



May 2026

Montague, MA

Hazard Mitigation Plan Update

TOWN OF MONTAGUE, MA HAZARD MITIGATION PLAN UPDATE

May 2026

Town of Montague

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<https://montague-ma.gov>

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Acknowledgements

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- Andy Brydges, Community Relations Director, First Light Power
- Kyle Cogswell, Deputy Fire Chief, Turners Falls Fire Department
- Heath Cummings, Director of Facilities & Safety, Gill-Montague Regional School District
- Gary Dion, Commissioner, Montague Center Water Department
- Mark Fisk, Commissioner, Montague Center Water District
- Ashley Gough, Health Director, Montague Board of Health
- Luke Hartnett, Chief, Montague Center Fire Department
- Jason Haskins, Chief of Police, Town of Montague
- John Haskins, Chief, Montague Police Department
- Jeffrey Hidreth, Superintendent, Turners Falls Water Department
- Peter Lapachinski, Sergeant, Montague Police Department
- Chelsey Little, Superintendent/Pretreatment Coordinator, Town of Montague
- Christopher Nolan-Zeller, Assistant Town Administrator, Town of Montague
- Maureen Pollock, Director of Planning & Conservation, Town of Montague
- Roberta Potter, Gill-Montague Council on Aging Director, Town of Montague
- Walter Ramsey, Town Administrator, Town of Montague
- Tom Taaffe, Executive Director, Brick House Resource Center
- Sam Urkiel, Department of Public Works Superintendent, Town of Montague
- John Zellmann, Emergency Management Director, Town of Montague

Local Adoption Resolution

TOWN OF MONTAGUE, MASSACHUSETTS

SELECT BOARD

A RESOLUTION ADOPTING THE

TOWN OF MONTAGUE, MA HAZARD MITIGATION PLAN UPDATE

RESOLUTION NO. _____

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

WHEREAS the Town of Montague has prepared a multi-hazard mitigation plan, hereby known as TOWN OF MONTAGUE, 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 MONTAGUE, 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 Montague from the impacts of future hazards and disasters; and

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

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

Section 1. In accordance with M.G.L. c. 40, the Town of Montague Select Board adopts the TOWN OF MONTAGUE, MA HAZARD MITIGATION PLAN UPDATE. While content related to the Town of Montague may require revisions to meet the plan approval requirements, changes occurring after adoption will not require Town of Montague 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 _____ in favor and _____ against, and _____ abstaining, this _____ day of _____, _____.

SELECT BOARD:

By: _____ Mathew Lord, Chair

By: _____ Gina Goldman, Clerk

By: _____ Richard Kuklewicz, Vice Chair

APPROVED AS TO FORM:

By: _____ Chris Nolan-Zeller, Town Manager

Record of Changes

This Town of Montague, 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.

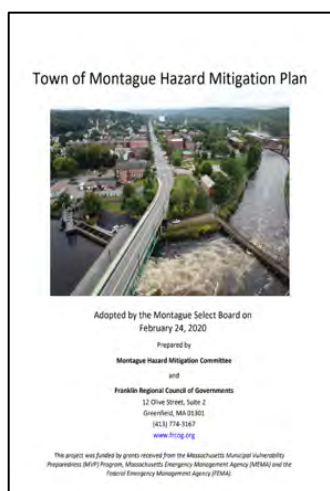
Table 1. Summary of Changes.

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 Montague, 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 Hazard Mitigation Plan (HMP) meets the requirements of the Disaster Mitigation Act 2000. It is an update to the Town’s previous Hazard Mitigation Plan from 2020. More importantly, the plan was created to reduce loss of life, land, and property due to natural hazards that affect the Town of Montague. 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 Montague 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 Montague and the surrounding communities. Throughout the development of the HMP, 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), Brick House Resource Center, First Light Power.

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 in 44 CFR § 201.6(d)(3). These requirements are included throughout the HMP in the call-out boxes, like the one below.

FEMA Requirement 44 CFR § 201.6(d)(3) 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.

Green call-out boxes like the one to the right, are definitions taken from the Federal Emergency Management Agency Local Policy Guide, April 2025. 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.

The HMPC identified the following list of hazards to profile:

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

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.

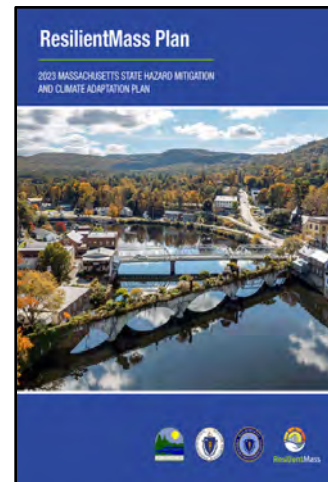
³ Federal Emergency Management Agency. (April 11, 2025). Local Mitigation Planning Policy Guide, p.10.

- Tornadoes
- Wildfires/Brushfires

Mitigation Strategy

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

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. This HMP is consistent with the State's ResilientMass Plan (2023). The HMPC developed the goals shown below. The goals from the previous Town of Montague Hazard Mitigation Plan (2020) and the Town of Montague MVP Resiliency Plan (2018) 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 Montague.



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

1. Save Lives and Reduce Losses to Private Property

Reduce risks to people and property through natural hazard mitigation and climate adaptation.

2. High Hazard Potential Dams

Assess the vulnerabilities of high-hazard dams (including the canal system) and implement strategies to reduce risks.

3. Increase Capacity to Mitigate Risk

Implement plans, land use policies, and development regulations to promote smart growth and low-impact development while prioritizing equity.

4. Buildings and Infrastructure

Strengthen Town-owned facilities, including historic buildings, and infrastructure to improve community resiliency throughout the five villages while prioritizing green infrastructure and other nature-based solutions.

5. Natural Resources

Prioritize the protection of open spaces, farmland, and natural resources such as waterways.

6. Education and Awareness

Improve community-wide resilience to natural hazards and climate change through public education and engagement.

Figure 1. Hazard Mitigation Plan Goals.

Land Use and Development

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

Changes in Development

Changes in Development means recent development (for example, construction completed since the last plan was approved, or development planned or under consideration by the jurisdiction), or conditions that may affect the risks and vulnerabilities of the jurisdictions (for example, declining populations or projected increases in population, or foreclosures). This can also include changes in local policies, standards, codes, regulations, land use regulations and conditions.

Montague has not seen many changes in development since the last plan update in 2020. This is primarily due to the general lack of population growth driving new construction and limited economic development in the community. While there has been some new and improved construction activity as further described below, there have been no significant changes in development that have occurred in hazard-prone areas during this period which have affected the Town's overall vulnerability.

Montague's population has been remarkably steady over recent years, with very little change according to U.S. Census Bureau data between 2010 and 2020. The Town experienced a net gain of only 143 residents during this

period and hasn't experienced notable population growth since the 1980s and 1990s. This trend of limited growth is expected to continue, with the UMass Donahue Institute projecting that Montague will see a gradual decline in population in the years and decades ahead, with a total loss of more than 1,000 residents by 2050.⁵ A notable demographic trend for Montague is the growing proportion of older residents. In 2020, people 65 and older represented 21 percent of the population. If current trends continue, this age group is estimated to make up 31 percent of the population by 2050. On the reverse end, the percentage of residents 24 and younger is projected to decline from 24 percent of the population to only 16 percent by 2050.

Over the past five years, development in Montague has focused on transitioning from traditional manufacturing to a mixed-use, green economy with significant investment in downtown Turners Falls and the revitalization of former industrial sites. Key trends include major brownfield remediation, the expansion of municipal infrastructure, and proactive rezoning to address housing needs, particularly following the closure of the Farren Hospital in 2021. For example, recent development areas and planned projects include revitalization of the Canal District (Turner Falls), the 5th Street Pedestrian Bridge and Gateway, and the remediation and redevelopment of the Griswold Cotton Mill and Strathmore Mill complex.

As expressed in the Town's 2024 Comprehensive Plan, Montague residents favor conserving open space by increasing housing density and directing growth to existing villages, and the ability to accommodate additional growth through infill versus expanding development into open space areas allows the community to do this in a way that prevents new infrastructure and development from expanding into hazard-prone areas. Thus, the Town's community development efforts have shifted from a focus on industrial expansion to a more urgent push for residential revitalization and climate resilience. While the Town faces challenges associated with aging infrastructure and a stagnant population, significant progress

⁵ UMass Donahue Institute V2024 Population Projections. May 2024.

has been made in redeveloping brownfield sites and modernizing key village centers in a manner that has not increased hazard vulnerability. It is also worth noting that many of Montague’s undeveloped, hazard-prone areas are effectively protected from hazardous development by its strong planning and regulatory framework. As further described in Chapter 5 (Capability Assessment), new or improved development is managed through the Town’s enforcement of zoning, subdivision, and stormwater management regulations in addition to building code and floodplain regulations with stringent provisions for hazard-resistant construction practices.

In summary, the long-term development outlook for Montague is one of slow, managed growth, and there are no anticipated changes in development that would significantly increase the risks and vulnerabilities of the community to hazards. Limited development may still occur, but most of this will be located within or around areas already developed and not considered at high risk to future hazard impacts. While it is anticipated that climate change and projected future conditions will increase the frequency and severity of natural hazard events in Montague, the Town’s efforts to integrate resilience at all levels will help mitigate and decrease the community’s vulnerability to hazards in the years to come.

Progress in Mitigation Efforts

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

Based on Montague’s 2024 Comprehensive Plan (“Five Villages: One Future”), the 2017 Open Space & Recreation Plan, the 2022 Economic Development Plan, and the FY2023 and FY2024 Annual Reports, the Town’s priorities have shifted meaningfully since 2020. Prior to 2020, Montague emphasized conservation, trail connectivity, village revitalization, brownfield planning, and long-term economic repositioning. Planning efforts focused on protecting rivers and farmland, expanding recreation assets, stabilizing legacy mill sites, and identifying opportunities for industrial and mixed-use redevelopment. Since 2021, however, the Town’s focus has shifted from defining long-term vision toward implementation—particularly in climate resilience, infrastructure modernization, housing production, and large-scale redevelopment. The shift reflects a transition from asking “what should Montague become?” to “how do we execute transformative projects, fund them, and integrate climate adaptation across all sectors?”

Today, Montague’s priorities center on climate resilience and infrastructure reliability. The 2024 Comprehensive Plan integrates climate vulnerability, flooding, energy transition, and municipal facility resilience across all topic areas. Sewer and stormwater management, combined sewer overflow control, and modernization of the wastewater system have become high-level strategic concerns rather than routine operational matters. Municipal building upgrades, renewable energy generation, and climate-ready infrastructure now frame capital planning decisions. In this way, Montague’s current priorities emphasize safeguarding critical systems while adapting to increased precipitation, flooding, and long-term climate impacts.

Housing has also emerged as a central priority. Since 2020, the Town has advanced affordable housing initiatives in newly established zoning districts, pursued redevelopment of key infill sites such as the Farren property and aligned zoning tools with state housing policy. Village-center revitalization remains important, but the emphasis has shifted toward increasing housing supply, enabling adaptive reuse of large properties, and supporting population stability in the face of demographic change. This represents a move from conceptual redevelopment planning toward active housing production and zoning implementation.

Economic development priorities have likewise evolved. Earlier efforts emphasized identifying brownfields and industrial sites for potential reuse. Today, the Town is executing major projects, including securing substantial external funding for demolition and transformation of the Strathmore Mill complex and repositioning riverfront land for public and economic benefit. The Airport Industrial Park remains a key employment center, but economic strategy now intersects with riverfront recreation, arts and culture, renewable energy, and village-scale infill development. The Town has become more aggressive and coordinated in pursuing state and federal grants, using external funding as a primary implementation tool.

Finally, equity, access, and community facilities have become more visible components of Montague's planning framework. The Comprehensive Plan emphasizes ADA-accessible recreation, access to swimming and gathering spaces, senior services, and coordination among municipal departments. While open space protection and recreation expansion remain priorities, the focus now includes ensuring that amenities are accessible, climate-resilient, and equitably distributed across the five villages. Public safety continuity, infrastructure reliability, and fiscal sustainability are increasingly integrated into long-term planning discussions.

This Hazard Mitigation Plan (HMP) update reflects Montague's current priorities and the Town's shift toward implementation. The mitigation strategy incorporates completed and ongoing sewer system upgrades, riverfront stabilization efforts, municipal energy projects, and drainage improvements aligned with resilience goals. Chapter 6 documents the status of previous mitigation actions and identifies those that are complete, in progress, delayed, or carried forward. As with other recent planning efforts, the HMP reflects Montague's broader evolution: from goal setting and visioning toward coordinated execution of infrastructure, climate adaptation, housing, and redevelopment initiatives that strengthen long-term community resilience.

Authority and Assurances

The Town of Montague 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 Town, State or Federal laws and regulations, as required in 44 CFR 201.6. The list of laws and regulations the Town 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 Grants¹⁰.
- 44 CFR Part 206 Subpart N. Hazard Mitigation Grant Program.

Plan Adoption

The Town of Montague 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 9.

Document Overview

Below is a summary of the Town of Montague, 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 Montague, including history, population, government, and infrastructure.

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 Montague and its residents. The risk assessment looks at current and future vulnerabilities based on land use development including structures and infrastructure. Included in this chapter is a list of critical facilities identified by the HMPC.

Chapter 5: Capability Assessment

The Capability Assessment looks at the Woburn’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 local lead, potential funding sources, and implementation timeframe.

Chapter 7: Plan Implementation and Maintenance

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

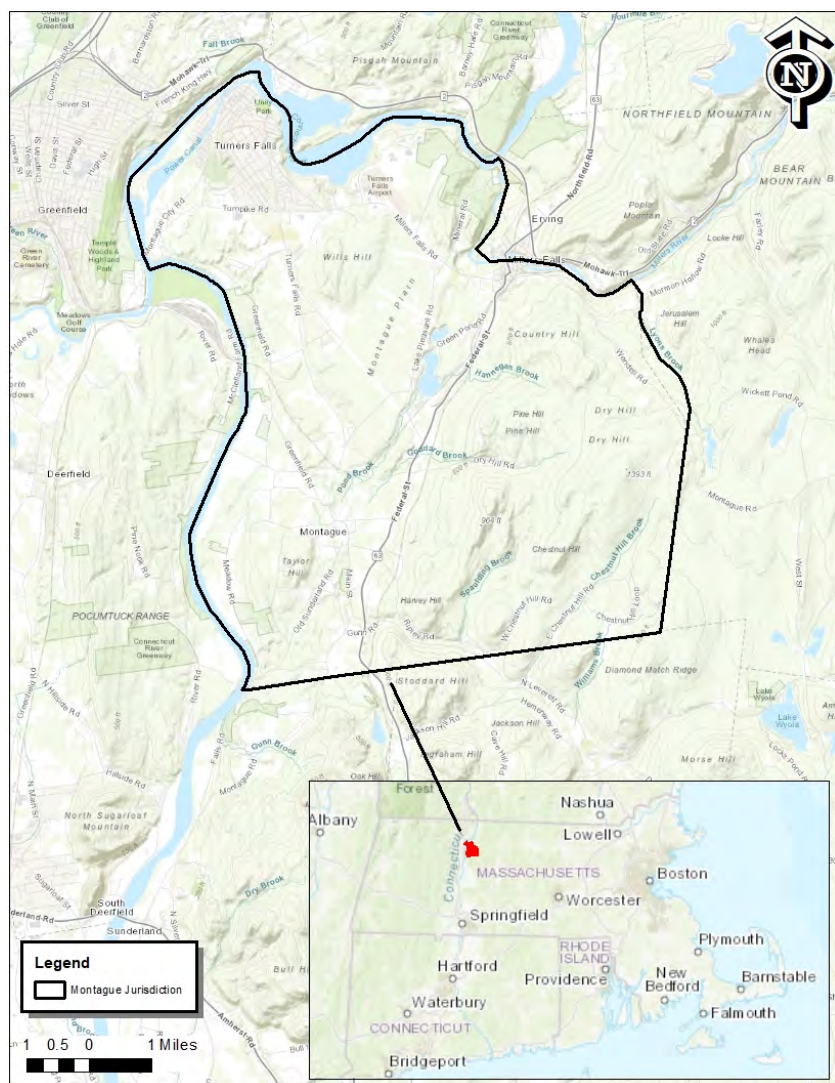
Appendices

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 Montague, Massachusetts, with a population of 8,501⁶, is in central Franklin County. Montague is part of the “traditional homelands” of the Sokoki/Squaheaq, Pocumtuck, and Nipmuc Tribes, which were present in the area for over 10,000 years.⁷ The Town is bordered by the communities of Gill and Erving to the north and northeast, Leverett and Sunderland to the south, Wendell to the east, and Deerfield and Greenfield to the west. The Connecticut and Millers Rivers also border Montague.⁸ The Town is made up of five villages which include:

1. Lake Pleasant
2. Millers Falls
3. Montague Center
4. Montague City
5. Turners Falls.⁹



The Town of Montague has a **Figure 2. Town of Montague Base Map.** three-person Selectboard and a representative form of Town Meeting which includes 21 people from each of the five villages, who hold three-year terms.¹⁰

⁶ 2019-2023 American Community Survey (ACS) 5-year Estimates

⁷ Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

⁸ Open Space and Recreation Plan. (2017). Town of Montague, Massachusetts.

⁹ Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

¹⁰ “Our Form of Government.” (2025). Town of Montague, Massachusetts. Retrieved from <https://montague-ma.gov/e/10/Our-Form-of-Government>.

Town Villages

Lake Pleasant is the smallest and “most remote” village in Montague.¹¹ It consists of two neighborhoods that are built around the pond called “Lake Pleasant” – these neighborhoods were historically called “The Highlands” and “The Bluffs.”¹² The village was created in the 1800’s as a campground and resort community for those in the Spiritualist Movement. Lake Pleasant is home to the “oldest continuously existing Spiritualist center in the United States.”¹³ The village’s character is shaped by its small lots, winding roads, and large parcels of protected lands, such as the Montague Plains.

Millers Falls is located on both sides of the Millers River and “straddles” the Towns of Montague and Erving.¹⁴ The village was founded in the early 1800’s as a farming community and much of its development was dependent on its proximity to the two major railways that passed through the area.¹⁵

Montague Center is the oldest and largest of the Town’s five villages, with European settlers moving into the area in the early 1700’s. The village’s fertile soil allowed for farming to take place along the Connecticut and Sawmill Rivers. Industry like lumber and sawmills provided an economic base for the area. Today, the village is the second most populated village following Turners Falls. Montague Center remains rural and agricultural, with much of its open space conserved and protected.¹⁶

Montague City, created to help travelers bypass the falls in the area, is now primarily a residential neighborhood and is said to be the “only village lacking a clearly defined village center.”¹⁷ Today, it is the location of the Cabot Station, which is one of the largest “conventional hydroelectric generating facilities” in the Commonwealth of Massachusetts.¹⁸ It is also home to the Silvio O. Conte Northeast Anadromous Fish Research Center.¹⁹

Turners Falls was settled at the turn of the nineteenth century by Dutch capitalists. The community was powered by hydropower through the construction of a dam on the Connecticut River. Many industries flourished at the time, including paper and textile mills as well as a cutler factory. In the 1900’s, the area’s industrial character continued to grow, with the construction of the Cabot Station Hydroelectric Plant in 1915, the Airport Industrial Park, and other manufacturing sites. Turners Falls became the largest of the five villages and continues to serve as its “civic and commercial center” and “as a destination for experiencing history, natural history, and arts and culture.”²⁰

¹¹ Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

¹² Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

¹³ Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

¹⁴ Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

¹⁵ Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

¹⁶ Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

¹⁷ Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

¹⁸ Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

¹⁹ Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

²⁰ Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

People

As of 2023, the Town of Montague had a population of 8,501, with a median age of 44.3 years old. Approximately 89.9% of the population identified as White (non-Hispanic), 0.5% as Black or African American (non-Hispanic), 0.6% as American Indian and Alaska Native, 1.2% as Asian including Other, 5.07% as two or more races, and 3.0% as Other. Approximately 4.1% of the population was foreign-born. There were 3,712 households in Montague with a median household income of \$72,344. The poverty rate in the Town was 10.3%.²¹

Environmental Justice Communities

In Massachusetts, Environmental Justice (EJ) is defined as the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, income, or English proficiency, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.²² EJ populations are census block groups that meet one or more criteria related to income status, race and ethnicity, language isolation, or limited English proficiency, as established under the Massachusetts environmental justice policy and executive direction.²³

The EJ population criteria include the following:

1. Annual median household income is 65% or less of the State's annual median household income. (Income)
2. Minorities make up 40% or more of the population. (Minority)
3. Twenty-five percent or more of households speak English less than "very well." (Language Isolation)
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.²⁴

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.²⁵

²¹ 2019-2023 American Community Survey (ACS) 5-year Estimates

²² Massachusetts Executive Office of Energy and Environmental Affairs Environmental Justice Policy. (2023). Massachusetts Executive Office of Energy and Environmental Affairs.

²³ Massachusetts Executive Office of Energy and Environmental Affairs Environmental Justice Policy. (2023). Massachusetts Executive Office of Energy and Environmental Affairs.

²⁴ "Environmental Justice Populations in Massachusetts." (2024). Commonwealth of Massachusetts. <https://www.mass.gov/info-details/environmental-justice-populations-in-massachusetts>.

²⁵ "Environmental Justice Populations in Massachusetts." (2024). Commonwealth of Massachusetts. <https://www.mass.gov/info-details/environmental-justice-populations-in-massachusetts>.

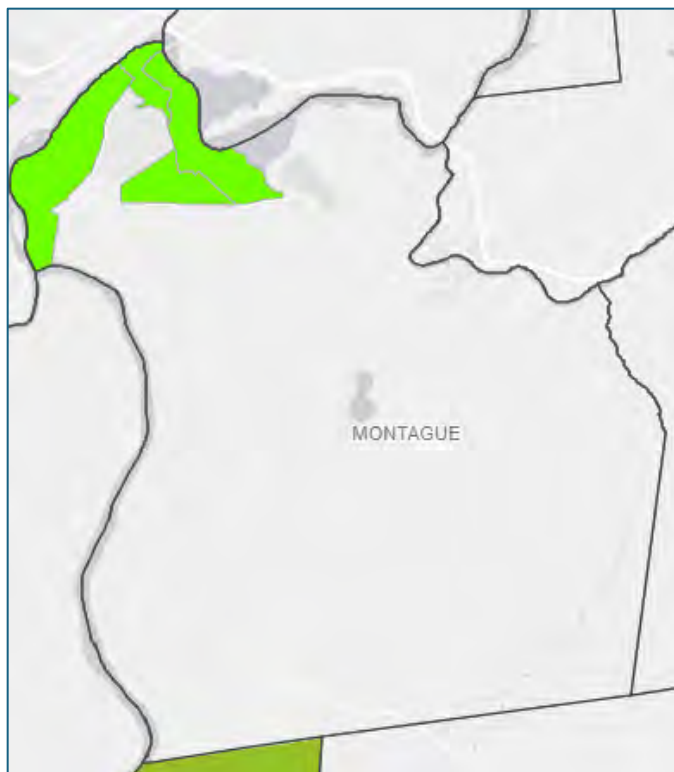


Figure 3. Environmental Justice Communities in Montague.

The Town of Montague has four block groups that are classified as an EJ community, all of which fit the “income” criteria (bright green) and have average household median incomes less than 65% of the State median household income.

Land Use and Development (Structures)

The Town of Montague has a “spectrum of urban to rural experiences, a variety of housing options, close-knit village communities, a diverse population, a vibrant art and culture community, business and job opportunities, and many options for recreation.”²⁶ Each village has a distinct village center and commercial spaces within those centers. The Town’s water and sewer services provide “flexibility” in how densely developed the areas are.²⁷ Large amounts of space in Montague are permanently protected and much of the Town’s farmlands have been

spared from being developed upon. A recent Housing Infill Analysis showed that Montague can still have some residential growth through infill development or with the addition of accessory dwelling units (ADUs) on single-family parcels. The Town has a low demand for new housing developments.²⁸

The Town has twelve Zoning Districts which are listed below:

1. Agricultural Forest
2. Agricultural Forest 2
3. Agricultural Forest 4
4. Central Business
5. General Business
6. Historic Industrial
7. Industrial
8. Neighborhood Business
9. Rural Business
10. Recreational Educational

²⁶ Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

²⁷ Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

²⁸ Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

11. Residential 1
12. Residential 2.²⁹

There are also three overlay districts in Montague which include a Flood Plain Overlay District, a Water Supply Protection Overlay District, and an Agricultural Business Overlay District.³⁰

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, Lakes, and Other Water Bodies

The Town has two major watersheds within its boundary, which include the Millers River Watershed and the Connecticut River Watershed. Both watersheds have their respective Watershed Councils that help to maintain their overall quality, wellbeing, and management.³¹

There are three major rivers in the Town of Montague and they include:

1. Connecticut River
2. Millers River
3. Sawmill River.³²

In addition to the major rivers, there are small water bodies that include a lake, brooks, and ponds. These water bodies are listed in alphabetical order below.

- Beaver Pond
- Chestnut Hill Brook
- Cranberry Pond Brook
- Goddard Brook
- Green Pond
- Hannegan Brook

²⁹ Zoning Bylaws. (2022). Town of Montague, Massachusetts.

³⁰ Zoning Bylaws. (2022). Town of Montague, Massachusetts.

³¹ Open Space and Recreation Plan. (2017). Town of Montague, Massachusetts.

³² Open Space and Recreation Plan. (2017). Town of Montague, Massachusetts.

- Hatchery Brook
- Lake Pleasant
- Lucas' Pond³³
- Lyons Brook
- Montague Center School Pond
- Podlenski's Pond
- Pond Brook
- Randall Brook
- Spaulding Brook
- West Pond
- Williams Brook.³⁴



Figure 4. Connecticut River.

Landscape

Montague falls into two “ecoregions” which are defined as areas with similar ecosystems.³⁵ The western part of Town is part of the Connecticut River Valley which is defined by “surrounding uplands by milder climate, relatively rich floodplain soils, and level terrain with some higher outcropping ridges.”³⁶ The rest of Montague falls within the Worcester-Monadnock Plateau which has the hilliest areas in central Massachusetts. According to the Town’s Open Space and Recreation Plan, “higher elevations and geology in this region result in generally cool and acidic soils and vegetation typical of northern New England.”³⁷

In addition to these ecoregions, Montague has many different forest and water resources that result in a diverse range of both wildlife and animal species.³⁸

Open Space and Recreation

The Town of Montague has over 60% of its land protected from development and is classified as open space with federal, state, and local bodies owning much of this land, alongside private landowners.

Approximately half of Montague’s farmland is permanently protected. The FirstLight Power Company controls most of the land along the Connecticut River and is the largest landowner in the Town.³⁹

The recreational resources in the community include the Canalside Trail Bike Path, which is the longest off-road section of the larger Franklin County Bikeway. The path travels from Unity Park in Turners Falls through Montague City and into neighboring Deerfield. Bicycling and mountain biking are popular in the Town, while playgrounds and the new skate park offer recreational opportunities for families and young

³³ Open Space and Recreation Plan. (2017). Town of Montague, Massachusetts.

³⁴ Open Space and Recreation Plan. (2017). Town of Montague, Massachusetts.

³⁵ Open Space and Recreation Plan. (2017). Town of Montague, Massachusetts.

³⁶ Open Space and Recreation Plan. (2017). Town of Montague, Massachusetts.

³⁷ Open Space and Recreation Plan. (2017). Town of Montague, Massachusetts.

³⁸ Open Space and Recreation Plan. (2017). Town of Montague, Massachusetts.

³⁹ Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

adults. Other forms of recreation include hiking, fishing hunting, horseback riding, birdwatching, and boating. The Poplar Street Boat Launch offers access to the Connecticut River.⁴⁰

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 and Sewer Service



Figure 5. Clean Water Facility.

Water and sewer services in the Town are provided by the Montague Center Water District and the Turners Falls Water District. Waste management is provided through the Franklin County Solid Waste Management District.⁴¹

⁴⁰ Open Space and Recreation Plan. (2017). Town of Montague, Massachusetts.

⁴¹ Public Works/Utilities. (2025). Town of Montague, Massachusetts. Retrieved from <https://montague-ma.gov/e/16/Public-WorksUtilities>.

Energy

The Town of Montague has a “Green Community” designation which highlights the Town’s “strong commitment and proactive planning towards energy transition.”⁴² Montague also invests in energy planning while studying and reporting on goals for energy efficiency and solar siting. The Town has an Energy and Solar Planning Committee to aid in these efforts.⁴³ The Town’s primary energy provider is Eversource.⁴⁴

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 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.

The Town has approximately 48 critical facilities. The list of critical facilities in Montague 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. There are four critical facilities that have generators, which include the Montague Department of Public Works (DPW), the Franklin County Technical School, a Pumping Station in Lake Pleasant, and the Town Hall.

Table 2. List of Critical Facilities in the Town of Montague.

Critical Facility	Address
Turner Falls Fire Department/Police Department	180 Turnpike road, Turners Falls, MA 01376
Turners Falls Water Department	226 Millers Falls road, Turners Falls, MA 01376
Tuners Falls Reservoir	Reservoir Dr, Turner Falls, MA 01376
Turners Falls Fire District	225 Millers Falls road, Turners Falls, MA 01376

⁴² Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

⁴³ Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

⁴⁴ Public Works/Utilities. (2025). Town of Montague, Massachusetts. Retrieved from <https://montague-ma.gov/e/16/Public-WorksUtilities>.

Critical Facility	Address
Franklin County Regional Housing Authority	241 Millers Falls road, Turners Falls, MA 01376
Turner Falls Airport-0B5	1 Avenue A, Turners Falls, MA 01376
Great Falls Middle School/ Turners Falls High School	222 Turnpike road, Montague, MA 01351
Great Falls Aquaculture	1 Australia Way, Turners Falls, MA 01376
Montague DPW	128 Turners Falls road, Turners Falls, MA 01376
St Mary's Cemetery	Turners Falls road, Turners Falls, MA 01376
St Anne's Cemetery	Turners Falls road, Turners Falls, MA 01376
Our Lady of Czestochowa Cemetery	Turners Falls road, Turners Falls, MA 01376
Springdale Cemetery	Turnpike road, Turners Falls, MA 01376
Franklin County Sheriff's Office (Dog Shelter)	10 Sandy Ln, Turners Falls, MA 01376
Solar Photovoltaic Power Plant	12 Sandy Ln, Turners Falls, MA 01376
Montague Recycling Center	11 Sandy Ln, Montague, MA 01351
Cabot Station Power Plant Dam	15 Cabot St, Turners Falls, MA 01376
USGS S.O. Conte Anadromous Fish Research Center	1 Migratory way, Turners Falls, MA 01376
Canalside Rail Trail	2 Avenue A, Turners Falls, MA 01376
New England Wound Care	7 Burnham St SUITE 2, Turners Falls, MA 01376
Community Health Center of Franklin County	8 Burnham St, Turners Falls, MA 01376
Gil Montague Superintendent of Schools	35 Crocker Ave, Turners Falls, MA 01376
Sheffield Elementary School	43 Crocker Ave, Turners Falls, MA 01376
Hillcrest School	Bulkey St, Turners Falls, MA 01376
Franklin County Technical School	82 Industrial Blvd, Turners Falls, MA 01376
JaDuke Preschool and Early Education Center	110 Industrial Blvd, Turners Falls, MA 01376
Montague Public Libraries	201 Avenue A, Turners Falls, MA 01376
Montague Town Police Department	1 Avenue A, Turners Falls, MA 01376
Montague Center Fire Department	28 Old Sunderland road, Montague, MA 01351
Montague Common Hall	34 Main St, Montague, MA 01351
Montague Center Public Library	17 Center St, Montague, MA 01351
Bridge of Names	Owasso Ave, Montague, MA 01351
Turners Falls- Gill Bridge	2 Avenue A, Turners Falls, MA 01376
Power Canal Bridge	Turners Falls road, Montague, MA 01351
South Street Bridge	9 South St, Montague, MA 01351
Center Street Bridge	52 Center St, Montague, MA 01351

Critical Facility	Address
Montague City Road Bridge	498 Montague City road, Montague, MA 01351
HeartWing f/k/a Montague Catholic Social Ministries	41 3rd St, Turners Falls, MA 01376
Franklin Area Survival Center	96 4th St, Turners Falls, MA 01376
Turners Falls Dam	Turners Falls Dam, Gill, MA 01354
Pumping Station	92 Green Pond road, Lake Pleasant, MA 01347
Montague Senior Center*	62 Fifth Street, Turners Falls
Brick House Resource Center	24 Third Street, PO Box 135, Turners Falls
Town Hall	1 Avenue A, Turners Falls
DCR Great Falls Discovery Center*	2 Avenue A, Turners Falls
Carnegie Public Library*	201 Avenue A, Turners Falls
Millers Falls Library*	23 Bridge Street, Millers Falls
Montague Center Library*	17 Center Street, Montague Center
Senior Affordable Housing	15 Canal Street, Turner Falls
*Informal warming/cooling center	

Critical Transportation Infrastructure

Montague has one major route, Route 63, that travels north to south and transects the Town. There is a short portion of Route 47 that is in the southern part of Town which branches off Route 63 before entering the Town of Sunderland. Montague has a network of sidewalks in most of its villages in addition to the Canalside Rail Trail that connects Turners Falls with northeast Deerfield. The Franklin County Bikeway also runs through the Town.⁴⁵

Public transportation is limited in Montague, but when grant funding becomes available to the Franklin Regional Transit Authority (FRTA), the Town plans to participate in “pilot transit services” to increase efficiency in the transit system for their rural, small town.⁴⁶

Dams

Since the early 18th century, Montague has utilized dams for several reasons. Early settlers utilized dams to power lumber mills along the Sawmill River and to market the Town as an up and coming industrial community. Today, many dams are still of great value to the community. For example, the Turner Falls Dam still operates as a hydroelectric dam on the Connecticut River, benefiting over one million people throughout the Connecticut River Valley. Overall, there are a total of eleven dams in the Town of Montague. Nine of these are privately owned and two are owned by the Town of Montague. The dams in Town, ownership, and hazard class can be found in the table below.

⁴⁵ Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

⁴⁶ Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

Table 3. List of Dams in the Town of Montague.

Dam Name	Owner Type	Hazard Code
Turner Falls Power Canal Left Dike	Private	High Hazard
Richard Clapp Dam	Private	Significant Hazard
Billings Lower Pond Dam	Private	N/A
Billings Lower Pond Dam	Private	N/A
Cabot Spillway	Private	N/A
Lake Pleasant Dam	Town of Montague	N/A
Turners Falls Dam	Private	N/A
Turners Falls No. 1 Dam	Private	N/A
Turners Falls Project Power Canal Left Embankment	Private	N/A
Turners Falls Canal Headgates	Private	N/A
Turners Falls New Reservoir Dam	Town of Montague	N/A

Economy

As of 2020, Montague’s top industries by occupation according to the United States Census include:

1. Educational services, healthcare and social assistance
2. Retail trade
3. Manufacturing.⁴⁷

Figure 6. Annual Turners Falls Dam Inspection Drawdown.

Current employers have reported “difficulty in finding enough employees,” and as a result, Montague aims to encourage new residents to work within the Town and will work to support the growth and development of businesses, as well.⁴⁸

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

⁴⁷ “Industry By Occupation for the Civilian Employed Population 16 Years and Over ACS 5-Year Estimates.” (2020). United States Census Bureau.

⁴⁸ Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

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.

The Town is known for its “vibrant arts and cultural scene, which is predominately centered in downtown Turners Falls.”⁴⁹ Some of these sites include the Shea Theater Arts Center and the Great Falls Discovery Center. “RiverCulture” which is administered by the Town’s Planning and Conservation Department, acts as a promoter of economic development for cultural-related initiatives and other programming.⁵⁰

The Town has a National Registered Historic District that encourages the restoration and reuse of historic buildings. Additionally, the Town works to remember its history such as the Great Falls Massacre and Native American Cultural Celebrations. The Pocumtuck Homelands Festival Native American Cultural Celebration is hosted in the Town annually.⁵¹

With a rich history and diverse culture, Montague sees its current arts and cultural offerings as “resources” both for residents and for visitors who take part in heritage tourism and eco-tourism.⁵² The Town aims to continue its historic preservation efforts while supporting new endeavors for cultural and community development.⁵³

⁴⁹ Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

⁵⁰ Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

⁵¹ Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

⁵² Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, Massachusetts.

⁵³ Five Villages: One Future – Montague Comprehensive Plan. (2024). Town of Montague, 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, (Effective April 11, 2025)
- 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.

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

Involvement means being engaged and actively participating in the development of the plan; providing input and directly providing, affecting or editing plan content as the representative of the participating jurisdiction(s) or organization.

Participation means being engaged and having the chance to provide input on the plan. It can be defined and met in a variety of ways (such as attendance at meetings, reviewing and commenting on drafts, etc.).

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 2025 and concluded in May 2026 (this does not include the months of plan review and adoption). Below is a graphical display of the plan development timeline.

Table 4. Planning Process Schedule.

Tasks	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APRIL	MAY	JUN
Convene LHMP Committee	Kick-off Meeting	HMPC #1		HMPC #2	Public Meeting #1 & HHPD Meeting	HMPC #3	HMPC #4	Public Meeting #2		
Update Hazard Profiles			Draft Risk Assessment	Complete Risk Assessment						
Update Critical Facility Inventory										
Meet High Hazard Potential Dam (HHPD) Requirements		Review HHPD Plans	Conduct Outreach to HHPD Owners	Conduct HHPD Risk Analysis	Identify HHPD Actions & Meeting	Prioritize Actions with HHPD				
Update Mitigation Goals	Capability Assessment Meetings									
Update Actions			Previous Actions Meeting		New Actions Meeting	Final Mitigation Action List		Prioritize Mitigation Actions		
Plan Review, Evaluation, and Implementation								Complete Draft for HMPC Review		
Public Review of Draft									Public Review	
Review and Approval									Submit Plan to MEMA	Submit Plan to FEMA

Maureen Pollock, Planning Director had the role of leading the planning process. She was the direct contact to the consulting team and facilitated all activities related to the HMP Update, including meeting logistics and outreach, data gathering, and public engagement.

The consulting team met with ten leaders from Town government to Kick-off the planning process on September 16, 2025. The agenda for this meeting in in Appendix A, along with a list of meeting participants. The purpose of the meeting was to review the scope of plan development, the timeline and roles of Town leaders, to discuss developing a Hazard Mitigation Planning Committee (HMPC), and to collect GIS data, and review the status of previously identified mitigation actions.

During the Kick-off Meeting, the Town mentioned FEMA floodplain mapping is under review and they intend to update the Zoning Bylaw in May 2027. Participants identified potential members of the HMPC including First Light that owns High Hazard Potential Dams, FRCOG the author of the previous plan and the MVP 2.0 plan, the Brickhouse Resource Center to represent vulnerable communities and the Senior Center Director. Discussed vulnerable communities such as the senior population, and an economically and racially diverse environmental justice community.

Hazard Mitigation Planning Committee

Following the Kick-off Meeting, Maureen Pollock conducted outreach to develop the Hazard Mitigation Planning Committee (HMPC). The HMPC membership shown in Table 5 included nineteen members of the Town of Montague government and stakeholder agencies. These Town employees represent five sectors of the community shown in Table 6.

Table 5. HMPC Membership.

First Name	Last Name	Title	Affiliation	Phone	Email
Todd	Brunelle	Fire Chief	Turners Falls Fire Department	413-863-9023	chief@turnersfallsfire.org
Andy	Brydges	Community Relations Director	First Light Power	860-549-3373	andy.brydges@firstlight.energy
Kyle	Cogswell	Deputy Fire Chief	Turners Falls Fire Department	413-863-9023 x 109	kcogswell@turnersfallsfire.org
Heath	Cummings	Director of Facilities & Safety	Gill-Montague Regional School District	413-863-3261	heath.cummings@gmrtd.org
Mike	Currie	Acting Deputy Fire Chief	Turners Falls Fire Department	413-863-9023	currie@turnersfallsfire.org
Gary	Dion	Commissioner	Montague Center Water Department	413-367-9455	dion25r3@msn.com
Mark	Fisk	Commissioner	Montague Center Water District	413-367-2812	shollow25@comcast.net
Luke	Hartnett	Chief	Montague Center Fire Department	413-835-5343	chief@montaguecenterfire.com
Jason	Haskins	Chief of Police	Town of Montague	413-863-8911	Jhaskins@montague-ma.gov
Jeffrey	Hidreth	Superintendent	Turners Falls Water Department	413-863-4542	superintendent@turnersfallswater.com
Peter	Lapachinski	Sergeant	Montague Police Department	413-863-8911 x 210	plapachinski@montague.net
Chris	Nolan-Zeller	Assistant Town Administrator	Town of Montague	413-863-3200 x 109	ChrisN@montague-ma.gov
Ashley	Gough	Health Director	Montague Board of Health	413-863-3200 x 205	healthdir@montague-ma.gov
Maureen	Pollock	Director of Planning & Conservation	Town of Montague	413-863-3200 x 112	mpollock@montague-ma.gov

First Name	Last Name	Title	Affiliation	Phone	Email
Roberta	Potter	Gill-Montague Council on Aging Director	Town of Montague	413-863-9357	councilonaging@montague-ma.gov
Walter	Ramsey	Town Administrator	Town of Montague	413 863-3200 x 110	WalterR@montague-ma.gov
Tom	Taaffe	Executive Director	Brick House Resource Center	413-800-2039	ttaaffe@brickhousecommunity.org
Sam	Urkiel	Department of Public Works Superintendent	Town of Montague	413-863-2054	samuelu@montague-ma.gov
John	Haskins	Chief	Montague Police Department	413-863-8911	jhaskins@montague-ma.gov
John	Zellmann	Emergency Management Director	Town of Montague	413-325-1427	emd@montague-ma.gov
Chelsey	Little	Superintendent/Pretreatment Coordinator	Town of Montague	413-773-8865	chelseyl@montague-ma.gov

Table 6. Sectors of the Community Represented On HMPC.

Sectors of the Community	HMPC Members
Emergency Management	• Fire Chief and Deputy Fire Chief • Police Department • Emergency Management Director
Economic Development	• Town Administrator
Land Use and Development	• Director of Planning and Conservation
Health and Social Services	• Board of Health • Council on Aging • Brick House Resource Center
Infrastructure	• Director of Facilities & Safety, Regional School District • Montague Center Water Department • Turners Falls Water Department • Department of Public Works • First Light Power

The role of the HMPC, shown in the Figure 7, is to support all aspects of the HMP development. The HMPC met on four occasions through the planning processing and key findings from each of these meetings are detailed below. Each of these meetings was conducted via Zoom, however, sometimes Town employees gathered in their offices. A list of who attended each HMPC meeting and the agenda for each meeting is shown in Appendix A.

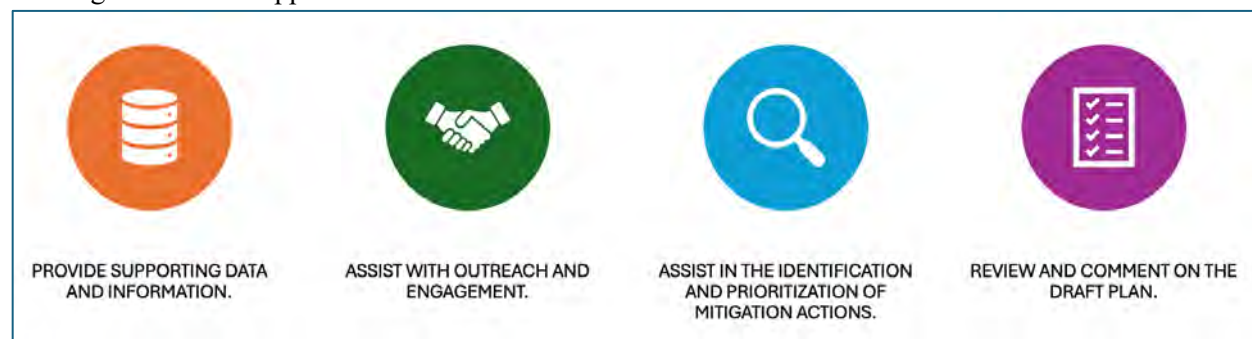


Figure 7. Role of HMPC Members.

HMPC #1 10/29/2025

The Hazard Mitigation Planning Committee (HMPC) held its first meeting to launch the Hazard Mitigation Plan update. Jamie introduced the consulting team and outlined the planning process, timeline, and committee roles. The meeting focused on committee membership, environmental justice (EJ) representation, capability assessment activities, critical facilities, and dam-related risk considerations.

The group discussed how the MVP 2.0 informed updated Town resilience priorities, including both broad goals and specific actions. They also discussed the importance of engaging vulnerable and underserved populations especially those in Millers Falls and Turners Falls. There was discussion about the hesitancy of vulnerable populations to participate in an in-person meeting due to the current political climate.

The consulting team shared the list of critical facilities from the previous plan and requested information about which facilities have back-up power and if new facilities exist. Meeting participants named the Senior Center, Brick House, Town Hall, Great Falls Discovery Center (owned by Massachusetts Department of Conservation and Recreation (DCR)), Shea Theater/Arts Center, and an informal list of warming and cooling centers. When discussing hazards to include in the HMP, stormwater overflow was named as a big concern including urban drainage issues and share Department of Public Works clean water data and areas of concern.

HMPC #2 12/9/2025

The Hazard Mitigation Planning Committee met to advance public engagement planning, review hazard risks, and continue development of mitigation strategies and actions. The discussion focused on upcoming public meetings, high-hazard potential dams (HHPDs), flood and stormwater risks, community-wide vulnerabilities, and findings from the capability assessment.

The HMPC agreed that the first public meeting will be on Zoom only. Outreach will include posting on the Town's website (the homepage and calendar), email blasts to boards, committees and staff, a posting on the Town's Facebook page, sending the press release to the Montague Reporter and the Greenfield Recorder and invitations to adjacent communities.

There was a discussion about HHPDs and other dams in the region. First Light owns three HHPDs in the northern part of Town, other dams discussed included the Richard Clapp dam and the Power Canal Left Dike. The HMPC agreed to consider dams outside of the Town's boundaries if a breach would impact Montague.

The HMPC reviewed a full list of hazards and indicated potential areas of concern. For flooding and stormwater issues they mentioned the Hillcrest School Building which has a history of flooding (12-18 inches in 2009) and another incident in 2019. Also mentioned were the Ferry Road Culvert, Center Street, which is closed indefinitely, and the Book Mill area and Montague City Road. The South Street bridges were fully rebuilt by MassDOT and reopened.

Landslide areas of concern included the Housing Authority property at 41 Sunrise Terrace, Avenue A, the airport area, and the Lake Pleasant area.



Figure 8. Turners Falls Municipal Airport.

The Town's 2015 Community Wildfire Protection Plan identifies the Dry Hill Road hillside, areas of pitch pine and scrub oak, and the Montague Plains.

When considering other hazards, the HMPC mentioned the Town is well equipped to manage severe winter storms. Overall, the HMPC raised questions about access to cooling centers, identifying the high school as a shelter but it is not near Turners Falls housing concentrations, and informal use of the library and the DCR visitor center.

HMPC #3 2/3/2026

The February 3, 2026, HMPC meeting focused on advancing Montague's Hazard Mitigation Plan update, with discussion centered on key hazards, infrastructure concerns, and mitigation priorities. A major issue raised was the unsafe, non-ADA-compliant walkway connecting L Street and 9th Street, which becomes impassable during rain and ice and may be contributing to winter absenteeism at the elementary school. The group discussed potential solutions, including redesign options and possible variances, while recognizing the equity implications for nearby low-income families. The committee also reviewed and refined hazard rankings, noting progress on flood mitigation along Montague City Road, infrastructure repair needs on Meadow Road, overlapping risks between storms and wildfire, and the need to update the 2015 Wildfire Protection Plan. Additional concerns included extreme heat and the importance of accessible warming and cooling centers, potentially leveraging plans for a new library facility.

The committee reviewed mitigation actions and capability improvements, emphasizing alignment with the Town's comprehensive plan and prioritization based on life safety, cost, and feasibility. School-related updates included removing an irrigation well action and addressing the need to reconfigure the high school generator to properly support emergency shelter operations. The group discussed emergency preparedness for affordable housing residents, outreach to unhoused populations in flood-prone areas along the Connecticut River, dam emergency action plan coordination, and staffing limitations for operating shelters. Members were tasked with updating and expanding the Mitigation Action Tracker, incorporating capability assessment recommendations, and preparing for action prioritization at the next meeting scheduled for March 16, 2026, with a public meeting anticipated in April.

HMPC #4 3/16/2026

The Hazard Mitigation Planning Committee held its fourth and final meeting to review and finalize Montague's Hazard Mitigation Plan update. The consulting team provided a status update on the plan's progress and led the group through a discussion of the hazard rankings and scoring system, with an explanation regarding how the numeric scores are based on 30% weighting each for probability and impact, 20% for spatial extent, and 10% each for morning time and duration. The committee reviewed the full mitigation action tracker, discussing the potential combination of Actions 39 and 42 (wildfire mitigation on the Montague Plains) and Actions 20 and 41 (tabletop exercises for wildfire and hazmat response), with the consulting team encouraging all members to review the actions assigned to their departments and confirm their comfort with the content and prioritization. The group confirmed that a public meeting will be held on April 29th at 6 PM via Zoom, with hard copies of the draft plan to be made available at the Planning Department and three local libraries during the two-week public review period. Next steps include sending the draft plan to department heads, Maureen Pollock coordinating the calendar invite and press release, Andy Brydges reviewing dam safety and FERC dam sections, and the HMPC collecting public comments through both an online Google Form and hard copy comment forms before the plan is submitted to MEMA and FEMA for approval.

FEMA Requirement Element G: High Hazard Potential Dams HHPD1: Did the plan describe the incorporation of existing plans, studies, reports and technical information for HHPDs?

The consulting team worked in conjunction with MEMA and the Town to identify the dams that may impact Montague and to conduct outreach and engagement to dam owners. Maureen Pollock sent the agenda and meeting information to Andy Brydges, Director of Community Relations at FirstLight for the HHPD Meeting held on January 13, 2026. The consulting team gathered Emergency Action Plans and available Inspection Reports for their review and analysis.

HHPD Meeting 1/13/2026

A major outcome of the meeting was a list of dam inventory and classifications. The Power Canal Left Embankment/Left Dike was confirmed as one structure and an HHPD. The Turners Falls Project is not dam, it is a power plant project. The Gill-Montague Dam is a large and important structure but not classified as high hazard. Northfield Mountain, located outside of Montague, may present downstream impacts to Millers Falls in Montague. It was determined at this meeting to review the Emergency Action Plans and inspection reports and to protect sensitive details.

Finally, the HMPC discussed the HHPD grant program and that some of the FirstLight dams may not be eligible since they are classified as federal facilities. The HMPC agreed to update a goal statement for the HMP related to assessing/fortifying HHPDs while reducing risk and supporting ecological resilience.

Community Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function. The integrated network of assets, services and capabilities that provide community lifeline services are used day to day to support recurring needs. Lifelines enable the continuous operation of critical government and business functions and are essential to human health and safety or economic security, as described in the National Response Framework, 4th Edition.

The specific entities may be defined by each jurisdiction based on the unique characteristics of the local government, including special districts. The purpose of inviting input is to integrate natural hazard risk reduction across all community systems, as well as encouraging implementation of mitigation actions.

Public Outreach

The HMPC and the consulting team tried to ensure 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 eight community lifelines and their respective components are shown in the figure below.

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 through two public workshops. Each public workshop was held 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.

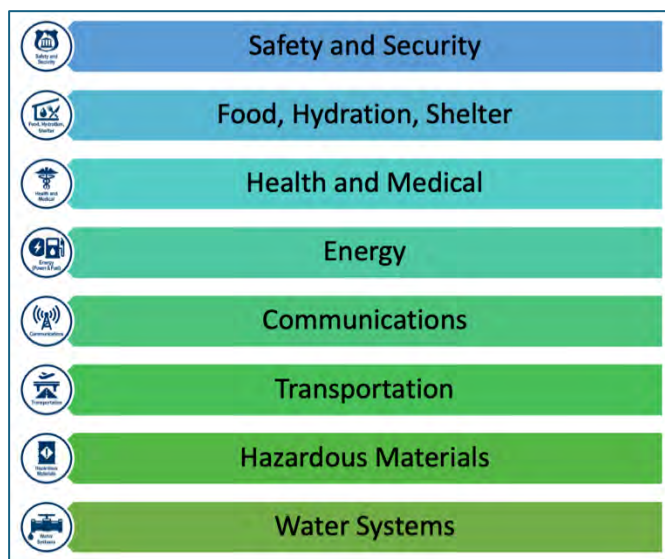


Figure 9. Community Lifelines.

FEMA Requirement §201.6(b)(2) 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?

Neighboring communities were specifically invited to participate in the planning process. An email (shown below) was sent to neighboring communities, utilities and other identified stakeholders.

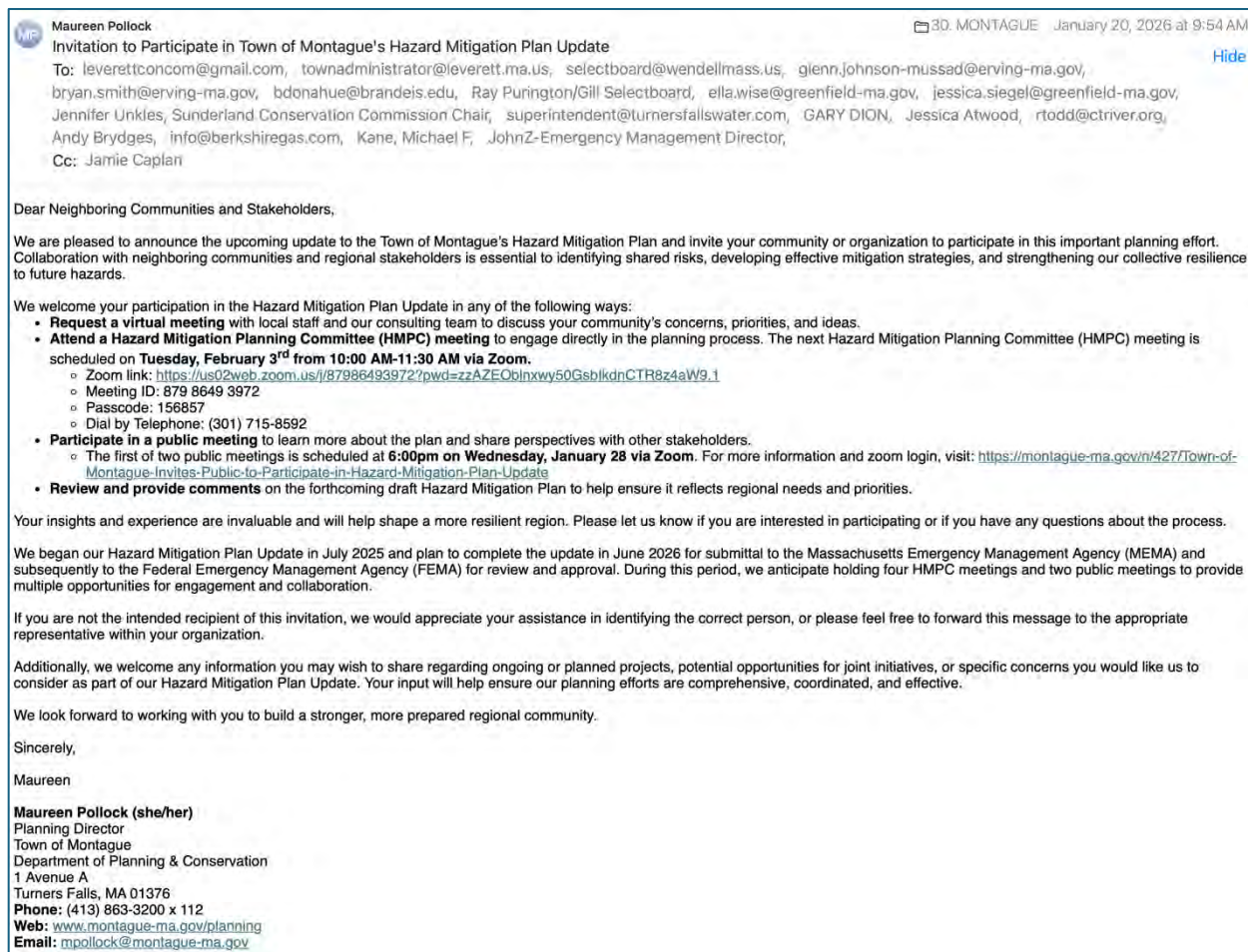


Figure 10. Invite to Neighboring Communities.

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

Each public workshop included a PowerPoint presentation and plenty of opportunities for questions and discussion. In addition, Mentimeter was available to facilitate input from meeting participants. 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.

To generate interest in each public meeting, Maureen Pollock sent an email blast (shown in Appendix A), posted on Facebook, and added announcements to the Town's website (shown in Appendix A). Below is an example of this outreach.



Figure 11. Public Meeting Announcement on Facebook.

Public Meeting #1 1/14/2026

Eleven people joined the Zoom-based Public Meeting on January 14, 2026. Ian Tapscott submitted comments prior to the public meeting encouraging the Town to plan not only for climate hazards but for public health and equity impacts because people may seek refuge in Montague during climate-driven emergencies. He suggested:

- Creating and maintaining heating and cooling centers.
- Ensuring access to public sanitary facilities to reduce health risks.
- Supporting consistent access to food and water.
- Centering resilience efforts on those with the least resources first, recognizing climate impacts are felt sooner and harder by lower-income residents.

Participants named the priority hazards affecting Montague as Wildfire (specifically in the Montague Plains), Flooding and Severe Storms, and Extreme Heat (downtown Turners Falls lacks outdoor shade). Locations of concern were the rivers and canals, buildings and potentially hazardous materials near the river, dams, and train tracks.

Finally, food security as a resilience strategy was mentioned. Participants suggested making more spaces where food can be foraged, establishing a community orchard, and developing edible landscaping.

Public Meeting #2 4/29/2026

A public meeting was held to present and gather input on the Town of Montague's updated Hazard Mitigation Plan. The meeting was facilitated by consulting team, with Town staff participation.

The consulting team provided an overview of hazard mitigation planning within the emergency management cycle, describing mitigation as sustained actions to reduce long-term risk from natural hazards. The risk assessment results were presented, identifying flooding as the top-ranked hazard based on weighted criteria including probability, impact, spatial extent, warning time, and duration. The mitigation strategy — including goals and specific actions addressing a range of natural hazards — was also reviewed, with particular attention to protecting vulnerable populations. Elderly residents, who represent nearly 25% of Montague's population, were highlighted as a priority group.

Infrastructure: Establishing a solar micro-grid for emergency backup power at the High School and Public Safety Complex (Action 3) and evaluating repairs to the Center Street bridge to accommodate higher flood flows (Action 31).

Community Support: Starting a Community Emergency Response Team (CERT) to assist isolated, elderly, and disabled residents (Action 8), and conducting targeted outreach to unhoused populations in flood-prone areas (Action 4).

Wildfire/Hazmat: Implementing safety infrastructure improvements on the Montague Plains (Action 42) and securing funding to demolish abandoned mill properties (Action 43).

Figure 12. Key Mitigation Actions Shared During the Public Meeting.

Following the presentation, the Town agreed to make the draft plan available for public review from May 12 through May 26, with the plan to be posted on the Town website and made available at each of the three local public libraries. A summary handout (included in Appendix A) will be provided alongside the draft to improve accessibility for the public. A Google Form will also be distributed to collect public feedback.

This meeting served as the second and final public meeting in the plan update process. Following the close of the public review period, any comments received will be incorporated into a final draft for submission to the Massachusetts Emergency Management Agency (MEMA) and FEMA for review and approval.

Review of Draft Plan

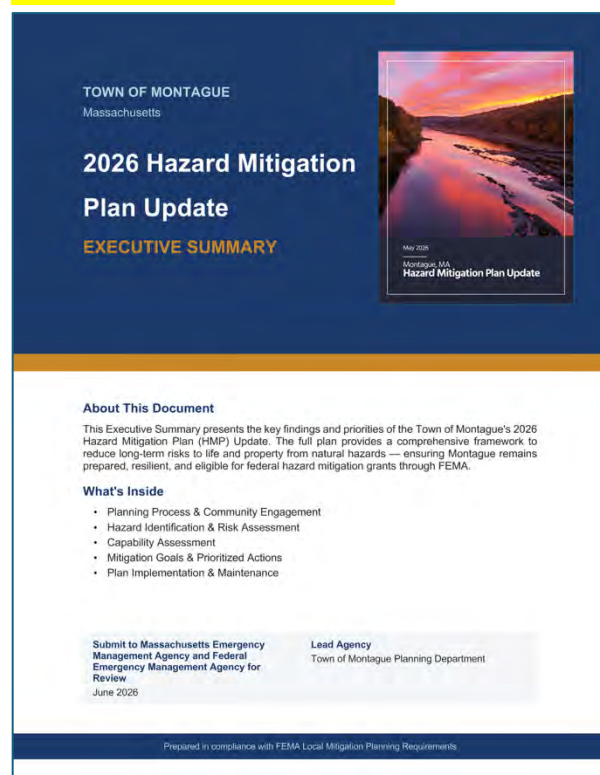


Figure 13. Executive Summary Cover.

The Town made the draft HMP available for public review from May 12, 2026, to May 26, 2026. Also available was an Executive Summary to facilitate ease of review by the public. To advertise the opportunity to review the draft HMP the Town distributed a flyer and a press release (included in Appendix A). The HMP was available on the Town's website, and a hard copy was placed in the Planning Department Office and each of the Town's public libraries. Feedback forms were left alongside the hard copies of the HMP and a link to Google Form was on the Town's website with the draft HMP.

Maureen Pollock sent the HMP via email to Greenfield, Deerfield, Sunderland, Leverett, Shutesbury, and Erving. In addition, the HMP was distributed to Town employees, committees, and boards. Ms. Pollock was on hand to field comments from the public. Comments collected are **included below**.

Stakeholders Included

The **following list identifies all the stakeholders** given an opportunity to participate in the planning process. The opportunities were extended via methods described above.

•

Public engagement with the HMPC and the public informed all aspects of the planning process. The table below indicates some of those highlights.

Table 7. Where Public Engagement Informed the Plan.

Area of the Plan Impacted	Contributions
Planning Area Profile	The HMPC updated the list of critical facilities. They also contributed information regarding current land use practices and priorities.
Planning Process	Participated in every aspect of the planning process and made recommendations regarding how to engage the public and key stakeholders.
Risk Assessment	- Described extent of hazard impacts based on previous events. - Offered first-hand insight and experiences of residents.

Area of the Plan Impacted	Contributions
	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	The HMPC agreed to implement the HMP and coordinate at a minimum twice a year to discuss mitigation actions and funding opportunities. Participation in the HMPC from FirstLight, Brick House Resource Center, the Turners Falls Water and Fire Departments, and the Gill-Montague Regional School District position the Town for success.

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 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) Program planning effort (completed in 2018), as well as the “ResilientMass Plan” (2023⁵⁴) 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 (February 2020) remain in this updated risk assessment. 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 during the 2018 MVP effort, severe weather events (snow, wind, ice rain), drought, and extreme temperatures, are thoroughly covered in this assessment, along with the top manmade hazards, flooding from dam failure and hazardous materials incident.

The HMP update profiled hazards are as follows:

- Average and Extreme Temperatures
- Drought
- Earthquake
- Flooding from Precipitation
- Flooding from Dam Failure or Overtopping
- Hurricanes and Tropical Storms
- Invasive Species
- Landslide
- Other Severe Weather
- Severe Winter Storms

Natural Hazards are a source of harm or difficulty created by a meteorological, environmental or geological event. Natural hazards, such as flooding and earthquakes, impact the built environment, including dams and levees.

⁵⁴ <https://www.mass.gov/doc/resilientmass-plan-2023>.

- Tornado
- Wildfire / Brush Fire
- Hazardous Materials Incident

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

Massachusetts Emergency Declarations

The Town of Montague has been subject to numerous federal disaster declarations along with the entirety of Franklin County. Some of these disaster declarations correspond to emergency declarations in portions of Massachusetts. The following table cross-references the 14 Massachusetts emergency declarations starting in 2011 with the corresponding federal disaster declarations. All the Massachusetts emergency declarations corresponding to Montague have involved natural hazards addressed in this HMP except for the shelter capacity crisis, which is not a natural hazard and is not profiled in this plan. In 2023, Governor Healey declared that a state of emergency existed in Massachusetts due to rapidly rising numbers of migrant families arriving in need of shelter and services and a severe lack of shelter available in the state. At the time, nearly 5,600 families or more than 20,000 individuals, including children and pregnant women, were in state shelter. Hazards that do not appear in this table (e.g., earthquakes) have not been subject to Massachusetts emergency declarations.

Table 8. Massachusetts Emergency / Disaster Declarations.

Massachusetts Emergency	Start	Termination	Corresponding Federal Disaster Declaration	FEMA Public Assistance Available	Applicable to Montague?
Storm Lee (also referred to as Hurricane Lee)	9/15/2023	9/17/2023	FEMA-EM-3599-MA	All counties	Yes
Severe Storms and Flooding DR-4780-MA	9/11/2023	9/13/2023 Declaration Date: 5/15/2024	FEMA-4780-DR-MA	Bristol County, Worcester County	No
Shelter Capacity Crisis	8/8/2023	8/1/2025	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 Impacted Communities: Towns of

Massachusetts Emergency	Start	Termination	Corresponding Federal Disaster Declaration	FEMA Public Assistance Available	Applicable to Montague?
					Andover and North Andover, and City of Lawrence (Essex County)
Nor'easter	3/13/2018	3/14/2018	FEMA-4379- DR-MA	Essex, Middlesex, Norfolk, Suffolk, and Worcester Counties	No
Coastal Storm	3/3/2018	3/6/2018	DR-4372-MA Severe Winter Storm and Flooding	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, Middlesex, Essex, Suffolk, Norfolk, Plymouth, Bristol, Barnstable, Dukes, and Nantucket Counties	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 Montague?
Tornadoes	6/1/2011	6/19/2011	DR-1994-MA	Hampden and Worcester Counties	No

The Town of Montague issued a Declaration of State of Emergency on July 19, 2021, in response to the significant rainfall and severe flooding of local rivers, other tributaries, and municipal roadways in the Town, noting that significant damage to private and public property as well as critical infrastructure had been observed. The Declaration (

Figure 14) stated that the Town of Montague Emergency Manager and Turners Falls Fire Chief had declared a local emergency on July 18, 2021, and that the Montague Selectboard had determined immediate public action was needed to prevent further damage to private and public property.

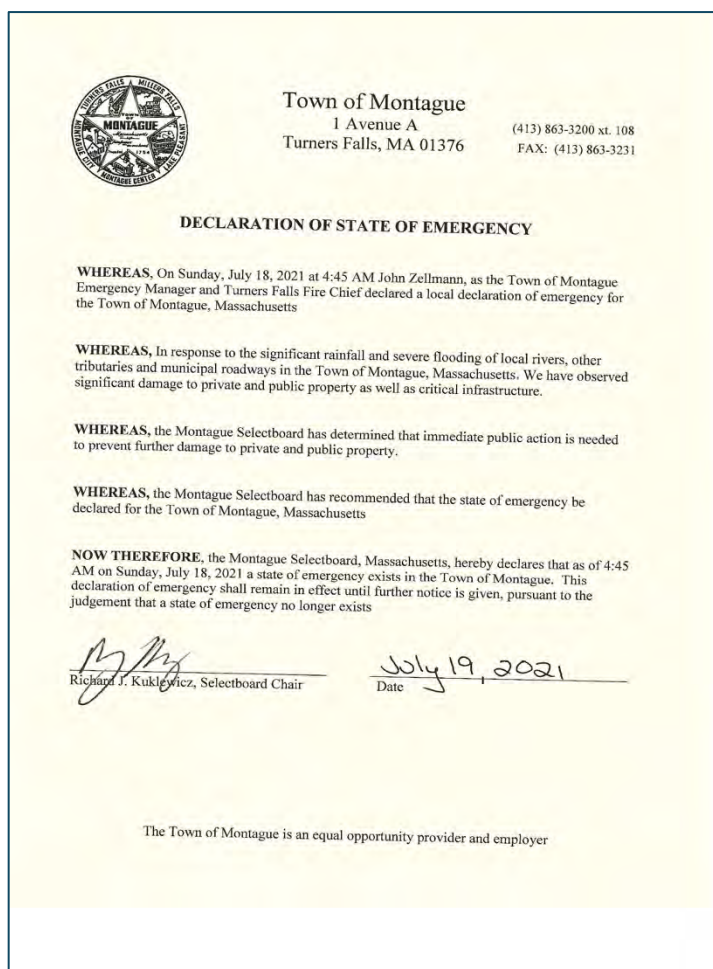


Figure 14. State of Emergency Declaration in Response to Significant Rainfall and Severe Flooding.

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. Montague is in the “Greater Connecticut River Valley” region shown in light blue in the figure below.

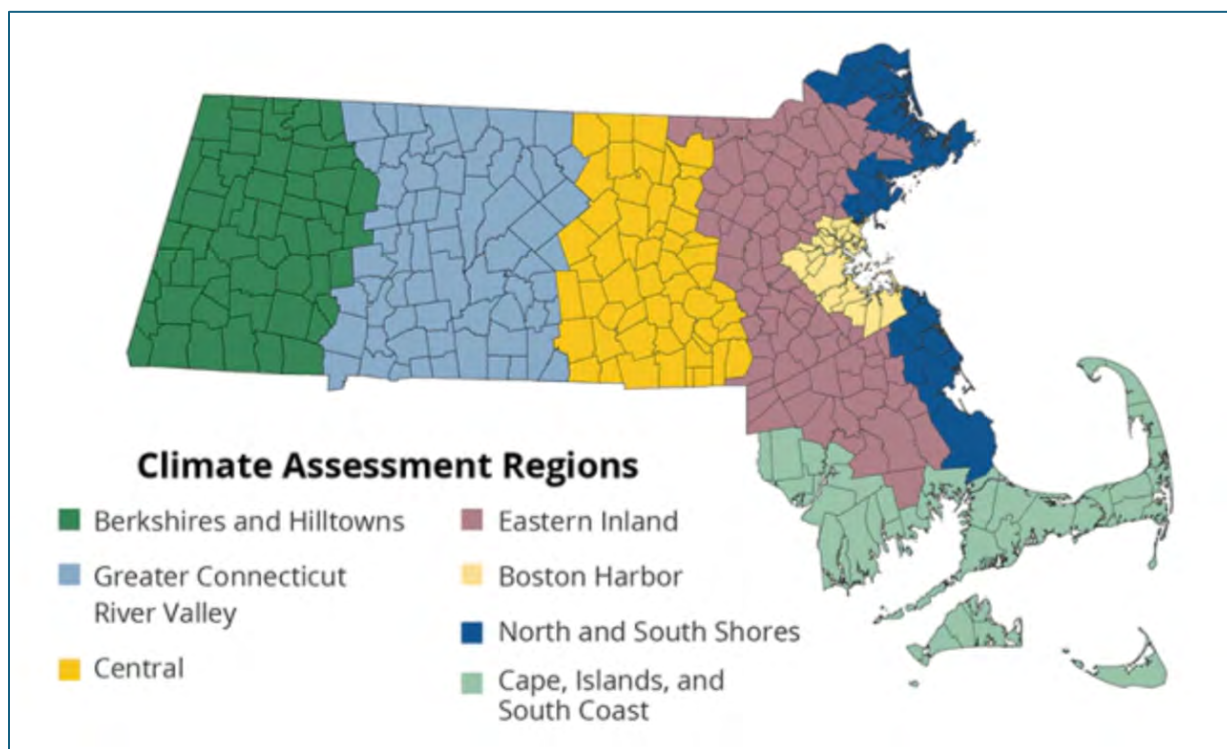


Figure 15. Climate Assessment Regions - Montague is in the Greater Connecticut River Valley Region.

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

Table 9. Top Impacts of Climate Change per Sector in the Greater Connecticut River Valley Region.

Sector	Top Impacts per Sector	Comments
Human	Health effects of extreme storms and power outages	Including injuries, food safety, and medical device failure
	Reduction in food safety and security	Causes are production and supply chain issues as well as spoilage during outages
Infrastructure	Damage to electric transmission and distribution	From heat stress and extreme storms

Sector	Top Impacts per Sector	Comments
	Damage to buildings	Causes are heavy rainfall and overwhelmed drainage
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
	Shifting distribution of native and invasive species	Changing conditions will favor some species
Governance	Increase in costs of responding to climate migration	Includes planning for abrupt increases in local populations
	Reduction in State and municipal revenues	Causes may include reduced property tax base due to floods
Economy	Decrease in agricultural productivity	Causes are crop yield impacts from precipitation patterns, extreme weather, and pests
	Reduction in availability of affordably priced housing	Causes are direct damage (floods) and scarcity caused by demand

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

Table 10. How This Plan Addresses the Top Impacts of Climate Change per Sector.

Sector	Top Impacts per Sector	Approach to Incorporating Impacts
Human	Health effects of extreme storms and power outages	Severe weather events are hazards profiled in this plan.
	Reduction in food safety and security	Some of the hazards that affect food security (i.e., droughts) are profiled in this plan. However, Montague also depends on food from other regions, and additional efforts beyond the scope of this plan will be needed to protect food safety and security.
Infrastructure	Damage to electric transmission and distribution	Severe weather events that damage transmission and distribution are hazards profiled in this plan.
	Damage to buildings	Severe weather events and floods that damage buildings are hazards profiled in this plan.
Natural Environment	Freshwater ecosystem degradation	Invasive species are addressed as a hazard profiled in this plan. Additional efforts beyond the scope of this plan will be needed to protect freshwater ecosystems.
	Forest health degradation	Invasive species, droughts, wildfires, and severe weather events that damage forests are hazards profiled in this plan. Additional efforts beyond the

Sector	Top Impacts per Sector	Approach to Incorporating Impacts
		scope of this plan will be needed to protect Forest health.
	Shifting distribution of native and invasive species	Invasive species is a hazard profiled in this plan.
Governance	Increase in costs of responding to climate migration	The capability assessment and related mitigation actions will help address increased costs related to responding to climate migration.
	Reduction in State and municipal revenues	The capability assessment and related mitigation actions will help address reduction in revenues.
Economy	Decrease in agricultural productivity	Causes are crop yield impacts from precipitation patterns, extreme weather, and pests; these are hazards profiled in this plan.
	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.

FEMA Requirements §201.6(c)(s)(i) and §201.6(c)(s)(ii) 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?

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?

Hazard Profiles

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, Vulnerability Assessment, and Probability of Future Events; these are described in the table below.

Table 11. 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.
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.
Vulnerability Assessment	Describes potential impact on the community, including estimated potential losses and the anticipated effects of climate change.
Probability of Future Events	Describes likelihood of future hazard occurrences in the Town based on best available and climate-informed science.

To describe previous occurrences, this plan update highlights major events from history but relies primarily on a roughly ten-year lookback (2015 through 2025) ending with any events from the date of plan development (2025-2026). 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.

The vulnerability assessment characterizes how hazards have impacted and may impact the different aspects of the community. In the vulnerability assessment subsections, 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

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, in Massachusetts, typically the highest temperatures are experienced in the southeast while the coldest are typically experienced in the northwest.

Description

Extreme cold 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 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.

Extreme heat is also 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. The EPA reports that more than 14,000 Americans have died directly from heat-related causes since 1979, according to death certificates, and heat-related deaths reached new highs in 2021 and 2022, which were two of the hottest years on record in the contiguous 48 states and featured several notable heat waves.⁵⁵

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.

Location

The Massachusetts Climate Assessment (2022) notes that recent efforts to characterize extreme heat have underscored that risks are present throughout the entire Commonwealth of Massachusetts. Therefore, the entirety of Montague is subject to extreme heat events. Similarly, as the entire Commonwealth of Massachusetts is at risk to cold temperatures, the entirety of Montague is also exposed to extreme cold events.

According to NOAA, Massachusetts is made up of three climate divisions: Western, Central, and Coastal, and average annual temperatures vary slightly across the divisions. Montague is within the Central climate division, with annual average temperatures of around 49°F. Extreme temperature events occur

⁵⁵ United States Environmental Protection Agency. Climate Change Indicators: Heat-Related Deaths (1979-2022). Web update: June 2024. <https://www.epa.gov/climate-indicators/climate-change-indicators-heat-related-deaths>.

more frequently and are characterized by greater variability in the inland regions of Massachusetts where temperatures are not moderated by the Atlantic Ocean.

Previous Occurrences

Extreme Cold

To understand extreme cold events for the Town, average minimum temperatures were researched. Average minimum temperatures in the region range from about 15 to 24 degrees in the winter months to the high-50s and 60 degrees in the summer months. In general, Massachusetts experiences extreme winters, and temperatures below freezing are common. The location nearest to Montague for which temperatures have been routinely monitored, recorded, and made available online by NOAA (National Weather Service and National Centers for Environmental Information) is Greenfield No. 3, MA (Station ID: USC00193229), approximately 2.5 miles southwest of Turners Falls, MA. Figure 16 shows average monthly minimum and record low temperatures recorded at the Greenfield No. 3 monitoring station from 2000 through 2025.

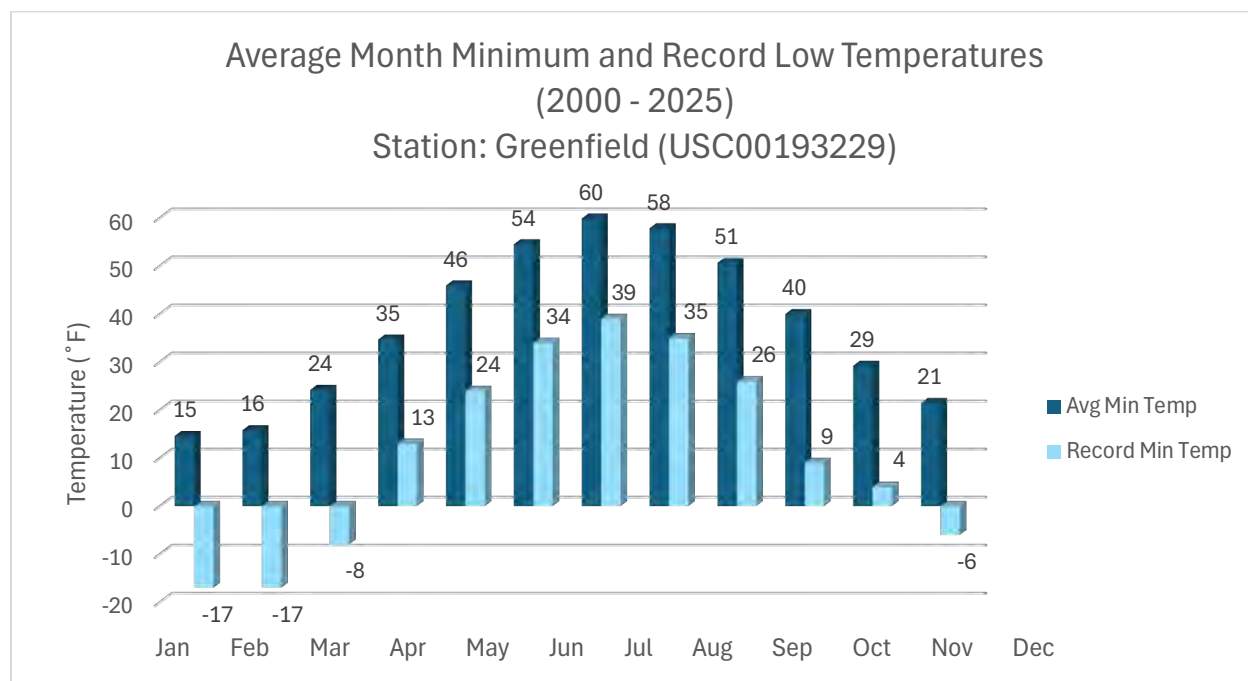


Figure 16. Average Monthly Minimum and Record Low Temperatures - Greenfield No.3 Station (2000-2025).

The ResilientMass Plan notes that, within the Commonwealth, 120 cold weather events, ranging from Cold/Wind Chill to Extreme Cold/Wind Chill events, have occurred since 1995. The NOAA NCEI Storm Events database lists two extreme cold/wind chill events that occurred in Franklin County from January 2015 through May 2025. No deaths or injuries were recorded, and no property damage or crop damage was recorded for these events. Details of the two events are provided in Table 12.

Table 12. NCEI Storm Events Database - Extreme Cold Events in Franklin County, MA (2015-2025).

Date	Description
02/16/2015	<i>Extreme Cold / Wind Chill – Eastern Franklin County.</i> Low pressure off the Delmarva peninsula intensified rapidly as it moved northeastward. Its path just southeast of Nantucket brought heavy snow to all of southern New England and blizzard conditions and coastal flooding to coastal areas. Near blizzard conditions occurred across much of eastern Massachusetts. This was the latest in a series of snowstorms that piled nearly 60 inches of snow on the city of Boston in barely three weeks. This amount of snow in such a short amount of time wreaked havoc on much of eastern Massachusetts. School and work for some employees were delayed or even cancelled, plowing and shoveling became nearly impossible, and the Massachusetts Bay Transit Authority reduced or even cancelled services more than once during the winter snow blitz. The Massachusetts Bay Transportation Authority commuter rail and subway lines were plagued with delays and cancellations that lasted until the end of March. The large amount of snow, combined with wintry, frigid temperatures resulted in snow piling up on roofs and numerous (250) roof collapses were reported to emergency management and to the National Weather Service in the days after this snowstorm. Fortunately, no injuries to humans were reported. The Automated Surface Observing System at Orange Municipal Airport (KORE) recorded wind chills as low as 28 below zero.
02/13/2016 to 02/14/2016	<i>Extreme Cold / Wind Chill – Eastern Franklin County.</i> Arctic high pressure brought strong northwest winds and extremely cold wind chills to southern New England. Many locations reported wind chills between 25 and 35 degrees below zero. Wind chills as low as 38 below zero were reported in Orange.

During the February 2015 event, a series of snowstorms piled nearly 60 inches on the City of Boston in three weeks and caused recurrent blizzards across eastern Massachusetts. While Montague and western Massachusetts were not impacted as much from the snow, temperature gauges across the Commonwealth measured extreme cold, with wind chills as low as -31°F. Wind chills as low as 28 below zero were recorded at the Orange Municipal Airport, approximately 15 miles east of Montague.

The February 2016 cold weather event broke records throughout the state. Arctic high pressure brought strong northwest winds and extremely cold wind chills to southern New England.

Cold events are also reported with winter storms and are described in the severe winter storm section of this chapter.

Extreme Heat

To understand extreme heat events for the Town, average maximum temperatures were researched. Average monthly maximum temperatures in the region range from about 34 degrees to the mid-40s in the winter months to high-70s to 83 degrees in the summer months. Figure 17 shows average monthly maximum and record high temperatures recorded at the Greenfield No. 3 monitoring station from 2000 through 2025 (year-to-date).

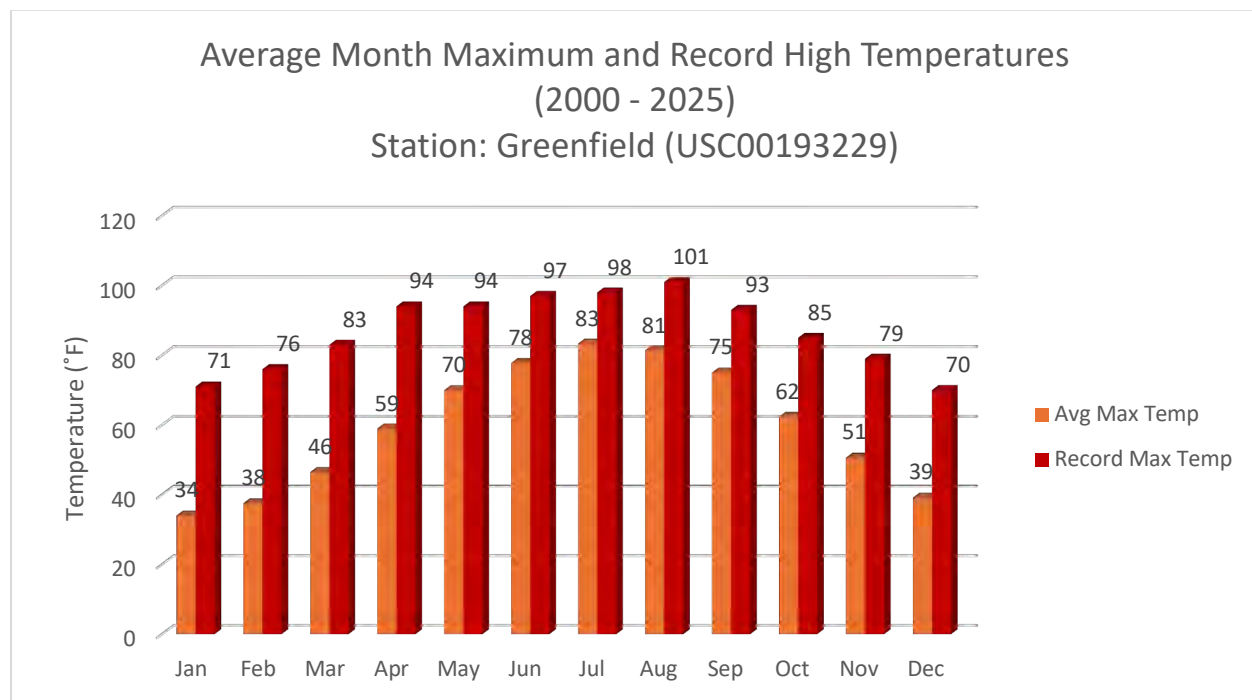


Figure 17. Average Monthly Maximum and Record High Temperatures - Greenfield No.3 Station (2000-2025).

According to the NOAA NCEI Storm Events Database, there have been 43 warm weather events (ranging from Record Warmth/Heat to Excessive Heat) since 1995 in Massachusetts. 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. Information on excessive heat was not available for the Town of Montague or Franklin County prior to 2018.

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. In Franklin County, excessive heat was recorded for July 1, 2018, when a heat index of 107°F was observed at the Orange Municipal Airport from 1:00 PM to 5:00 PM.

The ResilientMass Plan notes that, across the Commonwealth, an average of 3.6 heat events and two excessive heat events occurred between January 2018 and December 2022. In addition, Massachusetts experienced one ‘official’ heat wave in early September 2023 and at least four heat waves in 2024.

August 2022 was the hottest August on record, and 2020 and 2022 were the two hottest years on record, for the Commonwealth of Massachusetts. The City of Boston experienced two six-day heat waves and 17 days above 90 degrees in 2022.

The NOAA NCEI Storm Events database lists one extreme heat event for Franklin County in the timeframe January 2015 through May 2025. The event details are provided in Table 13.

Table 13. NCEI Storm Events Database - Extreme Heat Events in Franklin County, MA (2015-2025).

Date	Description
07/01/2018	<i>Excessive Heat – Eastern Franklin County.</i> An area of high pressure over the Eastern USA brought hot and very humid air to Southern New England on July 1st. Heat Index values of 105 to 109 occurred in parts of Eastern and Northwestern Massachusetts. Heat Index values in much of the state reached 95 to 104. The Automated Surface Observing System platform at Orange Municipal Airport observed a Heat Index of 107 on July 1st from 1PM to 5PM EST.

On Tuesday, July 16, 2024, the National Weather Service (NWS) issued a heat advisory for most of Massachusetts, including Franklin, Hampshire, and Hampden counties through the following evening, Wednesday, July 17, in anticipation of dangerous heat and humidity with temperatures reaching the upper 90s throughout the week.⁵⁶

On Tuesday, June 24, 2025, the NWS released an updated (from Sunday, June 22) heat advisory, in effect until 8pm for Franklin, Hampshire, and Hampden counties, stating these areas should prepare for heat index values up to 106 degrees.⁵⁷

The 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>. No Secretarial Disaster Designations were issued for Massachusetts counties in the 2025 Crop Year (based on data provided on the FSA website, updated 4/23/2025). The events resulting in disaster declarations related to extreme temperatures and impacting Franklin County between 2013 and 2024 are listed in Table 14.

Table 14. USDA Disaster Events That Refer to Extreme Temperatures - Franklin County, MA.

Year	Event	Event “Begin Date”
2023	Extreme freeze (Designation No. S5458) ⁵⁸	5/17/2023
2023	Frost and freeze (Designation No. S5446)	5/17/2023

⁵⁶ New England Public Media. July 16, 2024. <https://www.nepm.org/regional-news/2024-07-16/people-find-places-to-cool-off-as-extreme-heat-continues-in-western-mass>

⁵⁷ Advance Local Media LLC. MassLive, Weather Alerts. <https://www.masslive.com/weather-alerts/2025/06/heat-advisory-affecting-3-massachusetts-counties-from-sunday-to-tuesday.html>.

⁵⁸ USDA Farm Service Agency. News Release: Massachusetts. July 10, 2023. <https://www.fsa.usda.gov/news-events/news/07-10-2023/usda-designates-10-massachusetts-counties-primary-natural-disaster>.

Year	Event	Event “Begin Date”
2023	Freeze (Designation No. S5470)	5/17/2023
2022	Drought and Excessive Heat (Designation No. S5290)	5/9/2022
2019	Excessive rain and prolonged cool temperatures (Designation No. S4526)	4/1/2019
2019	Extreme cold and temperature fluctuations resulting in winterkill (Designation No. S4545)	12/1/2018
2016	Frost and freeze (Designation No. S4040)	2/14/2016
2016	Freeze and unseasonably warm temperatures (Designation No. S4017)	2/1/2016
2014	Extreme temperature fluctuations, excessive cold, frosts, and freezes (Designation No. S3755)	12/1/2013

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 three 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 three hours. On November 1, 2001, the NWS implemented a Wind Chill Temperature Index (Figure 18) designed to more accurately describe how cold air feels on human skin.

