TOWN OF WILLIAMSTOWN, MA HAZARD MITIGATION PLAN UPDATE

MARCH 2025

Town of Williamstown
31 North Street
Williamstown, MA 01267

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https://williamstownma.gov/

Prepared by:

JAMIE CAPLAN CONSULTING LLC
Emergency Management Services

351 Pleasant Street, Suite B # 208 · Northampton, MA 01060
Phone: 413-586-0867 · Fax: 413-727-8282 · www.jamiecaplan.com

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Acknowledgements

The Town of Williamstown would like to thank the following people for supporting the development of this plan. This group was considered the Hazard Mitigation Planning Committee (HMPC) throughout the planning process.

- Mina Amundsen, Director of Planning / Construction, Williams College
- Jamie Art, General Counsel, Williams College
- Peter Beck, Planning Board Chair, Town of Williamstown
- Joe Bergeron, Acting Superintendent, Mount Greylock School District
- Susan Briggs, Executive Director of Chamber of Commerce, Town of Williamstown
- Chuck Chandler, Police Department/Accreditation Manager, Town of Williamstown
- Craig Clough, Director of Public Works, Town of Williamstown
- Ryan Contenta, Building Commissioner, Town of Williamstown
- Joanne DeRose, Director, Community & Customer Management, Western MA, National Grid
- Andrew Groff, Director of Community Development, Town of Williamstown
- CJ Hoss, Community Planning Program Director, Berkshire Regional Planning Commission
- Robert (Bob) Ide, Community Manager, National Grid
- Phil McKnight, Conservation Commission, Chair, Town of Williamstown
- Robert Menicocci, Town Manager, Town of Williamstown
- Brian O'Grady, Council on Aging, Town of Williamstown
- Craig Pedercini, Fire Chief, Williamstown Fire District
- Bill Powers, Director of Facilities, Clark Art Institute
- Gina Puc, Community Relations, Williams College
- Ruth Russell, Health Inspector, Town of Williamstown
- Robin Sher, Clark Art Finance and Operations Director, Clark Art Institute
- Alison Warner, Campus Safety Chief, Williams College
- Rob Winuk, Director Of Facilities, Mount Greylock School District
- Mike Ziemba, Police Chief, Town of Williamstown
- Jeff Zukowski, Hazard Mitigation Planner, Massachusetts Emergency Management Agency

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

Local Adoption Resolution

TOWN OF WILLIAMSTOWN, MASSACHUSETTS
SELECT BOARD
A RESOLUTION ADOPTING THE
TOWN OF WILLIAMSTOWN, MA HAZARD MITIGATION PLAN UPDATE
RESOLUTION NO. ___________

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

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

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

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

Section 1. In accordance with M.G.L. c. 40, the Town of Williamstown Select Board adopts the TOWN OF WILLIAMSTOWN, MA HAZARD MITIGATION PLAN UPDATE. While content related to the Town of Williamstown may require revisions to meet the plan approval requirements, changes occurring after adoption will not require Town of Williamstown 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: ___________________________________ Jane Patton

By: ___________________________________ Randal Fippinger

By: ___________________________________ Jeff Johnson

By: ___________________________________ Stephanie Boyd

By: ___________________________________ Mathew Neely

APPROVED AS TO FORM:

By: ___________________________________ Robert Menicocci, Town Manager

Record of Changes

This Town of Williamstown, 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 Williamstown, Massachusetts created this plan as part of an ongoing effort to reduce the negative impacts and costs from damages associated with natural hazards, such as nor’easters, floods, and hurricanes. This plan meets the requirements of the Disaster Mitigation Act 2000. More importantly, the plan was created to reduce loss of life, land, and property due to natural hazards that affect the Town of Williamstown. 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 Williamstown 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 Williamstown and the surrounding communities. Throughout the development of the plan, the Hazard Mitigation Planning Committee (HMPC) consulted the public and key stakeholders for input regarding identified goals, mitigation actions, risk assessment, and mitigation implementation strategy. A sample of key stakeholders who

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[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), Williams College, and National Grid.

Guiding Principles for Plan Development

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

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

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

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

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

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

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

The HMPC identified the following list of hazards to profile:

- Average/Extreme Temperatures
- Changes in Groundwater (Covered in Flooding and Drought Sections)
- Drought
- Earthquakes
- Flooding from Precipitation and Dam Overtopping
- Hurricanes/Tropical Storms

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

- Invasive Species
- Landslides
- Other Severe Weather
- Severe Winter Storms
- Tornadoes
- Wildfires and Brush Fires

Mitigation Strategy

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

The hazard mitigation strategy is the culmination of work presented in the Planning Area Profile (Chapter 2), Risk Assessment (Chapter 4), and Capability Assessment (Chapter 5). It is also the result of multiple meetings and sustained public outreach. The HMPC developed the goals shown below. The goals from the previous Town of Williamstown Hazard Mitigation Plan Update 2019 and the Williamstown Municipal Vulnerability Preparedness 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 Williamstown.

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

Save Lives and Property
- Reduce risk to life and property from natural hazards and climate change to support a dynamic, inclusive, sustainable, and resilient community.

Local Plans and Regulations
- Develop plans and policies that support the Town's growth and hazard mitigation capacity through regulations, planning, and collaboration at the regional level.

