gather the HMPC in January and July	•Seek FEMA BRIC funding for plan update •Seek grant funding for mitigation actions •Gather the HMPC in January and July	•Begin the plan update process •Seek grant funding for mitigation actions •Gather the HMPC in January and July	•Complete the plan update process - adopt the new plan •Seek grant funding for mitigation actions •Gather the HMPC in January and July

Figure 28. Plan Update and Implementation Schedule.

The National Dam Safety Program Act has authorized FEMA to provide High Hazard Potential Dams (HHPD) Rehabilitation Grant Program assistance for the rehabilitation of dams that do not meet minimum safety standards and pose substantial risk to life and property.[48] Towns interested in accessing the HHPD grant must have an approved local hazard mitigation plan and meet criteria outlined in Element G: High Hazard Potential Dams. Element G is optional for local governments. While this Plan update did not address Element G requirements, the Town of Dalton will consider adding Element G during the next Plan update. Meeting the requirements of Element G include answering the following questions:

- Did the plan describe the incorporation of existing plans, studies, reports and technical information for HHPDs?
- Did the plan address HHPDs in the risk assessment?
- Did the plan include mitigation goals to reduce long-term vulnerabilities from HHPDs?
- Did the plan include actions that address HHPDs, and prioritize mitigation actions to reduce vulnerabilities from HHPDs?

[48] Local Mitigation Planning Policy Guide, FEMA, Effective April 19, 2023, p.32.

Responsible Parties for Plan Implementation and Maintenance

Dalton, MA

Glenn Lagerwall, Emergency Management Director

Town of Dalton

462 Main Street, Dalton, MA 01226

Phone: 413-684-6111 ext.116

Email: em@dalton-ma.gov

For State resources:

Massachusetts Emergency Management Agency:

Address: 400 Worcester Road, Framingham, MA 01702-5399

Phone: 508-820-2000 (MEMA Headquarters and Communications Center)

or 978-328-1500 (MEMA Region 1 Office)

Website: https://www.mass.gov/orgs/massachusetts-emergency-management-agency

For Federal resources:

Federal Emergency Management Agency:

Address: 220 Binney Street, Cambridge, MA 02142

Phone: 877-336-2734

Email: fema-r1-info@fema.dhs.gov

Website: https://www.fema.gov/region-i-ct-me-ma-nh-ri-vt

System to Integrate this Plan with Existing Planning Mechanisms

D3. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))

***INTEGRATE** means to include hazard mitigation principles, vulnerability information and mitigation actions into other existing community planning to leverage activities that have co-benefits, reduce risk and increase resilience.*

For the Town of Dalton to succeed in reducing hazard risks over the long term, the information, ideas, conclusions, and strategic recommendations of this hazard mitigation plan should be integrated throughout government operations. Effective integration means to include mitigation principles, vulnerability information, and mitigation actions into other existing community planning mechanisms to leverage activities that have co-benefits, reduce risk, and increase resilience. Many other local plans and processes will present opportunities to address hazard mitigation in a way that can support multiple community objectives, so an important part of maintaining and implementing this hazard mitigation plan will be to identify and capitalize on these opportunities to leverage activities that have co-benefits (including but not limited to risk reduction). The Town's adoption of the Dalton Green Infrastructure Plan in response to repeated flooding along Walker Brook demonstrates this type of integration by stressing the importance of integrating stormwater management practices with nature-based solutions for climate resilience across various elements of this separate planning document.

The HMPC will remain tasked with helping to ensure that all new or updated local plan documents are informed by and consistent with the goals and actions of this hazard mitigation plan and will not contribute to increased hazard vulnerability in Dalton. Specifically, this includes but is not limited to the implementation or future updates to the following local plans as identified and further described in Chapter 5 (Capability Assessment):

- Municipal Vulnerability Preparedness (MVP) / Community Resilience Building (CRB) Summary of Findings Report (2019)
- Master Plan (2016)
- Open Space and Recreation Plan (2021)
- Dalton Green Infrastructure Plan (2022 Update)

> ***PLANNING MECHANISMS*** *refers to the governance structures used to manage local land use development and community decision-making, such as budgets, comprehensive plans, capital improvement plans, economic development strategies, climate action plans or other long-range plans.*

Additional opportunities to integrate the requirements of this plan into other local planning mechanisms shall continue to be identified through future meetings of the HMPC and through the five-year review process described in this chapter. Other planning mechanisms include local regulations and existing code enforcement procedures (i.e., zoning bylaws, site plan review, etc.), internal municipal policies, special projects or initiatives, and other routine government or community decision-making activities such as capital improvement planning and the Town's annual budget process. Emphasis for identifying these integration opportunities will be placed on those governance structures used to manage local land use and community development in both the pre-disaster and post-disaster environment. Also, as it relates to implementing specific mitigation actions identified in this plan, it will be the responsibility of each assigned lead department to determine additional measures that can support action completion or enhancement. This includes integrating mitigation actions from this plan into other local planning documents, processes, or mechanisms as deemed appropriate and most effective.

While it is recognized that there are many possible benefits to integrating components of this plan into other local planning mechanisms, the routine maintenance of this stand-alone plan is considered by the Town to be the most effective and appropriate method to identify, prioritize, and implement local hazard mitigation actions. In moving forward, however, the Town will consider the incorporation of some other plan documents into the hazard mitigation plan, such as any future iterations of the Town's MVP Plan, Green Infrastructure Plan, or related climate adaptation planning efforts.

Acronyms

AAL	Average Annual Loss
ADU	Accessory Dwelling Units
APA	American Planning Association
APHIS	Animal and Plant Health Inspection Service
ASCE	American Society of Civil Engineers
AT	Appalachian Trail
ATV	All-Terrain Vehicle
BBRS	Board of Building Regulations and Standards
BCEGS	Building Code Effectiveness Grading Schedule
BMP	Best Management Practice
BNRC	Berkshire Natural Resources Council
BRIC	Building Resilient Infrastructure and Communities
BRPC	Berkshire Regional Planning Commission
BRTA	Berkshire Regional Transit Authority
BTU	British Thermal Unit
C2ES	Center for Climate and Energy Solutions
CAV	Community Assistance Visit
CAC	Community Assistance Contact
CDBG	Community Development Block Grant
CDC	Centers for Disease Control and Prevention
CDD	Consecutive Dry Days
CEMP	Comprehensive Emergency Management Plan
CERT	Community Emergency Response Team
CFR	Code of Federal Regulations
CIP	Capital Improvement Program
CMR	Code of Massachusetts Regulations
COOP	Continuity of Operations Plan
CPA	Community Preservation Act
CRA	Community Recreation Association
CRB	Community Resilience Building
CRS	Community Rating System
CZM	Coastal Zone Management
DAR	Department of Agricultural Resources
DCR	Department of Conservation and Recreation
DCTV	Dalton Community Television
DEP	Department of Environmental Protection
DMA	Disaster Mitigation Act
DMP	Drought Management Plan
DMTF	Drought Management Task Force

DOER	Department of Energy Resources
DOT	Department of Transportation
DRRA	Disaster Recovery Reform Act
DWR	Days Without Rain
EAP	Emergency Action Plans
EF	Enhanced Fujita
EJ	Environmental Justice
EMD	Emergency Management Director
EMT	Emergency Medical Technician
EOC	Emergency Operations Center
EOEEA	Executive Office of Energy and Environmental Affairs
EPA	Environmental Protection Agency
ERG	Eastern Research Group, Inc.
ERP	Energy Reduction Plan
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flooding Insurance Study
FMA	Flooding Mitigation Assistance
FPA	Floodplain Administrator
FSim	Forest Service Fire Simulation System
FY	Fiscal Year
GHG	Greenhouse Gas
GIS	Geographic Information Systems
H&H	Hydrology and Hydraulics
HHPD	High Hazard Potential Dam
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMPC	Hazard Mitigation Planning Committee
HUD	Housing and Urban Development
HVA	Housatonic Valley Association
HVAC	Heating, Ventilation, and Air Conditioning
IBC	International Building Code
IBHS	Insurance Institute for Business and Home Safety
ICC	International Code Council
IEBC	International Existing Building Code
IECC	International Energy Conservation Code
IFC	International Fire Code
IMC	International Mechanical Code
IRC	International Residential Code
ISO	International Organization for Standardization
ISPSC	International Swimming Pool and Spa Code

LED	Light Emitting Diode
MCDA	Multi-Criteria Decision Analysis
MCRIS	Massachusetts Cultural Resource Information System
MEMA	Massachusetts Emergency Management Agency
META	Municipal Energy and Technical Assistance
MGL	Massachusetts General Law
MIPAG	Massachusetts Invasive Plant Advisory Group
MPH	Miles Per Hour
MPPF	Massachusetts Preservation Projects Fund
MSBC	Massachusetts State Building Code
MVP	Municipal Vulnerability Preparedness
NCDC	National Climatic Data Center
NCEI	National Centers for Environmental Information
NE CASC	Northeast Climate Adaptation Science Center
NESIS	Northeast Snowfall Impact Scale
NFIP	National Flooding Insurance Program
NFIRA	National Flood Insurance Reform Act
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NWS	National Weather Service
OSRP	Open Space and Recreation Plan
PA	Public Assistance
PDM	Pre-Disaster Mitigation
PPC	Public Protection Classification
PPQ	Plant Protection and Quarantine
PWS	Public Water Systems
RMAT	ResilientMass Action Team
RSI	Regional Snowfall Index
SFHA	Special Flood Hazard Areas
SHMCAP	State Hazard Mitigation and Adaptation Plan
SI/SD	Substantial Improvement/Substantial Damage
SPGA	Special Permit Granting Authority
SWMP	Stormwater Management Plan
TRI	Toxic Release Inventory
TS	Tropical Strom
US	United States
USC	U.S. Code
USDA	United States Department of Agriculture
USGS	United States Geological Survey
USGCRP	U.S. Global Change Research Program

WPA	Wetlands Protection Act

Appendix A. Planning Process Supporting Materials

Hazard Mitigation Planning Committee Meetings

HMPC Meeting Participants

First Name	Last Name	Title	Affiliation	Office Phone	Email	HMPC #1 (10/25/2023)	HMPC #2 (11/29/2023)	HMPC #3 1/24/2024	HMPC #4 2/29/2024
Bob	Benlien	Water Department	Town of Dalton	413-684-6118	Bob.Benlien@daltonfiredistrict.org	☑	☑	☑	☐
Matthew	Bryan	Senior Planner (Public Health)	Berkshire Regional Planning Commission	413-442-1521 x30	mbryan@berkshireplanning.org	☐	☑	☑	☐
Jeff	Burch	Building and Grounds	Town of Dalton	413-684-6111 x115	jburch@dalton-ma.gov	☑	☑	☑	☑
Jason	Dion	Director of Facilities	Central Berkshire Regional School District	413-684-0320	jdion@cbrsd.org	☑	☐	☐	☑
Brian	Duval	Building Inspector	Town of Dalton	413-684-6111 x301	bduval@dalton-ma.gov	☑	☑	☐	☐
Bud	Hall	DPW Superintendent	Town of Dalton	413-684-6115 x501	bhall@dalton-ma.gov	☑	☑	☑	☐
Mike	Higgins	Safety Coordinator	Crane Currency	413-684-2600	Michael.Higgins@cranecurrency.com	☑	☐	☐	☐
Tom	Hutcheson	Town Manager	Town of Dalton	413-684-6111 x201	thutcheson@dalton-ma.gov	☑	☑	☑	☑
Glenn	Lagerwall	Emergency Management Director	Town of Dalton	413-684-6111 x116	em@dalton-ma.gov	☑	☑	☑	☑
Todd	Logan	Green Dalton Committee	Town of Dalton	413-242-4410	todd.c.logan@gmail.com	☐	☐	☑	☑
Morgan	McDonough	Firefighter/EMT	Dalton Fire	413-684-6118	cmcd22@gmail.com	☑	☑	☑	☐
Tyler	Miller	Police Department	Town of Dalton	413-684-0300	tmiller@dalton-ma.gov	☐	☑	☐	☐
Cheryl	Rose	Conservation Commission Chair	Town of Dalton	413-684-611 x221	conservationcommission@dalton-ma.gov	☐	☑	☑	☑
Henry	Rose	Conservation Commission	Town of Dalton	413-684-611 x221	rosehenryj@gmail.com	☐	☑	☑	☑
Janko	Tomasic	Town Planner	Town of Dalton	413-684-6111 x304	jtomasic@dalton-ma.gov	☑	☑	☑	☑
Agnes	Witkowski	Health Inspector	Town of Dalton	413-684-6111 x302	awitkowski@dalton-ma.gov	☐	☑	☑	☐
Pattie	Yates	Senior Center	Town of Dalton	413-992-7652	yankspatti63@yahoo.com	☐	☑	☐	☐
						☐	☐	☐	☐

HMPC Meeting Agendas

JAMIE CAPLAN CONSULTING LLC
Emergency Management Services

KICK-OFF MEETING

TOWN OF DALTON, MA HAZARD MITIGATION PLAN UPDATE

DATE: 9/18/2023

TIME: 10:00-11:00AM

ZOOM: https://us02web.zoom.us/j/89218190470?pwd=MGlZM0NvU3hCRTJYcXllVGF3SDBjZz09
Meeting ID: 892 1819 0470
Passcode: 998194

AGENDA ITEMS

I. Project Introduction
II. Timeline and Tasks
III. Developing a Hazard Mitigation Planning Committee (HMPC)
IV. Sharing GIS Data
V. Updating Mitigation Actions
VI. Scheduling a HMPC Meeting for October

ACTION ITEMS

I. Develop the HMPC
II. Share GIS Data & Relevant Resources
III. Update Mitigation Action Tracker with Action Status
IV. Schedule a HMPC Meeting for October

JAMIE CAPLAN CONSULTING LLC
Emergency Management Services

HMPC MEETING #1

TOWN OF DALTON, MA HAZARD MITIGATION PLAN UPDATE

DATE: 10/25/2023
TIME: 10:00-11:30AM
ZOOM: https://us02web.zoom.us/j/89277316131?pwd=aVQvWlhJN3BIMk80OU5hVjlVQlpPdz09
Meeting ID: 892 7731 6131
Passcode: 962903

AGENDA ITEMS

- **I.** Introductions
  - i. HMPC Members and Consulting Team
- **II.** Introduction to Hazard Mitigation Planning
  - i. What's in a Hazard Mitigation Plan?
  - ii. Planning Timeline
  - iii. HMPC Responsibilities
- **III.** Plan Development
  - i. Plans and Policies
  - ii. Public and Stakeholder Engagement
  - iii. Hazard Identification
  - iv. Critical Facilities
  - v. Capability Assessment
  - vi. Mitigation Strategy

ACTION ITEMS

- **I.** HMPC Meeting #2 Week of November 27th
- **II.** Capability Assessment Surveys
- **III.** Mitigation Action Tracker
- **IV.** Stakeholder Engagement
- **V.** GIS and Critical Facilities

JAMIE CAPLAN CONSULTING LLC
Emergency Management Services

HMPC MEETING #2

TOWN OF DALTON, MA HAZARD MITIGATION PLAN UPDATE

DATE: 11/29/2023

TIME: 10:00-11:30AM

ZOOM: https://us02web.zoom.us/j/87493540485?pwd=K2VFUFY5MUtCQVFiZ2p2Mnp0WlByUT09
Meeting ID: 874 9354 0485
Passcode: 587768

AGENDA ITEMS

I. Project Update and Loose Ends
II. Capability Assessment Update
   i. Key Plans Reviewed
   ii. Survey Status
   iii. Where are Strengths and Challenges Discussion
III. Risk Assessment
   i. Hazards and Critical Facilities Identified
   ii. Hazus Impacts
   iii. Problems Identified Including High Hazard Areas
   iv. Mitigation Actions Discussion
IV. Mitigation Strategy
   i. Goal Statements
   ii. Developing New Mitigation Actions
V. Town Priorities and Changes in Development

ACTION ITEMS

I. HMPC Meeting #3
II. Tie Up Loose Ends
III. Pictures
IV. New Mitigation Actions

HMPC MEETING #3 AGENDA

TOWN OF DALTON, MA HAZARD MITIGATION PLAN UPDATE

DATE:	1/24/2024
TIME:	10:30-12:00PM
ZOOM:	https://us02web.zoom.us/j/84439558345?pwd=dzBMUWR3NjVqdVlGU0xvbUJxUlhPQT09 Meeting ID: 844 3955 8345 Passcode: 724841

AGENDA ITEMS

I. **Project Update and Loose Ends**
II. **Risk Assessment**
   i. Risk Ranking
   ii. Problem Statements
III. **Capability Assessment Update**
   i. Opportunities Identified
IV. **Public Meeting**
   i. Date and Outreach Efforts
V. **Mitigation Strategy**
   i. Essential Details for New Actions
   ii. Action Prioritization
VI. **Plan Implementation**

ACTION ITEMS

I. Public Meeting Date and Outreach
II. HMPC #4 Date
III. Pictures
IV. New Mitigation Actions

HMPC MEETING #4 AGENDA

TOWN OF DALTON, MA HAZARD MITIGATION PLAN UPDATE

DATE: THURSDAY, 02/29/2024

TIME: 10:30-12:00PM

ZOOM: https://us02web.zoom.us/j/82131749582?pwd=R3FaNzBFSWpsMUt2V0xoUytmK29NUT09
MEETING ID: 821 3174 9582
PASSCODE: 767861

AGENDA ITEMS

I. **Project Update and Loose Ends**
II. **Public Engagement**
    i. Outreach for Public Meeting and Plan Review
III. **Final Hazard List Ranking**
IV. **Mitigation Actions**
    i. List Review Including Prioritization
V. **Plan Review**
    i. Essential Details for New Actions
    ii. Action Prioritization
VI. **Timeline for Completion**

ACTION ITEMS

I. Public Meeting Outreach
II. Plan Review

Public Outreach

TOWN OF DALTON, MA

PUBLIC MEETING

SHARE YOUR IDEAS FOR REDUCING RISK TO NATURAL HAZARDS AND CLIMATE CHANGE

Do you wonder if Dalton can flood, experience a tornado, or have an earthquake? What can prevent those natural hazards and climate change from wreaking havoc in our community?

Join the meeting to learn about this important project and to share your ideas for making Dalton more resilient to natural hazards and climate change.

11/27/2023

7:00 pm – 8:00 pm

Join the Selectboard Meeting or Join on Zoom

Dalton has formed a Hazard Mitigation Planning Committee to identify risks and projects to mitigate those risks. The Town is working with a consultant hired by the Massachusetts Emergency Management Agency to develop a Hazard Mitigation Plan that will be approved by the Federal Emergency Management Agency and adopted by the Town. This plan allows Dalton to apply for pre- and post-disaster mitigation funds.