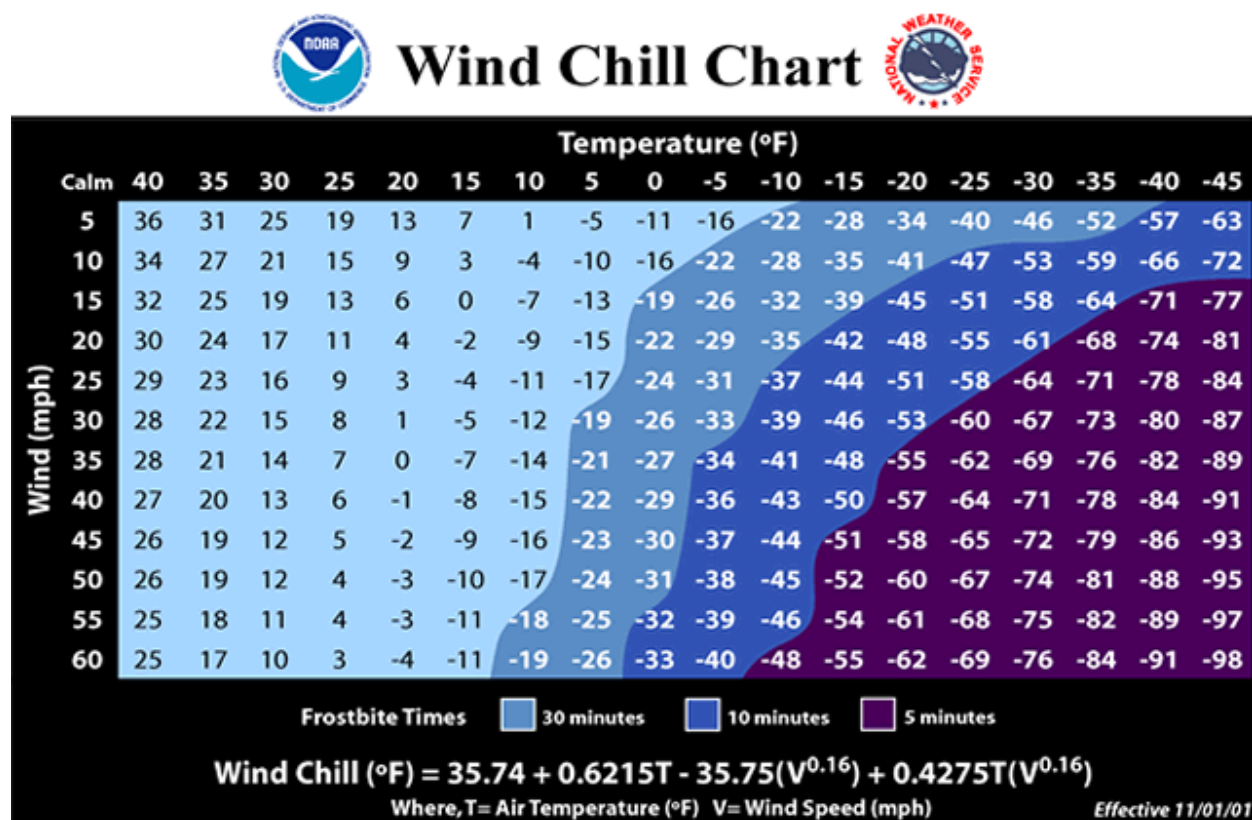


Figure 18. NWS Wind Chill Temperature Index and Frostbite Risk.

Extreme Heat: The NWS issues a Heat Advisory when the NWS Heat Indices are between 95°F and 99°F for two or more hours or two consecutive days, or if they are between 100°F and 104°F 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 two or more hours. The NWS Heat Index (Figure 19) 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.

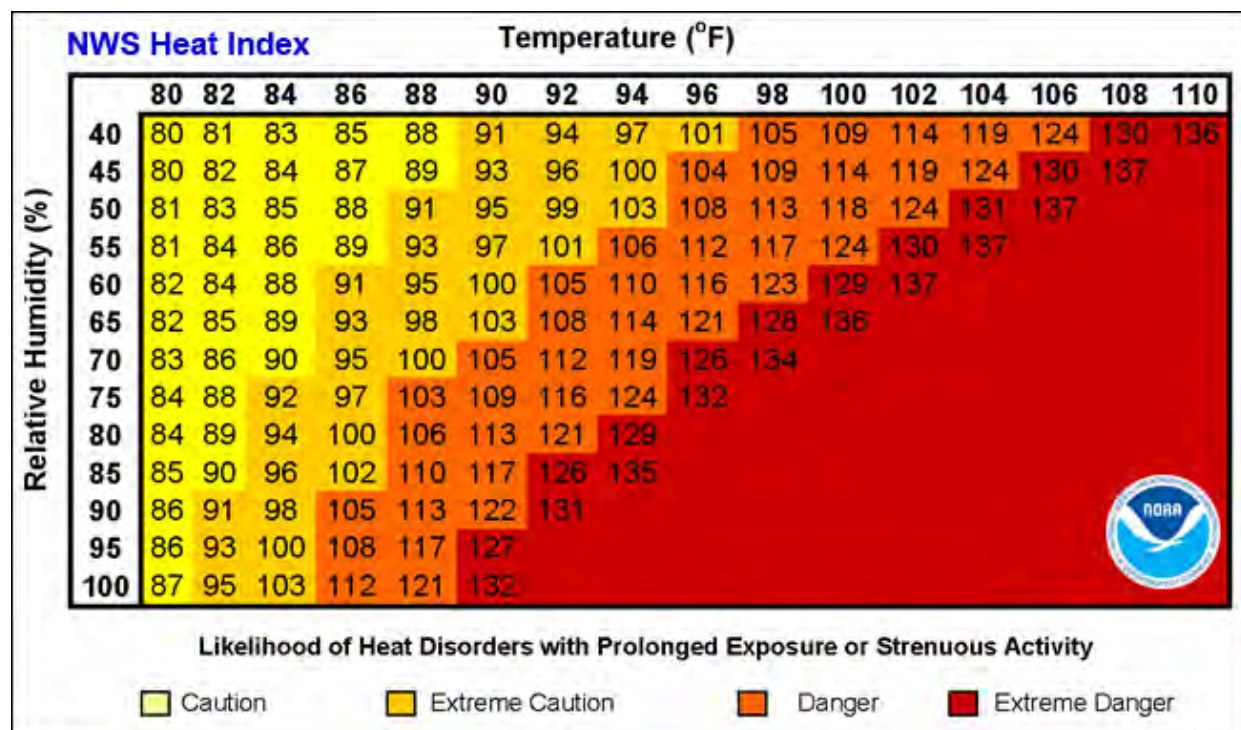


Figure 19. NWS Heat Index Chart.

The NWS advisory and warning products are applicable to all extreme temperature events that may affect Montague, as they are used throughout Massachusetts on a routine basis and appropriately characterized the most recent extreme cold and heat events over the last few years. Extreme temperatures have not been characterized outside of the NWS advisory/warning systems.

Vulnerability Assessment

Exposure

Extreme temperatures are a hazard with no defined geographic boundary. The entire Town should be considered exposed to the hazard.

Extreme cold for the region is considered to occur when temperatures are well below normal and accompanied by winds, which introduce wind chill factor that can be extremely harmful to exposed skin. Extreme cold is common in Montague from December through mid-March, with an average daily high temperature below 47°F. The coldest month of the year in Montague is January, with an average low temperature of 18°F. Excessive heat can occur at any time during the year but it is most dangerous during the months of June through mid-September, when average temperatures are at their highest. The hottest month of the year in Montague is July, with an average high temperature of 83°F. Extreme heat for the region is typically defined as three or more consecutive days above 90°F.

As noted above, extreme heat differentially impacts segments of the population, with elderly and low-income populations being particularly susceptible. Figure 20 and Figure 21 below show how the elderly and low-income populations are distributed throughout the Town.

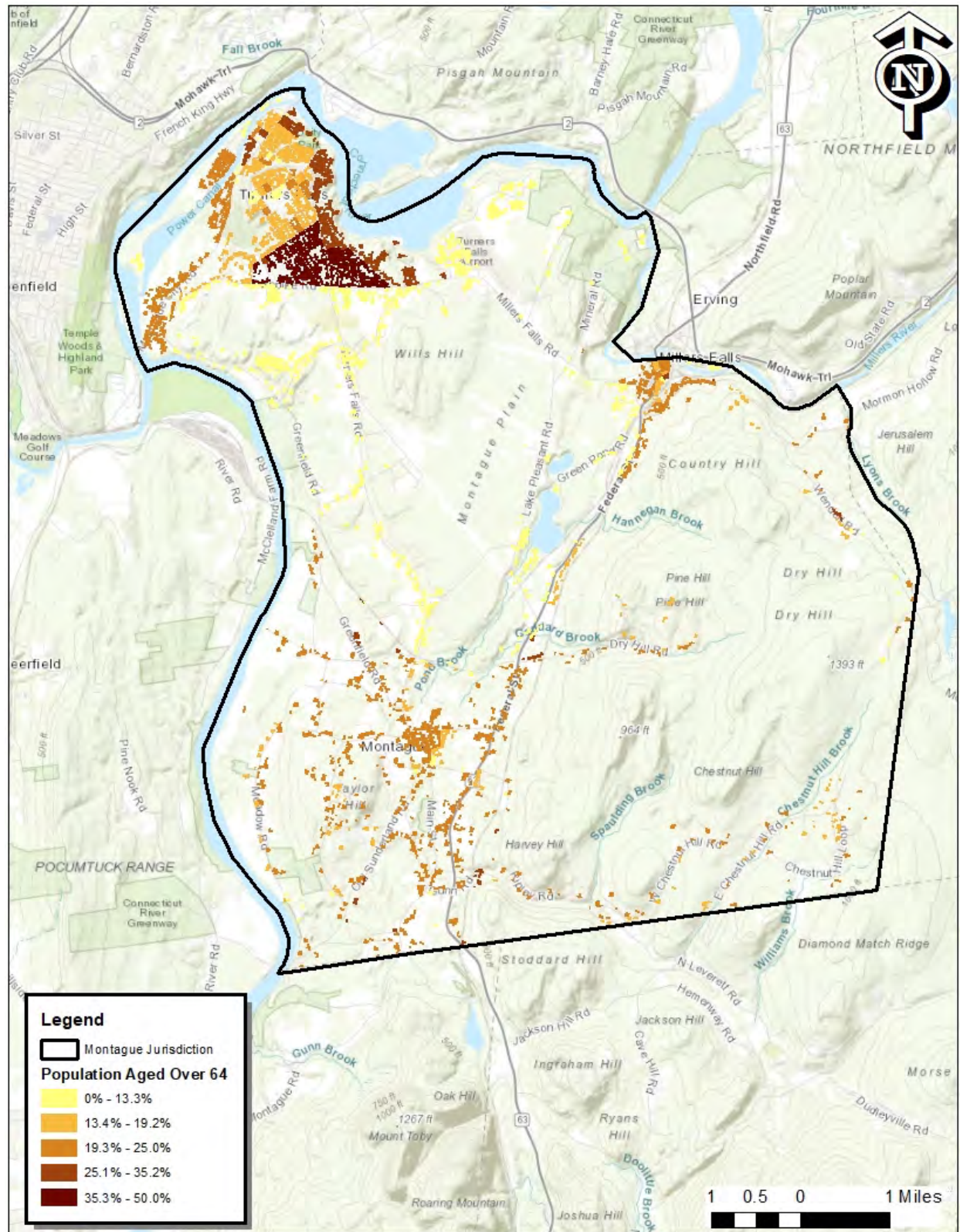


Figure 20. Population Over 64 years old.

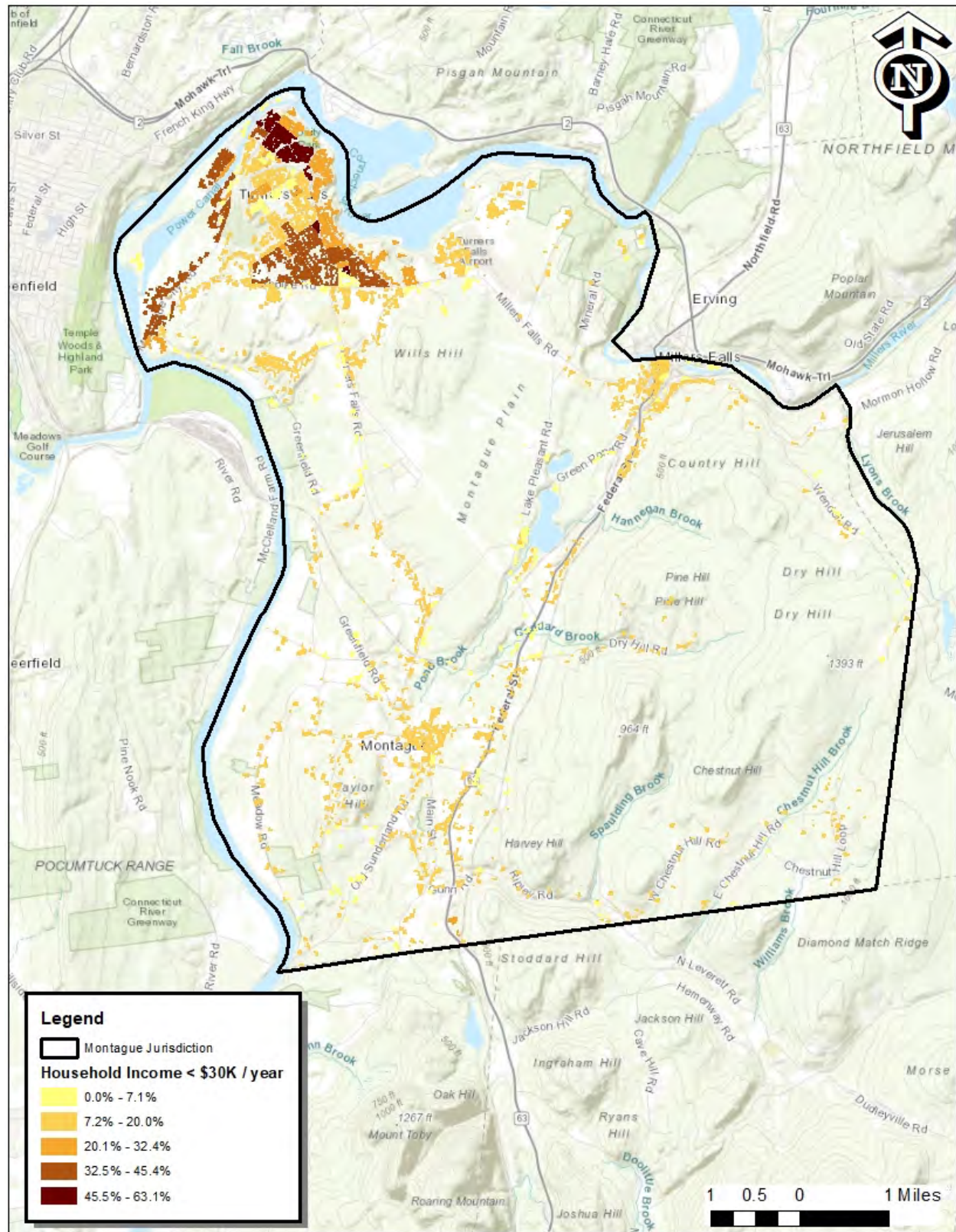


Figure 21. Population with income below \$30,000.

Built Environment Impacts

All elements of the built environment are exposed to the extreme temperature hazard. 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 electrical 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.

The impacts of excessive heat are most prevalent in developed areas. The impacts of extreme heat on buildings include increased thermal stresses on building materials, which leads to greater wear and tear and reduces a building's useful lifespan; increased air-conditioning demand to maintain a comfortable temperature; overheated heating, ventilation, and air-conditioning systems; and disruptions in service associated with power outages. Secondary impacts of excessive heat are severe strain on the electrical power system and increased potential for brownouts or blackouts. Extreme heat can have a negative impact on transportation infrastructure. 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. Heat also places stress on automobile cooling systems, diesel trucks, and railroad locomotives, which leads to an increase in mechanical failures. Steel rails are at risk of overheating and warping, which can lead to train derailments.

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, creating less dark asphalt-covered areas, and creating more natural areas. According to the ResilientMass Plan, extreme temperatures are projected to increase annual transportation infrastructure maintenance costs by over \$140 million (across the Commonwealth) by the end of the century.

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.

The Montague Senior Center (at 62 Fifth Street in Turners Falls) is open as a cooling center in the summer months. The Montague Public Libraries (Carnegie Library at 201 Avenue A in Turners Falls, Millers Falls Library at 23 Bridge Street in Millers Falls, and Montague Center Library at 17 Center Street in Montague Center) are air conditioned, supplied with bottled water for distribution to the public, and have been open several days a week during past heat advisory periods. The DCR Great Falls Discovery Center (at 2 Avenue A in Turners Falls) has been scheduled open several days, including weekends during extreme heat events. Based on information provided by the HMPC, at the time of HMP update, none of the facilities mentioned above is equipped with a backup generator.

Older adults are often at elevated risk from exposure to extreme temperatures due to a high prevalence of pre-existing and chronic conditions. In the Town of Montague, an estimated 21.0% of the population is age 65 and older.⁵⁹ 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, those who work outdoors, and those with underlying health conditions such as heart disease. The WinnCompanies Power Town apartment complex (located at Avenue A and Fourth Street) is an example of a residential community in which some members are elderly, rely on electric-powered medical equipment, and/or have mobility issues. In the case of a power outage, the Power Town complex is not currently equipped with backup power/generators.

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 U.S., 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

⁵⁹ Massachusetts Healthy Aging Collaborative. 2025 Massachusetts Healthy Aging Data Report: Community Profile, Montague (Franklin). May 2025. https://mahealthyagingcollaborative.org/wp-content/themes/mhac/pdf/community_profiles/MA_Towncode192_Montague.pdf.

- 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 and those under the influence of drugs or alcohol.

Climate change will increase the rate of heat-related illnesses and the 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 (e.g., excess algal growth, decreased oxygen), wildlife concerns (e.g., shifts in species distribution), and impact vegetative growth when combined with drought. The ResilientMass Plan predicts an increase in the number of high heat days to 23-29 per year by 2050 and annual average temperature increase of 5.9 to 7.9 degrees Fahrenheit.

Probability of Future Events

According to the 2022 Massachusetts Climate Change Assessment, across the state, summers are projected to be warmer in the future. With average summertime temperatures increasing, the projected change in humidity will have the added effect of making humans feel hotter than the actual temperature.

The ResilientMass Plan notes that Massachusetts averaged three declared cold weather events and two extreme cold weather events annually between January 2018 and December 2022. The years 2018 and 2019 were particularly notable, with 10 cold weather events in each year, including five extreme cold and wind chill events in 2018 and six events in 2019. The ResilientMass Plan also notes that, across the Commonwealth, an average of 3.6 heat events and two excessive heat events occurred per year between January 2018 and December 2022.

The 2022 Massachusetts Climate Change Assessment predicts that temperatures are almost certain to rise across the Commonwealth, and humidity will rise as well, causing hot days to feel even hotter. These changes could have significant consequences for human and ecosystem health, as human populations and ecosystems in Massachusetts are not adapted or accustomed to these temperatures. Inland areas are very likely to warm more and experience more extreme heat than coastal areas.

Many practitioners believe that some heat wave related circulation patterns are occurring more frequently due to climate change. There are several climatic phenomena that determine the number of extreme weather events in a specific year. However, significant long-term trends are present 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 temperatures. This is compared to a nearly 1:1 ratio in the 1950s. According to the Center for Climate and Energy Solutions, some models suggest that this ratio could climb to 20:1 by midcentury if GHG emissions are not significantly reduced.

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.

Based on analysis of data from NOAA's National Centers for Environmental Information for Essex County, MA, The Climate Explorer creates a graph depicting the number of high heat days per year and a graph depicting the number of frost days per year for observations (1950-2013), a modeled history (1950-2005), and projections (2006-2100) resulting from the application of two global climate models. In one model, humans stop increasing and then dramatically reduce global emissions, and in the other model, global emissions continue to increase through 2100. Figure 22 presents the projected number of days per year with maximum temperature above 90°F. Figure 23 presents the projected number of days per year with minimum temperature below 32°F. The dark gray bars show averages of observations recorded at individual climate and weather stations for each year from 1950 through 2013. The light gray band shows the range of values modeled (hindcast) for 1950 through 2005. The blue band shows projections for the lower emissions model, and the red band shows projections for the higher emissions model.⁶⁰

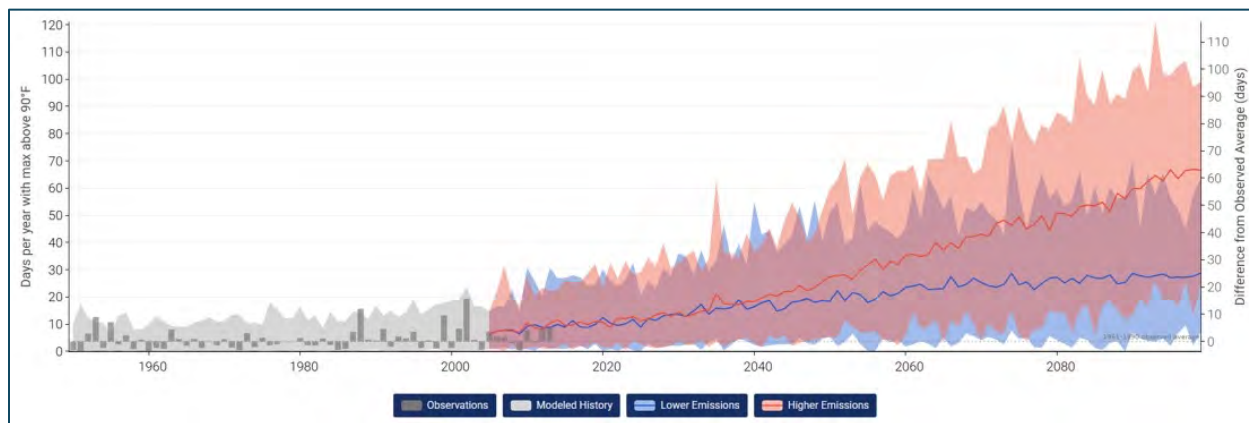


Figure 22. Projected Annual Days with Maximum Temperature above 90 Degrees - Franklin County, MA.

⁶⁰ NOAA/The Climate Explorer. Franklin County, MA, USA. https://crt-climate-xplorer.nemac.org/climate_graphs/.



Figure 23. Projected Annual Days with Minimum Temperature Below 32 Degrees - Franklin County, MA.

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 15. Problem Statements for Average and Extreme Temperatures.

Assets	Problems Associated with Average and 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 Senior Center needs a generator so it can consistently serve as a heating/cooling center. • The elderly and those with mobility issues may not be able to leave their homes and travel safely without assistance. • 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 and extreme cold.
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 during extreme heat events.

Assets	Problems Associated with Average and Extreme Temperatures
	The electric grid may become stressed and fail during extreme heat and cold events.
Systems (including networks and capabilities)	Although progress is being made, extreme heat mitigation and adaptation have not been fully integrated into existing local plans and regulations for new development.
Natural, historic, and cultural resources	- Extreme heat may lead to, or exacerbate, impacts on natural systems related to wildfires and invasive species (refer to those sections). - Extreme heat may lead to water quality concerns. - Risk of wildfires increases as the number of days greater than 90°F is expected to increase significantly. Coupled with changes in precipitation, less water may be available to fight the wildfires.
Activities that have value to the community	Recreational activities may be adversely impacted by extreme heat and extreme cold.

Drought

Drought is typically defined as a period 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. Drought related challenges to public water systems can affect a large number of residents and businesses. Public water suppliers may struggle to meet system demands while maintaining adequate pressure for fire suppression and meeting water quality standards. The Town of Montague maintains and

operates the water supply facilities in the Montague Center Water District and the Turners Falls Water District, which includes the villages of Millers Falls, Lake Pleasant, and Montague City. The MassDEP requires all public water systems (PWSs) to maintain an emergency preparedness plan.

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. Based on review of GIS data made available online through the MassDEP Well Location Viewer, domestic wells are common in Montague.

One primary hazard in this HMP 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. During a drought, dry soil and the increased prevalence of wildfires can increase the concentration of irritants (such as pollen or smoke) in the air. According to the Centers for Disease Control (CDC), degraded air quality can have widespread deleterious health impacts on humans and is particularly significant to the health of individuals with pre-existing respiratory health conditions such as asthma.

Location

The Massachusetts Drought Management Plan released in December 2023 presents an assessment of drought conditions in seven regions: Western, Connecticut River Valley, Central, Northeast, Southeast, 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 Montague, located in the Connecticut River Valley drought region, which includes Franklin, Hampshire, and Hampden Counties.

Previous Occurrences

To understand the conditions of past drought, it can be helpful to understand the typical precipitation received each year. The location nearest to Montague where precipitation has been routinely recorded and made available online by NOAA is Greenfield No. 3 monitoring station (Station ID: USC00193229), near Turners Falls, MA). Figure 24 shows average monthly precipitation recorded at the Greenfield monitoring station from 2000 to 2025 (year-to-date).

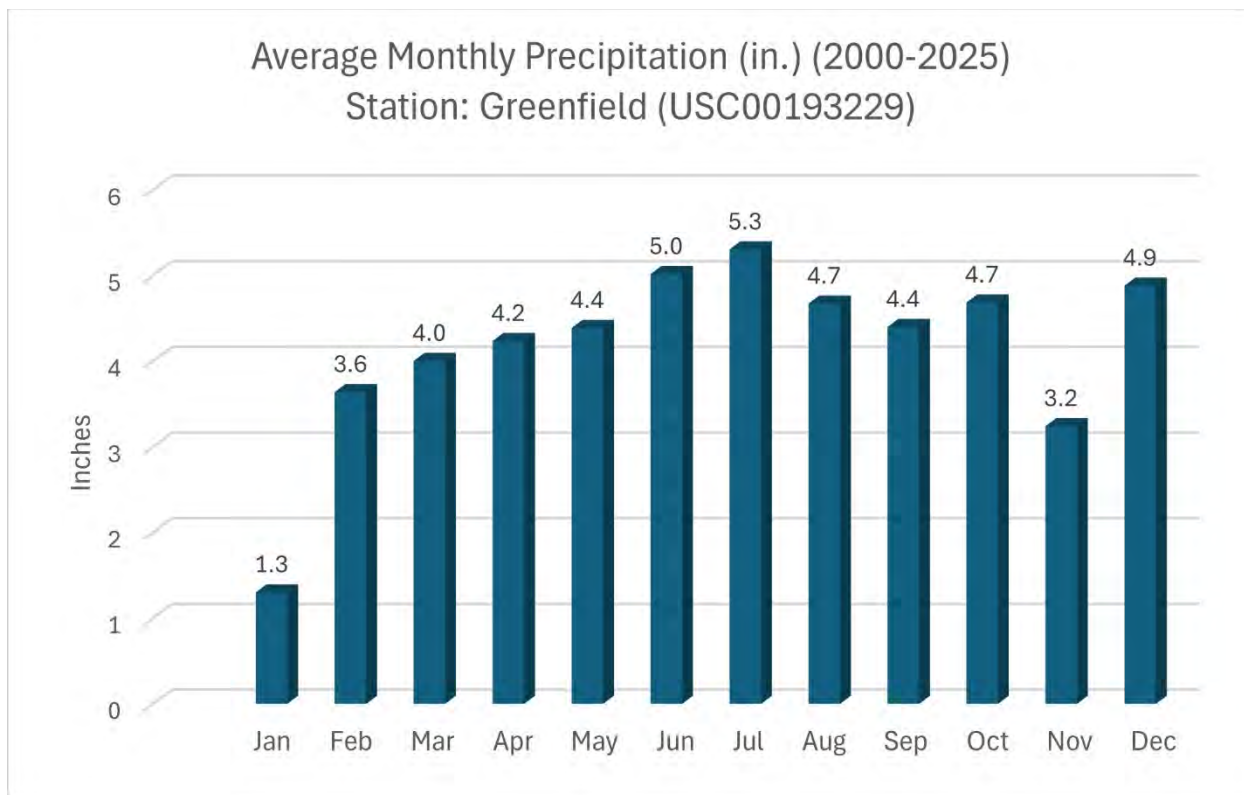


Figure 24. Average Monthly Precipitation - Greenfield Station (2000-2025).

Participants in the Municipal Vulnerability Preparedness (MVP) Program Community-Resilience Building (CRB) Workshop (April 2018) identified drought as a top concern among hazards considered. According to the CRB Workshop Summary of Findings in the MVP Resiliency Plan (June 2018), the drought of 2016 was severe enough to reduce groundwater levels and to impact water pressure for approximately ten percent of the Montague population, or approximately 800 people, who rely on private well water.

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 multistate drought caused significant impacts on both water supplies and agriculture.

Although short or relatively minor droughts occurred over the 50 years following the extensive 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 (EEA) 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. The DMTF declared an end to the drought in May 2017 with a return to wetter-than-normal conditions.

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 figure below (Figure 25) depicts the drought severity and the percent of the area impacted, based on the drought time series developed by the U.S. Drought Monitor, for Franklin County, MA.

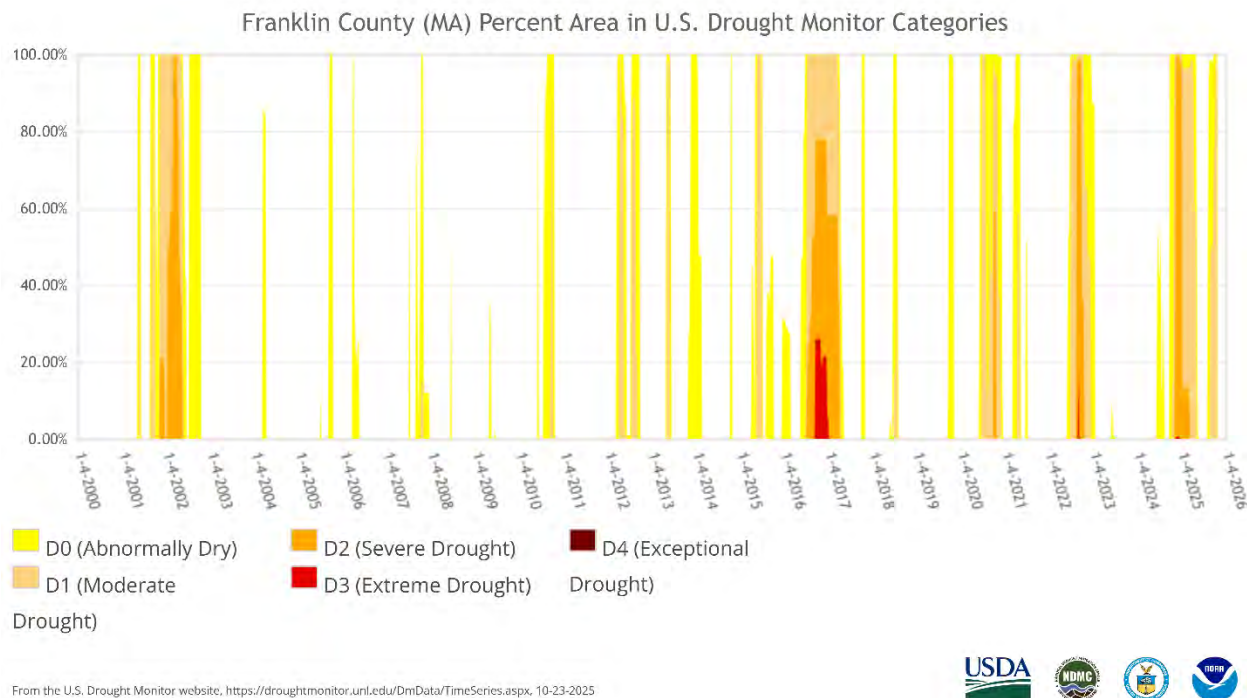


Figure 25. Percent Area in U.S. Drought Monitor Categories - Franklin County, MA (2000-2025).

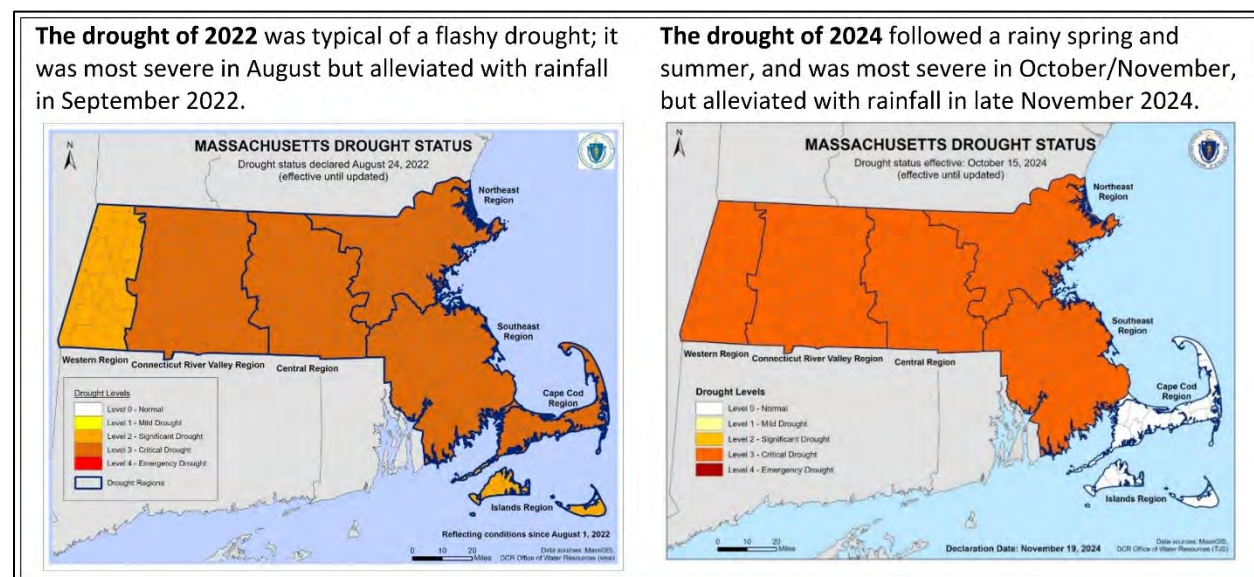
The USDA declares agricultural disasters as needed for a variety of hazards. The line items related to droughts in Franklin County are listed below, corresponding to the drought of 2015-2016 and the flashy droughts of 2020 and 2022.

Table 16. USDA Disaster Events That Refer to Drought in Massachusetts.

Year	Event	Event "Begin Dates"
2022	Drought	8/9/2022, 8/16/2022, 8/30/2022
	Drought and Excessive Heat	5/9/2022
2020	Drought	8/18/2020, 8/18/2020, 9/22/2020, 9/29/2020
2016	Drought	7/5/2016, 8/16/2016
2015	Drought	2/1/2015

Based on review of the relevant drought data for the ten-year lookback period of 2014 through 2024, a timeframe that includes the droughts of 2015-2017 and 2020, the USDA payments to Massachusetts agricultural sectors for drought impacts were identified. The USDA disbursements paid to recipients in Montague for drought and drought/heat, collectively, were \$20,349 in this timeframe.

Another severe drought occurred in 2024 as noted in Figure 26, which compares the 2022 and 2024 drought events, and as described in Figure 27 (the full-page text box on the following page). The Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs (EEA) noted the drop in groundwater levels in all regions as a significant impact of the 2024 drought event. The November 2024 rainfall was not enough to return to normal conditions after months of low precipitation. While some parts of the state remain under drought or abnormally dry conditions at the time of HMP development, on November 7, 2025, EEA reported that the Central and Connecticut River Valley Regions had improved from Level 2 – Significant Drought to Level 1 – Mild Drought, and the Southeast Region had returned to normal conditions.



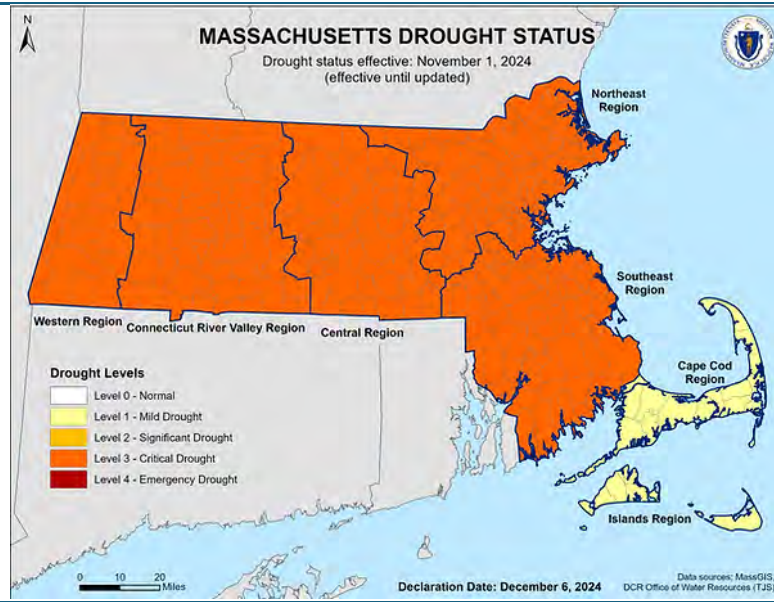


Figure 26. Drought Mapping for 2022 and 2024 - Massachusetts.

Press Release, 11/19/24 from Energy and Environmental Affairs (EEA)

With precipitation at an unprecedented low over the last three months, EEA elevated the Western, Connecticut River Valley, and Southeast regions to a Level 3 - Critical Drought. A Level 3 - Critical Drought persists in the Central and Northeast regions. As outlined in the Massachusetts Drought Management Plan, a Level 3 - Critical Drought requires detailed monitoring of drought conditions, continued coordination among state and federal agencies to communicate the implementation of water use restrictions, declaration of bans on open burning, engagement with municipalities including local Boards of Health, providing technical outreach and assistance to water suppliers and affected municipalities.

“Massachusetts is experiencing critical drought conditions that are fueling unprecedented and destructive wildfires across the state,” said Energy and Environmental Affairs Secretary Rebecca Tepper. “Climate change is reshaping our region’s weather patterns, resulting in warmer and drier fall and winter seasons. Water conservation is more important than ever. We urge municipalities, residents, and businesses - including those with private wells - to help us reduce stress on our water systems. We need to work together to ensure we have enough clean drinking water, protect wildlife habitats, and maintain effective fire control. Every small effort counts.”

Over the past 30 days, most of the state received less than an inch of rain, which is 3 to 4.5 inches below normal. Many areas recorded their lowest rainfall ever for this time of the year. Since August, when dry conditions began, all regions except the Cape and the Islands have seen an 8-to-11-inch rainfall deficit. Streamflow has also sharply decreased, especially in the Central region. This has resulted in dry brooks and streambeds, increased ponding, exposed beaches and sediments, limited fish passage, and drying ponds. Furthermore, groundwater levels are falling quickly in all regions, with the Western, Connecticut River Valley, Central, and Northeast regions showing the largest drops.

Fire activity has increased across the state because of drought conditions, leading to wildfires that are burning deeper into the soil. Due to fire conditions, the Department of Conservation and Recreation (DCR) has implemented a temporary ban of all open flame and charcoal fires within state park properties. Small portable propane grills are still allowed at campgrounds and recreation areas where grilling is permitted. This situation can make it harder to control fires and may prolong fire incidents. About 200 cities and towns have implemented temporary restrictions on all outdoor burning: residents are encouraged to follow local and state guidance on any activity that involves open flames, sparks and embers, or other ignition sources outdoors. Currently, there are approximately 37 active wildfires across the state. This year’s fire season has lasted longer because of dry conditions. Hundreds of wildfires have broken out across the state since October 1, burning more land than Massachusetts usually sees in an entire year. As firefighting efforts demand significant water resources, it’s crucial for residents to practice aggressive indoor water conservation to maintain sufficient supply and pressure in public water systems.

Figure 27. MA Executive Office of Energy and Environmental Affairs Press Release - Critical Drought.

The NOAA National Integrated Drought Information System (NIDIS) September 30, 2025, Drought Status Update for the Northeast indicates that drought continued to expand and intensify throughout September, with roughly one third of the Northeast (Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont) experiencing Severe Drought (D2) or Extreme Drought (D3).

Almost the entire Northeast (99.97%) is experiencing Abnormally Dry conditions or drought (D0-D3). Impacts are widespread, including water supply and quality issues, increased wildfires, crop losses/low yields, and livestock forage concerns.⁶¹

As of September 30, 2025, Montague reported no water use restrictions, while some neighboring communities, including Greenfield, MA, were imposing water use restrictions as shown in Figure 28.

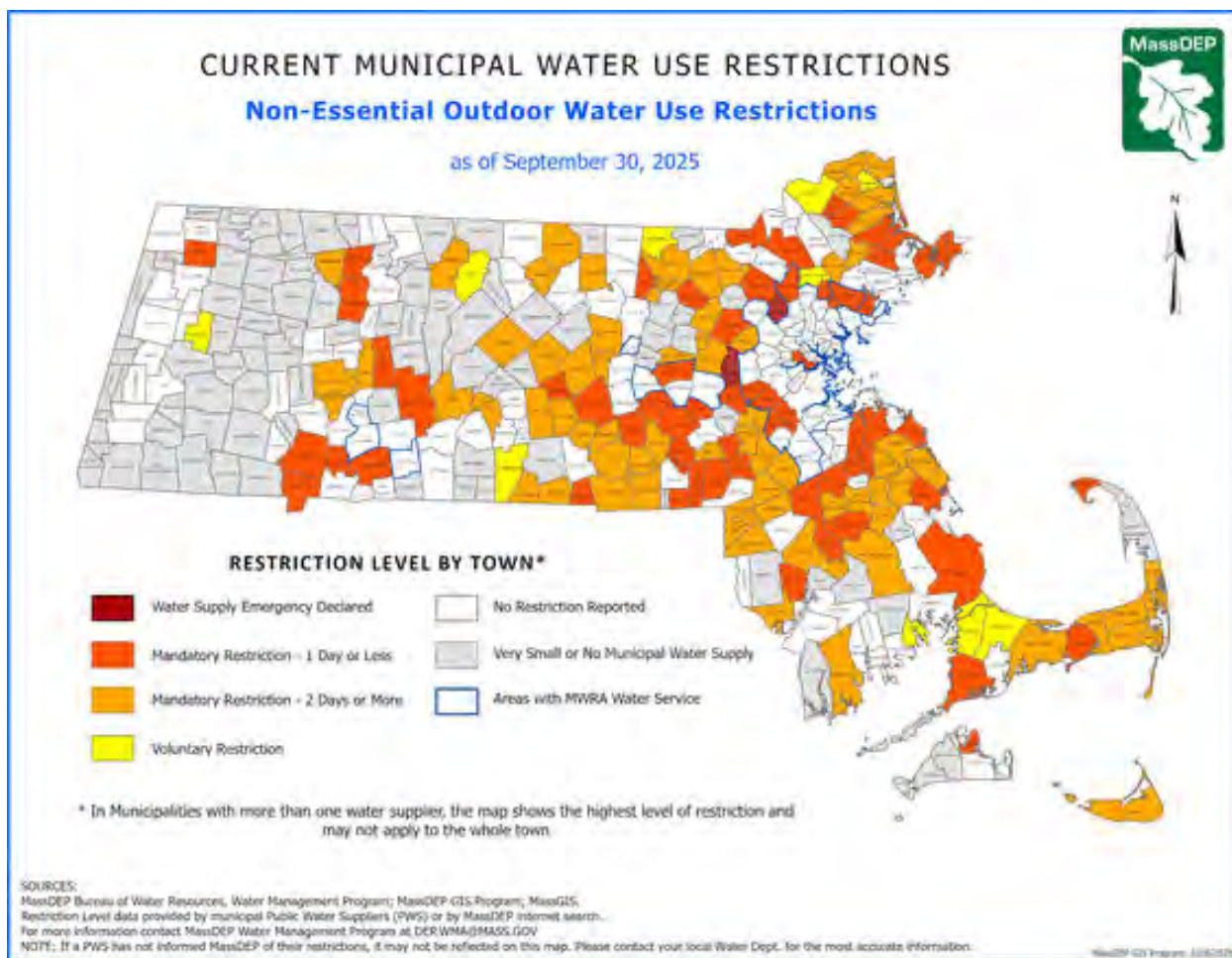


Figure 28. Municipal Outdoor Water Use Restrictions in Massachusetts by Town (as of September 30, 2025).

Extent

Drought is defined by a combined look at six indices as detailed in the 2023 Massachusetts DMP. For a given index, measurements at multiple sites within a region are analyzed wherever available. The indices are:

- Precipitation: The Standardized Precipitation Index, which is widely used, is based on monthly precipitation totals compiled from monitoring stations in the Massachusetts Department of

⁶¹ <https://www.drought.gov/drought-status-updates/drought-status-update-northeast-2025-09-30>.

Conservation and Recreation's (DCR) Precipitation Program, the NWS, and the Community Collaborative Rain, Hail and Snow Network.

- **Streamflow:** Is an early indicator of environmental impacts to rivers, streams, riparian buffer areas, riverfront areas, wetlands, and other habitats. Streamflow data are acquired from the Massachusetts USGS website.
- **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 NOAA Evaporative Demand Drought Index (EDDI) is used for the DMP Evapotranspiration (ET) index. The EDDI examines how anomalous the atmospheric evaporative demand is at a specific location, based on temperature, humidity, solar radiation, and wind. Values are provided as percentiles relative to the period of 1979-2015, and the two-month lookback was selected as the most applicable time scale to provide early warning for drought onsite and intensification.

These indices are monitored weekly to generate 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.

Because "changes in groundwater" was profiled as a subset of drought and a subset of flooding instead of as a separate hazard, the above discussion about classification systems for drought is relevant and applicable to groundwater. In fact, groundwater is one of the six indices used as the primary drivers of drought determinations, and the 2023 Massachusetts DMP describes the groundwater level monitoring network in Massachusetts. Monitoring locations near Montague can be selected to determine whether groundwater levels in the region are changing outside the range of historic conditions.

The Massachusetts drought warning and characterization products are applicable to all droughts that may occur in Montague, as they are used throughout Massachusetts on a routine basis and appropriately characterized previous droughts affecting Montague. Droughts have not been characterized outside of the framework established in the Massachusetts Drought Management Plan or, more broadly, outside federal resources such as the USGS Drought Monitor.

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.

The Montague Plains is the largest inland Pitch-Pine Scrub Oak (PPSO) community in southern New England, and the only large remnant of this ecosystem in the Connecticut River Valley. The Montague Open Space and Recreation Plan (2017) describe the PPSO barrens as vegetative communities occurring on deep, coarse, well-drained sands derived from glacial outwash. The sands are acidic, poor in nutrients and prone to drought.

According to the 2023 Water Quality Report, the Turners Falls Water Department operates Public Water System (PWS) #1192000 and maintains one groundwater artesian well as the main source of water for the public drinking water supply. The well, identified as Well #1192000-2G and installed in 1992, is a gravel packed well approximately 187 feet deep and pumps 1.2 to 2 million gallons of water per day to the filter plant. At the plant, the water is sand filtered to remove iron and manganese, and the treated, filtered water is then discharged into the gravity-fed distribution system. The Report states that the water quality is good and only requires the addition of water treatment chemicals for pH adjustment. The storage facilities in

Turners Falls have a total storage capacity of 6.3 million gallons. The Report notes that the Hannegan Brook Well located near Lake Pleasant can yield 1.44 million gallons per day to meet future water demands and identifies Lake Pleasant and Green Pond as emergency backup surface water supplies.

The Montague Center Water District operates Public Water System (PWS) #1192003, drawing source water from Well #1, located in the Connecticut River Subbasin and supplying 156 service connections serving a population of 450.⁶²

Built Environment Impacts

As noted in the 2020 HMP, impervious surfaces (e.g., pavement) and cover (e.g., buildings) associated with development can exacerbate the effects of drought due to decreased groundwater recharge. Similarly, the natural infiltration of rainwater and snowmelt can be interrupted by alteration of drainage patterns in the landscape and installation of drainage infrastructure with development. When drains are connected to the sanitary system, groundwater and precipitation are transported to wastewater treatment plants where the effluent is typically discharged to surface water bodies and not returned to groundwater.

Urbanized areas with traditional stormwater systems tend to experience higher peak flood levels during rainfall events and rapid decline of groundwater levels during periods of low precipitation. Groundwater withdrawals for drinking water can reduce groundwater levels, impacting water supplies as well as base flow (flow of groundwater) in streams. Major water users including water utilities and some commercial users are more susceptible to drought.

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 for increased water costs, vulnerable populations may be more severely impacted in the future. Overall, the risk of drought to people and property can be expected to increase with climate change.

⁶² Comprehensive Environmental, Inc. Drought Resiliency Needs Assessment for Franklin County, Massachusetts. Prepared for Franklin Regional Council of Governments. June 2025. <https://frcog.org/wp-content/uploads/2025/07/FRCOG-Drought-Resiliency-Needs-Assessment-for-Franklin-County-06-30-25-FINAL.pdf>.

Environment Impacts

Drought can impact agricultural areas in the Town, and some natural areas may be adversely impacted by drought too. 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. Drying of streambeds can result in limited fish breeding and migration, as well as fish mortality.

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, resulting in the closure of recreational areas. Drought may decrease plant growth, reduce farm and forest productivity, and create conditions for insect outbreaks. Sometimes the environmental damage caused by a drought is temporary, and other times it is irreversible.

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 17 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 data. The Town of Montague is represented by the Greater Connecticut River Valley region.

Table 17. 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 Plan, 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.

The ResilientMass Plan notes that droughts are expected to increase in frequency, severity, and length. By the end of the century, under a high carbon emissions scenario, the occurrence of droughts lasting one to three months could go up by as much as 75% over existing conditions. Secondary to drought, wildfire risk can be expected to rise.

As discussed in the 2020 HMP, although total annual precipitation is anticipated to increase over the next century, seasonal precipitation is predicted to include more severe and unpredictable dry spells. More rain falling over shorter time periods will reduce groundwater recharge, even in undeveloped areas, as the ground becomes saturated and unable to absorb the same amount of water if rainfall were spread out. The effects of this trend will be exacerbated by the projected reduction in snowpack, which can serve as a significant water source during the spring melt to buffer against sporadic precipitation. Also, the snowpack melt is occurring faster than normal, resulting not only in increased flooding but a reduced period in which the melt can recharge groundwater and the amount of water naturally available during the spring growing period.

Reduced recharge can in turn affect base flow in streams that are critical to sustain ecosystems during dry periods and groundwater-based water supply systems. Reservoir-based water supply systems will also need to be assessed to determine whether they can continue to meet projected demand by adjusting their operating rules to accommodate the projected changes in precipitation patterns and associated changes in hydrology. Finally, rising temperatures will also increase evaporation, exacerbating drought conditions.

Because "changes in groundwater" was profiled as a subset of drought and a subset of flooding instead of a separate hazard, the above discussion about probability is applicable. The probability of low groundwater levels (lower than levels typical in the past) is assumed to be the same as the probability of the occurrence of drought.

Problem Statements for Drought

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 18. 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 a 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.

Assets	Problems Associated with Drought
	The loss of clean water for consumption and for sanitation can cause significant impacts depending on the affected population's ability to quickly drill deeper or install a new well or to relocate to unaffected areas.
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. - High water users may need conservation measures and repairs.
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. - Increasing water storage and using interconnections with adjacent water utilities are potential methods of improving drought resilience.
Natural, historic, and cultural resources	- Water quality may be adversely impacted by major droughts. - Freshwater ecosystems may be degraded due to drought and the resulting increase in nutrient and contaminant concentrations. - Drought will adversely impact forested and vegetated areas and may contribute to tree die-off. - Existing issues with invasive species may be exacerbated by high levels of ecological stress introduced by drought. - Droughts may cause stress to wildlife. - Droughts may increase the risk of wildfire.
Activities that have value to the community	Use of parks and recreational areas may be adversely impacted by drought effects on plants, trees, and surface water bodies.

Earthquake

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, electricity, 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. According to the USGS, 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.

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 Montague or to occur elsewhere and be felt in Montague. The HMPC did not identify any specific areas of Montague more susceptible to earthquakes than the remainder of the Town.

Previous Occurrences

According to the 2020 HMP, no documented earthquakes have been centered in the Town of Montague, and no records have been identified of any damage to the Town resulting from earthquakes centered elsewhere. The plan also noted that in New England, an average of six earthquakes are felt each year. The largest earthquake since 1900 to strike Massachusetts was a magnitude 3.9 event located east of the Quabbin Reservoir in 1994.

To determine whether earthquakes have occurred more recently near or in Montague, all events listed by Weston Observatory (Boston College) were reviewed for all towns in Massachusetts since the date of last

update of this plan (2020). Listed earthquakes above magnitude 2.0 include the following very minor earthquakes:

- 11/8/20 – 11 km SW of New Bedford, MA, 3.8/3.4 [Mn*/Mc**]
- 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)

The earthquake events of Magnitude 2.5 or greater that have occurred in the region since 2000 are shown in Figure 29.

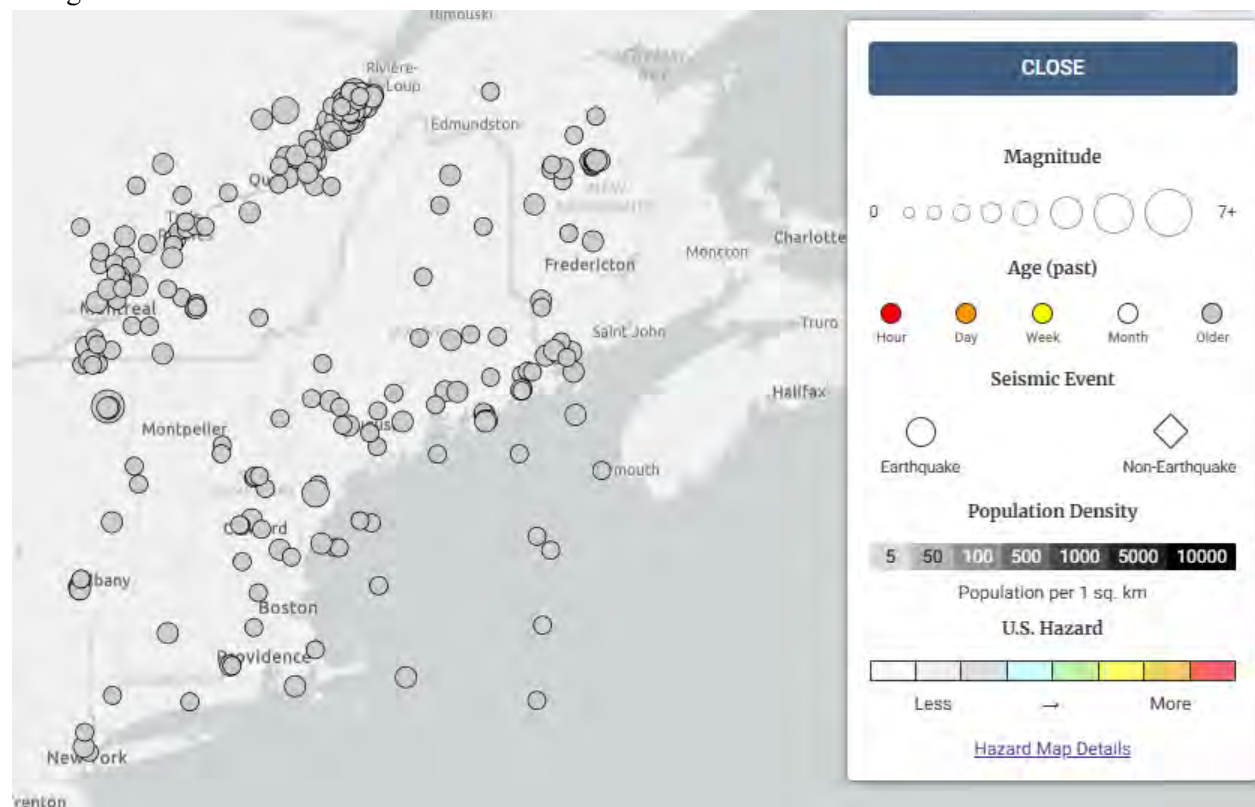


Figure 29. Earthquakes Magnitude 2.5 or Greater since 2000 - Northeast Region.

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 (M_w) 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 M_w 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 (M_n) 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 (M_c), 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 19. 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 20. 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

The above earthquake characterization systems are applicable to all earthquakes that may occur in Montague, as they are used throughout the northeastern United States on a routine basis and appropriately characterized previous earthquakes that were felt in Montague. Earthquakes have not been characterized outside of the Richter, Moment Magnitude, and Mercalli scales.

Vulnerability Assessment

Exposure

A major earthquake could cause severe damage to Town of Montague buildings, 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

The entire built environment of the Town of Montague is vulnerable to earthquakes. All buildings, including critical facilities, are at risk to earthquakes, but certain structures may be at a higher risk. Any structures not built to the Massachusetts State Building Code are at higher risk for damage or collapse. In addition, older structures are very susceptible to the impacts of earthquakes, and certain building types, such as unreinforced masonry and concrete, are at a higher risk of damage. Linear utilities and transportation infrastructure would likely suffer considerable damage in the event of an earthquake.

The 2020 HMP noted that ground shaking is the primary cause of earthquake damage to man-made structures, and Earthquakes can result in loss of crop yields, loss of livestock, damage to barns, processing facilities, greenhouses, equipment, and other agricultural equipment. In addition, earthquakes can be especially damaging to farms and forests if they trigger a landslide.

Historic data for earthquake events indicate that since 1931 no major (>5.0 magnitude) earthquakes were recorded in Franklin County, causing no (\$0) damage to property. To identify built environment impacts to the Town, Hazus was used to estimate the economic loss results for a 1,500-Year earthquake and a 2,500-Year earthquake scenario.

Probabilistic Scenario

Hazus was used to estimate the potential impacts on the Town of Montague under the conditions of a probabilistic scenario for the Town consisting of a 1,500-year event. The total building-related economic loss estimated for the modeled 1,500-year earthquake scenario is \$4.47M, which is derived from “capital stock” (a combination of structural, nonstructural, content, and inventory) losses. Based on the Hazus scenario analysis, the Town’s Average Annualized Loss (AAL) is modeled to be \$2,980.

Additionally, Hazus was used to estimate the potential impacts on the Town of Montague under the conditions of a probabilistic scenario for the Town consisting of a 2,500-year event.

The 1,500-Year event results are shown in Table 21, and the results for the 2,500-Year event are shown in Table 22. Copies of the Hazus: Earthquake Global Risk Reports for the 1,500-Year Earthquake and the 2,500-Year event are included as an Annex.

Table 21. Montague Building Losses for a 1,500-Year Earthquake Scenario.

Estimated Loss from Earthquake (in Millions of Dollars)						
		Residential	Commercial	Industrial	Others	Total
Building Loss	Building	0.96	0.78	0.41	0.41	2.56
	Content	0.26	0.25	0.20	0.15	0.86
	Inventory	0.00	0.05	0.03	0.01	0.09
	Total	1.22	1.08	0.64	0.57	3.51
Business Interruption Loss	Income	0.00	0.18	0.01	0.01	0.20
	Relocation	0.05	0.15	0.04	0.10	0.34
	Rental Income	0.03	0.11	0.01	0.02	0.17
	Wage	0.00	0.18	0.02	0.05	0.25
	Total	0.08	0.62	0.08	0.18	0.96
	Combined Total	1.30	1.70	0.72	0.75	4.47

Table 22. Montague Building Losses for a 2,500-Year Earthquake Scenario.

Estimated Loss from Earthquake (in Millions of Dollars)						
		Residential	Commercial	Industrial	Others	Total
Building Loss	Building	2.00	1.50	0.84	0.79	5.13
	Content	0.60	0.56	0.46	0.34	1.96
	Inventory	0.00	0.11	0.08	0.03	0.22
	Total	2.60	2.17	1.38	1.16	7.31
Business Interruption Loss	Income	0.00	0.29	0.02	0.01	0.32
	Relocation	0.11	0.26	0.06	0.17	0.60
	Rental Income	0.07	0.18	0.01	0.03	0.29
	Wage	0.01	0.30	0.03	0.08	0.42
	Total	0.19	1.03	0.12	0.29	1.63
	Combined Total	2.79	3.20	1.50	1.45	8.94

Population Impacts

Populations considered most vulnerable to earthquake impacts are identified based on several factors including their physical and financial ability to react or respond during a hazard event 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.

Using the Hazus software to estimate injuries and fatalities, the modeled 1500-Year and 2500-Year earthquake events were analyzed for Franklin County. For the 1500-Year modeled event, the estimated number of people with minor injuries (requiring medical attention but not hospitalization) was one, and there were no (zero) people with injuries requiring hospitalization, and zero fatalities. For the 2500-Year modeled event, the estimated number of people with minor injuries (requiring medical attention but not hospitalization) was two, and there were no (zero) injuries requiring hospitalization, and no (zero) fatalities.

Using the Hazus software, the 1500-Year modeled earthquake scenario results estimated that no (zero) households (or zero people) would be displaced due to the earthquake and no (zero) people would seek temporary public shelter. The 2500-Year modeled earthquake scenario results estimated that no (zero) households (or zero people) would be displaced due to the earthquake and no (zero) people would seek temporary public shelter.

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.

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 characterizes the probability of ground acceleration rather than estimating a probability of magnitude. The USGS 2014 Seismic Hazard Map for Massachusetts shows a peak ground acceleration of 14% to 20% of gravity in Montague (and central and western Franklin County) having a 2% probability of being exceeded in 50 years.

Climate change is not expected to significantly impact the risk of earthquakes. The ResilientMass Plan notes that there may be additional earthquake risk in conjunction with other hazards such as higher rainfall (which can contribute to soil liquefaction during earthquakes), but that research is not yet mature. Based on information available at this time, overall risk from earthquake to people and property can be expected to remain approximately the same as the current risk level.

Problem Statements for Earthquakes

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 23. 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. - Multi-story masonry residential buildings are present in the Town. - Utility systems impacted.
Systems (including networks and capabilities)	None apparent or projected.
Natural, historic, and cultural resources	- Historic buildings constructed out of unreinforced masonry are susceptible and may be impacted. - Earthquakes can be especially damaging to farms and forestry if they trigger a landslide.
Activities that have value to the community	None apparent or projected.

Flooding from Precipitation

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.

Description

Common types of flooding are described below.

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 where a river crosses an extensive flat landscape, or narrow, as where a river is confined. These areas form a complex physical and biological system that supports a variety of natural resources and provides flood storage.

The USGS New England Water Science Center maintains nearly 450 stream gauges that collect data to determine the amount of water flowing in rivers and streams in Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.

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. As 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.

The Montague Stormwater System Policy states that one of its purposes is to prevent or reduce flooding and erosion by managing the peak discharge and volume of runoff.⁶³

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.

⁶³ Town of Montague. Stormwater System Policy. Adopted by Montague Planning Board on March 24, 2009. https://montague-ma.gov/files/Planning_Board_Stormwater_Policy.pdf.

Roadways and bridges are impacted when floods undermine or wash out supporting structures. Dams may fail or be damaged or overtopped (as described in the next section of this HMP), 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/wastes directly into storm sewers and rivers. 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 Montague.

In Montague, 3,510 acres, or 9.4% of the total land area, is in the newer preliminary floodplain (2024), including approximately 14 acres of developed residential land. This is up from 7% of the community in the floodplain using the 1979 FEMA floodplain map.

Above the Turners Falls Dam and falls, the Connecticut River opens out into a large pond, which includes Barton Cove, an important scenic and recreational area. During the winter months much of the cove freezes over and ice fishermen can be seen out on the river setting their lines. During the late winter, ice jams work their way down the river and over the falls.⁶⁴

According to the Sustainable Stormwater Management Plan for Franklin County, the area in the Town of Montague known as ‘The Hill’ is a problematic location for flash flooding on some streets. The FRCOG identified opportunities for capturing and infiltrating stormwater in the Keith Street Complete Streets Project (#17). The project recommends incorporating linear bioretention areas into designs for the sidewalk on Keith Street, ensuring that water sheds quickly into the basin where it can be infiltrated to the water table and that streets and sidewalks do not flood. Catch basin maintenance is also critically needed in this neighborhood to mitigate localized flooding and the resulting stress on the storm drain and sewer systems. Keith Street is an important walking route to school for Sheffield Elementary students, and the Town wants to ensure it is kept safe from flooding.⁶⁵

Areas where flooding has previously been an issue in Montague include the following locations:

- Main Street – The Sawmill River hopped its bank and was undercutting the road in an area on Main Street. The 2020 HMP included a recommendation for the Town to pursue funds to continue bio-engineering work in this area and noted that a short-term solution was needed to stabilize the riverbank.
- The Montague Book Mill (a/k/a The Book Mill, 440 Greenfield road, Montague, MA 01351) – The HMPC identified this location as an area of concern based on past flooding of the Sawmill River. The popular used bookstore is housed in an 1842 gristmill, and the Book Mill complex includes a cafe/pub, a fine art and handmade gifts shop, and an independent music store.

⁶⁴ Town of Montague. Village of Turners Falls - History and Culture. <https://montague-ma.gov/p/14/Turners-Falls>.

⁶⁵ Franklin Regional Council of Governments. Sustainable Stormwater Management Plan for Franklin County. June 25, 2021. <https://storymaps.arcgis.com/stories/c20c55ad03bb433da5737fd401a3a538>.

- Montague City Road – Annual flooding occurring in the area between Montague City Road and the power canal had been attributed to beaver activity nearby and seepage from the canal. At the time the 2020 HMP was being developed, the Town had been awarded an MVP Action grant to fund design and engineering along the road to mitigate frequent flooding from the adjacent stream. The HMP included a recommendation to assess the entire drainage watershed along Montague City Road, noting that historic, manmade drainage patterns had been blocked and filled and the hydrology of the area had changed over time. The 2020 HMP also identified the flooding at Avenue A (near the carwash) as a specific concern. Participants in the HMPC meetings during development of this HMP update reported that some work on Montague City Road had been completed using FEMA and MVP Program funding but noted that significant rainfall washes out and damages the road, so it remains an area of concern.
- Hillcrest School Building (30 Griswold Street, Turners Falls, MA 01376) – The 2020 HMP noted that the Hillcrest School Building in Turners Falls experiences flooding approximately every five to ten years due to frozen dry wells. In 2009, flooding caused 12 to 18 inches of water to accumulate in the heating tunnels serving the building, and a similar situation occurred again in 2019. Participants in the HMPC meetings for this HMP update expressed concerns that the Hillcrest School is in the floodplain and acknowledged that follow-up is needed (by Town staff) to gather information to understand the current risk of flooding at the school.
- Ice Jams on the Sawmill River – Ice jams on the Sawmill River are an annual hazard event in Montague, causing flooding and threatening critical Town infrastructure and land uses nearby.
- Ice Jams on the Connecticut River – The 2020 HMP described ice jams as historically a common occurrence on the Connecticut River. The plan noted that during operation of the Vermont Yankee Nuclear Power Plant upstream in Vernon, VT, water from the river was used for cooling at the plant, which increased the temperature of the water discharged back into the river, resulting in fewer ice jams. The plant closed in 2015, and the HMP noted concerns that ice jams would become more common on the river again.
- Town Roads, Bridges, and Culverts – The previous HMP noted that while the Town had replaced several culverts, many more had been identified as remaining in need of replacement. Several bridges were also described as in need of repair or replacement, with the exception of the then relatively new Gill-Montague Bridge. Specific areas of concern included:
 - An undersized culvert on Ferry Road that was causing flooding. The HMPC confirmed that the Montague Department of Public Works completed a full-scale replacement of the culvert on South Ferry Road.
 - Center Street and South Street bridges over the Sawmill River, which were identified as vulnerable to flooding and had been reduced to one-lane traffic. The HMP noted that the South Street bridge was scheduled for replacement in 2024 through the Transportation Improvement Project (TIP), and the Town was working on adding the Center Street bridge to the TIP for replacement. The participants in the HMPC meetings for the current HMP update noted that the South Street bridges were fully rebuilt by MassDOT and are now open to traffic; and the Center Street bridge remains closed indefinitely.

- Millers Falls Road – The Town had received a Hazard Mitigation Grant to complete erosion control measures; however, erosion, steep slopes, and unstable soils were identified as ongoing issues.
- Chestnut Hill Road bridge was identified as in need of replacement. The HMP noted that it was scheduled for replacement in 2020 with funding from the State’s Small Bridge Program. Following a period of closure due to structural failures, MassDOT replaced the Chestnut Hill Loop Bridge (MassDOT #M-28-030) with a new three-sided box culvert, and construction was completed in 2022.
- The 2020 HMP mentioned that the General Pierce Bridge, a critical emergency route over the confluence of the Connecticut and Deerfield Rivers, was scheduled for repairs after the weight limit on the bridge was reduced and traffic was limited to one lane. In August 2022, work started on updating the bridge, which spanned from Greenfield, MA, to Montague, MA, under a MassDOT project. The work was completed and the bridge reopened for transportation in March 2023.

Locations where the Town of Montague measures and records total daily rainfall and monitors the flow and the regulators for two permitted combined sewer overflow outfalls are as follows.

- Greenfield Road, near the Water Pollution Control Facility, which was renamed Clean Water Facility (CWF)
- I Street, adjacent to the Power Canal

Previous Occurrences

The 2020 HMP included narratives about previous flood events. Excerpts from those narratives are provided below.

- In June 1996, the Town of Montague experienced severe flooding following a “microburst” rainstorm. Six inches of rain fell in less than an hour, resulting in the worst flooding in 100 years of records on the Sawmill River and causing flooding along Goddard Brook, Chestnut Hill Brook, Spaulding Brook, and Cranberry Pond Breek that washed out sections of Dry Hill Road, Chestnut Hill Road, Spaulding Brook Road, and Old Sunderland Road. Sections of Center Street and South Street were impassible. More than 30 miles of roadway in southern Montague and Leverett were destroyed. The Massachusetts Emergency Management Agency (MEMA) declared the Town a disaster area. The National Guard was dispatched to make temporary repairs to roads where detours were not possible, and the Town eventually received grant money from the state for permanent repairs. Numerous homes and businesses experienced some degree of flood damage. This event has been estimated as at least a 100-year event for southern Montague and a 500-year event for the Sawmill River and Spaulding Brook, and MEMA has estimated damage from this flood at close to \$2M. Local residents who have lived in the area for many years said this was the worst flooding they had witnessed since the Great New England Hurricane of 1938.
- In September 1999, all of Franklin County was declared a disaster area due to flooding from Tropical Storm Floyd.

- Floods in July and October of 2005 caused major damage countywide. Flooding during the Columbus Day holiday in 2005 saw the Connecticut River rise to 35.04 feet, more than 7 feet above flood stage, at Montague City, according to press reports at the time. There was flooding on Millers Falls Road near Highland Cemetery and part of Wendell Road was washed out because the culvert beneath the road was washed away, according to press reports. Parts of Montague Center near the Sunderland border were flooded, as well.
- In April 2007, minor flooding occurred along the main stem of the Connecticut River through Montague. A crest of 30.3 feet was recorded (flood stage is 28 feet).

The NOAA NCEI Storm Events database lists 90 flood and flash flood events recorded for Franklin County between 1996 and 2025. No deaths or injuries were reported in association with the events; a total of \$28.856M in property damage was reported, and no (\$0) crop damage was reported. As noted earlier, this HMP update relies primarily on a roughly ten-year lookback, and for the period January 2015 through June 2025, the database lists 45 flood and flash flood events that occurred in Franklin County, and of those, seven were reported as impacting Montague. The details of the Montague flood and flash flood events are provided in Table 24.

Table 24. NCEI Severe Storm Events Database Entries - Flood and Flash Flood in Montague (2015-2025).

Date	Description	Losses Reported
08/11/2015	Begin Location: 1NW Montague Station End Location: 1W Lake Pleasant <i>Flood.</i> A warm front moving north through southern New England brought showers and thunderstorms to much of the area. Because of a copious amount of moisture in the atmosphere, some of these showers and storms produced heavy rain which in turn produced street flooding, most of it minor. Turners Falls Road was flooded with one and a half feet of water near Hatchery Road.	---
08/15/2015	Begin Location: 0SSE Millers Falls End Location: 0ESE Millers Falls <i>Flood.</i> A weak cold front moving through southern New England brought showers and thunderstorms to the region. These storms produced hail and damaging winds as well as some poor drainage street flooding. One hundred yards of Route 63 near Millers Falls Road was flooded.	---
08/03/2018	Begin Location: 1WNW Turners Falls End Location: 0SW Turners Falls <i>Flood.</i> Bermuda High Pressure offshore delivered heat and humidity to Massachusetts. Heat indices in Eastern Massachusetts climbed into the lower 100s on the 2nd, but not high enough for an Excessive Heat Warning. Heat Index values climbed into the 90s on the 3rd. This tropical weather allowed a few strong thunderstorms over Western Massachusetts both days, with reports of flooding from downpours on the 3rd. At 4:12 PM EST flooding from heavy rain forced manhole covers off their settings on Avenue A near Food City Plaza in Turners Falls, and made the road	Property Damage: \$5,000

Date	Description	Losses Reported
	impassable. At 5:25 PM EST Griswold Street and Avenue C in Turners Falls were flooded and impassable.	
07/18/2021	Begin Location: 1ENE Millers Falls End Location: 1ENE Millers Falls <i>Flood.</i> A relatively stationary front meandered across southern New England on the 17th and 18th while low pressure slowly moved along the front. At upper levels, an upper low was moving slowly eastward from the Great Lakes. With very moisture-laden air in place across the region, the result was heavy rain and flash flooding. In addition, there were rounds of severe thunderstorms and even a weak tornado in northern Connecticut. Rainfall totals ranged from 3.0 to 5.6 inches in northern Connecticut and western and central Massachusetts. Mainly 1.0 to 2.0 inches fell in Rhode Island and eastern Massachusetts. In Erving, there was a flooded basement at 21 Pleasant Street.	Property Damage: \$4,000
07/18/2021	Begin Location: 1S Millers Falls End Location: 1SSE Millers Falls <i>Flash Flood.</i> A relatively stationary front meandered across southern New England on the 17th and 18th while low pressure slowly moved along the front. At upper levels, an upper low was moving slowly eastward from the Great Lakes. With very moisture-laden air in place across the region, the result was heavy rain and flash flooding. In addition, there were rounds of severe thunderstorms and even a weak tornado in northern Connecticut. Rainfall totals ranged from 3.0 to 5.6 inches in northern Connecticut and western and central Massachusetts. Mainly 1.0 to 2.0 inches fell in Rhode Island and eastern Massachusetts. In the Millers Falls section of Montague, several streets were closed due to flooding. Federal Street had 3 feet of water in the road. Flood waters were entering a business.	Property Damage: \$10,000
12/23/2022	Begin Location: 0WNW Montague End Location: 0WNW Montague <i>Flood.</i> Low pressure deepened rapidly as it tracked through the eastern Great Lakes. The storm produced damaging southeast to south winds across much of southern New England and minor to moderate coastal flooding the east and south coasts. There were two rounds of strong wind gusts -- one in the morning and one in the late afternoon and evening. Two to 3.5 inches of rain fell across much of RI and interior MA. A public MPing report was received from 2 miles south of Montague center, indicating either a creek overflowing or basement flooding. Rainfall in the area ranged from 1.45 inches in Greenfield (CWOP) to 3.50 inches in Shelburne Falls (CoCoRaHS).	Property Damage: \$1,000
07/21/2023	Begin Location: 1NNW Turners Falls End Location: 1NNW Turners Falls <i>Flash Flood.</i> A warm front stalled across Connecticut and Rhode Island, producing thunderstorms with very heavy rainfall. This caused significant flash flooding. Also, wind shear was just strong enough for a few thunderstorms to	---

Date	Description	Losses Reported
	become severe, with locally damaging wind gusts. A Tornado Warning was even issued for a storm in northern Worcester County, but no tornado damage was reported. In Greenfield, Rt 2 was closed at Adams road.	
		

Figure 30. Millers Falls Flooding.

The USDA declares agricultural disasters as needed for a variety of hazards. Review of the USDA disaster declaration datasets indicates that several events resulting in declarations related to excessive rain and moisture or flooding in Franklin County, and details of the events are listed below.

Table 25. USDA Disaster Events That Refer to Excessive Precipitation and/or Flooding.

Year	Event	Event “Begin Dates”
2023	Flooding and excessive moisture	6/15/2023
2023	Excessive rain	7/1/2023
2023	Excessive moisture	6/3/2023
2021	Excessive moisture	6/1/2021

Year	Event	Event “Begin Dates”
2018	Excessive rain and moisture (Designation No. S4462)	7/17/2018
2018	Excessive moisture (Designation No. S4475)	7/15/2018

The USDA disbursements paid to recipients in Montague for flood/rains, from 2014 through 2024 collectively, were \$2,493.



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 one percent (1%) 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

Figure 31. Turners Falls Fire Department pumping water from Hillcrest Elementary School.

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

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.

Flooding in Massachusetts is forecast and classified by the NOAA National Weather Service (NWS) Northeast River Forecast Center (Northeast RFC)⁶⁶ as minor, moderate, or major 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.

The Northeast RFC provides flood warnings for Massachusetts, relying on monitoring data from the USGS stream gaging network. The stream/river gauges nearest to Montague are the Connecticut River at Montague (MNTM3) and the Deerfield River at West Deerfield (WDEM3). 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. Notifications of potential flooding are shared among state agencies, 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.

Because “changes in groundwater” was profiled as a subset of drought and a subset of flooding instead of a separate hazard, the above discussion about classification systems for flooding is relevant and

⁶⁶ National Oceanic and Atmospheric Administration, National Weather Service Northeast River Forecast Center. <https://www.weather.gov/nerfc/>.

applicable to groundwater. If groundwater levels are sufficiently high to cause shallow flooding, the current flood classification systems would prevail. The Massachusetts Drought Monitoring Plan describes the groundwater level monitoring network in Massachusetts. Monitoring locations near Montague can be selected to determine whether groundwater levels in the region are changing outside the range of historic conditions.

The FEMA flood products and the NWS warning products are applicable to all floods that may occur in Montague, as they are used throughout Massachusetts on a routine basis and appropriately characterized previous floods in Montague. Floods have not been characterized outside of the FEMA flood characterization framework or the NWS watch/warning systems for floods.

Vulnerability Assessment

Exposure

In Montague, the 1% annual chance floodplain (100-year floodplain) covers about 1,454 acres, or approximately 7% of the total land area of the Town. Approximately 14 acres of developed residential land is in the floodplain.

The Town is home to several historic properties and districts, which are listed on the National Register of Historic Places (NRHP) and/or are recognized by the Massachusetts Historical Commission (MHC). Examples of historic sites in Montague that are exposed to flooding from precipitation primarily due to their location in or near the edge of the floodplain, are listed in Table 26 below.

The Montague Book Mill, listed on the National Register of Historic Places, is located in the floodplain along the Sawmill River. Additionally, several historically significant Native American sacred sites are in the vulnerable wetland areas along the Connecticut and Millers Rivers.

Table 26. Historic Sites Exposed to Flood Hazard - Montague, MA.

Facility Name	Address	Year Built
Hillcrest over Turners Falls Power Canal	Fifth Street	1954
Fifth Street Pedestrian Bridge over Turners Falls Power Canal	Fifth Street	1912
Keith Mill Footbridge over Turners Falls Power Canal	Fifth Street	1913
Lawrence Mill Dam Abutments	400 Greenfield Road	1830
Lawrence Mill Foundations	400 Greenfield Road	1760
Main Street Bridge over Sawmill River	Main Street	1895

Facility Name	Address	Year Built
Martin Machine Company Electrical Generator	400 Greenfield Road	No data
Martin Machine Company Tailrace	400 Greenfield Road	1934
Montague Paper Company Bridge over Turners Falls Power Canal	Canalside Trail	1914
Sixth Street Bridge over Turners Falls Power Canal	Sixth Street	1912
Alvah Stone Mill Dam	400 Greenfield Road	1830
Alvah Stone Mill Grinding Stone	400 Greenfield Road	1834
Turners Falls Bridge	Avenue A	1937
Turners Falls Power Canal	Turners Falls Power Canal	1798
White Bridge - Greenfield -Montague Bridge	Turners Falls Road	1936



Figure 32. Fifth Street Bridge.

In addition to the 100-year floodplain areas, stormwater has the potential to cause localized flooding. The Town initiated a project in 2025 to address erosion and stormwater runoff issues such as road washouts in “The Hill” neighborhood of Turners Falls.

Areas upstream from major rivers play an important role in flood mitigation. Upland areas and the small tributary streams that drain them are particularly vulnerable to impacts from development, which can increase the amount of flooding downstream. These areas are critical for absorbing, infiltrating, and slowing the flow of stormwater. When these areas are left in a natural vegetated state (forested or forested floodplain), they act as “green infrastructure,” providing flood storage and mitigation through natural processes.

No facilities in the EPA Toxics Release Inventory (TRI) database are in the FEMA Preliminary 100-year floodplain. The 2020 HMP identified several ‘hazardous facilities’, including the historic mill buildings and power canal in Turners Falls, and the Montague Water Pollution Control Facility (now called the Clean Water Facility) in Montague City, as located outside or at the edges of the 100-year floodplain and within the high hazard dam breach inundation area.

The buildings, by type, exposed to the Preliminary 100-year FEMA floodplain and their values are listed in Table 27. The number in parenthesis shows the total number of buildings and associated building values for the Town.

Table 27. Buildings in the Preliminary 100-Year Floodplain.

Building Type	Number of Buildings in 100-Year Floodplain (Total in Town)	Building Value in 100-Year Floodplain (Total in Town)
Single Family	12 (3,188)	\$1,672,600 (\$445,773,000)
Multi-Family	3 (898)	\$303,200 (\$179,501,600)
Government	3 (98)	\$637,400 (\$82,691,700)
Industrial	6 (75)	\$121,307,192 (\$277,187,352)
Outbuildings	27 (181)	\$8,880,000 (\$23,757,900)
Vacant	1 (120)	\$0 (\$311,100)
Total	52 (4,834)	\$132,800,392 (\$1,358,087,352)

The population exposed to the Preliminary 100-year floodplain is shown in Table 28. 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 of Montague. The population exposed to the flood hazard is similar to that in the Town as a whole, with a slightly higher percentage of lower income households and individuals over 64 in the floodplain. The percentage of the population in the EJ Zone at risk to flood is significantly higher than that of the population of the Town as a whole.

The major roads exposed to the Preliminary 100-year floodplain are listed below

- Avenue A
- Federal St
- Main St
- Montague City road
- N Leverett road
- Turners Falls road

Table 28. Population Exposed to the Preliminary 100-Year Floodplain (2020 U.S. Census).

Demographics	Population in and Adjacent to 100-Year Floodplain	Total Population
Population	180	8,536
Households	70	3,877
White	154 (85.6%)	7,484 (87.7%)
Black	4 (2.2%)	133 (1.6%)
American Indian	0 (0.0%)	42 (0.5%)
Asian	0 (0.0%)	82 (1.0%)
Pacific Islander	18 (10.0%)	0 (0.0%)
Other Race	11 (6.1%)	202 (2.4%)
Two or More Races	11 (6.1%)	593 (6.9%)
Hispanic or Latino	18 (10.0%)	531 (6.2%)
Population under 18	26 (14.4%)	1,373 (16.1%)
Population over 64	38 (21.1%)	1,809 (21.2%)
Annual Income < \$30K/year	17 (24.3%)	1,058 (27.3%)
Population in EJ Zone*	112 (62.2%)	4,036 (47.3%)

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

Natural resource conservation areas and parks in Montague could be impacted. As an example, the Connecticut River Greenway is in the Preliminary 100-year floodplain.

Figure 33 shows the Preliminary regulatory 100-year floodplain. The 100-year floodplain is depicted in Figure 34 along with critical facilities and roads with flood potential.



Figure 33. FEMA Preliminary 100-Year Floodplain - Town of Montague.

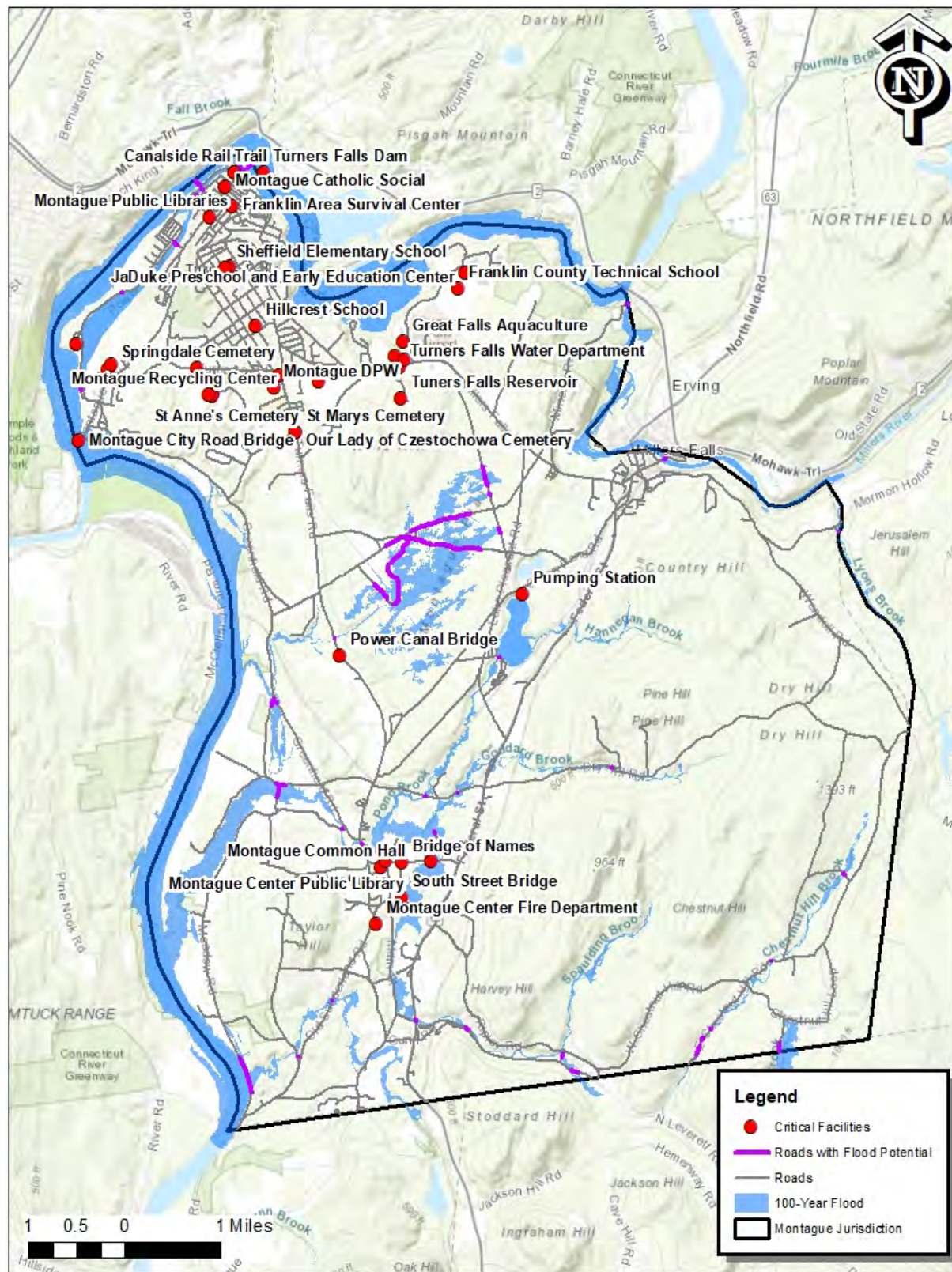


Figure 34. Montague Critical Facilities and Preliminary 100-Year Floodplain.

Built Environment Impacts

To identify built environment impacts to the Town of Montague, FEMA’s risk assessment software, Hazus, was implemented. Building footprint data and parcel data were used to update the model, while the latest floodplain was also integrated into the software. The estimated economic losses resulting from the 100-year flood event are shown in Table 29. The Town’s AAL is calculated to be \$279,400.

Table 29. Building Loss for the 100-Year Flood Scenario.

		Residential	Commercial	Industrial	Others	Total
Building Loss	Building	0.39	2.49	1.67	0.42	4.97
	Content	0.18	3.15	4.03	1.53	8.89
	Inventory	0.00	0.02	0.61	0.02	0.65
	Total	0.57	5.66	6.31	1.97	14.51
Business Interruption Loss	Income	0.01	3.05	0.04	0.26	3.36
	Relocation	0.09	0.73	0.04	0.30	1.16
	Rental Income	0.03	0.56	0.01	0.12	0.72
	Wage	0.02	1.12	0.07	6.98	8.19
	Total	0.15	5.46	0.16	7.66	13.43
Combined Total		0.72	11.12	6.47	9.63	27.94

Since 2005, the Town of Montague has implemented some of the recommendations of a Combined Sewer Overflow (CSO) Long-Term Control Plan (LTCP), and the plan was most recently updated in June 2023. Additionally, the Town was issued an Administrative Order (CWA-AO-R01-FY20-31) from the U.S. Environmental Protection Agency (EPA) on June 11, 2020, addressing compliance with its National Pollutant Discharge Elimination System (NPDES) permit (No. MA0100137) to meet numeric effluent limitations and minimize CSOs. The Administrative Order specifically brings attention to “excursions of the water quality criterion for E. coli bacteria in the Connecticut River” from untreated sewage that was discharged from CSO outfalls between 2018 and 2019.