Building and Infrastructure Projects
- Implement projects focused on buildings and infrastructure to mitigate risks from natural hazards, support climate change adaptation.

Natural and Cultural Resources
- Implement actions that create environmental sustainability and support cultural resources to increase resilience to natural hazards and climate change.

Outreach and Education
- Expand education and awareness programs for Town residents and employees to support the implementation of hazard mitigation and climate adaptation efforts in municipal operations, businesses, and homes.

Figure 1. Williamstown Goal Statements.

Land Use and Development

Changes in Development

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

Williamstown has not seen many changes in development since the last plan update in 2019. This is primarily due to the general lack of population growth driving new construction and economic development in the community. According to the U.S. Census Bureau Williamstown's population has been slowly but steadily decreasing over recent years, and this trend of limited growth is expected to continue. Current population projections from the UMass Donahue Institute estimate that Williamstown's population will decline by nearly 500 people (approximately 6 percent) by the year 2050.

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

New development of residential, commercial, and industrial uses is also fairly constrained in Williamstown due to the topography and physical characteristics of the land, in combination with the permanent protections in place by a variety of landowners. The steep valleys and deep ravines of the area are a key defining feature, with the Taconic Mountain Range, the Mount Greylock complex, and the foothills of the Green Mountains bordering the town. These steep slopes with thin, erodible soils have historically confined development and agriculture to the narrow river valleys of Williamstown. In addition, nearly 40 percent of the Town is considered to have a high degree of permanent protection from development. Most of these areas are owned by the Commonwealth with various departments managing the lands and maintaining them in their natural state, with other parcels protected through ownership by the Town or local land trusts in addition to deed restrictions for conservation or agricultural preservation. This includes the majority of the Hoosic River floodplain, which over the past 20 years has become publicly owned with preventions on any floodplain development.

These development constraints, coupled with relatively low growth and development pressures, have helped the Town avoid development in environmentally sensitive or hazard-prone areas and other changes that could increase its vulnerability to natural hazards. Many of the Town's undeveloped, hazard-prone areas are further protected by its strong planning and regulatory framework. As stated in its new comprehensive plan, Envisioning Williamstown 2035, the Town's "thoughtful land use planning and land protection policies balance environmental values with the growing housing needs of our community." As further described in Chapter 5 (Capability Assessment), new or improved development in Williamstown is managed through the Town's enforcement of its zoning bylaw, building codes, and other regulatory standards. Local administration of these regulations includes special permit and site plan review procedures that ensure development projects address risk reduction through various provisions such as stormwater and floodplain management, erosion control, and restrictions on the development of steep slopes.

Since 2019, only one building permit has been issued for development in a possible hazard area, located at 330 Cole Avenue. This development created a 42-unit affordable housing complex that is partially located in a 500-year floodplain (moderate risk flood zone) abutting the Hoosic River. The project's designers were very cognizant of the flood potential of the site and incorporated higher standards for resilient design, including elevating residences a foot higher than the 500-year flood elevations. Other developments of concern included some large lot estates which, although not located in flood hazard areas, may become inaccessible during future flood events due to roadway overtopping. Residents of these structures are not considered vulnerable populations but will continue to be included in public outreach efforts related to increasing risk awareness and emergency preparedness activities.

In terms of positive changes in development that have resulted in a decrease in hazard vulnerability, Williams College completed the development of a new Williams Inn at the foot of Spring Street. This project included the replacement of the Christmas Brook culvert that drains the entire downtown area.

The new culvert is now sized to accommodate a storm event that slightly larger than a 100-year flood, increasing the conveyance of stormwater generated from heavy precipitation events.

In summary, no major development changes over the past five years have affected Williamstown's overall vulnerability, and there are no proposed or planned development projects that have been determined to increase the risks and vulnerabilities of the community to natural hazards. However, as described in Chapter 4 (Risk Assessment), it is anticipated that climate change and projected future conditions will increase the threats posed by multiple hazards. Among the greatest concerns for Williamstown is the expected increase in the frequency and/or severity of flooding caused by extreme rainfall events and ice or snow melt, along with other severe weather events. Increasing risks associated with these hazards could result in more frequent and/or more severe impacts on the community and especially those populations considered to be more vulnerable to their effects as described in Chapter 4.

Progress in Mitigation Efforts

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

Priorities in the Town of Williamstown have shifted toward diversity, equity, and inclusion (DEI), ensuring that government employees receive training and that Town policies are evaluated through an equity lens. Significant efforts have been made to improve infrastructure including investments in road repairs, sewer and water infrastructure improvements, and energy efficiency efforts. The Town expanded the number of affordable housing units. Overall, the above actions reflect a priority in greater social equity, infrastructure resilience, and community engagement.

The status of each mitigation action from the Town's 2019 Multi-Hazard Mitigation Plan Update is included in Chapter 6 (Mitigation Strategy). The text in this chapter includes a designation of Completed, Completed & To Be Continued, Partially Completed/In Progress, Delayed, or Cancelled with a corresponding description. In addition, if the mitigation action has moved forward to this Plan's list of actions that is included.