HTTPS://DALTON-MA.GOV FOR MEETING DETAILS OR CONTACT GLENN LAGERWALL, EMERGENCY MANAGEMENT DIRECTOR 413-684-6111 OR EM@DALTON-MA.GOV

PRESS RELEASE
For Immediate Release
November 13, 2023

Contact: Glenn Lagerwall
Emergency Management Director
Town of Dalton
413-684-6111

Public Meeting Invitation
Identify Natural Hazard Risks and Recommend Mitigation Actions

Do you wonder if Dalton can flood, experience a tornado, or have an earthquake? What is the worst that can happen in Dalton? What can prevent those natural hazards and others from wreaking havoc?

Fortunately, the Town of Dalton is developing an update to their Hazard Mitigation Plan. This plan details all the natural hazard risks that may impact the Town and includes a list of potential actions to mitigate those risks.

The Town of Dalton encourages all residents and business owners to come to a public meeting to share your ideas and gather your feedback regarding which hazards present the greatest risks, which areas of Town are most susceptible to damage, and what you would like to see done to mitigate these risks?

We cannot stop winter storms, heavy rains, high winds, or earthquakes but we do not have to suffer severe consequences. The Town of Dalton hopes you will join our first of two Public Meetings on November 27, 2023, at 7:00 pm.

Town leaders have formed a Hazard Mitigation Planning Committee (HMPC), and with a grant from the Massachusetts Emergency Management Agency (MEMA) this Committee is developing the Hazard Mitigation Plan Update. A Hazard Mitigation Plan, approved by the Federal Emergency Management Agency (FEMA), and adopted by the Town, allows the Town to apply for pre- and post-disaster hazard mitigation grant funds. Development of this plan includes **public** participation.

Public participation is essential to the development of a Hazard Mitigation Plan that represents the interests of all residents and mitigates risk to all natural hazards and the impacts of climate change.

Meeting will be held in-person and via Zoom

- Monday, November 27, 2023
- 7:00 pm – 8:00 pm
- Select Board Meeting, Senior Center, 40 Field Street Extension
- https://us02web.zoom.us/j/82129262092?pwd=dENZQkhxeDYzaWdPUHhwOFZudkY3dz09
- Meeting ID: 821 2926 2092
- Passcode: 978324

For questions regarding this plan, please contact Glenn Lagerwall, Emergency Management Director, 413-684-6111 or em@dalton-ma.gov.

PUBLIC MEETING #2 AGENDA

TOWN OF DALTON, MA HAZARD MITIGATION PLAN

DATE: **FRIDAY, MARCH 8, 2024**

TIME: **10:30-11:30AM**

ZOOM: https://us02web.zoom.us/j/88242651143?pwd=QlJNc1FuZzdOb3kxT00rQzVuUGlFZz09

Meeting ID: 882 4265 1143

Passcode: 931979

AGENDA ITEMS

I. **Project Introduction**

II. **What is Hazard Mitigation?**
   - i. Benefits of Hazard Mitigation
   - ii. How the Plan was Developed

III. **Risk Assessment Process**
   - i. Critical Facility Identification
   - ii. Hazard Identification
   - iii. Where are the hazards experienced?
   - iv. What are your biggest concerns?

IV. **Hazard Mitigation Strategy**
   - i. Types of Mitigation Actions
   - ii. What are your recommendations for hazard mitigation?
   - iii. Review of actions

V. **Plan Review**
   - i. What to expect and how to review

VI. **Timeline for Completion**

TOWN OF DALTON, MA

PUBLIC MEETING

SHARE YOUR IDEAS FOR REDUCING RISK TO NATURAL HAZARDS AND CLIMATE CHANGE

Do you wonder if Dalton can flood, experience a tornado, or have an earthquake? What can prevent those natural hazards and climate change from wreaking havoc in our community?

Join our <u>**second public meeting**</u> to learn about this important project and to **share your ideas** for making Dalton **more resilient** to natural hazards and climate change.

Dalton has formed a Hazard Mitigation Planning Committee to identify projects to mitigate the risks caused by natural hazards and climate change.

The Town is working with a consultant hired by the Massachusetts Emergency Management Agency to develop a Hazard Mitigation Plan that will be approved by the Federal Emergency Management Agency and adopted by the Town. This plan allows Dalton to apply for pre- and post-disaster mitigation funds.

03/08/2024
10:30 am – 11:30 am
Join via Zoom!

<u>HTTPS://DALTON-MA.GOV</u> FOR MEETING DETAILS OR CONTACT GLENN LAGERWALL, EMERGENCY MANAGEMENT DIRECTOR 413-684-6111 OR <u>EM@DALTON-MA.GOV</u>

FOR IMMEDIATE RELEASE

The Town of Dalton Welcomes Community Input on Hazard Mitigation Plan

Dalton, Massachusetts – February 29, 2024

Do you wonder if Dalton can flood, experience a tornado, or have an earthquake? What is the worst that can happen in Dalton? What can prevent those natural hazards and others from wreaking havoc?

The Town is extending an invitation to the community to participate in a public meeting as it develops their Hazard Mitigation Plan. This plan details all the natural hazard risks that may impact the Town and includes potential actions to mitigate those risks.

Meeting Information:

- Friday, March 8, 2024
- 10:30 am – 11:30 am
- https://us02web.zoom.us/j/88242651143?pwd=QlJNc1FuZzdOb3kxT00rQzVuUGlFZz0
- Meeting ID: 882 4265 1143
- Passcode: 931979

The Town encourages all residents and business owners to attend this public meeting to share ideas and offer feedback on which hazards present the greatest risks, which areas of Town are most susceptible to damage, and what you would like to see done to mitigate these risks.

The Hazard Mitigation Planning Committee, in partnership with Jamie Caplan Consulting LLC, a Northampton, MA-based firm, is developing the plan with a grant from the Massachusetts Emergency Management Agency (MEMA). FEMA approval, coupled with Town adoption, will enable Dalton to access pre- and post-disaster hazard mitigation grant funds.

For Further Inquiries:

- *Glenn Lagerwall, Emergency Management Director*
- *Phone: 413-684-6111*
- *Email: em@dalton-ma.gov*

Public participation is essential to a Hazard Mitigation Plan. This Plan needs to represent the interests of all community members while working to mitigate risk to natural hazards and the impacts of climate change.

The Town looks forward to a collaborative effort in building a resilient and secure future!

iBerkshires.com

The town held a hazard mitigation plan presentation on Friday.

Dalton Hazard Mitigation Plan Near Completion

By Sabrina Damms
iBerkshires Staff
12:54PM / Thursday, March 14, 2024

DALTON, Mass. — The town's emergency management consultant Jamie Caplan Consulting presented goals on Friday for updating the hazard mitigation plan to fit the communities needs.

The town received a grant through the state Emergency Management Agency, part of which covers the cost of the consultant.

A number of town officials from various committees and departments have been working with the consultant to discuss the area's hazards and update the hazard mitigation plan to minimize the risk to people, property, and the environment.

In addition, the goal of the plan is to increase the town's capacity and promote a hazard mitigation culture in the community through education, regulations, planning, and collaboration with neighboring regions.

Departments and committees, or commissions, involved in this process included the Water, Building and Ground departments; Police, Fire, and Health departments; Conservation Commission members, town officials, and more.

They also requested feedback from residents during two public hearings. One public hearing occurred in the evening in December, and there was light attendance.

The second public meeting was held on Friday morning after the town received comments from residents expressing how they could not attend in the evening. The morning meeting did not have any attendees.

When approaching updating the hazard mitigation plan they try not to look too far ahead because they are required to update it every five years, However, they still take into consideration the effects of climate change, said the consulting firm's

THE TOWN OF DALTON WELCOMES COMMUNITY INPUT ON HAZARD MITIGATION PLAN UPDATE

Join Us in Building a Resilient Future for Dalton, MA!

WHAT?

Review and provide feedback on the Hazard Mitigation Plan Update drafted by Dalton's Hazard Mitigation Planning Committee.

HOW?

- For Online Access: https://dalton-ma.gov/ to read the draft plan.
- In-Person Viewing: Hard copies available at the Town Hall, Library, Senior Center, & Community Recreation Association.
- Complete the Google Form on the Town's website or at designated locations to provide feedback.

WHEN?

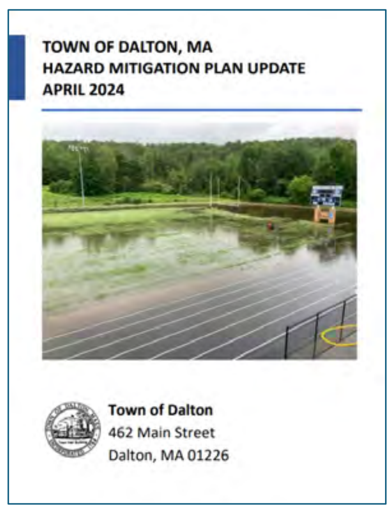
- Commentary Period: **April 23, 2024 – May 7, 2024**

WHY?

- Strengthen our community's resilience to natural hazards and climate change impacts, such as flooding, snowstorms, high winds, and extreme temperatures.

CONTACT FOR INQUIRIES

- Glenn Lagerwall, Emergency Management Director
- Phone: 413-684-6111
- Email: em@dalton-ma.gov



FOR IMMEDIATE RELEASE

The Town of Dalton Invites Community Input on Hazard Mitigation Plan Update

Dalton, Massachusetts – April 22, 2024

The Hazard Mitigation Planning Committee of Dalton has developed a comprehensive Hazard Mitigation Plan that identifies and prioritizes strategies to mitigate the impacts of natural hazards and climate change on our community.

Engage with the Draft Plan:

- Online Access: Visit the Town's website at https://dalton-ma.gov/ to review the draft plan.
- In-Person Review: Hard copies are available for review at the Town Hall located at 462 Main Street, Dalton, MA 01226, the Library, Senior Center, and Community Recreation Association.

Commentary Period: April 23, 2024 – May 7, 2024

How to Provide Feedback:

- Complete the Google Form provided on the Town's website and available in hard copy at the designated viewing locations.

Dalton's Hazard Mitigation Planning Committee has developed this plan as a strategy for our Town against existing and future natural hazard threats and the evolving challenges posed by climate change. Implementation of this plan will significantly enhance our resilience to hazards such as flooding, snowstorms, high winds, and extreme temperatures.

Town officials and local stakeholders developed this plan with funding support from the Massachusetts Emergency Management Agency. Federal Emergency Management Agency (FEMA) approval, and Town adoption, of the Hazard Mitigation Plan Update allows the Town to pursue pre- and post-disaster hazard mitigation grant opportunities.

For Further Inquiries:

- **Glenn Lagerwall, Emergency Management Director**
- **Phone:** 413-684-6111
- **Email:** em@dalton-ma.gov

Public engagement lies at the core of our Hazard Mitigation Plan. It is imperative that this plan reflects the diverse perspectives and priorities of our community members as we move to mitigate risks posed by natural hazards and climate change.

The Town looks forward to a collaborative effort in building a resilient and secure future!
###

Appendix B. Mitigation Actions.

Priority Ranking Points

Table 72. Priority Ranking Points for each action.

Action #	Action Title	Hazards Addressed	Approximate Cost	Implementation Timeline	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
1	Collaborate with Crane Company to dredge Center Pond to improve capacity and mitigate the flood risk to Pomeroy Manor.	3	1	3	3	3	3	2	2	**20**
2	Conduct evacuation exercise with Pomeroy Manor residents and Pine Grove Manor residents.	3	3	3	3	3	3	0	2	**20**
3	Add a generator to the Senior Center so it can function as a heating and cooling center.	3	2	3	3	3	3	0	2	**19**
4	Identify the best way to mitigate risk to the Dalton Housing Authority and the main housing unit from potential flooding.	3	1	2	3	3	3	0	2	**17**
5	Evaluate Craneville Elementary School as a possible primary shelter; conduct a feasibility/cost	3	1	2	3	3	3	0	2	**17**

Action #	Action Title	Hazards Addressed	Approximate Cost	Implementation Timeline	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
	study that includes wiring of building for a generator.									
6	Develop an education program that includes knowing your neighbors.	3	3	3	3	3	0	0	2	**17**
7	Increase enrollment and awareness in Code Red.	3	3	3	3	3	0	0	2	**17**
8	Continue to utilize Stormwater Management Committee to reduce stormwater runoff. Remind residents that there is a stormwater hotline call in number for potential pollution discharges; could be used to also report culverts or storm drains clogged or not properly functioning	3	3	3	0	1	3	2	2	**17**
9	Develop a system to effectively communicate with residents so they may understand risks and how to mitigate them.	3	3	3	2	3	0	0	2	**16**
10	Evaluate the capacity of critical facilities to withstand small to moderate earthquakes.	1	2	2	2	3	3	0	2	**15**

Action #	Action Title	Hazards Addressed	Approximate Cost	Implementation Timeline	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
11	Mitigate flood risk to the Walker Brook area.	3	1	2	0	2	3	2	2	**15**
12	Develop a study to Identify historic structures, businesses and critical facilities located in hazard prone areas, including floodplains and dam failure inundation areas.	3	3	3	0	1	3	0	2	**15**
13	Upgrade or replace culverts based on annual inspection and need.	3	1	1	0	2	3	0	2	**12**
14	Utilize the annual statistical water report to promote the water conservation program and to raise awareness of the importance of reducing demand on water and protecting the water supply.	2	3	1	0	2	0	2	2	**12**
15	Educate residents about the local landslide risk and how to identify high hazard areas and mitigate their risk.	2	3	2	2	1	0	0	2	**12**
16	Monitor wooded areas for impacts from invasive species or	2	3	2	0	1	0	2	2	**12**

Action #	Action Title	Hazards Addressed	Approximate Cost	Implementation Timeline	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
	drought and take action to mitigate wildfire/brushfire risk as needed.									
17	Establish communication with MassDOT on assessment of bridges for condition of both bridge structure and infrastructure attached.	3	1	1	0	1	3	0	2	**11**
18	Update online ArcGIS to include all critical facilities and hazard areas of concern; train key staff.	3	3	3	0	0	0	0	2	**11**
19	Protect open space and water supply areas from invasive species.	2	2	1	0	1	0	2	2	**10**
20	Reduce excess dry timber in the Pines to reduce wildfire risk.	2	2	1	0	1	0	2	2	**10**

Types of Mitigation Actions

Table 73. Mitigation Actions Sorted by Type.

Mitigation Category	Action #	Action Title
Plans and Regulations	12	Develop a study to Identify historic structures, businesses and critical facilities located in hazard prone areas, including floodplains and dam failure inundation areas.
	18	Update online ArcGIS to include all critical facilities and hazard areas of concern; train key staff.
Structure and Infrastructure	1	Collaborate with Crane Company to dredge Center Pond to improve capacity and mitigate the flood risk to Pomeroy Manor.
	3	Add a generator to the Senior Center so it can function as a heating and cooling center.
	4	Identify the best way to mitigate risk to the Dalton Housing Authority and the main housing unit from potential flooding.
	5	Evaluate Craneville Elementary School as a possible primary shelter; conduct a feasibility/cost study that includes wiring of building for a generator.
	10	Evaluate the capacity of critical facilities to withstand small to moderate earthquakes.
	11	Mitigate flood risk to the Walker Brook area.
	13	Upgrade or replace culverts based on annual inspection and need.
	17	Establish communication with MassDOT on assessment of bridges for condition of both bridge structure and infrastructure attached.
Natural Resources Protection	8	Continue to utilize Stormwater Management Committee to reduce stormwater runoff. Remind residents of the stormwater hotline for potential pollution discharges; could also be used to report culverts or storm drains clogged or not properly functioning.
	14	Utilize the annual statistical water report to promote the water conservation program and to raise awareness of the importance of reducing demand on water and protecting the water supply.
	16	Monitor wooded areas for impacts from invasive species or drought and take action to mitigate wildfire/brushfire risk as needed.
	19	Protect open space and water supply areas from invasive species.

Mitigation Category	Action #	Action Title
	20	Reduce excess dry timber in the Pines to reduce wildfire risk.
Education and Awareness Programs	2	Conduct evacuation exercise with Pomeroy Manor residents and Pine Grove Manor residents.
	6	Develop an education program that includes knowing your neighbors.
	7	Increase enrollment and awareness in Code Red.
	9	Develop a system to effectively communicate with residents so they may understand risks and how to mitigate them.
	15	Educate residents about the local landslide risk and how to identify high hazard areas and mitigate their risk.

Actions Sorted by Goal Statement

Table 74. Mitigation Actions Sorted by Goal Statement and Priority.

Goal Category	Action #	Action Title
Save Lives and Property	3	Add a generator to the Senior Center so it can function as a heating and cooling center.
	4	Identify the best way to mitigate risk to the Dalton Housing Authority and the main housing unit from potential flooding.
Infrastructure	5	Evaluate Craneville Elementary School as a possible primary shelter; conduct a feasibility/cost study that includes wiring of building for a generator.
	10	Evaluate the capacity of critical facilities to withstand small to moderate earthquakes.
	11	Mitigate flood risk to the Walker Brook area.
	13	Upgrade or replace culverts based on annual inspection and need.
	17	Establish communication with MassDOT on assessment of bridges for condition of both bridge structure and infrastructure attached.
Capacity	1	Collaborate with Crane Company to dredge Center Pond to improve capacity and mitigate the flood risk to Pomeroy Manor.
	12	Develop a study to Identify historic structures, businesses and critical facilities located in hazard prone areas, including floodplains and dam failure inundation areas.
	18	Update online ArcGIS to include all critical facilities and hazard areas of concern; train key staff.
Natural Resources	8	Continue to utilize Stormwater Management Committee to reduce stormwater runoff. Remind residents that there is a stormwater hotline call in number for potential pollution discharges; could be used to also report culverts or storm drains clogged or not pr
	14	Utilize the annual statistical water report to promote the water conservation program and to raise awareness of the importance of reducing demand on water and protecting the water supply.
	16	Monitor wooded areas for impacts from invasive species or drought and take action to mitigate wildfire/brushfire risk as needed.
	19	Protect open space and water supply areas from invasive species.
	20	Reduce excess dry timber in the Pines to reduce wildfire risk.

Goal Category	Action #	Action Title
Education	2	Conduct evacuation exercise with Pomeroy Manor residents and Pine Grove Manor residents.
	6	Develop an education program that includes knowing your neighbors.
	7	Increase enrollment and awareness in Code Red.
	9	Develop a system to effectively communicate with residents so they may understand risks and how to mitigate them.
	15	Educate residents about the local landslide risk and how to identify high hazard areas and mitigate their risk.