According to the 2023 CSO LTCP, the Town had completed field investigations and hydraulic modeling in the village of Turners Falls and initiated procedures, staffing, and funding opportunities in accordance with the recommendations of the December 2021 CSO LCP Update. The June 2023 CSO LTCP Update acknowledged that the Town of Montague would continue to have CSO discharges, and further stated that, until a sewer separation study/preliminary design is completed, it is unknown if CSOs in the Town can be eliminated within the next 20-year period. The Town of Montague maintains a Combined Sewer Overflow/Sanitary Sewer Overflow (CSO/SSO) Information page on its website, where public advisories are posted, as well as a map of the CSO outfall locations, and links to the CSO LTCP Summary and CSO/SSO reports and files dating back as far as 2020.⁶⁷

⁶⁷ Town of Montague CSO/SSO Information Page. Updated March 4, 2026. <https://montague-ma.gov/p/1501/CSOSSO-Information-Page>.

In 2024, the Town initiated a project to replace the screw pumps that move approximately one million gallons of wastewater per day for treatment at the Montague Clean Water Facility (34 Greenfield Road). The screw pumps are essentially giant tubes with Archimedes screws inside that can carry wastewater uphill by moving it along the screw as it twists. According to the Clean Water Facility Superintendent, if the screw pumps went offline, the facility's water well would overflow and within a few hours raw sewage would begin seeping into the Connecticut River.⁶⁸

Population Impacts

The Town should be aware that senior and low-income segments of the Montague population may be more vulnerable to hazard events due to several 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 for the 100-year flood scenario, the model estimates that 23 households (or 68 people) will be displaced due to the flood and the associated potential evacuation, and of these, seven people will seek temporary public shelter.

Environment Impacts

Flooding is part of the natural cycle of a balanced environment. However, severe flood events can also result in substantial damage to the environment and natural resources, particularly in areas where human development has interfered with natural flood-related processes. As described earlier in this section, severe weather events are expected to become more frequent as a result of climate change; therefore, flooding that exceeds the adaptive capacity of natural systems may occur more often.

One common environmental effect of flooding is riverbank and soil erosion. Riverbank erosion occurs when high, fast water flows scour the edges of the river, transporting sediment downstream and reshaping the ecosystem. In addition to changing the habitat around the riverbank, this process also results in the deposition of sediment once water velocities slow. This deposition can clog riverbeds and streams, disrupting the water supply to downstream habitats. Soil erosion occurs whenever floodwaters loosen particles of topsoil and then transport them downstream, where they may be redeposited somewhere else or flushed into the ocean. Flooding can also influence soil conditions in areas where floodwaters pool for long periods of time, as continued soil submersion can cause oxygen depletion in the soil, reducing the soil quality and potentially limiting future crop production.

⁶⁸ Schofield, M. \$2.8M Upgrade at Montague Clean Water Facility Underway. Greenfield Recorder. October 24, 2024. <https://recorder.com/2024/10/24/2-8m-upgrade-at-montague-clean-water-facility-underway-57618495/>.



Figure 35. Millers Falls Flooding.

Flooding can also affect the health and well-being of wildlife. Animals can be directly swept away by flooding or lose their habitats to prolonged inundation. Floodwaters can impact habitats nearby or downstream of agricultural operations by dispersing waste, pollutants, and nutrients from fertilizers. While some of these substances, particularly organic matter and nutrients, can increase the fertility of downstream soils, they can also result in severe impacts to aquatic habitats, such as eutrophication.

As described in the Montague Open Space and Recreation Plan (2017), in 2012, the Franklin Conservation District, with support from the

Montague Conservation Commission, implemented an innovative restoration project that reconnected a portion of the Sawmill River to its natural floodplain and implemented in-channel techniques intended to reduce sediment transport and improve aquatic habitat, channel stability and floodplain sediment storage. The project involved a 1,700-foot reach of the river from the Route 63 Bridge to Main Street, a stretch that had been channelized, resulting in areas of excessive sediment deposition, bank erosion, and degraded fisheries and wildlife habitat. Additionally, the disturbed areas along the river had become infested with invasive plant species, including Japanese knotweed. The Plan stated that the effectiveness of the restoration techniques should be monitored to help inform future restoration projects on the river.

One of the significant environmental impacts of a major flood would be the potential release of hazardous materials. Based on review of EPA's TRI database, 31 facilities located in Franklin County report under the EPA TRI requirements, and of those, six facilities are in Turners Falls, and none are in the 100-year floodplain. Other concerns at fixed facilities relate to the known or suspected presence of hazardous materials and toxic substances at abandoned mill sites and their potential to be released into the environment. The range of hazards that may be encountered at these sites include abandoned chemical product in containers, chemical product and byproduct residues on surfaces, hazardous or toxic contaminants in the surface and subsurface soils at the sites, asbestos-containing building materials, and lead-based paint.

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.



Figure 36. Millers Falls Flooding.

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.

The ResilientMass Plan estimates that precipitation will increase 6% to 14% by mid-century, with an increased frequency of floods meeting current 10-year flood levels. Much of the winter precipitation increase is projected to be in the form of rain rather than snow, which may actually reduce peak spring flooding but could lead to more frequent winter runoff events.

Overall, the frequency of flooding events and their

impacts on people and property can be expected to increase over time, largely in locations that are already of flood concern. Public health may be impacted through increased mosquito populations, which depend on the availability of standing water.

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 should consider these projected conditions. These new developments may cause additional stormwater, which should also be considered.

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.

Because "changes in groundwater" was profiled as a subset of drought and a subset of flooding instead of a separate hazard, the above discussion about probability is applicable. The probability of higher groundwater levels than typical levels in the past is assumed to be high in any given year.

The Sustainable Stormwater Management Plan for Franklin County describes many of the county's urban and village centers as historic and located along rivers where factories once operated. In these settings, it is common that the municipal stormwater drainage infrastructure is aging, undersized, and extremely susceptible to hazards caused by large volumes of water. The need for incorporating stormwater best

management practices (BMPs) into municipal redevelopment projects in urban centers is increasingly urgent in the context of climate change. The co-benefits that are possible with sustainable stormwater management – including increased climate resilience, enhanced water quality and natural resource protection, expanded pollinator and wildlife habitat, and community beautification, for example – add to their value and importance compared to conventional techniques, in which drainage is the singular purpose. The plan states that the Town of Montague intends to continue to utilize stormwater BMPs to address flash flooding on some of its streets.⁶⁹

Problem Statements for Flooding from Precipitation

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 30. Problem Statements Related to Flooding from Precipitation.

Assets	Problems Associated with Flooding from Precipitation
People (including underserved communities and socially vulnerable populations)	Older populations and lower income households in the floodplain may have difficulty evacuating.
Structures (including facilities, lifelines, and critical infrastructure)	- Approximately 52 buildings are in the floodplain, including residential, industrial, and government buildings, as well as outbuildings. - Bridges in the Town serve as important access and evacuation routes. Evacuating residents may be difficult in the event that any or all of compromised bridges are impacted by flooding and have to be closed during an emergency. Several bridges that were badly in need of repair, including the General Pierce Bridge connecting Montague with Greenfield, were replaced over the past five years. - Culvert maintenance is continuously needed across the Town, and continuing work to upgrade and replace culvers needs to be prioritized. - The Hillcrest School building experiences flooding approximately every five to ten years. - Combined Sewer Overflows need to be maintained and monitored continually, and the Town continues to identify opportunities to reduce the amount of stormwater entering the system to reduce the risk of overflow events occurring.
Systems (including networks and capabilities)	Road closures may interrupt the functioning of community systems, including emergency response and evacuation.
Natural, historic, and cultural resources	Historic properties, natural resource conservation areas, and parks could be impacted.

⁶⁹ Franklin Regional Council of Governments. Sustainable Stormwater Management Plan for Franklin County. June 25, 2021. <https://storymaps.arcgis.com/stories/c20c55ad03bb433da5737fd401a3a538>.

Assets	Problems Associated with Flooding from Precipitation
Activities that have value to the community	Road closures may disrupt community events.

Flooding from Dam Failure or Overtopping

FEMA Requirement Element G: High Hazard Potential Dams HHPD2: Did the plan address HHPDs in the risk assessment?

Dams and levees and their associated impoundments provide benefits to a community, such as water supply, recreation, hydroelectric power generation, and flood control. However, they also pose a potential risk to lives and property. Although not a common occurrence, dam failure is a conceivably disastrous hazard. When a dam fails, the potential energy of the stored water behind the dam is released rapidly.

Dam failure can cause severe flash flooding in the potential inundation area downstream, resulting in property damage, loss of life, destruction of infrastructure, environmental damage, and displacement of communities. Dam failure in Massachusetts is often the direct result of severe flooding but may also be caused by insufficient maintenance, deterioration, landslides, or earthquake damage. Increases in precipitation and extreme storm events over time will result in increased risk of dam failure.

The following narratives provide additional detail about some of the dams addressed in this section:

- The largest of the five villages of Montague, Turners Falls was founded in 1868 as a planned industrial community. The idea of constructing a dam and canal was to harness the Connecticut River to generate hydropower and to sell sites along the power canal, constructed in segments from 1866 to 1916, to companies for development of future mills and individual building lots to workers who would come to work in the mills. Above the Turners Falls dam, the Connecticut River is impounded in a large pool that extends twenty miles to the north and forms the lower reservoir of the Northfield Mountain Pumped Storage facility.⁷⁰
- According to the Hydropower Reform Coalition, the main Turners Falls Dam is a diversion dam, sending water through the canal to Station 1 and Cabot Station. The Cabot Spillway Dam is part of the facility licensed by the Federal Energy Regulatory Commission (FERC), identified as FERC docket #P-1889 (also referred to as Cabot Station or Cabot P-1889; permit issued on April 30, 1980), which is a conventional hydropower (peaking generation mode) station on the Connecticut River. The owner/operator is FirstLight Power Resources Services LLC, and the station. The six hydraulic turbine-generator units have a total generation capacity of 61.8 megaWatts (MW).
- The village of Lake Pleasant, once the focal point of a summer spiritual retreat developed in the late 19th century, is located adjacent to the Connecticut River Scenic Byway. What began as a tent encampment was further developed with small cottages, became a popular resort community, and grew to 196 homes and cottages by the turn of the century. Two events appear to have contributed

⁷⁰ Town of Montague. Village of Turners Falls - History and Culture. <https://montague-ma.gov/p/14/Turners-Falls>.

to the decline of the 53-acre Lake Pleasant as a tourist attraction: a major fire; and the development of the lake as a public water supply. The fire, which occurred in 1907, destroyed 130 homes; and although valiant efforts were made to rebuild, the village never achieved its pre-fire glory. The development of Lake Pleasant as a public water supply, one of Montague's emergency water supplies, effectively ended its recreational role and influenced the later growth of the village. As property values declined, many buildings around the lake were acquired by the water department and demolished for watershed protection purposes.⁷¹

- In the early 1900s, the New England Power Company began intensive hydroelectric development of the Deerfield River along its entire length in Vermont and Massachusetts. A massive earthen dam was constructed in 1912-13 to create the Somerset Reservoir, the largest wild body of water in the State of Vermont. To accommodate seasonal storage, the Somerset Reservoir is drawn down about 5 feet over the summer/fall period, and an additional 10 feet during the winter months.⁷²

Description

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 several 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.

Roadways and bridges are impacted when flooding from dam failure undermines or washes out supporting structures. Downstream dams may fail or be damaged by the flooding, compounding the flood hazard for downstream communities.

⁷¹ Town of Montague. Village of Lake Pleasant. <https://montague-ma.gov/p/18/Lake-Pleasant>.

⁷² Massachusetts Paddler. Deerfield River Reach 3. Somerset Reservoir. Last updated March 2024. <https://www.massachusettspaddler.com/df3-somerset-reservoir>.

Location

Locations of Dams

When the Town of Montague started the current HMP update process in 2025, the Massachusetts Office of Dam Safety identified two high hazard and three significant hazard dams in Montague. Updates to the Massachusetts GIS data that were available at the time of plan development identify none of the dams in



Figure 37. Annual Turners Falls Dam Inspection Drawdown.

village in Montague. The NID describes this federally regulated structure as an earth dam, 19 feet high and 3,250 feet long, with a surface area of 2,000 acres, drainage area of 7,163 square miles, and maximum storage of 21,500 acre-feet. Completed in 1915 and serving the purposes of hydroelectric power and recreation, the dam is owned and operated by FirstLight Power Services. According to the NID data, the most recent condition assessment, April 11, 2023, found the dam to be in Satisfactory condition.

Outside of Montague, two high hazard potential dams located upstream could impact the Town in the event of failure or overtopping. The Birch Hill Dam (Federal ID: MA00963), located in Athol, Worcester County, MA, on the Millers River, is described in the NID as an earth dam, 49 feet high and 1,00 feet long, with a drainage area of 175 square miles and maximum storage of 76,500 acre-feet. Completed in 1942 and serving the purpose of flood risk reduction, the dam is owned and operated by the USACE New England District. The Lake Wyola Dam (Federal ID: MA00510) is a high hazard dam located at the intersection of Locks Pond Road and Lakeview Road in the Town of Shutesbury, MA. The dam is described in the EAP as 14 feet high and 150 feet long, with a drainage area of 6.44 square miles and maximum storage of 1,703 acre-feet. Completed in 1883, the dam is owned and operated by the Town of Shutesbury.

Montague as high hazard and one dam as significant hazard (the Richard Clapp Dam). The U.S. Army Corps of Engineers (USACE) National Inventory of Dams (NID) provides more detailed information on the federally regulated dams and, in some cases, includes a hazard classification that differs from the Massachusetts hazard classification.

Currently, the NID data indicate the Turners Falls Power Canal – Left Dike (Federal ID: MA00849S005) is a high hazard potential dam located in Turners Falls, a

Figure 38 shows the location of the dams in Montague and outside of Montague considered for analysis as part of this HMP update. According to the MassGIS data attributes, dams indicated by the grey triangle symbol are of undetermined hazard classification, and dams identified as Removed/Breached have been removed or breached and are included in the data to aid in the documentation and tracking of efforts to restore river habitats for anadromous fish and other wildlife.

Overall, based on the information above, one high hazard dam is located in Montague or on its boundaries. The Cabot Spillway, Turners Falls #1 Dam, and Turners Falls Dam are High Hazard Potential dams in Montague. Failure of any of these dams, as well as the power canal itself, was identified as an area of concern during the MVP community workshop in 2018. The Patch neighborhood located between the canal and the Connecticut River, and the village of Montague City located downstream, are vulnerable to failure of these structures.

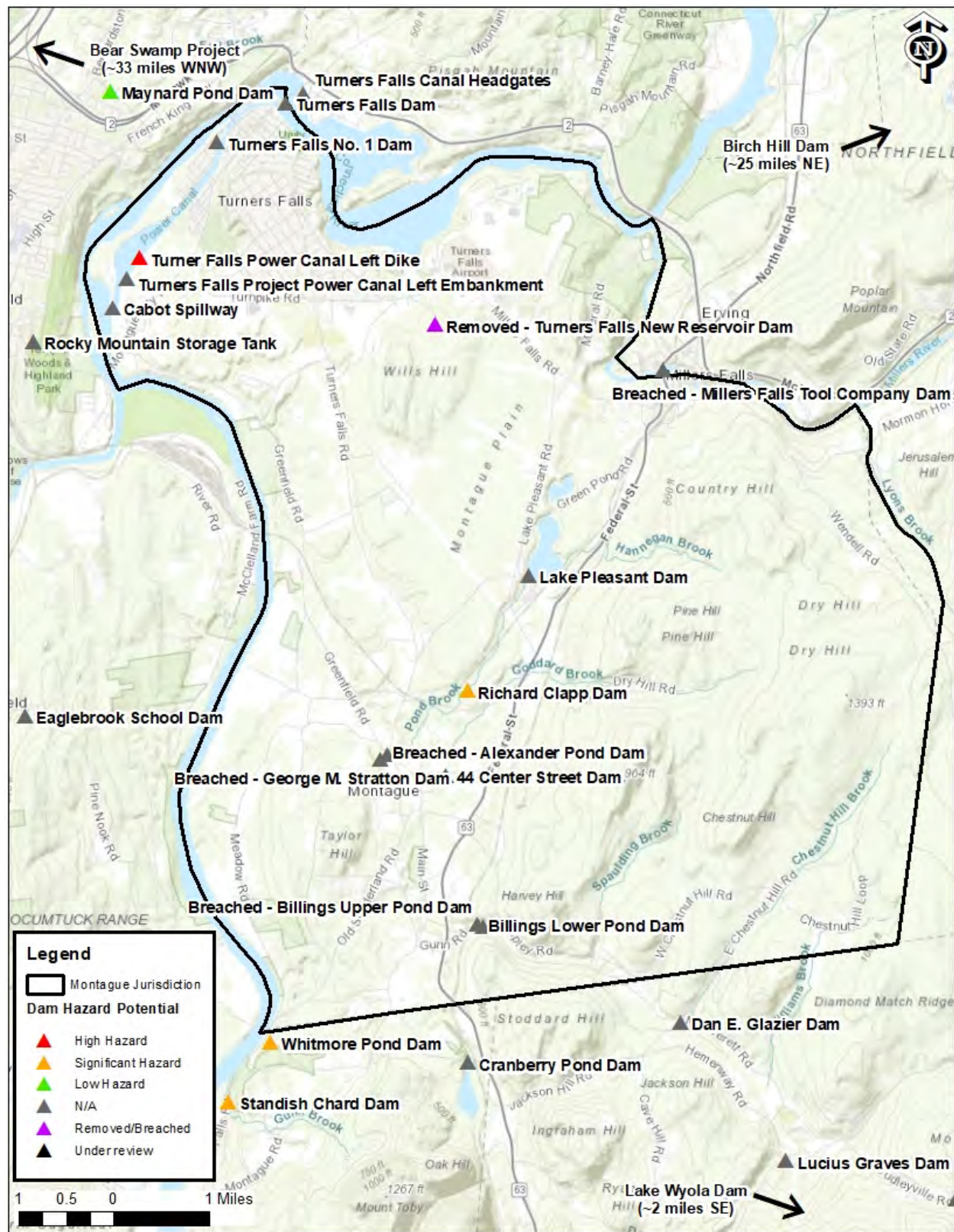


Figure 38. Location and Hazard Classification of Dams in Montague and the Vicinity.

Table 31 provides the information on the location, ownership, and hazard classification associated with the high hazard and significant hazard dams with the potential to impact Montague based on an EAP (or excerpt thereof) and/or an inundation map provided. In addition, some low-hazard dams are included to provide the overall risk context, as some of the low-hazard dams are part of a multi-structure complex in which at least one of the dams/dikes is classified as high hazard.

Table 31. Dams in and Upstream of the Town of Montague, MA.

National ID	Dam Name and Location	Owner Name / Owner Type	Hazard Potential	Notes
MA00974	Northfield Mountain Pumped Hydro Storage Station – Main Dam	FirstLight Power Services LLC / Public Utility	High	River or Stream Name: Connecticut River
	Northfield Mountain Reservoir			Purposes: Hydroelectric, Recreation
	Farley, Franklin County, MA			Year Completed: 1973 Last Inspection Date: 08/04/2022 Condition Assessment: Satisfactory, 04/11/2023 Last EAP Revision: 04/08/2022
MA00974S001	Northfield Mountain – Upper Reservoir Intake	FirstLight Power Services LLC / Public Utility	High	River or Stream Name: Connecticut River Purposes: Hydroelectric, Recreation Year Completed: 1973 Last Inspection Date: 08/04/2022 Condition Assessment: Satisfactory, 04/11/2023 Last EAP Revision: 04/08/2022
MA00974S002	Northfield Mountain – Upper Reservoir Spillway	FirstLight Power Services LLC / Public Utility	Low	River or Stream Name: Connecticut River Purposes: Hydroelectric, Recreation Year Completed: 1973 Last Inspection Date: 08/04/2022

National ID	Dam Name and Location	Owner Name / Owner Type	Hazard Potential	Notes
				Condition Assessment: Satisfactory, 04/11/2023 Last EAP Revision: 04/08/2022
MA00974S003	Northfield Mountain – North Dike Northfield Mountain Reservoir Farley, Franklin County, MA	FirstLight Power Services LLC / Public Utility	High	River or Stream Name: Connecticut River Purposes: Hydroelectric, Recreation Year Completed: 1973 Last Inspection Date: 08/04/2022 Condition Assessment: Satisfactory, 04/11/2023 Last EAP Revision: 04/08/2022
MA00974S004	Northfield Mountain – Northwest Dike	FirstLight Power Services LLC / Public Utility	High	River or Stream Name: Connecticut River Purposes: Hydroelectric, Recreation Year Completed: 1973 Last Inspection Date: 08/04/2022 Condition Assessment: Satisfactory, 04/11/2023 Last EAP Revision: 04/08/2022
MA00974S005	Northfield Mountain – West Dike Northfield Mountain Reservoir Farley, Franklin County, MA	FirstLight Power Services LLC / Public Utility	High	River or Stream Name: Connecticut River Purposes: Hydroelectric, Recreation Year Completed: 1973 Last Inspection Date: 08/04/2022 Condition Assessment: Satisfactory, 04/11/2023 Last EAP Revision: 04/08/2022

National ID	Dam Name and Location	Owner Name / Owner Type	Hazard Potential	Notes
MA00963	Birch Hill Dam Athol, Worcester County, MA	USACE New England District	High	River or Stream Name: Millers River Purposes: Flood Risk Reduction Year Completed: 1942 Last Inspection Date: 10/19/2021 Condition Assessment: Satisfactory, 04/11/2023 Last EAP Revision: 09/15/2022
MA00043 FERC ID: 02323-05-01	Sherman Dam Monroe Bridge, Franklin County, MA	Great River Hydro, LLC / Private	High	River or Stream Name: Deerfield River Purposes: Hydroelectric, Recreation Year Completed: 1927 Last Inspection Date: 08/03/2022 Condition Assessment: Satisfactory, 04/11/2023 Last EAP Revision: 08/03/2018
MA00051	Grandin Reservoir Dam Seminary Reservoir (a/k/a Grandin Reservoir) Franklin County, MA	Northfield Mount Hermon School / Private	High	River or Stream Name: Louisiana Brook (Connecticut River Watershed) Purpose: Water Supply Year Completed: 1935 Last Inspection Date: 06/02/2022 Condition Assessment: Satisfactory, 06/02/2022 Last EAP Revision: 05/01/2022
MA00975	Fife Brook Dam (a/k/a Bear Swamp Lower Reservoir Dike)	Brookfield Renewable Power – New York East	High	River or Stream Name: Deerfield River Purpose: Hydroelectric

National ID	Dam Name and Location	Owner Name / Owner Type	Hazard Potential	Notes
FERC ID: 02669-02-01	Sherman Reservoir Charlemont, Franklin County, MA	Operations, Bear Swamp Power Co., LLC (Note: Owner Name and Type not listed in NID)		Year Completed: 1974 Last Inspection Date: 09/13/2022 Condition Assessment: Satisfactory, 04/11/2023 Last EAP Revision: 12/21/2021
MA00976 Federal ID: MA00976S001 FERC ID: 02669-01-02	Bear Swamp – Dike A (a/k/a Bear Swamp Upper Reservoir Dike) Charlemont, Franklin County, MA	Brookfield Renewable Power – New York East Operations, Bear Swamp Power Co., LLC (Note: Owner Name and Type not listed in NID)	Low	River or Stream Name: Deerfield River Purpose: Hydroelectric Year Completed: 1974 Last Inspection Date: 09/13/2022 Condition Assessment: Satisfactory, 04/11/2023 Last EAP Revision: 12/19/2014
MA00976S002 Federal ID: MA00976S002 FERC ID: 02669-01-03	Bear Swamp – East Dike (a/k/a Bear Swamp Upper Reservoir Dike) Charlemont, Franklin County, MA	Brookfield Renewable Power – New York East Operations, Bear Swamp Power Co., LLC (Note: Owner Name and Type not listed in NID)	High	River or Stream Name: Deerfield River Purpose: Hydroelectric Year Completed: 1974 Last Inspection Date: 09/13/2022 Condition Assessment: Satisfactory, 04/11/2023 Last EAP Revision: 12/19/2014
MA00976S003 Federal ID: MA00976S003 FERC ID: 02669-01-04	Bear Swamp – South Dike (a/k/a Bear Swamp Upper Reservoir Dike) Charlemont, Franklin County, MA	Brookfield Renewable Power – New York East Operations, Bear Swamp Power Co., LLC (Note: Owner Name and Type not listed in NID)	High	River or Stream Name: Deerfield River Purpose: Hydroelectric Year Completed: 1974 Last Inspection Date: 09/13/2022 Condition Assessment: Satisfactory, 04/11/2023 Last EAP Revision: 12/31/2015

National ID	Dam Name and Location	Owner Name / Owner Type	Hazard Potential	Notes
MA00976	Bear Swamp – North Dike (a/k/a Bear Swamp Upper Reservoir Dike)	Brookfield Renewable Power – New York East Operations, Bear Swamp Power Co., LLC	High	River or Stream Name: Deerfield River Purpose: Hydroelectric Year Completed: 1974 Last Inspection Date: 09/13/2022 Condition Assessment: Satisfactory, 04/11/2023 Last EAP Revision: 12/21/2021
FERC ID: 02669-01-01	Charlemont, Franklin County, MA	(Note: Owner Name and Type not listed in NID)		
VT00025	Harriman Dam	Great River Hydro, LLC / Private	High	River or Stream Name: Deerfield River Purposes: Hydroelectric, Recreation Year Completed: 1924 Last Inspection Date: 08/02/2022 Condition Assessment: Satisfactory, 04/11/2023 Last EAP Revision: 08/21/2018
FERC ID: 02323-06-01	Readsboro, Windham County, VT			
NH00414	Moore Dam	Great River Hydro, LLC / Private	High	River or Stream Name: Connecticut River Purposes: Hydroelectric, Recreation Year Completed: 1957 Last Inspection Date: 06/07/2022 Condition Assessment: Satisfactory, 04/11/2023 Last EAP Revision: 12/10/2018
FERC ID: 02077-03-01	(a/k/a Samuel C. Moore Station Dam; formerly Littleton Dam) Littleton, NH, and Waterford, VT			
VT00018	Somerset Dam	Great River Hydro, LLC / Private	High	River or Stream Name: East Branch Deerfield River Purposes: Hydroelectric, Recreation
FERC ID: 02323-08-01	Searsburg, Windham County, VT			

National ID	Dam Name and Location	Owner Name / Owner Type	Hazard Potential	Notes
				Year Completed: 1913 Last Inspection Date: 08/02/2022 Condition Assessment: Satisfactory, 04/11/2023 Last EAP Revision: 12/10/2018
N/A	Lake Pleasant Dam Village of Lake Pleasant, Montague, MA	Town of Montague / Public	Significant	River or Stream Name: Hannegan Brook Year Completed: Approximately 1870
NID ID: MA01741 (State Regulated Dam)	Richard Clapp Dam Montague, Franklin County, MA	Joanne McGowan / Private	Significant	River or Stream Name: Pond Brook Purpose: Recreation Year Completed: 1955 Last Inspection Date: 10/08/2020 Condition Assessment: Fair, 10/08/2020 Last EAP Revision: 10/14/2019
MA00849 Federal ID: MA00849S005	Turners Falls Project Power Canal Left Embankment. Turners Falls, Franklin County, MA	FirstLight Power Services LLC / Public Utility	Low (EAP not required)	River or Stream Name: Connecticut River Purposes: Hydroelectric, Recreation Year Completed: 1970 Last Inspection Date: 07/25/2018 Condition Assessment: Satisfactory, 04/11/2023 Last EAP Revision: 12/14/2020
MA00849 Federal ID: MA00849S001	Montague Dam Other Name: Turners Falls Canal Headgates Dam	FirstLight Power Services LLC / Public Utility	Low (EAP not required)	River or Stream Name: Connecticut River Year Completed: 1915 Purposes: Hydroelectric, Recreation

National ID	Dam Name and Location	Owner Name / Owner Type	Hazard Potential	Notes
	Turners Falls, Franklin County, MA			Last Inspection Date: 08/02/2022 Condition Assessment: Satisfactory, 04/11/2023
MA00849 Federal ID: MA00849S002	Cabot Spillway Franklin County, MA	FirstLight Power Services LLC / Public Utility	Low	River or Stream Name: Connecticut River Year Completed: 1915 Last Inspection Date: 08/02/2022 Condition Assessment: Satisfactory, 04/11/2023
MA00849 Federal ID: MA00849S003	Turners Falls Dike / Turners Falls No. 1 Dam	FirstLight Power Services LLC / Public Utility	Low	River or Stream Name: Connecticut River Year Completed: No data
Federal ID: MA00849S004	Cabot Station Greenfield, Franklin County, MA	FirstLight Power Services LLC / Public Utility	Low (EAP not required)	River or Stream Name: Turners Falls Canal Purposes: Hydroelectric, Recreation Year Completed: 1916 Last Inspection Date: 08/02/2022 Condition Assessment: Satisfactory, 04/11/2023 Last EAP Revision: 11/09/2011
MA00849 Federal ID: MA00849S005	Turners Falls Power Canal – Left Dike Turners Falls, Franklin County, MA	FirstLight Power Services LLC / Public Utility	High	River or Stream Name: Turners Falls Canal Year Completed: 1915 Purposes: Hydroelectric, Recreation Last Inspection Date: 08/02/2022 Condition Assessment: Satisfactory, 04/11/2023

National ID	Dam Name and Location	Owner Name / Owner Type	Hazard Potential	Notes
				Last EAP Revision: 03/25/2022
MA00510 (State Regulated Dam)	Lake Wyola Dam a/k/a Locks Pond Reservoir Dam a/k/a Raymond 'Red' Moriarty Dam Shutesbury, Franklin County, MA	Town of Shutesbury / Local Government	High	River or Stream Name: Lake Wyola/Sawmill River Year Completed: 1883 Year Modified: 2009 Purpose: Recreation Last Inspection Date: 05/12/2023 Condition Assessment: Fair, 05/12/2023 Last EAP Revision: 05/1/2025
MA01743	Billings Lower Pond Dam	Unknown / Private	N/A Non-jurisdictional	River or Stream Name: Sawmill River Year Completed: No data
MA01744	Billings Upper Pond Dam	Unknown / Private	N/A - Breached Non-jurisdictional	River or Stream Name: Sawmill River Year Completed: No data
MA02674	Turners Falls New Reservoir Dam	Town of Montague / Public	N/A - Removed	Year Completed: No data

Locations of Inundation Areas

The Town of Montague maintains copies of the EAPs for Lake Wyola Dam on the Sawmill River (U.S. Army Corps of Engineers Number: MA00510; Mass DCR ID Number: 2-6-272-2) in Shutesbury, and Turners Falls Project Power Canal Left Embankment (FERC Project No. 1889; National Inventory of Dams No. MA83059) in Montague. During the development of this HMP, the Town also obtained a copy of the Dam Failure Inundation Map for Birch Hill Dam on the Millers River in South Royalston. Dams without EAPs would also cause flooding downstream, but the inundation areas may not have been mapped and are therefore not listed here.

General downstream inundation areas that may be subject to flooding due to dam failure are noted below:

- According to the EAP for Lake Wyola Dam, Shutesbury, MA (revised 5/1/2025), the Potential Impacted Area during an unusual or emergency event at the Lake Wyola Dam includes residential areas in Leverett, Shutesbury, and Montague, and the dam break flood wave causes a less-than-two-foot increase in 500-year flood stage in Montague. The EAP notes that the following roads in Montague would potentially be impacted: North Leverett Road, Spaulding Brook Road, Main Street, Center Street, South Ferry Road, and Meadow Road.
- According to the USACE National Inventory of Dams Risk Characterization Summary, the Department of Army risk assessment of Birch Hill Dam was last completed in 2016 and identified the risks associated with the dam as Low. No emergency situation currently exists at Birch Hill Dam and under normal circumstances, there is very low risk to the public.

The dam significantly reduces the risk of flooding to the surrounding communities. However, it does not eliminate the risk. The most likely scenario that could result in downstream flooding from Birch Hill Dam would be an uncontrolled high volume release of water from the dam's spillways during significant storm events. The amount of water being released could be great enough to cause flooding in downstream communities. Such higher releases from the spillway could create conditions similar to how the river might behave during a flood event if the dam did not exist.

There are three extremely unlikely, but far more devastating scenarios that would result in failure of the dam and downstream flooding: (1) Failure of the main spillway, resulting in a surge of water flowing through the opening created by a missing portion or portions of the spillway structure, and (2) water seeping through the earth embankment and/or the bedrock foundation resulting in voids in the dam as the soil erodes, potentially weakening the dam. Were either of these events to occur, an uncontrolled surge of water would flow out of the reservoir, flooding downstream communities. Athol, and Orange, MA, are the major areas in immediate danger in the event of the flood. Towns and cities further downstream, including Greenfield, and Northampton, MA would also be impacted, but less so. Even though very unlikely, if any of the scenarios described above were to occur, the downstream floodwater would be swift and deep, destroying buildings and key infrastructure, and those caught unaware and/or unable to evacuate could perish. In the less likely dam breach scenarios, the water depth, property damage, and lives lost would likely be far greater than flooding due to spillway discharges. In a worst-case scenario, water could be almost as high as a two-story building.

- Although an EAP has been prepared for the Turners Falls Project Power Canal Left Embankment, due to disclosure limitations imposed by the project owner, FirstLight Power Services, LLC, at the time of plan development, the Town only had access to excerpts from the EAP (Submitted: January 24, 2018; Revised March 24, 2022). The inundation area for the Power Canal Left Embankment was mapped based on two scenarios, represented by upper and lower breach locations, and the figures included in this HMP update reflect the modeled inundation areas for the two scenarios. However, no written description of the downstream path of the flood resulting from a breach event was available for review or inclusion in the

analysis. Representatives of FirstLight Power actively participated in the HMPC meetings for the development of this plan, and they emphasized that this federally regulated hydroelectric power project is subject to inspections for safety and regulatory compliance, and that a team of engineering and operations specialists manages the maintenance program.

Condition of Dams

The National Inventory of Dams⁷³ maintains information on dams across the United States, including information on dam conditions. This information is not always up to date but often provides a good indicator of the condition of a dam within the last decade. Details for high hazard dams identified as having the potential to impact the Town of Montague in the event of dam failure or overtopping and for which adequate information was available to analyze risk are presented in Table 32.

Table 32. Dam Conditions in Montague.

National ID	Dam Name	Downstream Channel	Dam Condition	Dam Condition Date
MA00510	Lake Wyola Dam	Sawmill River	Fair	05/12/2023
MA00963	Birch Hill Dam	Millers River	Operational Status: Normal Operations	Operational Status Date: 11/20/2025
MA0083059	Turners Falls Power Canal Project Left Embankment	Connecticut River	Unknown	Unknown

Previous Occurrences

At the time of plan development, the HMPC was not aware of any historical dam failure incidents in Montague or dam failure or overtopping incidents that impacted Montague.

Dams have been in the news frequently due to severe precipitation events occurring nationwide in the last few years. Events in New England from 2022-2025 include the following:

- The Crosby Pond Dam, a significant hazard dam on Mill Brook in Concord, MA, failed in May 2015. According to the Association of State Dam Safety Officials (ASDSO)⁷⁴, the uncontrolled release of the impoundment inundated a heavily traveled road. No one was injured, but the road was closed all day creating significant traffic delay issues.
- The Silica Pond Dam, a significant hazard dam in New Hampshire, was reported by ASDSO as having had a gate/valve failure in July 2022 that resulted in the release of the impoundment. This was not a catastrophic failure but the release of storage was caused by the deterioration and/or poor condition of the outlet valve.
- The George Schnopp Road Pond Dam in Hinsdale, MA breached in October 2022. According to the Hinsdale Hazard Mitigation Plan (2024), significant damage did not occur downstream,

⁷³ U.S. Army Corps of Engineers. National Inventory of Dams. <https://nid.sec.usace.army.mil/#/>.

⁷⁴ Association of State Dam Safety Officials. Dam Incident Database. <https://www.damsafety.org/incidents>.

but the experience underscored the challenges associated with dams. During the breach, five to ten million gallons of water was released rapidly to the downstream watercourse, flowing into Ashmere Lake. The Town responded with clearing and repair of George Schnopp Road, which was covered in debris and eroded partially by the flooding.

- Five dam failures were reported by ASDSO as occurring in Vermont on July 10, 2023, following a severe flood event. These included the Clarks Sawmill Dam, a low hazard dam on the Winooski River which fully failed; the Hands Mill Dam, a significant hazard dam on the Jail Branch River which fully failed; the Lyons Pond Dam, a low hazard dam on Burndt Meadow Brook which fully failed; the Quinn Lower Dam, a low hazard dam on Homer Stone Brook which fully failed; and the South Woodbury Pond Dam, a significant hazard dam on a tributary to Sabin Pond which partially breached. Several of these dams were reportedly remote and failure only discovered several days following the failure.
- A dam overtopped at Barrett Park Pond Dam in September 2023 in Leominster, MA resulting in downstream evacuations and emergency repairs. Floodwaters downstream caused damage to roads and properties.
- A partial dam breach on the Yantic River occurred in January 2024 in Bozrah, Connecticut, resulting in evacuations downstream in the Town of Bozrah and the City of Norwich.
- On May 17, 2025, several rounds of strong to severe thunderstorms produced large hail, isolated damaging winds, and localized flash flooding across parts of northern New York and Vermont. Some of the locations that saw significant flooding were in Waitsfield, Warren, Killington, and Hartford in Vermont.⁷⁵ Reportedly, local and regional organizations in Vermont removed nine dams in the state in 2025, restoring floodplains and reconnecting 125 miles of river.⁷⁶

Extent

Many dams in Massachusetts were built in the 19th Century without the benefit of modern engineering design and construction oversight. Dams can fail because of structural problems due to age and/or lack of proper maintenance. Dam failure can also be the result of structural damage caused by an earthquake or flooding brought on by severe storm events.

The Massachusetts Department of Conservation and Recreation (DCR) is the agency responsible for regulating dams in the state (M.G.L. Chapter 253, Section 44, and the implementing regulations 302 CMR 10.00). The DCR was also responsible for conducting dam inspections until 2002, when state law was changed to place the responsibility and cost of inspections on the owners of the dams. In accordance with the new regulations, which went into effect in 2005, dam owners must register, inspect, and maintain dams in good operating condition. Owners of High Hazard Potential dams and certain Significant Hazard Potential dams are also required to prepare, maintain, and update EAPs. The state has three hazard classifications for dams:

⁷⁵ Clay, M., and B. Taber, National Weather Service, Burlington, VT, Weather Forecast Office. Large Hail and Flash Flooding Event on 17 May 2025. <https://www.weather.gov/btv/Large-Hail-and-Flash-Flooding-Event-on-17-May-2025>.

⁷⁶ Petenko, E. Nine Vermont dams were removed in 2025. There are many more to go. VTDigger. December 21, 2025. <https://vtdigger.org/2025/12/21/nine-vermont-dams-were-removed-in-2025-there-are-many-more-to-go/>.

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

According to FEMA⁷⁷, hazard potential classification systems vary between certain states and federal agencies. The Massachusetts dam hazard classification system is consistent with the federal dam hazard classification system (Low, Significant, and High) but some dams that are identified as high by the State maybe be identified as significant by the USACE. There are dams regulated by the Federal Energy Regulatory Commission (FERC) in this analysis which have a different ranking than the State's ranking. Owners of dams are required by DCR to hire a qualified engineer to inspect and report results using the following inspection schedule:

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

The time intervals represent the maximum time between inspections. More frequent inspections may be performed at the discretion of the state. Owners of High Hazard Potential dams and certain Significant Hazard Potential dams are also required to prepare, maintain, and update EAPs. Dams and reservoirs licensed and subject to inspection by the Federal Energy Regulatory Commission (FERC) are excluded from the provisions of the state regulations provided that all FERC-approved periodic inspection reports are provided to the DCR. FERC inspections of high and significant hazard projects are conducted on a yearly basis. All other dams are subject to the regulations unless exempted in writing by DCR. The HMPC noted the importance of coordination between the Town, dam owners, and the Office of Dam Safety for securing funding for dam inspections and repairs to ensure proper maintenance.

According to FEMA⁷⁷, the common dam failure modes include those in the following table. Any of these failure modes could result in an uncontrolled downstream release of water with potential downstream consequences.

⁷⁷ https://www.fema.gov/sites/default/files/2020-08/fact-sheet_dam-awareness.pdf.

Table 33. Dam Failure Modes

Failure Type	Description
Seepage and Piping	Seepage and piping can cause internal erosion within the dam that can erode embankment or foundation materials and lead to dam failure. Evidence of piping is generally detected at the location of seepage discharge.
Overtopping (hydrologic failure)	Overtopping can cause erosion and head-cutting of embankment materials and can lead to dam failure.
Deformation	Deformation is caused by differential settlement; transverse or longitudinal cracking; or slope instability, slumps, or other slope failures. Deformation can provide a path for seepage through the dam and lead to failure. Low areas in the crest of the dam can make the dam more vulnerable to overtopping.
Liquefaction	Liquefaction can occur when the strength and stiffness of a saturated soil is reduced by earthquake shaking or other rapid loading. The weakened soil can cause the collapse of the dam.
Concrete failure	Concrete failure, structural cracking, broken masonry, and offsets at joints can lead to sudden failures.
Neglected maintenance and deterioration	Neglected maintenance and deterioration can leave a dam vulnerable to several failure modes: • Missing riprap can leave areas of an embankment unprotected and vulnerable to erosion from wave action or head-cutting during overtopping events. • Woody vegetation growing on a dam can interfere with effective dam safety monitoring. Uprooted trees can create large voids in the embankment, and roots can create preferred seepage paths, causing internal erosion problems. Vegetation can also block spillways. • Animal burrows in the embankment can cause preferred seepage paths. Livestock activity can damage embankment slopes and increase erosion potential. • Malfunctioning gates, conduits, or valves can reduce discharge capacity and cause the dam to overtop, which could lead to failure.
Other	Other problems that can leave a dam vulnerable to failure include outdated designs; hydraulically inadequate spillways; and damage from vandalism, cyber-attacks, or terrorism.

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, with the exception of flash flood warnings which can be issued only

hours before a flood. 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 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.

The protocols from the EAPs that are described on this page are provided solely for informational purposes. For a potential dam overtopping or failure event, the EAP for the specific dam must be consulted. This hazard mitigation plan is not appropriate for emergency response related to dams.

Flooding in Massachusetts is forecasted and classified by the 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. Typically, dam EAPs are triggered by NWS forecasts above a certain precipitation level or by the level of potential flooding that may occur in the watershed above the dam.

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.

At the present time, the NWS utilizes the flood advisory, watch, and warning products for dam-related hazards. Specific warnings are used as needed to augment these messages when a dam failure could occur. In Massachusetts, EAPs must include a “procedure for warning downstream residents if failure of the dam is imminent.” Therefore, the use of the word “imminent” is often incorporated into specific dam-related messages from local emergency managers.

In Montague, the Town would issue messages according to the approach outlined in the EAPs for the Lake Wyola Dam, the Birch Hill Dam, and the Turners Falls Project Power Canal Left Embankment:

- “Dam Safety Watch / Phase 1” (potential failure is developing) is typically perceived as a lower grade emergency that may be contained and corrected with resources at a local level. An identified problem at the dam, such as excessive seepage, boiling, whirlpool, slope failure, etc. will need to be observed constantly, checking for any significant changes which may indicate development of a Phase 2 emergency condition. Since the time to maximum failure for earthen embankments is typically of a very short duration, reaction time will be limited. Certainly, there is much “gray area” as to what constitutes a Phase 1 emergency. A condition at the dam may initially be perceived as minor but may be a precursor to a complete embankment failure.

- “Dam Failure Warning / Phase 2” (failure is imminent or has occurred) is typically perceived a potentially deteriorating condition where mobilization of workforce is necessary to mitigate the impact of dam failure. Notification procedures are to be enacted immediately with the highest warning – that is, for evacuation of potentially impacted downstream areas identified on the Inundation Maps. Therefore, priority notification will be to the Montague Police Department/Emergency Services Dispatch.

The procedure in the Turners Falls Project EAP are generally similar to those described above, although that EAP utilizes three condition levels as follows: Imminent Failure (Condition A), Potential Failure (Condition B), and Non-Failure (Condition C).

The NWS⁷⁸ is reportedly in the process of developing alternative forecasting tools and processes that will enable River Forecast Center (RFC) and Weather Forecast Office (WFO) forecasters of different skill levels to evaluate the consequences of a potential dam failure in a relatively short period of time. This new project is designed to address the limitations of the current dam inventory data and dam break modeling approaches. Two goals should be achieved with this project: the first is to provide RFC and WFO forecasters access to quality-controlled, up-to-date dam inventory information; and the second goal is to develop a system that will integrate several dam break modeling approaches. Results from these approaches will assist forecasters in selecting the tool that could be most appropriate, given the length of time needed for execution, how quickly the results are needed, and the availability of data.

The dam classifications, modes of failure, and warning procedures outlined in this section are presently appropriate for the dams in Montague and for dams that could affect Montague in the event of a breach and are believed to be appropriate for future conditions. Response procedures in the EAPs can be revised during any of the routine updates to the EAPs.

Vulnerability Assessment

The failure of high hazard and significant hazard dams in and upstream of Montague could impact the Town. Dam failures, while rare, can destroy roads, structures, facilities, and utilities, and impact the population of Montague. Particularly vulnerable are low-income and elderly populations, buildings in the floodplain or potential dam breach inundation areas, and infrastructure such as roadways and utilities that can be damaged as a result of dam failure and dam breach or overtopping events.

Participants in the HMPC Meetings for this HMP update discussed the numerous dams located in and upstream of Montague could impact the Town if they overtopped or breached. Based on the knowledge that no failures have been recorded at the upstream dams classified as high hazard, the HMPC decided to proceed with a limited risk assessment based on the availability of data and information from studies and reports related to a subset of those dams.

⁷⁸ National Weather Service. Office of Water Prediction. OHD/HL/HSMB - Hydraulics: Dam Break Analysis. Retrieved January 11, 2026, from https://www.weather.gov/owp/oh_hrl_hsmb_hydraulics_dam_break_analysis.

Of the dams and dikes and embankments located in and upstream of Montague, three dams that could impact the Town in the event of a breach due to dam failure or overtopping and for which an EAP or inundation map was provided are included in the risk analysis.

Exposure

The 2020 HMP identified five high hazard and five low hazard dams on the Deerfield River and noted that a catastrophic failure of any one high hazard dam would likely result in the cascading failure of all the downstream dams and cause widespread flooding of downstream areas. The plan further stated that dams on the Connecticut River, both within the Town boundaries and upstream of Montague in Vermont and New Hampshire, have the potential for catastrophic flood impacts. The plan noted that failure of either the dam or dike at the Northfield Mountain Pump Storage Facility in Erving would also cause catastrophic flooding in Montague. Additionally, the plan noted that the failure of dams on the Sawmill River could release sufficient floodwaters upstream to inundate major portions of the Town, including densely settled village areas, critical infrastructure, and sections of roads that serve as evacuation routes.

According to the 2020 HMP, the following high hazard dams on the Deerfield and Connecticut Rivers were of particular concern at the time that plan was being developed:

- Somerset Dam
- Harriman Dam
- Sherman Dam
- Fife Brook Dam
- Bear Swamp Upper Reservoir Dam
- Moore Dam
- Northfield Mountain Pumped Storage Facility
- Turners Falls Project

The plan states that a catastrophic failure of any one of these high hazard dams would likely result in the cascading failure of all the downstream dams (both high and low hazard dams), resulting in widespread flooding of downstream areas in a matter of hours. Additionally, the plan states inundation maps for the Harriman Dam failure indicate significant areas of Montague would be flooded, including a large area west of Montague City Road. Flood waters would also impact areas along the Connecticut River west of Montague Center and would rise up the Sawmill River to Greenfield Road. Under the worst-case scenario, floodwaters from a catastrophic failure of the Sherman Dam would reach the confluence of the Connecticut and Deerfield Rivers in 3.2 hours. Copies of the Harriman Dam inundation maps were unavailable at the time of this HMP update, and consequently, no risk analysis could be conducted. Because the EAPs, inundation maps, and inspection reports were unavailable to the Town at the time of plan development for this HMP update, no risk analysis could be conducted of the dams listed in the 2020 HMP (above). One exception is the a component of the multi-structure complex of hydroelectric power generation known as Turners Falls Project, for which excerpts of an EAP were provided as described below.

Procedures for emergency events at the dam identified by FirstLight Power Services, LLC, as a high hazard dam are described in the excerpts provided from the Emergency Action Plan Turners Falls Project Power Canal Left Embankment, FERC Project No. 1889, (Submitted: January 24, 2018; Revised: March 24, 2022).

To determine the exposure associated with the high hazard potential dams, the inundation maps provided were digitized and integrated into a GIS, where they were converted into an inundation depth using a high-resolution Digital Elevation Model (DEM). This inundation depth was used with the local inventory to determine exposure and loss shown in the next section. The following series of figures (Figure 39, Figure 40, and Figure 41) show the dam locations and the dam breach inundation areas.

No EAP was provided for the Turners Falls Power Canal – Left Dike (NID ID: MA00849; Federal ID: MA00849S005), which, as mentioned earlier in this section, the USACE classifies as high hazard potential. The best available information from which to assess the risk associated with a potential breach of the Turners Falls Power Canal was obtained from the excerpts provided from the document entitled, “Emergency Action Plan for Turners Falls Project Power Canal Left Embankment, FERC Project No. 1889; National Inventory of Dams No. MA83059” (Submitted: January 24, 2018; Revised: March 24, 2022). It should be noted that a search of the NID database failed to locate a structure with the specific name and/or ID No. included on the referenced EAP. The inundation areas for the Turners Falls Project Power Canal Left Embankment Upper and Lower Breach Locations were provided in the excerpts from the EAP and were used for analysis but could not be displayed in this HMP as it is a public document. Those dams and structures comprising the Turners Falls Project are regulated by FERC and subject to federal government restrictions on releasing to the public any part of the EAP.

Although the analysis of the Lake Wyola Dam breach, based on digitization of the inundation maps included in the EAP for Lake Wyola Dam and overlay of the current inventory, indicates that the population and built environment of Montague are not exposed to the inundation area, the digitized mapping indicates that the inundation area extends into the jurisdictional boundaries of the Town, so the figure is included to illustrate that point.

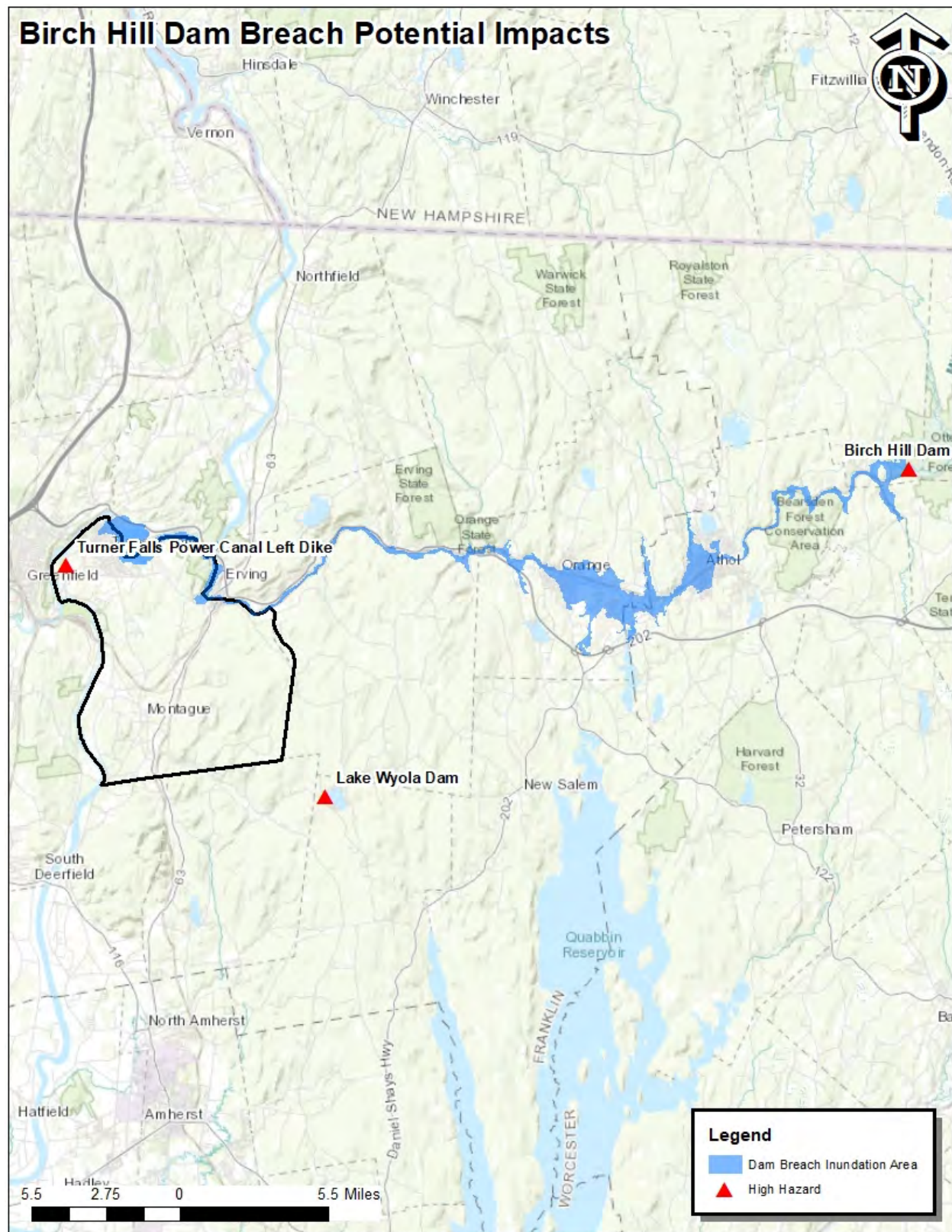


Figure 39. Birch Hill Dam Breach Inundation Area.

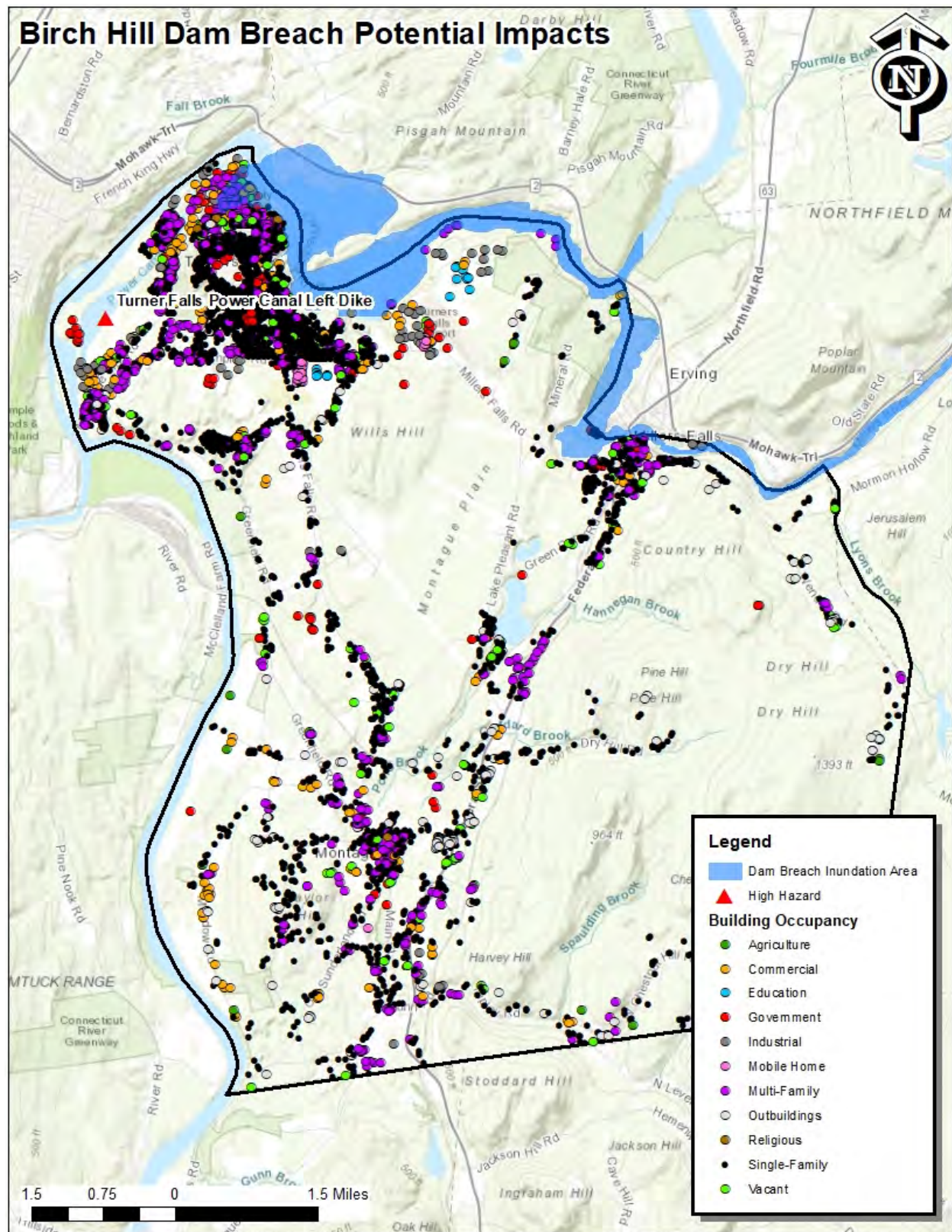


Figure 40. Birch Hill Dam Breach Inundation Area - Town of Montague.

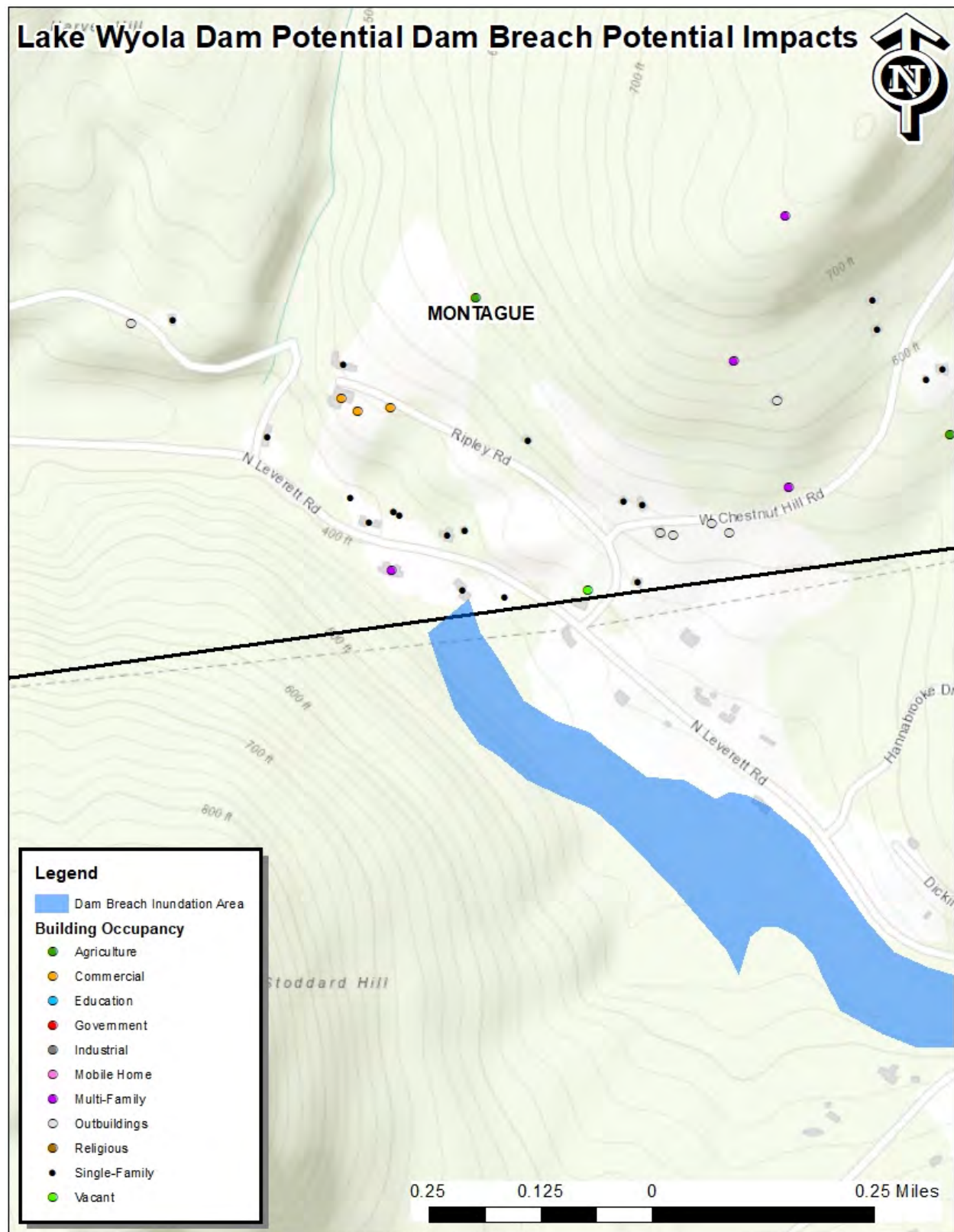


Figure 41. Lake Wyola Dam Breach Inundation Area - Town of Montague.

For the high hazard and significant hazard dams with EAPs or inundation mapping available to the Town, Table 34 presents the critical facilities in the inundation areas. Table 34 presents the dams by name, the size of the inundation area resulting from an overtopping or breach event, and the critical facilities exposed to the inundation areas.

Table 34. Montague Critical Facilities Exposed to Dam Inundation Areas.

Dam	Inundation Area Within Jurisdiction (Acres)	Critical Facilities Exposed
Birch Hill Dam	5,878.5	- Franklin Area Survival Center 96 4th Street, Turners Falls - Montague Police Department 1 Avenue A, Turners Falls - Montague Town Hall 1 Avenue A, Turners Falls - Turners Falls Airport-0B5 10 Aviation Way, Turners Falls
Turners Falls Project Power Canal Left Embankment Lower Inundation Area	169.9	- Community Health Center of Franklin County 8 Burnham Street, Turners Falls - Montague City Road Bridge 498 Montague City Road - New England Wound Care 7 Burnham Street, Suite 2
Turners Falls Project Power Canal Left Embankment Upper Inundation Area	227.0	- Community Health Center of Franklin County 8 Burnham Street, Turners Falls - Montague City Road Bridge 498 Montague City Road - New England Wound Care 7 Burnham Street, Suite 2

Several roads in Montague are also exposed to the dam inundation areas, as shown in Table 35.

Table 35. Roads Exposed to Dam Inundation Areas.

Dam	Roads Exposed in Montague
Birch Hill Dam	3rd Street

Dam	Roads Exposed in Montague
Turners Falls Project Power Canal Left Embankment Lower	Montague City Road Turnpike Road
Turners Falls Project Power Canal Left Embankment Upper	Montague City Road Turnpike Road
Lake Wyola Dam	N/A

The Town of Montague buildings, categorized by building occupancy, exposed to the dam inundation areas for the Birch Hill Dam and Turners Falls Project Power Canal Left Embankment are shown in the tables (Table 36, Table 37 and Table 38) below. The analysis identified no exposure of buildings associated with the dam breach inundation area for Lake Wyola Dam.

Table 36. Buildings in Birch Hill Dam Inundation Area.

Building Type	Number of Buildings in Dam Breach Inundation Area (Total in Town)	Building Value in Dam Breach Inundation Area (Total in Town)
Single Family	39 (3,188)	\$4,044,300 (\$445,773,000)
Multi-Family	120 (898)	\$19,301,200 (\$179,501,600)
Commercial	22 (178)	\$2,399,300 (\$54,889,400)
Government	6 (98)	\$2,599,300 (\$82,691,700)
Industrial	2 (75)	\$870,400 (\$277,187,352)
Outbuildings	1 (181)	\$0 (\$23,757,900)
Vacant	6 (120)	\$0 (\$311,100)
Total	196 (4,834)	\$29,214,500 (\$1,358,087,352)

Table 37. Buildings in Turners Falls Project Power Canal Left Embankment Lower Inundation Area.

Building Type	Number of Buildings in Dam Breach Inundation Area (Total in Town)	Building Value in Dam Breach Inundation Area (Total in Town)
Single Family	84 (3,188)	\$9,816,400 (\$445,773,000)
Multi-Family	54 (898)	\$7,602,200 (\$179,501,600)
Commercial	7 (178)	\$2,321,600 (\$54,889,400)
Government	1 (98)	\$3,810,200 (\$82,691,700)
Industrial	6 (75)	\$159,800 (\$277,187,352)
Outbuildings	4 (181)	\$0 (\$23,757,900)
Vacant	7 (120)	\$0 (\$311,100)
Total	163 (4,834)	\$23,710,200 (\$1,358,087,352)

Table 38. Buildings in Turners Falls Project Power Canal Left Embankment Upper Inundation Area.

Building Type	Number of Buildings in Dam Breach Inundation Area (Total in Town)	Building Value in Dam Breach Inundation Area (Total in Town)
Single Family	87 (3,188)	\$10,257,900 (\$445,773,000)
Multi-Family	53 (898)	\$7,401,400 (\$179,501,600)
Commercial	7 (178)	\$2,321,600 (\$54,889,400)
Industrial	6 (75)	\$97,200 (\$277,187,352)
Outbuildings	4 (181)	\$0 (\$23,757,900)
Vacant	7 (120)	\$0 (\$311,100)
Total	164 (4,834)	\$9,820,200 (\$1,358,087,352)

Based on review of the location information in the EPA Toxics Release Inventory database, five facilities in Turners Falls that report hazardous materials activity under the EPA TRI program are exposed to the

dam breach inundation areas from the Turners Falls Project Power Canal Left Embankment. The details for the facilities are provided in Table 39.

Table 39. Facilities Reporting under EPA TRI Exposed to the Turners Falls Project Power Canal Left Embankment Lower and Upper Inundation Areas.

Facility Name	Address
15 Rod Shop Road	15 Rod Shop Road
25 Rod Shop Road Property	25 Rod Shop Road
Farren Care Center	340 Montague City Road
Raus Sunoco Station	20 Depot Street
Sandri Inc.	Depot Street

Natural resources potentially in the dam inundation area for Birch Hill Dam include Unity Park in Turners Falls.

The historic properties exposed to the dam inundation areas are presented in Table 40, Table 41, and Table 42. Due to the high number (more than 150) of historic sites listed in the GIS data as exposed to the flood resulting from a breach of the Birch Hill Dam, a selection of properties is included in the table to illustrate the risk.

Table 40. Historic Properties Exposed to the Birch Hill Dam Inundation Area.

Facility Name	Address	Year Built
Aubuchon Hardware Store	Avenue A	Unknown
Beaubien, Robert Sunoco Gas Station	Third Street	Unknown
English Methodist Church	Fifth Street	1880
Hermann Sons Lodge	Second St	Unknown
Polish Co-Operative Store	96 Fourth St	Unknown
Rooney's Clothing Store	151 Avenue A	Unknown
Rooney's Shoe Store	Avenue A	Unknown

Facility Name	Address	Year Built
Russell, John Cutlery Mfg. Company Worker Housing	Third Street	1870
Saint Stanislaus Society	6 K Street	Unknown
Shady Glen Restaurant	7 Avenue A	Unknown
Shea Theater	71 Avenue A	1927
Third Street Garage	Third St	Unknown
Turners Falls Company Office Building	1 Avenue A	Unknown
Turners Falls Inn	Avenue A	1904
Turner's Falls Odd Fellows Hall	23 Avenue A	Unknown
Coin-a-matic Launderette	115 Avenue A	Unknown
Comet Cleaners	123 Avenue A	Unknown
Singley Building	169-173 Avenue A	1914

Table 41. Historic Properties Exposed to the Turners Falls Project Power Canal Left Embankment Lower Inundation Area.

Facility Name	Address	Year Built
Connecticut River Bridge - B & M RR Bridge #1.01	Connecticut River	1880
Montague City Road Bridge over Connecticut River	Montague City Road	1947

Table 42. Historic Properties Exposed to the Turners Falls Project Power Canal Left Embankment Upper Inundation Area.

Facility Name	Address	Year Built
Connecticut River Bridge - B & M RR Bridge #1.01	Connecticut River	1880
Montague City Road Bridge over Connecticut River	Montague City Road	1947

The population exposed to dam breach is shown in Table 44. The column on the left shows the population in and around the dam breach areas (wherever the Census Block overlapped with the inundation boundary) while the column on the right shows the total population numbers for the Town. The population exposed to potential dam breach is an older population than the Town's average.

Table 43. Population Exposed to Birch Hill Dam Breach Inundation Area (U.S. 2020 U.S. Census).

Demographics	Population in Inundation Area	Total Population
Population	1,045	8,536
Households	481	3,877
White	829 (79.3%)	7,484 (87.7%)
Black	21 (2.0%)	133 (1.6%)
American Indian	12 (1.1%)	42 (0.5%)
Asian	12 (1.1%)	82 (1.0%)
Pacific Islander	0 (0.0%)	0 (0.0%)
Other Race	53 (5.1%)	202 (2.4%)
Two or More Races	118 (11.3%)	593 (6.9%)
Hispanic or Latino:	118 (11.3%)	531 (6.2%)
Population under 18	122 (11.7%)	1,373 (16.1%)
Population over 64	252 (24.1%)	1,809 (21.2%)
Annual Income < \$30K/year	210 (43.7%)	1,058 (27.3%)
Population in EJ Zone*	1045 (100%)	4,036 (47.3%)

*Massachusetts Office of Energy and Environmental Affairs, 2022

Table 44. Population Exposed to Turners Falls Project Power Canal Left Embankment Breach - Lower Inundation Area (2020 U.S. Census).

Demographics	Population in Dam Breach Inundation Area	Total Population
Population	438	8,536
Households	142	3,877
White	361 (82.4%)	7,484 (87.7%)
Black	16 (3.7%)	133 (1.6%)
American Indian	1 (0.2%)	42 (0.5%)
Asian	7 (1.6%)	82 (1.0%)
Pacific Islander	0 (0.0%)	0 (0.0%)
Other Race	29 (6.6%)	202 (2.4%)
Two or More Races	24 (5.5%)	593 (6.9%)
Hispanic or Latino:	49 (11.2%)	531 (6.2%)
Population under 18:	56 (12.8%)	1,373 (16.1%)
Population over 64:	100 (22.8%)	1,809 (21.2%)
Annual Income < \$30K/year	48 (33.8%)	1,058 (27.3%)
Population in EJ Zone*	425 (97.0%)	4,036 (47.3%)

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

Table 45. Population Exposed to Turners Falls Project Power Canal Left Embankment Breach - Upper Inundation Area (2020 U.S. Census).

Demographics	Population in Dam Breach Inundation Area	Total Population
Population	473	8,536
Households	159	3,877
White	387 (81.8%)	7,484 (87.7%)
Black	17 (3.6%)	133 (1.6%)
American Indian	1 (0.2%)	42 (0.5%)
Asian	7 (1.5%)	82 (1.0%)
Pacific Islander	0 (0.0%)	0 (0.0%)
Other Race	31 (6.6%)	202 (2.4%)
Two or More Races	30 (6.3%)	593 (6.9%)
Hispanic or Latino:	51 (10.8%)	531 (6.2%)
Population under 18:	66 (14.0%)	1,373 (16.1%)
Population over 64:	106 (22.4%)	1,809 (21.2%)
Annual Income < \$30K/year	50 (31.4%)	1,058 (27.3%)
Population in EJ Zone*	425 (89.9%)	4,036 (47.3%)

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

Built Environment Impacts

According to the 2020 Montague HMP, a dam failure in Montague or upstream from Montague is likely to have a catastrophic impact.

To identify built environment impacts to the Town, FEMA's risk assessment software, Hazus, was utilized. Building footprint data and parcel data were used to update the model while the EAPs ½ PMF wet weather scenario was also integrated into the software. The economic loss results for the dam breach events are shown in the tables below. Although there is no return period assigned to the dam breach, the assumption is that it is a catastrophic (1,000-year) event. The Town's AAL is calculated to be \$62,745.

Table 46. Estimated Building-Related Losses in Birch Hill Dam Inundation Area.

Estimated Loss from Dam Inundation (in Millions of Dollars)						
		Residential	Commercial	Industrial	Others	Total
Building Loss	Building	15.73	9.73	0.94	0.53	26.93

	Content	8.26	15.56	2.43	2.61	28.86
	Inventory	0.00	1.53	0.27	0.03	1.83
	Total	23.99	26.82	3.64	3.17	57.62
Business Interruption Loss	Income	0.02	13.58	0.02	0.39	14.01
	Relocation	1.58	2.25	0.06	0.26	4.15
	Rental Income	2.11	1.76	0.01	0.04	3.92
	Wage	0.06	10.25	0.04	14.68	25.03
	Total	3.77	27.84	0.13	15.37	47.11
	Combined Total	27.76	54.66	3.77	18.54	104.73

Table 47. Estimated Building-Related Losses in Turners Falls Project Power Canal Left Embankment Lower Inundation Area.

Estimated Loss from Dam Inundation (in Millions of Dollars)						
		Residential	Commercial	Industrial	Others	Total
Building Loss	Building	1.45	0.58	0.83	0.02	2.88
	Content	1.22	2.43	2.32	0.11	6.08
	Inventory	0.00	0.14	0.31	0.00	0.45
	Total	2.67	3.15	3.46	0.13	9.41
Business Interruption Loss	Income	0.63	1.71	0.07	0.02	2.43
	Relocation	0.32	0.36	0.11	0.00	0.79
	Rental Income	0.47	0.18	0.03	0.00	0.68
	Wage	1.48	3.42	0.13	0.54	5.57
	Total	2.90	5.67	0.34	0.56	9.47

Estimated Loss from Dam Inundation (in Millions of Dollars)					
Combined Total	5.57	8.82	3.80	0.69	18.88

Table 48. Estimated Building-Related Losses in Turners Falls Project Power Canal Left Embankment Upper Dam Inundation Area.

Estimated Loss from Dam Inundation (in Millions of Dollars)						
		Residential	Commercial	Industrial	Others	Total
Building Loss	Building	1.84	0.95	1.09	0.01	3.89
	Content	1.32	4.08	3.01	0.08	8.49
	Inventory	0.00	0.22	0.37	0.00	0.59
	Total	3.16	5.25	4.47	0.09	12.97
Business Interruption Loss	Income	0.42	2.19	0.06	0.02	2.69
	Relocation	0.41	0.49	0.11	0.00	1.01
	Rental Income	0.46	0.24	0.03	0.00	0.73
	Wage	0.98	4.13	0.11	0.42	5.64
	Total	2.27	7.05	0.31	0.44	10.07
Combined Total		5.43	12.30	4.78	0.53	23.04

Climate change will increase the probability and magnitude of dam breach impacts (if a breach occurs) to the built environment. New development in the Town should consider these projected conditions.

Population Impacts

The Town should be aware that senior and low-income segments of the Montague population may be more vulnerable to hazard events due to several factors. Senior (people aged 65 and older) and low-income populations may be physically or financially unable to react and respond to a hazard event and may require additional assistance. Among the most vulnerable are those living or working within the floodplain or dam inundation areas, those who would be unable to evacuate quickly, including people over the age of 65, people in households with children under the age of 5, individuals with mobility limitations, and people with low English proficiency. The dam inundation areas have high percentages of these vulnerable populations including those in Environmental Justice areas. Access to information about

the hazard event may be lacking for vulnerable members of the Town population, 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.

Climate change will increase the probability and magnitude of dam inundation impacts to the population if a breach occurs. Future inundation areas may be larger than the current modeled scenarios and new development should consider these projected conditions. Vulnerable populations should be considered when development near the current dam breach inundation areas is planned.

Environment Impacts

One of the significant environmental impacts of a major flood from dam breach would be the potential release of hazardous materials. According to EPA's TRI database, five facilities that contain hazardous materials are exposed to the dam breach for the Turners Falls Project Power Canal Left Embankment, Lower and Upper inundation areas.

Damage inflicted on the dams and related structures by dam failure or overtopping would directly impact aquatic species. For example, a series of three ladders constructed along a 2.5-mile stretch of the Connecticut River allow migrating fish to get past the Turners Falls dam. The ladders, located at the Cabot Hydroelectric Station, the spillway (dam), and the gatehouse, consist of a series of rising pools, each pool approximately one foot higher than the last, and the fish climb these ladders by swimming from pool to pool.

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

Probability of Future Events

Several significant hazard and high hazard dams are located in and upstream of Montague, but there have not been any reports of dam failure events impacting the Town. The probability of a future dam failure event is presumed to be low.

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.

In light of the above, dam overtopping and failure is anticipated to be a greater risk in the future. This is believed to be the case if dam conditions are static. However, many dams need maintenance, which can increase risks of failure in the future if these needs are not addressed.

Problem Statements for Flooding from Dam Failure and Overtopping

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 49. Problem Statements Related to Flooding from Dam Failure and Overtopping.

Assets	Problems Associated with Dam Failure and Overtopping
People (including underserved communities and socially vulnerable populations)	- Older and lower income populations in the potential downstream inundation area may have difficulty evacuating, particularly in a short time frame. - The Town lacks capacity to reach non-English speaking populations during emergencies. - Homeless and transient people, who often camp near the rivers in Town, may be difficult to reach in the event of an emergency. - In the event that the Farren Care Facility must evacuate, available resources may not be sufficient for ensuring adequate ambulances and first responders to evacuate patients safely and effectively during a widespread hazard like dam failure, which would place a significant strain on emergency resources across the county.
Structures (including facilities, lifelines, and critical infrastructure)	- Several ‘hazardous facilities’ including the historic mill buildings and power canal in Turners Falls, and the Montague Clean Water Facility in Montague City are located outside or at the edges of the 100-year floodplain and within the high hazard dam breach inundation area. - Need more communication about the dams, need to identify dam maintenance and repairs, stormwater issues caused by dam spillway. - When engineered, dam spillways were often designed to pass a discharge for a particular historic storm recurrence interval. As the frequency and magnitude of precipitation events changes, these spillways are becoming undersized relative to their design standard which places downstream areas at increased risk of experiencing inundation from a dam failure. - Local officials sometimes do not routinely receive copies and updates of EAPs for privately owned dams. Without these documents, it is harder for emergency personnel to characterize the potential downstream risks and prepare for a potential breach event.
Systems (including networks and capabilities)	Roads may be impacted by a dam breach, potentially impacting Town capabilities to respond to events.

Assets	Problems Associated with Dam Failure and Overtopping
	The Lake Wyola Dam, a high hazard dam located in the Town of Shutesbury, could impact Montague if it failed, releasing flood waters into the Sawmill River. Roads that would be impacted by a dam failure, according to the Emergency Action Plan, are North Leverett Road, Spaulding Brook Road, Main Street, Center Street, South Ferry Road, and Meadow Road.
Natural, historic, and cultural resources	- Five sites contain hazardous materials in the dam breach inundation areas. - The Turners Falls Historic District is located in the potential dam inundation area. - Critical buildings and infrastructure, including the Town Hall, Farren Care Facility, Unity Park, Newton Street and Franklin Street in Millers Falls, and bridges, are located partially or wholly within the High Hazard dam inundation areas.
Activities that have value to the community	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 property damage due to high winds. The impacts from high winds are the primary concern of this section.

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 Montague.

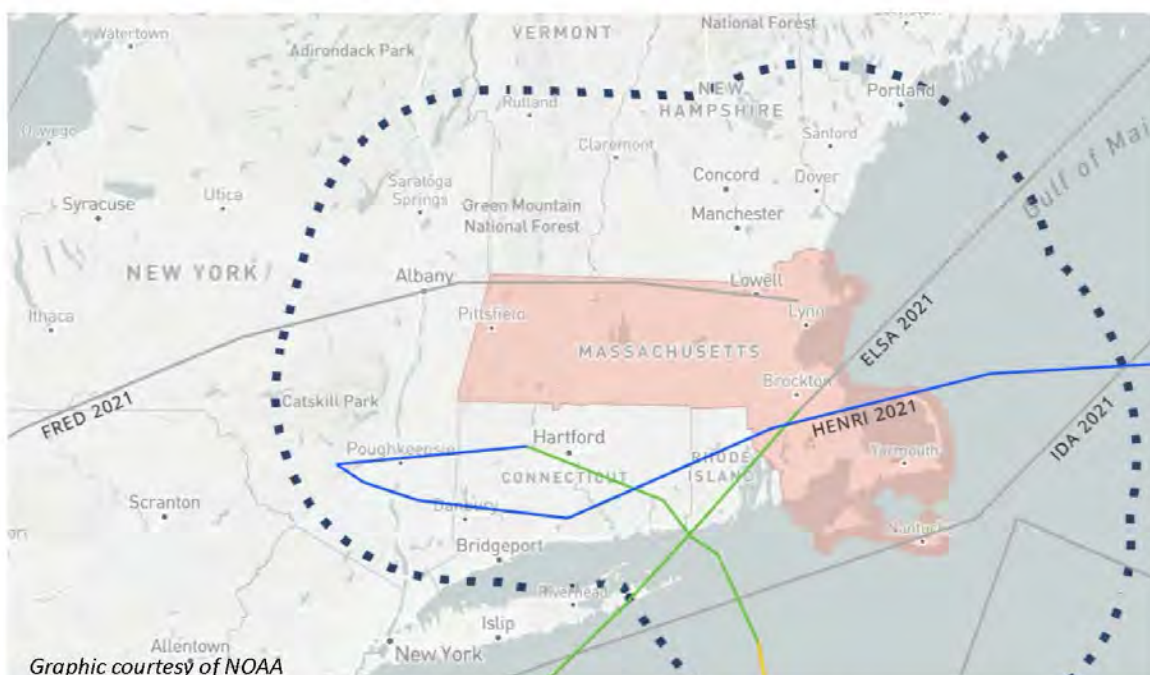
Previous Occurrences

The ResilientMass Plan notes that hurricanes and tropical storms occur somewhat regularly in Massachusetts. Recent notable events for the Commonwealth include Tropical Storm Isaias (2020), Tropical Depression Henri (2021), Tropical Storm Elsa (2021), and Hurricane Erin (August 2025).

The 2021 hurricane season impacted locations across Massachusetts, as depicted and described in Figure 42. Impacts of the 2021 Hurricane Season in Massachusetts.

Historical tropical system tracks near and through the Town of Montague are depicted in Figure 43. This mapping is available from NOAA and updated continuously.

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.

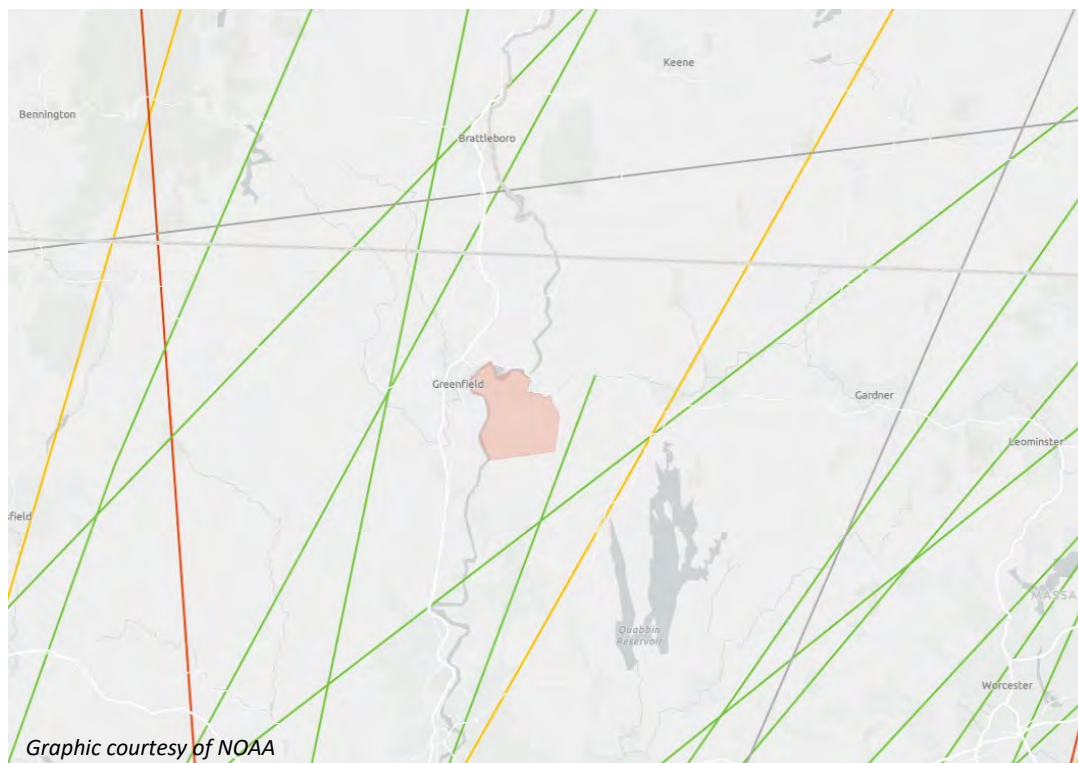
Extratropical Storm Fred crossed northern Massachusetts lengthwise on August 19 and 20, delivering flooding rains to parts of southern New England. Flooding in Massachusetts was worst in the Worcester area. Approximately 2 to 4 inches of rain were recorded in many towns.

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 42. Impacts of the 2021 Hurricane Season in Massachusetts.

Historical Tropical Storm Tracks in the Town of Montague



A handful of tropical storms and hurricanes have passed near Montague since recordkeeping began. Some of the closest passing storms include T.S. Belle (1976) to the east, and T.S. Doria (1971) and Unnamed Storm (1968) to the west. None of these were believed to cause widespread damage in the town. The Hurricane of 1938 is still considered one of the most damaging hurricanes for the region, in addition to Hurricane Gloria which affected much of the Northeast causing thousands of power outages and an estimated \$900 million in damages.

Figure 43. Historical Tropical Storm Tracks in Montague.

Hurricane Irene of 2011 and Tropical Storm Isaias of 2020 are the only tropical storms appearing in the NCEI Storm Events database for Franklin County during the period January 1996 to July 2025. As noted

elsewhere, this HMP update relies primarily on a ten-year lookback. During the ten-year period 2015 through 2025, only one Massachusetts emergency declaration (Storm Lee of 2023) was associated with a tropical system, but it is not listed in the NCEI database for Franklin County. Details of Hurricane Irene (2011) and Tropical Storm Isaias of 2020 are provided in Table 50. Although no reports of damage were received from Montague, it is likely that scattered tree and power line damage occurred.

Table 50. Tropical Storm Events in Franklin County, MA - 2015-2025.

Date	Description	Losses Reported
08/28/2011	<i>Tropical Storm, Eastern Franklin County:</i> Hurricane Irene formed east of the Caribbean island of Dominica, part of the Lesser Antilles region, on the afternoon of August 20. Irene moved through the Caribbean and up the east coast of the United States making landfall twice. She first made landfall as a Category 1 Hurricane near Cape Lookout, North Carolina around 7:30am on August 27, then moved offshore again during the evening. She then made a 2nd landfall, again as a Category 1 Hurricane at 5:40am on August 28 near Little Egg Inlet in New Jersey. She moved over New York City and then into southeastern New York State and Connecticut as a Tropical Storm a few hours later. By the end of the evening of the 28th, Irene was crossing the U.S./Canada border having produced significant amounts of rain, storm surge, inland and coastal flooding, and wind damage across southern New England and much of the east coast of the United States. Despite the relatively low wind speeds, sustained winds over a 6-to-12-hour-long duration caused widespread tree damage and resulted in power outages to roughly half a million customers throughout the state. Some of these customers did not get their power back until five days later. Rainfall associated with Tropical Storm Irene contributed to significant flooding in northwestern Massachusetts where mainstem rivers and their tributaries reached levels not seen since 1987 (the Connecticut River at Holyoke, Springfield, and Northampton crested at its highest level since April 1987), and in some cases, since 1938 (the Connecticut River at Montague). The collective effects of Tropical Storm Irene on August 28, resulted in 1 fatality, 0 injuries, and \$127.3M in property damage in the following counties: Barnstable, Bristol, Essex, Franklin, Hampden, Hampshire, Middlesex, Nantucket, Norfolk, Plymouth, Suffolk, and Worcester (all in MA), Hartford, Tolland, and Windham (all in CT), Cheshire and Hillsborough (all in NH), and Bristol, Providence, Kent, Washington, and Newport (all in RI).	
08/04/2020	<i>Tropical Storm, Franklin County:</i> Tropical Storm Isaias moved from coastal Virginia to eastern New York State, near the Connecticut/Massachusetts border on Tuesday, August 4. As the storm reached the New York City area, southerly winds were maximizing across southern New England, causing widespread wind damage. There were numerous power outages in western Franklin County due to downed trees and wires, especially near the slopes of the Berkshires. In New Salem at 6:45 PM EDT, a small tree was snapped at the base. There were scattered power outages in eastern Franklin County.	Property damage: \$3,800

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

Extent

The Beaufort Wind Scale is reportedly one of the first scales to estimate and characterize wind speeds. It was developed in 1805 to help sailors estimate winds via visual observations. The scale ranges from zero (“seas like a mirror”) to 12 (“hurricane”). The Beaufort scale is still used to estimate wind strengths.

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 scale is used to give an estimate of the potential property damage and flooding expected along the coast from a hurricane landfall, as described in Table 51. Wind speed is the determining factor in the scale, inherently leaving out any measure of precipitation and flooding.

Table 51. 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: NOAA National Hurricane Center

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 typically 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. The local NWS forecast office for Montague is Norton, MA, and weather conditions for the area are reported for Deerfield, MA, and Orange Municipal Airport (KORE).⁷⁹

The Saffir-Simpson scale and the NWS watch/warning products are applicable to all tropical storms and hurricanes that may strike Montague, as they are used throughout Massachusetts on a routine basis and appropriately characterized the previous storms that posed risks to Montague.

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 the Town of Montague should be considered exposed to high winds.

Figure 44 shows the 100-year windspeeds identified in the ASCE 7-98 publication.