The Town's 2019 Multi-Hazard Mitigation Plan Update concepts were integrated throughout Town plans developed since 2019 including the following plans:

- Envisioning Williamstown 2035 (2023)
- Williamstown Cares Final Report (2023)
- Williamstown Annual Report 2023
- Williamstown Water Quality Report 2023

- Housing Needs Assessment 2022
- Recommendations for Enhancements to Williamstown's Parks and Recreation Offerings 2022
- Williamstown Open Space and Recreation Plan, 2024

The Town also continues to review and occasionally update its regulations and procedures that can help reduce natural hazard risks. This includes the administration of zoning regulations, building codes, and special permit and site plan review procedures that ensure new or improved development projects address risk reduction through various provisions such as stormwater and floodplain management, erosion control, and the prohibition of residential development on steep slopes. Including mitigation principles into the above list of plans and into Town policies and budget processes illustrates how the Town has leveraged hazard mitigation concepts of reducing risk and increasing resilience from their 2019 Multi-Hazard Mitigation Plan Update.

Authority and Assurances

The Town of Williamstown 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 Grants[10].
- 44 CFR Part 206 Subpart N. Hazard Mitigation Grant Program.

Plan Adoption

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

Document Overview

Below is a summary of the Town of Williamstown, 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 Williamstown, 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 Williamstown 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 Town's ability to mitigate risk prior to and following disaster. This chapter is structured around the following four categories: planning and regulatory, administrative, and technical, financial, as well as education and outreach. The chapter concludes with information regarding the National Flood Insurance Program (NFIP).

Chapter 6: Mitigation Strategy
This chapter provides a blueprint for reducing losses identified in the Risk Assessment. The chapter presents the hazard mitigation goals and identifies mitigation actions in priority groupings. Each mitigation action includes essential details, such as Town lead, potential funding sources, and implementation timeframe.

Chapter 7: Plan Implementation and Maintenance
The Plan Implementation and Maintenance establishes a system and mechanism for periodically monitoring, evaluating, and updating the Town of Williamstown 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

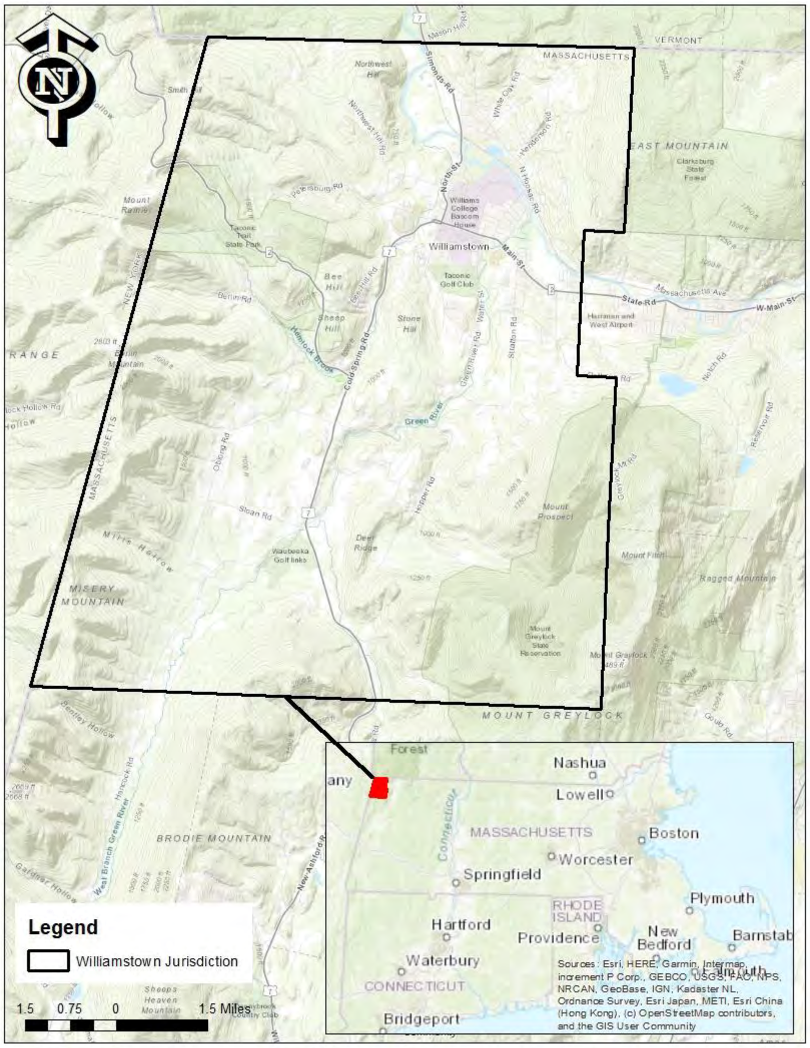

Figure 2. Williamstown Basemap.

The Town of Williamstown, with a population of 7,513[5], is in Berkshire County, Massachusetts. Williamstown borders the State of Vermont to its north and the State of New York to its west. Additionally, the Town borders Clarksburg and North Adams to its east, Adams to its southeast, and New Ashford to its south. The adjacent figure shows the Town's location in Massachusetts.