Actions Sorted by Hazard

Table 75. Mitigation Actions Sorted by Hazard.

Specific Hazards Addressed	Action #	Action Title
All hazards	7	Increase enrollment and awareness in Code Red.
	9	Develop a system to effectively communicate with residents so they may understand risks and how to mitigate them.
	18	Update online ArcGIS to include all critical facilities and hazard areas of concern; train key staff.
Drought, Invasive Species	14	Utilize the annual statistical water report to promote the water conservation program and to raise awareness of the importance of reducing demand on water and protecting the water supply.
Earthquakes	10	Evaluate the capacity of critical facilities to withstand small to moderate earthquakes.
Extreme Temperatures, Earthquake, Hurricane/Tropical Storm, Other Severe Weather, Severe Winter Storms, Tornadoes	3	Add a generator to the Senior Center so it can function as a heating and cooling center.
	5	Evaluate Craneville Elementary School as a possible primary shelter; conduct a feasibility/cost study that includes wiring of building for a generator.
	17	Establish communication with MassDOT on assessment of bridges for condition of both bridge structure and infrastructure attached.
Flooding, Extreme Temperatures, Hurricanes/Tropical Storms, Other Severe Weather, Severe Winter Storms	11	Mitigate flood risk to the Walker Brook area.
Flooding, Extreme Temperatures, Severe Storms, Tornadoes, Wildfires	2	Conduct evacuation exercise with Pomeroy Manor residents and Pine Grove Manor residents.
Flooding, Hurricanes/Tropical Storms, Other Severe Weather, Severe Winter Storms, Tornadoes	1	Collaborate with Crane Company to dredge Center Pond to improve capacity and mitigate the flood risk to Pomeroy Manor.
	4	Identify the best way to mitigate risk to the Dalton Housing Authority and the main housing unit from potential flooding.
	12	Develop a study to Identify historic structures, businesses and critical facilities located in hazard prone areas, including floodplains and dam failure inundation areas.

Specific Hazards Addressed	Action #	Action Title
Flooding, Other Severe Storms, Severe Winter Storms, Hurricanes/Tropical Storms, Tornadoes	6	Develop an education program that includes knowing your neighbors.
	8	Continue to utilize Stormwater Management Committee to reduce stormwater runoff. Remind residents of the stormwater hotline for potential pollution discharges; could also be used to report culverts or storm drains clogged or not properly functioning.
	13	Upgrade or replace culverts based on annual inspection and need.
Invasive Species	19	Protect open space and water supply areas from invasive species.
Landslides	15	Educate residents about the local landslide risk and how to identify high hazard areas and mitigate their risk.
Wildfire/Brushfire, Drought, Invasive Species	16	Monitor wooded areas for impacts from invasive species or drought and take action to mitigate wildfire/brushfire risk as needed.
	20	Reduce excess dry timber in the Pines to reduce wildfire risk.

Actions Sorted by Lead Position

Table 76. Mitigation Actions Sorted by Action Lead.

Action Lead	Action #	Action Title
Building Inspector	10	Evaluate the capacity of critical facilities to withstand small to moderate earthquakes.
	12	Develop a study to Identify historic structures, businesses and critical facilities located in hazard prone areas, including floodplains and dam failure inundation areas.
	15	Educate residents about the local landslide risk and how to identify high hazard areas and mitigate their risk.
Conservation Commission Chair	19	Protect open space and water supply areas from invasive species.
Emergency Management Director	3	Add a generator to the Senior Center so it can function as a heating and cooling center.
	5	Evaluate Craneville Elementary School as a possible primary shelter; conduct a feasibility/cost study that includes wiring of building for a generator.
	6	Develop an education program that includes knowing your neighbors.
	7	Increase enrollment and awareness in Code Red.
	9	Develop a system to effectively communicate with residents so they may understand risks and how to mitigate them.
	18	Update online ArcGIS to include all critical facilities and hazard areas of concern; train key staff.
Executive Director, Dalton Housing Authority	4	Identify the best way to mitigate risk to the Dalton Housing Authority and the main housing unit from potential flooding.
Fire Chief	2	Conduct evacuation exercise with Pomeroy Manor residents and Pine Grove Manor residents.
	14	Utilize the annual statistical water report to promote the water conservation program and to raise awareness of the importance of reducing demand on water and protecting the water supply.
Forest Warden	16	Monitor wooded areas for impacts from invasive species or drought and take action to mitigate wildfire/brushfire risk as needed.
Highway Superintendent	8	Continue to utilize Stormwater Management Committee to reduce stormwater runoff. Remind residents that there is a stormwater hotline call in number for potential pollution discharges; could be used to also report culverts or storm drains clogged or not properly functioning

Action Lead	Action #	Action Title
	13	Upgrade or replace culverts based on annual inspection and need.
	17	Establish communication with MassDOT on assessment of bridges for condition of both bridge structure and infrastructure attached.
Town Manager	1	Collaborate with Crane Company to dredge Center Pond to improve capacity and mitigate the flood risk to Pomeroy Manor.
	11	Mitigate flood risk to the Walker Brook area.
Green Committee Chair	20	Reduce excess dry timber in the Pines to reduce wildfire risk.

Actions Sorted by Implementation Schedule

Table 77. Mitigation Actions Sorted by Implementation Schedule.

Implementation Schedule	Action #	Action Title
2024	3	Add a generator to the Senior Center so it can function as a heating and cooling center.
2024-2025	1	Collaborate with Crane Company to dredge Center Pond to improve capacity and mitigate the flood risk to Pomeroy Manor.
	2	Conduct evacuation exercise with Pomeroy Manor residents and Pine Grove Manor residents.
	6	Develop an education program that includes knowing your neighbors.
	7	Increase enrollment and awareness in Code Red.
	8	Continue to utilize Stormwater Management Committee to reduce stormwater runoff. Remind residents that there is a stormwater hotline call in number for potential pollution discharges; could be used to also report culverts or storm drains clogged or not pr
	9	Develop a system to effectively communicate with residents so they may understand risks and how to mitigate them.
	12	Develop a study to Identify historic structures, businesses and critical facilities located in hazard prone areas, including floodplains and dam failure inundation areas.
	18	Update online ArcGIS to include all critical facilities and hazard areas of concern; train key staff.
2024-2026	4	Identify the best way to mitigate risk to the Dalton Housing Authority and the main housing unit from potential flooding.
	5	Evaluate Craneville Elementary School as a possible primary shelter; conduct a feasibility/cost study that includes wiring of building for a generator.
2024-2027	11	Mitigate flood risk to the Walker Brook area.
2024-2028	13	Upgrade or replace culverts based on annual inspection and need.
	14	Utilize the annual statistical water report to promote the water conservation program and to raise awareness of the importance of reducing demand on water and protecting the water supply.
	17	Establish communication with MassDOT on assessment of bridges for condition of both bridge structure and infrastructure attached.
2025-2028	19	Protect open space and water supply areas from invasive species.
2025-2029	20	Reduce excess dry timber in the Pines to reduce wildfire risk.
2026-2028	15	Educate residents about the local landslide risk and how to identify high hazard areas and mitigate their risk.

Implementation Schedule	Action #	Action Title
	16	Monitor wooded areas for impacts from invasive species or drought and take action to mitigate wildfire/brushfire risk as needed.
2027-2029	10	Evaluate the capacity of critical facilities to withstand small to moderate earthquakes.

Appendix C. Plan Implementation and Review Supporting Materials.

Plan Update Evaluation Worksheet

Table 78. Plan Update Evaluation Worksheet.

Plan Section	Considerations	Explanation
Planning Process	Should the town invite any additional stakeholders to participate in the planning process? What public outreach activities have occurred? How can public involvement be improved?	
Risk Assessment	What disasters has the town, or the region experienced? Should the list of hazards be modified? Are new data sources, maps or studies available? If so, what have they revealed, and should the information be incorporated into the plan update? Has development in the region occurred and could it create or reduce risk?	
Capability Assessment	Has the town adopted new policies, plans, regulations, or reports that could be incorporated into this plan? Are there different or additional administrative, human, technical, and financial resources available for mitigation planning? Are there different or new education and outreach programs and resources available for mitigation activities?	
Mitigation Strategy	Is the mitigation strategy being implemented as anticipated? Were the cost and timeline estimate accurate? Should new mitigation actions be added to the Action Plan? Should existing mitigation actions be revised or removed from the plan? Are there new obstacles that were not anticipated in the plan that will need to be considered in the next plan update? Are there new funding sources to consider? Have elements of the plan been incorporated into other planning mechanisms?	
Implementation Plan	Was the plan monitored and evaluated as anticipated? What are needed improvements to the plan implementation procedures?	

Mitigation Action Progress Worksheet

Table 79. Mitigation Action Progress Worksheet.

<table>
<tr><th colspan="5">Mitigation Action Progress Worksheet</th></tr>
<tr><td>Progress Report Period</td><td colspan="2">From Date</td><td colspan="2">To Date</td></tr>
<tr><td>Action/Project Title</td><td colspan="4"></td></tr>
<tr><td>Responsible Department</td><td colspan="4"></td></tr>
<tr><td>Contact Name</td><td colspan="4"></td></tr>
<tr><td>Contact Phone/Email</td><td colspan="4"></td></tr>
<tr><td>Project Description</td><td colspan="4"></td></tr>
<tr><td>Project Goal</td><td colspan="4"></td></tr>
<tr><td>Project Objective</td><td colspan="4"></td></tr>
<tr><td>Project Cost</td><td colspan="4"></td></tr>
<tr><td colspan="5">Project Status</td></tr>
<tr><td>Date of Project Approval</td><td>Date of Project Start</td><td>Anticipated Date of Completion</td><td>Project Canceled</td><td>Project Delayed</td></tr>
<tr><td colspan="5">Explanation of Delay or Cost Overruns</td></tr>
<tr><td colspan="5">Project Report Summary</td></tr>
<tr><td colspan="5">What was accomplished for this project during this reporting period?</td></tr>
<tr><td colspan="5">What obstacles, problems, or delays did the project encounter?</td></tr>
<tr><td colspan="5">Plans for next reporting period.</td></tr>
</table>

Appendix D. Hazus Reports

Hazus: Flood Global Risk Report

Region Name: Dalton_Flood

Flood Scenario: 100year

Print Date: Sunday, November 26, 2023

Disclaimer:
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is approximately 2 square miles and contains 137 census blocks. The region contains over 3 thousand households and has a total population of 6,312 people. The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 2,621 buildings in the region with a total building replacement value (excluding contents) of 1,371 million dollars. Approximately 89.93% of the buildings (and 66.62% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 2,621 buildings in the region which have an aggregate total replacement value of 1,371 million dollars. Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	913,428	66.6%
Commercial	211,637	15.4%
Industrial	99,092	7.2%
Agricultural	3,642	0.3%
Religion	25,735	1.9%
Government	41,347	3.0%
Education	76,201	5.6%
Total	**1,371,082**	**100%**

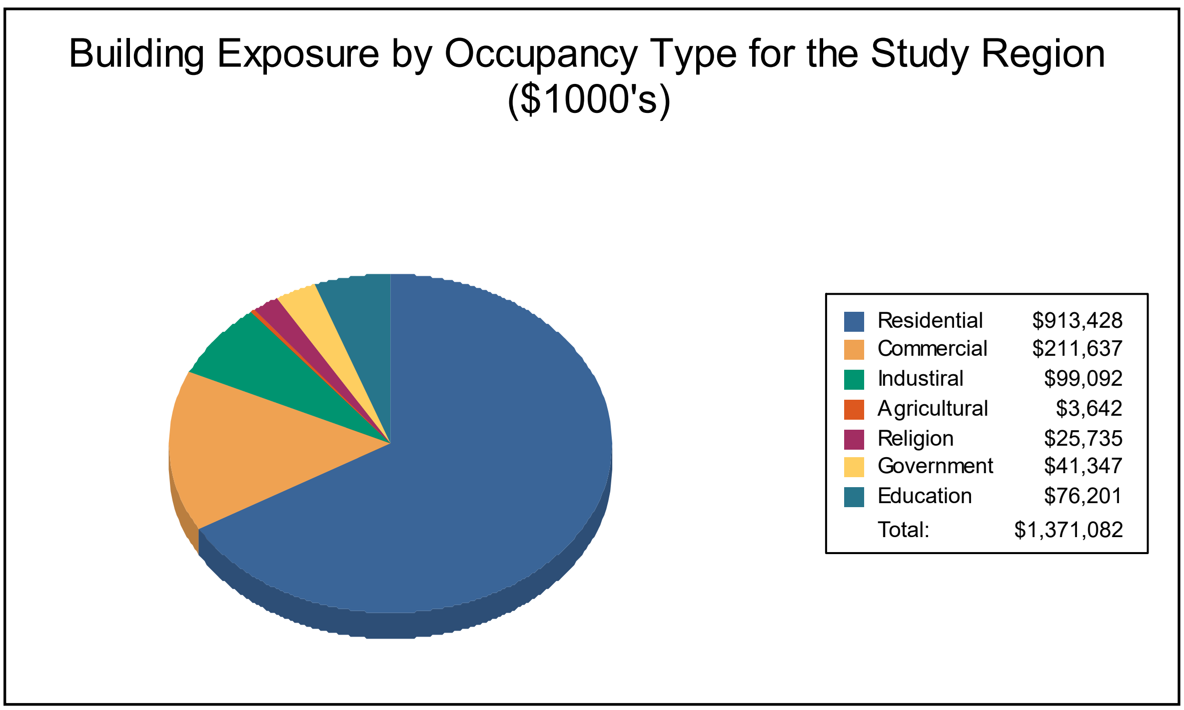
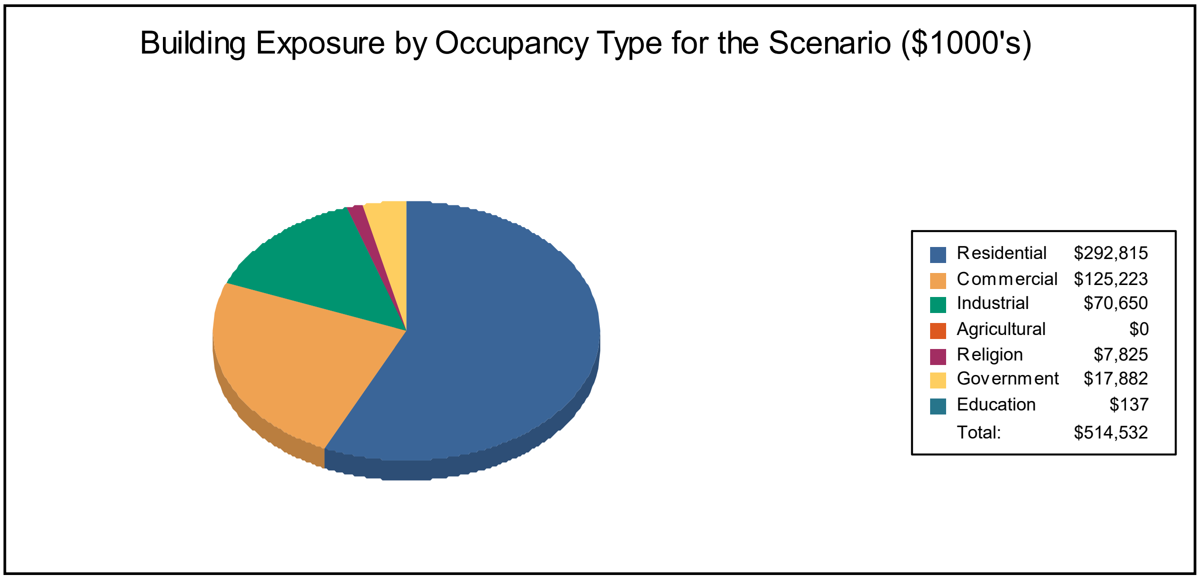


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	292,815	56.9%
Commercial	125,223	24.3%
Industrial	70,650	13.7%
Agricultural	0	0.0%
Religion	7,825	1.5%
Government	17,882	3.5%
Education	137	0.0%
Total	**514,532**	**100%**



Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 4 schools, 1 fire station, 1 police station and 2 emergency operation centers.