⁷⁹ NWS Forecast Office – Boston / Norton, MA. Map with locations for detailed forecast. Updated December 11, 2025. <https://www.weather.gov/box>.

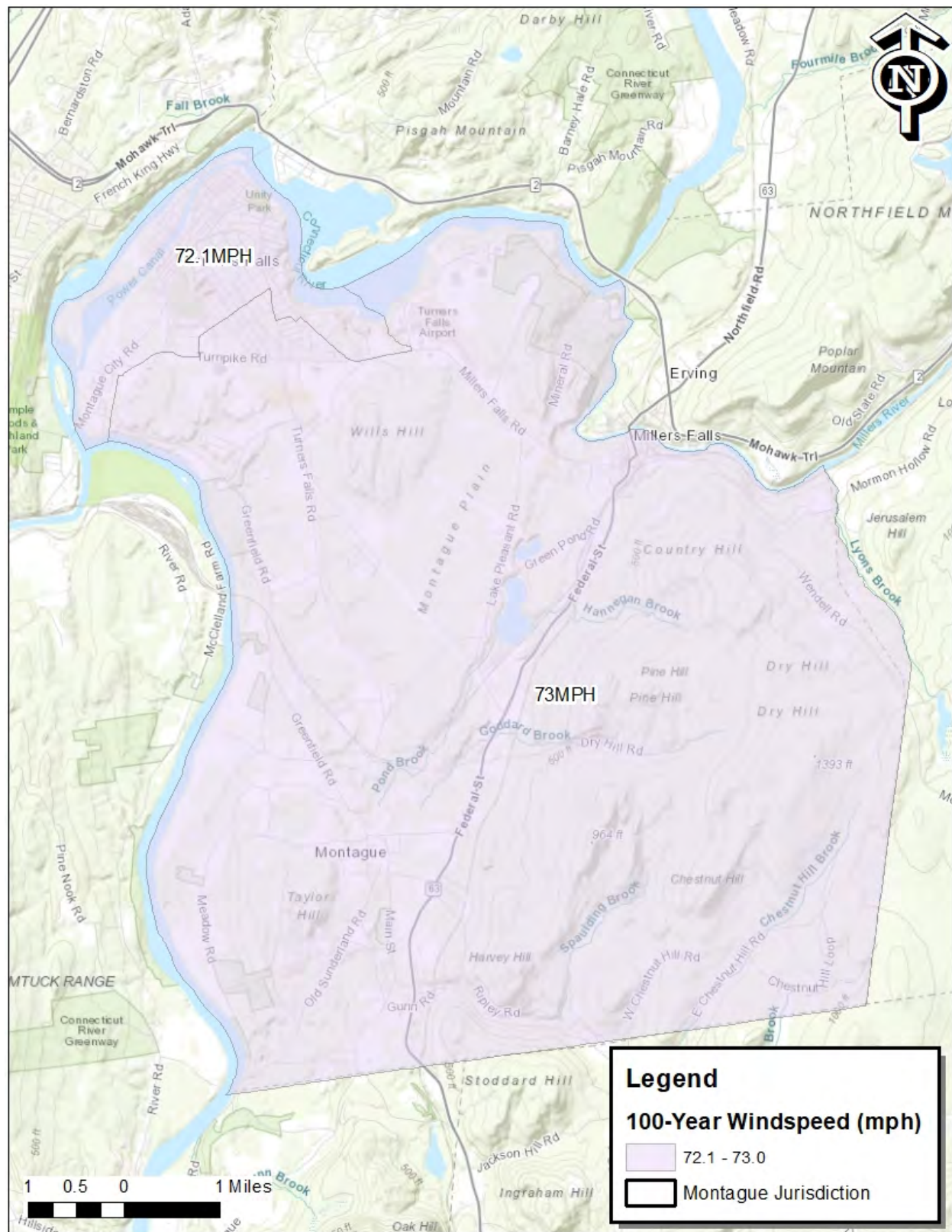


Figure 44. Montague 100-Year Windspeeds (ASCE 7-98).

Built Environment Impacts

To identify built environment impacts to the Town resulting from wind damage, FEMA’s risk assessment software, Hazus, was utilized to estimate losses. The estimated economic loss results of the modeled 500-year event are shown in Table 52, while the results for the 1000-year event are shown in Table 53. Based on the Hazus modeled wind scenarios, the Town of Montague AAL is calculated to be \$140,000.

Buildings that are permanently open with bays or open sides are susceptible to wind damage since the building envelope can’t be maintained. Communication antennas are vulnerable to high wind speeds and solar arrays may be impacted by very high winds. Neighborhoods with aerial utilities would be more vulnerable than neighborhoods with below ground utilities.

Table 52. Estimated Economic Losses Due to Wind from the 500-Year Scenario.

Estimated Loss from Wind (in Millions of Dollars)						
		Residential	Commercial	Industrial	Others	Total
Building Loss	Building	7.26	0.87	0.93	0.64	9.70
	Content	2.20	0.17	0.50	0.14	3.01
	Inventory	0.00	0.03	0.07	0.02	0.11
	Total	9.46	1.07	1.49	0.80	12.83
Business Interruption Loss	Income	0.00	0.08	0.01	0.05	0.14
	Relocation	0.26	0.11	0.06	0.10	0.53
	Rental Income	0.32	0.05	0.01	0.01	0.38
	Wage	0.00	0.07	0.02	0.47	0.56
	Total	0.58	0.31	0.10	0.63	1.61
Combined Total		10.04	1.38	1.60	1.43	14.44

Table 53. Building Losses Due to Wind for a 1000-Year Scenario.

Estimated Loss from Wind (in Millions of Dollars)						
		Residential	Commercial	Industrial	Others	Total
Building Loss	Building	10.78	1.39	1.56	1.00	14.74

	Content	3.23	0.30	0.93	0.24	4.70
	Inventory	0.00	0.06	0.13	0.03	0.22
	Total	14.01	1.75	2.61	1.27	19.65
Business Interruption Loss	Income	0.01	0.14	0.02	0.06	0.23
	Relocation	0.45	0.20	0.10	0.16	0.91
	Rental Income	0.48	0.09	0.02	0.01	0.60
	Wage	0.02	0.13	0.03	0.70	0.88
	Total	0.96	0.56	0.17	0.93	2.62
	Combined Total	14.97	2.32	2.79	2.21	22.27

Population Impacts

Populations considered most vulnerable to hurricane and tropical storm impacts in Montague are identified based on several 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 is 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 Montague are particularly susceptible to extreme winds, and it should be noted that there may be overlap between the two groups. The Town should be aware of the potential needs of residents within these population segments in the event of a hazard occurrence.

As an example, the Power Town Apartment complex, which includes 11, 13, 15, 18, 19, and 25 Fourth Street and 118, 152, and 175 Avenue A, is home to residents with electric-powered medical equipment, elderly individuals, and individuals with mobility issues. These members of the community would require assistance and access to a backup power supply in the event of an outage. According to the facility management company, WinnResidential (part of WinnCompanies), the Power Town buildings are not currently equipped with backup power/generators.

For the 500-year hurricane event, Hazus predicts that there will be five displaced households and two people seeking temporary public shelter from the high windspeeds. For the 1000-year hurricane event, Hazus predicts that there will be eleven displaced households and six people seeking temporary 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.

Probability of Future Events

The ResilientMass Plan notes 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.

The ResilientMass Plan, acknowledging some remaining uncertainty about the impacts of climate change on hurricanes and tropical storms, states that the limited evidence available indicated stronger storms (Category 4 and 5) are becoming more frequent. Overall, the risk from hurricanes and their associated flooding can be expected to increase as a result of climate change.

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 Montague in the future that may be of greater frequency and intensity than in the past.

Problem Statements for Hurricanes/Tropical Storms

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 54. 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. • The Montague Senior Center is used as a warming and cooling facility but is not equipped with a generator. • The Carnegie, Millers Falls, and Montague Center Public Libraries are used as warming and cooling centers but are not equipped with generators.
Structures (including facilities, lifelines, and critical infrastructure)	• Wind may cause trees to fall into structures and infrastructure, and roadways.

Assets	Problems Associated with Hurricanes and Tropical Storms
	- Wind damage to wind-susceptible buildings such as communication antennas, aerial utilities, solar arrays, greenhouses, pavilions, gazebos, and open-walled buildings. Additional damage to commercial buildings with HVAC located on roofs. - 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 and invasive and native pest insect species is also provided when relevant.

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 the Executive Office of Energy and Environmental Affairs to provide recommendations to the Commonwealth to manage invasive species. The 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 plant species can monopolize natural communities, displacing many native species and causing widespread economic and environmental damage.

To be considered for listing as invasive, a plant species must first be evaluated and found to meet certain base criteria, including that it:

- is non-indigenous to Massachusetts
- demonstrates the potential for rapid and widespread dispersion and establishment
- has the potential to disperse over spatial gaps
- exists in high numbers in natural habitats

Examples of invasive plant species in Massachusetts include:

- Autumn Olive, a deciduous shrub with white flowers in spring and bright red berries in fall.
- Black Locust, a deciduous tree brought to Massachusetts from the Appalachian and Ozark Mountains for erosion control and durable wood.
- Common Buckthorn, a deciduous plant with oval-shaped leaves and small dark fruit.
- Common Reed (Phragmites), a perennial grass native to Europe and Asia that can grow as tall as 14 feet by late summer.
- Japanese knotweed, a perennial herb brought from eastern Asia as a garden plant with heart-shaped leaves and white flowers, it grows up to 10 feet in height.
- Oriental Bittersweet, a deciduous woody vine that has a base up to six inches in diameter and can grow up to 60 feet in length.
- Purple Loosestrife, a perennial from Europe that usually grows from three to five feet tall but can reach a height of up to seven feet.
- Tree-of-heaven, a deciduous tree with compound leaves that typically reaches 30 to 50 feet but can grow up to 80 feet in height.⁸⁰

The Commonwealth of Massachusetts considers any species introduced to an area in which it would not naturally occur or live as invasive. Agencies including the DCR and the Department of Agricultural Resources implement the Massachusetts laws and regulations to combat the threat of invasive species to the integrity of natural communities and the survival of many indigenous species. At the federal level, the USDA Forest Service works against harmful invasive species and also works collaboratively to detect, prevent, and control certain native pests and diseases that cause widespread environmental damage and tree mortality.⁸¹ Some examples of invasive and native pest insect species in Massachusetts 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.

⁸⁰ Mass Audubon. Common Invasive Plants in Massachusetts. <https://www.massaudubon.org/nature-wildlife/invasive-plants-in-massachusetts>.

⁸¹ Invasive Species. U.S. Department of Agriculture Forest Service. <https://www.fs.usda.gov/managing-land/invasive-species>.

- 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. According to the Montague State Forest Resource Management Plan, the emerald ash borer (*Agrilus planipennis*), a wood-boring invasive insect, poses a risk to all ash species within Montague State Forest.⁸²
- Hemlock Woolly and Balsam Woolly Adelgid (non-native pest) is a very small, invasive, aphid-like insect that attacks North American hemlocks (Hemlock Woolly) and firs (Balsam Woolly). They can be identified by the white woolly 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.
- Spongy 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.

Examples of invasive aquatic species in Massachusetts include:

- Zebra Mussel
- Eurasian Milfoil
- Purple Loosestrife
- Hydrilla
- Water Chestnut
- Japanese Knotweed
- Common Reed

Location

The entire Commonwealth is vulnerable to invasive species. The 2020 HMP noted that the damage rendered by invasive species is significant, described the scope of the hazard as massive, and stated that the entire Town of Montague may experience impacts. The types of species can vary by location,

⁸² Montague State Forest Resource Management Plan. Massachusetts Department of Conservation and Recreation. Public Review Draft, September 2025.

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 there are multiple opportunities for transport to new locations (by boats, for example).

Although the entire geographic area of the Town of Montague is believed to be at risk for invasive species propagation, participants in the MVP Community Resilience Building Workshop (June 2018) identified the Montague Plains, a rare pitch-pine scrub-oak barren forest, as being especially vulnerable to the southern pine beetle and noted that with warming temperatures, other pests and pathogens could imperil the Montague Plains.

In the spring of 2022, the Massachusetts Department of Conservation and Recreation (DCR), in cooperation with the Division of Fisheries and Wildlife (DFW) and supported by a contractor, conducted a vegetation management program on 166 acres of stump sprouts within the Montague Plains Wildlife Management Area (MPWMA). The management activities focused on the protection and preservation of the unique and exceptionally xeric (dry) outwash pitch pine-scrub oak barren natural community, its associated biota, and its ecological processes. The goal was to encourage dominance of scrub oak species and native species of the scrub oak/pine vegetative complex. The most prevalent of the invasive species identified during the project was Oriental bittersweet. The project team applied herbicides to accomplish sprout management.

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>. The species of current concern to forest health in Franklin County are reportedly:

- Spongy Moth (introduced)
- Winter Moth (introduced)
- Hemlock Woolly Adelgid (introduced)
- Southern Pine Beetle (native)
- Emerald Ash Borer (introduced)
- White Pine Needlecast (native)⁸³

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 budget figures provided in Table 55 are derived from the Massachusetts Energy and Environmental Affairs Administration Budget Summary figures published online for the years 2017 through 2025.

⁸³ Current Forest Health Threats. Massachusetts Department of Conservation and Recreation. Retrieved December 15, 2025, from <https://www.mass.gov/info-details/current-forest-health-threats>.

Table 55. Statewide Budgets for Addressing Invasive Species.⁸⁴

FY Year	Budget
2025	\$255,328
2024	\$306,902
2023	\$166,902
2022	\$277,838
2021	\$146,348
2020	\$4,150,000
2019	\$3,831,135
2018	\$4,347,000
2017	\$6,046,870

The 2020 HMP addressed invasive species in detail, including invasive plants, invasive forest pests, and invasive aquatic species, noting, for example, that the zebra mussel (*Dreissena polymorpha*) had, at the time, recently been detected in Western Massachusetts. The Montague Open Space and Recreation Plan (2017) described objectives related to the controlling the infestation and spread of invasive aquatic species and invasive terrestrial plant species within the Millers River watershed. Additionally, the Plan documented the negative impacts to aquatic life, negative impacts on wildlife habitat, and the decline in plant diversity in the Sawmill River watershed associated with the removal of trees to create pastureland, grazing of livestock along the river banks, replacement of forested buffers with impervious surfaces, and invasive species taking over the understory along stream segments in the Sawmill River riparian corridor.

The website iNaturalist.org provides an entry point to an online social network for people to share biodiversity information. Based in the U.S., the nonprofit organization has the stated mission to connect people to nature and advance biodiversity science and conservation through technology. Individuals use iNaturalist to record their own observations and can access observational data collected by other users. Invasive species identified in five or more verifiable observations on iNaturalist in the Town of Montague from January 2016 through January 2026 are listed in Table 56 below. It should be noted that marine species, nocturnal species, and small insects may be underreported on iNaturalist.

Table 56. Invasive Species Observed in the Town of Montague (2016-2026).

Species Common Name	Number of Observations
Spongy Moth	75
Oriental Bittersweet	58
Japanese Knotweed	28
Japanese Barberry	26

⁸⁴ Energy & Environmental Affairs, Conservation and Recreation. Commonwealth of Massachusetts Budget Summary. <https://budget.digital.mass.gov/summary/>.

Species Common Name	Number of Observations
Common St. John's Wort	25
Multiflora Rose	25
Garlic Mustard	24
Autumn Olive	21
Purple Loosetrife	21
Common Toadflax	19
Tree-Of-Heaven	19
Hemlock Woolly Adelgid	15
Spotted Knapweed	14
Japanese Beetle	9
Bull Thistle	7
Japanese Stiltgrass	5
Common Reed	5

Extent

The MIPAG evaluates the invasiveness of plant species using established criteria, and, when a species meets the criteria, MIPAG recommends that it be added to the Prohibited Plant List maintained by the Massachusetts Department of Agricultural Resources. At the time of plan development, the MIPAG Annotated Species lists recognized 72 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. To be considered for listing as invasive by MIPAG, a plant species must first be evaluated and found to meet the base criteria (#1-4 below). The species must:

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 in natural habitats (i.e., away from intensively managed artificial habitats).
5. If a species does not meet all four of the previous criteria, it cannot be listed. If a species meets all four, then it must: 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 (#10-12):

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 (#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.

MIPAG 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 species by county.

Table 57. Early Detection Information for Addressing Invasive Species.

Species	Common Name	Current County of Distribution (November 2010)	Notes
<i>Arthraxon hispidus</i>	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
<i>Butomus umbellatus</i>	Flowering rush	Essex, Middlesex	<i>Butomus umbellatus</i> is an aquatic perennial herb which reproduces by seed dispersal or vegetatively by bulbils
<i>Carex kobomugi</i>	Japanese sedge; Asiatic sand sedge	Barnstable (historically)	Native to northeastern Asia, <i>Carex kobomugi</i> is an invasive plant that invades coastal sand dunes and can outcompete native dune-binding grasses. This species was last collected in 1973.
<i>Egeria densa</i>	Brazilian waterweed; Brazilian elodea	Essex, Middlesex, Norfolk, Plymouth, Worcester	This species is often confused with Hydrilla and native <i>Elodea</i> 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.
<i>Glyceria maxima</i>	Tall mannagrass; reed mannagrass	Essex	This perennial grass invades low shrub-swamps and other wetland.
<i>Heracleum mantegazzianum</i>	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.
<i>Hydrilla verticillata</i>	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 established, can replace native vegetation and affect fish populations.
<i>Myriophyllum aquaticum</i>	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.
<i>Nymphoides peltata</i>	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

Species	Common Name	Current County of Distribution (November 2010)	Notes
			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.
<i>Persicaria perfoliata</i> syn.: <i>Polygonum perfoliatum</i>	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.
<i>Peuraria montana</i> ssp. <i>lobata</i>	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.
<i>Senecio jacobaea</i>	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.
<i>Trapa natans</i>	Water chestnut	Berkshire, Bristol, Essex, Franklin, Hamden, Hampshire, Middlesex, Suffolk, Worcester	Water chestnut is an annual aquatic species with both floating and submerged leaves.

In addition, the Massachusetts Department of Agricultural Resources (MDAR) Invasive Pest Dashboard is a convenient tool for tracking invasive pests in Massachusetts. The mapping tool shows the history of detections of Asian longhorn beetle, Beech leaf disease, Box tree moth, Elm zigzag sawfly, Emerald ash borer, Spotted lanternfly, and a few species of vegetation. As more data are added to the dashboard, scales

of invasive species emergence will become clearer and can be used in communities. At the time of plan development, the mapping tool lists known species present for Montague as follows:

- Beech Leaf Disease
- Emerald ash borer
- Mile-a-Minute Vine⁸⁵

Vulnerability Assessment

Exposure

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

Built Environment Impacts

Invasive vegetation may impact power lines, obstruct pathways, and interfere with the functioning of other infrastructure. Invasive mollusks may adversely impact water infrastructure. For example, zebra mussels block intake pipes for power generation and water treatment facilities.⁸⁶

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

Invasive species may impact human health by serving as vectors for new and existing diseases or causing wounds through bites, stings, allergens, or other toxins.⁸⁷

Invasive species may directly impact property values, agricultural productivity, public utility operations fisheries, tourism, and outdoor recreation. The costs associated with invasive species control efforts are an additional economic impact. Invasive species may indirectly impact populations by adversely affecting livelihoods. Agricultural and aquacultural livelihoods, in addition to livelihoods dependent on fisheries, are particularly vulnerable.⁸⁸

⁸⁵ Massachusetts Department of Agricultural Resources. MDAR Invasive Pest Dashboard. Retrieved October 23, 2025, from: <https://experience.arcgis.com/experience/a25afa4466a54313b21dd45abc34b62d/page/Dashboard?views=Town-by-Town>.

⁸⁶ USDA. Economic and Social Impacts. Invasive Species Info. Retrieved January 9, 2026, from <https://www.invasivespeciesinfo.gov/subject/economic-and-social-impacts>.

⁸⁷ USDA. Human Health Impacts. Invasive Species Info. Retrieved January 9, 2026, from <https://www.invasivespeciesinfo.gov/subject/human-health-impacts>

⁸⁸ USDA. Economic and Social Impacts. Invasive Species Info. Retrieved January 9, 2026, from <https://www.invasivespeciesinfo.gov/subject/economic-and-social-impacts>.

Environment Impacts

Invasive species impact both native species and local ecosystems. Invasives may directly impact native species through predation, herbivory, and disease, or indirectly impact native species populations through resource competition and habitat alteration.⁸⁹ Invasive species typically reproduce quickly, have no natural predators and spread aggressively, meaning they can quickly outcompete or overconsume native species, alter the existing food web, and reduce biodiversity.⁹⁰ Invasive species have contributed significantly to the decline of approximately 42 percent of species on the endangered species list and have been a factor in 70 percent of native aquatic species extinctions this century. For example, the hemlock woolly adelgid feeds on the sap of eastern hemlock trees and has caused widespread mortality of the species, which is now considered endangered in certain regions of the United States.

Most of the natural features in the Town have some susceptibility to 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.

During the drought in 2016, it was observed that while no direct agricultural impacts were reported for the month of July, farmers in Massachusetts were having to irrigate their crops much more than is normal for July. An unusual result of the dry conditions that persisted through the first half of the year was the thriving gypsy moth population. These caterpillars are usually killed by a fungus earlier in the year, but with a lack of rain and moisture, these caterpillars thrived and then decimated tree foliage in much of southern New England.⁹¹

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 manages the Plant Protection and Quarantine Program which safeguards U.S. agriculture and natural resources from the introduction, establishment, and spread of plant pests and noxious weeds. The program 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.

⁸⁹ USDA. Environmental and Ecological Impacts. Invasive Species Info. Retrieved January 9, 2026, from <https://www.invasivespeciesinfo.gov/subject/environmental-and-ecological-impacts>.

⁹⁰ National Wildlife Federation. Invasive Species. Retrieved January 9, 2026, from <https://www.nwf.org/Home/Educational-Resources/Wildlife-Guide/Threats-to-Wildlife/Invasive-Species>.

⁹¹ NOAA National Centers for Environmental Information. Storm Events Database. Event Details: July 5, 2016. Retrieved December 26, 2025, from <https://www.ncei.noaa.gov/stormevents/eventdetails.jsp?id=654035>.

Massachusetts has a variety of laws and regulations in place that attempt to mitigate the impacts of these species. The MDAR 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 MDAR. Species on the MDAR 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 adopted 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, Office of Coastal Zone Management, 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.

Problem Statements for Invasive Species

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 58. Problem Statements for Invasive Species.

Assets	Problems Associated with Invasive Species
People (including underserved communities and socially vulnerable populations)	Invasive species pose a threat to agricultural activities in the Town and could threaten related livelihoods.
Structures (including facilities, lifelines, and critical infrastructure)	Trees damaged or killed by invasive pests can become hazards to structures, property, utility lines, and roadways when they fall.

Assets	Problems Associated with Invasive Species
Systems (including networks and capabilities)	Additional Town resources may be required in terrestrial and aquatic areas to control the species of concern.
Natural, historic, and cultural resources	- Vegetation favored by Spotted lanternfly will likely become a larger concern over the next few years. - Urban trees are susceptible to invasive pests. - Invasive pests may cause a decline in forest health and the associated ecosystem services provided by forests. - Invasive species may cause losses in native biodiversity and the localized loss of culturally important species.
Activities that have value to the community	- Recreational activities may be adversely impacted, depending on location, and especially in parks and natural areas. - Invasive species impact the health of outdoor recreational areas and open spaces. - Invasive species can quickly overgrow trails.

Landslide

The term “landslide” includes a wide range of ground movements such as rock falls, deep failure of slopes, and shallow debris flows. The 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.⁹² 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.

⁹² Mabee, S.B., and C. Duncan. Slope Stability Map of Massachusetts. December 2013. <https://hdl.handle.net/20.500.14394/57157>.

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 included 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.

The USGS provides the following graphic (Figure 45) 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.

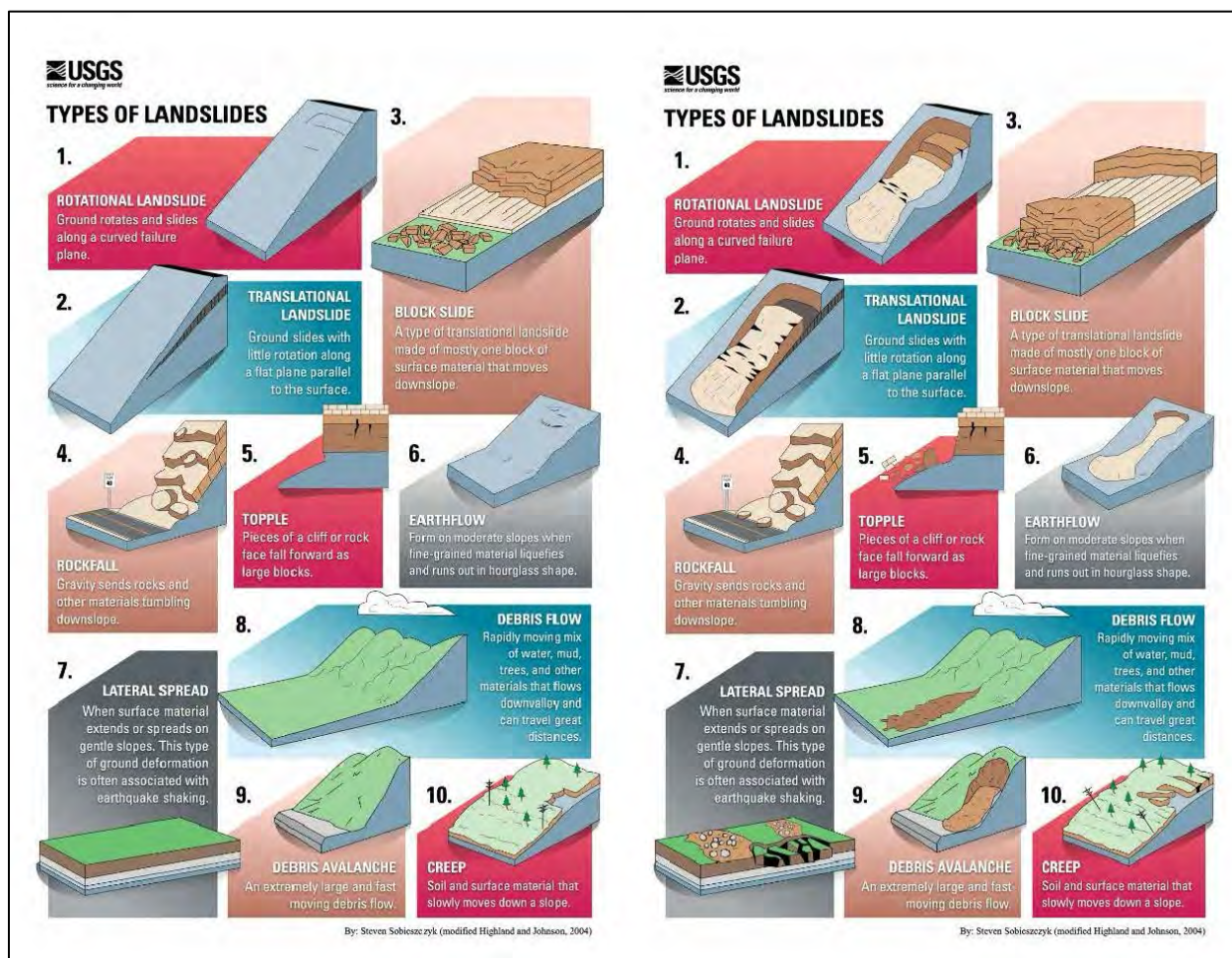


Figure 45. Types of Landslides.

Location

According to the USGS, landslides occur in every U.S. state. In 2013, the Massachusetts Geological Survey and University of Massachusetts Amherst published a Slope Stability Map of Massachusetts (Figure 46). 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 and areas of low stability are located throughout Franklin County. Landslide risk is therefore assumed present in Montague.

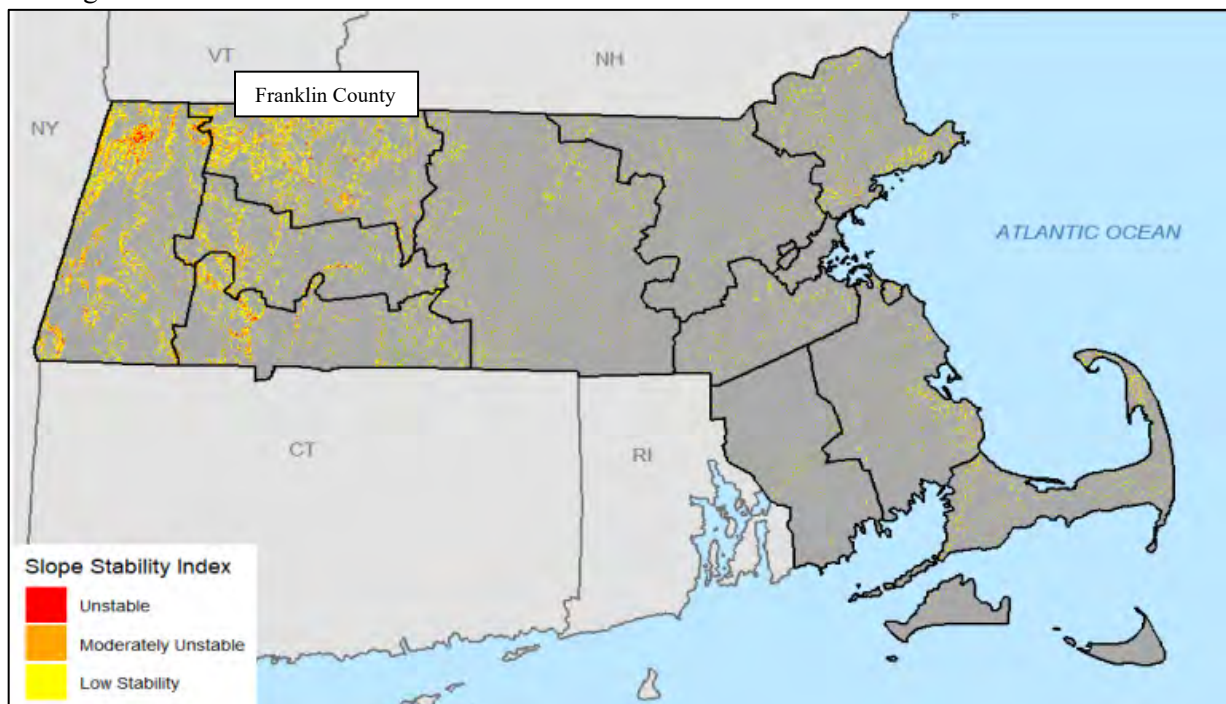


Figure 46. Slope Stability Map of Massachusetts (Created by ERG using data from Mabee & Duncan (2013)).

The FEMA National Risk Index assigns Franklin County, MA, a Score of 81.93 (Relatively Low when compared to the rest of the U.S.), characterizes Landslide risk across the entirety of Franklin County as relatively moderate, and assigns an Expected Annual Loss Rating of Relatively Low. The area at risk to landslide in Montague is approximately 720 acres.

In Montague, unstable slopes are identified along the Connecticut River upstream of the Turners Falls dam and along the Millers River. Smaller areas of unstable slopes are also identified on steep slopes near Montague Center and east of Route 63. Unstable soils are also present along the edges of the Montague

Plains. Erosion along the Millers River has threatened Millers Falls Road. The Town received and executed a Hazard Mitigation Grant Program (HMGP) award to address slope stabilization in this area about ten years ago, but the area of the landslide continually needs to be monitored. In addition, the HMPC identified the steep riverbank behind Carlisle Avenue as a location that had experienced recent landslides. At the time the 2020 HMP was being developed, the road was not threatened but the Town was monitoring the area.

Participants in the HMPC meetings during the development of this HMP update identified the following locations of concern with respect to landslide risk: Montague Housing Authority (property at 41 Sunrise Terrace), Montague Town Hall (property at 1 Avenue A), areas surrounding the Turners Falls Airport, and areas near Lake Pleasant.

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 pose threats to highways and structures that support fisheries, tourism, and transportation. According to the U.S. Landslide Inventory, 12 landslide, debris flow, and mudslide incidents occurred in Massachusetts between 2008 and 2017, and the inventory contains no reports of landslides occurring in Massachusetts since that time. The Massachusetts Geological Survey reported three landslide or mudflow events during this timeframe 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.

The 2020 HMP noted that no “significant” landslide events have been observed in Montague. However, geographically limited landslides occur frequently in the Town. Recent landslides have occurred behind Carlisle Avenue on the banks of the Connecticut River, as well as along Millers Falls Road on the banks of the Millers River.

Additionally, the 2020 HMP noted that after completion of the previous Hazard Mitigation Plan update, the Town applied for and was awarded HMGP funds for the Millers Falls Road landslide and erosion control project. Erosion along a steep slope was threatening a segment of Millers Falls Road located across from Highland Cemetery, between the Turners Falls Airport and the village of Millers Falls. The route is a main artery and evacuation route and is the most direct route to access Millers Falls from the fire and police services based in Turners Falls. According to Town officials, the road was in imminent danger of washing out, failing, or collapsing at the head of the landslide. Neither the road nor the slope is within a floodplain, although the Millers River is located at the base of the slope. Web-based aerial photographs of the area depict a large sediment delta in the river, which was indicative of severe erosion. Visual reconnaissance revealed that the slope had been actively failing, with fallen trees and scarps that had not yet weathered. Although most of the work conducted by the Town prior to the project had

focused on management of drainage, other factors were likely contributing to the slope failure such as groundwater seepage and erosion of the toe of the slope at Millers River.

The HMGP-funded mitigation project helped stabilize the slope and prevent future erosion and failure of the roadway. While the project was successful in protecting the roadway, this area continues to experience erosion and needs constant monitoring from the Town.

In 2025, the Town initiated a project to mitigate the effects of erosion and road washouts in “The Hill” neighborhood of Turners Falls. The neighborhood, which is described as housing a significant portion of the Town’s residents, is increasingly threatened by erosion and washouts due to changes in precipitation patterns. In addition, flooding and sedimentation impacts reach beyond The Hill, threatening roads and properties below, as well as the Connecticut River. The grant-funded project reportedly aims to take proactive measures including shoring up areas at risk of slope failure and addressing stormwater runoff across the neighborhood.⁹³

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 46), 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

⁹³ Franklin County Now. Montague sets grant in motion for Hill neighborhood erosion project. September 23, 2025. <https://franklincountynow.com/news/216612-montague-sets-grant-in-motion-for-hill-neighborhood-erosion-project/>.

- 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

Rigorous landslide classification systems are not currently used in Montague and have only occasionally been used in Massachusetts. However, if a significant or damaging landslide occurred in Montague, the type of slide would be identified; and then consistency with the slope stability mapping for Massachusetts would be examined to determine if susceptibility identification tools are appropriate. Referencing Figure 28, a copy of the USGS graphic used to depict different types of landslides, the numbers 1, 2, 3, and 8 are considered most frequent in Massachusetts. This USGS classification system is believed appropriate for Montague, including the site of the HMGP-funded landslide mitigation project that protected Millers Falls Road.

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. The analysis identified 52 residential buildings located in the unstable or moderately unstable area, and no critical facilities. The two government buildings are identified in the GIS data as Montague Housing Authority (41 Sunrise Terrace) and Inhabitants of Montague (1 Avenue A). Table 59 shows the result of the analysis.

Table 59. Buildings in the Unstable and Moderately Unstable Areas.

Building Type	Number of Buildings at Risk to Landslide (Total in Town)	Building Value in Areas at Risk to Landslide (Total in Town)
Single Family	41 (3,188)	\$6,820,400 (\$445,773,000)
Multi-Family	11 (898)	\$1,381,300 (\$179,501,600)
Government	2 (98)	\$2,017,200 (\$82,691,700)
Industrial	3 (75)	\$108,429,260 (\$277,187,352)
Religious	1 (12)	\$875,600 (\$6,829,200)
Outbuildings	2 (181)	\$0 (\$23,757,900)
Vacant	4 (120)	\$0 (\$311,100)
Total	64 (4,834)	\$119,523,760 (\$1,358,087,352)

The 2020 HMP described the cliffs along the Connecticut River at Barton's Cove in Turners Falls as being vulnerable to erosion from stormwater runoff coming from residential streets that dead end near the edge of the precipice. Residences close to the cliffs could be in danger if erosion continues. There are also negative consequences to the increased amount of salt and silt eroding into the Cove, including the possibility of increased eutrophication and loss of clean habitat for resident nesting bird populations. The electric utility company FirstLight Power maintains an erosion control plan along the Connecticut River as required by the Federal Energy Regulatory Commission (FERC) and has repaired and maintained eroding riverbank and slopes along the river since 2008 using bioengineering techniques, totaling over 1,000 feet. In 2009, bank stabilization work was completed in the vicinity of the Narrows on the Connecticut River.

The following roads in Montague are exposed to the landslide hazard:

- Third Street
- Avenue A
- Federal Street
- Millers Falls Road
- North Leverett Road
- Turners Falls Road

Figure 47 shows the landslide susceptibility map for the Town. The red (unstable) and pink (moderately unstable) areas are more susceptible to landslides, and the buildings identified by black dots are the most susceptible.

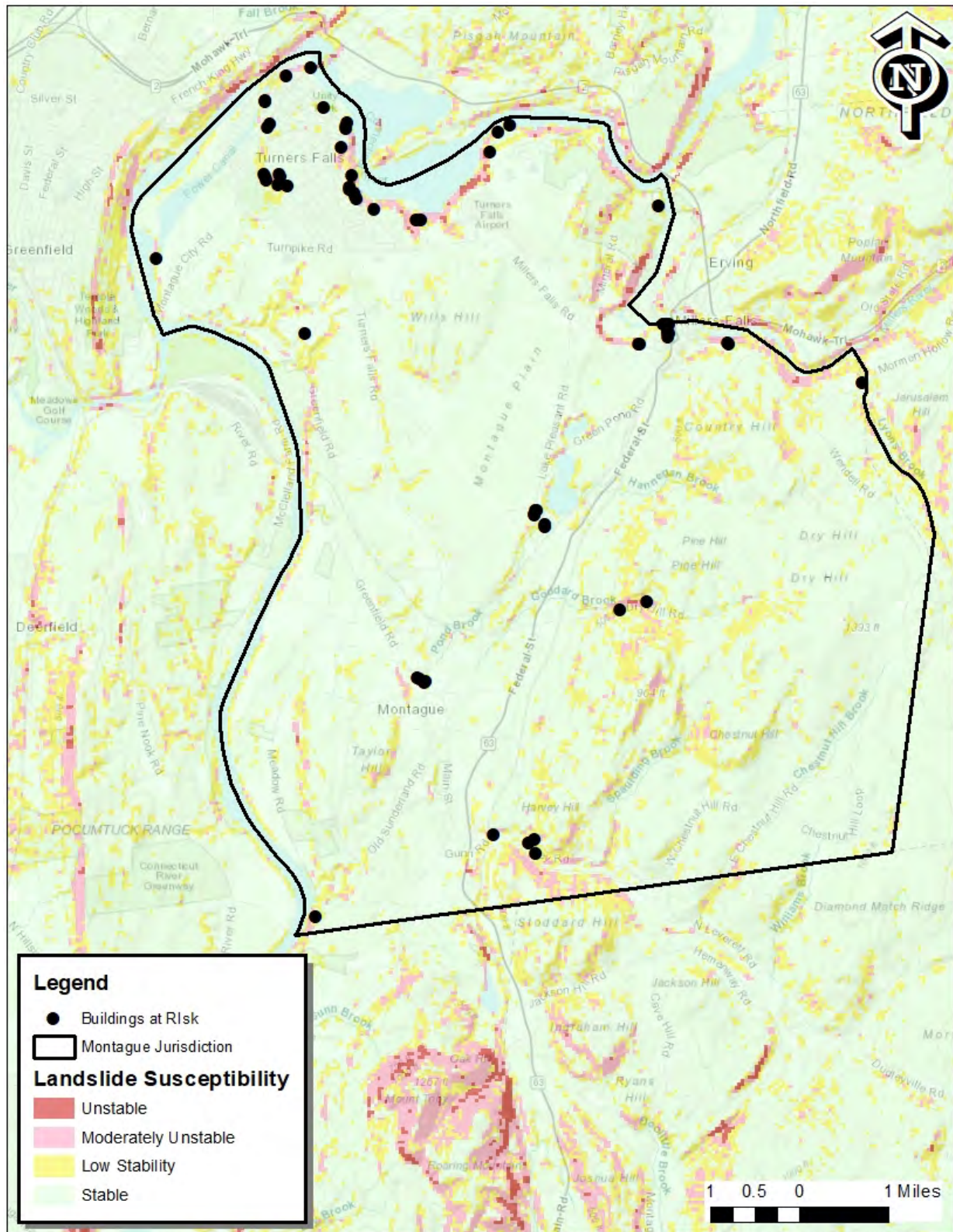


Figure 47. Landslide Susceptibility and Buildings at Risk - Town of Montague.

Built Environment Impacts

As the databases with records of historic landslide events in Massachusetts indicate that for the period 2008 to 2017, no landslide events were recorded in Montague, no damage estimates were available for the Town. To estimate the built environment impacts from a landslide in Montague, a total loss was assumed due to a 100-year landslide event. As the average value of the buildings in the moderately unstable and unstable zones is \$1,867,559, this would result in an AAL of approximately \$18,676.

Population Impacts

Populations considered most vulnerable to landslide impacts are identified based on several 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.

Prolonged obstruction of major transportation routes due to landslides can disrupt the shipment of goods and the delivery of services to Town residents and businesses. This was one of the concerns that contributed to the award of the HMGP funds to reduce risks along Millers Falls Road.

Environment Impacts

A few unstable and moderately unstable areas are located near the transportation routes (roads, highways, and rail lines) used to move hazardous materials; therefore, there is some risk of a spill or release of hazardous materials occurring in the event of a landslide in those areas.

Other associated environmental concerns are debris management issues, including debris removal and identification of disposal sites.

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 in the state. 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.

The 2020 HMP reported that no significant landslide events have been observed in Montague but geographically limited landslides occur frequently in the Town. Changes in precipitation may increase the chance of a landslide occurring, as extreme rain events are expected to result in more frequently saturated soils, which are vulnerable to landslides. Drought may also increase the likelihood of landslides occurring if loss of vegetation decreases soil stability.

Problem Statements for Landslides

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 60. 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, which was the risk associated with Millers Falls Road that led to the award of HMGP funds.
Structures (including facilities, lifelines, and critical infrastructure)	- Some residential and other structures reside within and adjacent to moderately unstable areas and unstable areas could be impacted. - Areas at risk of landslide events include Third Street, Avenue A, Federal Street, Millers Falls Road, North Leverett Road, and Turners Falls Road.
Systems (including networks and capabilities)	Roads and railways 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	Road closures due to landslides may disrupt community activities.

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. Severe winter storms and tornadoes are addressed in later sections.

Description

Thunderstorm: 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 thunderstorm 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.

Thunderstorm Wind / Downburst: The NOAA National Severe Storms Laboratory classifies damaging winds as those exceeding 50-60 miles per hour (mph) and classifies a thunderstorm as “severe” when it contains winds gusting in excess of 57.5 mph (or 50 knots). A downburst is a severe and localized wind blasting down from a thunderstorm. Downburst activity is, on occasion, mistaken for tornado activity. Both storms have very damaging winds and are very loud. Downbursts are more common than tornadoes, are generally short-lived, and are straight line winds, whereas a tornado is a rapidly spinning, violent vortex of air. Depending on the size and location of downburst events, the destruction of 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. 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.

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 rapid 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.

Hail: Hail is a form of precipitation consisting of solid ice that forms inside thunderstorm updrafts. Hailstones are the chunks of ice that grow as the 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. Estimates from NOAA of the velocity of falling hail range from 9 meters per second (m/s) (or 20 mph) for a hailstone one centimeter (1 cm) in diameter to 48 m/s (or 107 mph) for an 8-cm, 0.7-kilogram hailstone.

Location

Thunderstorms, high wind events, lightning, and hail can affect the entirety of Massachusetts, including the geographic extent of Montague. The HMPC did not identify specific areas of Montague at more risk to the impacts of extreme storms than the remainder of the Town.

Previous Occurrences

The NOAA NCEI Storm Events database lists numerous (243 in total: 214 thunderstorm wind, 18 hail, and 8 lightning) severe weather events recorded for Franklin County from January 2015 through November 2025. The total property damage across all (243 in total) events was \$1.142M. Details of those events that affected Montague are provided in Table 61. Unless otherwise noted in the Losses Reported column, no deaths or injuries were reported in association with these events.

Table 61. NCEI Storm Events Database Entries Covering Other Severe Storms in Montague - 2015-2025.

Date	Description	Losses Reported
08/15/2015	<i>Thunderstorm Wind:</i> (Turners Falls) A weak cold front moving through southern New England brought showers and thunderstorms to the region. These storms produced hail and damaging winds as well as some poor drainage street flooding. A tree and wires on Federal Street were downed by thunderstorm winds.	Property Damage: \$5,000
08/15/2015	<i>Thunderstorm Wind:</i> (Millers Falls) A weak cold front moving through southern New England brought showers and thunderstorms to the region. These storms produced hail and damaging winds as well as some poor drainage street flooding. Trees and wires on West Mineral Road and West Main Street were downed by thunderstorm winds.	Property Damage: \$10,000
08/15/2015	<i>Thunderstorm Wind:</i> (Montague Station) A weak cold front moving through southern New England brought showers and thunderstorms to the region. These storms produced hail and damaging winds as well as some poor drainage street flooding. A tree and wires on Denton Street were downed by thunderstorm winds.	Property Damage: \$5,000
08/15/2015	<i>Thunderstorm Wind:</i> (Montague Station) A weak cold front moving through southern New England brought showers and thunderstorms to the region. These storms produced hail and damaging winds as well as some poor drainage street flooding. Wires on Pleasant Road and Adams Street were downed by thunderstorm winds	Property Damage: \$5,000
08/25/2015	<i>Thunderstorm Wind:</i> (Turners Falls) Cyclonic flow associated with an upper level low in the Great Lakes combined with an approaching cold front to produce showers and thunderstorms across much of western Massachusetts and northern Connecticut. A few of these storms produced damaging winds.	Property Damage: \$5,000

Date	Description	Losses Reported
	Trees and wires on Turners Falls Road were downed by thunderstorm winds.	
07/18/2016	<i>Thunderstorm Wind:</i> (Turners Falls) A cold front moved through southern New England during the peak heating of the day, taking full advantage of the available instability. This resulted in showers and thunderstorms that produced damaging winds. Numerous power lines throughout Turners Falls were downed by thunderstorm winds.	Property Damage: \$25,000
08/13/2016	<i>Thunderstorm Wind:</i> (Montague) Heat, humidity, and a back door cold front all contributed to the development of showers and thunderstorms across southern New England. These storms resulted in damaging winds and localized flooding. A tree at the intersection of South and Federal Streets was downed by thunderstorm winds.	Property Damage: \$5,000
09/11/2016	<i>Thunderstorm Wind:</i> (Montague) A cold front moved through during the morning hours, producing showers and thunderstorms. Some of these storms became strong enough to produce wind damage. Multiple trees were downed onto Old Sunderland Road and Taylor Hills Road.	Property Damage: \$15,000
02/25/2017	<i>Thunderstorm Wind:</i> (Montague Station) Low pressure moving through Eastern Canada dragged a cold front through New England during the night of the 25th. Showers and thunderstorms ahead of the cold front moved through Western Massachusetts, then dissipated as they moved farther east. Tree down on wires on Swamp Road in Montague. Multiple trees down on North Leverett Road in Montague.	Property Damage: \$5,000
02/25/2017	<i>Thunderstorm Wind:</i> (Turners Falls) Low pressure moving through Eastern Canada dragged a cold front through New England during the night of the 25th. Showers and thunderstorms ahead of the cold front moved through Western Massachusetts, then dissipated as they moved farther east. Trees and wires down on South Cross Road in Gill. Tree down on Route 2.	Property Damage: \$4,000
07/05/2018	<i>Lightning:</i> (Turners Falls) Thunderstorms forming along a pre-frontal trough moved across Northwest Massachusetts during the afternoon. At 12:14 PM EST, lightning struck a house on K Street in Turners Falls, Massachusetts. This caused a house fire, with one injury resulting.	Injuries: 1 (in Turners Falls) Property Damage: \$5,000
08/17/2018	<i>Lightning:</i> (Montague Station) Low pressure moved east from the Great Lakes. This drew warm humid air north across Massachusetts, then swung a cold front across the state. This caused afternoon thunderstorms; the most damaging thunderstorms moved across the northern half of Massachusetts.	Property Damage: \$8,000

Date	Description	Losses Reported
07/30/2019	<i>Thunderstorm Wind:</i> (Montague) A hot, humid weather regime was in place across southern New England. A weak, subtle upper level shortwave passing through in the afternoon hours helped trigger an isolated severe thunderstorm in northwest Massachusetts. A tree was down on a house on North Taylor Hill Road. Multiple trees down on Ferry Road and South Ferry Road. Wires were down on Main Street.	Property Damage: \$3,000
05/15/2020	<i>Thunderstorm Wind:</i> (Montague) With a warm, somewhat humid air mass in place, a strong cold front moved through southern New England during the evening hours. In addition, southern New England was on the southern edge of a strong jet stream aloft. The result was a quasi-linear convective system (QLCS) that moved through Massachusetts. It caused significant damage in places, tearing the roof of buildings in Holyoke and hundreds of trees downed in parts of north-central and northeast Massachusetts. In Montague, a tree and wires were down on Center Street.	Property Damage: \$800
08/25/2020	<i>Thunderstorm Wind:</i> (Turners Falls Airport) A few severe thunderstorms formed during the evening hours, out ahead of a strong cold front which swept across southern New England at night. In Gill, multiple trees and wires were down on Green Hill Road and throughout the Town.	Property Damage: \$5,000
06/30/2021	<i>Thunderstorm Wind:</i> (Millers Falls) Oppressive heat and humidity, along with increasing wind shear from an approaching mid level short wave, led to scattered severe thunderstorms in Massachusetts and northern Connecticut during the late afternoon and evening. In Erving, a large tree and wires were down on French King Highway.	Property Damage: \$1,300
06/30/2021	<i>Thunderstorm Wind:</i> (Turners Falls) Oppressive heat and humidity, along with increasing wind shear from an approaching mid level short wave, led to scattered severe thunderstorms in Massachusetts and northern Connecticut during the late afternoon and evening. In Montague, trees and wires were down on Montague City Road near Walnut Street.	Property Damage: \$1,300
07/14/2021	<i>Thunderstorm Wind:</i> (Millers Falls) A weakening ridge of high pressure extended from the Maine and New Hampshire coast southeast to Rhode Island. At the same time, a surface warm front was beginning to advance northward. This combined with rising temperatures and very humid air created scattered strong to severe thunderstorms. In Wendell, a tree and lines were down on Montague road and also on Mormon Hollow road.	Property Damage: \$1,000
03/07/2022	<i>Thunderstorm Wind:</i> (Turners Falls Airport) Low pressure passed to the west of New England, with a cold front speeding across southern New England during the evening hours. A strong upper level short wave moved across northern New England and an associated low level jet of 80-90 knots moved across southern New England. As is typical in late winter and early spring, a line of heavy showers, with a few embedded	Property Damage: \$500

Date	Description	Losses Reported
	thunderstorms, raced across the region, accompanied by severe-level wind gusts that produced some damage during the late evening. There was also some isolated wind damage from post-frontal wind gusts around and just after midnight on the 8th. In Gill, a tree was down on Route 2A.	
07/21/2022	<i>Thunderstorm Wind:</i> (Millers Falls) A pre-frontal trough of low pressure in western New England combined with instability and just enough shear to produce a broken line of severe thunderstorms in western MA and northern CT in the late afternoon. A significant microburst occurred in Erving and Warwick, MA. In Montague, in the Millers Falls portion of Town, a large tree was down on a house and a car on the 800 block of Wendell Road. Trees were also downed on the 900 block of Wendell Road.	Property Damage: \$9,000
09/13/2022	<i>Thunderstorm Wind:</i> (Turners Falls Airport) A cold front moved through southern New England during the early evening triggering a few severe thunderstorms in northern Massachusetts. In Gill, multiple trees were down across Pisgah Mountain Road. Two trees were snapped in half.	Property Damage: \$1,000
07/17/2024	<i>Thunderstorm Wind:</i> (Montague Station) A cold front swept through southern New England causing widespread damage, especially in western and central Massachusetts. In Montague, tree reported down on a road.	\$300
06/06/2025	<i>Thunderstorm Wind:</i> (Montague) After one rouge severe storm in northeast MA in the morning, a cold front brought a round of strong to severe storms through western and central Massachusetts during the afternoon and evening. These storms dropped quarter sized hail, produced damaging winds, and some flash flooding. In Montague, a tree was down in the area of Sunderland Road.	---

The 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>. Review of the USDA data for the years 2012-2024 identified no disaster declarations for events related to severe weather, including thunderstorm winds and hail, in Franklin County.

The principal concern of the CRB workshop participants related to severe weather, including heavy snow, ice, and wind events, is the potential for downed trees and widespread power outages. According to the 2020 HMP, the Highway Department and electric company trim trees near overhead utility lines and in areas where downing could block emergency access to roads or equipment. This practice was identified as an existing and effective mitigation capability in the Town.

Extent

Scales used to characterize “other severe weather” focus primarily on the thunderstorm watch and warning system. The strength of thunderstorms is typically measured in terms of their 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. The NWS classifies a thunderstorm as “severe” when it produces damaging wind gusts in excess of 58 mph (50 knots), hail that is 1 inch in diameter or larger (quarter size), or a tornado.

Scales used to characterize individual hazards within “other severe weather” such as hail and lightning are focused on communicating the threat to life and property.

- Past efforts to develop scales for classifying lightning risk have been focused on components of larger risk communication projects. For example, the Lightning Activity Level (LAL) was a tool that was developed in the 1960s in Montana to characterize lightning risk for use as an input into the National Fire Danger Rating System (NFDRS). The LAL had a range of values from 1 through 6: a value of 1 represented no lightning, values from 2 through 5 represented an increasing coverage of wet thunderstorms and corresponding increases in the frequency of lightning strikes, while 6 represented rare dry lightning events with a lightning frequency similar to a LAL of 3. The NWS currently supports public use of mapping lightning threats ranging from “non-threatening” to “extreme.” The scale is based on the likelihood that cloud-to-ground lightning (CG) from thunderstorms will occur combined with the anticipated flash rate.
- The NWS currently supports public use of mapping hail threats ranging from “non-threatening” to “extreme.” The scale is based on the likelihood that severe hail will occur combined with the anticipated size (diameter) of the biggest stones.

Table 62 summarizes the criteria for the different threat levels.

Table 62. Threat Levels for Lightning and Hail.

Threat Level	Description (Threat Level to Life and Property)	
	Lightning	Hail
Extreme	• Within 12 miles of a location, a moderate likelihood of CG lightning (or 50% thunderstorm probability), with storms capable of excessive CG lightning. • <i>And/or</i> a high likelihood of CG lightning (or 60% to 70% thunderstorm probability), with storms capable of frequent CG lightning. • <i>And/or</i> a very high likelihood of CG lightning (or 80% to 90% thunderstorm probability), with storms capable of occasional CG lightning.	• Within 12 miles of a location, a moderate likelihood or greater (16% probability or greater) of severe hail, with storms capable of baseball to softball sized stones. See diameter description below. • <i>And/or</i> a high likelihood or greater (26% probability or greater) of severe hail, with storms capable of golf ball to baseball sized hail stones. See diameter description below. • <i>And/or</i> a very high likelihood (36% or greater) of severe hail, with storms capable of quarter to golf ball sized hail stones. See diameter description below.

Threat Level	Description (Threat Level to Life and Property)	
	Lightning	Hail
High	• Within 12 miles of a location, a low likelihood of CG lightning (or 30% to 40% thunderstorm probability), with storms capable of excessive CG lightning. • <i>And/or</i> a moderate likelihood of CG lightning (or 50% thunderstorm probability), with storms capable of frequent CG lightning. • <i>And/or</i> a high likelihood of CG lightning (or 60% to 70% thunderstorm probability), with storms capable of occasional CG lightning.	• Within 12 miles of a location, a low likelihood (6% to 15% probability) of severe hail, with storms capable of baseball to softball sized stones. See diameter description below. • <i>And/or</i> a moderate likelihood (16% to 25% probability) of very large hail (golf ball to baseball sized hail stones). See diameter description below. • <i>And/or</i> a high likelihood (26% to 35% probability) of large hail (quarter to golf ball sized hail stones). See diameter description below.
Moderate	• Within 12 miles of a location, a very low likelihood of CG lightning (or 10% to 20% thunderstorm probability), with storms capable of excessive CG lightning. • <i>And/or</i> a low likelihood of CG lightning (or 30% to 40% thunderstorm probability), with storms capable of frequent CG lightning. • <i>And/or</i> a moderate likelihood of CG lightning (or 50% thunderstorm probability), with storms capable of occasional CG lightning.	• Within 12 miles of a location, a very low likelihood (2% to 5% probability) of severe hail, with storms capable of baseball to softball sized stones. See description below. • <i>And/or</i> a low likelihood (6% to 15% probability) of severe hail, with storms capable of golf ball to baseball sized hail stones. See description below. • <i>And/or</i> a moderate likelihood (16% to 25% probability) of severe hail, with storms capable of quarter to golf ball sized hail stones.
Low	• Within 12 miles of a location, a very low likelihood of CG lightning (or 10% to 20% thunderstorm probability), with storms capable of frequent CG lightning. • <i>And/or</i> a low likelihood of CG lightning (or 30% to 40% thunderstorm probability), with storms capable of occasional CG lightning.	• Within 12 miles of a location, a very low likelihood (2% to 5% probability) of severe hail, with storms capable of golf ball to baseball sized hail stones. See diameter description below. • <i>And/or</i> a low likelihood (6% to 15% probability) of severe hail, with storms capable of quarter to golf ball sized hail stones.
Very Low	• Within 12 miles of a location, a very low likelihood of CG lightning (or 10% to 20% thunderstorm	• Within 12 miles of a location, a very low likelihood (2% to 5% probability) of severe hail, with storms capable of nickel to golf

Threat Level	Description (Threat Level to Life and Property)	
	Lightning	Hail
	probability), with storms capable of occasional CG lightning.	ball sized hail stones. See diameter description below. • <i>And/or</i> a low likelihood or greater (6% or greater) of small hail (less than 1 inch).
Non-Threatening	• Within 12 miles of a location, environmental conditions do not support CG lightning.	• Within 12 miles of a location, environmental conditions do not support the occurrence of severe hail.
Definitions	• The flash rate definitions are: • Occasional - CG lightning at the rate of 1 to 3 flashes per minute (about 5 to 15 flashes per 5 minutes) associated with a given lightning storm. • Frequent - CG lightning at the rate of 4 to 11 flashes per minute (about 20 to 55 flashes per 5 minutes) associated with a given lightning storm. • Excessive - CG lightning rate of 12 flashes or more per minute (about 60 flashes or more per 5 minutes); and is nearly continuous and associated with a given lightning storm.	• The size definitions are: • Small Hail - Hail less than 1 inch in diameter (from the size of peas to nickels). • Large Hail - Hail from 1 inch to 1 3/4 inch in diameter (from the size of quarters to golf balls) causing minor damage. • Very Large Hail - Hail from 1 3/4 inch to 2 3/4 inch in diameter (from the size of golf balls to baseballs) causing moderate damage. • Giant Hail - Hail larger than 2 3/4 inch (larger than baseballs, such as the size of grapefruit or softballs) causing major damage.

Furthermore, for hail, NOAA provides a range from “bb” (< 0.25 inch) to “softball” (4.5 inches) with common sizes reported in Massachusetts ranging from pea- to nickel-sized (0.25-inch to 0.875-inch).

The NOAA/NWS classification systems coupled with the NWS warning systems are appropriate for severe storm events in Montague, inclusive of thunderstorm winds, lightning, and hail. These classification systems have been used for many severe storms that have occurred in Montague and adjacent communities. Severe storms have not been characterized outside of these systems of classification.

Vulnerability Assessment

Exposure

The entire built environment of the Town of Montague is vulnerable to thunderstorms, hail, downbursts, extreme wind, and lightning from a severe weather event.

Built Environment Impacts

Severe weather events, including thunderstorms and their associated wind, hail, and lightning events, brought about only minor property damage in Montague in previous years.

Based on review of the NCEI Storm Events database, for Franklin County from January 2015 to November 2025, a total of 243 severe weather events were recorded in the County. The reported property damage was \$1.142M for the 243 events; therefore, the average annualized loss from other severe weather to Franklin County is \$114,200.

Hail may affect vehicles, roofs, landscaping and other areas of the built environment. Hailstorm events can occur anywhere within Montague independently or during a tornado, thunder or lightning storm event. When hail breaks windows, water damage from accompanying rains can also be significant.

Wind structural vulnerability relates to building construction type and age. Structures of light construction, particularly manufactured homes typically sustain the greatest damage. Wood-frame structures are more susceptible to high winds; steel and concrete are more resistant. Even if a building remains structurally sound, broken glass from windows can cause injuries inside and outside the building and badly damage building contents. Failures of windows and doors can greatly increase storm damage. If wind-driven rain and water reach the interior, materials can be damaged or ruined. Wet materials can promote the growth of mold, and even materials that do not appear damaged can harbor enough moisture to contribute to mold growth later on.

Lightning has the ability to create wildfires as well as local and large-scale power outages that can be damaging to communication systems and electrical systems including computers, network servers, and HVAC components. Hail causes billions of dollars in damage to crops and property each year.

Construction sites are especially vulnerable to severe weather because they are so exposed to the elements. Tools, construction materials, cranes, scaffolding, derricks, concrete formwork, sidewalk bridges, and other items may loosen in high winds. Partially completed buildings are also vulnerable if their components have not yet been fully connected, or if structural features intended to withstand strong winds have not yet been completed.

Population Impacts

Some traffic accidents associated with storm events result in injuries and deaths. However, the number of injuries and deaths reported for accidents is generally low. Based on review of the NCEI Storm Events Database, from January 2015 to November 2025 (ten-year lookback), 243 severe weather events were recorded in all of Franklin County, with no deaths and one reported injury in Montague (July 2018, in Turners Falls).

Populations considered most vulnerable to hail, lightning, thunderstorm winds, and other thunderstorm impacts in Montague are identified based on several factors including their physical and financial ability to react or respond during a hazard. Senior and low-income populations in Montague 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 thunderstorm wind, including microbursts, can cause damage to parks and other natural areas. Some areas of the Town may be out of service until downed trees are removed. Lightning can cause wildfires and brush fires that damage the community's natural areas.

Probability of Future Events

Evidence shows that severe weather including thunderstorms, damaging wind, and tornadoes, is already increasing as temperatures rise. The ResilientMass Plan notes that smaller storm events are becoming less frequent, while more severe storms are becoming more common. Overall, the risk from severe weather events can be expected to increase as a result of climate change.

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. According to the U.S. Global Change Research Program (USGCRP), climate models show projections that the frequency and intensity of severe thunderstorms (which can include tornadoes, hail, and winds) will increase. 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 ten downbursts are reported for every one tornado report in the United States. This implies that approximately 10,000 downbursts are 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 cites NOAA data that indicates 8 fatalities and 148 injuries occurred in Massachusetts as a result of lightning events between 1990 and 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.

Problem Statements for Other Severe Weather

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 63. Problem Statements for Other Severe Weather.

Assets	Problems Associated with Other Severe Weather
People (including underserved communities and socially vulnerable populations)	• People in Montague have been disrupted by severe weather including wind and thunderstorm events. Vulnerable populations may be isolated if roads are closed. • Participants in the MVP CRB Workshop (2018) noted that the Community Action school in the Patch (in Turners Falls) could be vulnerable during a severe weather event requiring evacuation, given the limited access to the neighborhood.
Structures (including facilities, lifelines, and critical infrastructure)	• Given the frequency of events in and around Montague, 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 not plowed/treated or 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

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 20°F. 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.

Nor'easters: 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. Overall, winter storms can affect the entirety of Massachusetts, including the geographic extent of Montague. Participants in the MVP Community Resilience Building Workshop (June 2018) identified short-term, acute weather events, including severe rain and snow storms, ice, and wind as being of the most concern in Montague. The HMPC has previously identified North Leverett Road as an area experiencing frequent vehicle accidents in the winter due to icy conditions.

Previous Occurrences

Winter storms occur regularly in Massachusetts. Six of the disasters declared in Massachusetts from 2000 through 2022 were associated with winter/snow storms; three covered Franklin County and, therefore, the Town of Montague, are described in Table 64.

Table 64. Winter Storm Disaster Declarations Covering Franklin County.

Incident Period	Event	Public Assistance
February 8, 2013 – February 9, 2013	Massachusetts Severe Winter Storm, Snowstorm, and Flooding (DR-4110-MA)	Entire state designated as eligible
December 11, 2008 – December 18, 2008	Severe Winter Storm and Flooding in Massachusetts (DR-1813-MA)	Berkshire County, Essex County, Franklin County, Hampden County, Hampshire County, Middlesex County, Worcester County
December 6, 2003 – December 7, 2003	Massachusetts Snow (EM-3191-MA)	Barnstable County, Berkshire County, Bristol County, Essex County, Franklin County, Hampden County, Hampshire County, Middlesex County, Norfolk County, Plymouth County, Suffolk County, Worcester County

DR-4110 was subject to a concurrent emergency declaration in Massachusetts. Review of the FEMA data revealed that the Town of Montague did not receive Public Assistance reimbursements associated with DR-4110.

Blizzards and heavy snow are high frequency events, occurring more than once every five years. The average annual snowfall in Montague is approximately 45 inches. Ice storms are considered to be medium frequency events. Most of the severe winter storms, including nor'easters, impacting Montague and the surrounding area have occurred between November and April, with the most likely month for a winter storm being January. Because the Town does not keep local records of winter storms, the storm data for Franklin County is the best available.

The 2020 HMP noted that in In Montague's rural areas, many households that lose power during winter storms also lose access to their wells and are without a potable drinking water source. A snow storm in February 2010 caused widespread power outages in Millers Falls and Montague Center, in some areas lasting up to three days. The Turners Falls High School was opened as a shelter for residents during this time. During the winter of 2010/2011, large snow loads on roofs were a concern and caused the roof of a barn in Town to collapse.

The NOAA NCEI Storm Events database lists 95 severe winter storm events occurring in Franklin County for the period January 2014 to November 2025. No deaths, injuries, or crop damage, and a total of \$155,700 in property damage were recorded in association with these events. Montague and Turners Falls

are specifically mentioned in eight of the entries, and details of these events are provided in Table 65 below. The property damage shown reflects the data recorded for Eastern Franklin County.

Table 65. NCEI Storm Events Database Entries Covering Winter Storms in Franklin County (2014-2025).

Date	Description	Damage
11/26/2014	<i>Heavy Snow.</i> A strong coastal storm moved up the east coast and over Nantucket bringing a heavy wet snow to much of the area. This resulted in tree damage and scattered power outages across the region. Six to ten inches of snow fell across eastern Franklin County. The heavy wet snow brought down trees and wires in Leverett, Northfield, Deerfield, Greenfield, Sunderland, New Salem, Bernardston, Whately, Gill, Wendell, Erving, and Montague.	Property Damage: \$75,000
10/27/2016	<i>Winter Weather.</i> High pressure over the Maritimes brought cold air to interior parts of Southern New England. Low pressure moved from the Great Lakes to the Massachusetts coast bringing several inches of wet snow to the interior. Most trees still had leaves at this time, allowing the snow to cause a significant amount of tree damage. The damage was most pronounced in the Connecticut River Valley in western Massachusetts. An average of one to four inches of wet snow fell in eastern Franklin County. However, because it was early in the season and most trees still had leaves, there was some damage. Wires were reported down on Meadow Road in Montague.	Property Damage: \$6,000
12/1/2019	<i>Heavy Snow.</i> A storm system slowly moved across southeast Massachusetts and into the Gulf of Maine during this period. One to two feet of snow fell in much of western and northern Massachusetts by the morning of December 3. An initial thump of snow, accompanied by some thunder, moved across central portions on the evening of December 1. Many areas had a lull on Dec. 2, except in northwest Massachusetts, where snow continued. Final snow totals ranged from 14 to 17 inches in eastern Franklin County. A Co-op observer in Turners Falls and a Trained Spotter in Whately both reported 17 inches of snow.	---
12/16/2020	<i>Heavy Snow.</i> A storm system produced heavy snow, strong to damaging winds, and minor coastal flooding in southern New England. By far, the heaviest snow fell to the north (Laconia, NH) and west (Binghamton, NY), where more than 3 feet fell. Heavy snow ranged from 7 to 17 inches across eastern Franklin County. Some specific amounts included 17.0 inches in Montague, 16.2 inches in Greenfield, 12.0 inches in New Salem, 11.6 inches in Sunderland, 8.0 inches in Leverett, and 7.0 inches in Shutesbury. Winds generally were gusting to 20 to 30 mph.	---
2/1/2021	<i>Heavy Snow.</i> A mid-level trough over the Appalachians produced a secondary surface low pressure near the mid-Atlantic coast. High pressure over Hudson Bay allowed low level cold air to stay in place initially. Most of the region received 8 to 12 inches of snow, but a	---

Date	Description	Damage
	coastal front kept accumulations down in southeast and extreme eastern Massachusetts. This storm also produced strong winds and minor coastal flooding. Snowfall amounts generally ranged from 8 to 12 inches. The highest report was 15 inches in Montague.	
3/3/2023 to 3/4/2023	<i>Heavy Snow.</i> A low pressure system brought heavy snow to the higher terrain of northern and western Massachusetts, while mixed precipitation occurred elsewhere. Initial snow began before midnight on March 3. Winds gusted 45 to 55 mph near the coast. Snowfall amounts averaged 5.5 to 6.0 inches in eastern Franklin County. Some specific totals included 7.0 inches in Montague, 5.8 inches in Greenfield, 5.4 inches in Leverett, and 4.5 inches in both Sunderland and Shutesbury.	-
3/13/2023 to 3/14/2023	<i>Heavy Snow.</i> Strong low pressure meandered just off the southeast coast of New England and produced 2 to 3+ feet in northern and western MA. Snowfall varied widely across eastern Franklin County from as much as 26 inches in the highest elevations to 4-8 inches in the valley. Some specific amounts included, 26.0 in Wendell, 24.0 in Shutesbury, 16.8 in New Salem, 7.2 in Bernardston, 7.1 in Greenfield, and 6.2 in Montague. In Montague at 9am, a tree and power lines were down on Taylor Hill Road at Old Sunderland Road.	Property Damage: \$13,500
1/6/2024 to 1/7/2024	<i>Heavy Snow.</i> A strong storm moved up the east coast and brought heavy snow to southern New England. The first round of heavy snow fell overnight. Generally, 8 to 15 inches of snow fell. Some higher amounts included 15 inches in Montague and 10.2 inches in New Salem.	
2/15/2025 to 2/16/2025	<i>Winter Storm.</i> Cold air in place ahead of a low pressure system approaching from the Ohio Valley allowed snow to develop on the evening of February 15 th . The main low pressure system passing to our west resulted in warmer mid-level temps to overspread the region. This changed the snow to ice/rain by the early morning hours of February 16 th . Generally, 4 to 6 inches of snow fell followed by around 0.25 inches of ice. Some of the highest snowfall reports were 5.7 inches in New Salem and 5.1 inches in Turners Falls. Winds generally gusted 45 to 55 mph which, combined with the snow and ice, led to widespread power outages.	

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. 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.⁹⁴

Table 66. 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.

The RSI and NESIS classification systems coupled with the NWS warning systems are appropriate for Montague, as they have been used for many of the severe winter storms that have occurred in the region and the community. Storms have not been characterized outside of these systems of classification.

As described in the 2020 HMP, based on data available from NOAA at the time, only 210 winter storms that occurred since 1900 have registered on the RSI scale. Of those, approximately 18 storms resulted in snow falls of at least 10 inches in all or parts of Franklin County.

According to some resources, the Sperry-Piltz Ice Accumulation Index (SPIA® Index) is becoming a resource for characterizing ice events. The index is a copyright product with controlled distribution, according to its developers (refer to <https://spia-index.com/>). The SPIA® Index is “a forward-looking, ice

⁹⁴ NOAA National Centers for Environmental Information. Regional Snowfall Index. Webpage last modified: June 23, 2023. <https://www.ncei.noaa.gov/access/metadata/landing-page/bin/iso?id=gov.noaa.ncdc:C00465>.

accumulation and ice damage prediction index that uses an algorithm of researched parameters that, when combined with National Weather Service forecast data, predicts the projected footprint, total ice accumulation, and resulting potential damage from approaching ice storms. It is a tool to be used for risk management and/or winter weather preparedness.” The index ranges from 0 (“minimal risk of damage to exposure utility systems”) to 5 (“catastrophic damage to entire exposure utility systems”). To date, this type of system has not been needed in Montague, but it would be appropriate for future ice storms.

Vulnerability Assessment

Exposure

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

Built Environment Impacts

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

As Hazus doesn’t support severe winter storms, and in the absence of other readily available severe winter storm models, historical data was used to determine potential losses and probabilities. Review of the data for severe winter storms (including blizzard, heavy snow, ice storm, winter storm, and winter weather) in the NCEI Storm Events Database reveals that between January 2015 and September 2025, Franklin County experienced 86 winter storm events, with no recorded deaths or injuries and no recorded crop damage. The total property damage recorded was \$45,700 for the winter storm events that occurred in the ten-year lookback period. The AAL for Franklin County is estimated to be \$4,570.

Population Impacts

The Town's overall vulnerability to heavy snow and blizzards is primarily related to restrictions on travel on roadways, temporary road closures, school closures, and potential restrictions on emergency vehicle access.

Some traffic accidents associated with storm events may result in 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 several factors including their physical and financial ability to react or respond during a hazard event and the location and construction quality of their housing. Senior and low-income populations and those with mobility issues in Montague 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.

During the Montague HMP Update Public Meeting #1, participants discussed the cost of snow removal preventing some senior and low-income community members from clearing the access to their place of residence to allow for emergency responders, home health care workers, family members, and others to deliver food, medicine, and critical services. Participants also shared concerns about extreme snow and other hazard-related events that cause school closures. When the schools are closed, students who would normally have access to school meals will miss meals, potentially exacerbating existing child and youth hunger and malnutrition issues.

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 downed trees are removed.

Probability of Future Events

The ResilientMass Plan notes that Massachusetts has experienced high-impact snowstorms at the rate of approximately three per year over the past 50 years, although the frequency and severity of winter storms can vary significantly from year to year. The Town of Montague 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.

The ResilientMass Plan estimated that as the climate warms, winter snowfall will be reduced and will generally occur later in the winter season. Additionally, the Climate Change Assessment Report predicted that snowfall events will decline over time from around 5 per month during winter to 1 – 3 per month, but that the frequency of the strongest winter storms may actually increase until winter average temperatures warm above the freezing point late in the century. Overall, the risk of winter storms to people and property can be expected to decline.

Problem Statements for Severe Winter Storms

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 67. 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)	Vulnerable populations may be stranded during a winter storm event and may not be able to travel to emergency services.
Systems (including networks and capabilities)	- Roof ice dams may cause damage to structures. - The electrical grid and roadways are susceptible to failure and loss of use during storms.
Natural, historic, and cultural resources	First responders may have difficulty reaching people if roads are closed due to road closures.
Activities that have value to the community	Severe storms may damage trees in natural areas, and historical and cultural sites.

Tornado

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. The tornado is the most violent of all atmospheric storms. Tornadoes can develop from individual cells within severe thunderstorm squall lines; they can also develop 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.

Tornadoes usually last only a few minutes, but some can last more than an hour and travel dozens of miles. 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 western Massachusetts in May 1995 and caused extensive damage.

Location

According to the NOAA website (last updated May 29, 2025), the U.S. experiences more tornadoes than any other country, and tornadoes can occur in any month across the U.S. According to the NOAA National Weather Service (NWS) Storm Prediction Center (SPC), the U.S. averaged 1,248 tornadoes annually from 2003 to 2022, of which 54% occurred between April and June. During the same period, Massachusetts experienced an average of two tornadoes per year. 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, and Montague is located in this area. However, historically, Franklin County has averaged less than one tornado per year in the last decade. The year in which the County experienced the most tornado activity was 1972, with three recorded events, and the decade with the most tornado activity, with six recorded events, was the 1950s.

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 injuries. 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 event to impact Massachusetts occurred June 1, 2011, affecting communities in Hampden and Worcester Counties. Often referred to as the Springfield Tornado, the long-track EF3 tornado touched down in Westfield and traveled through West Springfield, Springfield, Wilbraham, Monson, Brimfield, Sturbridge, Southbridge, and Charlton. Reportedly, as severe storms developed over western Massachusetts, the NWS issued a tornado warning at 3:28pm for parts of Hampden, Hampshire, and Franklin Counties. The severe storms and tornadoes caused extensive property damage and resulted in a Presidential disaster declaration on June 15, 2011 (FEMA-1994-DR).

Based on review of the NCEI Storm Events database, 25 tornado events were recorded in Franklin County between January 1950 and June 2025, and they resulted in zero deaths, five injuries, a total of \$1.146M in property damage, and no crop damage. Of the 25 events, five were F2 tornadoes, occurring in 1955, 1958, 1963, 1972, and 2006. One of the tornado events during the 75-year period in Franklin County was recorded as Thunderstorm Wind in Montague on July 11, 2006. No deaths or injuries were reported; \$250,000 in property damage and no (\$0) crop damage was reported. Details of the event are as follows:

- Hot and humid air in place over southern New England set the stage for severe thunderstorms throughout the Bay State during the afternoon and early evening. Although storm damage was reported from the Connecticut Valley region to the Worcester Hills and Merrimack Valley, damage was especially severe in eastern Franklin County as well as Boston's North Shore.

Early in the afternoon, one cluster of thunderstorms formed in Franklin County and rapidly

became severe, causing considerable damage in Montague and especially Wendell.

A damage survey conducted by the National Weather Service concluded the damage in Wendell was caused by a combination of straight-line wind damage and a tornado, which was rated as a strong F2 on the Fujita Scale with winds estimated near 155 mph.

Damage began around 2:30 pm EDT, about 200 yards west of Montague Road. Wind damage extended from Montague Road about 1.5 miles east to Wickett Pond in the Wendell State Forest. Large oak, maple, and pine trees were uprooted and snapped in this area. Some oaks over two feet in diameter were snapped about 10 to 15 feet from the ground. Damage from this microburst extended along a path of one and a half miles in length, and anywhere from 50 to 300 yards in width. Wind speeds were estimated near 90 mph.

Tornado damage first appeared on the northeast corner of Wickett Pond. [NOTE: Wickett Pond is in Wendell, MA, approximately five miles east of Montague.] An eyewitness reported seeing a six-foot wave form on the pond. On the west side of the pond, many trees were snapped 15 to 20 feet above the ground, with debris left in a chaotic pattern.

The next area of damage was on Wickett Pond Road, which is where the most severe damage occurred. Trees as large as three feet in diameter were uprooted. Bark was stripped off trees and a house had part of its roof torn off. The tornado tracked to the east along Wickett Pond Road, passing over Depot Road which is in Wendell Center. Part of a roof was torn off an old barn and many trees were uprooted.

After crossing Depot Road, the tornado continued to track to the east, passing north of Morse Village Road. A construction storage trailer was completely destroyed and its roof was wrapped around a tree. Trees were also uprooted or snapped in this area. Damage came to an end about one half mile east of New Salem Road.

The path length of the tornado was approximately three miles. Its average width was 200 yards, varying from 100 to 300 yards.

A tornado that touched down in Goshen (Hampshire County), MA, and Conway (Franklin County), MA, on February 25, 2017, was recorded as an EF1 with a path several miles wide. The extreme weather event included widespread rain showers and a few strong thunderstorms, and by the evening, the NWS was receiving reports of wind gusts as high as 67 mph. Trees and wires were reported down in the communities of Ashfield, Bernardston, Chesterfield, Conway, Deerfield, Gill, Goshen, Montague, Northfield, Shelburne, Turners Falls, Warwick, and Whately. Meteorologists with the NWS called the tornado “a highly unusual occurrence.” It was described as the first recorded tornado to occur in the month of February since official tornado statistics began being kept in 1950. The NCEI Storm Events database recorded the tornado beginning at 19:23 EST in South Ashfield, MA, and ending at 19:27 EST in Conway, MA (i.e., the recorded path did not touch Montague). Details of two related events recorded by NCEI that impacted Montague on February 25, 2017 are as follows.

- Montague Station: *Thunderstorm Wind*. Low pressure moving through Eastern Canada dragged a cold front through New England during the night of the 25th. Showers and thunderstorms ahead of the cold front moved through Western Massachusetts, then dissipated as they moved farther east. At 19:35 EST, trees down on wires on Swamp Road in Montague. Multiple trees down on North Leverett Road in Montague. No deaths, injuries, or crop damage were reported; \$5,000 in property damage was reported.
- Turners Falls. *Thunderstorm Wind*. At 19:52 EST, trees and wires down on South Cross Road in Gill. Tree down on Route 2. No deaths, injuries, or crop damage were reported; \$4,000 in property damage was reported.

Notwithstanding the many previous occurrences of tornadoes in Massachusetts, none have touched down in Montague.

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 68. 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.

The EF scale and the NWS warning products are applicable to all tornadoes that may strike Montague, as they are used throughout Massachusetts on a routine basis and appropriately characterized the tornadoes (retroactively) that affected Montague. Tornadoes have not been characterized outside of the EF scale or the NWS watch/warning system.

Vulnerability Assessment

Exposure

The high winds, heavy rain, lightning, and/or hail associated with tornadoes can cause damage to utilities, structures, roads, trees (potentially causing vehicle accidents) and injuries and death. The entire Town of Montague should be considered exposed to the tornado hazard. Microbursts are also a concern in the Town, as noted in the “Other Severe Weather” section.

Built Environment Impacts

As Hazus does not support assessment of tornado risk, and in the absence of other readily available tornado models, historical data were used to determine potential losses and probabilities.

Based on the data recorded for Franklin County, the County’s average annualized loss would be estimated at \$15,280.

Population Impacts

Populations considered most vulnerable to tornado impacts in the Town of Montague 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 Montague are vulnerable. 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.

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. According to NOAA, from 1995 to 2021, the average frequency of these events has been 2.06 events per year. Massachusetts experienced an

average of 1.4 tornadoes per 10,000 square miles annually between 1991 and 2010, less than half of the national average of 3.5 tornadoes per 10,000 square miles 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. According to the USGCRP, climate models show projections that the frequency and intensity of severe thunderstorms (which include tornadoes, hail, and winds) will increase. 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.

Problem Statements for Tornadoes

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 69. 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.
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. - Sheltering and mass feeding efforts may be required along with debris clearance, search and rescue, and emergency fire and medical services.
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.

Wildfire/Brush Fire

A wildfire can be defined as any non-structure fire, that occurs in vegetative wildland containing grass, shrub, leaf litter, and forested tree fuels. A brush fire is an uncontrolled wildfire burning low vegetation (under six feet tall) like shrubs, grasses, and saplings. 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

According to FEMA, wildland fires fall into three classes: surface fires, ground fires, and crown fires. The most common type is a surface fire, which burns slowly along the floor of a forest, killing or damaging trees. A ground fire burns on or below the forest floor and is usually started by lightning. Crown fires move quickly by jumping along the tops of trees. A crown fire may spread rapidly, especially under windy conditions, and it is extremely difficult to extinguish.

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. 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: 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 gases, which 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, oxygen is commonly abundant in the air and sustains the reaction. Smothering a fire, as with foam or a fire blanket, is often the method employed to remove oxygen 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 the use of dry chemical extinguishers, break up the uninhibited chain reaction of combustion to stop a fire.

Location

The 2023 ResilientMass Plan identified areas with the highest wildfire potential in the state. Among the ecosystems most susceptible to the wildfire hazard are the pine barrens in the Connecticut River Valley. According to the Montague Community Wildfire Protection Plan (December 2015), the total land area of the Town of Montague is approximately 20,109 acres. Approximately 14,170 acres (70% of the total land area) are undeveloped forest. More than 5,900 acres of forest are permanently protected through public

and private ownership and are likely to remain undeveloped in perpetuity. Approximately 2,736 acres are in agricultural use (not including forestry), constituting 14% of the Town's land. More than 1,200 acres have been permanently protected for agriculture.

In 1908, the Commonwealth of Massachusetts paid \$140 to purchase about 25 acres of land on what was then called Millers Plain, "for the purpose of experiment and illustration in forest management." Over the next 75 years, the Commonwealth purchased additional parcels in the area, including what is now the Bitzer Fish Hatchery. In 1999, the Commonwealth purchased nearly 1,500 acres from the Quinnehtuk Corporation, "for fish and wildlife conservation, natural habitat protection, and associated public recreation," creating the Montague Plains Wildlife Management Area. According to the Montague Open Space and Recreation Plan (2017), the addition of another 175 acres brought the total area protected on and around the regionally important glacial sandplain to nearly 1,800 acres.

The 2020 Town of Montague HMP noted that sparks from passing trains, as well as fires started by people, are a wildfire threat to the Montague Plains. The Fire Management Plan for Montague Plains Wildlife Management Area identified two fire-sensitive areas: the clubhouse building along Plains Road on the eastern side of the MPWMA and the electrical transmission lines (on wooden poles) that cross the property. The plan noted that only the largest powerline, running northwest-to-southeast, was on a metal tower.⁹⁵

The Montague Community Wildfire Protection Plan (December 2015) identified the village of Lake Pleasant, on the eastern edge of the Plains, as an area of particular concern with respect to the wildfire hazard. The plan noted that a crown fire west of the village could spread quickly resulting in devastating loss of property and possibly life. Other residential and commercial buildings to the north, northwest, west and southwest of the Plains on Millers Falls Road, Hillside Road and Turners Falls Road were described as somewhat less susceptible to a catastrophic fire but are still considered at risk. Smoke-sensitive areas close to the Plains include major roads, the Turners Falls Airport, Turners Falls High School/Great Falls Middle School, the Sheffield and Hillcrest Elementary Schools, and the Franklin County Technical School.

With the prevalence of invasive species damaging trees, significant dead wood and vegetation is available for a wildfire. This is a potential concern relative to Town-owned watershed protection area lands, the Montague Plains, and other wildlife management and natural resource conservation areas, as well as parks and other forested lands. According to The Montague Community Wildfire Protection Plan (December 2015), fire is a significant natural hazard on the Montague Plains due to the highly flammable nature of the pitch pine-scrub oak vegetation. The plan states that paleoecological evidence strongly suggests fire was a common occurrence on the Plains from 500 to at least 2,000 years before European settlement. It is believed that most of these fires were intentionally set for the purposes of land use management. Historical records indicate that extensive fires (some larger than 1,000 acres) burned through the Plains in the early and middle 20th century followed by numerous smaller fires (less than 5 acres) after about 1950.

⁹⁵ Clark, K.H. and W.A. Patterson III. 2003. Fire Management Plan for Montague Plain Wildlife Management Area. Department of Natural Resources Conservation, University of Massachusetts, Amherst, Massachusetts. https://www.umass.edu/nebarrensfuels/publications/pdfs/montague_fireplan.pdf.

A 1907 fire destroyed most of the homes in Lake Pleasant, the residential community on the edge of the Montague Plains. The last large fire (approximately 460 acres) occurred in 1957.

The wildland-urban interface is the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. As is the case across Massachusetts, the wildland-urban interface areas in Montague are susceptible to wildfire.

Previous Occurrences

Several notable wildfires have occurred in Massachusetts history, although none has resulted in a FEMA disaster declaration. Smaller fires such as brush fires are somewhat easier to characterize. The Leverett fire in June 2020 burned a 56-acre tract of forest after fire crews spent more than a month working to bring it under control. The state's chief fire warden at the time noted that wildfire has always been a part of the region's natural ecological rhythm of disturbance and recovery. The build-up of excessive amounts of fuel such as twigs and needles on the forest floor has contributed to the severity of some fires in Massachusetts, such as the 1957 wildfire in Plymouth that torched 15,000 acres in less than 12 hours.

Participants in HMPC #2 Meeting (December 9, 2025) mentioned a fire that occurred at a solar farm over the summer of 2025. Research identified media coverage of the event and yielded the details as follows. The Turners Falls Fire Department released a statement indicating they received multiple 911 calls around 12:36pm on Sunday, August 10, 2025, for heavy smoke in the area of Sandy Lane near the Montague Transfer Station. On arrival, their crews found a column of smoke in the solar array field. Due to electrical hazards, the crews did not access the area until a solar field representative was contacted to secure the power. The fire burned 0.8 acres of grass, the fire crews put out the fire, and no injuries were reported. The Montague Police Department, Montague Police Dispatch, Shelburne Control Regional Dispatch, Eversource Electric, and Kearsarge Energy assisted.⁹⁶

Late in 2024, the Commonwealth experienced a surge in brush fires, with around 200 fires occurring in October and over 290 occurring in November. According to the Massachusetts Department of Fire Services 2024 Massachusetts Fire Fact Sheet, the occurrence of outdoor fires in 2024 increased 11% from 2023, with 8,948 fires, five civilian fatalities, 21 civilian injuries, 53 fire service injuries, and \$5M in property damage recorded. The fires in 2024 were fueled by severe drought conditions that led to a dramatic spike in fires in October of that year. The Brush Fire Warning issued by the Department of Fire Services on October 28, 2024, indicated that with 47 active brush fires reported statewide, local and state officials were urging residents to use extra caution with any open flame or other heat source outdoors, reminding them that open burning is prohibited statewide through January and in many communities year-round, and encouraging them to enable Wireless Emergency Alerts on their mobile phones.