Williamstown is known as "The Village Beautiful" and is comprised of almost 47 square miles of land. The Town sits in the Hoosic River valley and is surrounded by mountains. The center of Town is defined by Williams College, a private, four-year liberal arts college, in addition to a small business sector.[6] Outside of the center, Williamstown is rural with large fields, working farms, vast hillsides, forestland, and single-family residences.[7]

The Town was originally home to the native Mohican people.[8] The first "permanent" European settlers arrived between 1745 and 1748 and were soldiers stationed at Fort Massachusetts and Fort West

[5] "QuickFacts Williamstown town, Berkshire County, Massachusetts." (2020). United States Census Bureau. Retrieved from https://www.census.gov/quickfacts/fact/table/williamstowntownberkshirecountymassachusetts/PST045223.

[6] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.

[7] Envisioning Williamstown 2035. (2023). Town of Williamstown, Massachusetts.

[8] Envisioning Williamstown 2035. (2023). Town of Williamstown, Massachusetts.

Hoosac during the French and Indian War. Colonel Ephraim Williams Jr. bought two lots of Williamstown land and the plantation that was originally called "West Hoosuck" was incorporated as a Town in 1765. Colonel Williams bestowed his estate to form a free school and in 1793 the Free School was chartered as Williams College, the second institution of higher learning in the Commonwealth.[9]

Williamstown was primarily a farming community that produced dairy and wool. The Town also had some small local mills and stores. After the opening of the Hoosac Tunnel and railroad, Williamstown "transformed" with the presence of textile and twine mills. [10] The railroad also created a tourist economy in the Town and major resort hotels were constructed to accommodate.[11]

Following World War II, Williamstown grew quickly. Major employers included manufacturers such as Steinerfilm, Photech, and Carol Cable. With the population growth, suburban residential development also expanded. Subdivisions were constructed in the northern parts of Town. The Town continues to be known for the presence of Williams College, cultural attractions, and its "scenic rural landscape."[12]

Williamstown is governed by a five-member Selectboard and Town Manager form of government.[13]

People

As of 2020, 84.5% of the Town identified as White, 3.5% identified as Black or African American, 0.1% identified as American Indian and Alaska Native, 4.9% identified as Asian, and 5.8% identified as Two or More Races. [14] Additionally, 3.5% identified as Hispanic or Latino.[15] About 8.7% of the population is foreign-born.[16] There are approximately 2,537 households in Williamstown. [17] The median household

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[9] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.

[10] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.

[11] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.

[12] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.

[13] "Elected Positions." (2024). Town of Williamstown, Massachusetts. Retrieved from https://williamstownma.gov/boards-committees/#officials.

[14] "QuickFacts Williamstown town, Berkshire County, Massachusetts." (2020). United States Census Bureau. Retrieved from https://www.census.gov/quickfacts/fact/table/williamstowntownberkshirecountymassachusetts/PST045223.

[15] "QuickFacts Williamstown town, Berkshire County, Massachusetts." (2020). United States Census Bureau. Retrieved from https://www.census.gov/quickfacts/fact/table/williamstowntownberkshirecountymassachusetts/PST045223.

[16] "QuickFacts Williamstown town, Berkshire County, Massachusetts." (2020). United States Census Bureau. Retrieved from https://www.census.gov/quickfacts/fact/table/williamstowntownberkshirecountymassachusetts/PST045223.

[17] "QuickFacts Williamstown town, Berkshire County, Massachusetts." (2020). United States Census Bureau. Retrieved from https://www.census.gov/quickfacts/fact/table/williamstowntownberkshirecountymassachusetts/PST045223.

income is $102,545.[18] The number of people living below the poverty level is 11.0%.[19] Almost 98% percent of the Town, aged 25 years or older, has a high school or higher diploma.[20]

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

1. Annual median household income is 65% or less of the state's annual median household income.
2. Minorities make up 40% or more of the city or town's population.
3. Twenty-five percent or more of households speak English "less than very well."
4. Minorities make up 25% or more of the population *and* the annual median household income of the municipality where the neighborhood is located does not exceed 150% of the statewide annual median household income.[21]

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.[22]

The Town has one EJ census tract that fits the minority criteria which can be seen in yellow in the figure below. This area is the location of Willams College. The HMPC reports the student population is not considered vulnerable despite meeting the EJ Population definition. The neon green census

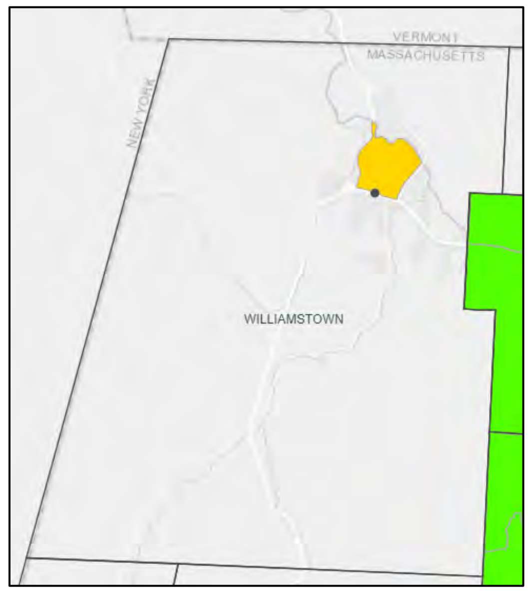

Figure 3. Environmental Justice Community.