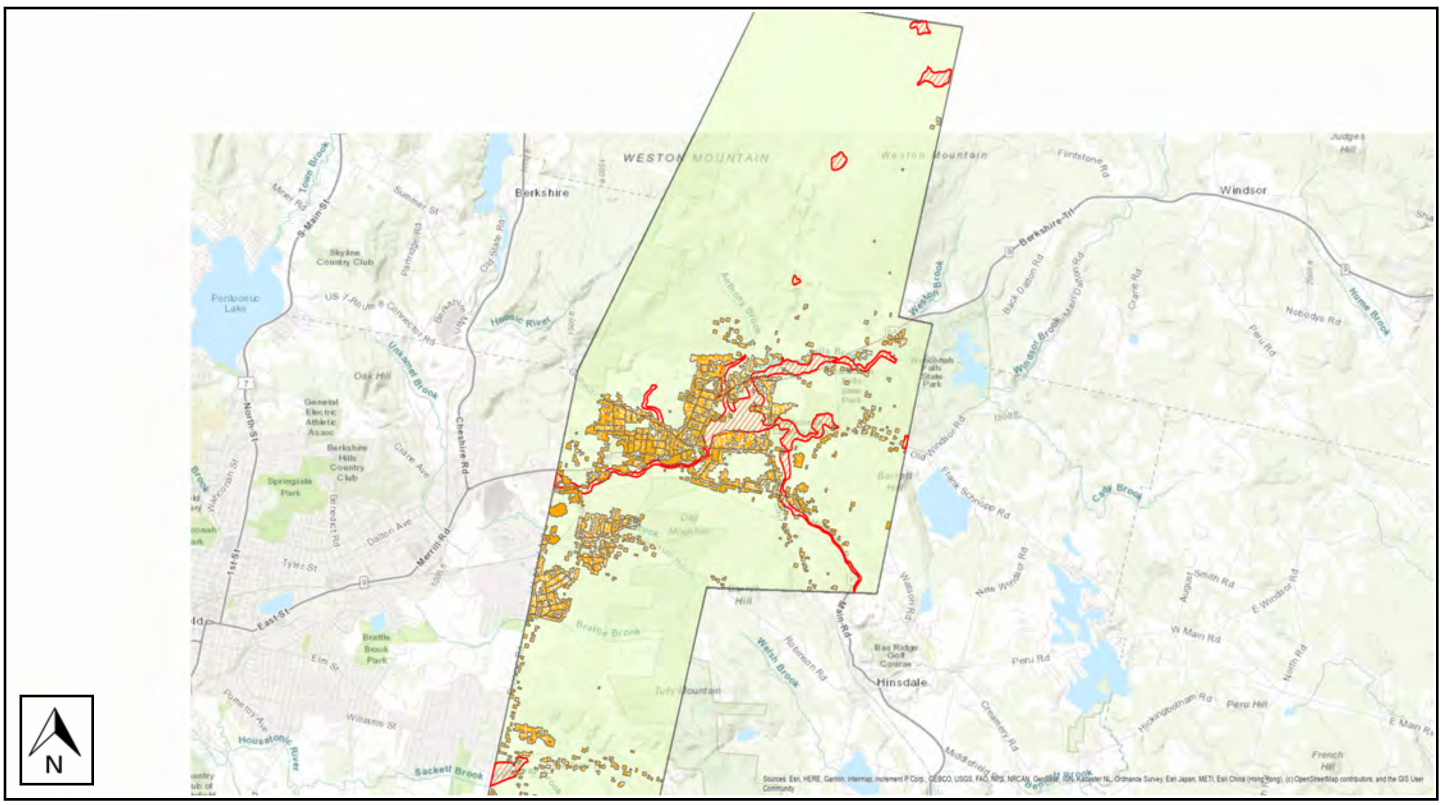
Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	Dalton_Flood
Scenario Name:	100year
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure



Building Damage

General Building Stock Damage

Hazus estimates that about 2 buildings will be at least moderately damaged. This is over 100% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Total Economic Loss (1 dot = $300K) Overview Map

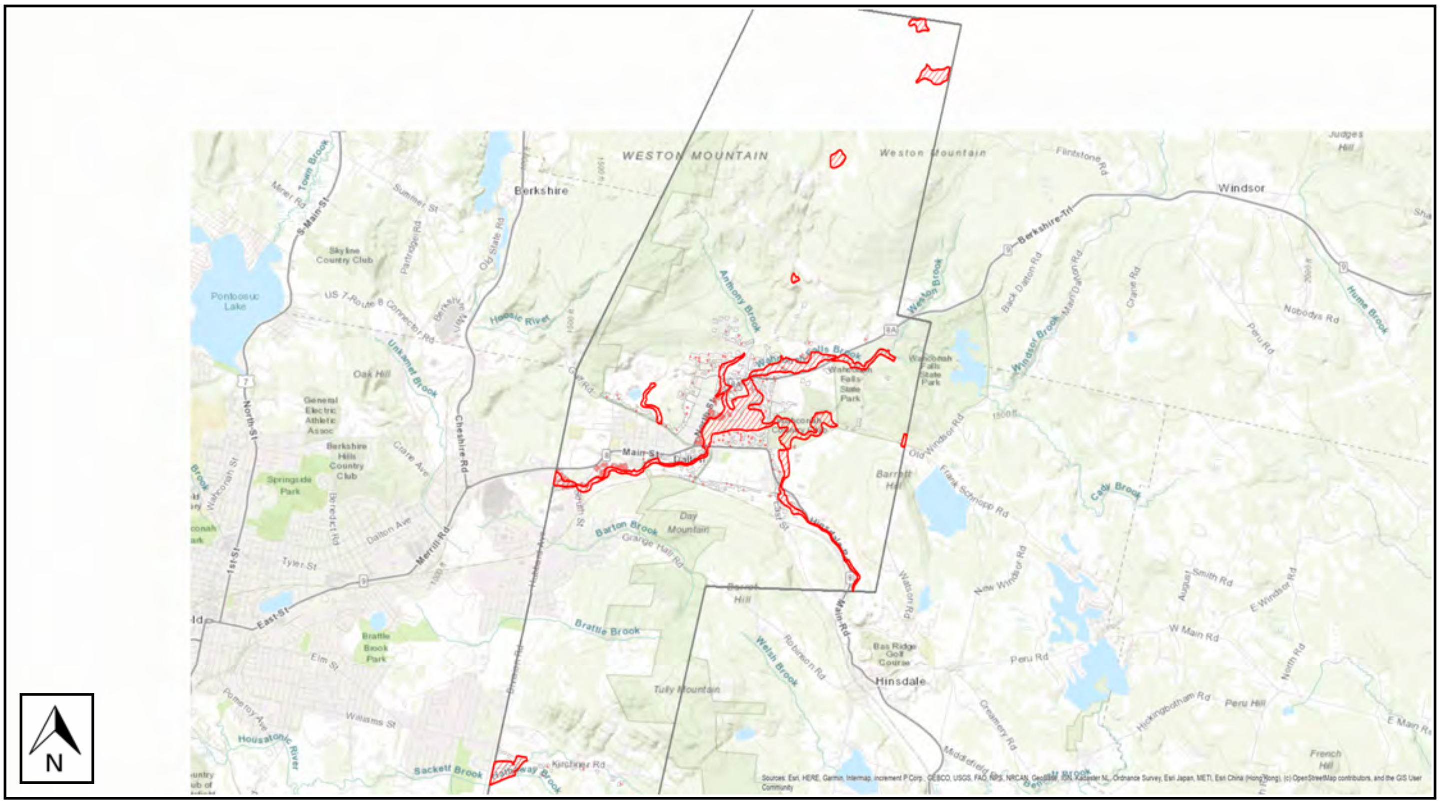


Table 3: Expected Building Damage by Occupancy

Occupancy	1-10 Count	1-10 (%)	11-20 Count	11-20 (%)	21-30 Count	21-30 (%)	31-40 Count	31-40 (%)	41-50 Count	41-50 (%)	>50 Count	>50 (%)
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	5	71	2	29	0	0	0	0	0	0	0	0
Total	**5**		**2**		**0**		**0**		**0**		**0**	

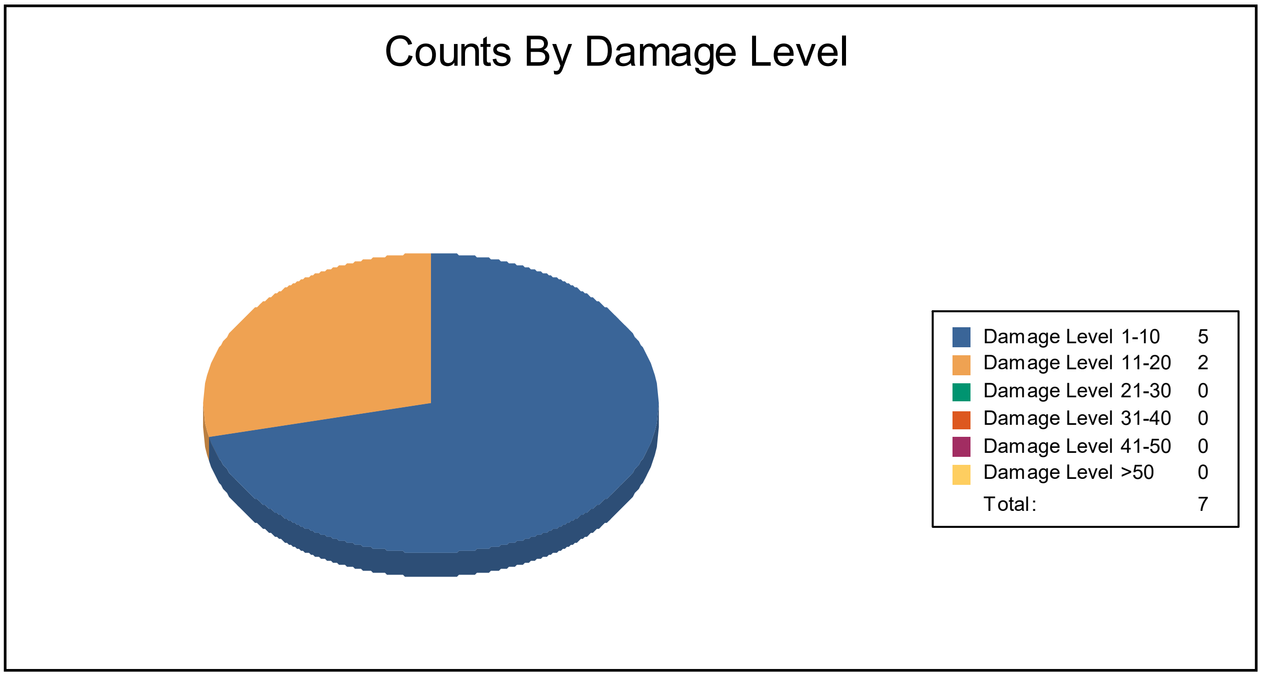


Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0	0	0	0	0	0	0	0	0	0	0
ManufHousing	0	0	0	0	0	0	0	0	0	0	0	0
Masonry	0	0	0	0	0	0	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	5	71	2	29	0	0	0	0	0	0	0	0

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	2	0	0	0
Fire Stations	1	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	4	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

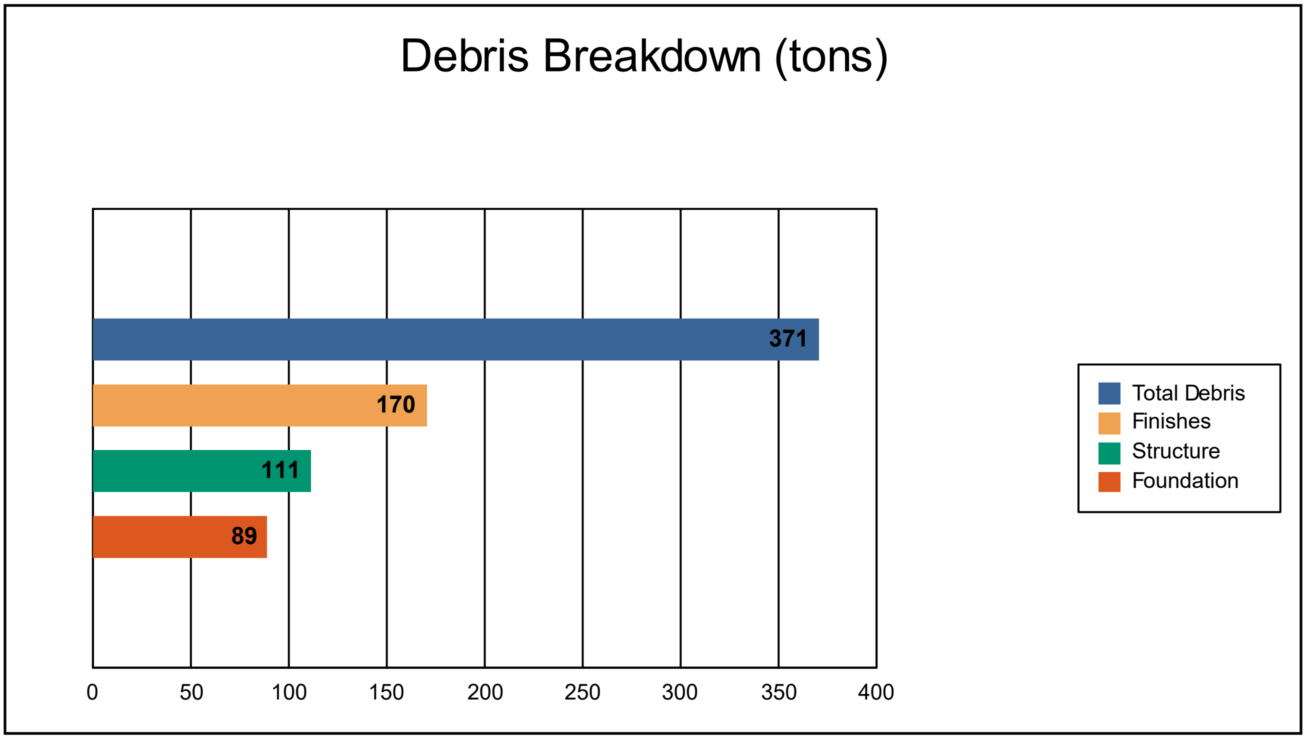
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

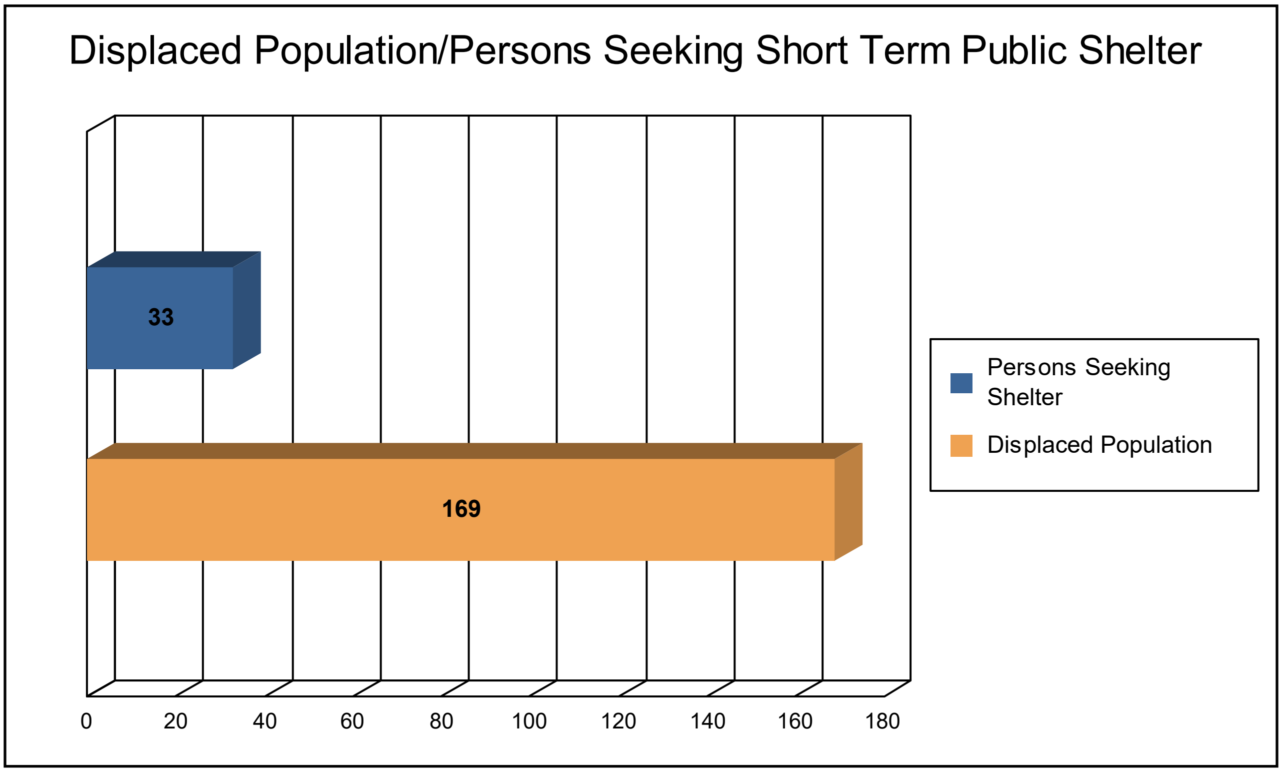


The model estimates that a total of 371 tons of debris will be generated. Of the total amount, Finishes comprises 46% of the total, Structure comprises 30% of the total, and Foundation comprises 24%. If the debris tonnage is converted into an estimated number of truckloads, it will require 15 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 56 households (or 169 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 33 people (out of a total population of 6,312) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 17.33 million dollars, which represents 3.37 % of the total replacement value of the scenario buildings.

Building-Related Losses

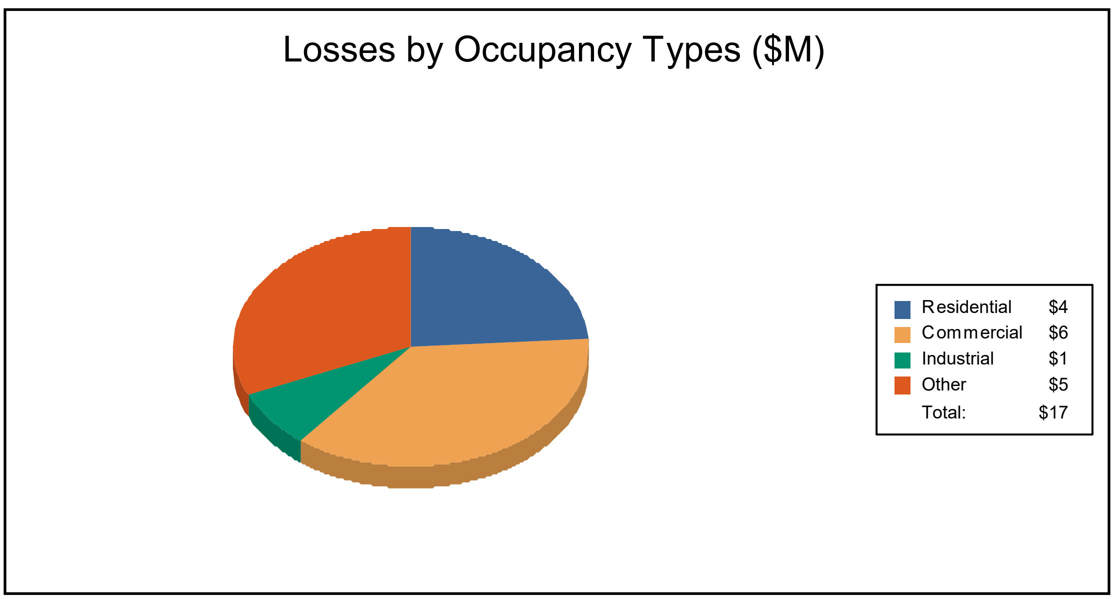
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 7.43 million dollars. 57% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 23.84% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	2.04	0.43	0.36	0.14	2.97
	Content	1.01	1.52	0.86	0.93	4.32
	Inventory	0.00	0.04	0.10	0.00	0.14
	Subtotal	**3.05**	**1.99**	**1.31**	**1.08**	**7.43**
Business Interruption						
	Income	0.09	2.22	0.01	0.29	2.60
	Relocation	0.56	0.20	0.02	0.24	1.02
	Rental Income	0.23	0.17	0.00	0.07	0.47
	Wage	0.20	1.80	0.02	3.80	5.81
	Subtotal	**1.08**	**4.39**	**0.04**	**4.39**	**9.90**
ALL	**Total**	**4.13**	**6.38**	**1.36**	**5.46**	**17.33**



Appendix A: County Listing for the Region

Massachusetts

- Berkshire

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Massachusetts				
Berkshire	6,312	913,428	457,654	1,371,082
Total	**6,312**	**913,428**	**457,654**	**1,371,082**
Total Study Region	**6,312**	**913,428**	**457,654**	**1,371,082**

Hazus: Hurricane Global Risk Report

Region Name: Dalton_Wind

Hurricane Scenario: Probabilistic 500-year Return Period

Print Date: Sunday, November 26, 2023

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 21.91 square miles and contains 1 census tracts. There are over 2 thousand households in the region and a total population of 6,312 people. The distribution of population by State and County is provided in Appendix B.