According to the Massachusetts DCR Bureau of Forest Fire Control and Forestry⁹⁷, October 2024 saw 588 acres burned across Massachusetts through 185 separate fires as of October 29th. The majority of the

⁹⁶ Shook, A. Brush fire at Turners Falls solar field burns nearly an acre. 22 News (WWLP.com). August 11, 2025. <https://www.wwlp.com/news/local-news/franklin-county/brush-fire-at-turners-falls-solar-field-burns-nearly-an-acre/>

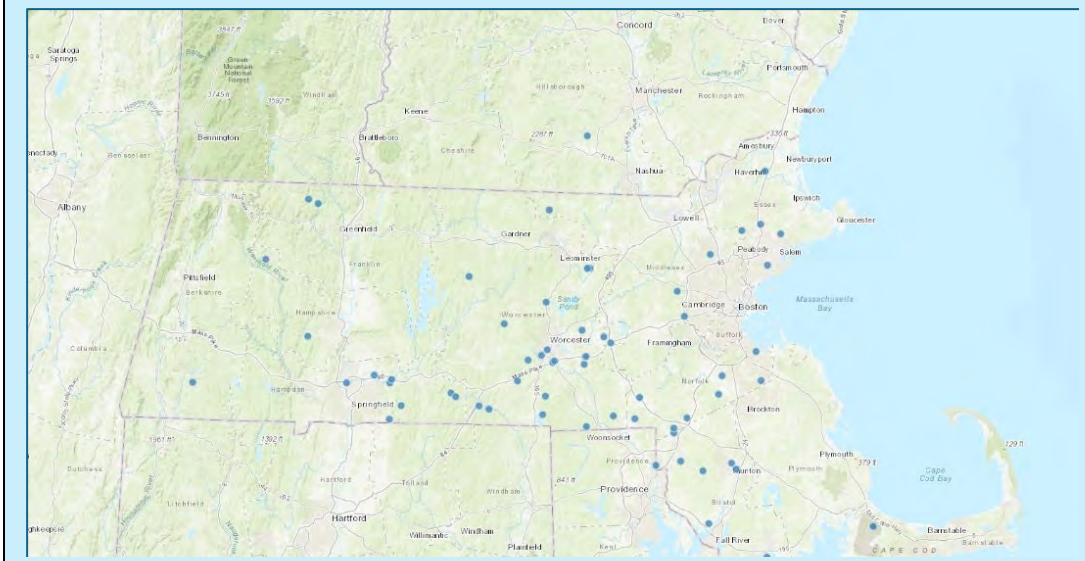
⁹⁷ 22 News WWLP.com. "Massachusetts Wildfire Activity Briefing, October 29, 2024, as of 17:00", <https://www.wwlp.com/wp-content/uploads/sites/26/2024/10/Massachusetts-Wildfire-Activity-Briefing-10-29-24.pdf>

fires occurred during the last week of the month.⁹⁸ Refer to the box below for more information regarding the October 2024 wildfires.

Weather in October 2024 resulted in “abnormally dry” or “moderate drought” conditions across Massachusetts, resulting in multiple wildfires. Conditions were particularly susceptible to wildfires during the last week of the month. The NWS issued a Red Flag warning on Friday, October 25. Over the weekend, 126 brush fires were reported burning over 548 acres across Massachusetts into the following week:

- The Cain Hill brush fire burned over 133 acres in Salem, Lynn, Peabody, and other communities. Two other multi-acre fires also occurred in Salem.
- The Middleton Pond brush fire burned over 250 acres in Middleton, North Reading, and Breakheart Reservation in Saugus.
- A brush fire in Millbury killed a woman in an encampment where the fire was believed to have started.
- The Papas 32-acre brush fire occurred in Canton.
- Other areas with brush fires include Brockton, Devens, Haverhill, Holden, Leominster, Milton, New Bedford, North Andover, Springfield, Sutton, Westfield, Weston, Wilmington, Worcester

A major challenge for firefighters was limited resources with so many other fires occurring at the same time. The statewide Fire Mobilization Plan was activated to organize firefighting resources. The state National Guard was deployed to provide water drops onto the larger fires. Air quality was affected throughout Massachusetts, particularly on the North Shore with the worst air quality found in Lynn, Saugus, Swampscott, and Salem. Salem High School shut down classes early on Tuesday, 10/29 due to poor air quality, and the annual Trick or Treat festival in Reading was cancelled due to air quality concerns.



⁹⁸ Advance Local Media LLC. MASS LIVE. Wildfires spread across Massachusetts amid dry, windy weather. October 29, 2024. <https://www.masslive.com/news/2024/10/wildfires-spread-across-massachusetts-amid-dry-windy-weather.html>

The Massachusetts Department of Fire Services 2023 Annual Report noted that brush, trash, and other outside fires accounted for 31% of the total fire incidents statewide in 2023. The category ‘outside and other’ fires, which includes natural vegetation fires, is differentiated from structure fires and vehicle fires. In 2023, Massachusetts experienced 8,064 outside and other fires, which caused two civilian deaths, 23 civilian injuries, 49 fire service injuries, and an estimated loss of \$3.5M. These fires accounted for 31% of the total fire incidents in 2023. Of the 8,064 reported total outside and other fires, 4,208 were natural vegetation fires, which include forest, woods, or wildland fires; grass fires, brush or brush and grass mix fires; and unclassified natural vegetation fires. The 2023 natural vegetation fires burned 2,330 acres, and the losses recorded for these incidents included two civilian deaths, one civilian injury, 20 fire service injuries, and an estimated economic loss of \$701,933.

These types of fires are the most variable category of fire from year to year. Large increases and decreases are not uncommon and are often linked to weather patterns. In 2023, the reported number of natural vegetation fires dropped by 2,244, or 35%, from the 6,452 reported in 2022, which had the 7th highest number of brush fires on record, to 4,208. The estimated statewide natural vegetation fire counts and associated losses from 2012 through 2023 are provided in Table 70.⁹⁹

Table 70. Statewide Natural Vegetation Fire Counts (2012-2023).

Year	Total Number of Events	Injuries/deaths (civilians and fire service)	Reported Losses
2023	4,208	21/2	\$701,933
2022	6,452	Not available	Not available
2021	4,205	Not available	Not available
2020	6,388	Not available	Not available
2019	2,974	12/0	\$136,357
2018	3,253	1/5	\$493,145
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 dataset, fire event counts for Franklin County between 2012 and 2023 were as shown in Table 71.

⁹⁹ Massachusetts Department of Fire Services. Massachusetts Fire Incident Reporting System. 2023 Annual Report. <https://www.mass.gov/doc/2023-mfirs-annual-report/>.

Table 71. Outside and Other Total Fire Events - Franklin County, MA.

Year	Outside and Other Fires	Total Fires	Reported Losses - Outside and Other Fires
2023	95	236	Not available
2022	Not available	Not available	Not available
2021	105	239	\$21,377
2020	127	259	Not available
2019	93	224	\$510,079
2018	110	296	\$35,500
2017	113	253	\$13,520
2016	158	342	\$151,649
2015	159	314	\$3,000
2014	40	69	\$304,021
2013	80	103	\$109,400
2012	64	118	\$228,400

The ‘Other Fire’ statistics compiled by the MFIRS and reported in the Franklin County Profile are provided in Table 72. The data include the Montague Center and Turners Falls Fire Districts.

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 Montague is presented below. The right-hand side of the table lists the figures presented in the previous edition of this plan, for comparison.

Table 72. Estimated Brush Fire Event Losses Reported for Montague, MA.

Year	Estimated Brush Fires* (Franklin County / Montague)	Estimated Brush Fire Losses*
2023	49 / Not available	\$7,932
2021	55 / 7 (Montague Center and Turners Falls)	\$3,820
2020	66 / 5 (Turners Falls)	Not available
2019	48 / 5 (Turners Falls)	\$5,078
2018	36 / 6 (Montague Center and Turners Falls)	\$6,695
2017	59 / 7 (Montague Center and Turners Falls)	\$3,282
2016	82 / 8 (Montague Center and Turners Falls)	\$5,446
2015	60 / < 1 (Montague Center and Turners Falls)	\$7,599

*Estimated from Countywide fire data provided in MFIRS Annual Reports and County Profiles.

The USDA declares agricultural disasters as needed for a variety of hazards. No agricultural disasters were reported for Massachusetts over the last 10 years that were related to wildfires.

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 (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.

The various wildfire classification systems coupled with the detection and warning systems are believed appropriate for Montague given the fact that extensive wildfires have occurred in the community. Wildfires have not been characterized outside of these systems of classification.

Vulnerability Assessment

Exposure

To help identify potential wildfire areas for the Town of Montague, the wildfire hazard potential mapping from The Montague Community Wildfire Protection Plan (2015) was used to identify primary wildfire risk, secondary wildfire risk, and areas of ignition risk (transmission lines, railroad, and riverbank). The primary wildfire risk area was used to conduct the exposure analysis identifying the buildings at risk, and details are provided in Table 73.

Table 73. Buildings at Risk to Wildfire Hazard (Primary Wildfire Risk Area).

Building Type	Number of Buildings in Primary Wildfire Risk Area (Total in Town)	Building Value in Primary Wildfire Risk Area (Total in Town)
Single Family	213 (3,188)	\$27,399,300 (\$445,773,000)
Multi-Family	12 (898)	\$2,458,300 (\$179,501,600)
Government	13 (98)	\$2,613,600 (\$82,691,700)
Industrial	4 (75)	\$4,518,200 (\$277,187,352)
Outbuildings	6 (181)	\$79,200 (\$23,757,900)
Vacant	9 (120)	\$0 (\$311,100)
Total	257 (4,834)	\$37,068,600 (\$1,358,087,352)

The residential properties data indicate that 213 single-family and 12 multi-family residential buildings in the Town are located within the primary wildfire risk area. In addition, four critical facilities in the Town were identified in the primary wildfire risk area, and Table 74 shows the results of this analysis.

Table 74. Critical Facilities in Primary Wildfire Risk Areas - Town of Montague.

Facility Name	Address
Turners Falls Water Department	226 Millers Falls road, Turners Falls, MA 01376
Turners Falls Reservoir	Reservoir Dr, Turner Falls, MA 01376
Power Canal Bridge	Turners Falls road, Montague, MA 01351
Pumping Station	92 Green Pond road, Lake Pleasant, MA 01347

The population exposed to the primary wildfire risk areas and the total population data are provided by demographic segments in Table 75.

Table 75. Population Exposed to Primary Wildfire Risk Areas (2020 U.S. Census).

Demographics	Population in and Adjacent to Wildfire-Prone Areas	Total Population
Population	333	8,536
Households	0 (0%)	11763
White	0 (0%)	24,809 (88.3%)
Black	0 (0%)	561 (2.0%)
American Indian	0 (0%)	38 (0.1%)
Asian	0 (0%)	655 (2.3%)
Pacific Islander	0 (0%)	6 (0.02%)
Other Race	0 (0%)	599 (2.1%)
Two or More Races	0 (0%)	1,419 (5.1%)
Hispanic or Latino:	0 (0%)	1,245 (4.4%)
Population under 18	0 (0%)	5,128 (18.3%)
Population over 64	0 (0%)	6,113 (21.8%)
Annual Income < \$30K/year	0 (0%)	1,488 (12.6%)
Population in EJ Zone*	0 (0%)	2,853 (10.2%)

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

Based on The Montague Community Wildfire Protection Plan (December 2015), Figure 48 shows the areas within the Town of Montague boundary by ignition and wildfire risk.

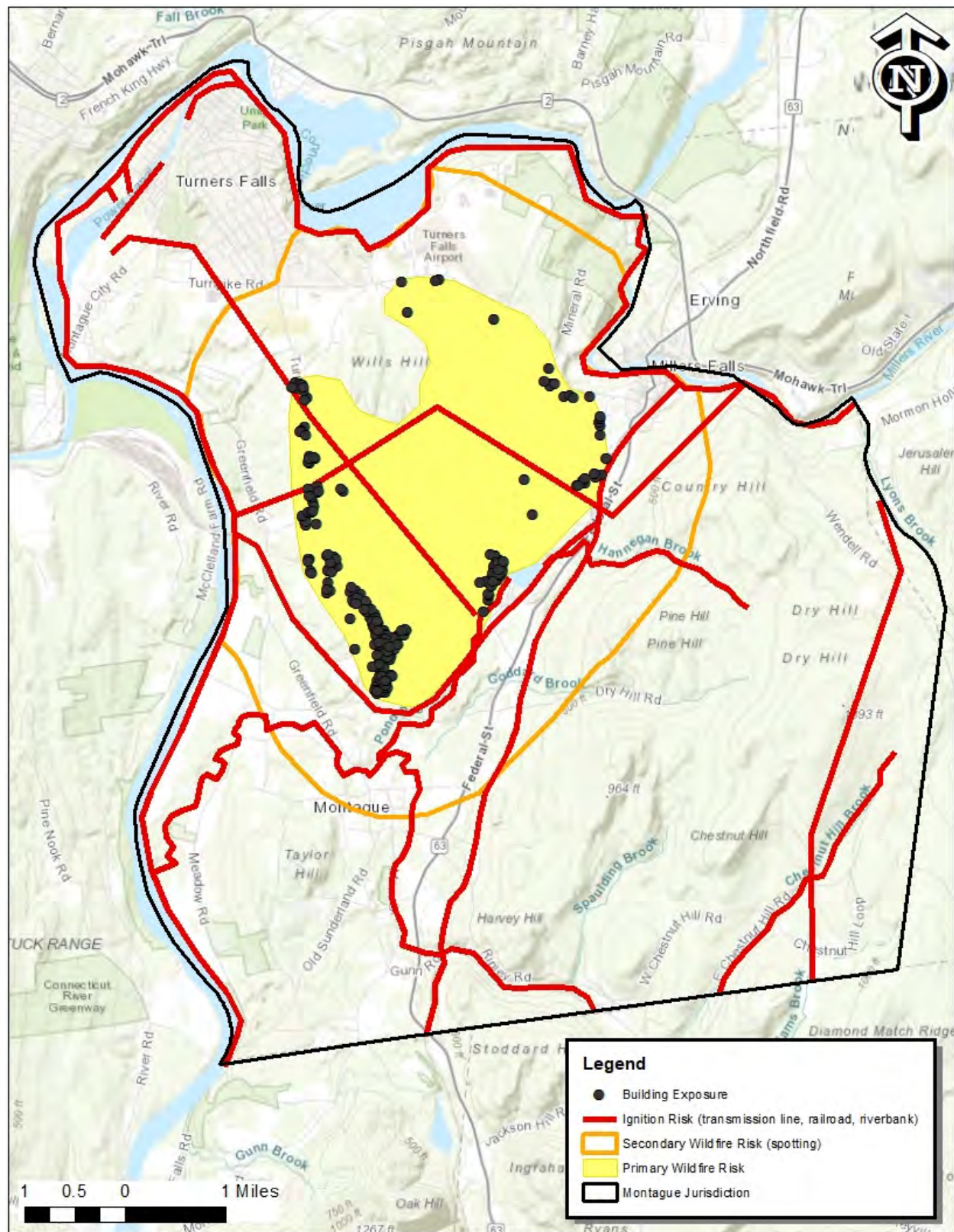


Figure 48. Wildfire Hazard Risk and Building Exposure - Town of Montague.

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.

Review of the NCEI Storm Events Database indicates that no reportable wildfire events were recorded in Franklin County from January 1996 through September 2025. Accordingly, no property damage, injuries, or deaths were reported associated with wildfires in Montague during the same period. Using the wildfire high risk exposure and assuming a major wildfire destroying all property and assigning this catastrophic event as a 1,000-year event, the AAL for Montague would be \$37,069.

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 brush fires.

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 Montague 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.

Air quality can also be impacted due to major wildfires. The Canadian wildfires in 2022 impacted the air quality of communities throughout Massachusetts, and the Canadian wildfires in 2024 impacted the air quality in counties in western and central Massachusetts. Individuals with asthma and smoke-sensitivity could be severely impacted by poor air quality leading to life and business disruption. Animals kept outside could also be impacted by poor air quality.

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 trees and forested areas, parks, and recreation areas. According to the ResilientMass Plan, the ecosystems most at risk from wildfires in the Commonwealth are pitch pine, scrub oak, and oak forests.

The Massachusetts Department of Fisheries, Wildlife, and Environmental Law Enforcement developed and implemented a fire management plan (FMP; July 2003) that defines a program to manage wildland fire on Montague Plain Wildlife Management Area for ecological health and public safety. The FMP addresses the prevention of and response to wildfires and the use of prescribed burning to reach resource management objectives. The FMP notes that without an active fire management program, fuels would continue to accumulate to very hazardous levels, ignitions could become more frequent due to uncontrolled human use of the site, fire-adapted natural communities and their component rare species would degrade, and human lives and homes would face the risk of catastrophic wildfire.



Figure 49. Montague Plains Prescribed Burn.

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.

As stated in the FMP, the presence of fire-prone vegetation and the extensive history of fire indicates that the Montague Plain will continue to experience fires.

The ResilientMass Plan projects summer rainfall to decrease as much as 15% in the next decades. In combination with higher temperatures and winds, this drop in precipitation would contribute to additional fire risk. Forest response to increased atmospheric carbon dioxide – the so-called “fertilization effect” – could also contribute to more tree growth and thus provide more fuel for wildfires. Climate change may increase winds that spread fires. Faster moving fires are harder to contain and thus are more likely to expand into residential neighborhoods. Reduced stream flows and pond depths may also impact the number and quality of access points for rural firefighting. Overall, the risk of wildfires to people and property in Montague can be expected to increase as a result of climate change.

Problem Statements for Wildfires

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 76. 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. - Fire poses direct risks to structures, emergency workers, and people living in or near exposed areas, as well as indirect risks to public health due to smoke.
Structures (including facilities, lifelines, and critical infrastructure)	Some structures are found in the higher probability burn areas such as the town forest. 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 the Town. - The economic consequences of wildfires can be substantial, due to the initial loss of structures, and to the loss of revenue from business and tourism, and natural heritage.
Activities that have value to the community	Recreational activities may be adversely impacted by wildfires, depending on location.

Hazardous Materials Incident

Description

Hazardous materials can be found in many forms and quantities that can potentially cause death; serious injury; long-lasting health effects; and damage to buildings, homes, and other property in varying degrees. Such materials are routinely used and stored in many homes and businesses and are also shipped daily on the nation's highways, railroads, waterways, and via pipelines. This subsection on the hazardous materials incident hazard is intended to provide a general overview of the hazard, and the threshold for identifying sources of hazardous materials is limited to available general information based on local knowledge and EPA-identified fixed HAZMAT sites determined to be of greatest significance as appropriate for the purposes of this plan.

In essence, HAZMAT incidents consist of solid, liquid, and/or gaseous contaminants that are released from fixed or mobile containers, whether by accident or by design as with an intentional terrorist attack. A HAZMAT incident can last hours to days, while some chemicals can be corrosive or otherwise damaging over longer periods of time. In addition to the primary release, explosions and/or fires can result from a release, and contaminants can be extended beyond the initial area by persons, vehicles, water, wind, and possibly wildlife as well.

Hazardous material(s) (HAZMAT) incidents occur at fixed facilities as well as in transportation-related accidents involving mobile sources carrying HAZMAT in the air, by rail, roads/highways, and on the water. Thousands of HAZMAT events occur each year, many of those are highway incidents, some are railroad incidents, and a few hundred are due to other causes. HAZMAT incidents can include the spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment of a hazardous material. Participants in the Town of Montague Community Resilience Building (CRB) Workshop in 2018 expressed concern about hazardous materials transported by rail and road. Accordingly, the 2020 HMP covered transportation-related industrial accidents in detail, focusing on the transport of freight and goods to and from Franklin County by truck and by rail. This HMP update focuses on the risk of industrial accidents at fixed facilities and the potential releases that can affect nearby populations and contaminate critical natural resources or environmentally sensitive areas.

HAZMAT incidents can also occur as a result of or in tandem with natural hazard events, such as floods, hurricanes, tornadoes, and earthquakes, which in addition to causing incidents can also hinder response efforts. In the case of Hurricane Floyd in September 1999, communities along the Eastern United States were faced with flooded junkyards, disturbed cemeteries, deceased livestock, floating propane tanks, uncontrolled fertilizer spills, and a variety of other environmental pollutants that caused widespread toxicological concern.

Location

As a result of the 1986 Emergency Planning and Community Right to Know Act (EPCRA), the EPA makes available to the public information on hazardous materials by location of their storage, use, handling, and disposal. One facet of this program is the collection of information from industrial facilities on the releases and transfers, including waste management activities, of certain toxic chemicals. This information is entered by the facilities in the EPA Toxics Release Inventory (TRI). The locations of TRI reporting facilities indicate where such activity is occurring. Based on a search of the EPA TRI database, as of 2024, the three TRI reporting facilities in Montague were located in Turners Falls. Details of the reporting facilities are provided in Table 77.

Table 77. TRI Reporting Facilities in Montague - Turners Falls (2024).

Name and of TRI Reporting Facility	Facility Address	Parent Company / Industry Sector	Chemicals Reported
Judd Wire Inc. Id # 110000308649	124 Turnpike Road Turners Falls MA 01376	Sumitomo Electric USA Holdings / Primary Metals	Copper Antimony and Antimony Compounds Zinc Compounds
Hart & Cooley LLC Id # 110030476811	130 Industrial Blvd Turners Falls MA 01376	Duravent Inc. / Fabricated Metals	Nickel Chromium
Charter Next Generation - Turners Falls	18 Industrial Blvd Turners Falls MA 01376	Charter Next Generation Inc. / Plastics and Rubber	Ozone

It is possible that other facilities in Montague are using or storing hazardous materials, either in compliance or not in compliance with regulatory requirements, and that spills and releases occur at levels below or above the threshold for TRI reporting and are not reported. Based on the likely presence of unreported sites, all developed areas of the Town are considered to be at risk to this hazard.

As stated in the 2020 HMP, in addition to the facilities described above, many farmers store agricultural chemicals on their properties. Given that much farmland is in or near floodplains and their adjacent water bodies, the potential for an accidental hazardous materials spill to impact water quality is present. This plan does not include an in-depth evaluation of hazardous materials as they relate to farming. In many cases, farmers use and store pesticides, herbicides and fertilizers on their property, and in most cases, farmers are utilizing best management practices in the use and storage of agricultural chemicals and have undergone any required training and licensing if they are applying these chemicals to the land. Despite training and best management practices, accidental release of hazardous materials can occur and potentially threaten human health and the environment.

In addition to fixed facilities, highway corridors, such as Interstate 91, near the Town, are most likely to be the site of mobile hazardous materials incidents. The USDOT has specific regulations for shipping hazardous materials and requires transporters to identify hazardous materials for transportation in accordance with the regulations. A USDOT hazardous material classification is applied if a material, in a particular amount and form, poses an unreasonable risk to health, safety or property. Although the risk of transportation-related HAZMAT incidents in the Town is not analyzed in detail in this HMP update, the topic is addressed by the Town of Montague in other planning efforts and emergency response and management plans.

Previous Occurrences

The HMPC did not provide specific details regarding previous HAZMAT incidents in the Town. Research on spills and releases in the area identified a June 2025 incident in which 445 gallons of hydraulic oil was released into the Connecticut River from the Turners Falls dam. The MassDEP issued an administrative consent order to FirstLight Hydro Generating Company, citing violations including discharging pollutants on the surface water without a permit and failure to notify MassDEP within two

hours of “obtaining knowledge that a threat of release is present.” The company paid \$20,000 in fines, completed response actions, and committed to a complete resolution of the issue.¹⁰⁰

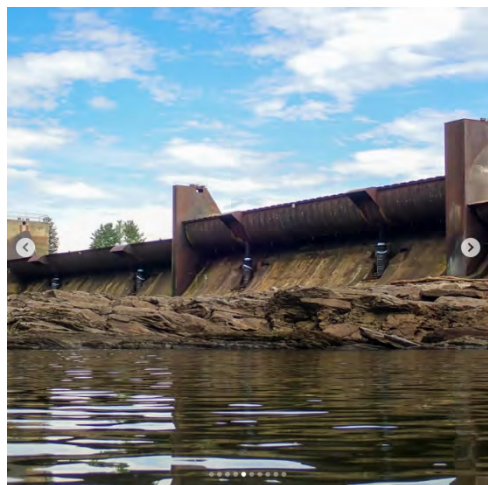
The 2020 HMP noted that the Vermont Yankee Nuclear Power Station, located on the Connecticut River in Vernon, VT, near the VT/MA border, and previously owned and operated by Entergy Corporation, had officially disconnected from the power grid on December 29, 2014. The nuclear reactor was manually shut down without incident, and the transfer of spent fuel from the reactor to the spent fuel pool was completed on January 12, 2015. The transfer of all Vermont Yankee spent fuel to dry cask storage was completed on August 1, 2018. On December 6, 2018, the Vermont Public Utilities Commission approved Entergy’s sale of Vermont Yankee to subsidiaries of NorthStar Group Services, Inc., as a means of

Figure 50. Hydraulic Fluid Spill.

completing the decommissioning and site restoration on an accelerated schedule.¹⁰¹ The 2020 HMP described the site as a hazardous materials facility outside the Town that previously (January 2010) reported detection of radioactive tritium in a groundwater monitoring well, indicative of an unintended release of radioactive material into the environment, including the Connecticut River. While Vermont Yankee is no longer in operation, the storage of spent fuel at the site still presents a potential risk, and Montague officials should stay abreast of proper evacuation procedures in the event of an accident at the Vermont Yankee Nuclear power plant site.

Based on a search of the U.S. Department of Transportation (DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Hazardous Materials Safety - Incident Reports Database, from January 2015 through October 2025, no Hazardous Materials Incidents (releases during transportation) were reported for the Town of Montague.

Extent



The extent of hazardous materials incidents can be defined in terms of the quantity of material released. For incidents involving any chemical, including oil or a hazardous material, there is a Reportable Quantity (QC) or Reportable Concentration (RC) that triggers the need to notify MassDEP. The RQs and RCs are published on the Massachusetts Oil and Hazardous Material List.¹⁰²

In Massachusetts, hazardous materials are defined under the Commonwealth’s regulations as substances that pose a risk to human health or the environment. Reporting requirements for hazardous materials spills are specified in the Massachusetts Contingency Plan and regulated by the MassDEP. The

¹⁰⁰ Hoffman, E-L. FirstLight pays \$20K for June oil spill. Daily Hampshire Gazette. September 4, 2025. <https://gazettenet.com/2025/09/04/firstlight-hydro-fined-oil-spill/>.

¹⁰¹ State of Vermont Department of Public Service. A Brief History of Vermont Nuclear Power: Vermont Yankee Nuclear Power Station. Retrieved on December 16, 2025, from: <https://publicservice.vermont.gov/public-advocacy/vermont-yankee-decommissioning/vermont-nuclear-decommissioning-citizens-advisory-5>.

¹⁰² Massachusetts Department of Environmental Protection. Search the Massachusetts Oil and Hazardous Material List (MOHML version 1.0, 2008). <https://eeaonline.eea.state.ma.us/DEP/MOMHL/hazmat.aspx>.

MassDOT oversees the transportation of hazardous materials in Massachusetts by enforcing regulations set forth by the federal government, particularly the U.S. Department of Transportation Hazardous Materials Regulations. The MassDOT works closely with other agencies such as the MassDEP to coordinate emergency response procedures in the event of a hazardous materials spill or release during transportation.

With any hazardous material release, the severity of an incident depends on several extenuating circumstances, including weather conditions, terrain, and compliance (or lack thereof) with codes, type of material released, and response time for emergency personnel.

Observers of hazardous materials incidents in Montague can report them by calling 9-1-1, and the Montague Center Fire Department and Turners Falls Fire Department will determine the appropriate level of response.

The warning systems related to hazardous materials incidents include the Town of Montague public warning system, which allows residents and business owners to sign up to receive text alerts that provide critical information during emergencies such as severe weather and public safety incidents. After the emergency notification system CodeRed was impacted by a data breach, the Town Selectboard approved a contract with Rave Mobile Safety to provide residents with a new communication method that does not require usernames or passwords.¹⁰³

No reports of direct or indirect impacts on the Town were available at the time of this HMP update in reference to the hydraulic oil release from the Turners Falls dam into the Connecticut River (2025) or the leak/release of radioactive tritium into groundwater and possibly the Connecticut River (2010). Therefore, the extent and severity of the impacts of these incidents on Montague have not been estimated, measured, calculated, or otherwise quantified.

Vulnerability Assessment

Exposure

Although the entire Town is susceptible to hazardous materials incidents, most hazardous materials incidents that occur are contained and suppressed before destroying any property, interrupting business and other activities, or threatening lives. Nonetheless, these incidents can have a significant negative impact. Such events can cause deaths or injuries and result in the closing down of roadways, buildings, or facilities. In a hazardous materials incident, solid, liquid, and/or gaseous contaminants may be released from fixed or mobile containers. Weather conditions will directly affect how the hazard event develops. Certain chemicals when released or discharged may travel through the air or water, affecting an area much larger than the point of the release itself. Noncompliance with fire and building codes, as well as failure to maintain existing fire and containment features, can substantially increase the damage from a

¹⁰³ Hoffman, Erin-Leigh. Montague adopts new emergency notification platform after CodeRED data breach. Greenfield Recorder. December 16, 2025. <https://recorder.com/2025/12/16/montague-switches-emergency-platform/>.

hazardous materials release. The duration of a hazardous materials incident can range from hours to days. Where detection and alert systems are lacking, warning time can be minimal to none.

The 2020 HMP noted that the blighted and abandoned properties in the canal district of Turners Falls are a hazardous materials concern for the Town. Some of these properties have known or suspected contaminants and have been targets of arson in the past. The Patch neighborhood abuts the canal district area and is vulnerable to releases of toxic chemicals from flooding or fire. In addition, the Keith Street apartments and Winslow Wentworth House public housing are in proximity to the area, as well as many multi-family homes on Canal Street. In the past, some of the eight bridges that access the canal district have been closed or only partially functional, posing a public safety access concern for this neighborhood.

It should be noted that the Town is making progress toward cleaning up and restoring or repurposing some of the mill sites. As an example, in 2024, the Town of Montague received a \$5M earmark from the Massachusetts Department of Conservation and Recreation (originally included in the state's 2018 environmental bond bill) for demolition and restoration of the Strathmore Mill Site (20 Canal Road) in Turners Falls. The historic paper mill complex, located between the Connecticut River and the Turners Falls/FirstLight Power Canal, was constructed from 1874 to 1970 and last saw large-scale industrial use under ownership of International Paper, which ceased operations in 1994. The DCR funding will be combined with the previously secured \$4.9M EPA Brownfields Cleanup Grant to enable the Town to proactively and responsibly address the substantial environmental and economic impacts associated with an uncontrolled collapse of the mill, which was determined to be imminent.¹⁰⁴

Built Environment Impacts

Most hazardous material releases do not directly affect critical facilities and infrastructure. Some critical infrastructure facilities use hazardous and toxic chemicals to operate, such as chlorine for water treatment and PCBs for electrical transformers. Similarly, the contamination of the water supply may be treated like a hazardous material release. Propane, oil, and natural gas, fuels needed for heating, can also be hazardous if released during their delivery due to their flammable and explosive potential. Transportation may be limited if a key roadway is blocked by an incident.

A hazardous material release can result in potential losses to buildings due to inaccessibility, contamination, and structural and contents losses, for example, from an explosion, as well as possible economic losses caused by business closures and associated business disruption.

Given the large number of historic properties, buildings, and districts in Montague, it is possible that these sites, along with other cultural resource sites and/or critical facilities, may be at risk of impacts from a future hazardous materials incident at one of the TRI reporting facilities identified in Table 77. Although historical evidence indicates that the Town is susceptible to hazardous materials events, no reports of past incidents and the associated damage estimates are available. Therefore, the potential annualized loss for the Town is not calculated.

¹⁰⁴ Town of Montague. Town of Montague Receives Nearly \$10M in Demolition and Restoration Funds for Strathmore Mill Site. May 22, 2024. <https://montague-ma.gov/n/294/Town-of-Montague-Receives-Nearly-10M-in-Demolition-and-Restoration-Funds-for-Strathmore-Mill-Site>.

Population Impacts

Populations considered most vulnerable to hazardous material incidents are identified based on several factors including their physical and financial ability to react to the immediate or long-term impacts of the hazard. Residents and community members engaged in outdoor activities are vulnerable to acute exposure to airborne releases, particularly if they are located downwind of the source.

Environment Impacts

Hazardous materials, including commonly used chemicals, when disposed in any uncontrolled manner (e.g., dumping), improperly managed, or accidentally released due to spillage or leaking, present a public health hazard, as exposure can result in immediate or long-term health effects. Once released into the environment, some hazardous materials and substances persist without biodegradation for long periods of time, posing a health risk to future generations who may be exposed to contaminated water, soil, and plants/animals in the food chain.

A hazardous material release can include significant environmental impacts, as described below.

- Hydrologic effects
 - Surface and groundwater contamination
 - Other effects on water quality such as changes in water temperature
 - Damage to streams, lakes, ponds, estuaries, and wetland ecosystems
- Air and soil quality effects
 - Pollutants, smoke, and dust
 - Loss of quality in landscape and soil quality
- Damage to plant communities
 - Loss of biodiversity
 - Damage to vegetation
- Damage to animal species
 - Animal fatalities
 - Degradation of wildlife and aquatic habitat
 - Pollution of drinking water for wildlife
 - Loss of biodiversity
 - Disease

As noted in the 2020 HMP, one approach that the Town could take to help prepare for a hazardous materials spill on a farm would be to become familiar with the types and quantities of chemicals stored on site at the larger farms. This would assist first responders in being adequately prepared to protect human health and prevent contamination of the environment in the event of a major spill or other accidental release of hazardous materials from farm operations.

Probability of Future Events

In general, the future probability of a hazardous material incident is scale dependent. For example, the probability of a small-scale hazardous material incident such as a limited oil spill is considered high, whereas the probability of a large-scale incident is considered low.

Problem Statements for Hazardous Materials Incident

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 78. Problem Statements for Hazardous Materials Incident.

Assets	Problems Associated with Hazardous Materials Incident
People (including underserved communities and socially vulnerable populations)	- Older residents may have difficulty evacuating during a hazmat spill or release incident. - Individuals with mobility issues and limited English language proficiency may require additional support in case of evacuation.
Structures (including facilities, lifelines, and critical infrastructure)	Some residential and historic structures may be located near sites with hazardous materials.
Systems (including networks and capabilities)	Hazmat spills may cause roads to be closed requiring detours.
Natural, historic, and cultural resources	Hazardous materials released in and near the Town may impact valuable natural, historic, and cultural resources, including the Montague Plains, Montague State Forest, the Connecticut River Scenic Farm Byway, and Montague Center Historic District.
Activities that have value to the community	Recreational activities may be adversely impacted by hazardous materials spills and releases.

National Flood Insurance Repetitive Loss Properties

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

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.

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.

According to data provided by MEMA, no (zero) repetitive loss properties or severe repetitive loss properties are in the Town of Montague.

A summary of the Town's participation and compliance with the NFIP, including current policy and historical claims statistics, is provided in 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 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:

$$\text{Hazard Score Value} = [(Probability \times 30\%) + (Impact \times 30\%) + (Spatial \text{ Extent} \times 20\%) + (Warning \text{ Time} \times 10\%) + (Duration \times 10\%)]$$

Table 79 provides the hazard characteristic, level description, level criteria, level index value, and weighting value.

Table 79. Hazard Ranking Criteria.

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

	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 80 provides the final hazard ranking for Montague. 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 2.7 or greater, it was assigned as a high risk hazard. If the value was greater than or equal to 2.0 and less than or equal to 2.7, it was assigned as a moderate risk. If the value was less than 2.0, it was assigned as a low risk hazard. The flooding from precipitation, severe winter storms, and other severe weather hazard were

ranked highest. The coastal flooding, droughts, average and extreme temperatures, hurricanes/tropical storms, coastal erosion, flooding from dam failure and overtopping, tornadoes, and wildfire/brushfire hazards were all ranked as moderate. The invasive species, earthquakes, and landslides hazards are ranked as low. This ranking is the average for the year with an understanding that some of the hazards become a greater concern with specific environments and seasons.

Table 80. Ranking of Hazards for Montague.

Hazards	Probability	Impact	Spatial Extent	Warning Time	Duration	Value	Rank
Flooding from Precipitation	4	3	2	3	2	3	High
Severe Winter Storms	4	2	4	1	3	3	High
Average and Extreme Temperatures	4	2	4	1	2	2.9	High
Other Severe Weather	4	2	4	2	1	2.9	High
Wildfire/Brush fire	2	3	3	3	3	2.7	Mod.
Hurricanes/Tropical Storms	3	2	4	1	2	2.6	Mod.
Drought	2	2	4	1	4	2.5	Mod.
Flooding from Dam Failure	2	3	2	4	2	2.5	Mod.
Tornado	2	4	1	3	1	2.4	Mod.
Hazardous Material Incident	2	3	1	4	2	2.3	Mod.
Invasive Species	3	1	2	3	4	2.3	Mod.
Landslide	2	2	1	4	3	2.1	Mod.
Earthquake	1	1	4	4	1	1.9	Low

The following table summarizes changes in population, land use, and development as indicators of the potential impacts of the hazards relative to future conditions.

Table 81. Changes in Population Patterns and Land Use and Development.

Hazards	Changes in Population Patterns	Changes in Land Use and Development
Flooding from Precipitation	There is a growing elderly population exposed to the floodplain: - along Avenue A from 3rd Street north; and - near the intersection of Montague City Road and Greenfield Road.	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
Severe Winter Storms	The Town's elderly population has increased from 16.5% in 2010 to 24.0% in 2020. The number of people living below the poverty line has decreased from 13.1% in 2010 to 11.0% in 2020.	Should not be impacted by changes in land use and development.
Average and Extreme Temperatures	The Town's elderly population has increased from 16.5% in 2010 to 24.0% in 2020. The number of people living below the poverty line has decreased from 13.1% in 2010 to 11.0% in 2020.	All new developments will exacerbate heat island effect if the development includes tree removal and adding black surfaces such as asphalt and roofs.
Other Severe Weather	The Town's elderly population has increased from 16.5% in 2010 to 24.0% in 2020. The number of people living below the poverty line has decreased from 13.1% in 2010 to 11.0% in 2020.	Should not be impacted by changes in land use and development.
Wildfires and Brush Fires	There is no moderate or higher wildfire risk in the Town, and therefore no changes in the exposed population.	Development in or adjacent to a forested or brushland area can lead to a higher risk of wildfire.
Hurricanes and Tropical Storms	The Town's elderly population has increased from 16.5% in 2010 to 24.0% in 2020. The number of people living below the poverty line has decreased from 13.1% in 2010 to 11.0% in 2020.	Should not be impacted by changes in land use and development.
Drought	The Town's elderly population has increased from 16.5% in 2010 to 24.0% in 2020. The number of people living below the poverty line has decreased from 13.1% in 2010 to 11.0% in 2020.	All new developments will create more demand for limited water resources.
Flooding from Dam Failure and Overtopping	There is a growing elderly population exposed to the dam inundation areas: - along Avenue A from 3rd Street north; and - near the intersection of Montague City Road and Greenfield Road.	

Hazards	Changes in Population Patterns	Changes in Land Use and Development
	There is a growing population living below the poverty line exposed to the dam inundation areas near the intersection of Canal Street and 2 nd Street.	
Tornado	The Town's elderly population has increased from 16.5% in 2010 to 24.0% in 2020. The number of people living below the poverty line has decreased from 13.1% in 2010 to 11.0% in 2020.	Should not be impacted by changes in land use and development.
Hazardous Materials Incident	There is a growing elderly population living in proximity to hazardous material sites near the intersection of Millers Falls Road and Industrial Boulevard.	
Invasive Species	Should not be impacted by population changes.	Should not be impacted by changes in land use and development.
Landslide	There is a growing elderly population in the landslide-prone area along Millers Falls Road and Unity Street, as well as along Avenue A between 7 th Street and 11 th Street. There is a growing population living below the poverty line near the intersection of Canal Street and 2 nd Street.	Existing land use regulations will help to keep development out of landslide-prone areas.
Earthquake	The Town's elderly population has increased from 16.5% in 2010 to 24.0% in 2020. The number of people living below the poverty line has decreased from 13.1% in 2010 to 11.0% in 2020.	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 82. Problem Statements Summary.

Hazard	Problem Summary
Flooding from Precipitation	- Older populations and lower income households in the floodplain may have difficulty evacuating. - Approximately 52 buildings are in the floodplain, including residential, industrial, and government buildings, as well as outbuildings. - Bridges in the Town serve as important access and evacuation routes. Evacuating residents may be difficult in the event that any or all of compromised bridges are impacted by flooding and have to be closed during an emergency. Several bridges that were badly in need of repair, including the General Pierce Bridge connecting Montague with Greenfield, were replaced over the past five years. - Culvert maintenance is continuously needed across the Town, and continuing work to upgrade and replace culvers needs to be prioritized. - The Hillcrest School building experiences flooding approximately every five to ten years. - Combined Sewer Overflows need to be maintained and monitored continually, and the Town continues to identify opportunities to reduce the amount of stormwater entering the system to reduce the risk of overflow events occurring.
Severe Winter Storms	- Vulnerable populations may be stranded during a winter storm event and may not be able to travel to emergency services. - Roof ice dams may cause damage to structures. - 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. - Severe storms may damage trees in natural areas, and historical and cultural sites. - Outdoor activities may be adversely impacted by severe winter storms.
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 Senior Center needs a generator so it can consistently serve as a heating/cooling center.

Hazard	Problem Summary
	• The elderly and those with mobility issues may not be able to leave their homes and travel safely without assistance. • 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 and extreme cold. • 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. • Extreme heat mitigation and adaptation have not been fully integrated into existing local plans and regulations for new development, though progress is being made. • 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. • Risk of wildfires increases as the number of days greater than 90°F are expected to increase significantly. Coupled with changes in precipitation, less water may be available to fight the wildfires. • Recreational activities may be adversely impacted by extreme heat.
Other Severe Weather	• People in Montague have been disrupted by severe weather including wind and thunderstorm events. Vulnerable populations may be isolated if roads are closed. • Participants in the MVP CRB Workshop (2018) noted that the Community Action school in the Patch (in Turners Falls) could be vulnerable during a severe weather event requiring evacuation, given the limited access to the neighborhood. • Given the frequency of events in and around Montague, the impacts occur often and can occur anywhere in the Town. • First responders may have difficulty reaching people if roads are not plowed/treated or are closed due to tree debris. • Natural, historic, and cultural resources can be adversely impacted depending on the specific locations of damage. • Activities that have value to the community can be adversely impacted depending on the specific locations of damage.

Hazard	Problem Summary
Wildfires/Brushfires	- Populations with severe asthma may be adversely impacted by wildfires in the vicinity. - Fire poses direct risks to structures, emergency workers, and people living in or near exposed areas, as well as indirect risks to public health due to smoke. - Some structures are found in the higher probability burn areas. Structures without defensible zones are more susceptible to wildfires and brush fires. - Wildfires often cause roads to be closed requiring detours impacting emergency services. - The economic consequences of wildfires can be substantial, due to the initial loss of structures, and to the loss of revenue from business and tourism, and natural heritage. - Recreational activities may be adversely impacted by wildfires, depending on location.
Hurricanes/Tropical Storms	- Vulnerable populations may need to be evacuated and could be displaced from their homes. - The Montague Senior Center is used as a warming and cooling facility but is not equipped with a generator. - The Carnegie, Millers Falls, and Montague Center Public Libraries are used as warming and cooling centers but are not equipped with generators. - Wind may cause trees to fall into structures and infrastructure, and roadways. - Wind damage to wind-susceptible buildings such as communication antennas, aerial utilities, solar arrays, greenhouses, pavilions, gazebos, and open-walled buildings. Additional damage to commercial buildings with HVAC located on roofs. - The electric grid may go down during high wind events. - First responders may have difficulty reaching people if roads are closed due to tree debris. - 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. - A severe hurricane wind and rain event could negatively impact outdoor activities in the Town.
Droughts	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.

Hazard	Problem Summary
	If rates are increased to lower water demand, this may also adversely impact underserved and vulnerable communities. • 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. • 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. • Increasing water storage and using interconnections with adjacent water utilities are potential methods of improving drought resilience. • Water quality may be adversely impacted by major droughts. • Use of parks and recreational areas may be adversely impacted by droughts due to the effects on plants, trees, and surface water bodies.
Flooding from Dam Failure or Overtopping	• Older and lower income populations in the potential downstream inundation area may have difficulty evacuating, particularly in a short time frame. • The Town lacks capacity to reach non-English speaking populations during emergencies. • Homeless and transient people, who often camp near the rivers in Town, may be difficult to reach in the event of an emergency. • In the event that the Farren Care Facility must evacuate, available resources may not be sufficient for ensuring adequate ambulances and first responders to evacuate patients safely and effectively during a widespread hazard like dam failure, which would place a significant strain on emergency resources across the county. • Several ‘hazardous facilities’ including the historic mill buildings and power canal in Turners Falls, and the Montague Clean Water Facility in Montague City are located outside or at the edges of the 100-year floodplain and within the high hazard dam breach inundation area. • Local officials sometimes do not routinely receive copies and updates of EAPs for privately owned dams. Without these documents, it is harder for emergency personnel to characterize the potential downstream risks and prepare for a potential breach event. • When engineered, dam spillways were often designed to pass a discharge for a particular historic storm recurrence interval. As the frequency and magnitude of precipitation events changes, these spillways are becoming undersized relative to their design standard which places downstream areas at increased risk of experiencing inundation from a dam failure. • Roads may be impacted by a dam breach, potentially impacting Town capabilities to respond to events. • Five sites contain hazardous materials in the dam breach inundation areas.

Hazard	Problem Summary
	• The Turners Falls Historic District is located in the potential dam inundation area. • Critical buildings and infrastructure, including the Town Hall, Farren Care Facility, Unity Park, Newton Street and Franklin Street in Millers Falls, and bridges, are located partially or wholly within the High Hazard dam inundation areas.
Tornado	• 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. • 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. • Sheltering and mass feeding efforts may be required along with debris clearance, search and rescue, and emergency fire and medical services. • Historic and cultural resources may be impacted by tornado winds. • Winds may damage trees and cause natural areas to close for cleanup. • Outdoor events could be impacted by potential tornado activity.
Hazardous Materials Incident	• Older residents may have difficulty evacuating during a hazmat spill or release incident. • Individuals with mobility issues and limited English language proficiency may require additional support in case of evacuation. • Some residential and historic structures may be located near sites with hazardous materials. • Hazmat spills may cause roads to be closed requiring detours. • Hazardous materials released in and near the Town may impact valuable natural, historic, and cultural resources, including the Montague Plains, Montague State Forest, the Connecticut River Scenic Farm Byway, and Montague Center Historic District. • Recreational activities may be adversely impacted by hazardous materials spills and releases.
Invasive Species	• Invasive species pose a threat to agricultural activities in the Town and could threaten related livelihoods. • Additional Town resources may be required in terrestrial and aquatic areas to control the species of concern.

Hazard	Problem Summary
	• Vegetation favored by Spotted lanternfly will likely become a larger concern over the next few years. • Invasive pests may cause a decline in forest health and the associated ecosystem services provided by forests. • Invasive species impact the health of outdoor recreational areas and open spaces. • Invasive species can quickly overgrow trails.
Landslide	• Vulnerable populations in isolated areas may be cut off if a landslide impacts specific roads. • Areas of highest risk likely include the Bradley Road and Ardmore Road cul-de-sacs, which are downgradient from Hilltop Road. Structural mitigation was necessary to stabilize the slope when the Hilltop Road subdivision was constructed. • 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.
Earthquake	• Vulnerable populations located in unreinforced masonry structures may sustain injuries. • Elderly people may fall during events. • Unreinforced masonry and utility lifelines impacted. • Multi-story masonry residential buildings are present in the Town. • Utility systems impacted. • Historic buildings constructed out of unreinforced masonry are susceptible and may be impacted. • Earthquakes can be especially damaging to farms and forestry if they trigger a landslide.

Chapter 5: Capability Assessment

Overview

The capability assessment is an evaluation of the existing tools and resources available to the Town of Montague 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 Montague’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 Montague’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 2025 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.”*¹⁰⁵

The capability assessment for the Town of Montague includes a comprehensive examination of several components as summarized in Table 83. It was prepared using the latest guidance and worksheets provided in FEMA’s 2025 Local Mitigation Planning Handbook.¹⁰⁶

Table 83. 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.
Education and Outreach Capabilities	Local programs and methods already in place that can be used to support mitigation activities.

¹⁰⁵ Local Mitigation Planning Policy Guide. FEMA. April 2025. P. 22.

¹⁰⁶ Local Mitigation Planning Handbook. FEMA. May 2025. PP. 69-81 and Worksheets 4-5.

Components	Description
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

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

Incorporate means to reference or include information from other existing sources to from the content of the mitigation plan.

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 2020. 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 six years. The 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan (the "ResilientMass" Plan), as well as other plans adopted by the Town of Montague 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 84 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 84. 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 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. 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

Plan / Study / Report	Summary Description / Incorporation
	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 Greater Connecticut River Valley 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 Montague’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 Montague’s updated plan address the key themes identified in the ResilientMass Plan.
The Five Villages: One Future Montague Comprehensive Plan (2024)	The Five Villages: One Future Montague Comprehensive Plan is a strategic framework designed to guide and support land management and physical and economic development in Montague over the next 15 years. It aims to address its future through recommendations regarding land use, housing, economic development, natural and cultural resources, climate change and resiliency, parks and open space, community services and facilities/utilities, and transportation. The plan guides Town staff, boards, and committees in supporting a resilient and sustainable vision for the future of the Town while preserving its unique character and sense of community. It serves as an update to Montague’s 1999 Master Plan and defines a new vision, updated goals, and strategies to support the future of Montague. Notably the Town’s 2024 Comprehensive Plan was prepared through the lens of resiliency and specifically included “integrating climate resiliency at all levels” in its shared vision statement. It addresses natural hazards and climate change throughout all elements including but not limited to flooding and erosion, drought, wildfire, and extreme heat. It goes beyond physical and economic resiliency by addressing vulnerable populations/social resiliency as well as governance resiliency. There are numerous goals, objectives, and strategies to reduce known hazard risks which were reviewed and incorporated into the plan update process, especially as it relates to new mitigation actions for the mitigation strategy.
Town of Montague Municipal Vulnerability Preparedness (MVP) / Community Resilience Building (CRB) Summary of Findings Report (2020)	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 2017, Montague was awarded an MVP Planning Grant to assess its vulnerability to and prepare for climate change impacts, build community resiliency, and receive designation from the Executive Office of Energy and Environmental Affairs (EEA) as an MVP Community. Communities with this designation become

Plan / Study / Report	Summary Description / Incorporation
	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 Montague followed the Community Resilience Building (CRB) framework with technical assistance provided by a state-certified MVP Provider, the Franklin Regional Council of Governments (FRCOG). The CRB methodology is an “anywhere at any scale” format 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 4, 2018, 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 Montague. 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 Montague’s top hazards including Severe Weather Events (snow, wind, ice), Drought, Extreme Temperatures (high heat and freezing), and Manmade Hazards (dam failure, hazardous materials). They also included descriptions of vulnerable areas or community assets (infrastructural, societal, and environmental), current community concerns and challenges presented by the top hazards, current strengths and assets, and specific, prioritized recommendations to improve resilience in Montague.
Open Space and Recreation Plan (2017)	The Montague Open Space and Recreation Plan (OSRP) is a comprehensive inventory of the Town’s natural, agricultural and recreational resources and a plan for their stewardship and protection. It contains an analysis of the Town’s needs and goals and objectives designed to guide important decisions about the use, conservation and development of the Town’s land and resources. A Seven-Year Action Plan provides real steps that the Town can take towards achieving these goals. The OSRP served as a key source of information related to Montague’s natural environment and growth and development patterns, with specific content regarding natural hazards and mitigation activities also being incorporated into this updated plan. This includes details on environmental challenges such more frequent severe storms, flooding and erosion, droughts, wildfires, and invasive species for the risk assessment, in addition to 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.
Housing Production Plan (2015)	The Town’s Housing Plan presents an overview of housing in Montague, discusses how well the current housing supply meets demand, evaluates housing affordability, and assesses which areas of the Town may be most suitable for new residential development. The plan does not actively address natural hazards in its recommendations or strategies, though it does describe how the 2014 Hazard

Plan / Study / Report	Summary Description / Incorporation
	Mitigation Plan recommended that the Town consider prohibiting all new development within the 100-year floodplain or require a special permit for development in the floodplain in addition to current requirements. It further notes that restricting development within the floodplain will mitigate flooding risks to homes. The 2015 HPP has expired but the Town received a \$52,000 Rural Development Fund award in FY-2026 to support a plan update process that will begin in July 2026.
Community Wildfire Protection Plan (2015)	The Montague Community Wildfire Protection Plan (CWWP) was prepared to set clear priorities for the implementation of wildfire mitigation in the Town. The plan includes a community wildfire risk assessment, hazards map, and prioritized recommendations as to the methods of fuel reduction, new/repairs to safety infrastructure, training and equipment, and structure ignitability reduction that will protect the community and its essential infrastructure. The CWWP was last updated in 2015 and needs a comprehensive update based on current information and local conditions, but it was reviewed and considered during the plan update process in support of the risk assessment and mitigation strategy development.
Emergency Action Plans (EAPs)	The purpose of Emergency Action Plans (EAPs) is to safeguard lives and reduce damage to private and public property downstream of dam structures in the event of a dam failure. EAPs define responsibilities and provides procedures designed to identify unusual or unlikely conditions that may endanger the integrity of a dam in time to take mitigative action. In addition, EAPs provide procedures to notify the appropriate emergency management officials of possible, impending, or actual failure of the dam. The latest available EAPs for the Lake Wyola Dam in Shutesbury and Turners Falls Project Power Canal Left Embankment in Montague were reviewed and used to inform the plan update. Relevant data and information were incorporated into the risk assessment as deemed appropriate, especially as it relates to dam failure inundation maps that show the stream(s) which would be flooded, as well as the impacted downstream environment, during potential dam failure events. These maps were digitized and integrated into the risk assessment to conduct a GIS-based vulnerability assessment to determine the exposure of critical facilities, buildings, and populations in the planning area to dam failure. They were also integrated into Hazus, FEMA's loss estimation software, to determine economic losses from dam failure inundation.
FEMA Flood Insurance Study for Franklin County (2024)	Last revised by FEMA on May 22, 2024, this report constitutes the revised preliminary Flood Insurance Study (FIS) report for Franklin County. This latest FIS revises and updates information from the currently effective (1982) FIS report on the existence and severity of flood hazards for the study area, which includes the Town of Montague. The studies described in this report provide flood hazard data that will, once formally adopted as final/effective, be used to establish actuarial flood insurance rates and to assist communities in efforts to implement sound floodplain management. The Town anticipates the preliminary FIS will become effective sometime in 2026 or 2027 and all required zoning amendments will likely go to Annual Town Meeting for approval (the Town has been coordinating with the State's Flood Hazard Management Program on this process).

Plan / Study / Report	Summary Description / Incorporation
	The FIS and accompanying Flood Insurance Rate Maps (FIRMs) include relevant data and information on flood hazards for Montague, 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 GIS-based 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 85 in the next section.

- ***Annual Report (2024)*** – The Annual Report contains updated facts about Montague with a compilation of individual reports and information provided by the Town’s various departments, boards, committees, commissions, and other officials.
- ***Montague Age Friendly Plan (2023)*** – The Town’s Mass in Motion/Age-Friendly Report was prepared to help understand how the community can best serve older adults and people with dementia. It includes a community assessment and action plan with recommended projects for the Town to implement in becoming an age and dementia-friendly community.
- ***MEDIC Economic Development Plan (2022)*** – The Economic Development Plan for the Montague Economic Development and Industrial Corporation (EDIC) guides economic development and industrial activities in areas currently zoned to allow for industrial uses in Montague. First created in 1984 when the Montague Economic Development EDIC was established, it has been updated in 1999, 2015, and most recently in 2022. The current plan establishes a vision and has identified five project areas as priorities in this plan including the Airport Industrial Park, Turnpike Road Industrial Park, Turner Falls Canal District, Great Falls Discovery Center Area, and Farren Care Center.
- ***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 regional, state, federal, private sector, and other resources that 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 the Town that briefly summarizes potential impacts to the community.

- **Complete Streets Prioritization Plan (2018)** – The Town developed this prioritization plan through MassDOT's Complete Streets program, which is focused on the planning, design, and implementation of transportation systems to provide safety and accessibility to all its users. The plan is based off a comprehensive needs assessment and gap analysis to help better understand and prioritize improvements in the Town's intermodal infrastructure. The current plan includes 41 priority projects for the Town to implement with varying locations, construction costs and durations, and is being used by the Town to apply for funding made available from MassDOT and other sources.
- **Community Development Strategy (2018)** – The Town's Community Development Strategy (CDS), prepared by the Planning and Conservation Department, summarizes the Town's efforts to engage in community-based planning and priority setting and to outline a plan of action intended to accomplish specific community development goals between 2018 and 2023.

Planning and Regulatory Capabilities

FEMA Requirement §201.6(c)(3) 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?

Table 85 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 85. Planning and Regulatory Findings.

Planning/Regulatory Tool	In Place? (Yes/No)	General Description / Effectiveness for Hazard Risk Reduction
Plans		
Master/Comprehensive Plan	Yes	The Town recently completed The Five Villages: One Future Montague Comprehensive Plan in 2024, a strategic framework designed to guide and support land management and physical and economic development in Montague over the next 15 years (see full description in Table 84). The plan addresses natural hazards including but not limited to flooding and erosion, drought, wildfire, and extreme heat while also addressing vulnerable populations and building community resilience. It should be a very effective tool in support hazard risk reduction activities including and beyond those identified in this plan update.

Planning/Regulatory Tool	In Place? (Yes/No)	General Description / Effectiveness for Hazard Risk Reduction
Open Space & Recreation Plan	Yes	Last amended updated in 2017 (see full description in Table 84), the Town's OSRP aligns well with reducing known hazard risks and incorporates information from the Town's preceding (2014) Hazard Mitigation Plan, including some specific recommendations for flood mitigation and stormwater management. It was last updated in 2017, but the Town has recently received funding to support the next plan update process which began in 2025 and is expected to be completed by July 2026. The OSRP can be used to support the implementation of mitigation actions, especially those that may provide co-benefits for the expansion and protection of the community's open space and recreational assets. It is expected to continue as another local planning mechanism to support and implement new mitigation actions identified for this plan update.
Climate Adaptation Plan	Yes	Climate adaptation is addressed in the Town's Municipal Vulnerability Preparedness (MVP) Resiliency Plan, prepared with technical assistance from FRCOG (see full description in Table 84). The plan was adopted by the Selectboard in 2018, was incorporated into the 2020 Hazard Mitigation Plan, and will continue to be used to support the identification and implementation of mitigation actions through this plan update.
Floodplain Management Plan	No	N/A
Stormwater Management Plan	No	N/A
Capital Improvements Plan	Yes	In June 2023, the Capital Improvements Committee adopted the Town's first 6 year Capital Improvements Plan and continues to update it on an annual basis. Montague has made tremendous financial strides in recent years, allowing it to execute numerous timely and often overdue capital projects and equipment purchases.
Housing Production Plan	Yes	The Town's 2015 Housing Production Plan (HPP) briefly addresses flood hazards and potential risk reduction opportunities through floodplain avoidance for new development (see full description in Table 84). The existing HPP has expired but the Town has received funding to support a plan update process that will begin in July 2026, with additional opportunities to integrate hazard

Planning/Regulatory Tool	In Place? (Yes/No)	General Description / Effectiveness for Hazard Risk Reduction
		mitigation and resilience into local housing policy and decision-making.
Transportation Plan	No	No specific plan, though transportation is addressed as an element in the Town's Comprehensive Plan. The Town also created a Complete Streets Funding Program Project Prioritization Plan in 2018.
Economic Development Plan	No	The Montague Economic Development and Industrial Corporation (EDIC) Economic Development Plan examines and identifies priority economic and industrial development activities in Montague, but due to limitations in enabling state legislation, EDIC is only authorized to plan for economic development projects in areas currently zoned to allow for industrial uses. However, economic development is addressed on a broader scale as an element in the Town's Comprehensive Plan.
Historic Preservation Plan	No	No specific plan, however, the Montague Historical Commission is tasked to identify, evaluate and protect important historical assets of the community.
Emergency Operations Plan	Yes	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 (see summary description following Table 2). Last updated in 2021. The CEMP can be an effective tool for coordinating hazard risk reduction but is more focused on incident-driven preparedness and response actions.
Continuity of Operations Plan	No	N/A
Community Wildfire Protection Plan	Yes	The Montague Community Wildfire Protection Plan (CWWP) was prepared in 2015 to set clear priorities for the implementation of wildfire mitigation in the Town (see full description in Table 84). The CWWP is considered outdated and in need of a comprehensive update but should remain a very effective tool in support of wildfire risk reduction efforts.
<i>Building Code, Permitting, and Inspections</i>		
Building Code	Yes	Version/Year: MA State Building Code (780 CMR), Tenth Edition, 2025. Based on modified versions of the 2021

Planning/Regulatory Tool	In Place? (Yes/No)	General Description / Effectiveness for Hazard Risk Reduction
		International Codes (I-Codes) as published by the International Code Council (ICC), with amendments.
ISO Building Code Effectiveness Grading Schedule (BCEGS®) Classification	Yes *	BCEGS Commercial Class: 5 BCEGS Residential Class: 6 <i>* Last survey completed 3/1/2018</i>
ISO Public Protection Classification (PPC©)	Yes *	PPC Grade (Community Classification): 03/3Y <i>* Last survey completed 6/9/2014</i>
Special Permit / Site Plan Review Requirements	Yes	Adopted under Zoning Bylaw, Section 9.1 (Site Plan Review) to provide detailed review of certain uses and structures which have a potential for significant impact on the character, infrastructure, and natural resources of the Town. Applies to relatively larger development projects and is effectively requires the identification of areas subject to flooding and plans for stormwater management.
<i>Zoning, Land Use, and Development Regulations</i>		
Zoning Bylaw	Yes	The Purpose of the Town's Zoning Bylaw is to promote the health, safety, convenience, amenities, and general welfare of the inhabitants of the Town of Montague, through encouraging the most appropriate use of the land. Among its stated objectives are to conserve health and to secure safety from fire, flood, panic and other dangers. Very effective in administering site plan review and special permit requirements, floodplain management regulations, and other development review and approval requirements described in this section which support long-term hazard risk reduction.
Subdivision Regulations	Yes	The Town's Subdivision Regulations were enacted for the purpose of protecting the environment and for the safety, convenience and welfare of Town residents by dictating street, utility, and drainage design and construction of ways in subdivisions. They require all utilities to be placed underground for new subdivisions, mitigating power outages from extreme weather, and for trees to be planted along new subdivision streets which is helpful in providing shade and mitigating the urban heat island effect. Plans for new subdivisions are also submitted to the appropriate Fire Department for review to ensure that fire trucks will have adequate access and that the water supply is adequate for fire-fighting purposes. Considered effective and were last updated in 2017 to encourage Low Impact Development

Planning/Regulatory Tool	In Place? (Yes/No)	General Description / Effectiveness for Hazard Risk Reduction
		(LID) site design and stormwater management techniques, stronger protection of natural features, and reduced roadway pavement widths.
Floodplain Regulations	Yes	Adopted under Zoning Bylaw, Section 6.1 (Flood Plain Overlay District) to control development in the FEMA-mapped special flood hazard area. Adequately administered and enforced but only partially effective due to the outdated flood risk modeling used for the currently effective 1982 Flood Insurance Rate Maps (FIRMs), though these are in the process of being updated. Preliminary FIRMs were released in 2024 and are expected to become effective in 2026 or 2027 pending a possible appeal in the Montague Plains Wildlife Management Area (WMA). The Town will continue coordinating with the State's Flood Hazard Management Program on the adoption of the new FIRMs and regulatory updates to be consistent with the State's most recent Model Floodplain Bylaw.
Wetlands Protection Regulations	Yes	The Town does not have its own local wetlands protection bylaw but does administer the regulations required under the State's Wetland Protection Act (WPA), which regulates activities that have the potential to remove, fill, dredge or alter wetland resource areas. Inland wetland resource areas protected by Massachusetts law include the banks of streams and ponds, vegetated wetlands bordering the banks, land under water, bordering and isolated areas subject to flooding and a 200-foot riverfront area extending horizontally from the banks of rivers that run all year. In addition, the Act protects a 100-foot buffer zone extending horizontally from the banks of streams and ponds.
Stormwater Management Regulations	Yes	Adopted in 2009, the purpose of the Town's Stormwater System Policy is to ensure high water quality standards and address any potential water quantity problems associated with development and to (1) preserve hydrologic conditions that closely resemble pre-development conditions; (2) prevent or reduce flooding and erosion by managing the peak discharge and volume of runoff, and (3) reduce the amount of suspended solids and other pollutants in order to maintain water quality. Applies to projects requiring Site Plan Review with requirements for stormwater management that can be effective in reducing the impact of flooding but are more focused on managing

Planning/Regulatory Tool	In Place? (Yes/No)	General Description / Effectiveness for Hazard Risk Reduction
		stormwater runoff and water quality versus flood control/mitigation.
Other hazard-specific regulations or ordinances?	Yes	Industrial Park Development Standards – Requires all drainage from new development to be accommodated on-site; drainage infrastructure must be designed to accommodate 125% of runoff from the 100-year storm.

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 tenth edition, which became effective on October 11, 2024, with a concurrency period with the ninth edition that ended on June 30, 2025. The tenth edition is based on modified versions of the following 2021 International Codes (I-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)

The tenth edition of the MSBC is a significant improvement over the ninth edition which was based off 2015 I-Codes. The MSBC is found in the Code of Massachusetts Regulations at 780 CMR 1.00 to 115.00. The primary structure of the tenth edition is based upon adoption of the 35 chapters and appendices of the 2021 IBC. Select chapters of the IBC have been replaced with Massachusetts specific amendments as well as other I-Codes. Note that with regards to energy, the tenth edition is considered a “base” energy code as the Massachusetts Department of Energy Resources (DOER) adopts stretch and specialized stretch codes for application in certain cases.

The tenth edition of the MSBC also 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 24 Tables included in 780 CMR. Under the tenth edition of the MSBC, a higher regulatory standard that affects development and redevelopment within mapped flood zones is the requirement that new or substantially improved buildings must be elevated so that the lowest floor surface is 2-3 feet above the FEMA base flood elevation (1% chance storm elevation from the FEMA Flood Insurance Rate Map) depending on the situation. This requirement raised the minimum freeboard standards by an additional foot from the ninth edition of the MSBC to allow for the uncertainties of mapping as well as increasing precipitation and sea level rise. In addition, new and substantially improved buildings in coastal A zones, as delineated by the Limit of Moderate Wave Action (LiMWA), are now required to meet the same standards as buildings in V zones.

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 77 out of a possible 100 points on the IBHS scale). Now in its fifth edition, IBHS’s 2024 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. Massachusetts was a state with a downward trend in its IBHS scores since the program began in 2012 due to various actions that have weakened the MSBC, however it is expected that the adoption of higher standards in 2024, including those based on the latest (2021) I-Codes through the tenth edition, will result in score increases for the next edition of the IBHS report.

The Town of Montague administers the MSBC for all applicable projects and according to Insurance Services Office, Inc. (ISO) maintains a demonstrated commitment to code adoption and enforcement services. ISO helps distinguish communities with effective building codes through a comprehensive evaluation program called the Building Code Effectiveness Grading Schedule (BCEGS). Under BCEGS, ISO collects information on a community’s building code adoption and enforcement services, analyzes the data, and then assigns a classification from 1 to 10. BCEGS Class 1 represents an exemplary commitment to building code enforcement through code administration, plan review, and field inspection. According to the latest evaluation study performed by Insurance Services Office (ISO) in 2014, the Town of Montague had a BCEGS class of 6 for 1 and 2 family dwellings and a class 5 for all other construction.

It is anticipated that these classifications will only improve following ISO's next BCEGS survey based on its enforcement of the tenth edition of the MSBC as described above.

Safe Growth Survey

As part of the assessment for planning and regulatory capabilities, Town staff 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 Montague 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 future 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 86. This includes describing how strongly the Town's planning staff agrees or disagrees with 25 statements as they relate to Montague'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 86. Safe Growth Survey Results.

MASTER/COMPREHENSIVE PLAN					
<i>Land Use</i>					
The master/comprehensive plan includes a future land use map that clearly identifies natural hazard areas.	1	2	3	4	5

MASTER/COMPREHENSIVE PLAN					
Current land use policies discourage development and/or redevelopment within natural hazard areas.	1	2	3	4	5
The master/comprehensive plan provides adequate space for expected future growth in areas located outside of natural hazard areas.	1	2	3	4	5
Transportation					
The transportation element limits access to natural hazard areas.	1	2	3	4	5
Transportation policy is used to guide future growth and development to safe locations.	1	2	3	4	5
Transportation systems are designed to function under disaster conditions (e.g., evacuation, mobility for fire/rescue apparatus, etc.).	1	2	3	4	5
Environmental Management					
Environmental features that serve to protect development from hazards (e.g., wetlands, riparian buffers, etc.) are identified and mapped.	1	2	3	4	5
Environmental policies encourage the preservation and restoration of protective ecosystems.	1	2	3	4	5
Environmental policies provide incentives to development that is located outside of protective ecosystems.	1	2	3	4	5
Public Safety					
The goals and policies of the master/comprehensive plan are related to and consistent with those in the hazard mitigation plan.	1	2	3	4	5
Public safety is explicitly included in the master/comprehensive plan's growth and development policies.	1	2	3	4	5
The monitoring and implementation section of the master/comprehensive plan covers safe growth objectives.	1	2	3	4	5
ZONING BYLAWS					

MASTER/COMPREHENSIVE PLAN					
The zoning bylaws conform to the master/comprehensive plan in terms of discouraging development and/or redevelopment within natural hazard areas.	1	2	3	4	5
The bylaws contain natural hazard overlay zones that set conditions for land use within such zones.	1	2	3	4	5
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	3	4	5
The bylaws prohibit development within, or filling of, wetlands, floodways, and floodplains.	1	2	3	4	5
SUBDIVISION REGULATIONS					
The subdivision regulations restrict the subdivision of land within or adjacent to natural hazard areas.	1	2	3	4	5
The regulations provide for conservation subdivisions or cluster subdivisions to conserve environmental resources.	1	2	3	4	5
The regulations allow density transfers where natural hazard areas exist.	1	2	3	4	5
CAPITAL IMPROVEMENT PROGRAM AND INFRASTRUCTURE POLICIES					
The capital improvement program limits expenditures on projects that would encourage development and/or redevelopment in areas vulnerable to natural hazards.	1	2	3	4	5
Infrastructure policies limit the extension of existing facilities and services that would encourage development in areas vulnerable to natural hazards.	1	2	3	4	5
The capital improvements program provides funding for hazard mitigation projects identified in the hazard mitigation plan.	1	2	3	4	5
OTHER					
Economic development and/or redevelopment strategies include provisions for mitigating natural hazards or otherwise enhancing social and economic resiliency to hazards.	1	2	3	4	5

MASTER/COMPREHENSIVE PLAN

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 3 **4** 5

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 4 **5**

Administrative and Technical Capabilities

Table 87 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 87. Administrative and Technical Findings.

Administrative/Technical Resource	In Place? (Yes/No)	General Description / Effectiveness for Hazard Risk Reduction
Local Boards/Committees		
Planning Board	Yes	The Planning Board maintains the Comprehensive Plan, prepares zoning bylaws and zoning map amendments for Town Meeting acceptance, administers Subdivision Regulations, approves site plans and issues special permits for industrial and commercial development and common driveways.
Conservation Commission	Yes	The Conservation Commission administers the Massachusetts Wetlands Protection Act (WPA), which regulates work in or near surface waters and wetlands. The Commission also works to support the protection of important natural resources areas through land conservation.
Capital Planning Committee	Yes	Montague's Capital Improvements Committee is responsible for preparing the Town's long term capital improvement plan, identifying and prioritizing many capital needs, and issuing recommendations relative to the slate of capital investments to be considered by Town Meeting. Recommendations for funding are advisory in nature to the Selectboard, Finance Committee, and Town Meeting.
Climate Action Committee	Yes	The Montague Energy Committee serves in an advisory capacity to the Selectboard and Town Administration, helping to define the Town’s energy-related policies,

Administrative/Technical Resource	In Place? (Yes/No)	General Description / Effectiveness for Hazard Risk Reduction
		performing public outreach on behalf of certain energy-related programs (i.e. Mass Save), and issuing recommendations regarding energy efficiency in the context of the Town's capital projects and operations.
Other relevant boards/committees?	Yes	Board of Health – dedicated to preserving and protecting the health of Montague's population and to promoting health status improvement for everyone. Council on Aging – provides referral, outreach, nutrition and health services in cooperation with other Town departments and area agencies; sets policy for the operation of the Senior Center; enhances the quality of life for seniors in the community by providing health, education, and recreation programs and activities. Finance Committee – meets and investigates the cost of maintenance and expenditures of the different departments of the Town and recommends in detail the amounts to be appropriated for each department for the ensuing year. They also consider articles in Town warrants requiring the appropriation of money and shall make a written report to the meetings considering such articles. Zoning Board of Appeals – serves as the Town's highest locally controlled arbitrator of land use issues. It is the safety valve to settle or vary the terms of the Zoning Bylaw where the strict application is unfair or unanticipated.
Staff		
Community Planner	Yes	The Town's Planning and Conservation Department is staffed by a Planning Director and Assistant Planner and RiverCulture Program Coordinator. The primary function of the Department is to manage regulatory processes for development proposals submitted to the Planning Board pursuant under the Zoning Bylaw and Subdivision Control Law; and to the Conservation Commission pursuant under the State's Wetlands Protection Act regulations. As part of that process the Department evaluates development proposals for their contribution toward community planning goals as documented in the Town's Comprehensive Plan and other local strategic plans. The Department is also actively engaged in programs and

Administrative/Technical Resource	In Place? (Yes/No)	General Description / Effectiveness for Hazard Risk Reduction
		projects that help the community achieve its planning goals.
Chief Building Official	Yes	The Town's Inspector of Buildings oversees the Building Department that administers and enforces permits and inspections for building construction and/or renovation, electrical, plumbing and gas.
Civil Engineer	No	N/A
Emergency Manager	Yes	The Town has a part-time Emergency Management Director through a stipend-funded position (not a permanent staff position). This hurts the Town's comprehensive emergency management program capabilities, including those in support of long-term hazard risk reduction. The Town also runs into issues with staffing capacity when it comes to limited abilities to pay overtime during emergency events/activations.
Floodplain Administrator	No	The Town has not designated a position to serve as the community's official floodplain administrator but will consider doing so as part of updating its floodplain regulations (Zoning Bylaw, Section 6.1) and adopting the new FEMA FIRMs, consistent with the State's most recent Model Floodplain Bylaw.
Sustainability/Climate Coordinator	No	N/A
GIS Coordinator	No	N/A
Public Information Officer/Specialist	No	N/A
Technical		
Grant writing	Yes	No dedicated or formally designated position, but several Town staff are involved in writing grants including the Town Administrator, Assistant Town Administrator, and Planning Director.
GIS mapping and analysis	No	The Town currently doesn't have an ArcGIS license but has the ability to work with consultants and/or FRCOG for GIS mapping and analysis needs.
Hazard data and information	No	N/A
Maintenance programs to reduce risk (e.g., tree trimming, drainage clearance)	Yes	The Department of Public Works (DPW) has 20 full time employees and has a budget exceeding \$1 million. The department is responsible for maintenance, repair and construction of the Town's infrastructure, public buildings

Administrative/Technical Resource	In Place? (Yes/No)	General Description / Effectiveness for Hazard Risk Reduction
		and property including its parks, playgrounds, streetscapes, sewers, drainage systems, street lighting and 108 miles of roadways. DPW maintains Town-owned bridges and culverts, implements erosion control measures along impacted Town roadways, and partners with the electric company to trim tree branches near overhead power lines. DPW has strong capabilities and resources for supporting emergency preparedness and mitigation of disruptive hazard events (winter storm response, etc.). The Massachusetts Division of Fisheries and Wildlife has long used a combination of tree harvesting, shrub mowing, and prescribed burning to benefit rare species and to reduce the risk of a catastrophic wildfire on the Montague Plains WMA.
Acquisition of land for open space, recreation, and other public use	No	The Town has rarely taken a lead role in acquiring parcels for resource protection. In the past, land conservation efforts in Montague have largely been driven by landowners, citizen advocates, and state agencies. A large amount (~60%) of land in Montague is already permanently protected as open space. Many of these open space resources are State or Town managed, guaranteeing public access. Much of Montague's farmland has also been spared from development.
Warning systems/services (e.g., Reverse 911, outdoor warning signs)	Yes	Montague utilizes the RAVE® Alerts system as an opt-in option for local emergency alerts and communication alerts. It is used to send important information such as severe weather alerts, road closures, emergency-related parking bans, and other urgent public safety updates. RAVE uses telephone, text and email to quickly provide instructions to residents and businesses on how to prepare for, or otherwise deal with, an emergency. This high-speed telephone and text messaging system can contact the entire Montague database in less than 30 minutes.
Mutual Aid Agreements	Yes	The Town collaborates closely with surrounding communities and has opted in with MEMA under the statewide mutual aid agreements for Public Safety and Public Works.

Financial Capabilities

Table 88 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.

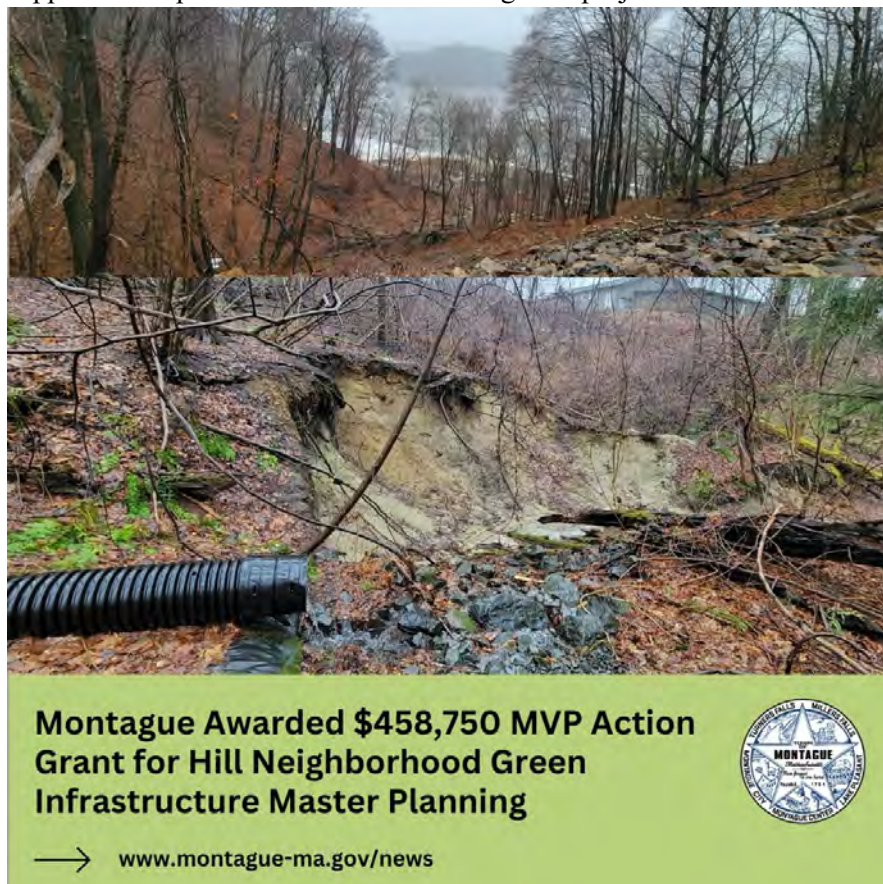


Figure 51. MVP Action Grant for Hill Neighborhood.

Table 88. Financial Findings.

Financial Tool/Source	In Place? (Yes/No)	General Description / Effectiveness for Hazard Risk Reduction
General funds	Yes	Departmental budgets allotted from the General Fund are used for routine maintenance and operational expenses needed to keep the Town resilient against hazards.
Capital Improvement Program (CIP) funding	Yes	The Town has a strong Capital Improvement Program that emphasizes predictability and responsible upkeep of facilities and infrastructure. Having major projects listed on the 5-year capital plan, even for projects expected to receive full or partial grant funding, helps to provide a realistic timeline for keeping up with maintenance needs, while also allowing for more competitive grant

Financial Tool/Source	In Place? (Yes/No)	General Description / Effectiveness for Hazard Risk Reduction
		applications by demonstrating the necessity of projects and the Town's commitment to completing them.
Special purpose taxes	Yes	The Town has a series of special purpose districts which provide fire protection and water service to different geographic areas of the community. These districts have their own taxing authority separate from the Town, and use the revenue collected to fund operational and capital expenses, including for hazard risk activities.
Fees for water, sewer, gas, or electric services	Yes	The Town has a Sewer Enterprise Fund funded by the rates charged to users of the public sewer system. The Enterprise Fund is routinely used to fund both operational and capital expenses for the Town's Clean Water Facility (CWF), sewer collections system, and related infrastructure (i.e. pump stations, grinder pumps), all of which aid in hazard mitigation efforts by protecting public health and safety from the risks of untreated wastewater entering the environment.
Stormwater utility fee	No	N/A
Development impact fees	No	N/A
General obligation bonds and/or special purpose bonds	Yes	The Town routinely uses bonding as a means of funding large-scale projects. Recent examples included a Proposition 2 ½ - excluded borrowing for a new Public Works facility that has greatly improved the Department of Public Works' ability to meet the community's infrastructure needs. Special purpose bonds have been used through loan programs offered by USDA Rural Development for wastewater infrastructure upgrades.
FEMA Hazard Mitigation Assistance (HMA) funds	Yes	In 2022 the Town was awarded a FEMA Pre-Disaster Mitigation (PDM) grant to complete the engineering of a nature-based solution to recurring flooding along Montague City Road, which began with a regional MVP action grant. Although their status is in flux, FEMA's HMA grant programs (BRIC, FMA, HMGP) are a good source of external funding for implementing eligible and cost-effective mitigation projects in coordination with MEMA.
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.

Financial Tool/Source	In Place? (Yes/No)	General Description / Effectiveness for Hazard Risk Reduction
		The CDBG program has been crucial to many of the Town's successful economic development projects in recent years, including with support for several phases of the ongoing Avenue A Streetscape Improvement project, which has seen a gradual revitalization of the Town's main downtown commercial center. Other activities under the CDBG program have included park improvements, support to local non-profit organizations providing social services to vulnerable community members, and housing rehabilitation loans administered to residents by the Franklin County Regional Housing & Redevelopment Authority.
Other federal funding programs	Yes	In 2024, the Town was awarded a \$4.92 million EPA Brownfields Cleanup Grant to perform cleanup activities at the former Strathmore Mill Complex in the Turners Falls Canal District. This complex has been vacant for more than 25 years, and today poses a hazard to the community's wellbeing, as well as the natural environment. Sitting directly adjacent to the Connecticut River, the dilapidated mill buildings are in the initial stages of collapse. An unplanned collapse of any of these buildings would be catastrophic. In addition to EPA, NOAA, USACE, and other federal agencies do occasionally 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.¹⁰⁷
Massachusetts Municipal Vulnerability Preparedness (MVP) Action Grant funds		The MVP Action Grant offers financial resources to communities to advance priority climate adaptation actions that 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

¹⁰⁷ Mitigation Resource Guide. FEMA. March 2021.

Financial Tool/Source	In Place? (Yes/No)	General Description / Effectiveness for Hazard Risk Reduction
		municipalities provided that the lead applicant is MVP-designated. In 2018 the Town was awarded an MVP Action Grant to engineer a nature-based solution to recurring flooding that closes Montague City Road. In 2025 the Town was awarded an MVP Action Grant for the Hill Neighborhood Green Infrastructure Master Planning Project. Specifically, the project will address stormwater runoff issues before they impact the Town's underground drainage system and the surrounding deep, sandy slopes—areas increasingly vulnerable to erosion from high-volume discharges. These grant awards are in addition to the ongoing resilience building work being performed under MVP 2.0., including the Window Insert Community Build project that was selected as the climate-resilience “seed” project which aims to promote energy efficiency and comfort in homes of low-income homeowners and tenants, while simultaneously reducing the community's carbon footprint.
Massachusetts Community Preservation Act (CPA) funds	No	The Town of Montague has not yet adopted the CPA, however, per the 2024 Comprehensive Plan it will explore the feasibility of doing so to provide funding for village improvements and to assist with public park and building improvements as well as historic preservation.
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. The Town has received a \$5 million state earmark to help match its EPA Brownfields Cleanup Grant for activities at the former Strathmore site. Other state programs which have provided assistance with Hazard Mitigation include MassDOT's Chapter 90 program for roadway maintenance, the Municipal Small Bridge Program, and the

Financial Tool/Source	In Place? (Yes/No)	General Description / Effectiveness for Hazard Risk Reduction
		Division of Ecological Restoration's Culvert Replacement Program.
Private or non-profit grants, loans or funding	Yes	Certain roadway repairs, riverbank restoration, and infrastructure improvements in the Canal District and along the Connecticut River have received support from FirstLight Power, which owns the Turners Falls Dam, the Canal, and the hydroelectric plant known as Cabot Station.

Education and Outreach Capabilities

Table 89 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 89. Education and Outreach Findings.

Education & Outreach Program/Method	In Place? (Yes/No)	General Description / Effectiveness for Hazard Risk Reduction
Community newsletter(s)	No	N/A
Web-based / social media	Yes	The Town maintains an informative website and has social media accounts (Facebook, Instagram) that can be helpful in conducting outreach and communicate with community members.
Public Access TV, radio, etc.	Yes	Montague Community Television (MCTV)
Community gatherings, festivals, celebrations, or other events	Yes	Franklin County Community Meals Program; Turners Falls Meal Site; 90 7th Street on each Monday from 4p-6p (to-go meals).
Hazard awareness campaigns (e.g., <i>Severe Weather Awareness Week</i>)	No	N/A
Organizations that represent, advocate for, or interact with underserved or vulnerable populations	Yes	Brick House Resource Center; HeartWing Center; Montague Food Security Coalition
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, etc.	No	N/A
Ongoing public education or information program	No	N/A

Education & Outreach Program/Method	In Place? (Yes/No)	General Description / Effectiveness for Hazard Risk Reduction
<i>(e.g., responsible water use, fire safety, household preparedness)</i>		
Natural disaster or safety-related school programs	Yes	The Montague Fire Departments have ongoing educational programming on fire safety in the schools.
StormReady® certification	No	N/A
Firewise USA® certification	No	N/A, however the Town's 2015 Community Wildfire Protection Plan identified the implementation of a Firewise program as a proposed community hazard reduction priority which has been carried over and included as an action for the Hazard Mitigation Plan.
Public-private partnership initiatives addressing disaster-related issues	No	N/A

National Flood Insurance Program (NFIP) Participation and Compliance

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

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 damage 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 damage 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 Montague has participated in the NFIP since 1979. As summarized in Table 90, 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 helped the HMPC to identify areas for improvement and other ideas that could be potential mitigation actions.

Table 90. NFIP Participation and Compliance Findings.

NFIP Topic	Source of Information	Comments
<i>Insurance Summary</i>		
How many NFIP policies are in the community? What is the total premium and coverage?	FEMA NFIP Services – Policy and Loss Data by Geography (HUDEX report)	As of December 31, 2025, a total of 8 NFIP policies are in force. The total written premium is \$10,601 for a total of \$2,249,000 in coverage.
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 – Policy and Loss Data by Geography (HUDEX report)	There has been a total of 2 claims paid since 1979, totaling \$1,208 in dollars paid. 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 has been estimated that 52 structures are at risk to the 1-percent annual chance flood, and 117 are at risk to the 0.2 percent annual chance flood for a combined total of 169 structures exposed to flood risk.
Are there any repetitive or severe repetitive loss structures in the community?	MEMA / FEMA	No
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 8 current policies under the NFIP in comparison to 169 structures estimated to be exposed to moderate to high flood risk).
<i>Staff Resources</i>		
Who is responsible for floodplain management in the community? Do they serve any roles other than Community Floodplain Administrator (FPA)?	HMPC	Although no formal designation for the official position of Floodplain Administrator has been made, this role is jointly supported by the Planning Director and Inspector of Buildings by administering and enforcing the MSBC, Zoning Bylaw, and Wetlands Protection regulations.
Is the Community FPA or NFIP Coordinator a Certified Floodplain Manager?	HMPC	No
Is floodplain management an auxiliary function?	HMPC	Yes, for the Planning Director and Inspector of Buildings
Explain NFIP administration services (e.g., permit review, GIS, inspections, engineering)	HMPC	All development in the Flood Plain Overlay District, including structural and non-structural activities, are reviewed for compliance with the Town's Zoning Bylaws and above rules and regulations. The Town complies with the NFIP by enforcing floodplain

NFIP Topic	Source of Information	Comments
capability).		regulations, maintaining up-to-date floodplain maps, and providing information to property owners and builders regarding floodplains and building requirements. The Building Department offers FIRMs and other relevant information for those considering the purchase of flood insurance.
What are the barriers to running an effective NFIP program in the community, if any?	HMPC	None identified.
<i>Compliance History</i>		
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA	Yes
Are there any outstanding compliance issues (i.e., current violations)?	HMPC	No
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	State NFIP Coordinator, FEMA (CIS)	Last CAC was 8/28/2025 Last CAV was 1/26/2005
Is a CAV or CAC scheduled or needed?	HMPC	Not at this time.
<i>Regulation</i>		
When did the community enter the NFIP?	State NFIP Coordinator, FEMA (CIS)	8/15/1979 (Regular Entry) 6/13/1975 (Emergency Entry)
Are the FIRMs digital or paper?	Community FPA	Digital – Effective FIRMs (dated 2/12/1982) and Preliminary FIRMs (dated 5/22/2024)
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	Floodplain regulations are administered through the enforcement of the Town's Zoning Bylaw which meets 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. Other NFIP development requirements are included in the Town's administration of the Commonwealth's Wetlands Protection Act Regulations (CMR 10) and Title V (310 CMR 15) requirements for sewage treatment and disposal.