[18] "QuickFacts Williamstown town, Berkshire County, Massachusetts." (2020). United States Census Bureau. Retrieved from https://www.census.gov/quickfacts/fact/table/williamstowntownberkshirecountymassachusetts/PST045223.

[19] "QuickFacts Williamstown town, Berkshire County, Massachusetts." (2020). United States Census Bureau. Retrieved from https://www.census.gov/quickfacts/fact/table/williamstowntownberkshirecountymassachusetts/PST045223.

[20] "QuickFacts Williamstown town, Berkshire County, Massachusetts." (2020). United States Census Bureau. Retrieved from https://www.census.gov/quickfacts/fact/table/williamstowntownberkshirecountymassachusetts/PST045223.

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

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

tracts pictured in the figure are located adjacent to Williamstown in the neighboring towns of North Adams and Adams and fit the income EJ criteria.

Land Use and Development (Structures)

Williamstown's land use and development changed from farms and forests to residential development following World War II. Williams College also created two major subdivisions of farmland and forest to create housing to accommodate faculty. As a result, residences now "line" back roads that once served as farms in the southern, eastern, and northwest sections of Town.

Williams College has also undergone expansion with building a new stadium complex, new library, and an expanded Science Center.[23]

To protect and preserve the Town's remaining open space, the Planning Board is working to encourage infill development and alternative housing types to decrease pressure on developing on open land.[24]

The Town has four residential districts, four business districts, one industrial district, and one mixed-use district. There are also nine overlay districts which include:

1. Cable Mills Redevelopment District (CMRD)
2. Confined Aquifer District (CA)
3. Floodplain District (FP)
4. Mobile Home Park District (MHP)
5. Upland Conservation District (UC)
6. Water Resource District 1 (WRD1)
7. Water Resource District 2 (WRD2)
8. Waubeeka Overlay District (WOD)
9. Wellhead Protection District (WPD).[25]

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

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[23] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.

[24] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.

[25] "Zoning - Establishment of Districts." (2023). Town of Williamstown, Massachusetts. Retrieved from https://ecode360.com/10633026.

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 and Waterways

The Town is located within the Hoosic River Watershed. The Hoosic River runs in a northwesterly direction through the northern part of Town for 4.6 miles. The river offers a "natural in-town greenway" and recreation source.[26] Williamstown, alongside the neighboring towns of North Adams and Clarksburg formed the Hoosic River Water Quality District (HWQD) with a treatment plant that is situated on the river in the northern part of Williamstown. In addition to the HWQD, the Hoosic River Watershed Association (HooRWA) was formed with the goal of conserving the river and distributing information related to recreational use and access. The river and its tributaries, such as the Green River, are Williamstown's major surface water resources.[27]

Wetlands and Bodies of Water

The Town has "small and scattered wetlands" which makes them hard to protect. [28] They were inventoried in the 1980's as part of a Williams College senior thesis and class project. Open water wetlands, which are mainly ponds, are the most common type of wetland in the Town. There are also marshes, swamps, wet meadows, seasonally flooded flats, floodplain forests, and vernal pools. These wetlands are home to "special communities of flora and fauna adapted to these unique environments."[29] The total area of wetlands is approximately 595 acres, the largest is a 69-acre wood swamp and the smallest is a farm pond at 0.1 acres. The wetlands have a variety of owners that include the Commonwealth, the Town, public groups, non-profit organizations, and private landowners.[30]

There are few "sizeable" ponds in the Town.[31] Only three ponds are larger than two acres in area, Bridges Pond which is seven acres, Eph's Pond which is five acres, and Sherman Springs Reservoir which is two acres.[32]

[26] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.
[27] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.
[28] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.
[29] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.
[30] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.
[31] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.
[32] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.

Forests

Approximately two-thirds of Williamstown's land area is forested. Much of the land was cleared for agriculture, timber, or charcoal, but some have grown back to forest. Williamstown has several forest types which include sugar maple, beech, hemlock, spruce, giant cottonwoods, spruce-fir, and oak-hickory. These forests are located throughout the Town.[33]

Agriculture

With such a deep-rooted history of agriculture, there remains a "significant productive farmland" that forms a "belt" across the southern part of Williamstown.[34] This belt stretches from the north of the Mt. Greylock State Reservation across to the west. The land is mostly used for grazing and haying, though some is used for cultivation.[35]

Open Space and Recreation

The Town is home to many scenic landscapes that offer opportunities for passive and active recreation. According to the Town's 2016 Open Space and Recreation Plan, the landscapes include:

- Mt. Greylock Reservation – designated a "Distinctive Landscape" by the Department of Environmental Management which identifies "impressive vistas and the most picturesque mountain scenery" in the State.[36]
- Foothills (Bee, Birch, Sheep, and Stone Hills) – the area is adjacent to the Mt. Greylock area and is rated "Noteworthy" in the Department of Conservation and Recreation Inventory. The landscape has open fields as well as wooded hills and high ridges.[37]
- Pine Cobble Mountain – a large, wooded mountainous area in the northeast part of Town that reaches an elevation of 1,894 feet. It is a popular hiking spot.[38]
- Stratton and Blair Roads - located in the eastern part of Town, the intersection of these roads offers a 360-degree panorama and some of the "best views" in Williamstown.[39]
- The Glens (Floras and Ford) – Floras Glen is a scenic and historic woodland brook in the Town. Ford Glen is a "wild and beautiful ravine" and brook.[40]

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[33] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.
[34] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.
[35] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.
[36] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.
[37] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.
[38] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.
[39] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.
[40] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.