There are an estimated 2 thousand buildings in the region with a total building replacement value (excluding contents) of 1,371 million dollars. Approximately 90% of the buildings (and 67% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 2,621 buildings in the region which have an aggregate total replacement value of Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provi distribution of the building value by State and County.

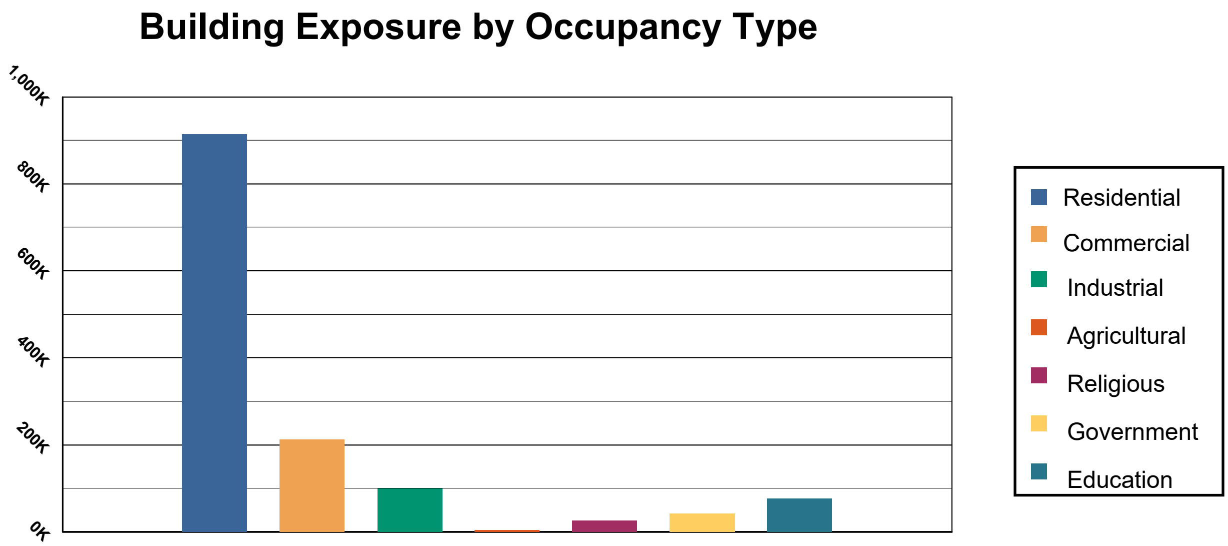


Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	913,428	66.62%
Commercial	211,637	15.44%
Industrial	99,092	7.23%
Agricultural	3,642	0.27%
Religious	25,735	1.88%
Government	41,347	3.02%
Education	76,201	5.56%
Total	**1,371,082**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 4 schools, 1 fire stations, 1 police stations and 2 emergency operation facilities.

Hurricane Scenario

Hazus used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 13 buildings will be at least moderately damaged. This is over 1% of the total number of buildings in the region. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

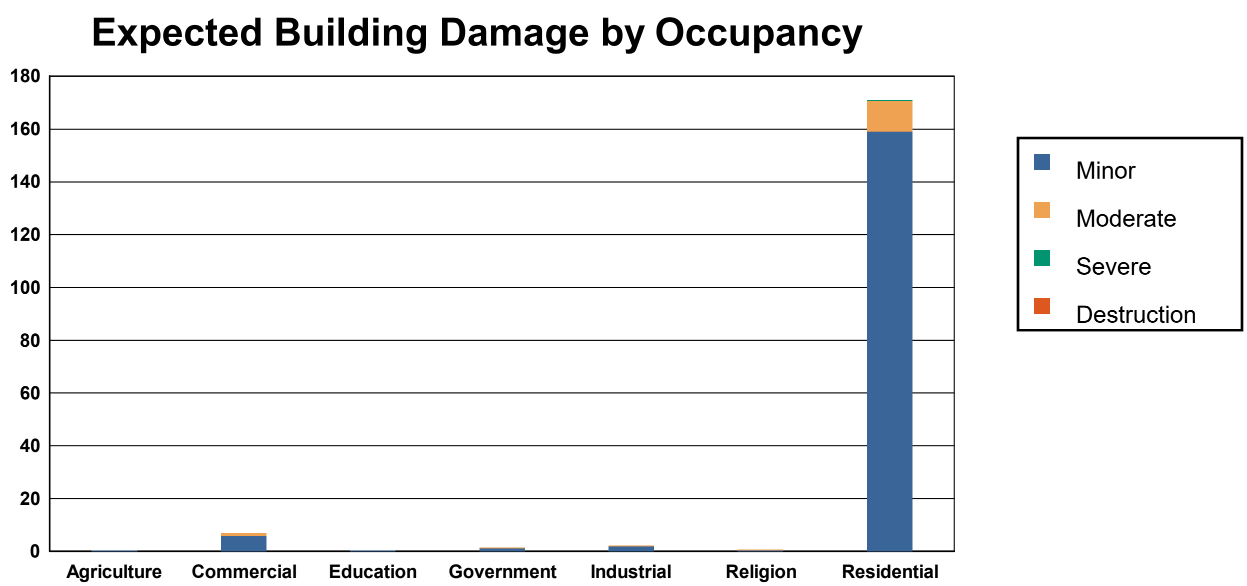


Table 2: Expected Building Damage by Occupancy : 500 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	5.64	94.08	0.29	4.81	0.05	0.77	0.02	0.32	0.00	0.02
Commercial	146.98	95.44	6.01	3.90	0.92	0.60	0.09	0.06	0.00	0.00
Education	4.81	96.22	0.18	3.62	0.01	0.17	0.00	0.00	0.00	0.00
Government	32.61	95.92	1.31	3.86	0.07	0.22	0.00	0.00	0.00	0.00
Industrial	48.95	95.98	1.86	3.64	0.16	0.32	0.03	0.06	0.00	0.00
Religion	13.43	95.91	0.55	3.94	0.02	0.16	0.00	0.00	0.00	0.00
Residential	2,186.14	92.75	159.09	6.75	11.50	0.49	0.21	0.01	0.07	0.00
Total	**2,438.57**		**169.29**		**12.73**		**0.35**		**0.07**	

Table 3: Expected Building Damage by Building Type : 500 - year Event

Building Type	None Count	None (%)	Minor Count	Minor (%)	Moderate Count	Moderate (%)	Severe Count	Severe (%)	Destruction Count	Destruction (%)
Concrete	21	96.08	1	3.71	0	0.21	0	0.00	0	0.00
Masonry	171	93.14	10	5.50	2	1.28	0	0.09	0	0.00
MH	18	98.74	0	0.92	0	0.24	0	0.00	0	0.09
Steel	106	96.02	4	3.45	1	0.47	0	0.06	0	0.00
Wood	2,016	92.90	147	6.75	8	0.35	0	0.00	0	0.00

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, none of the beds will be in service. By 30 days, none will be operational.

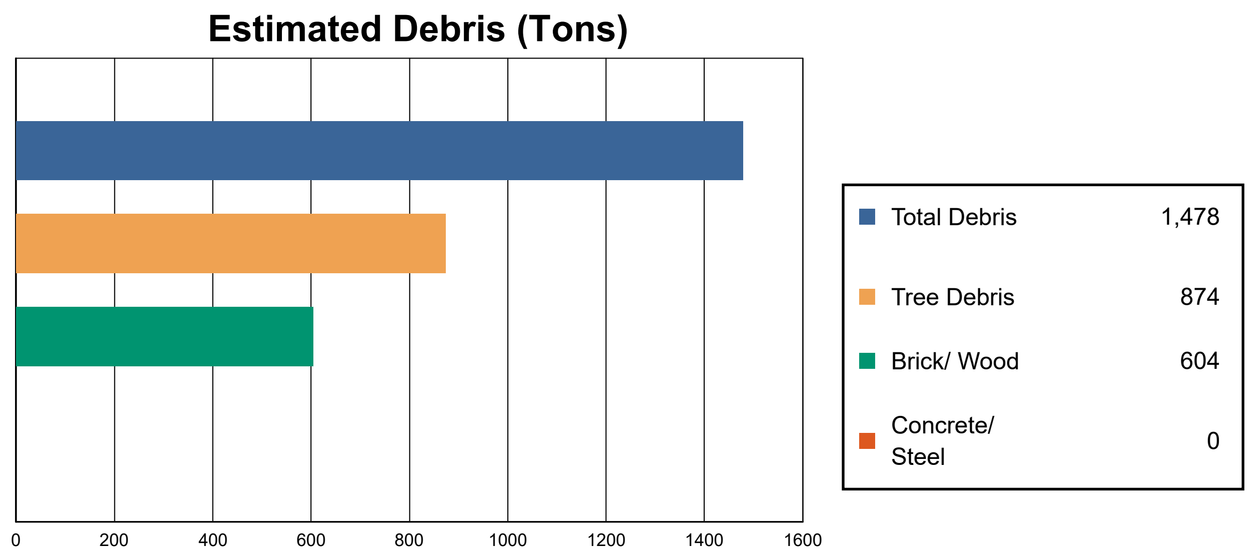
Thematic Map of Essential Facilities

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
EOCs	2	0	0	2
Fire Stations	1	0	0	1
Police Stations	1	0	0	1
Schools	4	0	0	4

Induced Hurricane Damage

Debris Generation

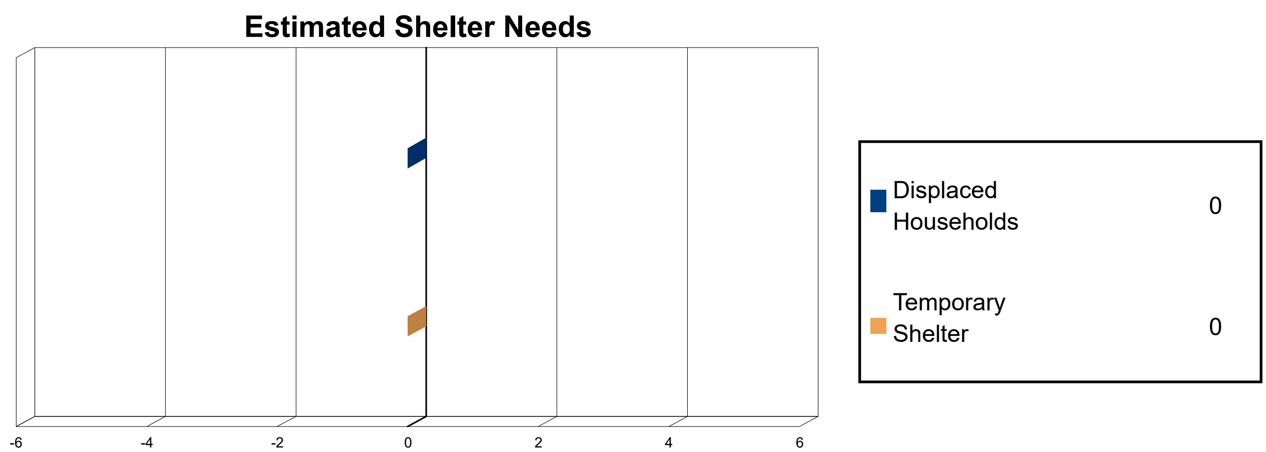


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 1,478 tons of debris will be generated. Of the total amount, 734 tons (50%) is Other Tree Debris. Of the remaining 744 tons, Brick/Wood comprises 81% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 24 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 140 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement



Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 0 households to be displaced due to the hurricane. Of these, 0 people (out of a total population of 6,312) will seek temporary shelter in public shelters.

Economic Loss

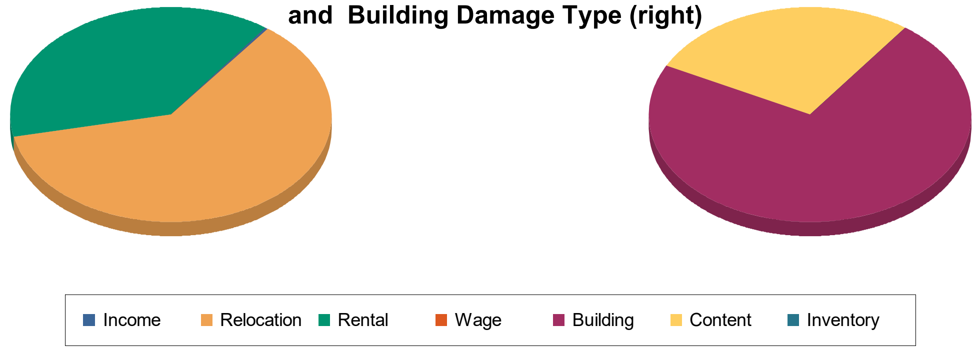
The total economic loss estimated for the hurricane is 11.5 million dollars, which represents 0.84 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 12 million dollars. 3% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 95% of the total loss. Table 5 below provides a summary of the losses associated with the building damage.

Loss by Business Interruption Type (left) and Building Damage Type (right)



Loss Type by General Occupancy

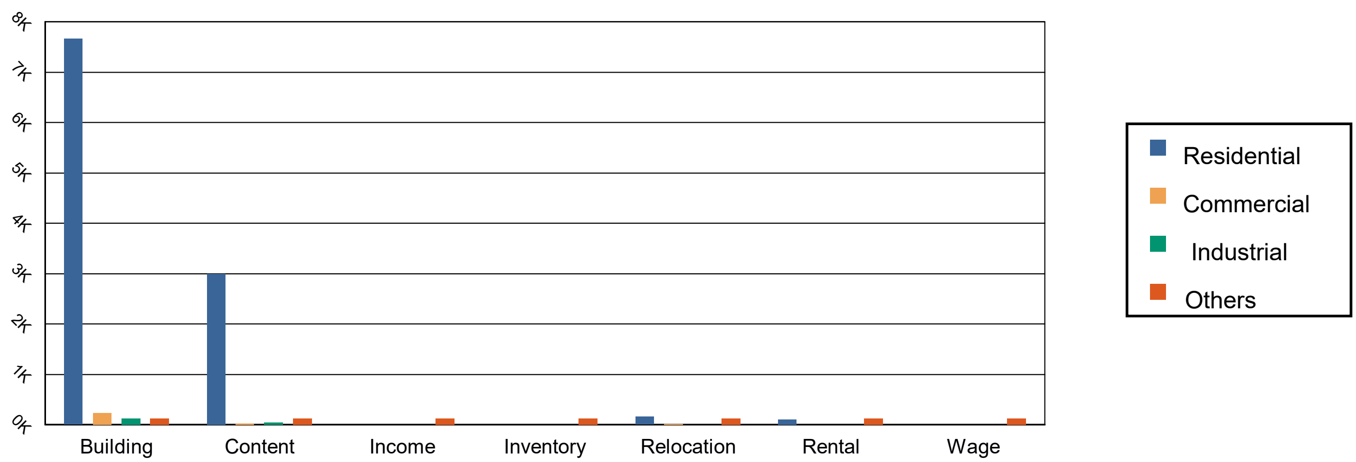


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	7,658.59	237.15	129.11	124.87	8,149.73
	Content	2,996.25	23.57	48.10	4.72	3,072.64
	Inventory	0.00	2.67	6.87	1.63	11.16
	Subtotal	**10,654.84**	**263.39**	**184.08**	**131.23**	**11,233.53**
Business Interruption Loss						
	Income	0.00	0.43	0.00	0.00	0.43
	Relocation	167.13	9.50	1.29	2.03	179.95
	Rental	111.41	0.21	0.00	0.02	111.64
	Wage	0.00	0.16	0.00	0.00	0.16
	Subtotal	**278.55**	**10.29**	**1.29**	**2.05**	**292.17**

Total

Total	**10,933.39**	**273.68**	**185.37**	**133.28**	**11,525.71**

Appendix A: County Listing for the Region

Massachusetts

- Berkshire

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Massachusetts				
Berkshire	6,312	913,428	457,654	1,371,082
Total	**6,312**	**913,428**	**457,654**	**1,371,082**
Study Region Total	**6,312**	**913,428**	**457,654**	**1,371,082**

Hazus: Hurricane Global Risk Report

Region Name: Dalton_Wind

Hurricane Scenario: Probabilistic 1000-year Return Period

Print Date: Sunday, November 26, 2023

Disclaimer:
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 21.91 square miles and contains 1 census tracts. There are over 2 thousand households in the region and a total population of 6,312 people. The distribution of population by State and County is provided in Appendix B.

There are an estimated 2 thousand buildings in the region with a total building replacement value (excluding contents) of 1,371 million dollars. Approximately 90% of the buildings (and 67% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 2,621 buildings in the region which have an aggregate total replacement value of Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provi distribution of the building value by State and County.

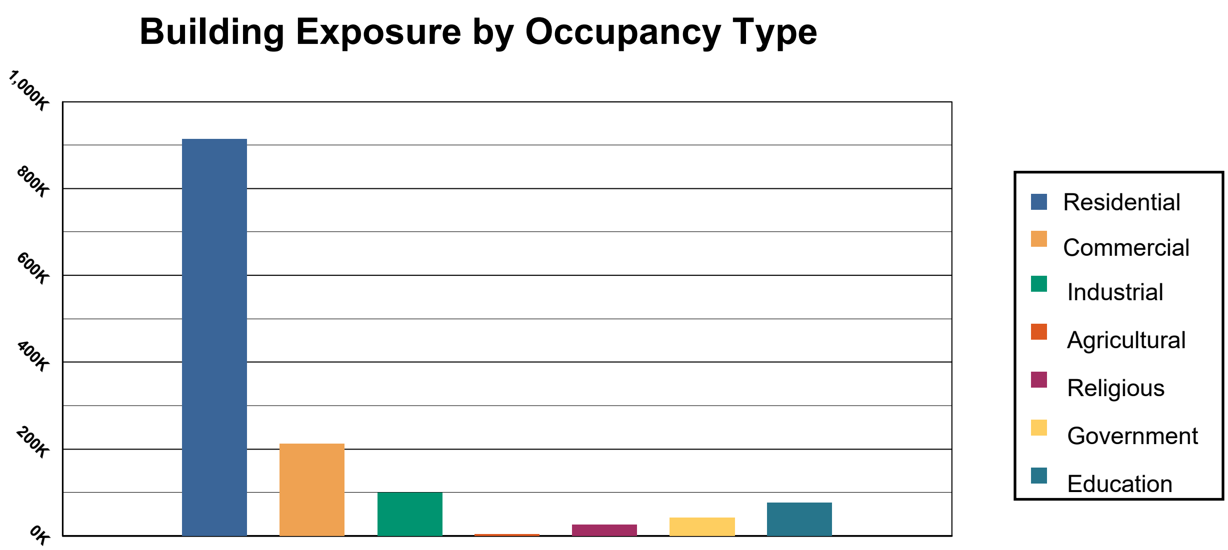


Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	913,428	66.62%
Commercial	211,637	15.44%
Industrial	99,092	7.23%
Agricultural	3,642	0.27%
Religious	25,735	1.88%
Government	41,347	3.02%
Education	76,201	5.56%
Total	**1,371,082**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 4 schools, 1 fire stations, 1 police stations and 2 emergency operation facilities.