NFIP Topic	Source of Information	Comments
How does the community enforce local floodplain regulations and monitor compliance? Explain the permitting process.	Community FPA, community records	The Town requires a permit for all proposed construction or other development in the Flood Plain Overlay District, including new construction or changes to existing buildings and structures, placement of manufactured homes, placement of agricultural facilities, fences, sheds, storage facilities or drilling, mining, paving and any other development that might increase flooding or adversely impact flood risks to other properties. Substantial monitoring and compliance activities are also performed under the Building Department's administration of the State Building Code. Inspection and certification of lowest floor elevation is required by the SBC. Applicants are required to submit plans that include the Special Flood Hazard Area and proposed elevations of the proposed structures.
<i>Community Rating System (CRS)</i>		
Does the community participate in CRS? If so, what is the community's CRS Class?	Community FPA	No
What categories and activities provide CRS points and how can the class be improved?	Insurance Services Office, Inc.	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 91 provides some additional information in response to the updated requirements included in FEMA's 2025 Local Mitigation Planning Policy Guide (Element C2-a):¹⁰⁸

Table 91. Additional NFIP Participation and Compliance Information.

Required Information	Response
Adoption of NFIP minimum floodplain management criteria via local regulation.	Adopted under Zoning Bylaw, Section 6.1 (Flood Plain Overlay District). The Town will continue coordinating with the State's Flood Hazard Management Program on the adoption of the new FIRMs and regulatory updates to be consistent with the State's most recent Model Floodplain Bylaw once a Letter of Final Determination is received for the Preliminary FIRMs released in 2024.
Adoption of the latest effective Flood Insurance Rate Map (FIRM), if applicable.	The Town's Zoning Bylaw at Section 6.1.2 (Applicability) establishes the Flood Plain Overlay

¹⁰⁸ Local Mitigation Planning Policy Guide. FEMA. April 2025. P. 23.

Required Information	Response
	District as shown on the official Flood Insurance Rate Map (FIRM) for the Town of Montague dated 2/12/1982.
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 90.
Appointment of a designee or agency to implement the addressed commitments and requirements of the NFIP.	The Town’s Planning Director and Inspector of Buildings are generally tasked with implementing the commitments and requirements of the NFIP, making sure Montague 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

Montague is a small, diverse Town comprised of five villages with relatively strong municipal capabilities and resources to support the implementation of hazard mitigation actions. As described in detail within this chapter, the Town has numerous policies, plans, practices, programs and regulations in place that support long-term resilience to the impacts of natural hazards and a changing climate. This includes very strong planning and regulatory capabilities, evidenced most recently through its 2024 Comprehensive Plan that specifically calls for “integrating climate resilience at all levels” in its shared vision statement, and numerous goals, objectives, and strategies to reduce known hazard risks. The Town has also adopted and maintains zoning, subdivision, and stormwater management regulations and an array of specific policies and regulations that include or indirectly support hazard mitigation best practices.

The Town benefits from full-time staff that can be dedicated to supporting hazard mitigation-related work, including a Town Administrator and Assistant Town Administrator, Town Planner (Director of Planning and Conservation), Building Inspector, Health Director, a professionally run and well-staff Department of Public Works, and a Tree Warden. The Town also has very committed and dedicated volunteers who serve on local boards and committees in support of Town operations, with very effective coordination between elected officials, Town departments, and board/committee members. In recent years the Town has also made tremendous strides in bolstering its financial capabilities, leveraging diverse funding sources for a variety of projects, and allowing it to execute numerous timely and often overdue capital projects and equipment purchases. This includes recurring maintenance and capital improvements to Town-owned infrastructure and other community assets in addition to strong emergency preparedness and response activities. The Town also has strong tools and methods in place to support public education

and outreach efforts, including an informative website, social media accounts, cable access television, school programming, and numerous community events that provide opportunities to engage and communicate with community members.

Although the Town of Montague has relatively high capabilities and is well-positioned to mitigate the natural hazard risks faced by the community, 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. These opportunities include some relevant strategies that are aligned with or directly extracted from the Town’s recently completed (2024) Comprehensive Plan. This complete list of 26 capability improvement opportunities was 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 Capabilities to Reduce Risk

Planning and Regulatory Capabilities

1. Integrate hazard mitigation and resilience into the Town’s updated **Open Space and Recreation Plan** and **Housing Production Plan**. This could include policies or actions to encourage the preservation and restoration of protective natural features along with policies or incentives for development located outside of known hazard areas.
2. Update the 2015 **Community Wildfire Protection Plan** (CWPP).
3. Conduct **regulatory reviews and updates** to Town bylaws that incorporate climate resilience considerations. Use existing tools for integrating nature-based solutions (such as Mass Audubon’s Bylaw Review Tool, MAPC Climate Resilient Land Use Strategies, etc.).*
4. Consider adopting **Town-specific Wetlands Protection regulations** that go beyond the minimum standards set forth by the Massachusetts Wetlands Protection Act (WPA), such as increasing required buffer zones or minimum natural vegetative buffer strips. *
5. Update the Town’s **Stormwater System Policy** to incorporate design standards that address future climate and flood risk conditions, including requirements for Low Impact Development (LID), nature-based solutions for stormwater retention, and other green infrastructure techniques in addition to traditional stormwater best management practices (BMPs).*

* Aligns with 2024 Comprehensive Plan Recommendations

Relevant Strategies from the 2024 Comprehensive Plan

Objective: Build the Town’s capacity to integrate climate resilience and sustainability into planning and operations

Appoint a working group comprised of Town staff, existing board/committee members, and community members to work with the Town Planner, Town Administrator, and Assistant Town Administrator to provide guidance to Town boards, committees, and departments on climate resilience and sustainability in planning and operations.

Have the board work to incorporate climate resilience and sustainability goals and review criteria into a) Town policies and practices, b) capital planning and c) into proposed zoning changes, and Planning Board/Zoning Board of Appeals review of site plan and special permit applications.

Develop a checklist for all departments, boards, and committees to help ensure that the climate-resilience checklist has been integrated into projects to the full extent possible.

Objective: Improve Flood Resilience and Water Quality

Continue to revise zoning and subdivision regulations to improve flood resilience and fluvial erosion control.

Consider protecting the resilience of wetlands and their benefits by adopting a local wetlands bylaw.

Continue to revise zoning, subdivision, and stormwater policy to improve stormwater management.

Objective: Create a More Complete and Resilient Road and Bridge Infrastructure

Incorporate climate-resilient design standards for stormwater management systems and evaluate ways to use Nature-Based Solutions for stormwater as construction projects occur.

Administrative and Technical Capabilities

6. Explore options to hire or designate an **Emergency Management Director** with a permanent Town staff position.
7. Formally designate a local **Floodplain Administrator**.
8. Consider hiring a dedicated **Zoning Enforcement Officer**.
9. Consider hiring or designating a dedicated **grant writer / administrator** to provide support across multiple departments that pursue their own external funding opportunities.
10. Build and maintain in-house **GIS capabilities** to support hazard mitigation and other community planning/project initiatives. This includes maintaining GIS hardware, software licenses, and geospatial data and continued coordination with FRCOG.
11. Encourage Town staff to participate in relevant training and **professional development opportunities** that are focused on hazard mitigation, climate adaptation, and other resilience building activities.
12. Continue to coordinate with **FRCOG** for assistance as it relates to administrative and technical support, capability enhancements, and/or other resource needs.

Relevant Strategies from the 2024 Comprehensive Plan

Objective: Improve Flood Resilience and Water Quality

- Ensure that the Conservation Commission, Building Inspector, Planning Board, Board of Health, and other regulatory bodies have and are using in their work the emergency inundation maps for the Turners Falls Dam, Hydro Projects, Northfield Mountain Pumped Storage, and other flood prevention tools and strategies.

Financial Capabilities

13. Incorporate hazard/climate resilience into the prioritization criteria for the Town's **annual budgeting and capital improvement planning** process (support investments to reduce risk and limit expenses on projects that could increase hazard vulnerabilities).*
14. Explore adoption of MA **Community Preservation Act (CPA)** to support open space acquisition and/or restorations, green infrastructure installations, or other projects that advance flood mitigation and watershed management in addition to other CPA objectives.*
15. Build **internal staff capacity to identify and pursue grant funding** for mitigation projects through training and the ability to invest more time on grant application development, grants management, and related administrative tasks.*
16. Continue to coordinate with **FRCOG** and neighboring communities on positioning the Town to pursue and capture future grant funding for **regional resilience/risk reduction projects**.*

* Aligns with 2024 Comprehensive Plan Recommendations

Relevant Strategies from the 2024 Comprehensive Plan

Objective: Build the Town's capacity to integrate climate resilience and sustainability into planning and operations

Continue to support successful **grant writing** by Town staff, community partners, and the FRCOG.

Objective: Plan for Future Facility Needs in Fiscally Sustainable Manner

Continue to support successful **grant writing** by Town staff, community partners, and the FRCOG.

Maintain the Town's 5-Year **Capital Improvement Plan** and execute that plan in accordance with the Town's Financial Management Policies.

Explore the feasibility of adopting the **Community Preservation Act (CPA)** to assist with public park and building improvements as well as historic preservation.

Education and Outreach Capabilities

17. Increase use of the Town's website and social media platforms, Hamilton-Wenham Cable TV, CodeRED, and other readily available outreach mechanisms to **promote low-cost public education initiatives** on emergency preparedness and hazard mitigation actions for homeowners, business owners, etc. *
18. Partner with the **Gill-Montague Regional School District** to incorporate hazard and climate resilience into existing curriculum and educational programming for K-12 students. Another option is to consider **expanding the Fire Department's ongoing educational programs** for schools to cover topics beyond fire safety.
19. Participate annually in **National Flood Safety Awareness Week** and other emergency preparedness campaigns by using MEMA's social media toolkits and other readily available communication materials to promote risk awareness and mitigation.
20. Explore targeted participation in the national **Firewise USA®** recognition program as proposed in the Town's 2015 CWPP.

21. Coordinate with large forest owners, including the State, fire and water districts, and utility companies, to develop **climate-smart forest stewardship plans** on forestlands. *
22. Conduct targeted outreach and issue emergency flood warnings to unhoused populations in encampments located in high risk flood hazard areas along the Connecticut River.

• * Aligns with 2024 Comprehensive Plan Recommendations

Relevant Strategies from the 2024 Comprehensive Plan

Objective: Build the community's capacity to integrate climate resilience and sustainability into community operations, planning, and education

- **Lend support when possible and appropriate to community organizations considering climate change risks and adaptation and mitigation strategies.**
- **Conduct community engagement and public outreach via community meetings or functions hosted by the partner organizations to reach community groups at familiar and accessible venues. Build the capacity of the partners to share information about climate risk and adaptation strategies with community members, and to relay to Town staff the concerns, experiences, and insight of community members.**
- **Work with local academic faculty to identify areas of Town that can act as a learning lab for climate impacts, vulnerabilities, and solutions to be used for school site visits.**

Objective: Improve Emergency Preparedness Planning, Communication, and Facilities

- **Update the Town's web page and social media in a coordinated and engaging way to communicate to the public about short-term hazards and emergencies, emergency preparedness, and long-term climate risks. Make the information accessible to priority populations. Use a variety of methods to dispatch emergency information.**
- **Update website to meet ADA accessibility standards and provide language translations.**

Objective: Improve and Increase Community Conservation and Waste Diversion

- **Educate residents and businesses about water conservation to reduce demand during times of drought.**

Possible New Actions Related to NFIP Participation and Compliance

23. Coordinate with the State Flood Hazard Management Program to **update the Town's floodplain regulations** (Zoning Bylaw, Section 6.1) in alignment with the State's latest Model Floodplain Bylaw *(to be adopted in parallel with new FEMA FIRMs becoming effective)*.
24. **Promote the availability of flood insurance** to all property owners and renters, especially those with structures located in areas of high to moderate flood risk.
25. Review the State's **Local Floodplain Action Guide** for possible regulatory or administrative improvements to enhance the community's resilience to future flood events.
26. Continue participating in **regional efforts** that consider advantages to **managing flood hazards and resilience at a watershed scale**, especially where the Town is experiencing challenges in finding local solutions.

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 the HMP.

Mitigation Goals

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

FEMA Requirement Element G: High Hazard Potential Dams HHPD3. Did the plan include mitigation goals to reduce long-term vulnerabilities from HHPDs?

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 Montague, MA Hazard Mitigation Plan Update the HMPC reviewed the Town of Montague Hazard Mitigation Plan Update (2020) and the Town of Montague MVP Resiliency Plan (2018) plan goal statements, and the goals of the 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan (ResilientMass Plan).

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

The Town of Montague has developed several plans since 2020 that reflect the Town's current vision and priorities. The HMPC and the consulting team reviewed these plans to capture current priorities of the Town and develop revised goal statements that recognize those priorities. Several of the documents reviewed are shown in the list below:

- 2018-2023 Montague Community Development Strategy
- 2023 Annual Town Report
- 2024 Annual Town Report
- 2024 Montague Comprehensive Plan
- Economic Development Plan, 2022
- Montague Mass in Motion Final Report, 2023
- Montague Open Space and Recreation Plan, 2017

The HMPC developed the goal statements shown below to represent their vision and priorities for the Town of Montague 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.

1. Save Lives and Reduce Losses to Private Property

Reduce risks to people and property through natural hazard mitigation and climate adaptation.

2. High Hazard Potential Dams

Assess the vulnerabilities of high-hazard dams (including the canal system) and implement strategies to reduce risks.

3. Increase Capacity to Mitigate Risk

Implement plans, land use policies, and development regulations to promote smart growth and low-impact development while prioritizing equity.

4. Buildings and Infrastructure

Strengthen Town-owned facilities, including historic buildings, and infrastructure to improve community resiliency throughout the five villages while prioritizing green infrastructure and other nature-based solutions.

5. Natural Resources

Prioritize the protection of open spaces, farmland, and natural resources such as waterways.

6. Education and Awareness

Improve community-wide resilience to natural hazards and climate change through public education and engagement.

Figure 52. Montague Hazard Mitigation Plan Goal Statements.

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

The HMPC reviewed the forty-three mitigation actions from the previous HMP and for the purposes of this HMP, the status of each was confirmed. Table 92 shows the previous HMP's actions and the status of each. In addition to their status, if an action was moved forward to this plan the final column indicates the title of the new action.

Table 92. Status of Previous HMP's Mitigation Actions.

Action #	Action Title	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title/Description (if applicable)
1	Install more radio and cell phone towers in the eastern and southeastern part of town.	Partially Completed / In Progress	Upgrading radios to the 800 system was completed 6 years ago. No action has been taken for cell phone tower upgrades. Adding cell towers is beyond the scope of the Town.	NO - explanation provided at left	
2	Convene an annual meeting of the Local Hazard Mitigation Committee to assess progress on implementing specified actions in the Local Multi-Hazard Mitigation Plan.	Delayed	This has not occurred to date and therefore will be included in the plan update.	YES - updated/revised description provided at right, if applicable	Convene an annual meeting of the Local Hazard Mitigation Committee to assess progress on implementing specified actions in the Local Multi-Hazard Mitigation Plan.
3	Establish a micro-grid powered by solar PV between the High School and Public Safety Complex to provide emergency back-up power.	Completed	This project was completed in 2019.	NO - explanation provided at left	
4	Improve the radio communication system at the Turners Falls High School and install repeaters.	Delayed	Not completed to date due to funding and competing priorities.	YES - updated/revised description provided at right, if applicable	Improve the radio communication system at the Turners Falls High School and install repeaters.
5	Rehabilitate the General Pierce Bridge, an important emergency and	Completed	The 20-year bridge repair work was completed in 2023.	NO - explanation provided at left	

Action #	Action Title	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title/Description (if applicable)
	evacuation connection to Greenfield.				
6	Connect the irrigation well to the Turners Falls High School to be available as a backup drinking water supply for sheltering.	Canceled	Well supplies irrigation. The building is supplied by the Water District. Remove from list.	YES - updated/revised description provided at right, if applicable	Connect the irrigation well to the Turners Falls High School to be available as a backup drinking water supply for sheltering.
7	Support the creation of additional neighborhood coalitions or networks, and strengthen connections with Town government or organizations. Conduct an educational program to encourage elders to register for assistance through TRIAD.	Delayed	Not completed: Conduct an educational program to encourage elders to register for assistance through TRIAD. Could be formalized and efforts could be strengthened: Support the creation of additional neighborhood coalitions or networks, and strengthen connections with Town government or organizations.	YES - updated/revised description provided at right, if applicable	Support the creation of additional neighborhood coalitions or networks, and strengthen connections with Town government or organizations. Conduct an educational program to encourage elders to register for assistance through TRIAD.
8	Explore the creation of a communication plan to reach out to homeless populations regarding emergency information. Increase the Town's ability to communicate with residents in multiple languages. Compile a list of social services	Partially Completed / In Progress	Some piecemeal efforts have occurred, additional work is needed.	YES - updated/revised description provided at right, if applicable	Prepare and implement communication plan to reach out to homeless populations and other residents regarding emergency information and resources. Conduct targeted outreach and issue emergency flood warnings to unhoused populations in encampments located in high risk flood hazard areas along the Connecticut River.

Action #	Action Title	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title/Description (if applicable)
	available including contacts and roles.				
9	Work with the REPC to develop a formal system for towns to record costs and property damages from hazard events. Encourage businesses and residents to report property damages, and farmers to report crop damages.	Partially Completed / In Progress		YES - updated/revised description provided at right, if applicable	Work with the REPC to develop a formal system for towns to record costs and property damages from hazard events. Encourage businesses and residents to report property damages, and farmers to report crop damages.
10	Publicize home rehabilitation and weatherization resources to residents to upgrade older homes to better withstand hazard events; continue to address distressed, vacant and abandoned homes in town.	Partially Completed / In Progress	Partial efforts have been conducted.	YES - updated/revised description provided at right, if applicable	Publicize home rehabilitation and weatherization resources to residents to upgrade older homes to better withstand hazard events; continue to address distressed, vacant and abandoned homes in town.

Action #	Action Title	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title/Description (if applicable)
11	Review and update the Floodplain District Overlay Zoning Bylaw once new floodplain maps are available. Special consideration should be given to further restricting or eliminating new development within the 100-year floodplain (1% chance flood event).	Partially Completed / In Progress	In Progress - Town is currently working with FEMA + MEMA to update Floodplain and associated Zoning Amendment. To be completed in ~2027	YES - updated/revised description provided at right, if applicable	Coordinate with the State Flood Hazard Management Program to update the Town's floodplain regulations (Zoning Bylaw, Section 6.1) in alignment with the State's latest Model Floodplain Bylaw (to be adopted in parallel with new FEMA FIRMs becoming effective). As part of future updates, continue to review the State's forthcoming Local Floodplain Action Guide for possible regulatory or administrative improvements to enhance the community's resilience to future flood events.
12	Improve the Canal District in Turners Falls and coordinate with property owners and FirstLight about redevelopment plans and the structural integrity of the canal.	Partially Completed / In Progress	This is considered a floodplain restoration project. Received \$10 million from EPA and MA to demolish the mill buildings along the canal. Currently preparing the demolition design with the hope of demolishing buildings by 2028. No new structures will be built. The land will become open space with direct access to the river.	YES - updated/revised description provided at right, if applicable	Improve the Canal District in Turners Falls and coordinate with property owners and FirstLight about redevelopment plans and the structural integrity of the canal.

Action #	Action Title	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title/Description (if applicable)
13	Maintain and improve sidewalks for all pedestrian routes to schools. Ensure that children have adequate and warm clothing for walking to school.	Partially Completed / In Progress	Sidewalk goes up a steep embankment that does not meet ADA compliance and is shaded by trees. The EJ population uses this path to get to school and their attendance declines in the winter. The EJ Population is too close to the school to qualify for bus access. Fixing the sidewalk and maintaining it will facilitate safe access to school.	YES - updated/revised description provided at right, if applicable	Maintain and improve sidewalks for all pedestrian routes to schools.
14	Implement recommended lining of failing sewer pipes in Millers Falls with “short sleeves” that will permanently seal the cracked sections to mitigate inflow and infiltration (I&I) of groundwater into the		Response from Montague Clean Water Facility Superintendent Chelsey Little: I do not believe this type of work has been done. There was a study done a few years back by an engineering firm looking at all of the I/I issues in Millers Falls. I am not sure what, if any, has actually been done as the focus over the last several years has been in the Turners Falls area due to the CSOs. I have looped in Sam, as he might have a		Unknown.

Action #	Action Title	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title/Description (if applicable)
	wastewater treatment system.		better idea of anything his crew or contractors might have done in the Millers Falls collection system recently. (They handle the collection system end of things.)"		
15	Implement recommendations from MA DEP to address the Combined Sewer Overflows (CSOs)	Partially Completed / In Progress	Town updated its Long Term Control Plan (LTCP) in 2023, rehabilitated over 50 manholes in 2025 with the support from the State's Rural Development Fund, and authorized up to \$3M in local funding for additional manhole and pipe rehabilitation in Turners and Millers Falls. The work completed so far has been effective at reducing inflow/infiltration (Chelsey: I/I went from 46.58% down to 38.73% between CY2024 and 2025) and the additional work projected will provide additional help with reducing the frequency and severity of CSO discharges into the Connecticut River.	YES - updated/revised description provided at right, if applicable	Implement recommendations from MA DEP to address the Combined Sewer Overflows (CSOs).
16	Consider new land use regulations, including impervious surface limits, and local wetlands bylaw to further regulate development in floodplain, reduce	Delayed	Work has not been done to date. The Town intends to update the bylaw in the next two years.	YES - updated/revised description provided at right, if applicable	Work has yet to take place, but the Town will keep the action on the list due to planned future projects. The Town will be updating the Zoning Bylaw section of the Floodplain Overlay District in the next 1-2 years.

Action #	Action Title	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title/Description (if applicable)
	runoff and minimize risk of localized flooding.				
17	Work with utility companies to establish standards for an annual tree pruning program to reduce risk to infrastructure from severe storms.	Canceled	The utility companies do pruning on their schedule as does the Town.	NO - explanation provided at left	
18	To decrease risk to population and buildings, disseminate information on how to prepare homes and other structures to withstand flooding and high winds.	Delayed	Work has not been done to date.	YES - updated/revised description provided at right, if applicable	Increase use of the Town's website and social media platforms, Montague Community Television, RAVE, and other readily available outreach mechanisms to promote low-cost public education initiatives on emergency preparedness and hazard mitigation actions for homeowners, business owners, etc. Expand hazard mitigation and other emergency management information on the Town's website.
19	Once new floodplain maps are available, expand and update the Vulnerability Assessment for properties located	Delayed	The maps have not gone into effect yet.	YES - updated/revised description provided at right, if applicable	Once new floodplain maps are available, expand and update the Vulnerability Assessment for properties located within the 100-year floodplain (1% chance flood

Action #	Action Title	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title/Description (if applicable)
	within the 100-year floodplain (1% chance flood event), including information on crop damages if available.				event), including information on crop damages if available.
20	Support local and regional watershed-wide open space protection efforts, particularly in floodplain areas or forested upland areas, with special attention to the Sawmill River Watershed.	Partially Completed / In Progress	This project is ongoing.	YES - updated/revised description provided at right, if applicable	Implement additional project named in the 2023 Sawmill River Corridor Assessment Project.
21	Encourage & implement forest stewardship practices that produce more stable, resilient, successional forested landscapes to reduce the risk of landslides, flooding, wildfire, drought, and invasive species.	Partially Completed / In Progress	Work done to date includes an MVP Action Grant to do soil testing and other work to determine stability.	YES - updated/revised description provided at right, if applicable	Update the 2015 Community Wildfire Protection Plan (CWPP). As part of this effort, coordinate with large forest owners, including the State, fire and water districts, and utility companies, to develop climate-smart forest stewardship plans on forestlands.

Action #	Action Title	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title/Description (if applicable)
22	Encourage the Zoning Board of Appeals to adopt the Stormwater System Policy. Clarify that Site Plan Review requires submission of a stormwater management plan in accordance with the Stormwater System Policy.	Delayed	The Planning Board adopted a stormwater policy but the Zoning Board has not adopted one. FRCOG created the policy over a decade ago and it needs to be revised and updated so it meets current standards and may be adopted by land use boards.	YES - updated/revised description provided at right, if applicable	Encourage the Zoning Board of Appeals to adopt the Stormwater System Policy.
23	Consider becoming part of NFIP's Community Rating System.	Canceled	The Town does not have the capacity or need for this action.	NO - explanation provided at left	
24	Provide property owners in flood prone areas information on the National Flood Insurance Program.	Delayed	The Town has not done this to date but will consider it moving forward.	YES - updated/revised description provided at right, if applicable	Promote the availability of flood insurance to all property owners and renters, especially those with structures located in areas of high to moderate flood risk.
27	Evaluate repairs to the Center Street and South Street bridges over the Sawmill River, and incorporate design improvements to accommodate floodplain capacity	Partially Completed / In Progress	The South Street Bridge replacement has been completed, but the Center Street Bridge repair or replacement has not occurred.	YES - updated/revised description provided at right, if applicable	Evaluate repairs to the Center Street bridge over the Sawmill River, and incorporate design improvements to accommodate floodplain capacity flows as identified in the Sawmill River Restoration Plan move Center Street bridge forward.

Action #	Action Title	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title/Description (if applicable)
	flows as identified in the Sawmill River Restoration Plan				
28	Map, assess, and prioritize culverts for repair or replacement. Design new or replacement culverts to withstand greater precipitation amounts due to climate change.	Partially Completed / In Progress	FRCOG did said inventory to assist in completing the project: https://frcog.maps.arcgis.com/apps/instance/attachmentviewer/index.html?appid=5820c96f19004b258a58ea1dbd7b78dc	YES - updated/revised description provided at right, if applicable	Map, assess, and prioritize culverts for repair or replacement. Design new or replacement culverts to withstand greater precipitation amounts due to climate change. Implement based on need from the FRCOG inventory.
29	Implement flood mitigation measures along Montague City Road, an important emergency and evacuation route in town.	Completed	Town completed drainage improvements along Montague City Road in 2024 through an MVP Action Grant.	NO - explanation provided at left	
30	Conduct a comprehensive study of the Montague City Road area drainage watershed to identify upstream solutions to address flooding at Avenue A (near the carwash) and along Montague City Road.	Completed	The project is completed.	NO - explanation provided at left	

Action #	Action Title	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title/Description (if applicable)
31	Develop an annual program to assess and clear floodway ditches in the floodplain of overgrown vegetation and any other debris.	Delayed	The work has not yet occurred.	YES - updated/revised description provided at right, if applicable	Develop an annual program to assess and clear floodway ditches in the floodplain of overgrown vegetation and any other debris. Submit a bundled Notice of Intent to the Conservation Commission for approval of annual maintenance plan.
32	Implement safety infrastructure improvements on the Montague Plains including addition of hydrants and improving access roads and fire breaks; install a hydrant on Turners Falls Road; update Fire Department equipment for fighting a wildfire.	Partially Completed / In Progress	The work has not been completed.	YES - updated/revised description provided at right, if applicable	Implement safety infrastructure improvements on the Montague Plains including the addition of hydrants and improving access roads and fire breaks, install a hydrant on Turners Falls Road, update Fire Department equipment for fighting a wildfire, and consider expanding to include areas with steep slopes that are prone to wildfires.
33	Continue fuels mitigation and management in the Montague Plains, including prescribed fire and mechanical treatments to reduce wildfire potential in the most critical areas.	Completed + To Be Continued	Ongoing work by the Mass Department of Fish and Wildlife.	YES - updated/revised description provided at right, if applicable	Continue fuels mitigation and management in the Montague Plains, including prescribed fire and mechanical treatments to reduce wildfire potential in the most critical areas.

Action #	Action Title	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title/Description (if applicable)
34	Educate homeowners about the risk of wildfires and brushfires and how to reduce the risk by adopting general fire safety techniques. In coordination with DCR, implement a Firewise program targeting the residents and businesses in the Urban-Interface zone; run 2-3 programs to demonstrate how to make a house safer in the event of a wildfire on the Montague Plains.	Delayed	The work has not yet occurred.	YES - updated/revised description provided at right, if applicable	Educate homeowners about the risk of wildfires and brushfires and how to reduce the risk by adopting general fire safety techniques. In coordination with DCR, implement a Firewise program targeting the residents and businesses in the Urban-Interface zone; run 2-3 programs to demonstrate how to make a house safer in the event of a wildfire on the Montague Plains and other forested areas in Town.
35	Conduct a tabletop exercise and educational trainings for first responders to improve the region's preparedness and response to a wildfire	Partially Completed / In Progress	The work has not yet occurred.	YES - updated/revised description provided at right, if applicable	Conduct a tabletop exercise and educational trainings for first responders to improve the region's preparedness and response to a wildfire.
36	Determine which shelters were built after 1975 and designate these as the appropriate shelter in the event of an earthquake.	Delayed	The High School is the designated shelter and it was built in 1974.	YES - updated/revised description provided at right, if applicable	Evaluate municipal buildings and structures to determine if they are particularly vulnerable to earthquake damage and determine if any retrofitting measures could mitigate this vulnerability. Integrate measures

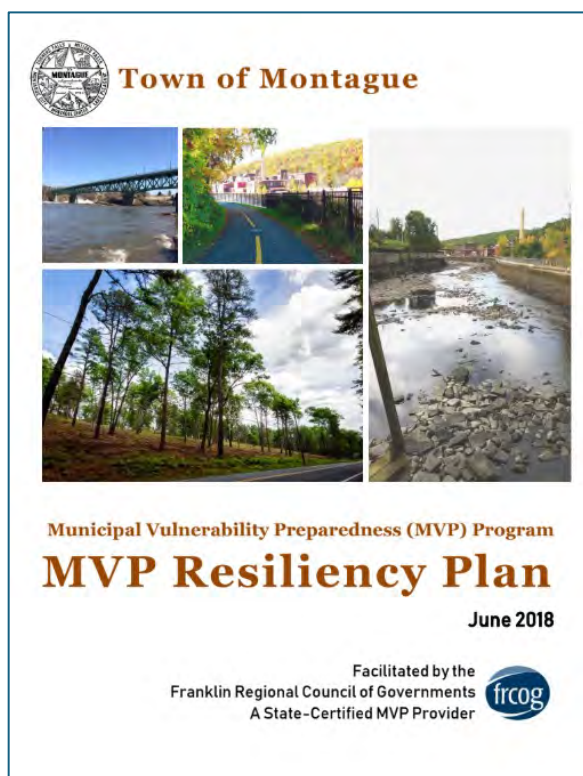
Action #	Action Title	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title/Description (if applicable)
					into planned updates of buildings.
37	Ensure Compliance with the Massachusetts State Building Code. Provide training to the Building Inspector, as needed, to ensure that all new construction complies with the appropriate seismic requirements of the State Building Code. Participate in trainings offered by FEMA's National Earthquake Technical Assistance Program (NETAP). NETAP is designed to help state, local, and tribal governments obtain the knowledge, tools, and support that they need to plan and implement effective earthquake mitigation strategies.	Delayed	The work has not yet occurred.	YES - updated/revised description provided at right, if applicable	Ensure Compliance with the Massachusetts State Building Code. Provide training to the Building Inspector, as needed, to ensure that all new construction complies with the appropriate seismic requirements of the State Building Code. Participate in trainings offered by FEMA's National Earthquake Technical Assistance Program (NETAP). NETAP is designed to help state, local, and tribal governments obtain the knowledge, tools, and support that they need to plan and implement effective earthquake mitigation strategies.

Action #	Action Title	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title/Description (if applicable)
38	Evaluate municipal buildings and structures to determine if they are particularly vulnerable to earthquake damage and determine if any retrofitting measures could mitigate this vulnerability. Integrate measures into planned updates of buildings.	Delayed	The work has not yet occurred.	YES - updated/revised description provided at right, if applicable	Evaluate municipal buildings and structures to determine if they are particularly vulnerable to earthquake damage and determine if any retrofitting measures could mitigate this vulnerability. Integrate measures into planned updates of buildings.
39	Develop and disseminate emergency earthquake public information and instructions. Conduct earthquake drills in schools, businesses, special care facilities and other public gathering places.	Delayed	The work has not yet occurred.	YES - updated/revised description provided at right, if applicable	Develop and disseminate emergency earthquake public information and instructions. Conduct earthquake drills in schools, businesses, special care facilities and other public gathering places.
40	Identify the locations of beaver dams in Montague and neighboring towns (Leverett) that pose a risk private property and town infrastructure if the dams were to fail. Work with the Franklin County REPC and neighboring towns to map potential inundation areas	Canceled	Beavers have not posed a big threat to the Town.	NO - explanation provided at left	

Action #	Action Title	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title/Description (if applicable)
	associated with beaver dams in and adjacent to Montague.				
41	Integrate regional landslide mapping into town land use regulations.	Delayed	The work has not yet occurred.	YES - updated/revised description provided at right, if applicable	Integrate regional landslide mapping into Town land use regulations. Consider if the significance of landslide risk and if updating these regulations would mitigate the risk.
42	Secure funding to complete abatement and demolition of abandoned and blighted mill properties on the Connecticut River such as Indeck, Railroad Salvage, and portions of Strathmore Mill.	Completed + To Be Continued	This activity is underway with the \$10 million the Town received, but they are seeking additional funds.	YES - updated/revised description provided at right, if applicable	Secure funding to complete abatement and demolition of abandoned and blighted mill properties on the Connecticut River such as the Strathmore Mill Complex. Additional demo may be necessary due to insufficient funds.
43	Continue to participate in the Regional Emergency Planning Committee (REPC) to address procedures to deal with hazardous materials emergencies and encourage community awareness.	Partially Completed / In Progress	The Emergency Manager coordinates with the REPC.	NO - explanation provided at left	

Action #	Action Title	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title/Description (if applicable)
44	Participate in tabletop exercises and trainings for hazardous material accidents.		It is unknown whether these trainings are provided.	YES - updated/revised description provided at right, if applicable	Participate in tabletop exercises and trainings for hazardous material accidents.
45	Review evacuation procedures for emergency action plans of hazardous facilities including the Vermont Yankee nuclear power plant and the FERC-licensed hydroelectric dams and facilities on the Connecticut River.	Partially Completed / In Progress	Town received an annual EAP from FirstLight but not for other dams. The Vermont Yankee Nuclear Power Plant is permanently closed. This will need to be reviewed annually in addition to getting EAPs from all applicable dams.	YES - updated/revised description provided at right, if applicable	Review evacuation procedures for emergency action plans of FERC-licensed hydroelectric dams and facilities on the Connecticut River and high and significant hazard dams in Montague, Greenfield, Sunderland, and Wendell.

Municipal Vulnerability Preparedness Plan



The Town of Montague MVP Resiliency Plan (2018) includes recommendations organized by high priorities, moderate priorities, and additional priorities. 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 Town of Montague'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.

Comprehensive Range of Mitigation Actions

FEMA Requirement §201.6(c)(3)(ii) C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure?

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 Montague. 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).

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

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 or types of mitigation action.



Figure 53. Process of Identifying a Range of Mitigation Actions.

The HMPC and the public considered four mitigation action categories defined in Figure 54 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 54. Types of Mitigation Actions.

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

Table 93. Examples of Mitigation Actions in Each Category.

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
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

Mitigation Action Category	Examples of Mitigation Actions
	• 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

The HMPC also included specific dam risk mitigation activities such as those shown in Table 94 below taken from FEMA's Hurricane and Flood Mitigation Handbook for Public Facilities (https://www.fema.gov/sites/default/files/documents/fema_p-2181-fact-sheet-2-3-dams-and-reservoirs_0.pdf).

Table 94. Dam Risk Mitigation Activities.

Type of Dam Risk Mitigation Activity	Description
Emergency Action Plans	• Develop and practice an Emergency Action Plan (EAP). EAPs include actions dam owners take to mitigate risk, coordinate with emergency management, issue early warnings, create inundation maps, and delineate responsibilities for those who manage an incident.
Improve Dam Stability	• Reduce the Slope • Use Buttressing • Use Anchoring
Increase Spillway Capacity	• Expand Existing Spillway • Add a New Spillway
Increase Temporary Storage Capacity	• Raise the Dam Height
Control Surface Erosion	• Use Armoring • Build a Parapet Wall • Build a Cutoff Wall to Address Headcutting
Reduce Seepage and Internal Erosion	• Install a Blanket Drain • Install a Filter Diaphragm

Type of Dam Risk Mitigation Activity	Description
	• Install a Reverse Filter • Install a Seepage Cutoff Wall
Address Foundation Issues	• Install a Grout Curtain • Install a Foundation Cutoff Wall

The Association of State Dam Safety Officials (<https://damsafety.org/Roadmap>) includes the following recommendations for mitigating risk. The HMPC considered each of these.

Dam Owners Should:

- Maintain and operate dams to assure that they do not fail. Work with state and local officials to mitigate the consequences of failures and incidents.
- Inform local officials of risks associated with dams.
- Develop emergency action plans (EAP) for every high-hazard potential dam. Use a nationally accepted model/guide. Integrate exercising into the planning process.
- Have a dam failure inundation map created as part of the EAP development process. Share plans and maps with local planners and first responders.
- Work with the state or federal regulator to comply with safety standards.
- Hire experienced professional engineers to oversee dam safety engineering issues.
- Attend educational programs when offered by organizations and agencies.

Emergency and Floodplain Managers Should:

- Open lines of communication with State and Federal dam safety agencies to improve planning and preparedness for dam failures or incidents.
- Participate in educational programs to become more aware of dams and how they intersect with emergency and floodplain management.
- Encourage improved land use planning at the local level so that communication about how dams affect local areas is more accurately known and considered in future planning.

Additional mitigation actions considered by the HMPC for dams included:

- Rehabilitation or removal
- Adopting or enforcing land use ordinances in inundation zones
- Elevating structures in inundation zones
- Adding flood protection measures such as berms, floodwalls, and floodproofing in inundation zones
- Managing the watershed to reduce erosion and sediment inflow.
- Public education.

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 each hazard identified. In several instances multiple actions address an identified hazard and problem.

Mitigation actions for each identified hazard and problem identified in the Risk Assessment are shown Table 95 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. The HMPC considered the pros and cons of all possible mitigation actions.

Table 95. Mitigation Actions for Each Hazard.

Hazard	Problem Summary and Mitigation Action
Flooding from Precipitation	Flooding is a high-risk, recurring hazard in Montague. Approximately 52 buildings lie within the floodplain, including residential, industrial, and government structures. Bridges and culverts serve as critical evacuation routes but are vulnerable to flood damage. The Hillcrest School floods periodically. Combined Sewer Overflows (CSOs) release untreated sewage during heavy rain events. Older and lower-income residents in the floodplain may have difficulty evacuating. Road closures disrupt emergency response and community activities, and historic properties and natural resource areas are at risk. Mitigation Actions: • Action 16: Update zoning, subdivision, and other regulations to improve flood resilience, fluvial erosion control, and stormwater management. • Action 19: Coordinate with the State Flood Hazard Management Program to update floodplain regulations in alignment with the State’s latest Model Floodplain Bylaw. • Action 23: Implement recommendations from the 2023 Sawmill River Corridor Assessment Project. • Action 24: Formally designate a local Floodplain Administrator. • Action 25: Promote the availability of flood insurance to all property owners and renters in flood-prone areas. • Action 26: Improve transportation infrastructure (bridges, culverts) to withstand stronger storms. • Action 29: Implement MA DEP recommendations to address Combined Sewer Overflows. • Action 30: Encourage adoption of the Stormwater System Policy and require stormwater management plans for site plan review. • Action 31: Evaluate repairs to the Center Street bridge over the Sawmill River incorporating design improvements for floodplain capacity flows. • Action 34: Expand and update the Vulnerability Assessment for properties within the 100-year floodplain once new FEMA maps are available. • Action 36: Develop an annual program to assess and clear floodway ditches of overgrown vegetation and debris.

Hazard	Problem Summary and Mitigation Action
	- Action 37: Map, assess, and prioritize culverts for repair or replacement to climate-resilient standards. - Action 14: Participate annually in National Flood Safety Awareness Week to build public knowledge of flood hazards.
Severe Winter Storms	Severe winter storms pose significant risks in Montague, including power outages, road closures, and the potential for residents to be stranded. Vulnerable populations may be unable to reach emergency services. Roof ice dams can damage structures. The electrical grid and roadways are susceptible to failure, and first responders may have difficulty reaching residents in need. Severe storms can also damage trees in natural areas and historic and cultural sites. Mitigation Actions: - Action 3: Establish a micro-grid powered by solar PV between the High School and Public Safety Complex to provide emergency back-up power. - Action 4: Prepare and implement a communication plan to reach out to residents, including vulnerable populations, regarding emergency information and resources. - Action 9: Maintain and improve sidewalks for all pedestrian routes to schools. - Action 11: Use the Town’s website, social media, and other outreach tools to promote public education on emergency preparedness and home weatherization resources. - Action 12: Improve emergency shelters and warming/cooling centers, including emergency backup power and improved heating capacity. - Action 26: Improve transportation infrastructure (bridges, culverts) to withstand stronger storms. - Action 40: Upgrade water and wastewater infrastructure to withstand stronger storms.
Average and Extreme Temperatures	Extreme heat poses a serious and growing public health threat in Montague, especially for vulnerable populations living in older homes without air conditioning. The Senior Center and several libraries used as warming/cooling centers lack backup generators. Elderly and mobility-impaired residents may be unable to leave their homes without assistance. The electric grid may become strained and fail during extreme heat or cold events. Older homes with poor insulation and single-pane windows are difficult and costly to heat and cool. Extreme heat also increases wildfire risk and may worsen water quality. Mitigation Actions: - Action 3: Establish a micro-grid powered by solar PV to provide emergency back-up power for the High School and Public Safety Complex. - Action 4: Prepare and implement a communication plan to reach vulnerable populations with emergency information and resources. - Action 10: Support the creation of neighborhood coalitions and strengthen connections with Town government, including TRIAD registration for elders. - Action 11: Use Town outreach mechanisms to promote public education on emergency preparedness and home weatherization resources. - Action 12: Improve emergency shelters and warming/cooling centers, including emergency backup power and better cooling capacity.

Hazard	Problem Summary and Mitigation Action
Other Severe Weather	- Action 21: Improve access to parks and trails for use during extreme heat, including lighting for early morning and evening hours. Severe weather events including high winds and thunderstorms frequently affect Montague, causing power outages, downed trees, and road closures. Vulnerable populations may become isolated when roads are closed. The Community Action school in the Patch neighborhood of Turners Falls is vulnerable during evacuation scenarios due to limited access. First responders may have difficulty reaching residents when roads are blocked by debris. Historic, cultural, and natural resources may be impacted. Mitigation Actions: - Action 3: Establish a micro-grid powered by solar PV to provide emergency back-up power during severe weather events. - Action 4: Prepare and implement a communication plan to reach vulnerable populations with emergency information and resources. - Action 8: Start a Community Emergency Response Team (CERT) to build local emergency response capacity. Action 11: Use Town outreach tools to promote emergency preparedness education for homeowners and businesses, including how to prepare for high winds. - Action 26: Improve transportation infrastructure (bridges, culverts, drainage) to withstand stronger storms. - Action 40: Upgrade water and wastewater infrastructure to withstand stronger storm events.
Wildfires/Brushfires	Montague faces elevated wildfire and brushfire risk, particularly near the Montague Plains and the wildland-urban interface. Accumulated fuels in the Montague Plains create conditions for fast-moving, high-intensity wildfires. Smoke poses health risks for residents with asthma or respiratory conditions. Structures without defensible space are especially vulnerable. Road closures from wildfires can impede emergency services, and wildfire events can cause significant economic losses from property damage and impacts to recreation and tourism. Mitigation Actions: - Action 20: Conduct tabletop exercises and training for first responders to improve preparedness and response to a wildfire. - Action 27: Educate homeowners on fire-safe practices and implement a Firewise program for residents in the wildland-urban interface. - Action 35: Update the 2015 Community Wildfire Protection Plan to cover the whole Town and integrate climate-smart forest stewardship. - Action 39: Continue fuels mitigation and management in the Montague Plains, including prescribed fire and mechanical treatments. - Action 42: Implement safety infrastructure improvements on the Montague Plains, including hydrants, improved access roads, and updated Fire Department equipment.
Hurricanes/Tropical Storms	While not as frequent as other hazards, hurricanes and tropical storms can bring damaging winds, heavy rainfall, and flooding to Montague. Vulnerable populations may need to be evacuated and could be displaced from their homes. The Senior Center and several libraries serve as warming and cooling facilities but lack generators. High winds can topple trees into structures, damage wind-susceptible

Hazard	Problem Summary and Mitigation Action
	buildings, and bring down the electric grid. First responders may have difficulty reaching people when roads are blocked by debris. Mitigation Actions: • Action 3: Establish a micro-grid powered by solar PV to provide emergency back-up power. • Action 4: Prepare and implement a communication plan to reach vulnerable populations with emergency information. • Action 8: Start a Community Emergency Response Team (CERT) to build local emergency response capacity. • Action 11: Use Town outreach tools to disseminate information on how to prepare homes to withstand flooding and high winds. • Action 12: Improve emergency shelters and warming/cooling centers, including emergency backup power and better cooling capacity. • Action 26: Improve transportation infrastructure to withstand stronger storms.
Droughts	Droughts pose a growing risk in Montague as changing precipitation patterns reduce water availability. Vulnerable communities may have difficulty accessing potable water during drought events. Water supply infrastructure may need to be shut down, and businesses requiring water for daily operations could face disruptions. Outdoor water use restrictions can be challenging to enforce. Freshwater ecosystems may be degraded, forests may suffer tree die-off, and invasive species may proliferate during drought conditions. Mitigation Actions: • Action 2: Incorporate climate and hazard resilience into the Town’s annual budgeting and capital improvement planning. • Action 11: Use Town outreach to share information regarding water conservation with residents and businesses. • Action 15: Connect the irrigation well to the Turners Falls High School to provide a backup drinking water supply for sheltering. • Action 36: Develop an annual program to maintain floodway ditches and support proper watershed function. • Action 40: Upgrade water and wastewater infrastructure to withstand drought and stronger storms.
Flooding from Dam Failure	Montague is downstream of multiple high hazard dams on the Connecticut and Deerfield Rivers. A dam failure or high-flow release could inundate thousands of acres, including critical facilities such as the Police Department, Town Hall, Farren Care Facility, and the Turners Falls Historic District. Older, low-income, and non-English-speaking residents and homeless populations along river encampments face the greatest evacuation challenges. Local officials do not always receive copies of Emergency Action Plans (EAPs) for privately owned dams. Historic mill buildings and the power canal in Turners Falls lie within high hazard dam breach inundation areas. Mitigation Actions: • Action 4: Prepare and implement a communication plan, including targeted outreach and emergency flood warnings to unhoused populations in encampments along the Connecticut River.

Hazard	Problem Summary and Mitigation Action
	• Action 5: Improve the Canal District in Turners Falls and coordinate with property owners and FirstLight about redevelopment and structural integrity of the canal. • Action 13: Review evacuation procedures for emergency action plans of FERC-licensed hydroelectric dams and other applicable dams on the Connecticut and Deerfield Rivers. • Action 34: Expand and update the Vulnerability Assessment for properties within the 100-year floodplain once new FEMA flood maps are available. • Action 43: Secure funding to complete abatement and demolition of abandoned and blighted mill properties on the Connecticut River.
Tornadoes	While relatively infrequent, tornadoes pose a real risk in Montague given the Town’s location in the Connecticut River Valley, a known tornado corridor. Vulnerable populations without basements or without cell phones for weather alerts face heightened risk. Tornadoes can damage or destroy structures and critical infrastructure, block roadways with debris, and cause widespread power outages. Sheltering, mass feeding, and debris clearance operations may be required. Mitigation Actions: • Action 3: Establish a micro-grid powered by solar PV to provide emergency back-up power. • Action 4: Prepare and implement a communication plan to reach vulnerable populations with emergency information. • Action 8: Start a Community Emergency Response Team (CERT) to build local emergency response capacity. • Action 10: Support the creation of neighborhood coalitions and strengthen connections with Town government. • Action 11: Use Town outreach tools to promote emergency preparedness education for homeowners and businesses. • Action 12: Improve emergency shelters and warming/cooling centers, including emergency backup power.
Hazmat	Montague has several hazardous materials sites, including TRI-reporting industrial facilities and legacy contamination from historic mill properties along the Connecticut River. Older residents and those with mobility limitations or limited English proficiency may have difficulty evacuating during a hazmat spill or release. Hazmat incidents can cause road closures, impact historic and cultural resources such as the Montague Plains and Connecticut River Scenic Farm Byway and threaten natural and aquatic ecosystems. Mitigation Actions: • Action 4: Prepare and implement a communication plan, including multilingual outreach, to reach vulnerable populations with emergency information. • Action 5: Improve the Canal District in Turners Falls and coordinate with property owners and FirstLight to address legacy contamination and structural integrity. • Action 41: Participate in tabletop exercises and training for hazardous material accidents to improve inter-agency coordination.

Hazard	Problem Summary and Mitigation Action
Invasive Species	- Action 43: Secure funding to complete abatement and demolition of abandoned and blighted mill properties on the Connecticut River. Invasive plant species and pests threaten Montague’s natural ecosystems, agricultural activities, and recreational areas. Species such as the Spotted Lanternfly pose a growing concern. Trees damaged or killed by invasive pests can become hazards to structures, property, utility lines, and roadways. Invasive species degrade forest health and biodiversity, reduce the quality of outdoor recreational areas and trails, and may exacerbate the impacts of other hazards such as flooding and wildfires. Mitigation Actions: - Action 11: Use Town outreach mechanisms to share information about invasive species threats with residents and landowners. - Action 16: Update land use regulations to incorporate nature-based solutions and protect natural systems. - Action 23: Implement recommendations from the 2023 Sawmill River Corridor Assessment Project, which includes responsible land stewardship practices to address invasive species. - Action 28: Integrate hazard mitigation and resilience into the Town’s Open Space and Recreation Plan, including policies for preservation of natural features.
Landslides	Geographically limited landslides occur periodically in Montague, particularly along river banks and steep slopes. Recent landslide activity has been documented behind Carlisle Avenue along the Connecticut River and along Millers Falls Road along the Millers River. “The Hill” neighborhood in Turners Falls faces increasing erosion and washout risk from changing precipitation patterns. Key roads including Third Street, Avenue A, Federal Street, Millers Falls Road, North Leverett Road, and Turners Falls Road are at risk. Landslides can cut off vulnerable populations, damage infrastructure, and trigger hazmat spills. Mitigation Actions: - Action 18: Build and maintain in-house GIS capabilities to support identification of hazard-prone areas including landslide zones. - Action 26: Improve transportation infrastructure to withstand stronger storms that can trigger landslides. - Action 37: Map, assess, and prioritize culverts for repair or replacement to reduce stormwater-related erosion and slope failure risks. - Action 38: Integrate regional landslide mapping into Town land use regulations to limit development in high-risk areas.
Earthquakes	Although Montague is not in a high seismic risk zone, the area is subject to moderate earthquake activity. Unreinforced masonry structures, multi-story residential masonry buildings, and utility lifelines are all vulnerable to seismic damage. Historic buildings constructed of unreinforced masonry are especially susceptible. Elderly residents may be at risk of falling during events. Earthquakes can also trigger landslides with cascading infrastructure impacts. Mitigation Actions: Action 17: Ensure compliance with Massachusetts State Building Code seismic requirements and participate in FEMA NETAP training.

Hazard	Problem Summary and Mitigation Action
	- Action 22: Evaluate municipal buildings for seismic vulnerability and integrate retrofitting measures into planned building updates. - Action 33: Develop and disseminate public information on earthquake preparedness and conduct earthquake drills in schools, businesses, and special care facilities.

Mitigation Action Plan

FEMA Requirement §201.6(c)(3)(iv)); §201.6(c)(3)(iii) 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?

FEMA Requirement Element G: High Hazard Potential Dams HHPD4: Did the plan include actions that address HHPDs and prioritize mitigation actions to reduce vulnerabilities from HHPDs?

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 11. 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 eight categories of criteria; these are detailed in the table 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 16 points or higher were ranked as High priority. Actions that scored between 14-15 points were considered Medium, and actions that scored under 13 points were considered low priority.

Table 12. 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, Severe Winter Storms, Average and Extreme Temperatures, Other Severe Weather) = 3 Medium (Wildfires/Brushfires, Hurricanes/Tropical Storms, Droughts, Flooding from Dam Failure, Tornadoes, Hazmat, Invasive Species, Landslides) = 2 Low (Earthquakes) = 1
2 High Hazard Dams	How much does the measure mitigate dam risk?	Specific Risk Mitigation = 3 Some Risk Mitigation = 2 No Risk Mitigation = 0
3 Approximate Cost	How much will the measure cost to implement?	Low (Under \$10k) = 3 Medium (\$10k - \$100k) = 2 High (\$100k-\$500k) = 1 Very High (over \$500k) = 0
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)?	Direct Support = 3 Moderate Indirect Support = 2 Minor Indirect 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
8 Alignment with Objectives	Does the measure align with the HMP objectives?	Yes = 2 No = 0

All the actions are listed in Table 96 in order of priority with the actions corresponding 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 96. Montague 2026 Hazard Mitigation Actions.

1	Convene bi-annual meetings of the Hazard Mitigation Planning Committee to assess progress on implementing specified actions in the Hazard Mitigation Plan.	
High	Action Description	A regular meeting schedule will help ensure the HMP is implemented and maintained.
	Lead Position	Director of Planning and Conservation
	Supporting Agencies	HMPC members
	Cost	Low
	Potential Funding Sources	Planning Department Budget
	Hazards	All Hazards
	Implementation Schedule	2026-2031
2	Incorporate hazard/climate resilience into the prioritization criteria for the Town's annual budgeting and capital improvement planning process (support investments to reduce risk and limit expenses on projects that could increase hazard vulnerabilities).	
High	Action Description	Develop a checklist for all departments, boards, and committees to help ensure that the climate-resilience checklist has been integrated into projects to the full extent possible. Incorporate climate resilience and sustainability goals and review criteria into Town policies and practices, capital planning, and proposed zoning changes. Also include Planning Board/Zoning Board of Appeals review of site plans and special permit applications.
	Lead Position	Selectboard
	Supporting Agencies	
	Cost	Low
	Potential Funding Sources	Town Administration Budget
	Hazards	All Hazards
	Implementation Schedule	2026-2031

3	Establish a micro-grid powered by solar PV between the High School and Public Safety Complex to provide emergency back-up power.	
High	Action Description	This action mitigates the risk of power loss and loss of critical heating/cooling during severe weather events (winter storms, extreme heat/cold, flooding) by providing a renewable-energy backup power source for emergency shelter operations at the High School and Public Safety Complex.
	Lead Position	Selectboard
	Supporting Agencies	Gill-Montague Regional School District
	Cost	High
	Potential Funding Sources	MA Department of Energy Resources (DOER): Community Microgrid Program, MA Executive Office of Energy & Environmental Affairs: Municipal Vulnerability Preparedness (MVP) Action Grants, Massachusetts Department of Energy Resources (DOER): Green Communities Grants and Microgrid Program, FEMA: Building Resilient Infrastructure and Communities (BRIC)
	Hazards	All Hazards
	Implementation Schedule	2026-2031

4	Prepare and implement communication plan to reach out to homeless populations and other residents regarding emergency information and resources. Conduct targeted outreach and issue emergency flood warnings to unhoused populations in encampments located in high risk flood hazard areas along the Connecticut River.	
High	Action Description	Increase the Town's ability to communicate with residents in multiple languages. Compile a list of social services available including contacts and roles.
	Lead Position	Chief of Police
	Supporting Agencies	FirstLight Power; DCR; 3 County Continuum of Care (CoC); Community Action among other local and regional nonprofits
	Cost	Low
	Potential Funding Sources	Police Department Budget
	Hazards	Flooding from Precipitation, Severe Winter Storms, Other Severe Weather, Flood from Dam Failure
	Implementation Schedule	2026-2031

5	Improve the Canal District in Turners Falls and coordinate with property owners and FirstLight about redevelopment plans and the structural integrity of the canal.	
High	Action Description	Deteriorating infrastructure in the Canal District poses flood risk and hazmat risk from structural collapse and legacy contamination along the Connecticut River. This action reduces those risks by improving structural integrity and coordinating redevelopment away from high-hazard areas.
	Lead Position	Selectboard
	Supporting Agencies	Private property owners; MassDevelopment; EPA
	Cost	High
	Potential Funding Sources	Massachusetts Executive Office of Housing and Livable Communities (EOHLC): One Stop for Growth Programs, U.S. Environmental Protection Agency (EPA): EPA Brownfields Cleanup Grants, FEMA: Building Resilient Infrastructure and Communities (BRIC)
	Hazards	Flooding from Precipitation, Severe Winter Storms, Other Severe Weather, Flood from Dam Failure
	Implementation Schedule	2026-2036

6	Improve the radio communication system at the Turners Falls High School and install repeaters.	
High	Action Description	Reliable radio communication at Turners Falls High School is critical for emergency coordination during any hazard event. Repeater installation mitigates the risk of communications failure during evacuations or shelter-in-place operations.
	Lead Position	Director of Facilities & Safety, Gill-Montague Regional School District
	Supporting Agencies	Gill-Montague Regional School District; Turners Falls Fire District
	Cost	Medium
	Potential Funding Sources	Capital Improvement for Gill-Montague Regional School District
	Hazards	All Hazards
	Implementation Schedule	2026-2031

7	Build internal staff capacity to identify and pursue grant funding for mitigation projects through training and the ability to invest more time on grant application development, grants management, and related administrative tasks.	

High	Action Description	This includes allocating more time for Town staff to do this as well as participate in relevant training and professional development opportunities that are focused on hazard mitigation, climate adaptation, and other resilience building activities.
	Lead Position	Selectboard
	Supporting Agencies	
	Cost	High
	Potential Funding Sources	Town Administration Budget
	Hazards	All Hazards
	Implementation Schedule	2026-2031

8	Start a Community Emergency Response Team (CERT).	
High	Action Description	Community members—especially elderly, disabled, and isolated residents—face heightened risk of injury or death during any hazard event without a trained local response network. Starting a CERT mitigates this vulnerability by building local emergency response capacity.
	Lead Position	Montague Police Chief
	Supporting Agencies	FRCOG; Water & Fire District
	Cost	Low
	Potential Funding Sources	FEMA: Community Emergency Response Team (CERT) Support, FEMA: Building Resilient Infrastructure and Communities (BRIC)
	Hazards	All Hazards
	Implementation Schedule	2026-2031

9	Maintain and improve sidewalks for all pedestrian routes to schools.	
High	Action Description	Routes frequented by children have not routinely been maintained leading to school absences, these absences create food insecurity in addition to missed education. Ensure that children have adequate and warm clothing for walking to school.
	Lead Position	Director of Department of Public Works
	Supporting Agencies	Director of Facilities & Safety, Gill-Montague Regional School District
	Cost	Medium

	Potential Funding Sources	Massachusetts Department of Transportation (MassDOT): Chapter 90 Program
	Hazards	Flooding from Precipitation, Extreme Temperatures, Severe Winter Storms
	Implementation Schedule	2027-2031

10	Support the creation of additional neighborhood coalitions or networks and strengthen connections with Town government or organizations. Conduct an educational program to encourage elders to register for assistance through TRIAD.	
Medium	Action Description	Lack of emergency support networks leaves vulnerable community members, including elders, at greater risk during any hazard event. This action reduces that risk by expanding neighborhood coalitions and registering residents for structured assistance programs such as TRIAD.
	Lead Position	Director of Public Safety
	Supporting Agencies	Franklin County Sheriff's Office; Council on Aging;
	Cost	Low
	Potential Funding Sources	MEMA: Emergency Performance Grant (EMPG), FEMA: Community Emergency Response Team (CERT) Support, MA Executive Office of Aging & Independence: Executive Office of Elder Affairs Grants, FEMA: Building Resilient Infrastructure and Communities (BRIC)
	Hazards	All Hazards
	Implementation Schedule	2026-2031
11	Increase use of the Town's website and social media platforms, Montague Community Television, RAVE, and other readily available outreach mechanisms to promote low-cost public education initiatives on emergency preparedness and hazard mitigation actions for homeowners, business owners, etc. Expand hazard mitigation and other emergency management information on the Town's website.	
Medium	Action Description	Publicize home rehabilitation and weatherization resources to residents to upgrade older homes to better withstand hazard events; continue to address distressed, vacant and abandoned homes in Town. Disseminate information on how to prepare homes and other structures to withstand flooding and high winds. Share information regarding water conservation.
	Lead Position	Selectboard Office
	Supporting Agencies	Council on Aging, Gill Montague Senior Center, Health Department
	Cost	Low

	Potential Funding Sources	Town Administration Budget
	Hazards	All Hazards
	Implementation Schedule	2026-2031

12	Improve emergency shelters and warming/cooling centers (e.g. emergency backup power; better cooling capacity)	
Medium	Action Description	Inadequate emergency shelter infrastructure increases the risk of heat- and cold-related illness and death during extreme temperature events or prolonged power outages. This action mitigates that risk by upgrading backup power and cooling/heating capacity at designated shelters.
	Lead Position	Selectboard Office
	Supporting Agencies	local and regional nonprofit support
	Cost	High
	Potential Funding Sources	FEMA: Hazard Mitigation Grant Program (HMGP), MEMA: Emergency Performance Grant (EMPG), MA Executive Office of Housing & Livable Communities: Community Development Block Grant (CDBG), U.S. Department of Energy: Energy Efficiency and Conservation Block Grants (EECBG), EPA: Environmental and Climate Justice Grants, FEMA: Building Resilient Infrastructure and Communities (BRIC)
	Hazards	All Hazards
	Implementation Schedule	2026-2031

13	Review evacuation procedures for emergency action plans of FERC-licensed hydroelectric dams and facilities on the Connecticut River and high and significant hazard dams in Montague, Greenfield, Sunderland, and Wendell.	
Medium	Action Description	Unreviewed dam emergency action plans increase the risk of uncoordinated evacuations and casualties in the event of a dam failure or high-flow release on the Connecticut and Deerfield Rivers. This action reduces that risk by ensuring evacuation procedures are current and understood by local officials.
	Lead Position	Emergency Management Director
	Supporting Agencies	FirstLight Power; FRCOG
	Cost	Low

	Potential Funding Sources	Town Administration Budget, FEMA: Building Resilient Infrastructure and Communities (BRIC)
	Hazards	Flooding from Dam Failure
	Implementation Schedule	2026-2031

14	Participate annually in National Flood Safety Awareness Week and other emergency preparedness campaigns by using MEMA's social media toolkits and other readily available communication materials to promote risk awareness and mitigation.	
Medium	Action Description	Flooding events repeatedly catch residents unaware, increasing property damage and risk to life. Annual participation in National Flood Safety Awareness Week reduces this risk by building public knowledge of flood hazards and available protective actions.
	Lead Position	Emergency Management Director
	Supporting Agencies	MEMA
	Cost	Low
	Potential Funding Sources	Town Administration Budget
	Hazards	Flooding from Precipitation
	Implementation Schedule	2026-2031

15	Connect the irrigation well to the Turners Falls High School to be available as a backup drinking water supply for sheltering.	
Medium	Action Description	Loss of potable water during an emergency event creates a serious public health risk for shelter occupants. Connecting the irrigation well provides a redundant backup drinking water supply, mitigating this risk during extended sheltering operations.
	Lead Position	Director of Facilities & Safety, Gill-Montague Regional School District
	Supporting Agencies	Gill-Montague Regional School District; Turners Falls Fire District; Turners Falls Water Department
	Cost	High
	Potential Funding Sources	Capital Improvement for Gill-Montague Schools, FEMA: Building Resilient Infrastructure and Communities (BRIC)
	Hazards	All Hazards
	Implementation Schedule	2026-2031

16	Conduct regulatory reviews and updates to Town bylaws that incorporate climate resilience considerations. Use existing tools for integrating nature-based solutions (such as Mass Audubon's Bylaw Review Tool, MAPC Climate Resilient Land Use Strategies, etc.). This should include but not be limited to revising zoning, subdivision, and other regulations or policies to improve flood resilience, fluvial erosion control, and stormwater management.	
Medium	Action Description	Consider new land use regulations, including impervious surface limits, and local wetlands bylaw to further regulate development in floodplain, reduce runoff and minimize risk of localized flooding. Town will be updating Zoning Bylaw section of Floodplain Overlay District in the next 1-2 years.
	Lead Position	Director of Planning and Conservation
	Supporting Agencies	FRCOG; MEMA
	Cost	Low
	Potential Funding Sources	Franklin Regional Council of Governments (FRCOG): District Local Technical Assistance (DLTA)
	Hazards	All Hazards
	Implementation Schedule	2026-2031

17	Ensure Compliance with the Massachusetts State Building Code. Provide training to the Building Inspector, as needed, to ensure that all new construction complies with the appropriate seismic requirements of the State Building Code. Participate in trainings offered by FEMA's National Earthquake Technical Assistance Program (NETAP). NETAP is designed to help state, local, and tribal governments obtain the knowledge, tools, and support that they need to plan and implement effective earthquake mitigation strategies.	
Medium	Action Description	Failure to comply with seismic provisions of the State Building Code increases the vulnerability of structures and occupants to earthquake damage. This action ensures new construction meets code requirements, reducing structural failure risk during a seismic event.
	Lead Position	Building Commissioner
	Supporting Agencies	
	Cost	Low
	Potential Funding Sources	Town Administration Budget
	Hazards	All Hazards
	Implementation Schedule	2026-2031

18	Build and maintain in-house GIS capabilities to support hazard mitigation and other community planning/project initiatives.	
Medium	Action Description	This includes maintaining GIS hardware, software licenses, and geospatial data and continued coordination with FRCOG. Without up-to-date GIS data, the Town is limited in its ability to identify hazard-prone areas and prioritize mitigation investments. This action reduces planning and response risk by maintaining accurate spatial data for all hazard types.
	Lead Position	Director of Planning and Conservation
	Supporting Agencies	FRCOG
	Cost	Medium
	Potential Funding Sources	Planning & Conservation Department, FEMA: Building Resilient Infrastructure and Communities (BRIC)
	Hazards	All Hazards
	Implementation Schedule	2026-2031

19	Coordinate with the State Flood Hazard Management Program to update the Town's floodplain regulations (Zoning Bylaw, Section 6.1) in alignment with the State's latest Model Floodplain Bylaw (to be adopted in parallel with new FEMA FIRMs becoming effective). As part of future updates, continue to review the State's forthcoming Local Floodplain Action Guide for possible regulatory or administrative improvements to enhance the community's resilience to future flood events.	
Medium	Action Description	Review and update the Floodplain District Overlay Zoning Bylaw once new floodplain maps are available. Special consideration should be given to further restricting or eliminating new development within the 100-year floodplain (1% chance flood event).
	Lead Position	Director of Planning and Conservation
	Supporting Agencies	FRCOG; MEMA
	Cost	Low
	Potential Funding Sources	Franklin Regional Council of Governments (FRCOG): District Local Technical Assistance (DLTA)
	Hazards	Flooding from Precipitation, Severe Winter Storms, Other Severe Weather, Flood from Dam Failure
	Implementation Schedule	2026-2027

20	Conduct a tabletop exercise and educational trainings for first responders to improve the region's preparedness and response to a wildfire	
Medium	Action Description	First responders and Town staff may be unprepared to manage hazardous materials incidents involving industrial chemicals or spills. Tabletop exercises reduce this risk by improving inter-agency coordination and response capability for hazmat emergencies.
	Lead Position	Emergency Management Director
	Supporting Agencies	MA Division of Fish & Game; Turners Falls Fire and Water District; Montague Center Fire and Water District
	Cost	Medium
	Potential Funding Sources	Massachusetts Emergency Management Agency (MEMA): Emergency Management Performance Grant (EMPG)
	Hazards	Wildfires/Brushfires, Droughts, Average and Extreme Temperatures
	Implementation Schedule	2026-2031

21	Improve access to parks and trails for use during extreme heat.	
Low	Action Description	Improvement should include lighting, so trails are accessible in the early morning or evening hours.
	Lead Position	Director of Parks & Recreation; Owners & stewards of non-Town owned open space
	Supporting Agencies	
	Cost	Medium
	Potential Funding Sources	Massachusetts Department of Conservation and Recreation (DCR): MassTrails Grant Program, Parkland Acquisitions and Renovations for Communities (PARC), MA Executive Office of Energy & Environmental Affairs: Municipal Vulnerability Preparedness (MVP) Action Grants
	Hazards	Average and Extreme Temperatures
	Implementation Schedule	2026-2031

22	Evaluate municipal buildings and structures to determine if they are particularly vulnerable to earthquake damage and determine if any retrofitting measures could mitigate this vulnerability. Integrate measures into planned updates of buildings.	
Low	Action Description	Existing municipal buildings may be structurally vulnerable to earthquake damage, posing risk of injury, death, and loss of critical facilities during a seismic event. This action reduces that risk by systematically assessing municipal structures for seismic vulnerabilities

		and integrating cost-effective retrofitting measures into planned building updates.
	Lead Position	Building Commissioner & Fire Chief
	Supporting Agencies	
	Cost	Medium
	Potential Funding Sources	Franklin Regional Council of Governments (FRCOG): District Local Technical Assistance (DLTA)
	Hazards	Earthquakes
	Implementation Schedule	2026-2031

23	Implement additional project named in the 2023 Sawmill River Corridor Assessment Project.	
Low	Action Description	This assessment and mapping project explores the overall health of the Sawmill River watershed, fluvial erosion hazards, and identifies ways the Town and private landowners can take part of responsible land stewardship practices. https://montague-ma.gov/p/1522/Sawmill-River-Corridor-Assessment-Project .
	Lead Position	Director of Planning and Conservation
	Supporting Agencies	FRCOG; MEMA; EEA
	Cost	Medium
	Potential Funding Sources	MA Executive Office of Energy & Environmental Affairs: Municipal Vulnerability Preparedness (MVP) Action Grants
	Hazards	Flooding from Precipitation
	Implementation Schedule	2026-2031

24	Formally designate a local Floodplain Administrator.	
Low	Action Description	Without a formally designated Floodplain Administrator, the Town lacks a clear point of accountability for enforcing floodplain regulations, maintaining NFIP compliance, and coordinating with FEMA on flood map updates. This action mitigates the risk of regulatory non-compliance, potential loss of flood insurance eligibility for residents, and inadequate oversight of development in flood-prone areas.
	Lead Position	Building Commissioner

	Supporting Agencies	
	Cost	Low
	Potential Funding Sources	Town Administration Budget
	Hazards	Flooding from Precipitation
	Implementation Schedule	2026-2027

25	Promote the availability of flood insurance to all property owners and renters, especially those with structures located in areas of high to moderate flood risk.	
Low	Action Description	Property owners in flood-prone areas who lack flood insurance face severe financial loss following a flood event. This action reduces that economic vulnerability by educating residents and renters about the National Flood Insurance Program.
	Lead Position	Director of Planning and Conservation
	Supporting Agencies	MEMA and FRCOG
	Cost	Low
	Potential Funding Sources	Town Administration Budget
	Hazards	Flooding from Precipitation, Severe Winter Storms, Other Severe Weather, Flood from Dam Failure
	Implementation Schedule	2026-2031

26	Improved transportation infrastructure (e.g., bridges, culverts, flooding or erosion issues) to withstand stronger storms.	
Low	Action Description	Aging bridges and culverts are vulnerable to failure during flood events and severe storms, creating risk of road closures, loss of emergency access, and property or infrastructure damage. This action mitigates those risks by upgrading transportation infrastructure to withstand stronger storms.
	Lead Position	Director of Department of Public Works
	Supporting Agencies	Selectboards Office, MassDOT, FRCOG
	Cost	Very High

	Potential Funding Sources	MassDOT; MA Executive Office of Energy & Environmental Affairs: Municipal Vulnerability Preparedness (MVP) Action Grants, Massachusetts Department of Transportation (MassDOT): Transportation Improvement Program (TIP), FEMA: Building Resilient Infrastructure and Communities (BRIC)
	Hazards	Flooding from Precipitation, Severe Winter Storms, Other Severe Weather, Flood from Dam Failure
	Implementation Schedule	2026-2031

27	Educate homeowners about the risk of wildfires and brushfires and how to reduce the risk by adopting general fire safety techniques. In coordination with DCR, implement a Firewise program targeting the residents and businesses in the Urban-Interface zone; run 2-3 programs to demonstrate how to make a house safer in the event of a wildfire on the Montague Plains and other forested areas in Town.	
Low	Action Description	Residents and businesses in the wildland-urban interface, particularly near the Montague Plains, face elevated risk of property damage and loss of life from wildfires and brushfires. This action reduces that risk by educating homeowners on fire-safe practices and implementing a Firewise program that demonstrates practical steps to harden structures and defensible space against wildfire ignition and spread."
	Lead Position	Turners Falls Water Department; Turners Falls Fire District
	Supporting Agencies	MA Division of Fish & Game; Turners Falls Fire and Water District; Montague Center Fire and Water District
	Cost	Low
	Potential Funding Sources	U.S. Forest Service: Community Wildfire Defense Grants (CWDG), MA Department of Conservation & Recreation (DCR): State Fire Assistance (SFA), MA Executive Office of Energy & Environmental Affairs: Municipal Vulnerability Preparedness (MVP) Action Grants, FEMA Assistance to Firefighters Program: National Fire Plan / Fire Prevention & Safety Grants
	Hazards	Wildfires/Brushfires, Droughts, Average and Extreme Temperatures
	Implementation Schedule	2026-2031

28	Integrate hazard mitigation and resilience into the Town's updated Open Space and Recreation Plan and Housing Production Plan.	
Low	Action Description	This could include policies or actions to encourage the preservation and restoration of protective natural features along with policies or incentives for development located outside of known hazard areas.
	Lead Position	Director of Planning and Conservation
	Supporting Agencies	FRCOG

	Cost	Medium
	Potential Funding Sources	MA Executive Office of Energy and Environmental Affairs (EEA) MVP Program, USDA Rural Development: Water and Waste Disposal Loan and Grant Program
	Hazards	All Hazards
	Implementation Schedule	2026-2027

29	Implement recommendations from MA DEP to address the Combined Sewer Overflows (CSOs).	
Low	Action Description	Combined Sewer Overflows release untreated sewage into local waterways during heavy precipitation events, posing serious public health and environmental risks that are expected to worsen as storm intensity increases with climate change. This action reduces those risks by implementing MA DEP's recommended improvements to the sewer system to prevent overflows and protect water quality during flood events.
	Lead Position	Selectboard's Office & Clean Water Facility Superintendent & DPW Director
	Supporting Agencies	
	Cost	Very High
	Potential Funding Sources	MassDEP: Clean Water State Revolving Fund (CWSRF), EPA: Sewer Overflow and Stormwater Reuse Municipal Grants (OSG), MA Executive Office of Energy and Environmental Affairs (EEA) MVP Program, MassDEP: EPA Section 319 Nonpoint Source Pollution Grants, USDA Rural Development: Water and Waste Disposal Loan and Grant Program, FEMA: Building Resilient Infrastructure and Communities (BRIC)
	Hazards	Flooding from Precipitation
	Implementation Schedule	2026-2031

30	Encourage the Zoning Board of Appeals to adopt the Stormwater System Policy.	
Low	Action Description	Clarify that Site Plan Review requires submission of a stormwater management plan in accordance with the Stormwater System Policy.
	Lead Position	Director of Planning and Conservation
	Supporting Agencies	FRCOG
	Cost	Low

	Potential Funding Sources	Franklin Regional Council of Governments (FRCOG): District Local Technical Assistance (DLTA), FEMA: Building Resilient Infrastructure and Communities (BRIC)
	Hazards	Flooding from Precipitation, Severe Winter Storms, Other Severe Weather, Flood from Dam Failure
	Implementation Schedule	2026-2031

31	Evaluate repairs to the Center Street bridge over the Sawmill River and incorporate design improvements to accommodate floodplain capacity flows as identified in the Sawmill River Restoration Plan move Center Street bridge forward.	
Low	Action Description	The Center Street bridge over the Sawmill River is undersized for floodplain capacity flows, increasing the risk of flood damage to the bridge, surrounding roads, and adjacent properties during heavy precipitation events. This action reduces that risk by evaluating needed repairs and incorporating design improvements identified in the Sawmill River Restoration Plan to allow the bridge to safely accommodate higher flood flows.
	Lead Position	Director of Department of Public Works
	Supporting Agencies	Selectboard, MassDOT; FRCOG
	Cost	High
	Potential Funding Sources	Massachusetts Department of Transportation (MassDOT): Transportation Improvement Program (TIP), FEMA: Building Resilient Infrastructure and Communities (BRIC)
	Hazards	Flooding from Precipitation, Severe Winter Storms, Other Severe Weather, Flood from Dam Failure
	Implementation Schedule	2026-2031

32	Work with the REPC to develop a formal system for towns to record costs and property damages from hazard events. Encourage businesses and residents to report property damages, and farmers to report crop damages.	
Low	Action Description	Without a formal system for recording costs and damages from hazard events, the Town lacks the documentation needed to accurately assess risk, justify mitigation investments, and strengthen future grant applications. This action reduces that systemic vulnerability by establishing a regional damage-tracking system through the REPC that captures losses across all hazard types, including property damage and agricultural crop losses.
	Lead Position	Emergency Management Director
	Supporting Agencies	FRCOG; Public Safety

	Cost	Low
	Potential Funding Sources	Franklin Regional Council of Governments (FRCOG): District Local Technical Assistance (DLTA), FEMA: Building Resilient Infrastructure and Communities (BRIC)
	Hazards	All Hazards
	Implementation Schedule	2026-2031

33	Develop and disseminate emergency earthquake public information and instructions. Conduct earthquake drills in schools, businesses, special care facilities and other public gathering places.	
Low	Action Description	Residents, students, and workers face injury and property loss risk during earthquake events due to lack of awareness about protective actions. This action reduces that risk through public education and earthquake drill programs.
	Lead Position	Emergency Management Director
	Supporting Agencies	
	Cost	Low
	Potential Funding Sources	Massachusetts Emergency Management Agency (MEMA): Emergency Management Performance Grant (EMPG), MA Executive Office of Energy and Environmental Affairs (EEA) MVP Program, National Earthquake Hazards Reduction Program (NEHRP), FEMA: Building Resilient Infrastructure and Communities (BRIC)
	Hazards	Earthquakes
	Implementation Schedule	2026-2031

34	Once new floodplain maps are available, expand and update the Vulnerability Assessment for properties located within the 100-year floodplain (1% chance flood event), including information on crop damages if available.	
Low	Action Description	As climate change increases flood frequency and severity, properties currently outside the mapped 100-year floodplain may become at-risk. This action reduces future exposure by updating the vulnerability assessment once new FEMA flood maps become available, ensuring the Town targets mitigation resources to the highest-risk properties.
	Lead Position	Director of Planning and Conservation
	Supporting Agencies	FRCOG; MEMA
	Cost	Medium
	Potential Funding Sources	Franklin Regional Council of Governments (FRCOG): District Local Technical Assistance (DLTA), FEMA: Building Resilient Infrastructure and Communities (BRIC)

	Hazards	Flooding from Precipitation, Severe Winter Storms, Other Severe Weather
	Implementation Schedule	2026-2031

35	Update the 2015 Community Wildfire Protection Plan (CWPP). As part of this effort, coordinate with large forest owners, including the State, fire and water districts, and utility companies, to develop climate-smart forest stewardship plans on forestlands.	
Low	Action Description	2015 Montague Community Wildfire Protection Plan is expired. Plan only focuses on the Montague Plains. Needs to be updated and needs to account for whole Town not just the Montague Plains. The "Hill Neighborhood" area in Turners Falls is sandy soil and through an MVP grant the Town will identify recommendations to address.
	Lead Position	Director of Planning and Conservation
	Supporting Agencies	MA Department of Conservation & Recreation (DCR) – Bureau of Forest Fire Control
	Cost	Medium
	Potential Funding Sources	USDA Forest Service – Community Wildfire Defense Grant (CWDG), MA Executive Office of Energy and Environmental Affairs (EEA) MVP Program, MA Department of Conservation & Recreation (DCR) – Bureau of Forest Fire Control may offer technical assistance
	Hazards	Wildfires/Brushfires, Droughts, Average and Extreme Temperatures
	Implementation Schedule	2026-2031

36	Develop an annual program to assess and clear floodway ditches in the floodplain of overgrown vegetation and any other debris. Submit a bundled Notice of Intent to the Conservation Commission for approval of annual maintenance plan.	
Low	Action Description	Overgrown floodway ditches and debris blockages increase the risk of localized flooding and property damage during precipitation events. Regular clearing of these ditches reduces that risk and helps maintain floodplain conveyance capacity.
	Lead Position	Director of Department of Public Works
	Supporting Agencies	FRCOG
	Cost	Medium

	Potential Funding Sources	Massachusetts Department of Transportation (MassDOT): Chapter 90 Program, MA Executive Office of Energy & Environmental Affairs: Municipal Vulnerability Preparedness Action Grants, MA Division of Ecological Restoration (DER): Culvert Replacement Municipal Assistance (CRMA) Program, MassDEP: Section 319 Nonpoint Source Grants, USDA Natural Resources Conservation Service: Watershed Protection & Flood Prevention (PL-566), FEMA: Building Resilient Infrastructure and Communities (BRIC)
	Hazards	Flooding from Precipitation, Invasive Species
	Implementation Schedule	2026-2031

37	Map, assess, and prioritize culverts for repair or replacement. Design new or replacement culverts to withstand greater precipitation amounts due to climate change. Implement based on need from the FRCOG inventory.	
Low	Action Description	Undersized or deteriorating culverts restrict stormwater flow during heavy precipitation events, contributing to road flooding, erosion, and infrastructure damage. This action mitigates those risks by systematically inventorying, prioritizing, and replacing culverts to climate-resilient standards.
	Lead Position	Director of Department of Public Works
	Supporting Agencies	Selectboard, FRCOG
	Cost	High
	Potential Funding Sources	MA Division of Ecological Restoration (DER): Culvert Replacement Municipal Assistance, Massachusetts Department of Transportation: MassDOT Community Culverts Program, MA Executive Office of Energy & Environmental Affairs: Municipal Vulnerability Preparedness Action Grants, FEMA Hazard Mitigation Grant Program (HMGP), USDA NRCS Watershed Protection & Flood Prevention Program (PL-566), EPA / MassDEP: EPA Section 319 Nonpoint Source Grants , FEMA: Building Resilient Infrastructure and Communities (BRIC)
	Hazards	Flooding from Precipitation, Severe Winter Storms, Other Severe Weather
	Implementation Schedule	2026-2031

38	Integrate regional landslide mapping into Town land use regulations. Consider if the significance of landslide risk and if updating these regulations would mitigate the risk.	

Low	Action Description	Without landslide risk data integrated into land use regulations, the Town may inadvertently permit development in areas vulnerable to slope failure, increasing risk of property damage, infrastructure loss, and injury. This action reduces that risk by incorporating regional landslide mapping into zoning and land use decisions, allowing the Town to evaluate whether regulatory updates are warranted to limit exposure in high-risk areas.
	Lead Position	Director of Planning and Conservation
	Supporting Agencies	Selectboard, FRCOG
	Cost	Low
	Potential Funding Sources	MA Executive Office of Energy & Environmental Affairs: Municipal Vulnerability Preparedness (MVP) Action Grants, FEMA: Building Resilient Infrastructure and Communities (BRIC)
	Hazards	Landslides
	Implementation Schedule	2026-2031

39	Continue fuels mitigation and management in the Montague Plains, including prescribed fire and mechanical treatments to reduce wildfire potential in the most critical areas.	
Low	Action Description	Accumulated fuels in the Montague Plains create conditions for fast-moving, high-intensity wildfires that threaten adjacent neighborhoods and natural resources. This action reduces wildfire ignition and spread through ongoing prescribed burns and mechanical fuel reduction.
	Lead Position	Montague Center Fire and Water District
	Supporting Agencies	MA Division of Fish & Game; Turners Falls Fire and Water District; Montague Center Fire and Water District
	Cost	Medium
	Potential Funding Sources	MA Department of Conservation & Recreation (DCR): Bureau of Forest Fire Control, MA Executive Office of Energy & Environmental Affairs: Municipal Vulnerability Preparedness (MVP) Action Grants, FEMA: Hazard Mitigation Grant Program (HMGP), FEMA: Building Resilient Infrastructure and Communities (BRIC), USDA Natural Resources Conservation Service (NRCS): Environmental Quality Incentives Program (EQIP)
	Hazards	Wildfires/Brushfires, Droughts, Average and Extreme Temperatures
	Implementation Schedule	2026-2031

40	Upgrade water/wastewater infrastructure to be able to withstand stronger storms.	

Low	Action Description	Aging water and wastewater infrastructure is vulnerable to damage or failure during severe storms and flooding, posing a public health risk from service disruption or contamination. This action mitigates those risks by upgrading systems to withstand greater storm intensities associated with a changing climate.
	Lead Position	Selectboard Office
	Supporting Agencies	DPW, Clean Water Facility
	Cost	Very High
	Potential Funding Sources	Massachusetts Department of Environmental Protection (MassDEP): Clean Water State Revolving Fund (CWSRF), MassDEP: Drinking Water State Revolving Fund (DWSRF), MA Executive Office of Energy & Environmental Affairs: Municipal Vulnerability Preparedness (MVP) Action Grants, MassDEP: Massachusetts State Revolving Fund Climate Resilience Funding (SRF Climate Initiatives), USDA Rural Development: USDA Rural Development – Water and Waste Disposal Loan & Grant Program
	Hazards	Flooding from Precipitation, Severe Winter Storms, Other Severe Weather
	Implementation Schedule	2026-2031

41	Participate in tabletop exercises and trainings for hazardous material accidents.	
Low	Action Description	First responders and Town staff may be unprepared to manage hazardous materials incidents involving industrial chemicals or spills. Participation in tabletop exercises reduces this risk by improving inter-agency coordination and building capability to respond effectively to hazmat emergencies.
	Lead Position	Emergency Management Director
	Supporting Agencies	
	Cost	Low
	Potential Funding Sources	Massachusetts Emergency Management Agency (MEMA): Emergency Management Performance Grant (EMPG)
	Hazards	Hazmat
	Implementation Schedule	2026-2031

42	Implement safety infrastructure improvements on the Montague Plains including addition of hydrants and improving access roads and fire breaks; install a hydrant on Turners Falls Road; update Fire Department equipment for fighting a wildfire. consider expanding to include areas with steep slope prone to wildfire	

Low	Action Description	Insufficient fire suppression infrastructure and limited access roads on the Montague Plains increase the risk of uncontrolled wildfire spread into adjacent neighborhoods. This action mitigates that risk by installing hydrants, improving access roads and firebreaks, and upgrading Fire Department wildfire-fighting equipment.
	Lead Position	Turners Falls Water Department; Turners Falls Fire District
	Supporting Agencies	MA Division of Fish & Game; Turners Falls Fire and Water District; Montague Center Fire and Water District
	Cost	High
	Potential Funding Sources	USDA Forest Service: Community Wildfire Defense Grants (CWDG), MA Department of Conservation & Recreation (DCR): Massachusetts Forest Fire Control Grants, MA Executive Office of Energy & Environmental Affairs: Municipal Vulnerability Preparedness (MVP) Action Grants, FEMA: Building Resilient Infrastructure and Communities (BRIC)
	Hazards	Wildfires/Brushfires, Droughts, Average and Extreme Temperatures
	Implementation Schedule	2026-2031

43	Secure funding to complete abatement and demolition of abandoned and blighted mill properties on the Connecticut River such as the Strathmore Mill Complex. Additional demo may be necessary due to insufficient funds.	
Low	Action Description	Abandoned and blighted mill properties along the Connecticut River present ongoing hazmat contamination and structural collapse risks, which are amplified during flood events. Abatement and demolition of these structures reduce public health hazards and eliminates a source of potential environmental contamination.
	Lead Position	Selectboard Office
	Supporting Agencies	EPA; EEA; MassDEP, MassDevelopment; DCR; etc
	Cost	Very High
	Potential Funding Sources	U.S. Environmental Protection Agency: EPA Brownfields Cleanup Grants, MassDevelopment: MA Brownfields Redevelopment Fund, MA Executive Office of Housing & Livable Communities: MassWorks Infrastructure Program, U.S. HUD / MA Department of Housing & Community Development: Community Development Block Grant (CDBG), U.S. Department of Commerce: Economic Development Administration (EDA) Public Works Grants, National Park Service: Land and Water Conservation Fund (LWCF)
	Hazards	Hazmat
	Implementation Schedule	2026-2031

Table 97 shows the mitigation actions that specifically target vulnerable populations and Table 98 shows

the mitigation actions that specifically target buildings and infrastructure. Each table lists the actions in order of priority.

Table 97. Actions that Target Vulnerable Populations.