- Green and Hoosic Rivers – in addition to their significance as a water resource, they are also noted as having "aesthetic importance in the landscape."[41]
- Eph's Pond – one of the most visited natural areas in the Town due to its located close to the Williams College campus and Town Center. The pond's shoreline and adjacent forestland attracts many bird species.[42]

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

Water is maintained by the Hoosic Water Quality District and waste is managed by Northern Berkshire Solid Waste Management.

Energy

The electric provider for the Town is the National Grid.

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.

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[41] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.

[42] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.

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

A list of critical facilities in Williamstown 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 six critical facilities that have back-up power via a generator, and these include the Williamstown Public Works, Fire Department, New Fire Station, Mount Greylock Regional School, and the Williams College Recreation Center.

Table 1. Critical Facility List.

Facility Name	Address
Berkshire Gas Company	Sand-Springs Rd.
Boston and Maine Railroad	Simonds Rd.
Buxton School	291 South Street
Campus Safety and Security - Hopkins Hall	880 Main St.
Children's Center at Williams College	44 Whitman Street
City of North Adams	0 WHITE-OAKS RD
Commons Nursing & Rehabilitation Center	25 Adams Road
Council on Aging	118 Church St.
Facilities Service Building	60 Latham St.
Facilities Service Building North	54 Heating Plant Drive
Hoosac Water Quality District	667 Simonds Road
Milne Public Library	1095 Main St.
Mount Greylock Regional School	1781 Cold Spring Road
New Fire Station	-73.1930, 42.7088
Pine Cobble School	163 Gale Road
Town of Williamstown	0 Gale Rd.
Town of Williamstown	0 Main St.
Town of Williamstown	0 Cold-Spring Rd.
Town of Williamstown	0 Longview Ter. Ext.
Verizon	Latham St.
Verizon	Hancock Rd.
Verizon (Formerly NYNEX CRE)	Sand-Springs Rd.

Facility Name	Address
Verizon (Formerly NYNEX CRE)	147 Water St.
Williams College	35 Whitman St.
Williams College Microgrid	-73.202014, 42.7096
Williams College Rec Center	-73.2013, 42.7167
Williamstown Dir Public Works	675 Simonds Road
Williamstown Elementary School	115 Church St.
Williamstown Fire Department	34 Water Street
Williamstown Municipal Building	31 North St.
Williamstown Police Department	825 Simonds Road
Williamstown Water Dept.	0 Stetson Rd.
Williamstown Youth Center	66 School Street

Critical Transportation Infrastructure

The major roads that travel through Williamstown include U.S. Route 7 (north to south), Massachusetts Route 2 (west to east), Massachusetts Route 43 (north to south).[43]

Williamstown's existing transportation network has limited public transportation as well as areas that are "underserved" by pedestrian and bicycle infrastructure.[44] However, the Town is serviced by the Berkshire Regional Transit Authority (BRTA).[45]

The Town has adopted a Complete Streets Policy. There are approximately 16 miles of sidewalk in the Town which are located mostly in the Town Center. There are also 14 electric vehicle charging stations, though most of them are located on Williams College campus properties.[46]

Dams

As will be discussed in the Risk Assessment Chapter, Williamstown has one High Hazard Dam and one Low Hazard Dam. There is also a High Hazard Dam located just east of the Town border. The table below identifies the dams within the Town listed in order by hazard type.

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[43] Google Maps. Retrieved from Williamstown - Google Maps.

[44] Envisioning Williamstown 2035. (2023). Town of Williamstown, Massachusetts.

[45] "Route 3 Schedule." (2021). Berkshire Regional Transit Authority. Retrieved from https://berkshirerta.com/plan-your-trip/route-3-schedule/.

[46] Envisioning Williamstown 2035. (2023). Town of Williamstown, Massachusetts.

Table 2. Dams in Williamstown.

Dam Name	Dam Owner	Hazard Ranking
Williamstown Reservoir Dam	Public	High Hazard
Harmon Pond Dam	Private	Low Hazard
Bee Hill Dam	Public	N/A
Haley Pond Dam	Private	N/A
Hoyt Pond Dam	Private	N/A
Lower Hopkins Pond Dam	Private	N/A
Nichols Pond Dam	Private	N/A
Taconic Park Dam	Public	N/A
Galusha Farm Dam	Private	N/A
Galusha Farm #2 Dam	Private	N/A

Economy

The Town and its neighbors in the northern Berkshire region "have been characterized by slow economic growth during the last several decades." Though there has been a steady loss of jobs in the farming and manufacturing industry, there has been a new focus on agriculture as a form of economic development.[47]

Williams College is said to be "an economic anchor" for the Town alongside the Clark Art Institute, the Massachusetts Museum of Contemporary Art (Mass MoCa), museums, a theater, proximity to Mt. Greylock State Reservation, health services, the Mount Greylock Regional School District, and outdoor recreation.[48][49] There has also been an increase in remote workers living in the Town.[50]

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

1. Educational services, healthcare and social assistance
2. Arts, entertainment, and recreation, and accommodation and food services
3. Retail trade.[51]

[47] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.
[48] Envisioning Williamstown 2035. (2023). Town of Williamstown, Massachusetts.
[49] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.
[50] Envisioning Williamstown 2035. (2023). Town of Williamstown, Massachusetts.
[51] "Industry By Occupation for the Civilian Employed Population 16 Years and Over ACS 5-Year Estimates." (2020). United States Census Bureau.