Hurricane Scenario

Hazus used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 31 buildings will be at least moderately damaged. This is over 1% of the total number of buildings in the region. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

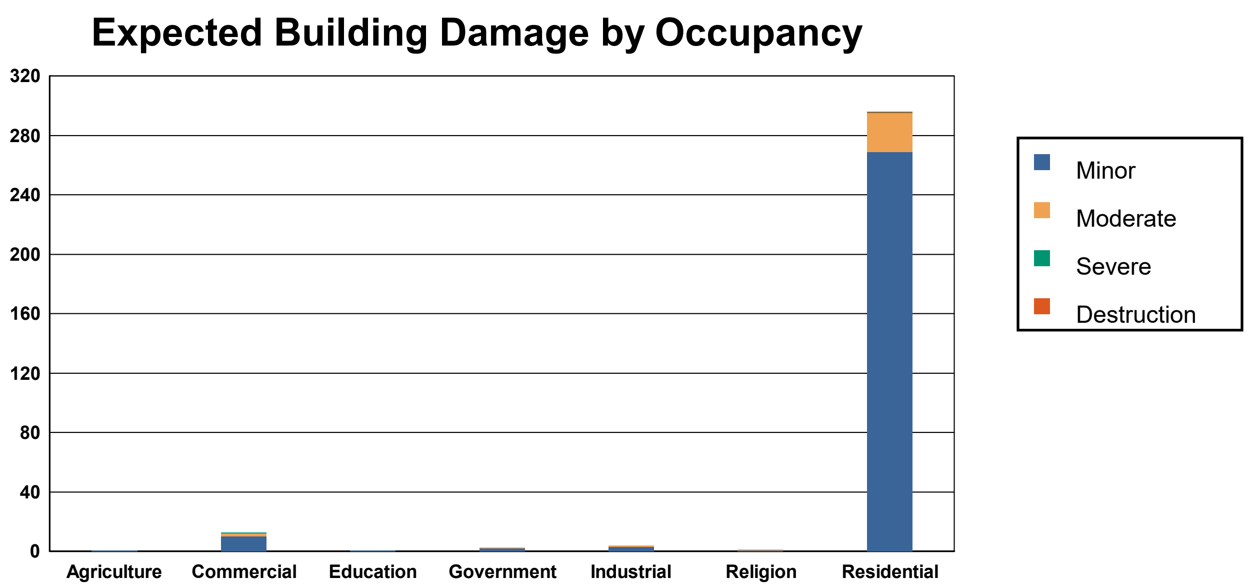


Table 2: Expected Building Damage by Occupancy : 1000 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	5.36	89.36	0.49	8.24	0.10	1.62	0.04	0.73	0.00	0.06
Commercial	141.44	91.85	10.33	6.71	1.95	1.27	0.27	0.17	0.00	0.00
Education	4.66	93.21	0.31	6.24	0.03	0.54	0.00	0.01	0.00	0.00
Government	31.52	92.71	2.23	6.55	0.25	0.72	0.01	0.02	0.00	0.00
Industrial	47.35	92.85	3.13	6.14	0.43	0.84	0.08	0.16	0.00	0.01
Religion	12.94	92.40	0.99	7.08	0.07	0.52	0.00	0.01	0.00	0.00
Residential	2,060.76	87.43	268.83	11.41	26.48	1.12	0.63	0.03	0.30	0.01
Total	**2,304.04**		**286.32**		**29.31**		**1.03**		**0.30**	

Table 3: Expected Building Damage by Building Type : 1000 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	20	93.09	1	6.21	0	0.69	0	0.01	0	0.00
Masonry	163	88.74	16	8.69	4	2.37	0	0.19	0	0.01
MH	17	96.96	0	2.03	0	0.72	0	0.01	0	0.28
Steel	102	92.96	6	5.79	1	1.08	0	0.17	0	0.00
Wood	1,899	87.53	251	11.56	19	0.88	0	0.01	0	0.02

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, none of the beds will be in service. By 30 days, none will be operational.

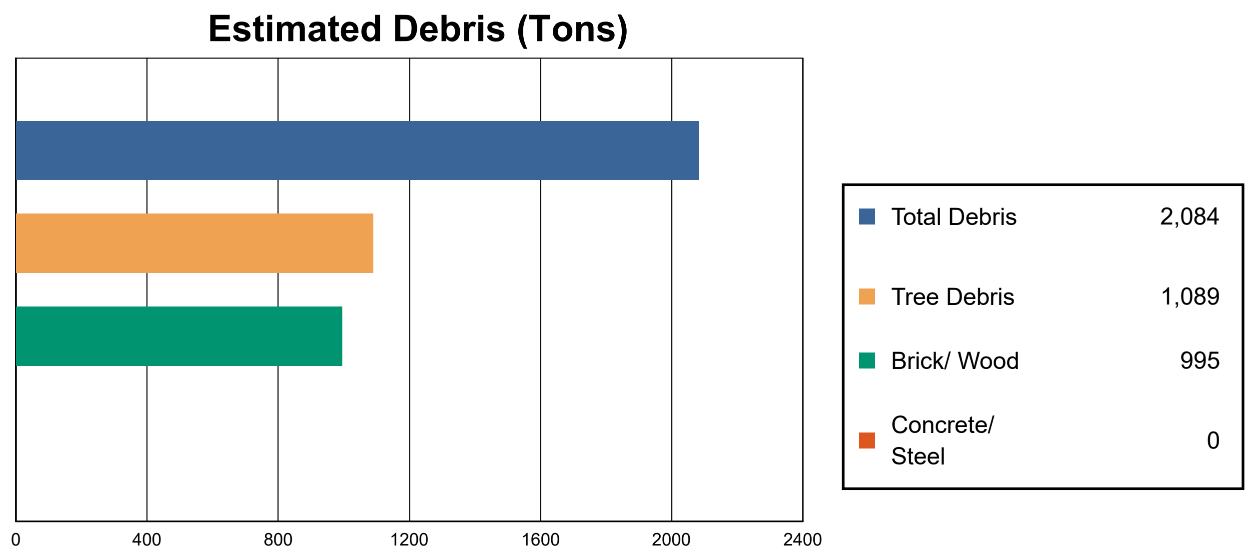
Thematic Map of Essential Facilities

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
EOCs	2	0	0	2
Fire Stations	1	0	0	1
Police Stations	1	0	0	1
Schools	4	0	0	4

Induced Hurricane Damage

Debris Generation

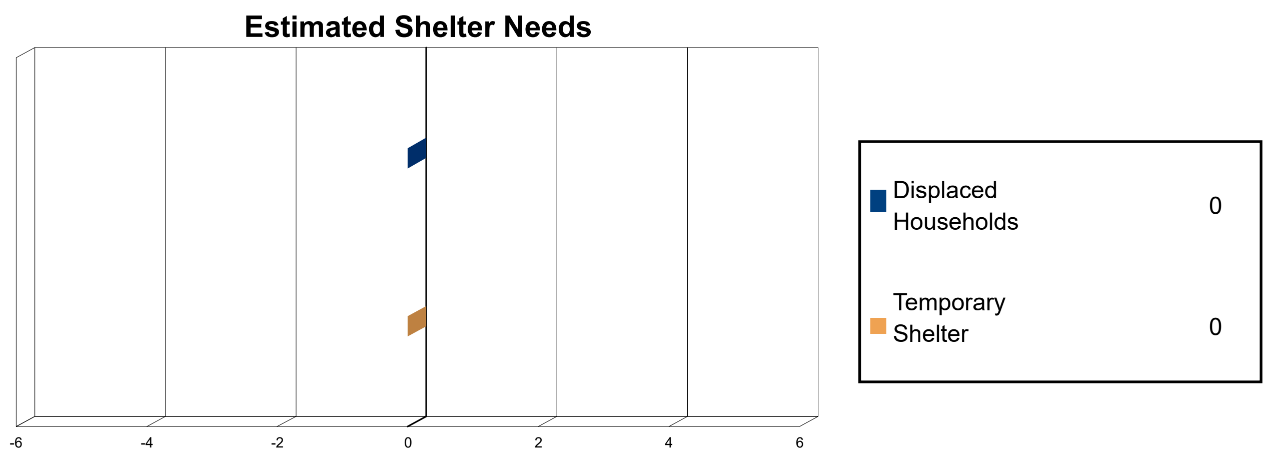


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 2,084 tons of debris will be generated. Of the total amount, 915 tons (44%) is Other Tree Debris. Of the remaining 1,169 tons, Brick/Wood comprises 85% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 40 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 174 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement



Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 0 households to be displaced due to the hurricane. Of these, 0 people (out of a total population of 6,312) will seek temporary shelter in public shelters.

Economic Loss

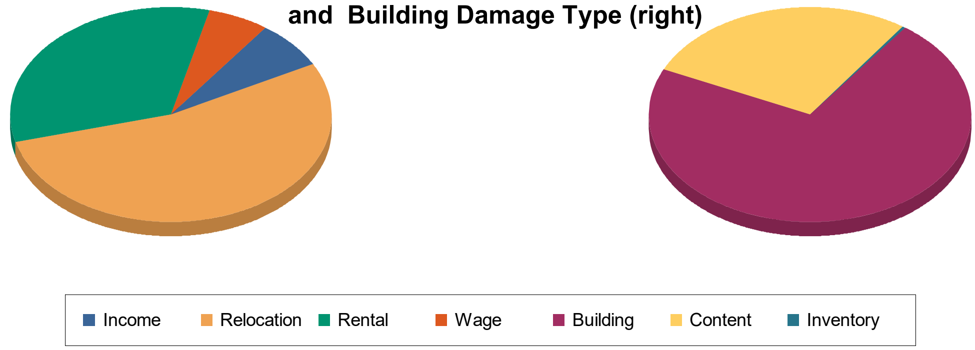
The total economic loss estimated for the hurricane is 17.4 million dollars, which represents 1.27 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 17 million dollars. 3% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 92% of the total loss. Table 5 below provides a summary of the losses associated with the building damage.

Loss by Business Interruption Type (left)
and Building Damage Type (right)



Loss Type by General Occupancy

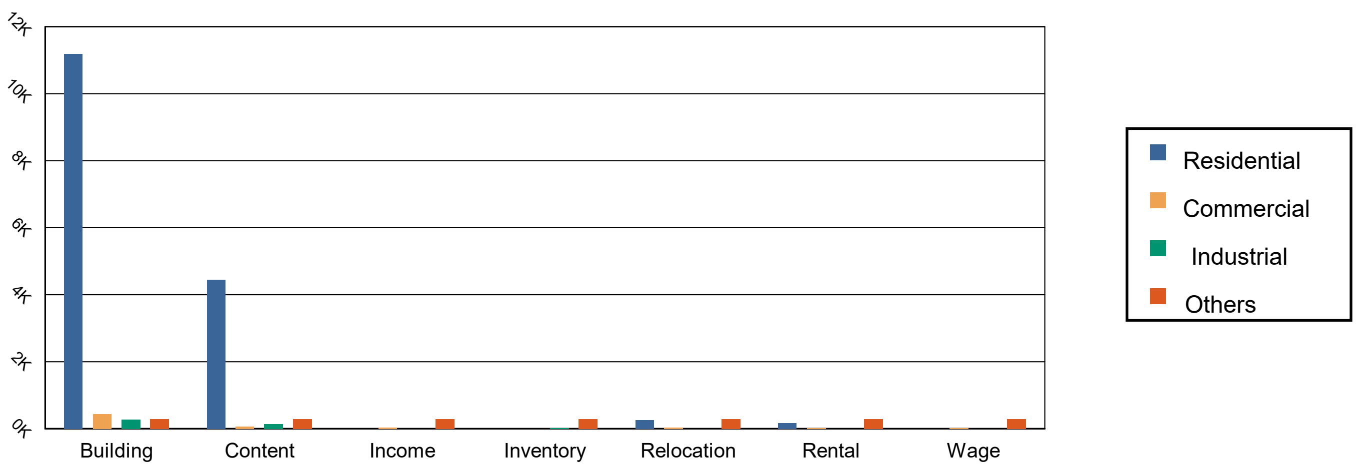


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	11,198.56	443.00	268.48	232.27	12,142.31
	Content	4,451.74	63.07	139.91	17.78	4,672.49
	Inventory	0.00	7.87	19.67	4.30	31.84
	Subtotal	**15,650.29**	**513.94**	**428.06**	**254.36**	**16,846.65**
Business Interruption Loss						
	Income	0.00	34.06	1.94	7.52	43.53
	Relocation	258.57	41.16	7.83	12.19	319.75
	Rental	178.33	17.32	1.32	0.64	197.60
	Wage	0.00	15.83	3.21	17.73	36.77
	Subtotal	**436.89**	**108.37**	**14.31**	**38.07**	**597.64**

Total

Total	**16,087.18**	**622.30**	**442.37**	**292.43**	**17,444.29**

Appendix A: County Listing for the Region

Massachusetts

- Berkshire

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Massachusetts				
Berkshire	6,312	913,428	457,654	1,371,082
Total	**6,312**	**913,428**	**457,654**	**1,371,082**
Study Region Total	**6,312**	**913,428**	**457,654**	**1,371,082**

Hazus: Earthquake Global Risk Report

Region Name: Dalton_Earthquake

Earthquake Scenario: 1500-year

Print Date: November 26, 2023

Disclaimer:
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

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Appendix A: County Listing for the Region

Appendix B: Regional Population and Building Value Data

General Description of the Region

Hazus-MH is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 21.91 square miles and contains 1 census tracts. There are over 2 thousand households in the region which has a total population of 6,330 peopleF. The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 2 thousand buildings in the region with a total building replacement value (excluding contents) of 1,371 (millions of dollars). Approximately 90.00 % of the buildings (and 67.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 1,302 and 213 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 2 thousand buildings in the region which have an aggregate total replacement value of 1,371 (millions of dollars) . Appendix B provides a general distribution of the building value by Total Region and County.

In terms of building construction types found in the region, wood frame construction makes up 84% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 0 hospitals in the region with a total bed capacity of beds. There are 4 schools, 1 fire stations, 1 police stations and 2 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes no hazardous material sites, no military installations and no nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 1,515.00 (millions of dollars). This inventory includes over 42.87 miles of highways, 12 bridges, 124.90 miles of pipes.

Table 1: Transportation System Lifeline Inventory

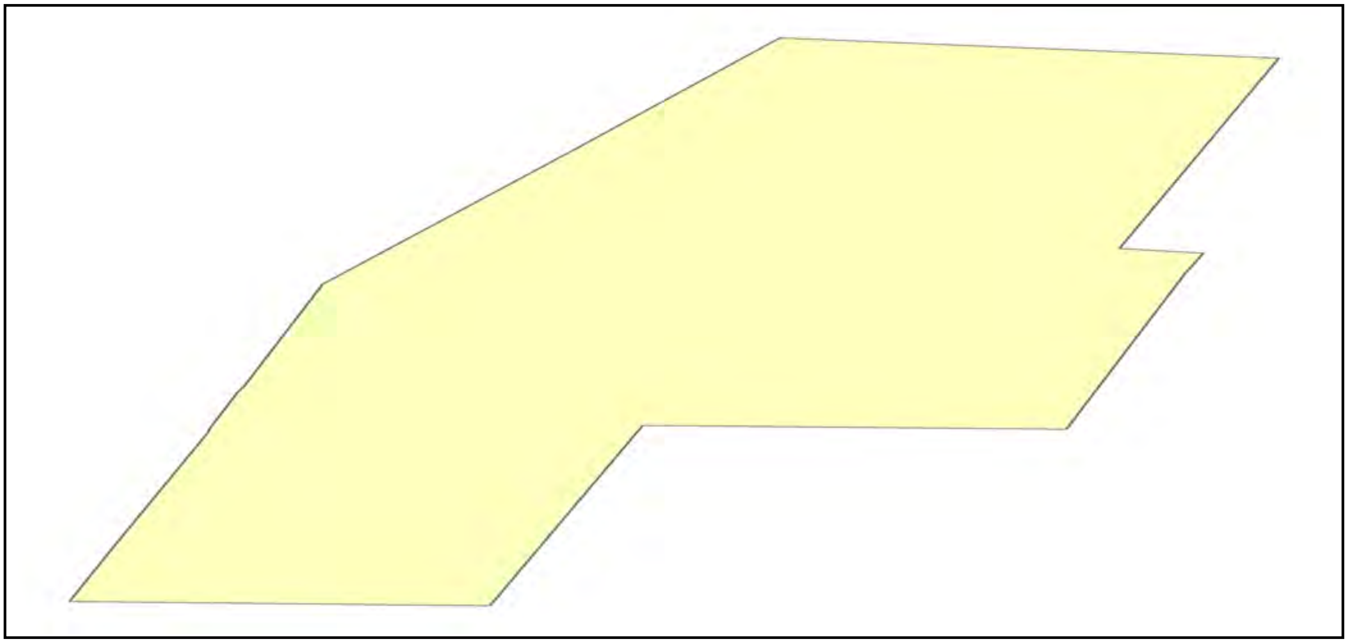
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	12	16.3039
	Segments	16	354.8339
	Tunnels	0	0.0000
		Subtotal	**371.1378**
Railways	Bridges	1	5.1900
	Facilities	0	0.0000
	Segments	8	925.9738
	Tunnels	0	0.0000
		Subtotal	**931.1638**
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	0	0.0000
	Tunnels	0	0.0000
		Subtotal	**0.0000**
Bus	Facilities	0	0.0000
		Subtotal	**0.0000**
Ferry	Facilities	0	0.0000
		Subtotal	**0.0000**
Port	Facilities	0	0.0000
		Subtotal	**0.0000**
Airport	Facilities	0	0.0000
	Runways	0	0.0000
		Subtotal	**0.0000**
		Total	**1,302.30**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	2.1013
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**2.1013**
Waste Water	Distribution Lines	NA	1.2608
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**1.2608**
Natural Gas	Distribution Lines	NA	0.8405
	Facilities	0	0.0000
	Pipelines	2	209.3857
		Subtotal	**210.2262**
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**0.0000**
Electrical Power	Facilities	0	0.0000
		Subtotal	**0.0000**
Communication	Facilities	0	0.0000
		Subtotal	**0.0000**
		Total	**213.60**

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.