Action #	Action Title
1	Convene bi-annual meetings of the Hazard Mitigation Planning Committee to assess progress on implementing specified actions in the Hazard Mitigation Plan.
3	Establish a micro-grid powered by solar PV between the High School and Public Safety Complex to provide emergency back-up power.
4	Prepare and implement communication plan to reach out to homeless populations and other residents regarding emergency information and resources. Conduct targeted outreach and issue emergency flood warnings to unhoused populations in encampments located in
5	Improve the Canal District in Turners Falls and coordinate with property owners and FirstLight about redevelopment plans and the structural integrity of the canal.
6	Improve the radio communication system at the Turners Falls High School and install repeaters.
8	Start a Community Emergency Response Team (CERT).
9	Maintain and improve sidewalks for all pedestrian routes to schools.
10	Support the creation of additional neighborhood coalitions or networks and strengthen connections with Town government or organizations. Conduct an educational program to encourage elders to register for assistance through TRIAD.
11	Increase use of the Town's website and social media platforms, Montague Community Television, RAVE, and other readily available outreach mechanisms to promote low-cost public education initiatives on emergency preparedness and hazard mitigation actions fo
12	Improve emergency shelters and warming/cooling centers (e.g. emergency backup power; better cooling capacity)
14	Participate annually in National Flood Safety Awareness Week and other emergency preparedness campaigns by using MEMA's social media toolkits and other readily available communication materials to promote risk awareness and mitigation.
15	Connect the irrigation well to the Turners Falls High School to be available as a backup drinking water supply for sheltering.
20	Conduct a tabletop exercise and educational trainings for first responders to improve the region's preparedness and response to a wildfire
21	Improve access to parks and trails for use during extreme heat.
27	Educate homeowners about the risk of wildfires and brushfires and how to reduce the risk by adopting general fire safety techniques. In coordination with DCR, implement a Firewise program targeting the residents and businesses in the Urban-Interface zone;
33	Develop and disseminate emergency earthquake public information and instructions. Conduct earthquake drills in schools, businesses, special care facilities and other public gathering places.

Table 98. Actions that Target Buildings and Infrastructure.

Action #	Action Title
3	Establish a micro-grid powered by solar PV between the High School and Public Safety Complex to provide emergency back-up power.
5	Improve the Canal District in Turners Falls and coordinate with property owners and FirstLight about redevelopment plans and the structural integrity of the canal.
6	Improve the radio communication system at the Turners Falls High School and install repeaters.
9	Maintain and improve sidewalks for all pedestrian routes to schools.
12	Improve emergency shelters and warming/cooling centers (e.g. emergency backup power; better cooling capacity)
13	Review evacuation procedures for emergency action plans of FERC-licensed hydroelectric dams and facilities on the Connecticut River and high and significant hazard dams in Montague, Greenfield, Sunderland, and Wendell.
15	Connect the irrigation well to the Turners Falls High School to be available as a backup drinking water supply for sheltering.
21	Improve access to parks and trails for use during extreme heat.
22	Evaluate municipal buildings and structures to determine if they are particularly vulnerable to earthquake damage and determine if any retrofitting measures could mitigate this vulnerability. Integrate measures into planned updates of buildings.
23	Implement additional project named in the 2023 Sawmill River Corridor Assessment Project.
26	Improved transportation infrastructure (e.g., bridges, culverts, flooding or erosion issues) to withstand stronger storms.
29	Implement recommendations from MA DEP to address the Combined Sewer Overflows (CSOs).
31	Evaluate repairs to the Center Street bridge over the Sawmill River and incorporate design improvements to accommodate floodplain capacity flows as identified in the Sawmill River Restoration Plan move Center Street bridge forward.
37	Map, assess, and prioritize culverts for repair or replacement. Design new or replacement culverts to withstand greater precipitation amounts due to climate change. Implement based on need from the FRCOG inventory.
40	Upgrade water/wastewater infrastructure to be able to withstand stronger storms.
43	Secure funding to complete abatement and demolition of abandoned and blighted mill properties on the Connecticut River such as the Strathmore Mill Complex. Additional demo may be necessary due to insufficient funds.

Table 99. Mitigation Actions that Target Dam Safety.

Action #	Action Title

1	Convene bi-annual meetings of the Hazard Mitigation Planning Committee to assess progress on implementing specified actions in the Hazard Mitigation Plan.
4	Prepare and implement communication plan to reach out to homeless populations and other residents regarding emergency information and resources. Conduct targeted outreach and issue emergency flood warnings to unhoused populations in encampments located in
5	Improve the Canal District in Turners Falls and coordinate with property owners and FirstLight about redevelopment plans and the structural integrity of the canal.
13	Review evacuation procedures for emergency action plans of FERC-licensed hydroelectric dams and facilities on the Connecticut River and high and significant hazard dams in Montague, Greenfield, Sunderland, and Wendell.

Possible Funding Sources

All the mitigation actions included in this plan have identified one or more potential funding sources. The HMPC focused on projects eligible for MVP Grant funding and FEMA 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)**
The Building Resilient Infrastructure and Communities (BRIC) grant program makes federal funds available to states, U.S. territories, federally recognized Tribal Nations, and local governments for hazard mitigation activities. The program aims to save lives and protect property by making smart investments now in resilient infrastructure.
- 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.

- **Rehabilitation of High Hazard Potential Dams**

The President signed the [Water Infrastructure Improvements for the Nation Act](#) or the “WIIN Act,” on Dec. 16, 2016, which adds a new grant program under FEMA’s National Dam Safety Program ([33 U.S.C. 467f](#)). Section 5006 of the Act, Rehabilitation of High Hazard Potential Dams, provides technical, planning, design, and construction assistance in the form of grants for rehabilitation of eligible high hazard potential dams. This is an annual funding opportunity. Town governments as well as private dam owners are eligible for the program which is managed by the state.

Additional funding opportunities to support Dam Removal

- NOAA- Community Based Restoration Grant Program
- U.S. Fish and Wildlife Service – National Fish Passage Program
- U.S. Army Corps of Engineers – Section 206 Aquatic Ecosystem Restoration Program
- U.S. Forest Service – Support for Dam Removal

Municipal Vulnerability Preparedness Action Grants¹⁰⁹

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

¹⁰⁹ 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 Integration and Maintenance

The Town's Planning Director has assumed responsibility 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 the HMP and its positive mitigation impact and intends to continue updating the HMP and implementing its strategies.

Continued Public Participation

FEMA Requirement §201.6(c)(4)(iii) D1. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process?

Public participation is an integral component of the mitigation planning process and will continue to be essential as the HMP is implemented and updated over time. Based on the high level of interest in the mitigation planning process, 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 the HMP, as well as in the reviewing and updating processes. The Planning Director will take the lead in soliciting participation from the public with support from other Town departments. This participation will take multiple forms, including all of those outlined in Chapter 3 (Planning Process) of the HMP. Efforts to involve the public include:

- Advertising on the Town website and calendar, and through standard meeting laws.
- Posting news and announcements on Town social media pages.
- 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.
- Post copies of the HMP on the Town website and keep a hard copy in Town Hall for public review.
- 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

FEMA Requirement §201.6(c)(4)(i) 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)?

The HMPC and the Town of Montague 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 HMP. They will notify the public prior to meetings. This work includes monitoring, evaluating, and updating the HMP over a five-year period. Overall, the responsibility for monitoring the Plan rests jointly with the Planning Director and Economic Development Manager.

Process to Track Actions

The Town Planner 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 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.

Monitoring means tracking the implementation of the plan over time.

If the Town experiences a large-scale disaster, the Town Planner 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

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 January; the second, in July.

Evaluating means assessing the effectiveness of the plan at achieving its stated purpose and goals.

At the first meeting (January 2027), 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

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 priorities. In addition, the HMPC will discuss methods for continuing to integrate the mitigation plan with other plans, processes, and projects in the Town.

Updating means reviewing and revising the plan at least once every five years.

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 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 20. 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.¹¹⁰ The Town of Montague is interested in accessing the HHPD grant funds and have designed this plan to meet criteria outlined in Element G: High Hazard Potential Dams. To continue meeting the requirements of Element G the HMPC will answer the following questions during plan update meetings:

- Do we have new or updated plans, studies, reports or technical information regarding the HHPDs?
- How does the risk assessment need to be updated to accurately reflect dam risk?
- Have the mitigation goals related to the HHPDs been implemented and do they need to be amended to reflect current conditions and priorities in the Town?
- Have the mitigation actions that addressed HHPDs been implemented and do new actions aimed at reducing vulnerabilities from HHPDs need to be added?

¹¹⁰ Local Mitigation Planning Policy Guide, FEMA, Effective April 19, 2023, p.32.

Responsible Parties for Plan Implementation and Maintenance

Montague, MA

Maureen Pollock, Planning Director

Town of Montague

1 Avenue A

Turners Falls, M A 01376

Phone: 413-833-3200 ext.112

Email: mpollock@montague-ma.gov

For State resources:

Massachusetts Emergency Management Agency

Address: 400 Williamstown 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>

Plan Integration

FEMA Requirement §201.6(c)(4)(ii) 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?

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 Montague 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 recent focus on incorporating a theme of climate resilience throughout its 2024 Comprehensive Plan demonstrates this type of integration by stressing the importance of hazard mitigation and climate adaptation strategies 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 Montague. 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):

- The Five Villages: One Future Montague Comprehensive Plan (2024)
- Municipal Vulnerability Preparedness / Community Resilience Building Summary of Findings Report (2020)
- Climate Action Plan (2022)
- Open Space and Recreation Plan (2017)
- Housing Production Plan (2017)
- Community Wildfire Protection Plan (2015)

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 or related climate adaptation planning efforts.

Acronyms

AAL	Average Annual Loss
ACS	American Community Survey
ADA	American with Disabilities Act
APA	American Planning Association
ASCE	American Society of Civil Engineers
ASDSO	Association of State Dam Safety Officials
BBRS	Board of Building Regulations and Standards
BCEGS	Building Code Effectiveness Grading Schedule
BRIC	Building Resilient Infrastructure and Communities
C2ES	Center for Climate and Energy Solutions
CAC	Community Assistance Contact
CAV	Community Assistance Visit
CDBG	Community Development Block Grant
CDBG-DR	Community Development Block Grant – Disaster Recovery
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
CIS	Community Information System
CMR	Code of Massachusetts Regulations
CPA	Community Preservation Act
CRB	Community Resilience Building
CRS	Community Rating System
CSO	Combined Sewer Overflow
CWDG	Community Wildfire Defense Grants
CWWP	Community Wildfire Protection Plan
DCR	Department of Conservation and Recreation
DEM	Digital Elevation Model
DEP	Department of Environmental Protection
DER	Division of Ecological Restoration
DLTA	District Local Technical Assistance
DMA	Disaster Mitigation Act
DMP	Drought Management Plan
DMTF	Drought Management Task Force
DOER	Massachusetts Department of Energy Resources
DOT	Department of Transportation
DPW	Department of Public Works
DWR	Days Without Rain
EAP	Emergency Action Plan

EDIC	Economic Development and Industrial Corporation
EDT	Eastern Daylight Time
EEA	Energy and Environmental Affairs
EF	Enhanced Fujita
EJ	Environmental Justice
EMPG	Emergency Management Performance Grant
EPA	Environmental Protection Agency
EST	Eastern Standard Time
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FMA	Flood Mitigation Assistance
FMP	Fire Management Plan
FPA	Floodplain Administrator
FRCOG	Franklin County Regional Council of Governments
FY	Fiscal Year
GIS	Geographic Information Systems
HAZMAT	Hazardous Materials
HHPD	High Hazard Potential Dam
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HMPC	Hazard Mitigation Planning Committee
HPP	Housing Production Plan
HUD	United States Department of Housing and Urban Development
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	Insurance Services Office, Inc.
ISPSC	International Swimming Pool and Spa Code
IT	Information Technology
LAL	Lightning Activity Level
LTCP	Long-Term Control Plan
MAPC	Metropolitan Area Planning Council
MDAR	Massachusetts Department of Agricultural Resources
MEMA	Massachusetts Emergency Management Agency
MFIRS	Massachusetts Fire Incident Reporting System

MIPAG	Massachusetts Invasive Plant Advisory Group
MSBC	Massachusetts State Building Code
MVP	Municipal Vulnerability Preparedness
NCEI	National Centers for Environmental Information
NCRRG	National Culvert Removal, Replacement, & Restoration Grant
NE CASC	Northeast Climate Adaptation Science Center
NEHRP	National Earthquake Hazards Reduction Program's State Assistance Program
NESIS	Northeast Snowfall Impact Scale
NETAP	National Earthquake Technical Assistance Program
NFIP	National Flooding Insurance Program
NFIRA	National Flood Insurance Reform Act
NID	National Inventory of Dams
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NWS	National Weather Service
OSG	Sewer Overflow and Stormwater Reuse Municipal Grant
OSRP	Open Space and Recreation Plan
PDM	Pre-Disaster Mitigation
PMF	Probable Maximum Flood
PPC	Public Protection Classification
PV	Photovoltaic (Solar)
PWS	Public Water Systems
RAVE	RAVE Alert System (Emergency Notification System)
REPC	Regional Emergency Planning Committee (Franklin County)
RFC	River Forecast Center
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
SPIA	Sperry-Piltz Accumulation Index
SSO	Sanitary Sewer Overflow
TRI	Toxics Release Inventory
TV	Television
US	United States
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGCRP	U.S. Global Change Research Program
USGS	United States Geological Survey
WFO	Weather Forecast Office

Appendix A. Planning Process Supporting Materials

Hazard Mitigation Planning Committee Meetings

HMPC Meeting Participants

First Name	Last Name	Title	Affiliation	Phone	Email	Kick-Off Meeting 8/16/2025	HMPC #1 Meeting 10/19/2025	HMPC #2 Meeting 12/9/2025	HMPC #3 Meeting 2/3/2026	HMPC #4 Meeting 3/16/2026
Todd	Brunelle	Fire Chief	Turners Falls Fire Department	413-863-9023	chief@turnersfallsfire.org	☒	☒	☒	☒	☒
Andy	Brydges	Community Relations Director	First Light Power	860-549-3373	andy.brydges@firstlightenergy.com	☒	☒	☒	☒	☒
Kyle	Cogswell	Deputy Fire Chief	Turners Falls Fire Department	413-863-9023 x 109	kcogswell@turnersfallsfire.org	☒	☒	☒	☒	☒
Heath	Cummings	Director of Facilities & Safety	Gill-Montague Regional School District	413-863-3261	heath.cummings@gmrnsd.org	☒	☒	☒	☒	☒
Mike	Currie	Acting Deputy Fire Chief	Turners Falls Fire Department	413-863-9023	currie@turnersfallsfire.org	☒	☒	☒	☒	☒
Gary	Dion	Commissioner	Montague Center Water Department	413-367-9455	dion253@msn.com	☒	☒	☒	☒	☒
Mark	Fisk	Commissioner	Montague Center Water District	413-367-2812	sholow25@comcast.net	☒	☒	☒	☒	☒
Ashley	Gough	Health Director	Montague Board of Health	413-863-3200 x 205	health@montague-ma.gov	☒	☒	☒	☒	☒
Luke	Hartnett	Chief	Montague Center Fire Department	413-835-5343	chief@montaguecenterfire.com	☒	☒	☒	☒	☒
Jason	Haskins	Chief of Police	Town of Montague	413-863-8911	jhaskins@montague-ma.gov	☒	☒	☒	☒	☒
John	Haskins	Chief	Montague Police Department	413-863-8911	jhaskins@montague-ma.gov	☒	☒	☒	☒	☒
Jeffrey	Hidreth	Superintendent	Turners Falls Water Department	413-863-4542	superintendent@turnersfallswater.com	☒	☒	☒	☒	☒
Peter	Lapachinski	Sergeant	Montague Police Department	413-863-8911 x 210	plapachinski@montague.net	☒	☒	☒	☒	☒
Chelsey	Little	Superintendent/Pretreatment Coordinator	Town of Montague	413-773-8865	chelsey@montague-ma.gov	☒	☒	☒	☒	☒
Chris	Nolan-Zeller	Assistant Town Administrator	Town of Montague	413-863-3200 x 109	ChrisN@montague-ma.gov	☒	☒	☒	☒	☒
Maureen	Pollock	Director of Planning & Conservation	Town of Montague	413-863-3200 x 112	mpollock@montague-ma.gov	☒	☒	☒	☒	☒
Roberta	Potter	Gill-Montague Council on Aging Director	Town of Montague	413-863-9357	councilonaging@montague-ma.gov	☒	☒	☒	☒	☒
Walter	Ramsey	Town Administrator	Town of Montague	413-863-3200 x 110	WalterR@montague-ma.gov	☒	☒	☒	☒	☒
Tom	Taaffe	Executive Director	Brick House Resource Center	413-800-2039	ttaaffe@brickhousecommunity.org	☒	☒	☒	☒	☒
Sam	Unikel	Department of Public Works Superintendent	Town of Montague	413-863-2054	samuelu@montague-ma.gov	☒	☒	☒	☒	☒
John	Zellman	Emergency Management Director	Town of Montague	413-325-1427	em@montague-ma.gov	☒	☒	☒	☒	☒

HMPC Meeting Agendas

KICK OFF MEETING AGENDA

TOWN OF MONTAGUE, MA HAZARD MITIGATION PLAN UPDATE

DATE: TUESDAY, 09/16/2025

TIME: 9:00-10:00AM

ZOOM: <https://us02web.zoom.us/j/81027636639?pwd=L6rLrRQ7CauYheTfbDvwQSDI34NfV7.1>
Meeting ID: 810 2763 6639
Passcode: 386863

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. Sharing GIS Data & Relevant Resources
- III. Updating Mitigation Action Tracker with Action Status
- IV. Scheduling a HMPC Meeting for October

HMPC MEETING #1 AGENDA

TOWN OF MONTAGUE, MA HAZARD MITIGATION PLAN UPDATE

DATE: WEDNESDAY, 10/29/2025

TIME: 10:00-11:30AM

ZOOM: <https://us02web.zoom.us/j/83573129233?pwd=AEJYwTRZuaUsAUntokz1Ppesc084YF.1>

MEETING ID: 835 7312 9233

PASSCODE: 045285

AGENDA ITEMS

- I. Introductions**
- II. Project Introduction**
 - i. What's in a Hazard Mitigation Plan?
 - ii. Project Timeline
 - iii. HMPC Responsibilities
- III. Public and Stakeholder Engagement**
 - i. Environmental Justice (EJ) Community Representation
- IV. Capability Assessment Introduction**
 - i. Introduction to Three Surveys
- V. Hazard Identification and Critical Facilities**
- VI. Goal Statements and New Mitigation Actions**
- VII. Next Steps**

ACTION ITEMS

- I. Capability Assessment Surveys**
- II. Critical Facility Lists and Data**
- III. Mitigation Action Meeting with Jamie**
- IV. Photos of Critical Facilities and Disasters**

HMPC MEETING #2 AGENDA

TOWN OF MONTAGUE, MA HAZARD MITIGATION PLAN UPDATE

DATE: TUESDAY, 12/9/2025

TIME: 9:30-11:00AM

ZOOM: <https://us02web.zoom.us/j/81551111865?pwd=b16j67adc1FYPPzKK6gSq45F3jAQbF.1>

Meeting ID: 815 5111 1865

Passcode: 395974

AGENDA ITEMS

- I. Project Update**
- II. Engagement**
 - i. Public Meeting #1
 - ii. HHPD Meeting
- III. Risk Assessment**
 - i. Vulnerability Assessments
 - ii. Problems Identified
- IV. Capability Assessment**
 - i. Update
 - ii. Strengths and Challenges Discussion
- V. Mitigation Strategy**
 - i. Final Goal Statements
 - ii. Developing New Mitigation Actions
- VI. Next Steps**

ACTION ITEMS

- I. Schedule HMPC #3, Public Meeting #1, HHPD Meeting
- II. Identify New Mitigation Actions
- III. Meet with Jamie regarding Old Mitigation Actions
- IV. Photos of Critical Facilities and Disasters



HMPC MEETING #3 AGENDA

TOWN OF MONTAGUE, MA HAZARD MITIGATION PLAN UPDATE

DATE: TUESDAY, 2/3/2026

TIME: 10:00 AM -11:30 AM

ZOOM: <https://us02web.zoom.us/j/87986493972?pwd=zzAZEObInxwy50GsblkdNCTR8z4aW9.1>

Meeting ID: 879 8649 3972

Passcode: 156857

AGENDA ITEMS

- I. Project Update**
- II. Risk Assessment**
 - i. Risk Ranking
 - ii. Problem Statements
- III. Capability Assessment**
 - i. Opportunities Identified
- IV. Mitigation Strategy**
 - i. Final Goal Statements
 - ii. Developing New Mitigation Actions
- V. Next Steps**

ACTION ITEMS

- I.** Schedule HMPC #4, Public Meeting #2
- II.** Develop New Mitigation Actions



HMPC MEETING #4 AGENDA

TOWN OF MONTAGUE, MA HAZARD MITIGATION PLAN UPDATE

DATE: MONDAY, MARCH 16, 2026

TIME: 10:00 AM -11:30 AM

ZOOM: <https://us02web.zoom.us/j/88408933057?pwd=vkslgTJI5BOBAiloAN2KLXV2mmjDb6.1>

Meeting ID: 884 0893 3057

Passcode: 655412

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. Review of Action List Including Prioritization
- V. Plan Review and Feedback**
- VI. Final Steps**

ACTION ITEMS

- I. Schedule Public Meeting #2**
- II. Review Plan**

HHPD MEETING AGENDA

TOWN OF MONTAGUE, MA HAZARD MITIGATION PLAN UPDATE

DATE: THURSDAY, JANUARY 8, 2026

TIME: 11:00 AM - 12:00 PM

ZOOM: <https://us02web.zoom.us/j/89135905931?pwd=fkY6lPGgz8fykN42uGITlncnGkCrwz.1>

Meeting ID: 891 3590 5931

Passcode: 639490

AGENDA ITEMS

1. **Welcome and Introductions**
2. **Office of Dam Safety**
 - a. Introduction to Funding
3. **HHPD Annex Development Process**
 - a. Element G Requirements
 - b. Approach for Hazard Mitigation Plan Update - our process tasks/schedule, annex review and adoption, dams included with inventory table
4. **Summary of Data Collected**
 - a. Emergency Action Plans, Inspection Reports, GIS data, etc.
5. **Dam Risk Summaries**
 - a. Downstream Risks – vulnerable populations, critical facilities, and other concerns
6. **Mitigation Strategy**
 - a. Goal Statement(s) for Dams - present applicable statements from HMPs
 - b. Status of Previous Mitigation Actions Related to HHPDs
 - c. Potential Mitigation Actions
7. **Reviewing Mitigation Actions and the Draft Plan**

Public Outreach

Public Meeting January 28, 2026

Montague Hazard Mitigation Plan Update

Virtual Public Meeting

All are welcome to attend
to learn about Montague's
Hazard Mitigation Plan.
Come share your ideas for
making our town more
resilient to natural hazards
and climate change.



6-7 PM • Thursday, Jan 28
Scan QR code for Zoom link
or visit www.montague-ma.gov/



From: Maureen Pollock
Bcc: "Kimberly MacPhee"; "Peter Chilton"; "editor@montaguereporter.org"; "dover_57@yahoo.com"; "Ella Ingraham"; "James Mussoni"; "John Furbish"; "Linda Ackerman"; "Robert J. Steinberg"; "Bob Obear"; "Elizabeth Irving"; "George Cooke"; "Ronald Sicard"; "Samuel Guerin"; "Al Averill"; "Donna Francis"; "Justin Fermann"; "Margaux Reckard"; "Mark Fairbrother"; "Sean Werde"; "Tobias Carter"; "Tony Reiber"; "Christopher Clawson"; "dobrule"; "Ed Gregory"; "Janel Nockleby"; "Jen Viencek"; "Matt Lord"; "ferdwulkan@gmail.com"; "Richard Kuklewicz Montague BOS"; "Montague Village Store"; "Will Quale"; "Neil Wright"; "Leslielomasson@gmail.com"; "Barbara White"; "Dean Garvin"; "Peg Piwonka"; "Senaída Bautista"; "Montague Assistant Planner"; "radwaydeb@gmail.com"; "Tamsin Flanders"; "Samuel Urkiel - DPW Superintendent"; "Britt Ruhe"; "Josh Goldman"; "Leo Hwang"; "Lisa Davol"; "Peter Chilton"; "Richie Richardson"; "River Culture"; "Shea Theater Arts Center"; "John Carlan (work email)"; "Sage Winter"; "personal email Sally Pick"; "Nico Nemeck"; "Walker Korb"; "Beth Giannini"; "Colleen Doherty"; "Eileen Dowd"; "Andy Brydges"; "Eileen Mariani"; "Rachel Stoler"; "Roy Rosenblatt"; "Amanda M"; "Dennis Gemme"; "hosmerjayden99@gmail.com"; "Jenna Weld"; "Imena De Pareja"; "Jose Olvera-Aguilera"; "Rachel Stoler"; "COA-Council on Aging"; "Shannon Callahan"; "Tamsin Flanders"; "Tom Taaffe"; "Erin-Leigh Hoffman"; "Annie Levine"; "Betsy Laczynski"; "Caitlin Kelley - Montague Library Director"; "Chelsey Little"; "Chris Meneconi"; "David Jensen"; "eimai127@gmail.com"; "Elizabeth Irving"; "Francia Wisniewski"; "James Mussoni"; "Janel Nockleby"; "Jason Burbank"; "Jen Audley"; "Josh Lively"; "Justin Fermann"; "Leigh Rae"; "Lilith Wolinsky"; "Margaux Reckard"; "Mary King"; "Paul Lipke"; "Rawcliffe, Andrew (DCR)"; "Highway Foreman"; "Brandy P - Montague Highway Department"; "Samuel Urkiel - DPW Superintendent"; "chief@montaguecenterfire.com"; "brunelle@turnersfallsfire.org"; "Nik Perry"; "lovekus@gmail.com"; "Chris Nolan-Zeller"; "Bill Ketchen - Building Inspector"; "Deb Radway"; "sabel77@verizon.net"; "samthl@earthlink.net"; "doudziadzio@gmail.com"; "jerimorani@gmail.com"; "mkavenill@gmail.com"; "scarlan@frcog.org"; "iscarbrough@frcog.org"; "jlore6@gmail.com"; "ferdwulkan@gmail.com"; "leslielomasson@gmail.com"; "lizrae@comcast.net"; "moyross@comcast.net"; "beloki1943@gmail.com"; "radwaydeb@gmail.com"; "laurierhoades@gmail.com"; "beloki1943@gmail.com"; "trishmailler@gmail.com"; "katespencerbranch@gmail.com"; "katespencerbranch@gmail.com"; "masibook@verizon.net"; "wicksim@yahoo.com"; "Kimberly MacPhee"; "editor@montaguereporter.org"; "dover_57@yahoo.com"; "Ella Ingraham"; "James Mussoni"; "John Furbish"; "Linda Ackerman"; "Robert J. 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Subject: SAVE THE DATE: January 28 Public Meeting to Identify Natural Hazard Risks and Mitigation Strategies

Date: Tuesday, January 13, 2026 4:06:00 PM

Attachments: Montague HMP Public Meeting 1 Flyer.pdf

Dear community member:

Have you experienced flooding in Montague? Do you know if Montague can have earthquakes or tornadoes? What are the most serious risks facing our community—and what can be done to reduce their impacts?

The Town of Montague is updating its **Hazard Mitigation Plan**, a critical document that identifies natural hazard risks facing the community and outlines actions to reduce damage to people, property, infrastructure, and the environment. As part of this

process, the Town invites residents, business owners, and community members to participate in a public meeting to share local knowledge and priorities.

Community input is essential to identifying which hazards pose the greatest risks, which areas of Town are most vulnerable, and what mitigation actions residents would like the Town to pursue. While natural hazards such as winter storms, heavy rainfall, high winds, and earthquakes cannot be prevented, proactive planning can significantly reduce their impacts.

The public is encouraged to attend the **first of two public meetings** on the Hazard Mitigation Plan Update:

Public Meeting Details:

- **Date/time: Wednesday, January 28, 2026**
- Time: 6:00pm - 7:00pm
- Join Zoom Meeting:
 - Zoom link: <https://us02web.zoom.us/j/82184402825?pwd=aXlgY0ZlekZq6Au8NEcVc4mmPhTvw5.1>
 - Meeting ID: 821 8440 2825
 - Passcode: 699333
 - Telephone: (305) 224-1968

The Hazard Mitigation Plan is being developed by the Town's Hazard Mitigation Planning Committee (HMPC) and must be approved by the Federal Emergency Management Agency (FEMA) and adopted by the Town. FEMA approval enables Montague to remain eligible for important pre- and post-disaster hazard mitigation grant funding. Public participation is a required and vital component of this planning process.

By participating, community members can help shape a plan that reflects local priorities, addresses climate-related risks, and strengthens Montague's long-term resilience.

Please share this announcement with anyone you think might be interested.

Sincerely,

Maureen

Maureen Pollock (she/her)

1/13/26, 4:06 PM



Town of Montague Invites Public to Participate in Hazard Mitigation Plan Update - Town of Montague, MA

Town of Montague

Town of Montague Invites Public to Participate in Hazard Mitigation Plan Update

Public Meeting to Identify Natural Hazard Risks and Mitigation Strategies

Montague Hazard Mitigation Plan Update

Virtual Public Meeting

All are welcome to attend to learn about Montague's Hazard Mitigation Plan. Come share your ideas for making our town more resilient to natural hazards and climate change.

6-7 PM • Thursday, Jan 28
Scan QR code for Zoom link
or visit www.montague-ma.gov/

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<https://montague-ma.gov/n/427/Town-of-Montague-Invites-Public-to-Participate-in-Hazard-Mitigation-Plan-Update?cache=0>

1/2

1/13/26, 4:06 PM

Town of Montague Invites Public to Participate in Hazard Mitigation Plan Update - Town of Montague, MA

By participating, community members can help shape a plan that reflects local priorities, addresses climate-related risks, and strengthens Montague's long-term resilience.

For more information about the Hazard Mitigation Plan Update or the public meeting, please contact Maureen Pollock, Director of Planning & Conservation, at 413-863-3200 x112 or mpollock@montague-ma.gov.

Posted: to [Planning Department](#) on Tue, Jan 13, 2026

Updated: Tue, Jan 13, 2026

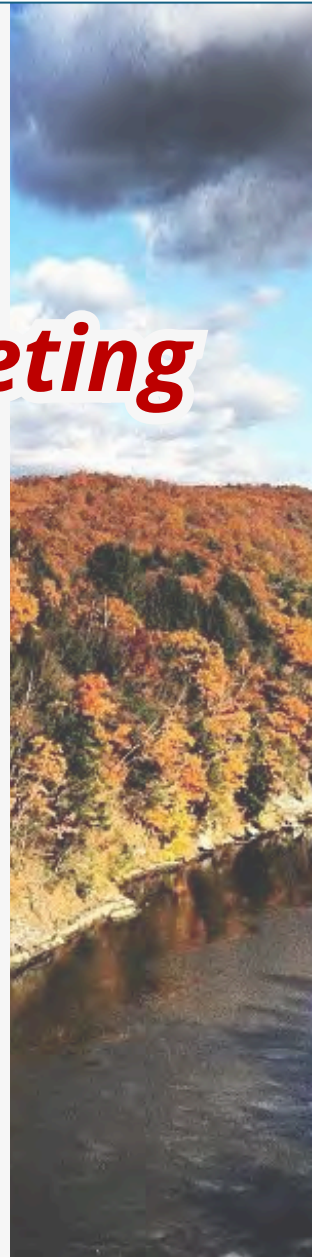
Public Meeting April 29, 2026

Montague Hazard Mitigation Plan Update

Virtual Public Meeting

All are welcome to the second meeting on the Town of Montague Hazard Mitigation Plan Update. Come hear about the plan for making our town more resilient to natural hazards and climate change.

Plan review: The Plan will be available for public review and comment on the City's website, and in print at the Planning Department Office and in each public library from May 6-20.



6-7 PM • Wednesday, April 29
Scan QR code for Zoom link or
visit www.montague-ma.gov/calendar

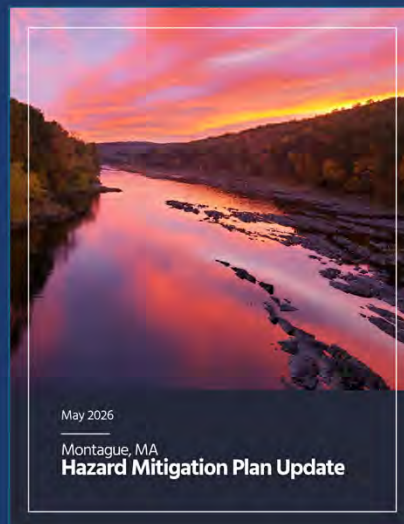


Executive Summary Designed to Facilitate Public Review

TOWN OF MONTAGUE
Massachusetts

2026 Hazard Mitigation Plan Update

EXECUTIVE SUMMARY



About This Document

This Executive Summary presents the key findings and priorities of the Town of Montague's 2026 Hazard Mitigation Plan (HMP) Update. The full plan provides a comprehensive framework to reduce long-term risks to life and property from natural hazards — ensuring Montague remains prepared, resilient, and eligible for federal hazard mitigation grants through FEMA.

What's Inside

- Planning Process & Community Engagement
- Hazard Identification & Risk Assessment
- Capability Assessment
- Mitigation Goals & Prioritized Actions
- Plan Implementation & Maintenance

**Submit to Massachusetts Emergency
Management Agency and Federal
Emergency Management Agency for
Review**
June 2026

Lead Agency
Town of Montague Planning Department

Prepared in compliance with FEMA Local Mitigation Planning Requirements

OVERVIEW & PURPOSE

The Town of Montague's 2026 Hazard Mitigation Plan (HMP) Update provides a comprehensive, FEMA-compliant framework to reduce or eliminate long-term risk to human life and property from natural hazards. Updating the previous 2020 plan ensures Montague remains eligible for FEMA Hazard Mitigation Assistance grant programs and reflects the community's evolving priorities, including a growing emphasis on climate-ready infrastructure and downtown revitalization.

Hazard Mitigation Plans are a federal requirement under the Disaster Mitigation Act of 2000. By maintaining an approved plan, Montague can access pre-disaster grant funding to proactively address vulnerabilities — reducing the cost and disruption of future disasters before they occur.

PLANNING PROCESS & COMMUNITY ENGAGEMENT

The plan was developed through a structured, inclusive planning process led by a 19-member Hazard Mitigation Planning Committee (HMPC) representing diverse community stakeholders:

- Town officials and department heads
- Fire, Police, and Emergency Management personnel
- FirstLight Power (operator of local hydroelectric dams)
- Montague Community Resource Center and social service agencies
- Representatives from Montague's five villages: Montague Center, Turners Falls, Millers Falls, Montague City, and Lake Pleasant

Public outreach included virtual and in-person public meetings, an online comment period, and targeted engagement with neighboring communities and vulnerable populations, including non-English-speaking residents and unhoused individuals living along the Connecticut River. The planning process also incorporated extensive review of current climate science, including the 2022 Massachusetts Climate Change Assessment and the 2023 ResilientMass Plan.

HAZARD IDENTIFICATION & RISK ASSESSMENT

The HMPC evaluated 13 specific hazards, assessing each based on probability of occurrence, potential impact, geographic extent, warning time, and event duration. Climate change projections were integrated throughout to account for worsening conditions over the plan's five-year horizon.

Risk Level	Hazards
HIGH	Flooding from Precipitation • Severe Winter Storms • Extreme Temperatures • Severe Weather Events
MODERATE	Wildfire/Brushfire • Hurricanes/Tropical Storms • Drought • Dam Failure Flooding • Tornadoes • Hazardous Material Incidents • Invasive Species • Landslides
LOW	Earthquakes

The risk assessment identified several interconnected vulnerabilities specific to Montague:

- Approximately 52 buildings lie within the Special Flood Hazard Area, including the Hillcrest School
- Critical bridges and culverts serving as evacuation routes are susceptible to washout during heavy precipitation events
- Combined Sewer Overflows (CSOs) release untreated sewage into local waterways during intense storms
- Multiple high-hazard dams upstream on the Connecticut and Deerfield Rivers pose inundation risk to the Town Hall, Police Department, Farren Care Facility, and historic mill buildings in Turners Falls
- The Montague Plains — a rare pitch-pine scrub-oak barren — presents significant wildfire risk to adjacent neighborhoods due to decades of accumulated fuels
- Abandoned and blighted mill properties along the Connecticut River contain legacy contamination that could be released during flood events
- Elderly residents, non-English speakers, and unhoused populations face heightened vulnerability during rapid-onset emergencies

CAPABILITY ASSESSMENT

Montague demonstrates strong foundational capacity to implement hazard mitigation measures. The Town's 2024 Comprehensive Plan explicitly integrates climate resilience into all levels of local planning and decision-making. Active regulatory tools include zoning bylaws, subdivision regulations, and stormwater management requirements.

Key Opportunities to Strengthen Local Capacity

- Formally designate a local Floodplain Administrator to ensure consistent NFIP compliance
- Update the 2015 Community Wildfire Protection Plan to provide town-wide coverage
- Build in-house GIS capabilities for improved hazard mapping and spatial analysis
- Increase staff capacity and grant-writing resources to pursue available federal funding

MITIGATION GOALS & PRIORITIZED ACTIONS

The HMPC established six broad goals to guide the Town's mitigation efforts over the next five years. These goals reflect both immediate safety priorities and the long-term vision for a climate-resilient Montague.

Goal 1: Save Lives and Reduce Losses to Private Property

Focus on protecting residents — particularly vulnerable populations — from the most acute risks of flooding, severe weather, and dam failure through improved emergency communications, evacuation planning, and shelter capacity.

Goal 2: High Hazard Potential Dams

Assess vulnerabilities associated with high-hazard dams on the Connecticut and Deerfield Rivers and coordinate with dam operators to reduce downstream risk to Montague's critical facilities and residential areas.

Goal 3: Increase Capacity to Mitigate Risk

Strengthen the Town's administrative, regulatory, and financial tools to pursue smart growth, low-impact development, and sustained hazard mitigation investment.

Goal 4: Buildings and Infrastructure

Prioritize investments that harden essential public facilities against natural hazards, expand backup power availability, and advance green infrastructure to reduce stormwater impacts.

Goal 5: Natural Resources

Protect open spaces, farmland, wetlands, and waterways that provide critical natural flood storage, wildlife habitat, and community quality of life.

Goal 6: Education and Awareness

Improve community-wide resilience by ensuring residents have the information and resources they need to prepare for, respond to, and recover from natural disasters.

To achieve these goals, the HMPC prioritized 43 specific mitigation actions. The highest-priority actions include:

High-Priority Mitigation Actions

- Establish a solar PV micro-grid between Montague High School and the Public Safety Complex to provide reliable emergency backup power for critical operations during and after major storms
- Improve the Turners Falls Canal District by coordinating with property owners and FirstLight Power on redevelopment planning and structural integrity assessment of the power canal
- Secure funding to abate and demolish abandoned blighted mill properties — particularly the Strathmore Mill Complex — to eliminate hazardous material and structural collapse risks along the Connecticut River
- Map, assess, and replace undersized culverts to climate-resilient standards capable of handling increased precipitation volumes projected under future climate scenarios
- Implement MA DEP recommendations to address Combined Sewer Overflows (CSOs) and protect water quality during heavy rain events
- Review and update Emergency Action Plans for FERC-licensed hydroelectric dams on the Connecticut and Deerfield Rivers
- Conduct targeted emergency outreach to unhoused populations in river encampments who face particular risk from dam failure flooding
- Update the 2015 Community Wildfire Protection Plan and expand the Firewise program to the wildland-urban interface
- Improve emergency shelters and warming/cooling centers with backup generator and cooling capacity upgrades
- Prepare targeted communications plans for vulnerable residents with emergency preparedness information and resource referrals

PLAN IMPLEMENTATION & MAINTENANCE

To ensure the HMP remains an active, living document rather than a static compliance product, the HMPC has established a robust implementation and monitoring framework:

- The HMPC will meet bi-annually (January and July) to monitor progress, evaluate changing conditions, and update the plan as needed
- The Town Planning Director will serve as the primary implementation coordinator
- A Mitigation Action Tracker will document the status of all 43 prioritized actions
- Hazard mitigation principles will be integrated into the Town's Capital Improvement Plan and other key planning processes
- The plan will undergo full update and FEMA re-approval within five years

This ongoing commitment ensures that Montague's investment in hazard mitigation translates into measurable protection for residents, property, and the natural systems that sustain community life.

For more information, contact the Montague Planning Department

This plan was developed with support from Jamie Caplan Consulting LLC and in compliance with FEMA Local Mitigation Planning Requirements.

Appendix B. Mitigation Actions.

Priority Ranking Points

Table 100. Priority Ranking Points for Each Action.

Action #	Action Title	Hazards Addressed	High Hazard Dams	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
1	Convene bi-annual meetings of the Hazard Mitigation Planning Committee to assess progress on implementing specified actions in the Hazard Mitigation Plan.	3	3	3	3	3	3	2	2	22
2	Incorporate hazard/climate resilience into the prioritization criteria for the Town's annual budgeting and capital improvement planning process (support investments to reduce risk and limit expenses on projects that could increase hazard vulnerabilities).	3	2	3	2	2	3	2	2	19

Action #	Action Title	Hazards Addressed	High Hazard Dams	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
3	Establish a micro-grid powered by solar PV between the High School and Public Safety Complex to provide emergency back-up power.	3	0	3	3	3	3	0	2	17
4	Prepare and implement communication plan to reach out to homeless populations and other residents regarding emergency information and resources. Conduct targeted outreach and issue emergency flood warnings to unhoused populations in encampments located in high risk flood hazard areas along the Connecticut River.	3	3	3	3	3	0	0	2	17

Action #	Action Title	Hazards Addressed	High Hazard Dams	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
5	Improve the Canal District in Turners Falls and coordinate with property owners and FirstLight about redevelopment plans and the structural integrity of the canal.	3	3	1	3	2	3	0	2	17
6	Improve the radio communication system at the Turners Falls High School and install repeaters.	3	0	2	3	3	3	0	2	16
7	Build internal staff capacity to identify and pursue grant funding for mitigation projects through training and the ability to invest more time on grant application development, grants management, and related administrative tasks.	3	2	3	2	2	0	2	2	16

Action #	Action Title	Hazards Addressed	High Hazard Dams	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
8	Start a Community Emergency Response Team (CERT).	3	2	3	3	3	0	0	2	16
9	Maintain and improve sidewalks for all pedestrian routes to schools.	3	0	2	3	3	3	0	2	16
10	Support the creation of additional neighborhood coalitions or networks and strengthen connections with Town government or organizations. Conduct an educational program to encourage elders to register for assistance through TRIAD.	3	2	3	3	2	0	0	2	15

Action #	Action Title	Hazards Addressed	High Hazard Dams	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
11	Increase use of the Town's website and social media platforms, Montague Community Television, RAVE, and other readily available outreach mechanisms to promote low-cost public education initiatives on emergency preparedness and hazard mitigation actions for homeowners, business owners, etc. Expand hazard mitigation and other emergency management information on the Town's website.	3	2	3	3	2	0	0	2	15

Action #	Action Title	Hazards Addressed	High Hazard Dams	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
12	Improve emergency shelters and warming/cooling centers (e.g. emergency backup power; better cooling capacity)	3	0	1	3	3	3	0	2	15
13	Review evacuation procedures for emergency action plans of FERC-licensed hydroelectric dams and facilities on the Connecticut River and high and significant hazard dams in Montague, Greenfield, Sunderland, and Wendell.	2	3	3	2	3	0	0	2	15

Action #	Action Title	Hazards Addressed	High Hazard Dams	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
14	Participate annually in National Flood Safety Awareness Week and other emergency preparedness campaigns by using MEMA's social media toolkits and other readily available communication materials to promote risk awareness and mitigation.	3	2	3	3	2	0	0	2	15
15	Connect the irrigation well to the Turners Falls High School to be available as a backup drinking water supply for sheltering.	3	0	1	3	3	3	0	2	15
16	Conduct regulatory reviews and updates to Town bylaws that incorporate climate resilience considerations. Use existing tools for integrating nature-based solutions (such as Mass Audubon's Bylaw Review Tool, MAPC Climate Resilient Land Use Strategies, etc.). This	3	0	3	0	1	3	2	2	14

Action #	Action Title	Hazards Addressed	High Hazard Dams	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
	should include but not be limited to revising zoning, subdivision, and other regulations or policies to improve flood resilience, fluvial erosion control, and stormwater management.									
17	Ensure Compliance with the Massachusetts State Building Code. Provide training to the Building Inspector, as needed, to ensure that all new construction complies with the appropriate seismic requirements of the State Building Code. Participate in trainings offered by FEMA's National Earthquake Technical Assistance Program (NETAP). NETAP is designed to help state, local, and tribal governments obtain the knowledge, tools,	3	0	3	2	1	3	0	2	14

Action #	Action Title	Hazards Addressed	High Hazard Dams	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
	and support that they need to plan and implement effective earthquake mitigation strategies.									
18	Build and maintain in-house GIS capabilities to support hazard mitigation and other community planning/project initiatives.	3	2	2	2	1	0	2	2	14

Action #	Action Title	Hazards Addressed	High Hazard Dams	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
19	Coordinate with the State Flood Hazard Management Program to update the Town's floodplain regulations (Zoning Bylaw, Section 6.1) in alignment with the State's latest Model Floodplain Bylaw (to be adopted in parallel with new FEMA FIRMs becoming effective). As part of future updates, continue to review the State's forthcoming Local Floodplain Action Guide for possible regulatory or administrative improvements to enhance the community's resilience to future flood events.	3	2	3	0	2	0	2	2	14
20	Conduct a tabletop exercise and educational trainings for first responders to improve the region's preparedness and response to a wildfire	2	0	2	3	3	0	2	2	14

Action #	Action Title	Hazards Addressed	High Hazard Dams	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
21	Improve access to parks and trails for use during extreme heat.	3	0	2	3	1	0	2	2	13
22	Evaluate municipal buildings and structures to determine if they are particularly vulnerable to earthquake damage and determine if any retrofitting measures could mitigate this vulnerability. Integrate measures into planned updates of buildings.	1	0	2	2	3	3	0	2	13
23	Implement additional project named in the 2023 Sawmill River Corridor Assessment Project.	3	0	2	0	1	3	2	2	13

Action #	Action Title	Hazards Addressed	High Hazard Dams	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
24	Formally designate a local Floodplain Administrator.	3	2	3	0	1	0	2	2	13
25	Promote the availability of flood insurance to all property owners and renters, especially those with structures located in areas of high to moderate flood risk.	3	2	3	2	1	0	0	2	13
26	Improved transportation infrastructure (e.g., bridges, culverts, flooding or erosion issues) to withstand stronger storms.	3	2	0	0	3	3	0	2	13

Action #	Action Title	Hazards Addressed	High Hazard Dams	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
27	Educate homeowners about the risk of wildfires and brushfires and how to reduce the risk by adopting general fire safety techniques. In coordination with DCR, implement a Firewise program targeting the residents and businesses in the Urban-Interface zone; run 2-3 programs to demonstrate how to make a house safer in the event of a wildfire on the Montague Plains and other forested areas in Town.	2	0	3	3	1	0	2	2	13
28	Integrate hazard mitigation and resilience into the Town's updated Open Space and Recreation Plan and Housing Production Plan.	3	0	2	2	1	0	2	2	12

Action #	Action Title	Hazards Addressed	High Hazard Dams	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
29	Implement recommendations from MA DEP to address the Combined Sewer Overflows (CSOs).	3	0	0	0	2	3	2	2	12
30	Encourage the Zoning Board of Appeals to adopt the Stormwater System Policy.	3	0	3	0	1	3	0	2	12

Action #	Action Title	Hazards Addressed	High Hazard Dams	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
31	Evaluate repairs to the Center Street bridge over the Sawmill River and incorporate design improvements to accommodate floodplain capacity flows as identified in the Sawmill River Restoration Plan move Center Street bridge forward.	3	2	1	0	1	3	0	2	12
32	Work with the REPC to develop a formal system for towns to record costs and property damages from hazard events. Encourage businesses and residents to report property damages, and farmers to report crop damages.	3	0	3	2	1	0	0	2	11

Action #	Action Title	Hazards Addressed	High Hazard Dams	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
33	Develop and disseminate emergency earthquake public information and instructions. Conduct earthquake drills in schools, businesses, special care facilities and other public gathering places.	1	0	3	3	2	0	0	2	11
34	Once new floodplain maps are available, expand and update the Vulnerability Assessment for properties located within the 100-year floodplain (1% chance flood event), including information on crop damages if available.	3	0	2	0	2	0	2	2	11

Action #	Action Title	Hazards Addressed	High Hazard Dams	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
35	Update the 2015 Community Wildfire Protection Plan (CWPP). As part of this effort, coordinate with large forest owners, including the State, fire and water districts, and utility companies, to develop climate-smart forest stewardship plans on forestlands.	3	0	2	0	2	0	2	2	11
36	Develop an annual program to assess and clear floodway ditches in the floodplain of overgrown vegetation and any other debris. Submit a bundled Notice of Intent to the Conservation Commission for approval of annual maintenance plan.	3	0	2	0	1	0	2	2	10

Action #	Action Title	Hazards Addressed	High Hazard Dams	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
37	Map, assess, and prioritize culverts for repair or replacement. Design new or replacement culverts to withstand greater precipitation amounts due to climate change. Implement based on need from the FRCOG inventory.	3	0	1	0	1	3	0	2	10
38	Integrate regional landslide mapping into Town land use regulations. Consider if the significance of landslide risk and if updating these regulations would mitigate the risk.	2	0	3	2	1	0	0	2	10

Action #	Action Title	Hazards Addressed	High Hazard Dams	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
39	Continue fuels mitigation and management in the Montague Plains, including prescribed fire and mechanical treatments to reduce wildfire potential in the most critical areas.	2	0	2	0	2	0	2	2	10

Action #	Action Title	Hazards Addressed	High Hazard Dams	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
40	Upgrade water/wastewater infrastructure to be able to withstand stronger storms.	3	0	0	0	1	3	0	2	9
41	Participate in tabletop exercises and trainings for hazardous material accidents.	2	0	3	0	2	0	0	2	9

Action #	Action Title	Hazards Addressed	High Hazard Dams	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
42	Implement safety infrastructure improvements on the Montague Plains including addition of hydrants and improving access roads and fire breaks; install a hydrant on Turners Falls Road; update Fire Department equipment for fighting a wildfire. consider expanding to include areas with steep slope prone to wildfire	2	0	1	0	2	0	2	2	9

Action #	Action Title	Hazards Addressed	High Hazard Dams	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
43	Secure funding to complete abatement and demolition of abandoned and blighted mill properties on the Connecticut River such as the Strathmore Mill Complex. Additional demo may be necessary due to insufficient funds.	2	0	0	0	1	0	0	2	5

Types of Mitigation Actions

Table 101. Mitigation Actions Sorted by Action Category.

Mitigation Category	Action #	Action Title
Local Plans and Regulations	1	Convene bi-annual meetings of the Hazard Mitigation Planning Committee to assess progress on implementing specified actions in the Hazard Mitigation Plan.
	2	Incorporate hazard/climate resilience into the prioritization criteria for the Town's annual budgeting and capital improvement planning process (support investments to reduce risk and limit expenses on projects that could increase hazard vulnerabilities).
	4	Prepare and implement communication plan to reach out to homeless populations and other residents regarding emergency information and resources. Conduct targeted outreach and issue emergency flood warnings to unhoused populations in encampments located in
	16	Conduct regulatory reviews and updates to Town bylaws that incorporate climate resilience considerations. Use existing tools for integrating nature-based solutions (such as Mass Audubon's Bylaw Review Tool, MAPC Climate Resilient Land Use Strategies, etc.
	17	Ensure Compliance with the Massachusetts State Building Code. Provide training to the Building Inspector, as needed, to ensure that all new construction complies with the appropriate seismic requirements of the State Building Code. Participate in training
	20	Conduct a tabletop exercise and educational trainings for first responders to improve the region's preparedness and response to a wildfire
	24	Formally designate a local Floodplain Administrator.
	28	Integrate hazard mitigation and resilience into the Town's updated Open Space and Recreation Plan and Housing Production Plan.
	30	Encourage the Zoning Board of Appeals to adopt the Stormwater System Policy.
	32	Work with the REPC to develop a formal system for towns to record costs and property damages from hazard events. Encourage businesses and residents to report property damages, and farmers to report crop damages.
	34	Once new floodplain maps are available, expand and update the Vulnerability Assessment for properties located within the 100-year floodplain (1% chance flood event), including information on crop damages if available.

Mitigation Category	Action #	Action Title
	35	Update the 2015 Community Wildfire Protection Plan (CWPP). As part of this effort, coordinate with large forest owners, including the State, fire and water districts, and utility companies, to develop climate-smart forest stewardship plans on forestlands.
	38	Integrate regional landslide mapping into Town land use regulations. Consider if the significance of landslide risk and if updating these regulations would mitigate the risk.
	41	Participate in tabletop exercises and trainings for hazardous material accidents.
Structure and Infrastructure Projects	3	Establish a micro-grid powered by solar PV between the High School and Public Safety Complex to provide emergency back-up power.
	5	Improve the Canal District in Turners Falls and coordinate with property owners and FirstLight about redevelopment plans and the structural integrity of the canal.
	6	Improve the radio communication system at the Turners Falls High School and install repeaters.
	9	Maintain and improve sidewalks for all pedestrian routes to schools.
	12	Improve emergency shelters and warming/cooling centers (e.g. emergency backup power; better cooling capacity)
	13	Review evacuation procedures for emergency action plans of FERC-licensed hydroelectric dams and facilities on the Connecticut River and high and significant hazard dams in Montague, Greenfield, Sunderland, and Wendell.
	15	Connect the irrigation well to the Turners Falls High School to be available as a backup drinking water supply for sheltering.
	21	Improve access to parks and trails for use during extreme heat.
	22	Evaluate municipal buildings and structures to determine if they are particularly vulnerable to earthquake damage and determine if any retrofitting measures could mitigate this vulnerability. Integrate measures into planned updates of buildings.
	23	Implement additional project named in the 2023 Sawmill River Corridor Assessment Project.
	26	Improved transportation infrastructure (e.g., bridges, culverts, flooding or erosion issues) to withstand stronger storms.

Mitigation Category	Action #	Action Title
	29	Implement recommendations from MA DEP to address the Combined Sewer Overflows (CSOs).
	31	Evaluate repairs to the Center Street bridge over the Sawmill River and incorporate design improvements to accommodate floodplain capacity flows as identified in the Sawmill River Restoration Plan move Center Street bridge forward.
	37	Map, assess, and prioritize culverts for repair or replacement. Design new or replacement culverts to withstand greater precipitation amounts due to climate change. Implement based on need from the FRCOG inventory.
	40	Upgrade water/wastewater infrastructure to be able to withstand stronger storms.
	43	Secure funding to complete abatement and demolition of abandoned and blighted mill properties on the Connecticut River such as the Strathmore Mill Complex. Additional demo may be necessary due to insufficient funds.
Natural Systems Protection	19	Coordinate with the State Flood Hazard Management Program to update the Town's floodplain regulations (Zoning Bylaw, Section 6.1) in alignment with the State's latest Model Floodplain Bylaw (to be adopted in parallel with new FEMA FIRMs becoming effective
	36	Develop an annual program to assess and clear floodway ditches in the floodplain of overgrown vegetation and any other debris. Submit a bundled Notice of Intent to the Conservation Commission for approval of annual maintenance plan.
	39	Continue fuels mitigation and management in the Montague Plains, including prescribed fire and mechanical treatments to reduce wildfire potential in the most critical areas.
	42	Implement safety infrastructure improvements on the Montague Plains including addition of hydrants and improving access roads and fire breaks; install a hydrant on Turners Falls Road; update Fire Department equipment for fighting a wildfire. consider expa
Education and Awareness Programs	7	Build internal staff capacity to identify and pursue grant funding for mitigation projects through training and the ability to invest more time on grant application development, grants management, and related administrative tasks.
	8	Start a Community Emergency Response Team (CERT).

Mitigation Category	Action #	Action Title
	10	Support the creation of additional neighborhood coalitions or networks and strengthen connections with Town government or organizations. Conduct an educational program to encourage elders to register for assistance through TRIAD.
	11	Increase use of the Town’s website and social media platforms, Montague Community Television, RAVE, and other readily available outreach mechanisms to promote low-cost public education initiatives on emergency preparedness and hazard mitigation actions fo
	14	Participate annually in National Flood Safety Awareness Week and other emergency preparedness campaigns by using MEMA’s social media toolkits and other readily available communication materials to promote risk awareness and mitigation.
	18	Build and maintain in-house GIS capabilities to support hazard mitigation and other community planning/project initiatives.
	25	Promote the availability of flood insurance to all property owners and renters, especially those with structures located in areas of high to moderate flood risk.
	27	Educate homeowners about the risk of wildfires and brushfires and how to reduce the risk by adopting general fire safety techniques. In coordination with DCR, implement a Firewise program targeting the residents and businesses in the Urban-Interface zone;
	33	Develop and disseminate emergency earthquake public information and instructions. Conduct earthquake drills in schools, businesses, special care facilities and other public gathering places.

Actions Sorted by Goal Statement

Table 102. Mitigation Actions Sorted by Goal Statement.

Goal	Action #	Action Title
Save Lives and Reduce Losses to Private Property	1	Convene bi-annual meetings of the Hazard Mitigation Planning Committee to assess progress on implementing specified actions in the Hazard Mitigation Plan.
	4	Prepare and implement communication plan to reach out to homeless populations and other residents regarding emergency information and resources. Conduct targeted outreach and issue emergency flood warnings to unhoused populations in encampments located in
	8	Start a Community Emergency Response Team (CERT).
	12	Improve emergency shelters and warming/cooling centers (e.g. emergency backup power; better cooling capacity)
	20	Conduct a tabletop exercise and educational trainings for first responders to improve the region's preparedness and response to a wildfire
	41	Participate in tabletop exercises and trainings for hazardous material accidents.
Building and Infrastructure	3	Establish a micro-grid powered by solar PV between the High School and Public Safety Complex to provide emergency back-up power.
	5	Improve the Canal District in Turners Falls and coordinate with property owners and FirstLight about redevelopment plans and the structural integrity of the canal.
	6	Improve the radio communication system at the Turners Falls High School and install repeaters.
	9	Maintain and improve sidewalks for all pedestrian routes to schools.
	15	Connect the irrigation well to the Turners Falls High School to be available as a backup drinking water supply for sheltering.
	21	Improve access to parks and trails for use during extreme heat.
	22	Evaluate municipal buildings and structures to determine if they are particularly vulnerable to earthquake damage and determine if any retrofitting measures could mitigate this vulnerability. Integrate measures into planned updates of buildings.
	23	Implement additional project named in the 2023 Sawmill River Corridor Assessment Project.
	26	Improved transportation infrastructure (e.g., bridges, culverts, flooding or erosion issues) to withstand stronger storms.
	29	Implement recommendations from MA DEP to address the Combined Sewer Overflows (CSOs).
	31	Evaluate repairs to the Center Street bridge over the Sawmill River and incorporate design improvements to accommodate floodplain capacity

Goal	Action #	Action Title
		flows as identified in the Sawmill River Restoration Plan move Center Street bridge forward.
	37	Map, assess, and prioritize culverts for repair or replacement. Design new or replacement culverts to withstand greater precipitation amounts due to climate change. Implement based on need from the FRCOG inventory.
	40	Upgrade water/wastewater infrastructure to be able to withstand stronger storms.
	43	Secure funding to complete abatement and demolition of abandoned and blighted mill properties on the Connecticut River such as the Strathmore Mill Complex. Additional demo may be necessary due to insufficient funds.
Natural Resources	19	Coordinate with the State Flood Hazard Management Program to update the Town's floodplain regulations (Zoning Bylaw, Section 6.1) in alignment with the State's latest Model Floodplain Bylaw (to be adopted in parallel with new FEMA FIRMs becoming effective
	36	Develop an annual program to assess and clear floodway ditches in the floodplain of overgrown vegetation and any other debris. Submit a bundled Notice of Intent to the Conservation Commission for approval of annual maintenance plan.
	39	Continue fuels mitigation and management in the Montague Plains, including prescribed fire and mechanical treatments to reduce wildfire potential in the most critical areas.
	42	Implement safety infrastructure improvements on the Montague Plains including addition of hydrants and improving access roads and fire breaks; install a hydrant on Turners Falls Road; update Fire Department equipment for fighting a wildfire. consider expa
Education and Awareness	7	Build internal staff capacity to identify and pursue grant funding for mitigation projects through training and the ability to invest more time on grant application development, grants management, and related administrative tasks.
	10	Support the creation of additional neighborhood coalitions or networks and strengthen connections with Town government or organizations. Conduct an educational program to encourage elders to register for assistance through TRIAD.
	11	Increase use of the Town's website and social media platforms, Montague Community Television, RAVE, and other readily available outreach mechanisms to promote low-cost public education initiatives on emergency preparedness and hazard mitigation actions fo
	14	Participate annually in National Flood Safety Awareness Week and other emergency preparedness campaigns by using MEMA's social media toolkits and other readily available communication materials to promote risk awareness and mitigation.
	18	Build and maintain in-house GIS capabilities to support hazard mitigation and other community planning/project initiatives.

Goal	Action #	Action Title
	25	Promote the availability of flood insurance to all property owners and renters, especially those with structures located in areas of high to moderate flood risk.
	27	Educate homeowners about the risk of wildfires and brushfires and how to reduce the risk by adopting general fire safety techniques. In coordination with DCR, implement a Firewise program targeting the residents and businesses in the Urban-Interface zone;
	33	Develop and disseminate emergency earthquake public information and instructions. Conduct earthquake drills in schools, businesses, special care facilities and other public gathering places.
Increase Capacity to Mitigate Risk	2	Incorporate hazard/climate resilience into the prioritization criteria for the Town's annual budgeting and capital improvement planning process (support investments to reduce risk and limit expenses on projects that could increase hazard vulnerabilities).
	16	Conduct regulatory reviews and updates to Town bylaws that incorporate climate resilience considerations. Use existing tools for integrating nature-based solutions (such as Mass Audubon's Bylaw Review Tool, MAPC Climate Resilient Land Use Strategies, etc.
	17	Ensure Compliance with the Massachusetts State Building Code. Provide training to the Building Inspector, as needed, to ensure that all new construction complies with the appropriate seismic requirements of the State Building Code. Participate in training
	24	Formally designate a local Floodplain Administrator.
	28	Integrate hazard mitigation and resilience into the Town's updated Open Space and Recreation Plan and Housing Production Plan.
	30	Encourage the Zoning Board of Appeals to adopt the Stormwater System Policy.
	32	Work with the REPC to develop a formal system for towns to record costs and property damages from hazard events. Encourage businesses and residents to report property damages, and farmers to report crop damages.
	34	Once new floodplain maps are available, expand and update the Vulnerability Assessment for properties located within the 100-year floodplain (1% chance flood event), including information on crop damages if available.
	35	Update the 2015 Community Wildfire Protection Plan (CWPP). As part of this effort, coordinate with large forest owners, including the State, fire and water districts, and utility companies, to develop climate-smart forest stewardship plans on forestlands.
	38	Integrate regional landslide mapping into Town land use regulations. Consider if the significance of landslide risk and if updating these regulations would mitigate the risk.
High Hazard Potential Dams	13	Review evacuation procedures for emergency action plans of FERC-licensed hydroelectric dams and facilities on the Connecticut River and

Goal	Action #	Action Title
		high and significant hazard dams in Montague, Greenfield, Sunderland, and Wendell.

Actions Sorted by Hazard

Table 103. Mitigation Actions Sorted by Hazards Addressed.

Specific Hazards Addressed	Action #	Action Title
Earthquakes	22	Evaluate municipal buildings and structures to determine if they are particularly vulnerable to earthquake damage and determine if any retrofitting measures could mitigate this vulnerability. Integrate measures into planned updates of buildings.
	33	Develop and disseminate emergency earthquake public information and instructions. Conduct earthquake drills in schools, businesses, special care facilities and other public gathering places.
All Hazards	1	Convene bi-annual meetings of the Hazard Mitigation Planning Committee to assess progress on implementing specified actions in the Hazard Mitigation Plan.
	2	Incorporate hazard/climate resilience into the prioritization criteria for the Town's annual budgeting and capital improvement planning process (support investments to reduce risk and limit expenses on projects that could increase hazard vulnerabilities).
	3	Establish a micro-grid powered by solar PV between the High School and Public Safety Complex to provide emergency back-up power.
	6	Improve the radio communication system at the Turners Falls High School and install repeaters.
	7	Build internal staff capacity to identify and pursue grant funding for mitigation projects through training and the ability to invest more time on grant application development, grants management, and related administrative tasks.
	8	Start a Community Emergency Response Team (CERT).
	10	Support the creation of additional neighborhood coalitions or networks and strengthen connections with Town government or organizations. Conduct an educational program to encourage elders to register for assistance through TRIAD.
	11	Increase use of the Town's website and social media platforms, Montague Community Television, RAVE, and other readily available outreach mechanisms to promote low-cost public education initiatives on emergency preparedness and hazard mitigation actions fo
	12	Improve emergency shelters and warming/cooling centers (e.g. emergency backup power; better cooling capacity)
	15	Connect the irrigation well to the Turners Falls High School to be available as a backup drinking water supply for sheltering.

Specific Hazards Addressed	Action #	Action Title
Flooding from Precipitation, Severe Winter Storms, Other Severe Weather, Flood from Dam Failure	16	Conduct regulatory reviews and updates to Town bylaws that incorporate climate resilience considerations. Use existing tools for integrating nature-based solutions (such as Mass Audubon's Bylaw Review Tool, MAPC Climate Resilient Land Use Strategies, etc.
	17	Ensure Compliance with the Massachusetts State Building Code. Provide training to the Building Inspector, as needed, to ensure that all new construction complies with the appropriate seismic requirements of the State Building Code. Participate in training
	18	Build and maintain in-house GIS capabilities to support hazard mitigation and other community planning/project initiatives.
	28	Integrate hazard mitigation and resilience into the Town's updated Open Space and Recreation Plan and Housing Production Plan.
	32	Work with the REPC to develop a formal system for towns to record costs and property damages from hazard events. Encourage businesses and residents to report property damages, and farmers to report crop damages.
	4	Prepare and implement communication plan to reach out to homeless populations and other residents regarding emergency information and resources. Conduct targeted outreach and issue emergency flood warnings to unhoused populations in encampments located in
	5	Improve the Canal District in Turners Falls and coordinate with property owners and FirstLight about redevelopment plans and the structural integrity of the canal.
Flooding from Precipitation, Extreme	19	Coordinate with the State Flood Hazard Management Program to update the Town's floodplain regulations (Zoning Bylaw, Section 6.1) in alignment with the State's latest Model Floodplain Bylaw (to be adopted in parallel with new FEMA FIRMs becoming effective
	25	Promote the availability of flood insurance to all property owners and renters, especially those with structures located in areas of high to moderate flood risk.
	26	Improved transportation infrastructure (e.g., bridges, culverts, flooding or erosion issues) to withstand stronger storms.
	30	Encourage the Zoning Board of Appeals to adopt the Stormwater System Policy.
	31	Evaluate repairs to the Center Street bridge over the Sawmill River and incorporate design improvements to accommodate floodplain capacity flows as identified in the Sawmill River Restoration Plan move Center Street bridge forward.
Flooding from Precipitation, Extreme	9	Maintain and improve sidewalks for all pedestrian routes to schools.

Specific Hazards Addressed	Action #	Action Title
Temperatures, Severe Winter Storms		
Flooding from Dam Failure	13	Review evacuation procedures for emergency action plans of FERC-licensed hydroelectric dams and facilities on the Connecticut River and high and significant hazard dams in Montague, Greenfield, Sunderland, and Wendell.
Flooding from Precipitation	14	Participate annually in National Flood Safety Awareness Week and other emergency preparedness campaigns by using MEMA's social media toolkits and other readily available communication materials to promote risk awareness and mitigation.
	23	Implement additional project named in the 2023 Sawmill River Corridor Assessment Project.
	24	Formally designate a local Floodplain Administrator.
	29	Implement recommendations from MA DEP to address the Combined Sewer Overflows (CSOs).
Wildfires/Brushfires, Droughts, Average and Extreme Temperatures	20	Conduct a tabletop exercise and educational trainings for first responders to improve the region's preparedness and response to a wildfire
	27	Educate homeowners about the risk of wildfires and brushfires and how to reduce the risk by adopting general fire safety techniques. In coordination with DCR, implement a Firewise program targeting the residents and businesses in the Urban-Interface zone;
	35	Update the 2015 Community Wildfire Protection Plan (CWPP). As part of this effort, coordinate with large forest owners, including the State, fire and water districts, and utility companies, to develop climate-smart forest stewardship plans on forestlands.
	39	Continue fuels mitigation and management in the Montague Plains, including prescribed fire and mechanical treatments to reduce wildfire potential in the most critical areas.
	42	Implement safety infrastructure improvements on the Montague Plains including addition of hydrants and improving access roads and fire breaks; install a hydrant on Turners Falls Road; update Fire Department equipment for fighting a wildfire. consider expa
Average and Extreme Temperatures	21	Improve access to parks and trails for use during extreme heat.
Flooding from Precipitation, Severe Winter Storms, Other Severe Weather	34	Once new floodplain maps are available, expand and update the Vulnerability Assessment for properties located within the 100-year floodplain (1% chance flood event), including information on crop damages if available.

Specific Hazards Addressed	Action #	Action Title
	37	Map, assess, and prioritize culverts for repair or replacement. Design new or replacement culverts to withstand greater precipitation amounts due to climate change. Implement based on need from the FRCOG inventory.
	40	Upgrade water/wastewater infrastructure to be able to withstand stronger storms.
Flooding from Precipitation, Invasive Species	36	Develop an annual program to assess and clear floodway ditches in the floodplain of overgrown vegetation and any other debris. Submit a bundled Notice of Intent to the Conservation Commission for approval of annual maintenance plan.
Landslides	38	Integrate regional landslide mapping into Town land use regulations. Consider if the significance of landslide risk and if updating these regulations would mitigate the risk.
Hazmat	41	Participate in tabletop exercises and trainings for hazardous material accidents.
	43	Secure funding to complete abatement and demolition of abandoned and blighted mill properties on the Connecticut River such as the Strathmore Mill Complex. Additional demo may be necessary due to insufficient funds.

Actions Sorted by Lead Position

Table 104. Mitigation Actions Sorted by Lead Position.

Action Lead	Action #	Action Title
Building Commissioner	17	Ensure Compliance with the Massachusetts State Building Code. Provide training to the Building Inspector, as needed, to ensure that all new construction complies with the appropriate seismic requirements of the State Building Code. Participate in trainings offered by FEMA's National Earthquake Technical Assistance Program (NETAP). NETAP is designed to help state, local, and tribal governments obtain the knowledge, tools, and support that they need to plan and implement effective earthquake mitigation strategies.
	24	Formally designate a local Floodplain Administrator.
Director of Planning and Conservation	1	Convene bi-annual meetings of the Hazard Mitigation Planning Committee to assess progress on implementing specified actions in the Hazard Mitigation Plan.
	16	Conduct regulatory reviews and updates to Town bylaws that incorporate climate resilience considerations. Use existing tools for integrating nature-based solutions (such as Mass Audubon's Bylaw Review Tool, MAPC Climate Resilient Land Use Strategies, etc.). This should include but not be limited to revising zoning, subdivision, and other regulations or policies to improve flood resilience, fluvial erosion control, and stormwater management.
	18	Build and maintain in-house GIS capabilities to support hazard mitigation and other community planning/project initiatives.
	19	Coordinate with the State Flood Hazard Management Program to update the Town's floodplain regulations (Zoning Bylaw, Section 6.1) in alignment with the State's latest Model Floodplain Bylaw (to be adopted in parallel with new FEMA FIRMs becoming effective). As part of future updates, continue to review the State's forthcoming Local Floodplain Action Guide for possible regulatory or administrative improvements to enhance the community's resilience to future flood events.
	23	Implement additional project named in the 2023 Sawmill River Corridor Assessment Project.
	25	Promote the availability of flood insurance to all property owners and renters, especially those with structures located in areas of high to moderate flood risk.

Action Lead	Action #	Action Title
	28	Integrate hazard mitigation and resilience into the Town's updated Open Space and Recreation Plan and Housing Production Plan.
	30	Encourage the Zoning Board of Appeals to adopt the Stormwater System Policy.
	34	Once new floodplain maps are available, expand and update the Vulnerability Assessment for properties located within the 100-year floodplain (1% chance flood event), including information on crop damages if available.
	35	Update the 2015 Community Wildfire Protection Plan (CWPP). As part of this effort, coordinate with large forest owners, including the State, fire and water districts, and utility companies, to develop climate-smart forest stewardship plans on forestlands.
	38	Integrate regional landslide mapping into Town land use regulations. Consider if the significance of landslide risk and if updating these regulations would mitigate the risk.
Selectboard Office	11	Increase use of the Town's website and social media platforms, Montague Community Television, RAVE, and other readily available outreach mechanisms to promote low-cost public education initiatives on emergency preparedness and hazard mitigation actions for homeowners, business owners, etc. Expand hazard mitigation and other emergency management information on the Town's website.
	12	Improve emergency shelters and warming/cooling centers (e.g. emergency backup power; better cooling capacity)
	40	Upgrade water/wastewater infrastructure to be able to withstand stronger storms.
	43	Secure funding to complete abatement and demolition of abandoned and blighted mill properties on the Connecticut River such as the Strathmore Mill Complex. Additional demo may be necessary due to insufficient funds.
Chief of Police	4	Prepare and implement communication plan to reach out to homeless populations and other residents regarding emergency information and resources. Conduct targeted outreach and issue emergency flood warnings to unhoused populations in encampments located in high risk flood hazard areas along the Connecticut River.
Director of Facilities & Safety, Gill-Montague Regional School District	6	Improve the radio communication system at the Turners Falls High School and install repeaters.

Action Lead	Action #	Action Title
	15	Connect the irrigation well to the Turners Falls High School to be available as a backup drinking water supply for sheltering.
Montague Police Chief	8	Start a Community Emergency Response Team (CERT).
Director of Department of Public Works	9	Maintain and improve sidewalks for all pedestrian routes to schools.
	26	Improved transportation infrastructure (e.g., bridges, culverts, flooding or erosion issues) to withstand stronger storms.
	31	Evaluate repairs to the Center Street bridge over the Sawmill River and incorporate design improvements to accommodate floodplain capacity flows as identified in the Sawmill River Restoration Plan move Center Street bridge forward.
	36	Develop an annual program to assess and clear floodway ditches in the floodplain of overgrown vegetation and any other debris. Submit a bundled Notice of Intent to the Conservation Commission for approval of annual maintenance plan.
	37	Map, assess, and prioritize culverts for repair or replacement. Design new or replacement culverts to withstand greater precipitation amounts due to climate change. Implement based on need from the FRCOG inventory.
Emergency Management Director	13	Review evacuation procedures for emergency action plans of FERC-licensed hydroelectric dams and facilities on the Connecticut River and high and significant hazard dams in Montague, Greenfield, Sunderland, and Wendell.
	14	Participate annually in National Flood Safety Awareness Week and other emergency preparedness campaigns by using MEMA's social media toolkits and other readily available communication materials to promote risk awareness and mitigation.
	20	Conduct a tabletop exercise and educational trainings for first responders to improve the region's preparedness and response to a wildfire
	32	Work with the REPC to develop a formal system for towns to record costs and property damages from hazard events. Encourage businesses and residents to report property damages, and farmers to report crop damages.
	33	Develop and disseminate emergency earthquake public information and instructions. Conduct earthquake drills in schools, businesses, special care facilities and other public gathering places.

Action Lead	Action #	Action Title
	41	Participate in tabletop exercises and trainings for hazardous material accidents.
Building Commissioner & Fire Chief	22	Evaluate municipal buildings and structures to determine if they are particularly vulnerable to earthquake damage and determine if any retrofitting measures could mitigate this vulnerability. Integrate measures into planned updates of buildings.
Turners Falls Water Department; Turners Falls Fire District	27	Educate homeowners about the risk of wildfires and brushfires and how to reduce the risk by adopting general fire safety techniques. In coordination with DCR, implement a Firewise program targeting the residents and businesses in the Urban-Interface zone; run 2-3 programs to demonstrate how to make a house safer in the event of a wildfire on the Montague Plains and other forested areas in Town.
	42	Implement safety infrastructure improvements on the Montague Plains including addition of hydrants and improving access roads and fire breaks; install a hydrant on Turners Falls Road; update Fire Department equipment for fighting a wildfire. consider expanding to include areas with steep slope prone to wildfire
Selectboard's Office & Clean Water Facility Superintendent & DPW Director	29	Implement recommendations from MA DEP to address the Combined Sewer Overflows (CSOs).
Selectboard	2	Incorporate hazard/climate resilience into the prioritization criteria for the Town's annual budgeting and capital improvement planning process (support investments to reduce risk and limit expenses on projects that could increase hazard vulnerabilities).
	3	Establish a micro-grid powered by solar PV between the High School and Public Safety Complex to provide emergency back-up power.
	5	Improve the Canal District in Turners Falls and coordinate with property owners and FirstLight about redevelopment plans and the structural integrity of the canal.
	7	Build internal staff capacity to identify and pursue grant funding for mitigation projects through training and the ability to invest more time on grant application development, grants management, and related administrative tasks.
Director of Public Safety	10	Support the creation of additional neighborhood coalitions or networks and strengthen connections with Town government or organizations. Conduct an educational program to encourage elders to register for assistance through TRIAD.

Action Lead	Action #	Action Title
Director of Parks & Recreation; Owners & stewards of non-town owned open space	21	Improve access to parks and trails for use during extreme heat.
Montague Center Fire and Water District	39	Continue fuels mitigation and management in the Montague Plains, including prescribed fire and mechanical treatments to reduce wildfire potential in the most critical areas.

Actions Sorted by Implementation Schedule

Table 105. Mitigation Actions Sorted by Implementation Schedule.

Implementation Schedule	Action #	Action Title
2026-2027	19	Coordinate with the State Flood Hazard Management Program to update the Town's floodplain regulations (Zoning Bylaw, Section 6.1) in alignment with the State's latest Model Floodplain Bylaw (to be adopted in parallel with new FEMA FIRMs becoming effective
	24	Formally designate a local Floodplain Administrator.
	28	Integrate hazard mitigation and resilience into the Town's updated Open Space and Recreation Plan and Housing Production Plan.
2026-2031	1	Convene bi-annual meetings of the Hazard Mitigation Planning Committee to assess progress on implementing specified actions in the Hazard Mitigation Plan.
	2	Incorporate hazard/climate resilience into the prioritization criteria for the Town's annual budgeting and capital improvement planning process (support investments to reduce risk and limit expenses on projects that could increase hazard vulnerabilities).
	3	Establish a micro-grid powered by solar PV between the High School and Public Safety Complex to provide emergency back-up power.
	4	Prepare and implement communication plan to reach out to homeless populations and other residents regarding emergency information and resources. Conduct targeted outreach and issue emergency flood warnings to unhoused populations in encampments located in
	6	Improve the radio communication system at the Turners Falls High School and install repeaters.
	7	Build internal staff capacity to identify and pursue grant funding for mitigation projects through training and the ability to invest more time on grant application development, grants management, and related administrative tasks.
	8	Start a Community Emergency Response Team (CERT).
	10	Support the creation of additional neighborhood coalitions or networks and strengthen connections with Town government or organizations. Conduct an educational program to encourage elders to register for assistance through TRIAD.

Implementation Schedule	Action #	Action Title
	11	Increase use of the Town's website and social media platforms, Montague Community Television, RAVE, and other readily available outreach mechanisms to promote low-cost public education initiatives on emergency preparedness and hazard mitigation actions fo
	12	Improve emergency shelters and warming/cooling centers (e.g. emergency backup power; better cooling capacity)
	13	Review evacuation procedures for emergency action plans of FERC-licensed hydroelectric dams and facilities on the Connecticut River and high and significant hazard dams in Montague, Greenfield, Sunderland, and Wendell.
	14	Participate annually in National Flood Safety Awareness Week and other emergency preparedness campaigns by using MEMA's social media toolkits and other readily available communication materials to promote risk awareness and mitigation.
	15	Connect the irrigation well to the Turners Falls High School to be available as a backup drinking water supply for sheltering.
	16	Conduct regulatory reviews and updates to Town bylaws that incorporate climate resilience considerations. Use existing tools for integrating nature-based solutions (such as Mass Audubon's Bylaw Review Tool, MAPC Climate Resilient Land Use Strategies, etc.
	17	Ensure Compliance with the Massachusetts State Building Code. Provide training to the Building Inspector, as needed, to ensure that all new construction complies with the appropriate seismic requirements of the State Building Code. Participate in training
	18	Build and maintain in-house GIS capabilities to support hazard mitigation and other community planning/project initiatives.
	20	Conduct a tabletop exercise and educational trainings for first responders to improve the region's preparedness and response to a wildfire
	21	Improve access to parks and trails for use during extreme heat.
	22	Evaluate municipal buildings and structures to determine if they are particularly vulnerable to earthquake damage and determine if any retrofitting measures could mitigate this vulnerability. Integrate measures into planned updates of buildings.
	23	Implement additional project named in the 2023 Sawmill River Corridor Assessment Project.

Implementation Schedule	Action #	Action Title
	25	Promote the availability of flood insurance to all property owners and renters, especially those with structures located in areas of high to moderate flood risk.
	26	Improved transportation infrastructure (e.g., bridges, culverts, flooding or erosion issues) to withstand stronger storms.
	27	Educate homeowners about the risk of wildfires and brushfires and how to reduce the risk by adopting general fire safety techniques. In coordination with DCR, implement a Firewise program targeting the residents and businesses in the Urban-Interface zone;
	29	Implement recommendations from MA DEP to address the Combined Sewer Overflows (CSOs).
	30	Encourage the Zoning Board of Appeals to adopt the Stormwater System Policy.
	31	Evaluate repairs to the Center Street bridge over the Sawmill River and incorporate design improvements to accommodate floodplain capacity flows as identified in the Sawmill River Restoration Plan move Center Street bridge forward.
	32	Work with the REPC to develop a formal system for towns to record costs and property damages from hazard events. Encourage businesses and residents to report property damages, and farmers to report crop damages.
	33	Develop and disseminate emergency earthquake public information and instructions. Conduct earthquake drills in schools, businesses, special care facilities and other public gathering places.
	34	Once new floodplain maps are available, expand and update the Vulnerability Assessment for properties located within the 100-year floodplain (1% chance flood event), including information on crop damages if available.
	35	Update the 2015 Community Wildfire Protection Plan (CWPP). As part of this effort, coordinate with large forest owners, including the State, fire and water districts, and utility companies, to develop climate-smart forest stewardship plans on forestlands.
	36	Develop an annual program to assess and clear floodway ditches in the floodplain of overgrown vegetation and any other debris. Submit a bundled Notice of Intent to the Conservation Commission for approval of annual maintenance plan.
	37	Map, assess, and prioritize culverts for repair or replacement. Design new or replacement culverts to withstand greater

Implementation Schedule	Action #	Action Title
		precipitation amounts due to climate change. Implement based on need from the FRCOG inventory.
	38	Integrate regional landslide mapping into Town land use regulations. Consider if the significance of landslide risk and if updating these regulations would mitigate the risk.
	39	Continue fuels mitigation and management in the Montague Plains, including prescribed fire and mechanical treatments to reduce wildfire potential in the most critical areas.
	40	Upgrade water/wastewater infrastructure to be able to withstand stronger storms.
	41	Participate in tabletop exercises and trainings for hazardous material accidents.
	42	Implement safety infrastructure improvements on the Montague Plains including addition of hydrants and improving access roads and fire breaks; install a hydrant on Turners Falls Road; update Fire Department equipment for fighting a wildfire. consider expa
	43	Secure funding to complete abatement and demolition of abandoned and blighted mill properties on the Connecticut River such as the Strathmore Mill Complex. Additional demo may be necessary due to insufficient funds.
2026-2036	5	Improve the Canal District in Turners Falls and coordinate with property owners and FirstLight about redevelopment plans and the structural integrity of the canal.
2027-2031	9	Maintain and improve sidewalks for all pedestrian routes to schools.

Appendix C. Plan Implementation and Review Supporting Materials.

Plan Update Evaluation Form

Table 106. Plan Update Evaluation Form.¹¹¹

Plan Section	Considerations
Planning Process	Participants - Should new jurisdictions be invited to participate in future plan updates? - How have communities and agencies helped to carry out mitigation actions? - Could anything from the initial planning process be done more efficiently? - Have there been any changes in public support or priorities about hazard mitigation? - Is there anything else to consider? Public Involvement - Has the public been actively involved in the plan's __implementation? How can public participation improve? - Have there been any ongoing public outreach activities for the plan? - Is there anything else you would like to consider?
	Hazard History - Have there been any recent disaster events? If so, how did they affect your community? - Should the list of hazards addressed in the plan be updated? If so, which hazards should be added or removed? - Have there been any new issues with hazards in a certain area of your community? - Is there anything else you would like to consider? New Data - Are any new data sources available (e.g., studies, reports, maps, etc.)? - Do any new critical facilities or infrastructure need to be added to the asset lists?

¹¹¹ Based on FEMA's Local Mitigation Planning Handbook, June 2025, p.212-214.

Plan Section	Considerations
	• Have any changes in development trends occurred that could create additional risks? • Does any new development <i>reduce</i> risk? • Is there anything else you would like to consider?
Capability Assessment	• Have jurisdictions adopted new policies, plans, regulations, or reports that could support the plan? • Are there different or new education and outreach programs and resources available for mitigation activities? • Has NFIP participation changed in the participating jurisdictions? • Is there anything else you would like to consider?
Mitigation Strategy	• Is the mitigation strategy being carried out as expected? Were the cost and timeline estimates accurate? • Are there new projects to consider? • Should existing mitigation actions be revised or removed from the plan? • Are there new funding sources to consider? • Have parts of the plan been worked into other planning mechanisms? • What challenges were there, and how can those be overcome over time? • Is there anything else you would like to consider?
Implementation Plan	• Was the plan monitored and evaluated as anticipated? • What are needed improvements to the plan implementation procedures?

Mitigation Action Progress Worksheet

Table 107. Mitigation Action Progress Worksheet.

Mitigation Action Progress Worksheet				
Progress Report Period	From Date	To Date		
Action/Project Title				
Responsible Department				
Contact Name				
Contact Phone/Email				
Project Description				
Project Goal				
Project Objective				
Project Cost				
Project Status				
Date of Project Approval	Date of Project Start	Anticipated Date of Completion	Project Canceled	Project Delayed
Explanation of Delay or Cost Overruns				
Project Report Summary				
What was accomplished for this project during this reporting period?				
What obstacles, problems, or delays did the project encounter?				
Plans for next reporting period.				

Appendix D. Hazus Reports



Hazus: Flood Global Risk Report

Region Name: MontagueFlood

Flood Scenario: 100year

Print Date: Wednesday, November 19, 2025

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 280 census blocks. The region contains over 4 thousand households and has a total population of 8,557 people. The distribution of population by State and County for the study region is provided in Appendix B .

There are an estimated 2,518 buildings in the region with a total building replacement value (excluding contents) of 1,322 million dollars. Approximately 85.27% of the buildings (and 54.69% of the building value) are associated with residential housing.



Building Inventory

General Building Stock

Hazus estimates that there are 2,518 buildings in the region which have an aggregate total replacement value of 1,322 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	723,284	54.7%
Commercial	278,331	21.0%
Industrial	159,060	12.0%
Agricultural	15,010	1.1%
Religion	17,376	1.3%
Government	51,580	3.9%
Education	77,848	5.9%
Total	1,322,489	100%

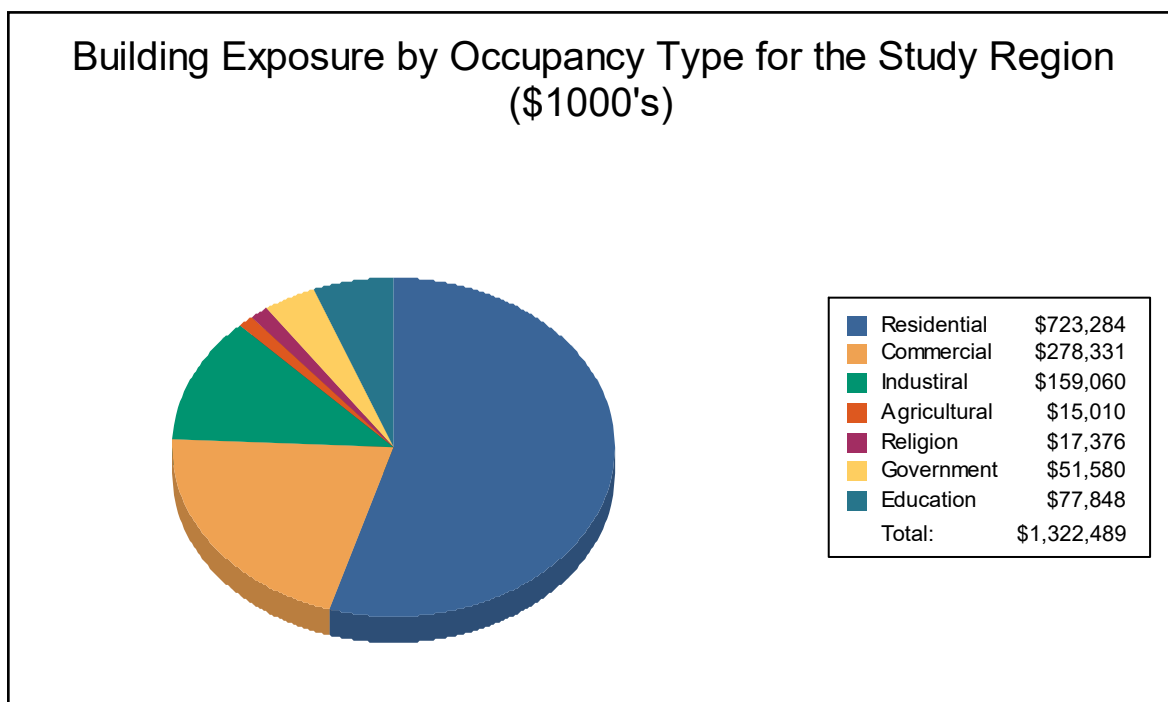
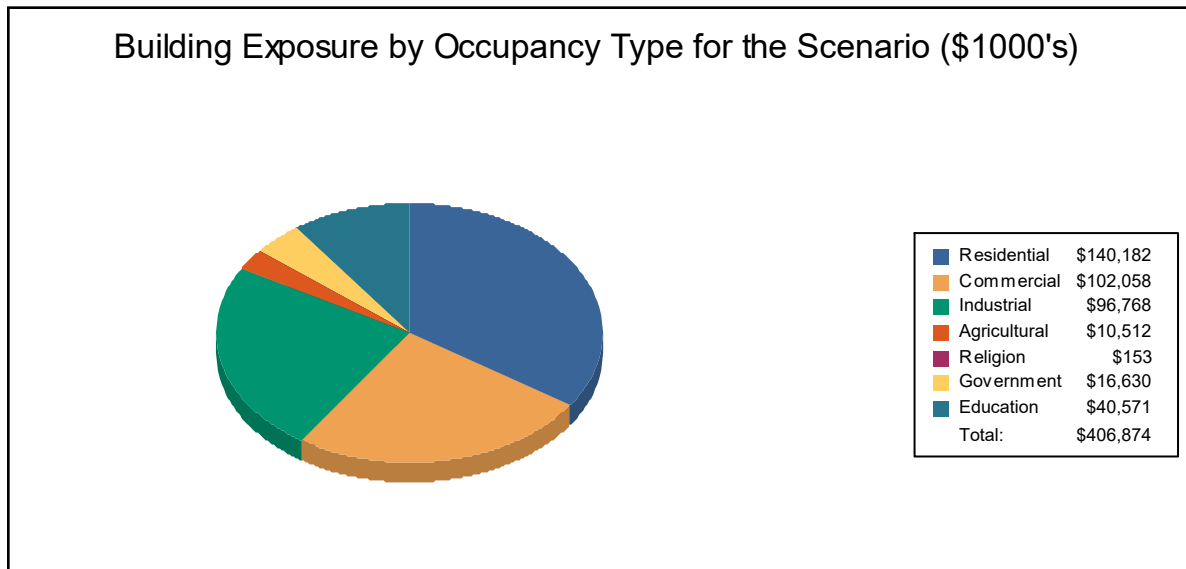


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure (\$1000)	Percent of Total
Residential	140,182	34.5%
Commercial	102,058	25.1%
Industrial	96,768	23.8%
Agricultural	10,512	2.6%
Religion	153	0.0%
Government	16,630	4.1%
Education	40,571	10.0%
Total	406,874	100%



Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 5 schools, 2 fire stations, 2 police stations and 2 emergency operation centers.