Historic and Cultural Resources

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

In *Envisioning Williamstown 2035*, examples of the Town's cultural assets included:

- Museums – Clark Art Institute, Williams College Museum of Art, Williamstown Historical Museum
- Historic Resources – Historic Districts, Historic Sites, Archeological Sites
- Williamstown Cultural District
- Active Working Farms
- Gathering Spaces – Milne Library, Council on Aging, Williamstown Youth Center, Sand Springs, Coffee Shops
- Community Events – Farmers Market, Fourth of July Parade, Annual Holiday Walk
- Visual and Performing Arts – Images Cinema
- Trails – Pine Cobble, Stony Ledge, and the RRR Brook Trail.[52]

Additional sites of importance include Main Street and the Town Green. Main Street was constructed in 1750 and "forms the heart" of the Williams College Campus and Williamstown Cultural District.[53] The Williams College Campus boasts old buildings that line Main Street and represents one of the oldest higher education institutions in the Commonwealth. Mount Hope Farm is a property located in the southern part of Town. During the 1920's and 1930's, it was known throughout the country for its pioneering in experiments in animal breeding and husbandry. The facility is now used by Williams College for events, lectures, and dinners. Hopkins Memorial Forest is also present within the Town and is a large tract of forested land in the northwest corner of Williamstown. It has been an environmental studies field station for student and faculty research, but also includes a trail system used by hikers, skiers, and horses.[54]

[52] Envisioning Williamstown 2035. (2023). Town of Williamstown, Massachusetts.

[53] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.

[54] Williamstown Open Space and Recreation Plan. (2016). Town of Williamstown, Massachusetts.

Chapter 3. Planning Process

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

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

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

A priority throughout 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 development of the plan and effort was made to develop an inclusive process from beginning to end. The whole community (individuals, communities, private and nonprofit sectors, educational institutions, regional partners, and all levels of government) were given an opportunity to participate.

The planning process for this updated mitigation plan began in July 2024 and concluded in March 2025 (this does not include the months of plan review and adoption). The Town developed a Municipal Vulnerability Preparedness (MVP) Program Summary of Findings in 2018. This planning effort contributed to the update of the mitigation plan. Below is a graphical display of the original plan development timeline. The first public meeting took place the first week in November.

Table 3. Planning Process Schedule.

Tasks	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
Convene LHMP Committee	Kick-off Meeting	HMPC #1	HMPC #2	Public Meeting #1	HMPC #3	HMPC #4	Public Meeting #2		
Update Hazard Profiles			Draft Risk Assessment	Complete Risk Assessment					
Update Critical Facility Inventory									
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

Andrew Groff, Director of Community Development, facilitated all activities related to the mitigation plan update, including meeting logistics, data gathering, and public outreach. The Consulting Team met with Mr. Groff on July 16, 2024, for a Kick-Off Meeting to review the planning process and timeline, and to discuss developing the HMPC, collecting GIS data if possible, and determining the status of previously identified mitigation actions.

Hazard Mitigation Planning Committee

The Community Development Director, Andrew Groff, developed the Hazard Mitigation Planning Committee (HMPC) and was the point of contact for the Consulting Team. The HMPC included Town employees and officials who represented six sectors of the community shown in Table 3 below. An education sector was added due to the substantial contribution from organizations such as Williams College. A full list of HMPC members is shown in Table 4. The HMPC met four times, August 15, 2024, September 19, 2024, November 4, 2024, and December 19, 2024. All the meetings were conducted via Zoom, however sometimes Town employees gathered in the Town offices. A list of participants at each of these meetings is included in Appendix A.

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

Sectors of the Community	HMPC Members
Emergency Management	• Campus Safety Chief (Williams College) • Fire Chief (Williamstown Fire District) • Police Chief • Police Department Accreditation Manager
Economic Development	• Director of Community Development • Executive Director of Chamber of Commerce • Planning Board Chair • Town Manager
Education	• Acting Superintendent (Mount Greylock School District) • Campus Safety Chief (Williams College) • Community Relations (William College) • Director of Facilities (Clark Art Institute) • Director of Facilities (Mount Greylock School District) • Director of Planning and Construction (Williams College) • Finance and Operations Director (Clark Art Institute) • General Counsel (Williams College)
Land Use and Development	• Building Commissioner • Conservation Commission Chair • Community Planning Program Director (Berkshire Regional Planning Commission) • Director of Community Development • Director of Public Works • Planning Board Chair • Town Manager
Health and Social Services	• Council on Aging • Director of Community Development

Sectors of the Community	HMPC Members
	• Fire Chief (Williamstown Fire District) • Health Inspector • Police Chief • Police Department Accreditation Manager • Town Manager
Infrastructure	• Building Commissioner • Community Manager (National Grid) • Community Planning Program Director (Berkshire Regional Planning Commission) • Director of Community Development • Director of Community and Customer Management, Western Massachusetts (National Grid) • Director of Public Works • Planning Board Chair • Town Manager

Table 4. HMPC Members.