Scenario Name	1500-year
Type of Earthquake	Probabilistic
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	1,500.00
Longitude of Epicenter	NA
Latitude of Epicenter	NA
Earthquake Magnitude	6.00
Depth (km)	NA
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	NA

Direct Earthquake Damage

Building Damage

Hazus estimates that about 13 buildings will be at least moderately damaged. This is over 0.00 % of the buildings in the region. There are an estimated 0 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

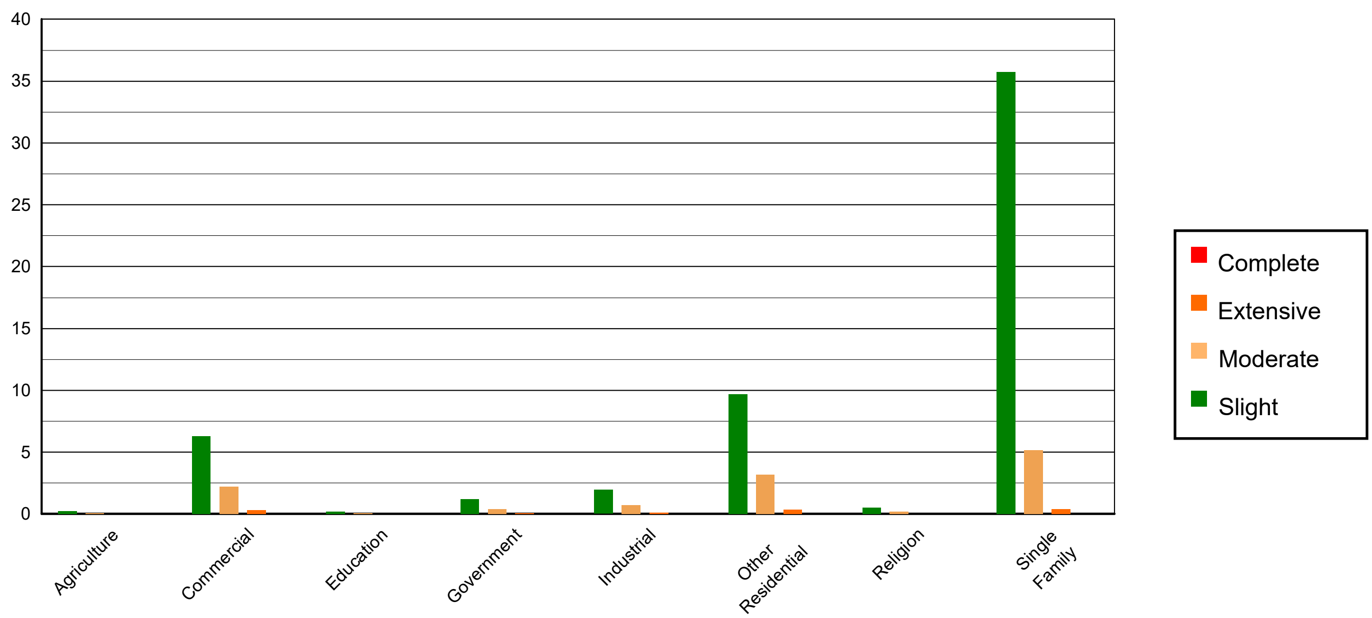


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	5.69	0.22	0.24	0.42	0.07	0.57	0.01	0.73	0.00	0.40
Commercial	145.17	5.69	6.31	11.29	2.20	18.39	0.30	24.21	0.02	18.44
Education	4.74	0.19	0.19	0.33	0.06	0.52	0.01	0.63	0.00	0.59
Government	32.34	1.27	1.21	2.16	0.40	3.35	0.05	3.75	0.00	2.30
Industrial	48.25	1.89	1.95	3.49	0.70	5.88	0.09	7.23	0.00	4.15
Other Residential	287.75	11.28	9.69	17.34	3.18	26.51	0.36	29.00	0.02	30.07
Religion	13.22	0.52	0.54	0.97	0.20	1.71	0.03	2.43	0.00	2.55
Single Family	2014.63	78.95	35.78	64.00	5.16	43.07	0.40	32.03	0.03	41.51
Total	**2,552**		**56**		**12**		**1**		**0**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	2156.38	84.50	34.23	61.24	3.08	25.73	0.00	0.00	0.00	0.00
Steel	122.93	4.82	4.04	7.23	1.31	10.93	0.12	9.85	0.00	0.00
Concrete	26.98	1.06	0.96	1.72	0.28	2.35	0.01	0.91	0.00	0.00
Precast	7.77	0.30	0.42	0.74	0.26	2.21	0.05	3.80	0.00	0.00
RM	44.43	1.74	1.40	2.51	0.71	5.96	0.09	7.51	0.00	0.00
URM	176.37	6.91	13.38	23.94	5.75	47.98	0.95	76.95	0.08	100.00
MH	16.94	0.66	1.47	2.63	0.58	4.83	0.01	0.97	0.00	0.00
Total	**2,552**		**56**		**12**		**1**		**0**	

*Note:

RM	Reinforced Masonry
URM	Unreinforced Masonry
MH	Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had hospital beds available for use. On the day of the earthquake, the model estimates that only hospital beds (%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, % of the beds will be back in service. By 30 days, % will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	0	0	0	0
Schools	4	0	0	4
EOCs	2	0	0	2
PoliceStations	1	0	0	1
FireStations	1	0	0	1

Transportation Lifeline Damage

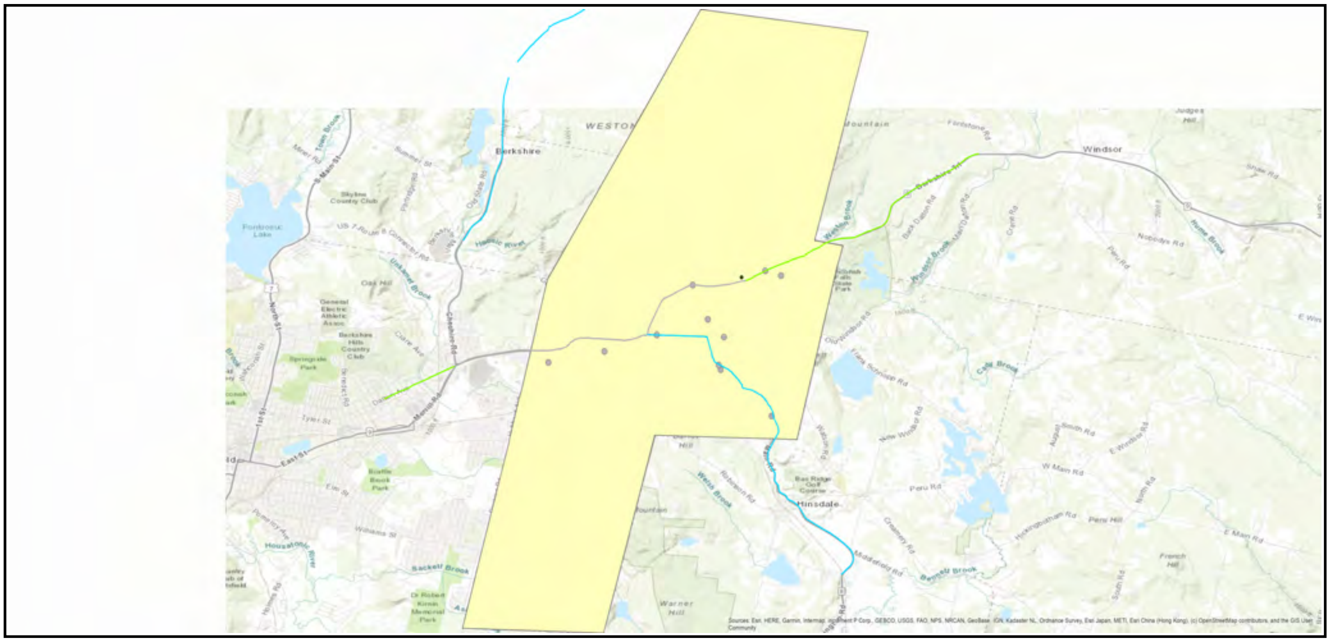


Table 6: Expected Damage to the Transportation Systems

System	Component	Number of Locations_				
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	16	0	0	12	12
	Bridges	12	0	0	12	12
	Tunnels	0	0	0	0	0
Railways	Segments	8	0	0	7	7
	Bridges	1	0	0	1	1
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	0	0	0	0	0
	Runways	0	0	0	0	0

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	0	0	0	0	0
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	0	0	0	0	0
Communication	0	0	0	0	0

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	65	0	0
Waste Water	39	0	0
Natural Gas	21	0	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	2,719	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0 tons of debris will be generated. Of the total amount, Brick/Wood comprises 73.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)

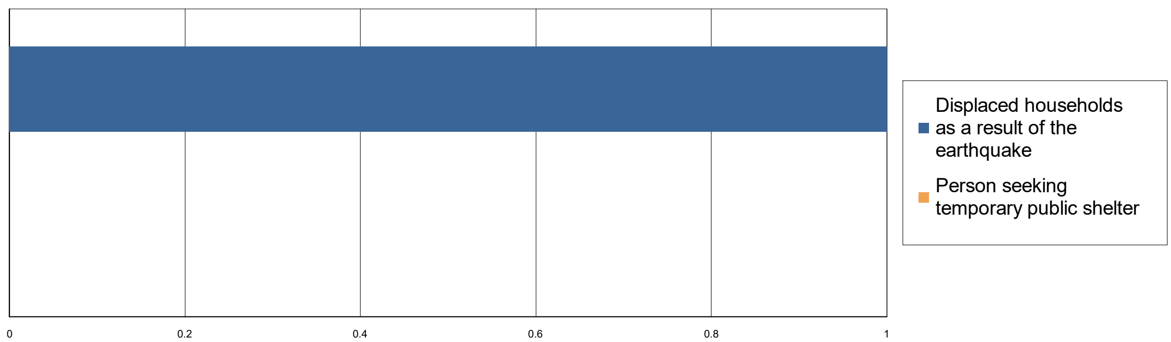
Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.00	0.00	0.00	0 (@25 tons/truck)

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 1 households to be displaced due to the earthquake. Of these, 0 people (out of a total population of 6,330) will seek temporary shelter in public shelters.

Displaced Households/ Persons Seeking Short Term Public Shelter



Displaced households as a result of the earthquake	Persons seeking temporary public shelter
1	0

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

· Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
· Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
· Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
· Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0.00	0.00	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.00	0.00	0.00	0.00
	Other-Residential	0.11	0.01	0.00	0.00
	Single Family	0.12	0.01	0.00	0.00
	Total	**0**	**0**	**0**	**0**
2 PM	Commercial	0.25	0.03	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.12	0.01	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.03	0.00	0.00	0.00
	Other-Residential	0.03	0.00	0.00	0.00
	Single Family	0.04	0.00	0.00	0.00
	Total	**0**	**0**	**0**	**0**
5 PM	Commercial	0.18	0.02	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.02	0.00	0.00	0.00
	Other-Residential	0.04	0.01	0.00	0.00
	Single Family	0.05	0.00	0.00	0.00
	Total	**0**	**0**	**0**	**0**

Economic Loss

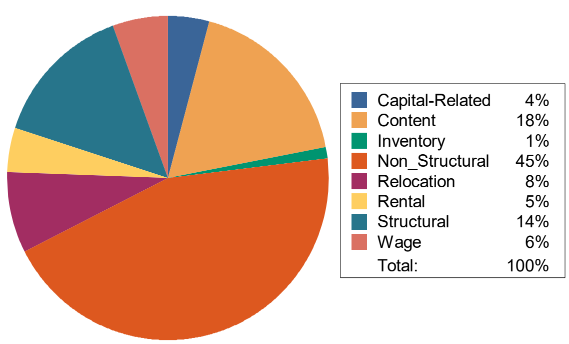
The total economic loss estimated for the earthquake is 3.12 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 3.12 (millions of dollars); 22 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 44 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Earthquake Losses by Loss Type ($ millions)



Earthquake Losses by Occupancy Type ($ millions)

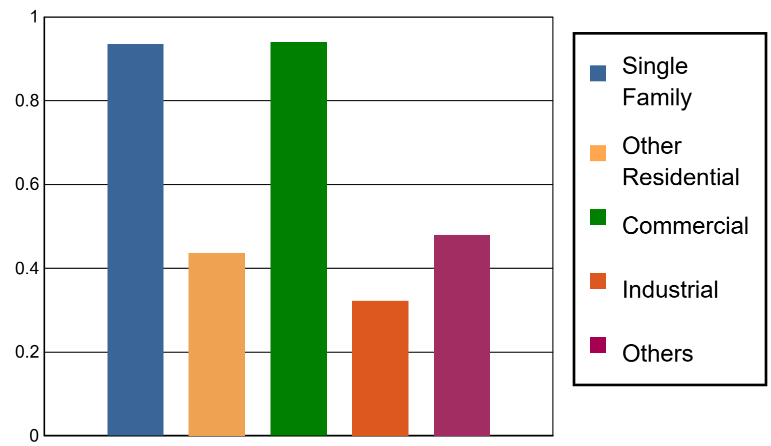


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.0351	0.1044	0.0079	0.0254	0.1728
	Capital-Related	0.0000	0.0149	0.1029	0.0047	0.0044	0.1269
	Rental	0.0147	0.0430	0.0698	0.0030	0.0112	0.1417
	Relocation	0.0484	0.0282	0.0871	0.0152	0.0671	0.2460
	Subtotal	**0.0631**	**0.1212**	**0.3642**	**0.0308**	**0.1081**	**0.6874**
Capital Stock Losses							
	Structural	0.1274	0.0599	0.1322	0.0494	0.0816	0.4505
	Non_Structural	0.5593	0.2078	0.2887	0.1380	0.1933	1.3871
	Content	0.1855	0.0486	0.1414	0.0889	0.0955	0.5599
	Inventory	0.0000	0.0000	0.0127	0.0158	0.0023	0.0308
	Subtotal	**0.8722**	**0.3163**	**0.5750**	**0.2921**	**0.3727**	**2.4283**
	Total	**0.94**	**0.44**	**0.94**	**0.32**	**0.48**	**3.12**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Table 12: Transportation System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	354.8339	0.0000	0.00
	Bridges	16.3039	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**371.1378**	**0.0000**	
Railways	Segments	925.9738	0.0000	0.00
	Bridges	5.1900	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**931.1638**	**0.0000**	
Light Rail	Segments	0.0000	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Bus	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Airport	Facilities	0.0000	0.0000	0.00
	Runways	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
	Total	**1,302.30**	**0.00**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	2.1013	0.0011	0.05
	Subtotal	**2.1013**	**0.0011**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	1.2608	0.0005	0.04
	Subtotal	**1.2608**	**0.0005**	
Natural Gas	Pipelines	209.3857	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	0.8405	0.0002	0.02
	Subtotal	**210.2262**	**0.0002**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Electrical Power	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Communication	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
	Total	**213.59**	**0.00**	

Appendix A: County Listing for the Region

Berkshire,MA

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Massachusetts					
	Berkshire	6,330	913	457	1,371
Total Region		**6,330**	**913**	**457**	**1,371**

Hazus: Earthquake Global Risk Report

Region Name: Dalton_Earthquake

Earthquake Scenario: 2500-year

Print Date: November 26, 2023

Disclaimer:
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

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Appendix A: County Listing for the Region

Appendix B: Regional Population and Building Value Data

General Description of the Region

Hazus-MH is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 21.91 square miles and contains 1 census tracts. There are over 2 thousand households in the region which has a total population of 6,330 peopleF. The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 2 thousand buildings in the region with a total building replacement value (excluding contents) of 1,371 (millions of dollars). Approximately 90.00 % of the buildings (and 67.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 1,302 and 213 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 2 thousand buildings in the region which have an aggregate total replacement value of 1,371 (millions of dollars) . Appendix B provides a general distribution of the building value by Total Region and County.

In terms of building construction types found in the region, wood frame construction makes up 84% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 0 hospitals in the region with a total bed capacity of beds. There are 4 schools, 1 fire stations, 1 police stations and 2 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes no hazardous material sites, no military installations and no nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 1,515.00 (millions of dollars). This inventory includes over 42.87 miles of highways, 12 bridges, 124.90 miles of pipes.