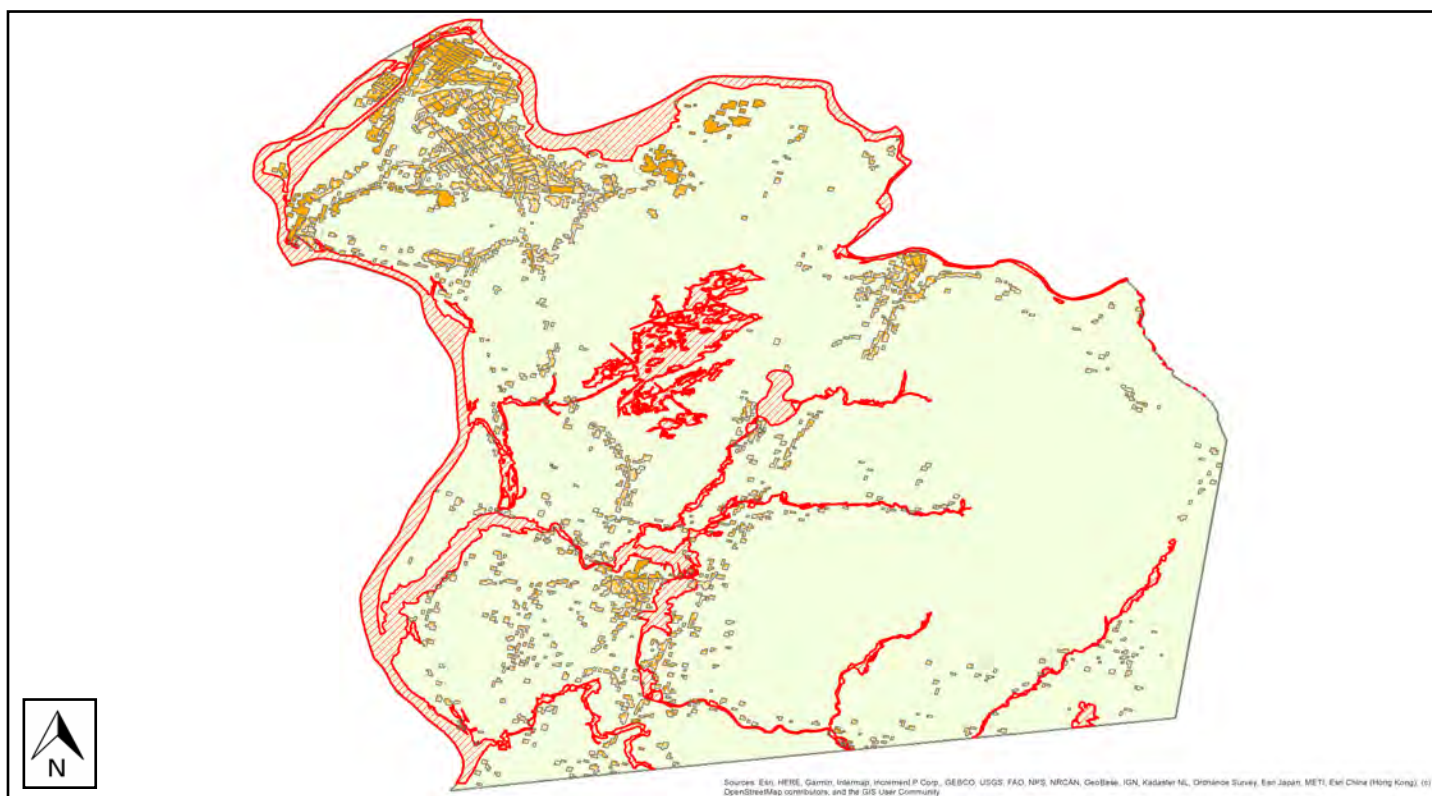
Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	MontagueFlood
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 0 buildings will be at least moderately damaged. This is over 0% 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

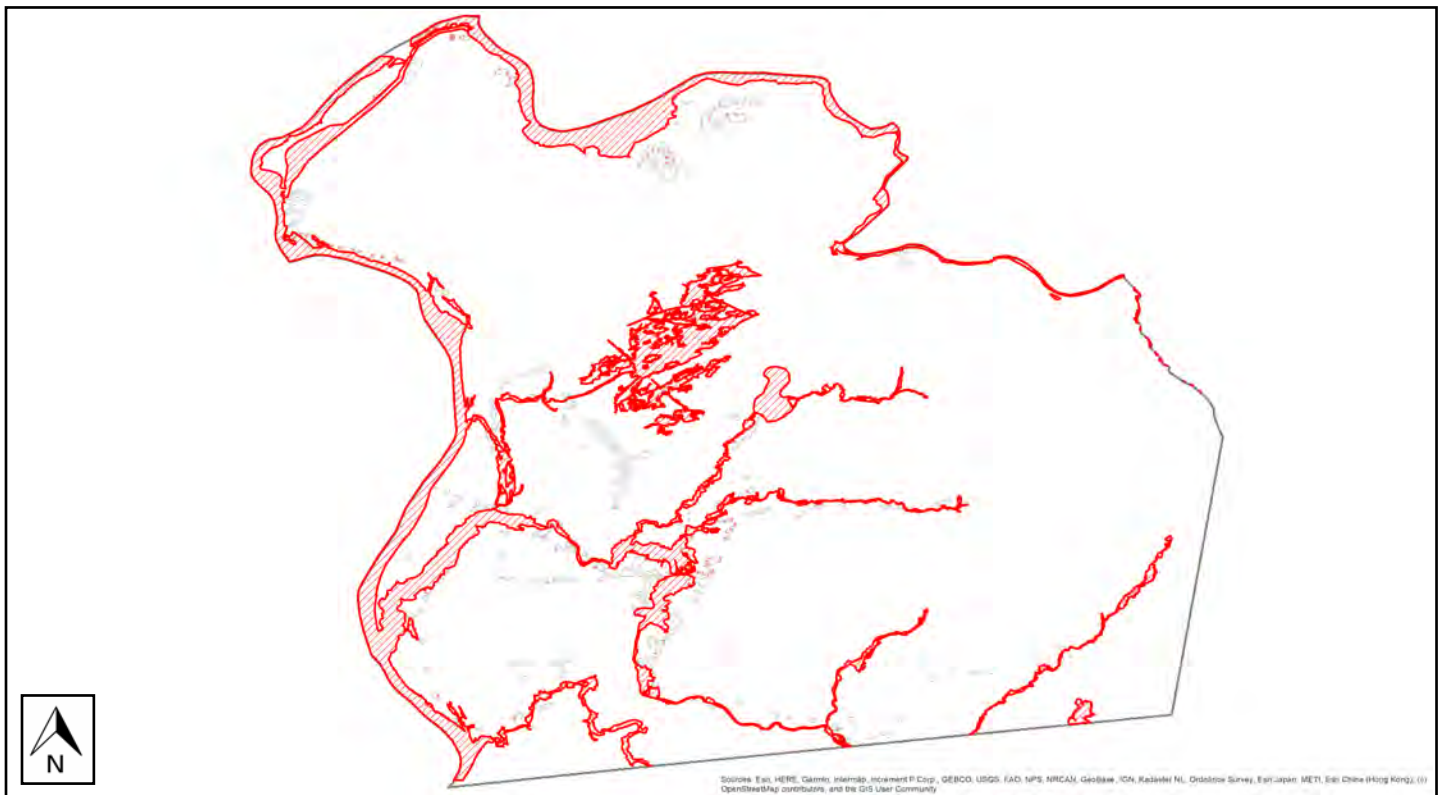


Table 3: Expected Building Damage by Occupancy

Occupancy	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
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	0	0	0	0	0	0	0	0	0	0	0	0
Total	0		0		0		0		0		0	

Counts By Damage Level

Damage Level 1-10	0
Damage Level 11-20	0
Damage Level 21-30	0
Damage Level 31-40	0
Damage Level 41-50	0
Damage Level >50	0
Total:	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	0	0	0	0	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

Classification	Total	# Facilities		
		At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	2	0	0	0
Fire Stations	2	0	0	0
Hospitals	0	0	0	0
Police Stations	2	0	0	0
Schools	5	0	0	0

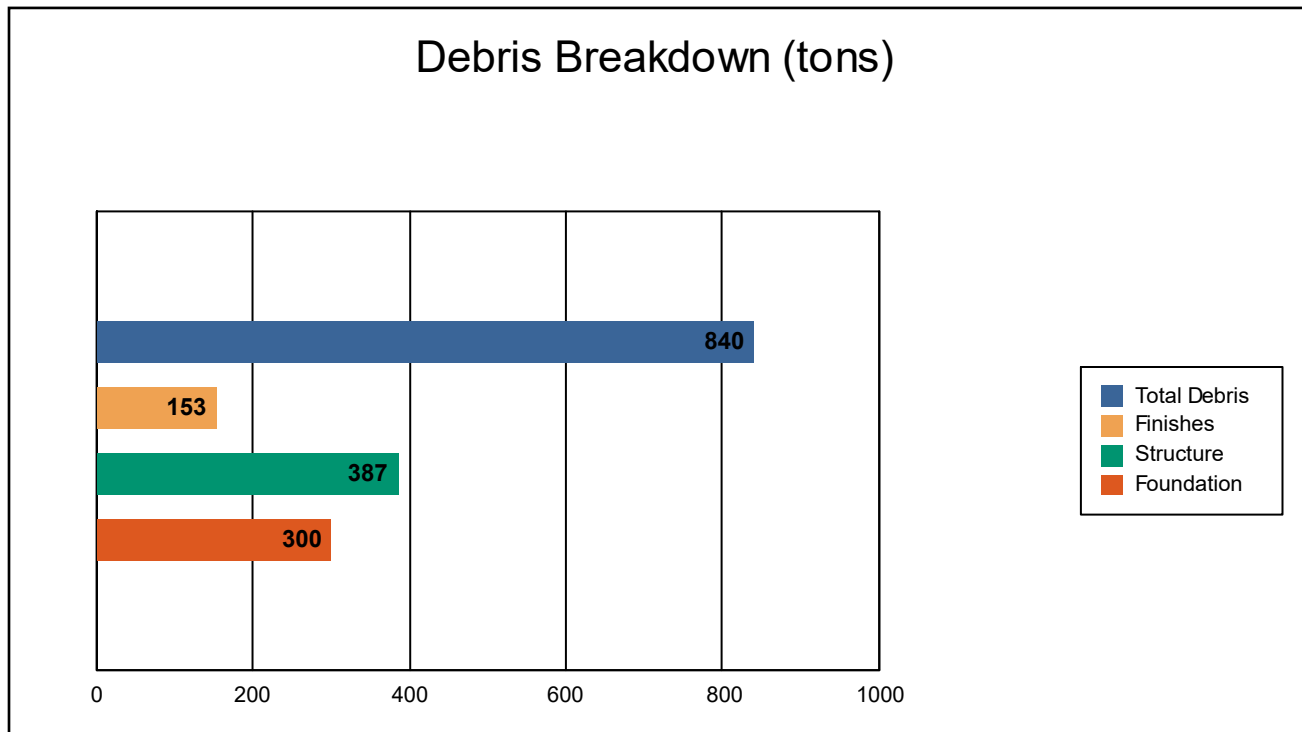
If this report displays all zeros or is blank, two possibilities can explain this.

- (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.

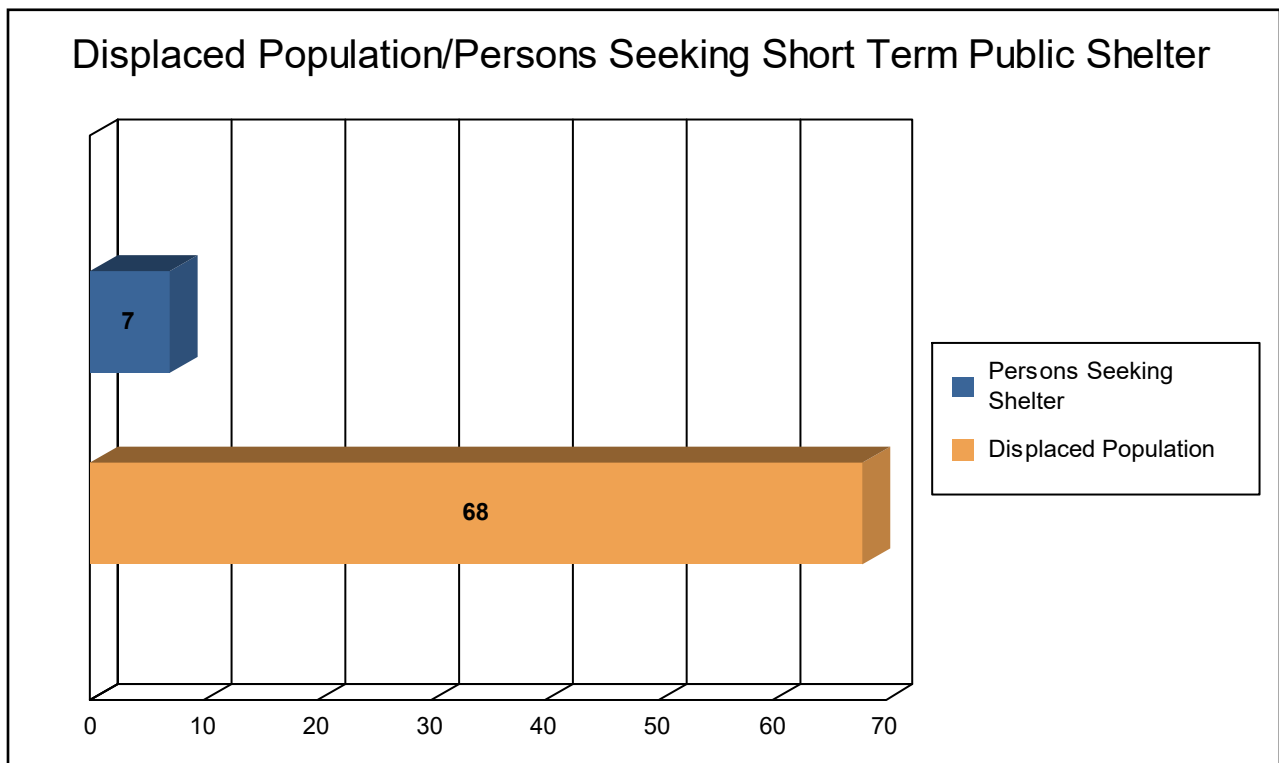


The model estimates that a total of 840 tons of debris will be generated. Of the total amount, Finishes comprises 18% of the total, Structure comprises 46% of the total, and Foundation comprises 36%. If the debris tonnage is converted into an estimated number of truckloads, it will require 34 truckloads (@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 23 households (or 68 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 7 people (out of a total population of 8,557) will seek temporary shelter in public shelters.





Economic Loss

The total economic loss estimated for the flood is 27.95 million dollars, which represents 6.87 % of the total replacement value of the scenario buildings.

Building-Related Losses

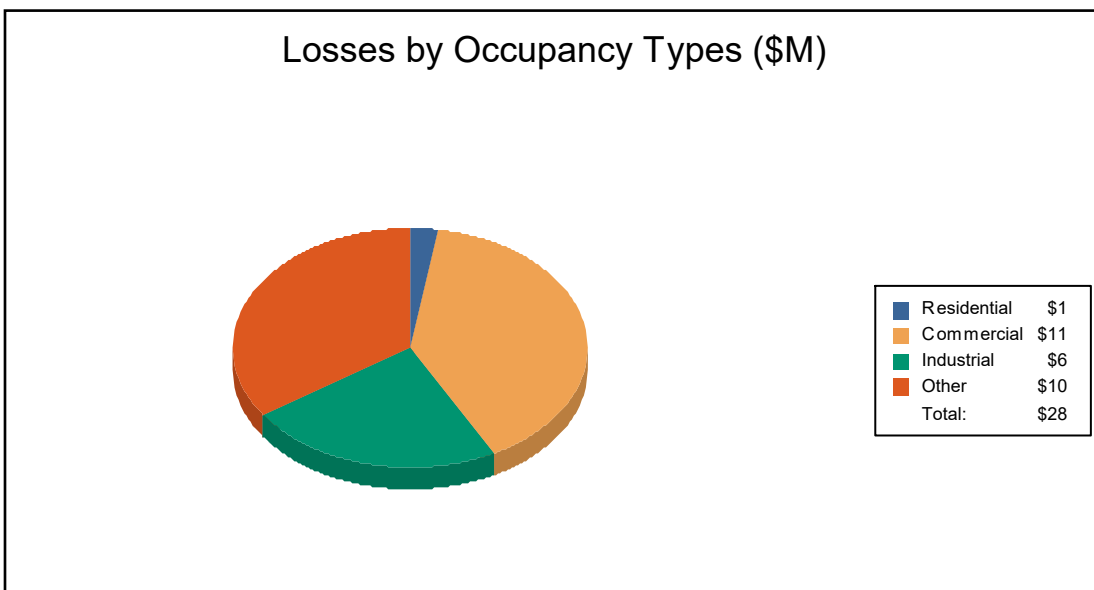
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability 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 14.51 million dollars. 48% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 2.57% 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	0.39	2.49	1.67	0.42	4.97
	Content	0.18	3.15	4.03	1.53	8.88
	Inventory	0.00	0.02	0.61	0.02	0.65
	Subtotal	0.57	5.66	6.32	1.97	14.51
Business Interruption						
	Income	0.01	3.05	0.04	0.26	3.36
	Relocation	0.09	0.73	0.04	0.30	1.15
	Rental Income	0.03	0.56	0.01	0.12	0.73
	Wage	0.02	1.12	0.07	6.98	8.20
	Subtotal	0.15	5.45	0.17	7.67	13.44
ALL	Total	0.72	11.11	6.49	9.63	27.95





Appendix A: County Listing for the Region

Massachusetts

- Franklin





Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Franklin	8,557	723,284	599,205	1,322,489
Total	8,557	723,284	599,205	1,322,489
Total Study Region	8,557	723,284	599,205	1,322,489



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Hazus: Hurricane Global Risk Report

Region Name: MontagueWind500

Hurricane Scenario: Probabilistic 500-year Return Period

Print Date: Friday, October 24, 2025

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 31.27 square miles and contains 2 census tracts. There are over 3 thousand households in the region and a total population of 8,580 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 1,323 million dollars. Approximately 85% of the buildings (and 55% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 2,518 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 provides distribution of the building value by State and County.

Building Exposure by Occupancy Type

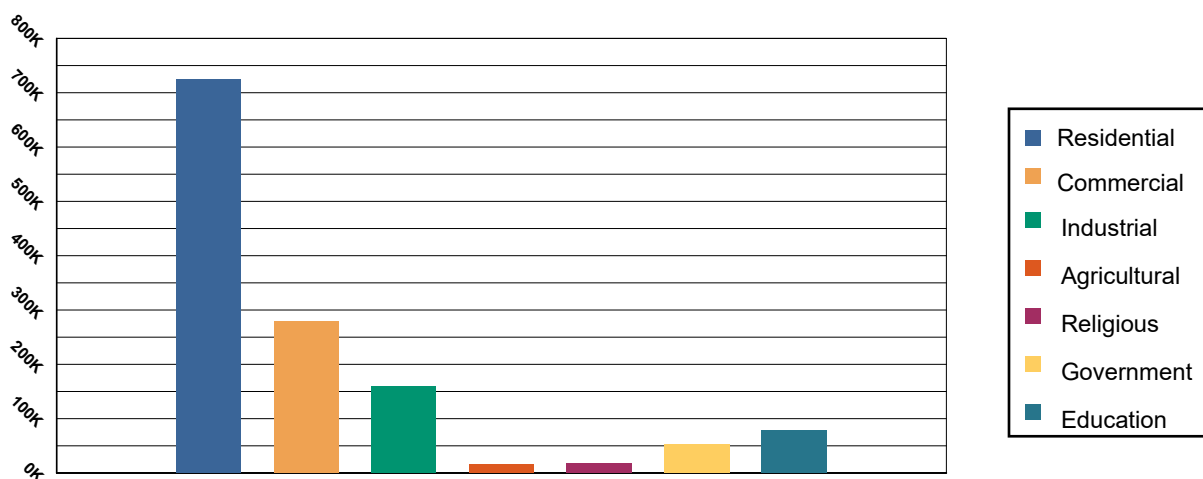


Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure (\$1000)	Percent of Tot
Residential	723,505	54.69%
Commercial	278,422	21.05%
Industrial	159,077	12.03%
Agricultural	15,014	1.13%
Religious	17,379	1.31%
Government	51,587	3.90%
Education	77,848	5.88%
Total	1,322,832	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 5 schools, 2 fire stations, 2 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 49 buildings will be at least moderately damaged. This is over 2% of the total number of buildings in the region. There are an estimated 1 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.

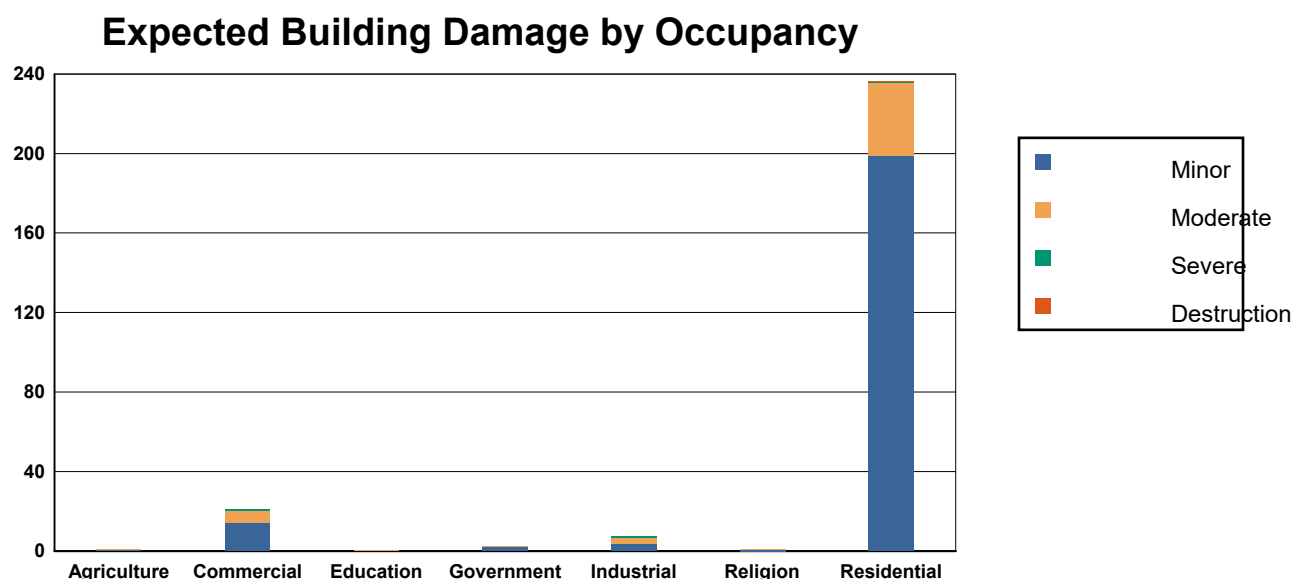


Table 2: Expected Building Damage by Occupancy : 500 - year Event

Occupancy	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	13	92.03	1	4.86	0	2.17	0	0.90	0	0.05
Commercial	235	91.89	14	5.59	6	2.28	1	0.23	0	0.00
Education	4	87.68	0	7.87	0	4.43	0	0.03	0	0.00
Government	29	92.39	2	6.14	0	1.46	0	0.02	0	0.00
Industrial	46	86.09	4	6.85	3	5.87	1	1.17	0	0.02
Religion	11	93.77	1	5.15	0	1.04	0	0.05	0	0.00
Residential	1,911	88.99	199	9.25	37	1.72	0	0.01	1	0.03
Total	2,249		220		47		2		1	

Table 3: Expected Building Damage by Building Type : 500 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	5	93.63	0	5.77	0	0.59	0	0.01	0	0.00
Masonry	193	91.65	14	6.61	3	1.38	1	0.35	0	0.02
MH	5	98.08	0	1.37	0	0.40	0	0.01	0	0.14
Steel	119	80.19	15	10.23	13	8.89	1	0.69	0	0.00
Wood	1,973	91.85	161	7.51	13	0.59	1	0.03	1	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

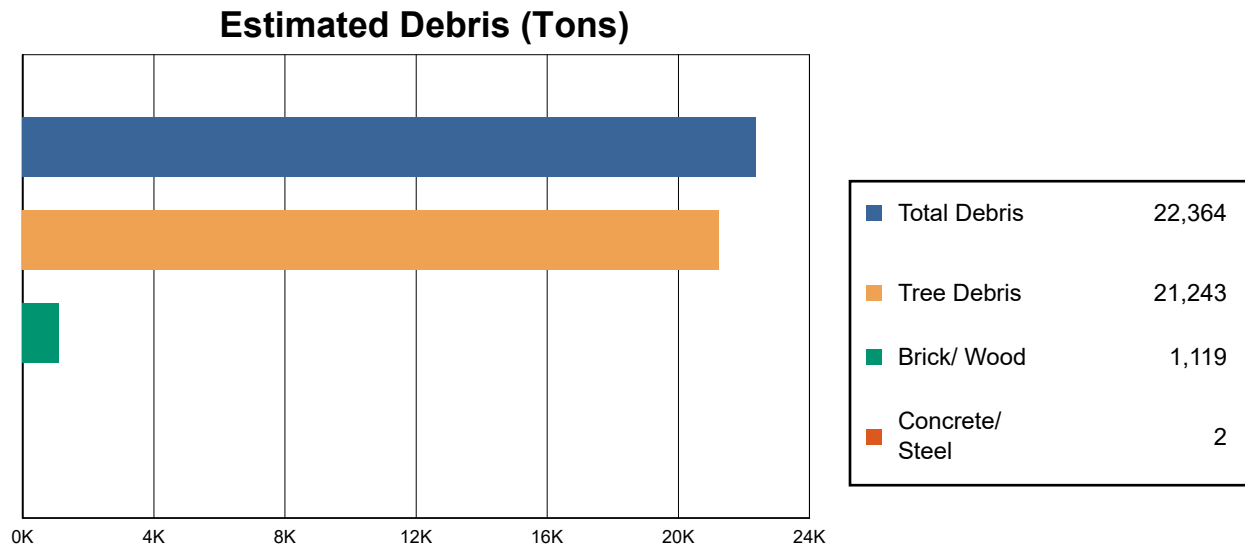


Table 4: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	Expected Loss of Use < 1 day
EOCs	2	0	0	2
Fire Stations	2	0	0	2
Police Stations	2	0	0	2
Schools	5	0	0	5

Induced Hurricane Damage

Debris Generation

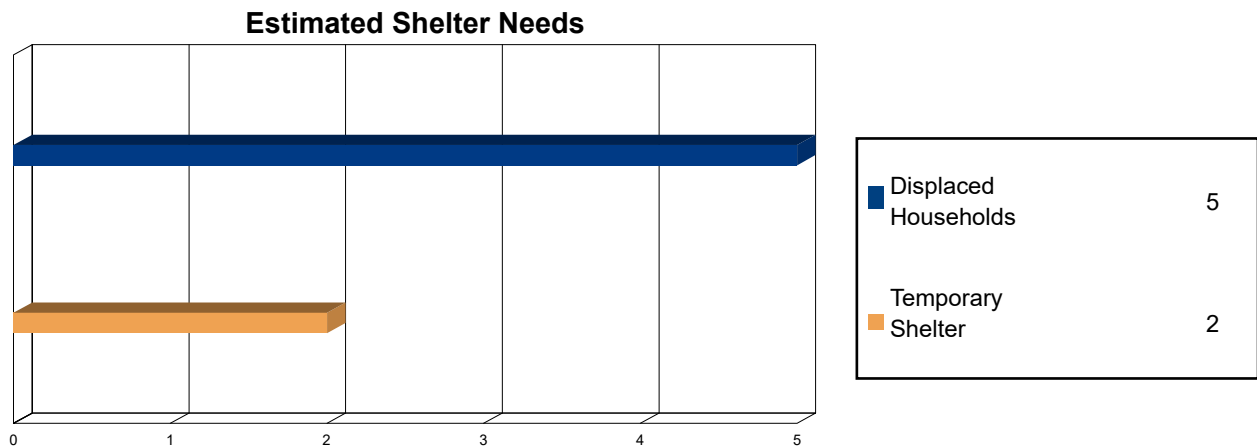


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 22,364 tons of debris will be generated. Of the total amount, 17,799 tons (80%) is Other Tree Debris. Of the remaining 4,565 tons, Brick/Wood comprises 25% 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 45 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 3,444 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 5 households to be displaced due to the hurricane. Of these, 2 people (out of a total population of 8,580) will seek temporary shelter in public shelters.

Economic Loss

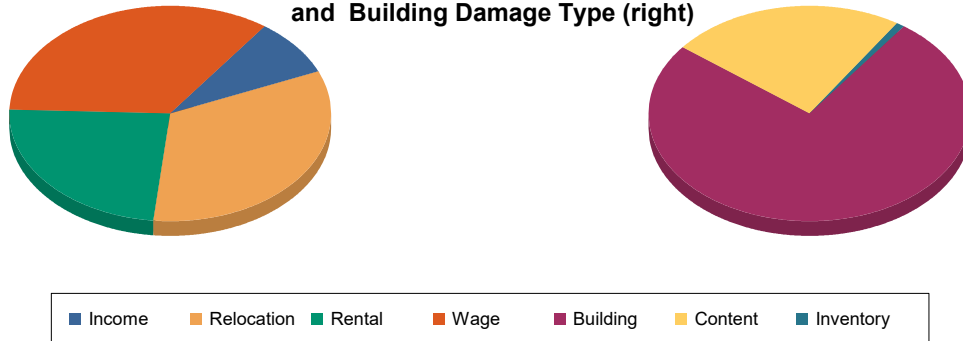
The total economic loss estimated for the hurricane is 14.4 million dollars, which represents 1.09 % of the total replacement value of the region's buildings.

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 14 million dollars. 11% 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 70% 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

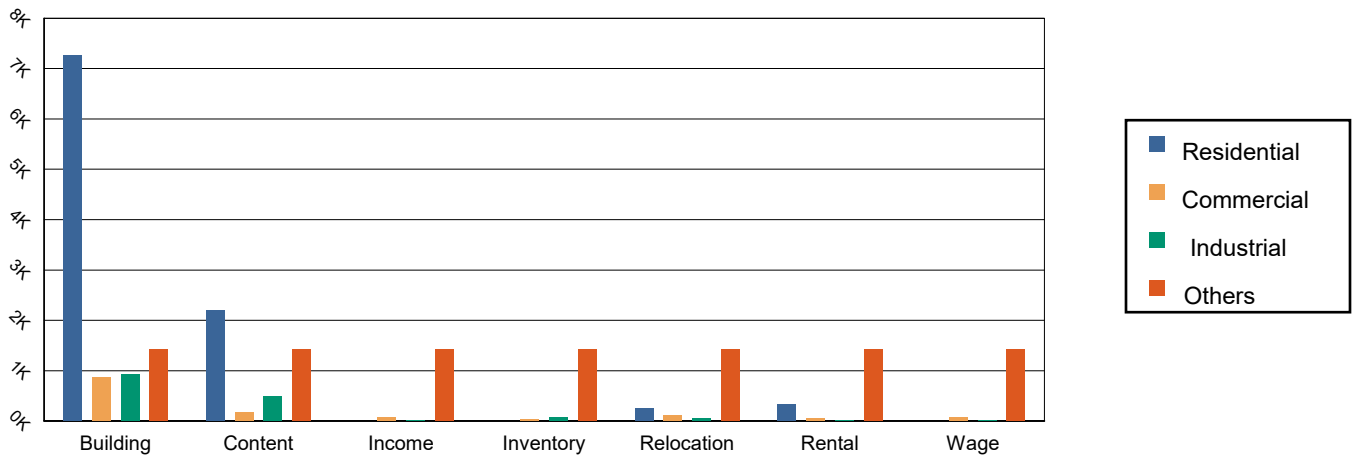


Table 5: Building-Related Economic Loss Estimates
(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	7,259.03	867.60	927.99	643.50	9,698.11
	Content	2,200.07	172.21	498.33	142.57	3,013.19
	Inventory	0.00	31.05	67.48	15.49	114.02
	Subtotal	9,459.09	1,070.86	1,493.80	801.57	12,825.32
Business Interruption Loss						
	Income	0.42	79.85	12.08	48.49	140.83
	Relocation	255.59	112.04	61.11	101.50	530.24
	Rental	322.60	46.24	9.16	6.75	384.74
	Wage	0.98	66.96	18.89	469.76	556.60
	Subtotal	579.59	305.09	101.24	626.49	1,612.41

Total

Total	10,038.68	1,375.95	1,595.04	1,428.06	14,437.73

Appendix A: County Listing for the Region

Massachusetts
- Franklin

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		Total
		Residential	Non-Residential	
Massachusetts				
Franklin	8,580	723,505	599,327	1,322,832
Total	8,580	723,505	599,327	1,322,832
Study Region Total	8,580	723,505	599,327	1,322,832



FEMA

RiskMAP
Increasing Resilience Together

Hazus: Hurricane Global Risk Report

Region Name: MontagueWind500

Hurricane Scenario: Probabilistic 1000-year Return Period

Print Date: Friday, October 24, 2025

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 31.27 square miles and contains 2 census tracts. There are over 3 thousand households in the region and a total population of 8,580 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 1,323 million dollars. Approximately 85% of the buildings (and 55% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 2,518 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 provides distribution of the building value by State and County.

Building Exposure by Occupancy Type

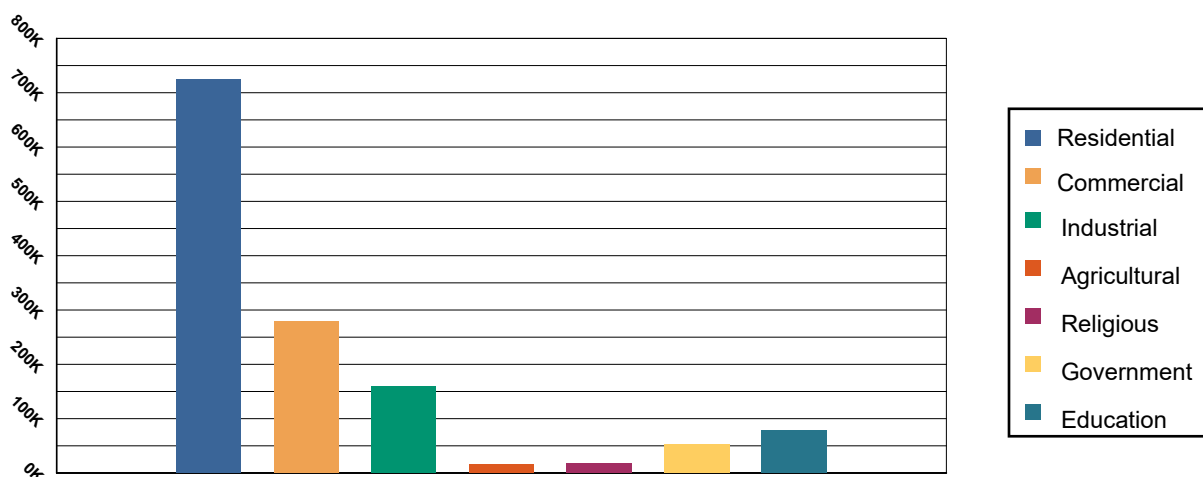


Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure (\$1000)	Percent of Tot
Residential	723,505	54.69%
Commercial	278,422	21.05%
Industrial	159,077	12.03%
Agricultural	15,014	1.13%
Religious	17,379	1.31%
Government	51,587	3.90%
Education	77,848	5.88%
Total	1,322,832	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 5 schools, 2 fire stations, 2 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 85 buildings will be at least moderately damaged. This is over 3% of the total number of buildings in the region. There are an estimated 2 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.

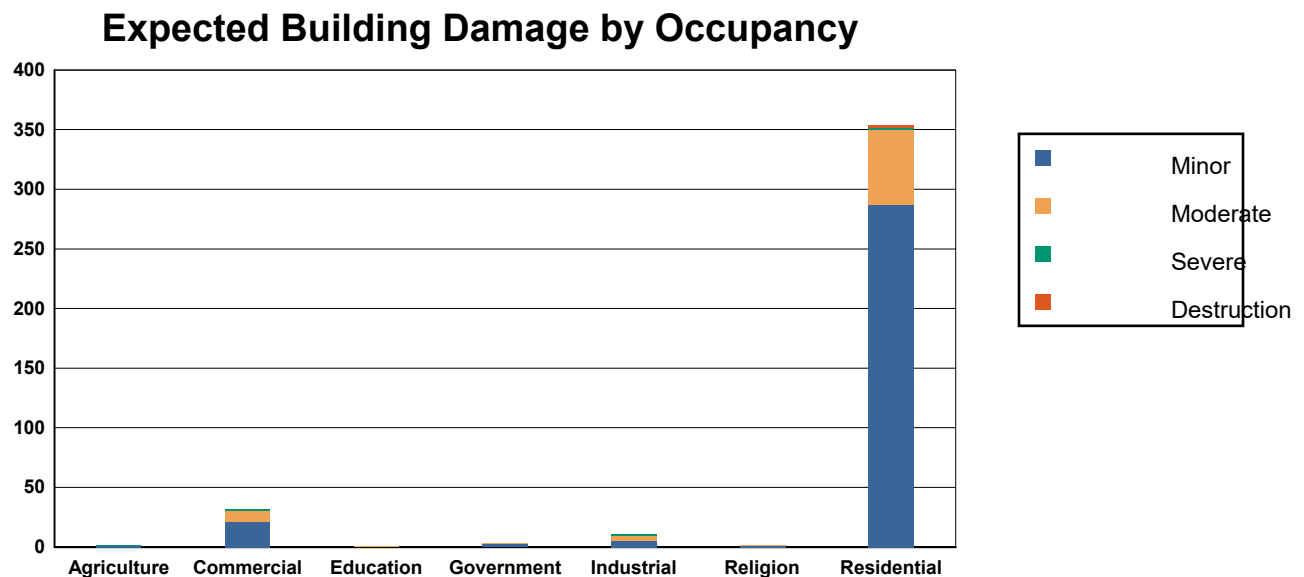


Table 2: Expected Building Damage by Occupancy : 1000 - year Event

Occupancy	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	12	87.55	1	6.99	0	3.49	0	1.85	0	0.12
Commercial	224	87.54	21	8.25	10	3.72	1	0.49	0	0.00
Education	3	82.60	0	10.39	0	6.96	0	0.06	0	0.00
Government	27	87.84	3	9.27	1	2.81	0	0.08	0	0.00
Industrial	43	79.82	5	9.05	5	8.64	1	2.43	0	0.06
Religion	11	89.77	1	8.10	0	2.03	0	0.11	0	0.00
Residential	1,794	83.54	287	13.36	63	2.95	1	0.05	2	0.10
Total	2,114		318		79		4		2	

Table 3: Expected Building Damage by Building Type : 1000 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	4	89.43	0	8.93	0	1.59	0	0.06	0	0.00
Masonry	183	86.52	21	9.87	6	2.80	2	0.74	0	0.07
MH	5	96.07	0	2.58	0	0.97	0	0.02	0	0.37
Steel	107	72.25	19	12.87	20	13.40	2	1.47	0	0.00
Wood	1,876	87.34	243	11.30	26	1.20	1	0.07	2	0.09

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

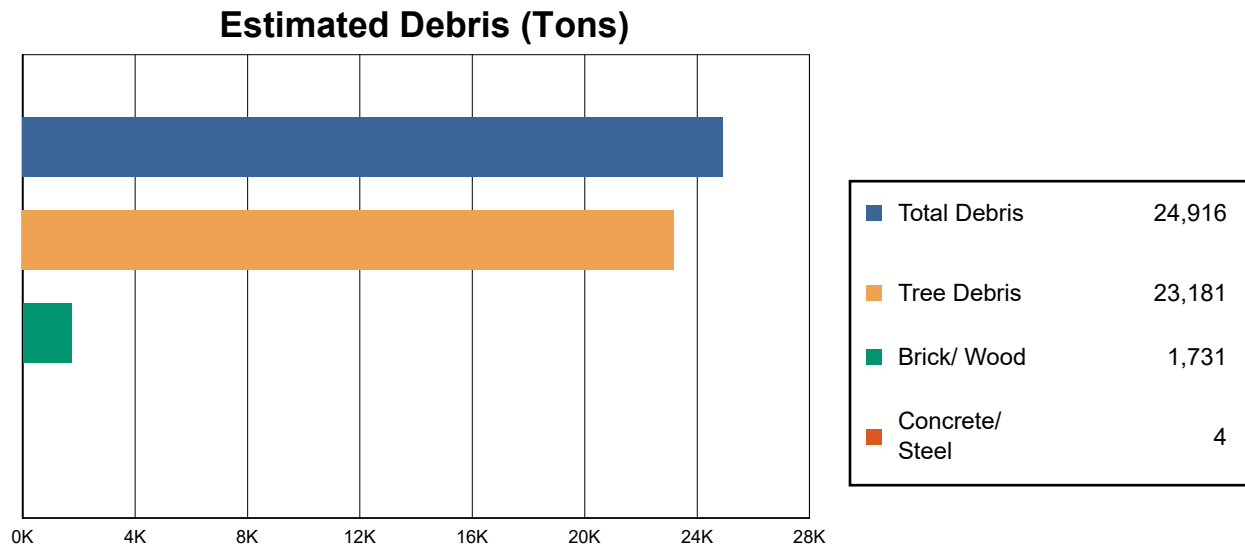


Table 4: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	Expected Loss of Use < 1 day
EOCs	2	0	0	2
Fire Stations	2	0	0	2
Police Stations	2	0	0	2
Schools	5	0	0	5

Induced Hurricane Damage

Debris Generation

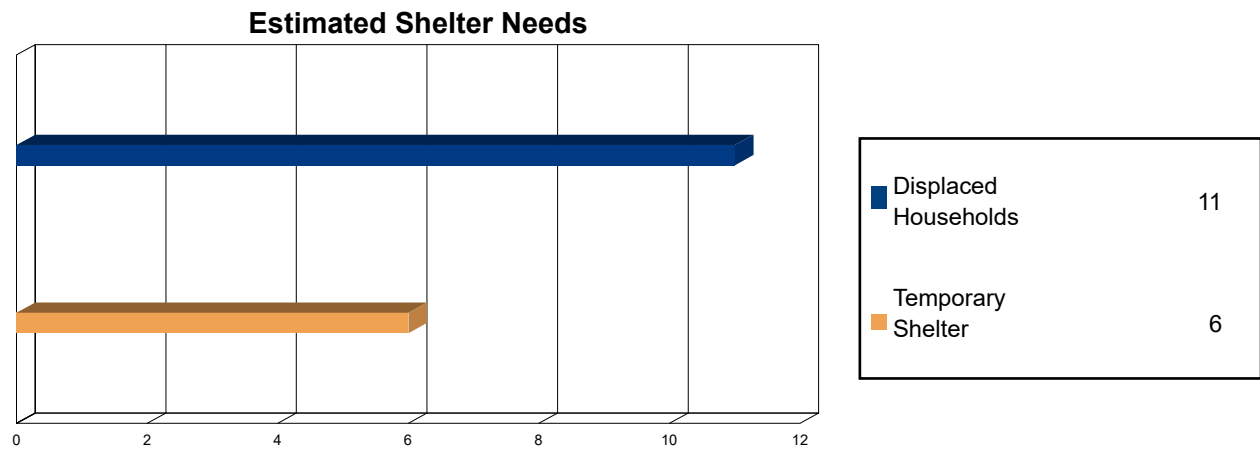


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 24,916 tons of debris will be generated. Of the total amount, 19,419 tons (78%) is Other Tree Debris. Of the remaining 5,497 tons, Brick/Wood comprises 31% 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 69 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 3,762 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 11 households to be displaced due to the hurricane. Of these, 6 people (out of a total population of 8,580) will seek temporary shelter in public shelters.

Economic Loss

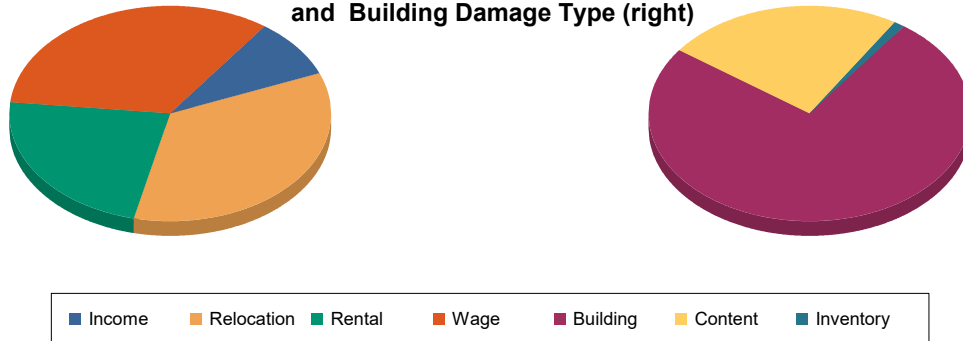
The total economic loss estimated for the hurricane is 22.3 million dollars, which represents 1.68 % of the total replacement value of the region's buildings.

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 22 million dollars. 12% 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 67% 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

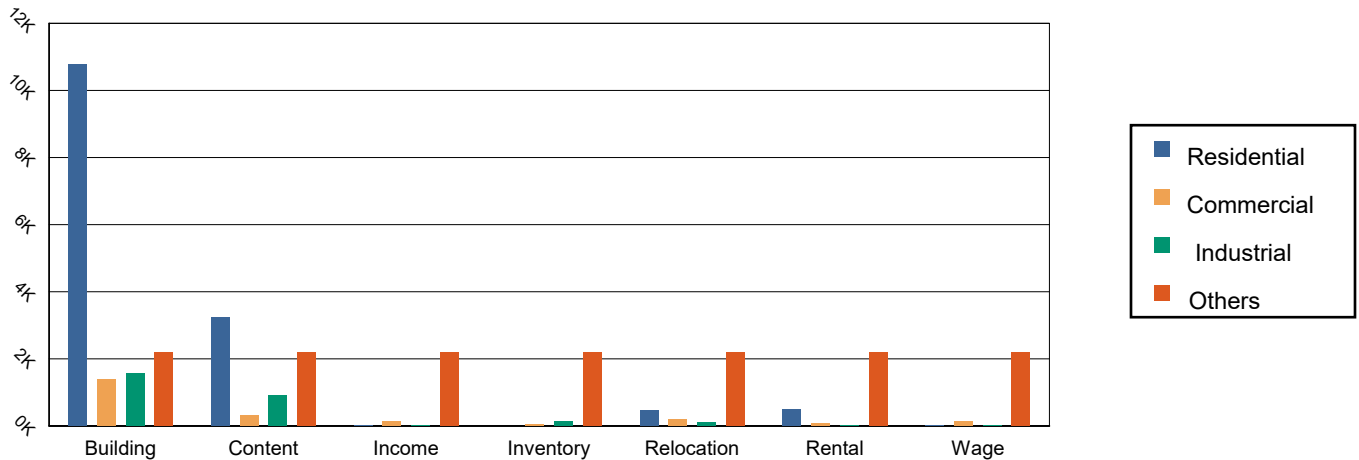


Table 5: Building-Related Economic Loss Estimates
(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	10,784.49	1,393.61	1,556.43	1,001.37	14,735.90
	Content	3,225.14	304.36	929.97	240.75	4,700.22
	Inventory	0.00	56.39	126.82	30.26	213.47
	Subtotal	14,009.63	1,754.36	2,613.22	1,272.38	19,649.59
Business Interruption Loss						
	Income	6.94	142.51	20.69	61.42	231.56
	Relocation	451.04	200.51	102.67	158.82	913.04
	Rental	483.31	89.79	16.49	12.35	601.94
	Wage	16.35	128.22	32.85	698.96	876.39
	Subtotal	957.65	561.04	172.70	931.55	2,622.93

Total

Total	14,967.27	2,315.40	2,785.92	2,203.93	22,272.52

Appendix A: County Listing for the Region

Massachusetts
- Franklin

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		Total
		Residential	Non-Residential	
Massachusetts				
Franklin	8,580	723,505	599,327	1,322,832
Total	8,580	723,505	599,327	1,322,832
Study Region Total	8,580	723,505	599,327	1,322,832

Hazus: Earthquake Global Risk Report

Region Name: Montague1500EQ

Earthquake Scenario: 1500year

Print Date: October 23, 2025

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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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 31.47 square miles and contains 2 census tracts. There are over 3 thousand households in the region which has a total population of 8,580 people. 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 1,322 (millions of dollars). Approximately 85.00 % of the buildings (and 55.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 869 and 703 (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 1,322 (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 85% 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 5 schools, 2 fire stations, 2 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 1,572.00 (millions of dollars). This inventory includes over 45.36 miles of highways, 20 bridges, 272.78 miles of pipes.

Table 1: Transportation System Lifeline Inventory

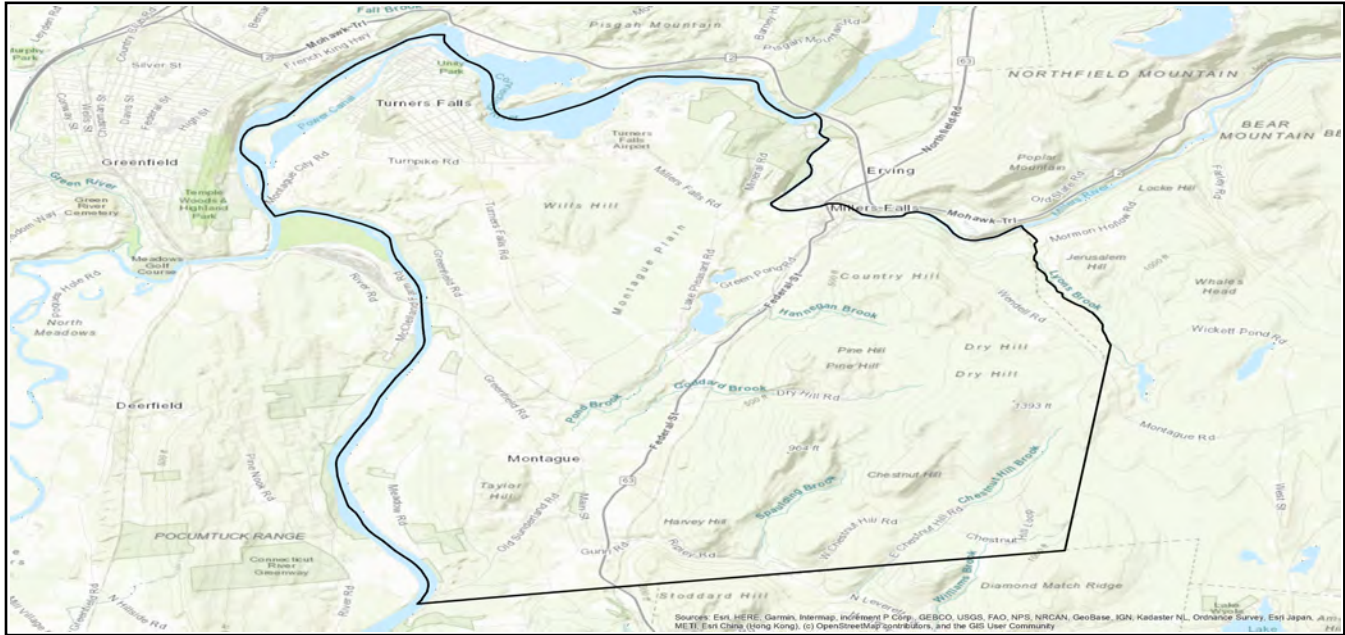
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	20	39.7251
	Segments	22	312.3068
	Tunnels	0	0.0000
	Subtotal		352.0319
Railways	Bridges	9	46.7100
	Facilities	0	0.0000
	Segments	27	462.5474
	Tunnels	0	0.0000
	Subtotal		509.2574
Light Rail	Bridges	0	0.0000
	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	1	5.3000
	Runways	1	3.2980
	Subtotal		8.5980
		Total	869.90

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	4.3993
	Facilities	0	0.0000
	Pipelines	0	0.0000
	Subtotal		4.3993
Waste Water	Distribution Lines	NA	2.6396
	Facilities	1	156.8418
	Pipelines	0	0.0000
	Subtotal		159.4814
Natural Gas	Distribution Lines	NA	1.7597
	Facilities	0	0.0000
	Pipelines	0	0.0000
	Subtotal		1.7597
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
	Subtotal		0.0000
Electrical Power	Facilities	4	537.9575
	Subtotal		537.9575
Communication	Facilities	0	0.0000
	Subtotal		0.0000
		Total	703.60

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	1500year
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	6.50
Depth (km)	NA
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	NA

Direct Earthquake Damage

Building Damage

Hazus estimates that about 15 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

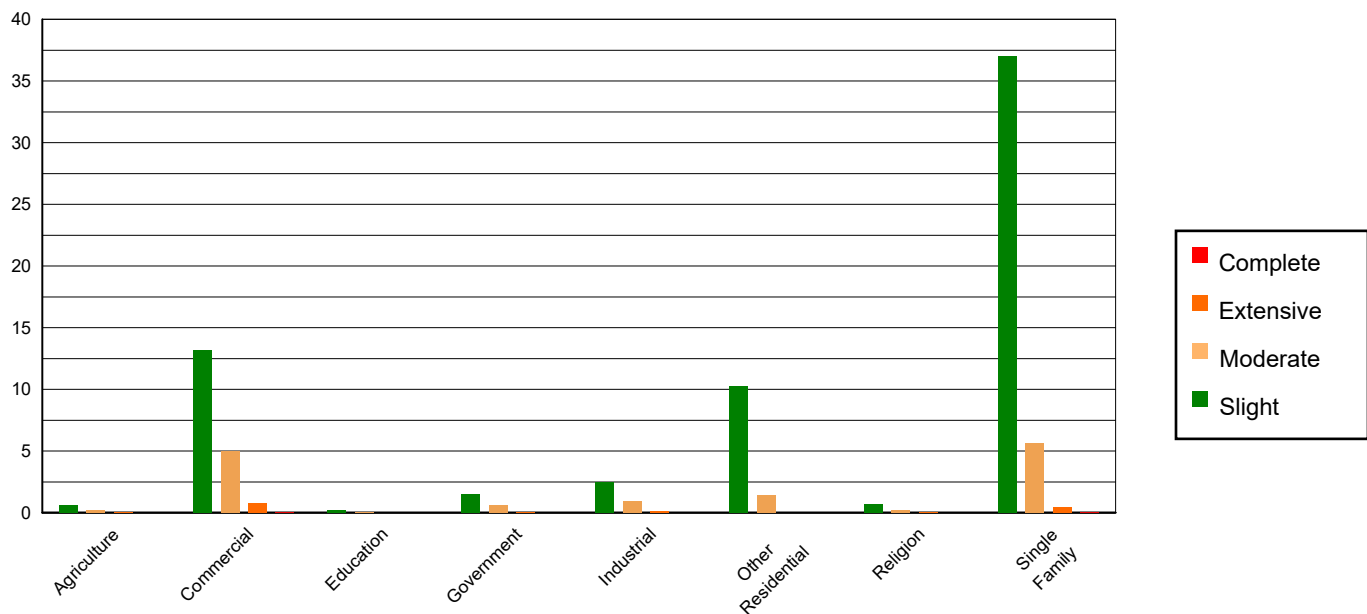


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	13.18	0.54	0.60	0.92	0.19	1.31	0.03	1.70	0.00	1.65
Commercial	236.93	9.73	13.17	19.96	5.01	35.53	0.82	50.82	0.07	50.44
Education	3.73	0.15	0.20	0.30	0.06	0.46	0.01	0.52	0.00	0.50
Government	28.81	1.18	1.51	2.29	0.58	4.11	0.09	5.69	0.01	5.38
Industrial	50.43	2.07	2.51	3.81	0.92	6.53	0.13	8.14	0.01	6.25
Other Residential	445.23	18.28	10.29	15.59	1.46	10.35	0.02	1.07	0.00	0.58
Religion	11.05	0.45	0.68	1.03	0.23	1.64	0.04	2.48	0.00	2.81
Single Family	1646.79	67.60	37.04	56.11	5.65	40.07	0.48	29.57	0.05	32.41
Total	2,436		66		14		2		0	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	2100.89	86.24	42.90	65.00	4.07	28.83	0.00	0.00	0.00	0.00
Steel	142.11	5.83	5.00	7.57	1.71	12.10	0.11	7.13	0.00	0.00
Concrete	2.72	0.11	0.11	0.17	0.04	0.25	0.00	0.09	0.00	0.00
Precast	1.93	0.08	0.13	0.20	0.09	0.65	0.02	1.17	0.00	0.00
RM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
URM	184.74	7.58	17.69	26.80	8.14	57.68	1.47	91.39	0.14	100.00
MH	3.75	0.15	0.18	0.27	0.07	0.49	0.00	0.22	0.00	0.00
Total	2,436		66		14		2		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	5	0	0	5
EOCs	2	0	0	2
PoliceStations	2	0	0	2
FireStations	2	0	0	2

Transportation Lifeline Damage

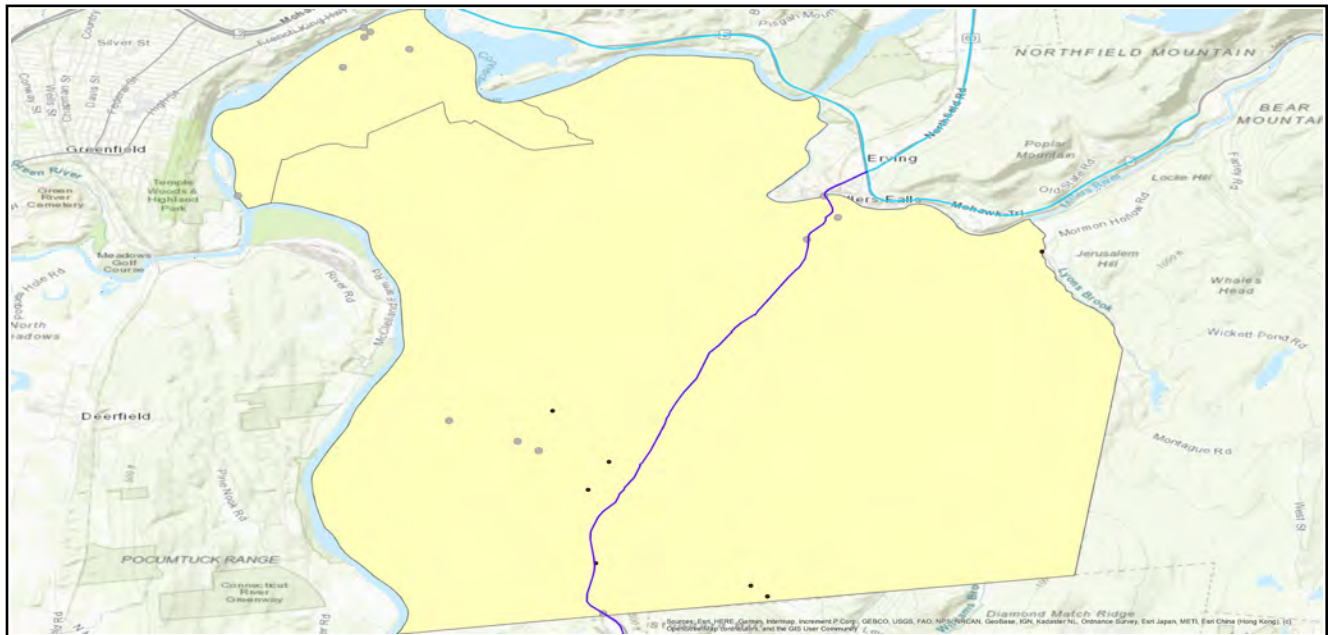


Table 6: Expected Damage to the Transportation Systems

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	22	0	0	11	11
	Bridges	20	0	0	20	20
	Tunnels	0	0	0	0	0
Railways	Segments	27	0	0	27	27
	Bridges	9	0	0	9	9
	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	1	0	0	1	1
	Runways	1	0	0	1	1

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	1	0	0	1	1
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	4	0	0	4	4
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	137	1	0
Waste Water	82	0	0
Natural Gas	55	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	3,892	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

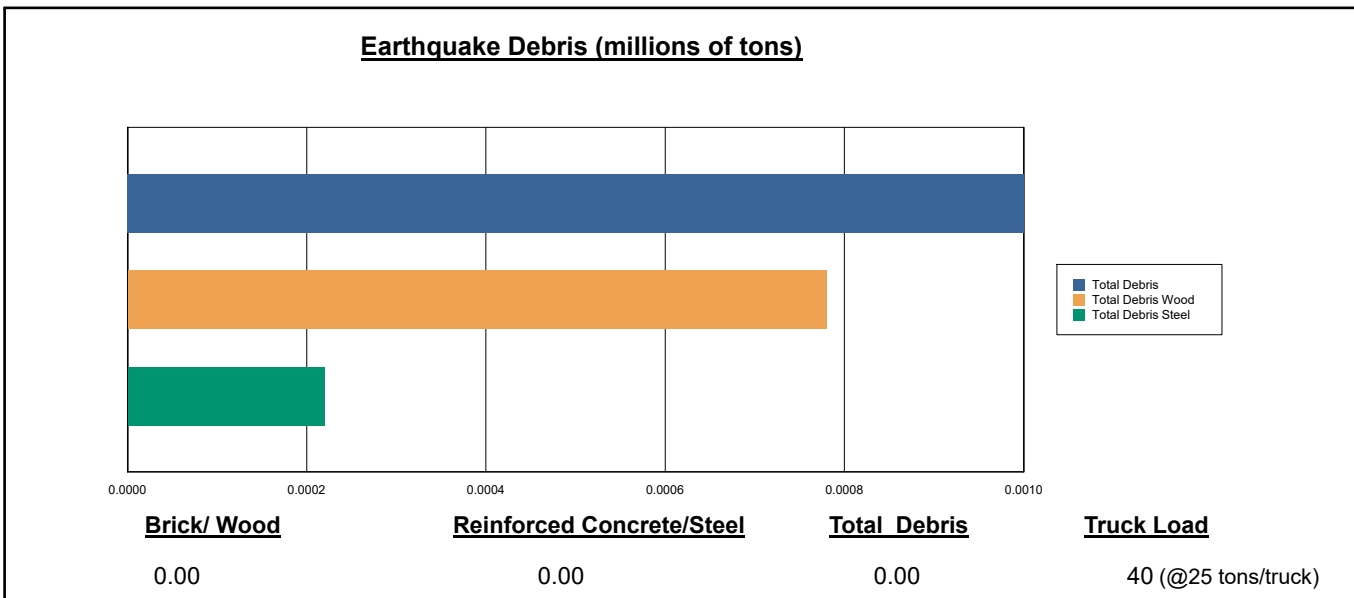
Fire Following Earthquake

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 78.00% 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.



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 0 households to be displaced due to the earthquake. Of these, 0 people (out of a total population of 8,580) will seek temporary shelter in public shelters.

Displaced Households/ Persons Seeking Short Term Public Shelter

Displaced households
as a result of the
earthquake

0

Persons seeking
temporary public shelter

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	0.01	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	0.07	0.00	0.00	0.00
	Single Family	0.14	0.01	0.00	0.00
	Total	0	0	0	0
2 PM	Commercial	0.65	0.09	0.01	0.01
	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	0.07	0.01	0.00	0.00
	Other-Residential	0.02	0.00	0.00	0.00
	Single Family	0.04	0.00	0.00	0.00
	Total	1	0	0	0
5 PM	Commercial	0.48	0.07	0.01	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	0.05	0.01	0.00	0.00
	Other-Residential	0.03	0.00	0.00	0.00
	Single Family	0.05	0.01	0.00	0.00
	Total	1	0	0	0

Economic Loss

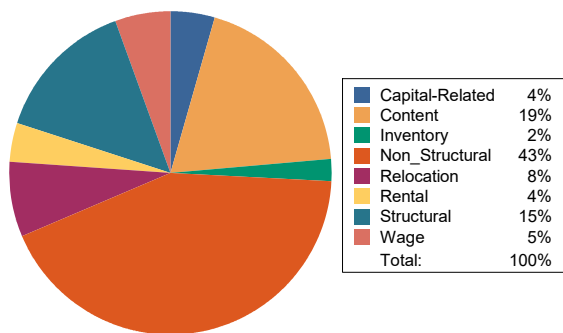
The total economic loss estimated for the earthquake is 28.32 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

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 4.48 (millions of dollars); 21 % 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 29 % 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)

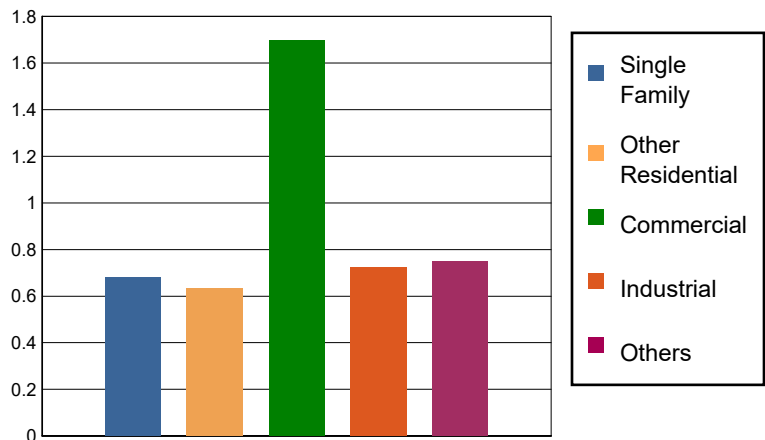


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.0021	0.1796	0.0174	0.0450	0.2441
	Capital-Related	0.0000	0.0009	0.1765	0.0104	0.0060	0.1938
	Rental	0.0121	0.0214	0.1127	0.0081	0.0193	0.1736
	Relocation	0.0405	0.0127	0.1528	0.0357	0.1009	0.3426
	Subtotal	0.0526	0.0371	0.6216	0.0716	0.1712	0.9541
Capital Stock Losses							
	Structural	0.0883	0.0421	0.2766	0.1135	0.1305	0.6510
	Non_Structural	0.4032	0.4278	0.5045	0.2983	0.2820	1.9158
	Content	0.1379	0.1265	0.2488	0.2041	0.1510	0.8683
	Inventory	0.0000	0.0000	0.0467	0.0345	0.0121	0.0933
	Subtotal	0.6294	0.5964	1.0766	0.6504	0.5756	3.5284
	Total	0.68	0.63	1.70	0.72	0.75	4.48

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	312.3068	0.0000	0.00
	Bridges	39.7251	0.0002	0.00
	Tunnels	0.0000	0.0000	0.00
	Subtotal	352.0319	0.0002	
Railways	Segments	462.5474	0.0000	0.00
	Bridges	46.7100	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	509.2574	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	5.3000	0.2183	4.12
	Runways	3.2980	0.0000	0.00
	Subtotal	8.5980	0.2183	
	Total	869.89	0.22	

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	4.3993	0.0026	0.06
	Subtotal	4.3993	0.0026	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	156.8418	1.1457	0.73
	Distribution Lines	2.6396	0.0013	0.05
	Subtotal	159.4814	1.1470	
Natural Gas	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	1.7597	0.0005	0.03
	Subtotal	1.7597	0.0005	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	0.0000	0.0000	
Electrical Power	Facilities	537.9575	22.4700	4.18
	Subtotal	537.9575	22.4700	
Communication	Facilities	0.0000	0.0000	0.00
	Subtotal	0.0000	0.0000	
	Total	703.60	23.62	

Appendix A: County Listing for the Region

Franklin, MA

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Massachusetts	Franklin	8,580	723	599	1,322
Total Region		8,580	723	599	1,322

Hazus: Earthquake Global Risk Report

Region Name: Montague2500EQ

Earthquake Scenario: 2500year

Print Date: October 23, 2025

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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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 31.47 square miles and contains 2 census tracts. There are over 3 thousand households in the region which has a total population of 8,580 people. 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 1,322 (millions of dollars). Approximately 85.00 % of the buildings (and 55.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 869 and 703 (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 1,322 (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 85% 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 5 schools, 2 fire stations, 2 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 1,572.00 (millions of dollars). This inventory includes over 45.36 miles of highways, 20 bridges, 272.78 miles of pipes.

Table 1: Transportation System Lifeline Inventory

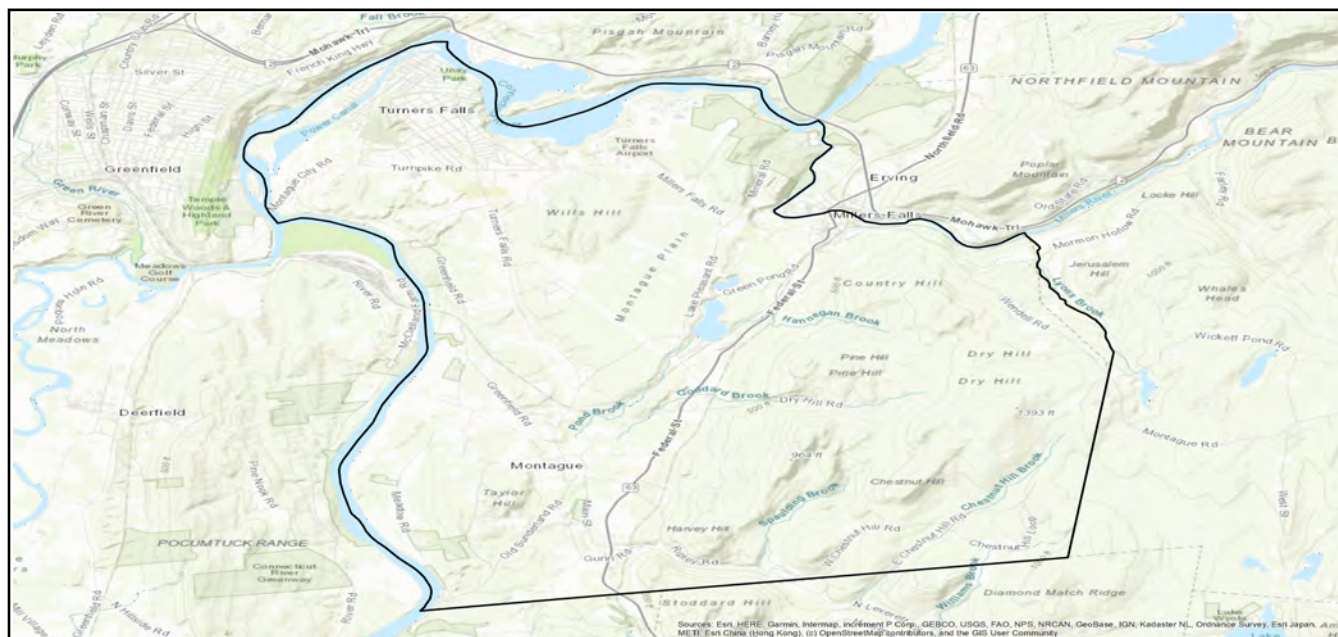
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	20	39.7251
	Segments	22	312.3068
	Tunnels	0	0.0000
	Subtotal		352.0319
Railways	Bridges	9	46.7100
	Facilities	0	0.0000
	Segments	27	462.5474
	Tunnels	0	0.0000
	Subtotal		509.2574
Light Rail	Bridges	0	0.0000
	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	1	5.3000
	Runways	1	3.2980
	Subtotal		8.5980
Total			869.90

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	4.3993
	Facilities	0	0.0000
	Pipelines	0	0.0000
	Subtotal		4.3993
Waste Water	Distribution Lines	NA	2.6396
	Facilities	1	156.8418
	Pipelines	0	0.0000
	Subtotal		159.4814
Natural Gas	Distribution Lines	NA	1.7597
	Facilities	0	0.0000
	Pipelines	0	0.0000
	Subtotal		1.7597
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
	Subtotal		0.0000
Electrical Power	Facilities	4	537.9575
	Subtotal		537.9575
Communication	Facilities	0	0.0000
	Subtotal		0.0000
		Total	703.60

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	2500year
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	6.50
Depth (km)	NA
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	NA

Direct Earthquake Damage

Building Damage

Hazus estimates that about 28 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

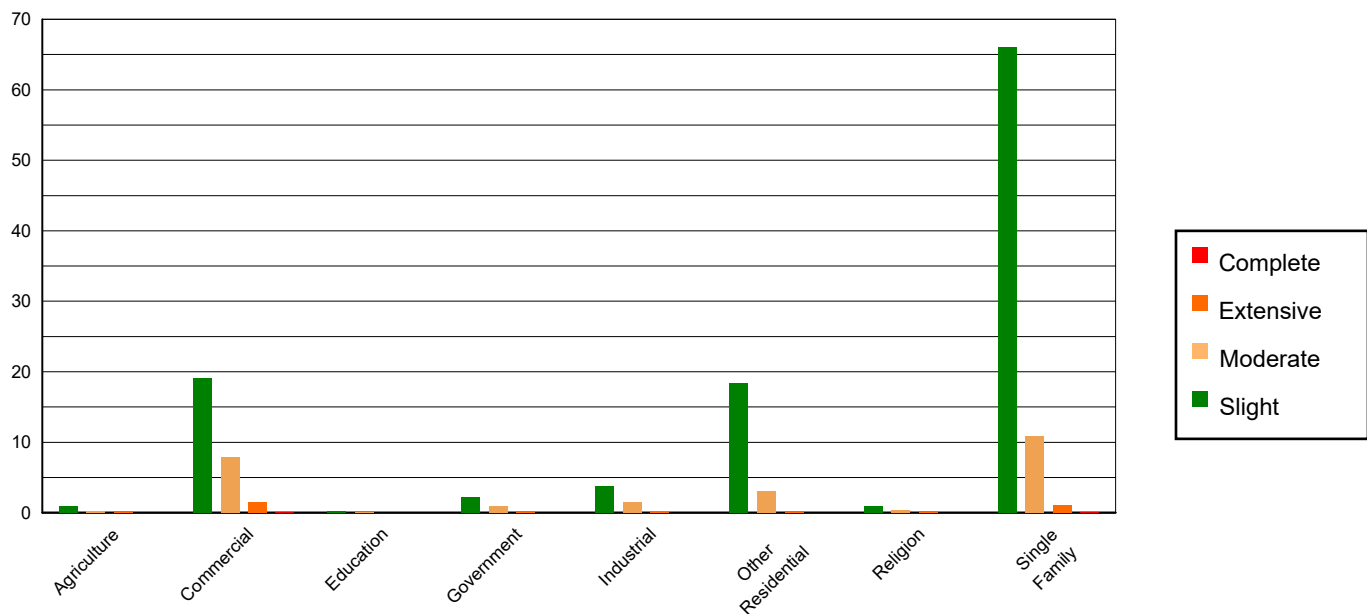


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	12.73	0.54	0.91	0.82	0.30	1.20	0.05	1.58	0.01	1.63
Commercial	227.30	9.56	19.14	17.13	7.94	31.62	1.46	46.19	0.16	50.49
Education	3.59	0.15	0.29	0.26	0.11	0.42	0.02	0.49	0.00	0.50
Government	27.65	1.16	2.22	1.99	0.94	3.74	0.17	5.24	0.02	5.47
Industrial	48.47	2.04	3.73	3.34	1.53	6.09	0.25	7.82	0.02	6.20
Other Residential	435.37	18.31	18.40	16.47	3.11	12.39	0.11	3.54	0.00	0.57
Religion	10.59	0.45	0.98	0.87	0.36	1.43	0.07	2.18	0.01	2.77
Single Family	1611.98	67.80	66.04	59.12	10.83	43.11	1.04	32.95	0.10	32.36
Total	2,378		112		25		3		0	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	2059.05	86.60	79.30	70.99	9.22	36.69	0.29	9.18	0.00	0.00
Steel	137.54	5.78	7.87	7.04	3.25	12.96	0.27	8.49	0.00	0.06
Concrete	2.61	0.11	0.18	0.16	0.07	0.29	0.00	0.13	0.00	0.00
Precast	1.82	0.08	0.18	0.16	0.14	0.56	0.03	1.07	0.00	0.07
RM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
URM	173.09	7.28	23.90	21.39	12.31	49.00	2.56	80.86	0.32	99.87
MH	3.58	0.15	0.29	0.26	0.13	0.50	0.01	0.28	0.00	0.00
Total	2,378		112		25		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	5	0	0	5
EOCs	2	0	0	2
PoliceStations	2	0	0	2
FireStations	2	0	0	2

Transportation Lifeline Damage

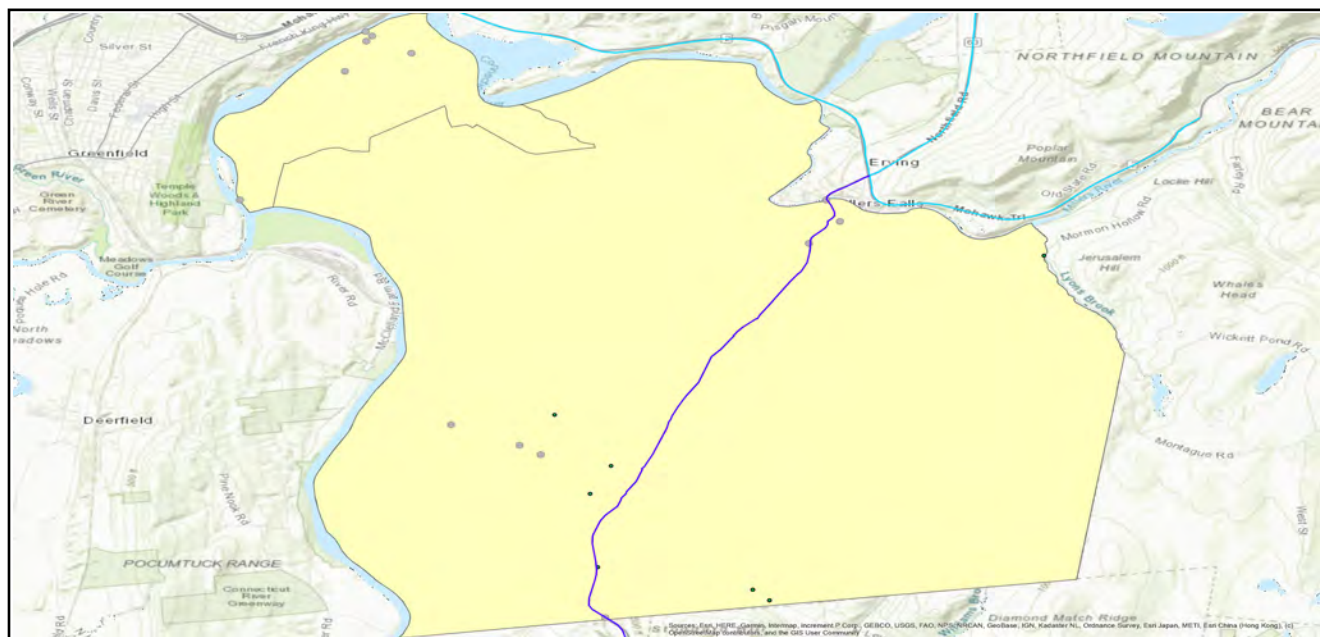


Table 6: Expected Damage to the Transportation Systems

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	22	0	0	11	11
	Bridges	20	0	0	20	20
	Tunnels	0	0	0	0	0
Railways	Segments	27	0	0	27	27
	Bridges	9	0	0	9	9
	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	1	0	0	1	1
	Runways	1	0	0	1	1

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	1	0	0	1	1
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	4	0	0	4	4
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	137	1	0
Waste Water	82	1	0
Natural Gas	55	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	3,892	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

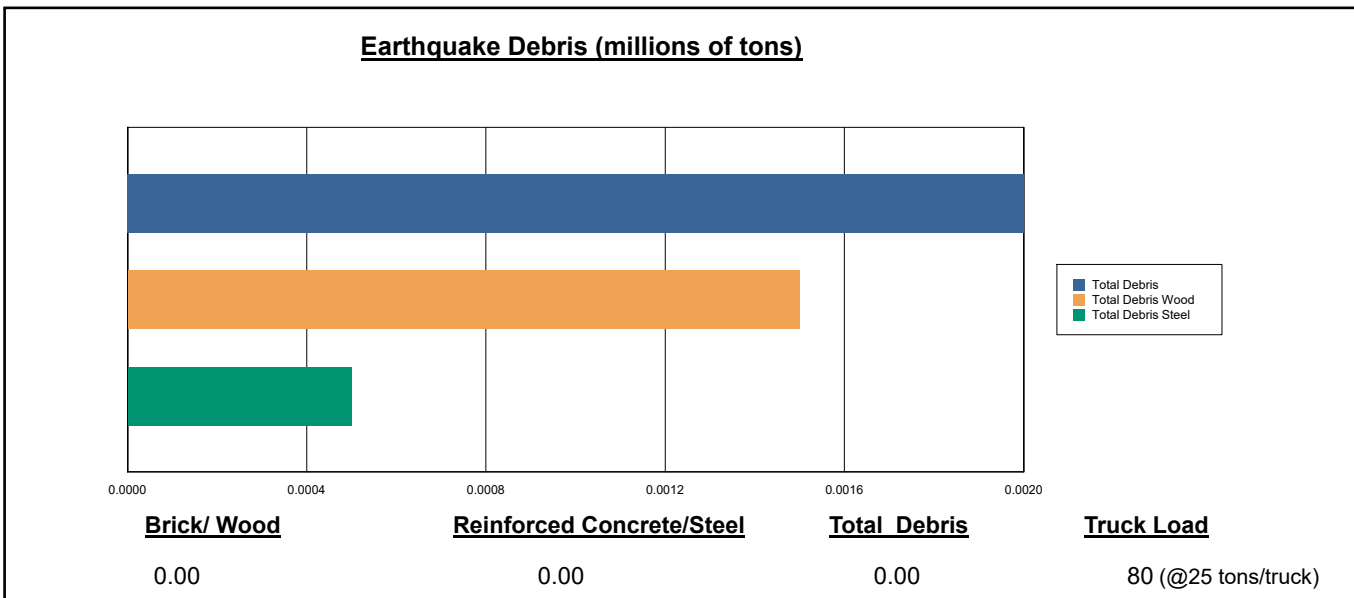
Fire Following Earthquake

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 2,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 75.00% 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 80 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.



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 0 households to be displaced due to the earthquake. Of these, 0 people (out of a total population of 8,580) will seek temporary shelter in public shelters.

Displaced Households/ Persons Seeking Short Term Public Shelter

Displaced households
as a result of the
earthquake

0

Persons seeking
temporary public shelter

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	0.02	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	0.02	0.00	0.00	0.00
	Other-Residential	0.14	0.01	0.00	0.00
	Single Family	0.27	0.03	0.00	0.00
	Total	0	0	0	0
2 PM	Commercial	1.14	0.18	0.02	0.03
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.22	0.03	0.00	0.01
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.13	0.02	0.00	0.00
	Other-Residential	0.04	0.00	0.00	0.00
	Single Family	0.08	0.01	0.00	0.00
	Total	2	0	0	0
5 PM	Commercial	0.84	0.13	0.01	0.03
	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	0.08	0.01	0.00	0.00
	Other-Residential	0.05	0.00	0.00	0.00
	Single Family	0.10	0.01	0.00	0.00
	Total	1	0	0	0

Economic Loss

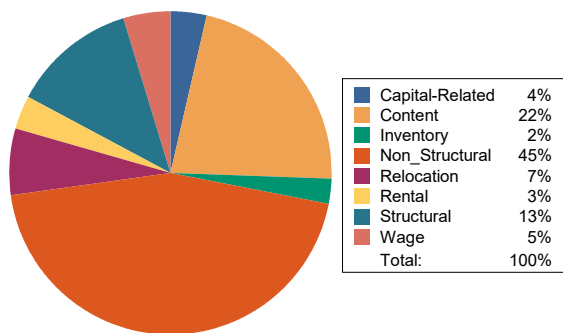
The total economic loss estimated for the earthquake is 58.67 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

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 8.94 (millions of dollars); 18 % 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 31 % 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)

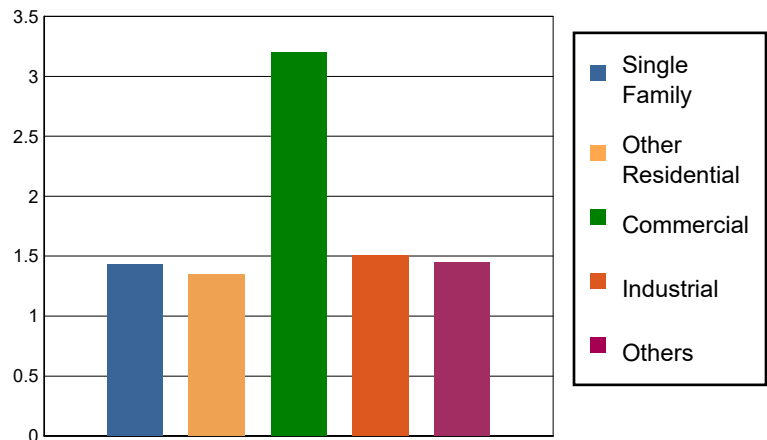


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.0057	0.3016	0.0296	0.0755	0.4124
	Capital-Related	0.0000	0.0024	0.2942	0.0178	0.0098	0.3242
	Rental	0.0237	0.0457	0.1843	0.0137	0.0322	0.2996
	Relocation	0.0799	0.0287	0.2558	0.0607	0.1717	0.5968
	Subtotal	0.1036	0.0825	1.0359	0.1218	0.2892	1.6330
Capital Stock Losses							
	Structural	0.1683	0.0831	0.4650	0.1907	0.2195	1.1266
	Non_Structural	0.8418	0.9020	1.0320	0.6512	0.5710	3.9980
	Content	0.3155	0.2821	0.5647	0.4642	0.3423	1.9688
	Inventory	0.0000	0.0000	0.1058	0.0785	0.0281	0.2124
	Subtotal	1.3256	1.2672	2.1675	1.3846	1.1609	7.3058
	Total	1.43	1.35	3.20	1.51	1.45	8.94

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	312.3068	0.0000	0.00
	Bridges	39.7251	0.0009	0.00
	Tunnels	0.0000	0.0000	0.00
	Subtotal	352.0319	0.0009	
Railways	Segments	462.5474	0.0000	0.00
	Bridges	46.7100	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	509.2574	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	5.3000	0.3382	6.38
	Runways	3.2980	0.0000	0.00
	Subtotal	8.5980	0.3382	
	Total	869.89	0.34	

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	4.3993	0.0052	0.12
	Subtotal	4.3993	0.0052	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	156.8418	2.5879	1.65
	Distribution Lines	2.6396	0.0026	0.10
	Subtotal	159.4814	2.5905	
Natural Gas	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	1.7597	0.0009	0.05
	Subtotal	1.7597	0.0009	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	0.0000	0.0000	
Electrical Power	Facilities	537.9575	46.7943	8.70
	Subtotal	537.9575	46.7943	
Communication	Facilities	0.0000	0.0000	0.00
	Subtotal	0.0000	0.0000	
	Total	703.60	49.39	

Appendix A: County Listing for the Region

Franklin, MA

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Massachusetts	Franklin	8,580	723	599	1,322
Total Region		8,580	723	599	1,322