Table 1: Transportation System Lifeline Inventory

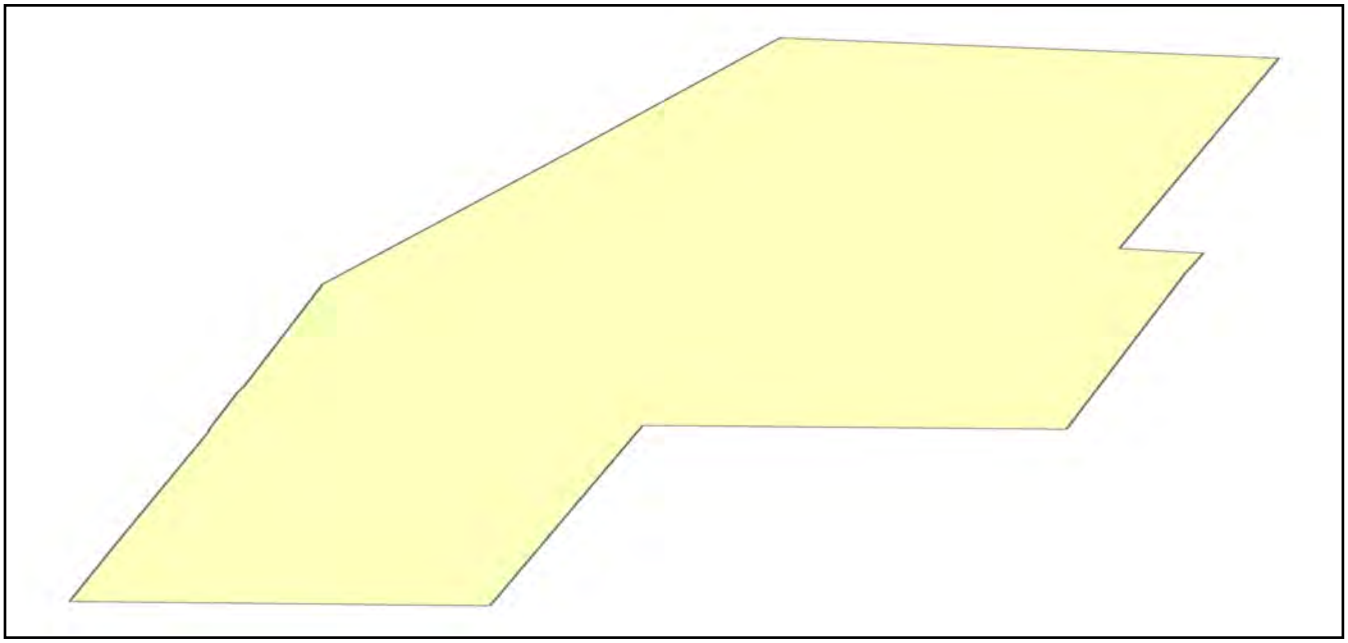
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	12	16.3039
	Segments	16	354.8339
	Tunnels	0	0.0000
		Subtotal	**371.1378**
Railways	Bridges	1	5.1900
	Facilities	0	0.0000
	Segments	8	925.9738
	Tunnels	0	0.0000
		Subtotal	**931.1638**
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	0	0.0000
	Tunnels	0	0.0000
		Subtotal	**0.0000**
Bus	Facilities	0	0.0000
		Subtotal	**0.0000**
Ferry	Facilities	0	0.0000
		Subtotal	**0.0000**
Port	Facilities	0	0.0000
		Subtotal	**0.0000**
Airport	Facilities	0	0.0000
	Runways	0	0.0000
		Subtotal	**0.0000**
		Total	**1,302.30**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	2.1013
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**2.1013**
Waste Water	Distribution Lines	NA	1.2608
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**1.2608**
Natural Gas	Distribution Lines	NA	0.8405
	Facilities	0	0.0000
	Pipelines	2	209.3857
		Subtotal	**210.2262**
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**0.0000**
Electrical Power	Facilities	0	0.0000
		Subtotal	**0.0000**
Communication	Facilities	0	0.0000
		Subtotal	**0.0000**
		Total	**213.60**

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.



Scenario Name	2500-year
Type of Earthquake	Probabilistic
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	2,500.00
Longitude of Epicenter	NA
Latitude of Epicenter	NA
Earthquake Magnitude	7.00
Depth (km)	NA
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	NA

Direct Earthquake Damage

Building Damage

Hazus estimates that about 24 buildings will be at least moderately damaged. This is over 1.00 % of the buildings in the region. There are an estimated 0 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

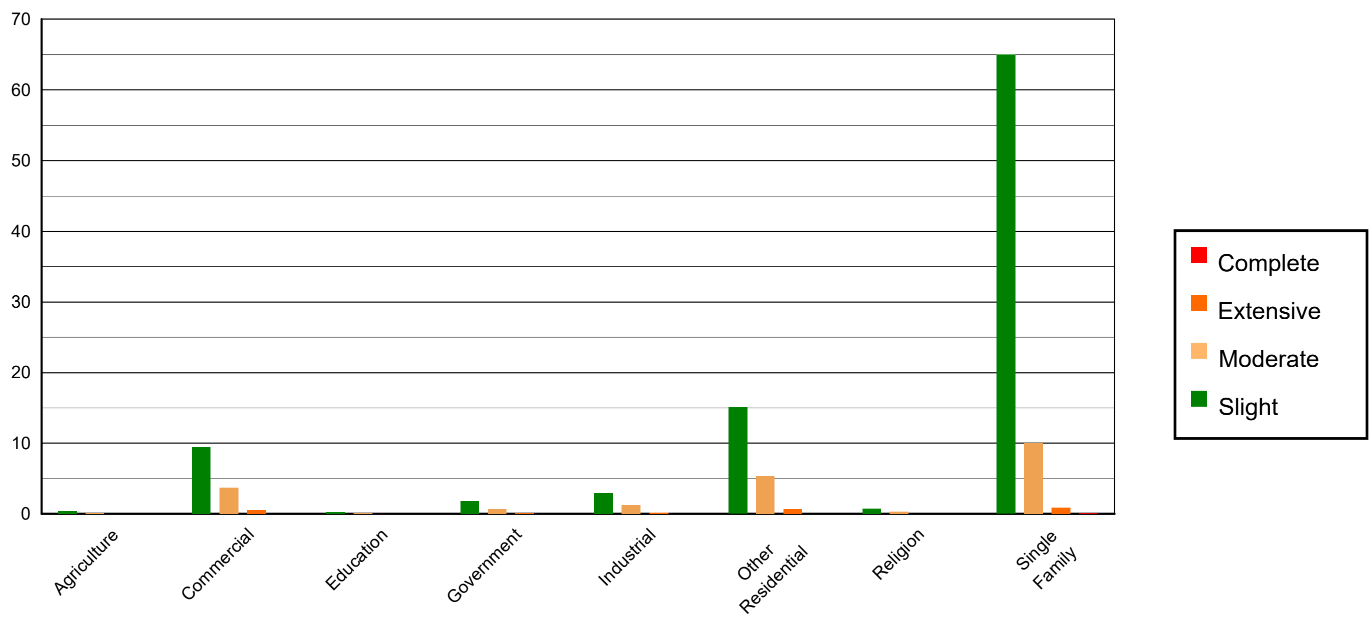


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	5.50	0.22	0.36	0.38	0.12	0.54	0.02	0.69	0.00	0.39
Commercial	140.27	5.61	9.43	9.85	3.70	17.16	0.56	22.48	0.03	18.37
Education	4.60	0.18	0.28	0.29	0.11	0.50	0.01	0.59	0.00	0.58
Government	31.36	1.25	1.84	1.92	0.70	3.26	0.09	3.60	0.00	2.33
Industrial	46.68	1.87	2.93	3.06	1.21	5.60	0.17	6.88	0.01	4.17
Other Residential	279.83	11.19	15.08	15.75	5.35	24.82	0.69	27.45	0.06	30.19
Religion	12.80	0.51	0.80	0.84	0.33	1.54	0.06	2.21	0.00	2.53
Single Family	1979.98	79.17	65.01	67.89	10.04	46.58	0.90	36.10	0.08	41.45
Total	**2,501**		**96**		**22**		**3**		**0**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	2121.85	84.84	64.59	67.46	7.05	32.71	0.22	8.60	0.00	0.00
Steel	119.44	4.78	6.29	6.57	2.41	11.20	0.26	10.26	0.00	0.00
Concrete	26.10	1.04	1.54	1.60	0.56	2.60	0.03	1.22	0.00	0.00
Precast	7.42	0.30	0.58	0.60	0.41	1.92	0.09	3.44	0.00	0.32
RM	43.20	1.73	2.06	2.15	1.20	5.58	0.19	7.40	0.00	0.00
URM	167.12	6.68	18.61	19.43	8.92	41.42	1.69	67.73	0.19	99.68
MH	15.89	0.64	2.09	2.18	0.99	4.58	0.03	1.34	0.00	0.00
Total	**2,501**		**96**		**22**		**3**		**0**	

*Note:

RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had hospital beds available for use. On the day of the earthquake, the model estimates that only hospital beds (%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, % of the beds will be back in service. By 30 days, % will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	0	0	0	0
Schools	4	0	0	4
EOCs	2	0	0	2
PoliceStations	1	0	0	1
FireStations	1	0	0	1

Transportation Lifeline Damage

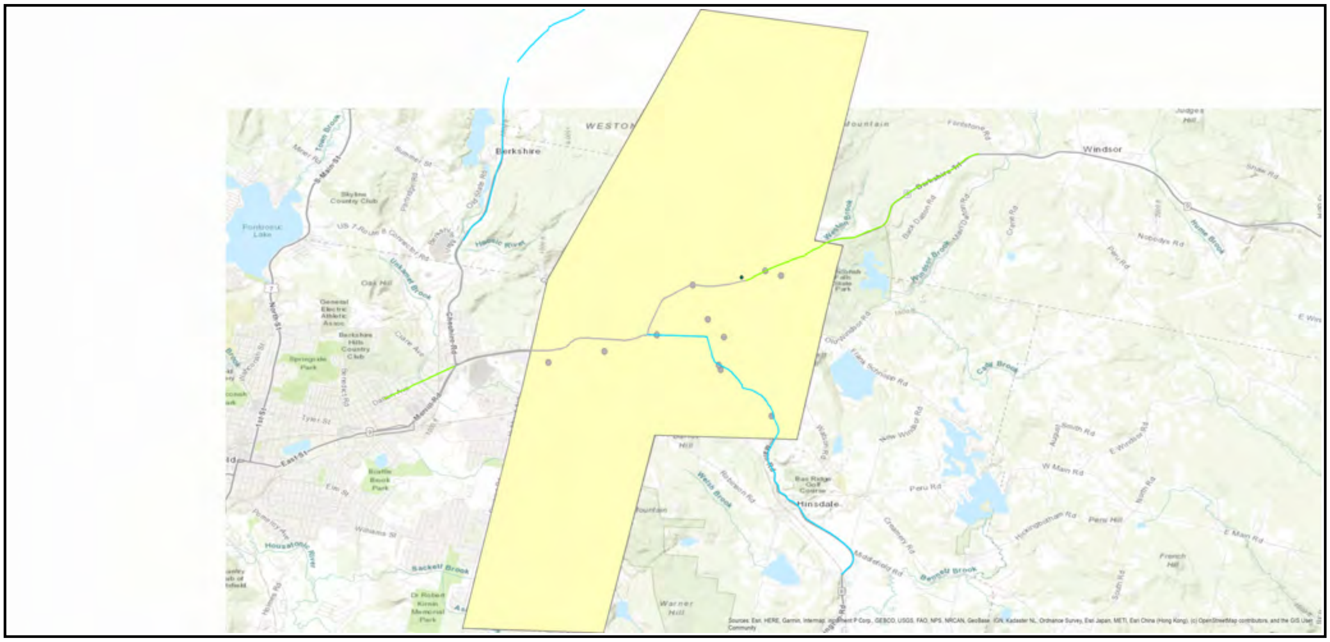


Table 6: Expected Damage to the Transportation Systems

System	Component	Number of Locations_				
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	16	0	0	12	12
	Bridges	12	0	0	12	12
	Tunnels	0	0	0	0	0
Railways	Segments	8	0	0	7	7
	Bridges	1	0	0	1	1
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	0	0	0	0	0
	Runways	0	0	0	0	0

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	0	0	0	0	0
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	0	0	0	0	0
Communication	0	0	0	0	0

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	65	0	0
Waste Water	39	0	0
Natural Gas	21	0	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	2,719	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

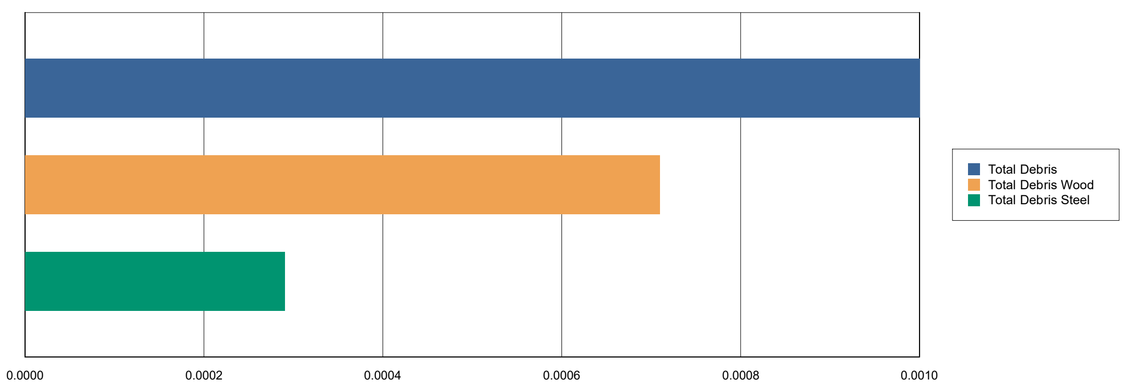
Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 1,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 71.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 40 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)



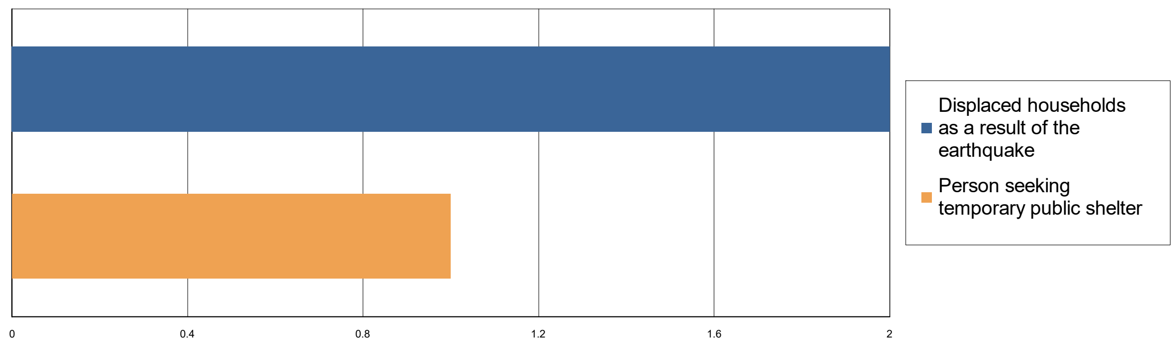
Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.00	0.00	0.00	40 (@25 tons/truck)

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 2 households to be displaced due to the earthquake. Of these, 1 people (out of a total population of 6,330) will seek temporary shelter in public shelters.

Displaced Households/ Persons Seeking Short Term Public Shelter



Displaced households as a result of the earthquake	Persons seeking temporary public shelter
2	1

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0.01	0.00	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.01	0.00	0.00	0.00
	Other-Residential	0.20	0.03	0.00	0.00
	Single Family	0.23	0.02	0.00	0.00
	Total	**0**	**0**	**0**	**0**
2 PM	Commercial	0.44	0.06	0.00	0.01
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.21	0.03	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.06	0.01	0.00	0.00
	Other-Residential	0.06	0.01	0.00	0.00
	Single Family	0.07	0.01	0.00	0.00
	Total	**1**	**0**	**0**	**0**
5 PM	Commercial	0.33	0.04	0.00	0.01
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.04	0.00	0.00	0.00
	Other-Residential	0.08	0.01	0.00	0.00
	Single Family	0.09	0.01	0.00	0.00
	Total	**1**	**0**	**0**	**0**

Economic Loss

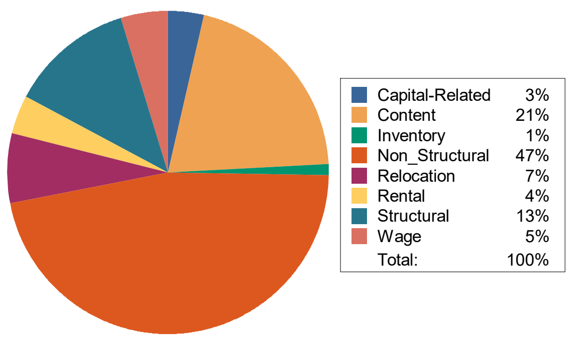
The total economic loss estimated for the earthquake is 6.40 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 6.39 (millions of dollars); 19 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 45 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Earthquake Losses by Loss Type ($ millions)



Earthquake Losses by Occupancy Type ($ millions)

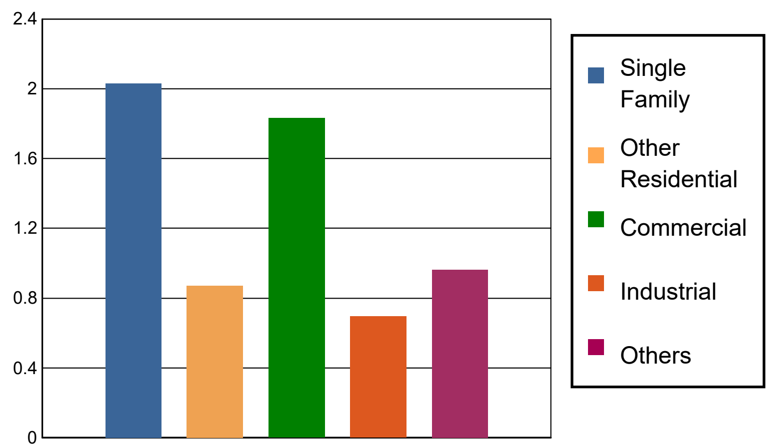


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.0641	0.1813	0.0141	0.0427	0.3022
	Capital-Related	0.0000	0.0273	0.1794	0.0083	0.0074	0.2224
	Rental	0.0291	0.0754	0.1175	0.0051	0.0196	0.2467
	Relocation	0.0973	0.0494	0.1515	0.0267	0.1190	0.4439
	Subtotal	**0.1264**	**0.2162**	**0.6297**	**0.0542**	**0.1887**	**1.2152**
Capital Stock Losses							
	Structural	0.2462	0.1037	0.2266	0.0854	0.1412	0.8031
	Non_Structural	1.2137	0.4366	0.6109	0.3112	0.4020	2.9744
	Content	0.4431	0.1151	0.3357	0.2088	0.2250	1.3277
	Inventory	0.0000	0.0000	0.0299	0.0371	0.0056	0.0726
	Subtotal	**1.9030**	**0.6554**	**1.2031**	**0.6425**	**0.7738**	**5.1778**
	Total	**2.03**	**0.87**	**1.83**	**0.70**	**0.96**	**6.39**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Table 12: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	354.8339	0.0000	0.00
	Bridges	16.3039	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**371.1378**	**0.0000**	
Railways	Segments	925.9738	0.0000	0.00
	Bridges	5.1900	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**931.1638**	**0.0000**	
Light Rail	Segments	0.0000	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Bus	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Airport	Facilities	0.0000	0.0000	0.00
	Runways	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
	Total	**1,302.30**	**0.00**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	2.1013	0.0022	0.10
	Subtotal	**2.1013**	**0.0022**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	1.2608	0.0011	0.09
	Subtotal	**1.2608**	**0.0011**	
Natural Gas	Pipelines	209.3857	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	0.8405	0.0004	0.05
	Subtotal	**210.2262**	**0.0004**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Electrical Power	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Communication	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
	Total	**213.59**	**0.00**	

Appendix A: County Listing for the Region

Berkshire,MA

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Massachusetts					
	Berkshire	6,330	913	457	1,371
Total Region		**6,330**	**913**	**457**	**1,371**