First Name	Last Name	Title	Affiliation	Phone	Email
Mina	Amundsen	Director of Planning / Construction	Williams College	413-597-2303	mma3@williams.edu
Jamie	Art	General Counsel	Williams College	413-597-4860	jba1@williams.edu
Peter	Beck	Planning Board Chair	Town of Williamstown	413-458-3500	peterlewisbeck@gmail.com
Joe	Bergeron	Acting Superintendent	Mount Greylock School District	413-458-9582 x4005	jbergeron@mgrsd.org
Susan	Briggs	Executive Director of Chamber of Commerce	Town of Williamstown	413-458-9077	info@williamstownchamber.com
Chuck	Chandler	Police Department/Accreditation Manager	Town of Williamstown	413-458-5733	cchandler@williamstownma.gov
Craig	Clough	Director of Public Works	Town of Williamstown	413-458-3500	cclough@williamstownma.gov
Ryan	Contenta	Building Commissioner	Town of Williamstown	413-458-3500	RContenta@Williamstownma.gov
Joanne	DeRose	Director, Community & Customer Management, Western Mass	National Grid	1-800-322-3223	joanne.derose@nationalgrid.com
Andrew	Groff	Director of Community Development	Town of Williamstown	413-597-8284	agroff@williamstownma.gov
CJ	Hoss	Community Planning Program Director	Berkshire Regional Planning Commission	413.442.1521 x44	choss@berkshireplanning.org
Robert (Bob)	Ide	Community Manager	National Grid	413-800-5054	robert.ide@nationalgrid.com
Phil	McKnight	Conservation Commission Chair	Town of Williamstown	413-458-3500	pmcknight@williams.edu
Robert	Menicocci	Town Manager	Town of Williamstown	413-458-3500	rmenicocci@williamstownma.gov
Brian	O'Grady	Council on Aging	Town of Williamstown	413-458-3500	bogrady@williamstownma.gov
Craig	Pedercini	Fire Chief	Williamstown Fire District	413-458-8113	cf1williamstown@gmail.com
Bill	Powers	Director of Facilities	Clark Art Institute	413 441 5830	bpowers@clarkart.edu

First Name	Last Name	Title	Affiliation	Phone	Email
Gina	Puc	Community Relations	Williams College	413-597-4233	gp9@williams.edu
Ruth	Russell	Health Inspector	Town of Williamstown	413-458-3500	rrussell@williamstownma.gov
Robin	Sher	Clark Art Finance and Operations Director	Clark Art Institute	413-458-2303	rsher@clarkart.edu
Alison	Warner	Campus Safety Chief	Williams College	413-597-4769	awarner@williams.edu
Rob	Winuk	Director Of Facilities	Mount Greylock School District	413-652-3394	rwnuk@mgrsd.org
Mike	Ziemba	Police Chief	Town of Williamstown	413-458-3500	mziemba@williamstownma.gov

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

The Town of Williamstown has a Community Development Director and an elected Planning Board. The Planning Board is responsible for overseeing the long term land use patterns of Williamstown through the Zoning Bylaw, Subdivision Rules, and Comprehensive Planning Process.

Stakeholders were invited to participate in the planning process through the HMPC, public meetings, and plan review. Appendix A includes the agendas and flyers used to announce meetings and opportunities for participation. Press releases for each public meeting were also distributed. The Director of Community Development Director conducted outreach specifically to local and regional agencies involved in hazard mitigation, Town boards and departments that regulate development, neighboring communities, organization representatives that serve socially vulnerable populations, businesses, and academic institutions such as Williams College.

The first HMPC Meeting was held on August 15, 2024. Since it was the first meeting with the HMPC, the consulting team began with introductions and then went on to ensure that all key stakeholders were invited to any future meetings. A summary of existing capabilities and critical facilities were provided. The Town shared that they had recently been updating their Master Plan and Open Space and Recreation Plan. They also shared that Williams College and Clark Art Institute are significant parts of the community. The HMPC noted that the Council on Aging and Police Department served as cooling centers this past summer. The library was discussed due to it needing a back-up generator so that it could serve as an emergency heating or cooling center if needed in the future. In terms of risk, flash flooding quickly came up as a primary concern, alongside landslide issues on the north side of the Town. The meeting wrapped up with a discussion on changes in development, which included the Town becoming more resilient, with an increased housing stock, larger apartments, and larger lot estates coming into the Town. The HMPC wants to preserve the rural character of the Town and have development located around areas already served by water and sewer, like those around the college campus.

The second HMPC Meeting was held on September 19, 2024. The meeting began with a project update and timeline. The Town then shared the status of some of their most recently updated plans which included:

- Comprehensive Emergency Management Plan (2022)
- Envisioning Williamstown (2035)
- Open Space and Recreation Plan (2024).

The HMPC reviewed the critical facility list and noted that the Williamstown Elementary School serves as an emergency shelter, and that the Senior Center and Council on Aging has no generator. The Risk Assessment was then shared and discussed as it related to each natural hazard. The risk of flooding and invasive species was emphasized, specifically the Emerald Ash Borers that have been killing trees which creates a risk during high winds, drought, and extreme temperatures. Additionally, community-wide risks, such as "everything related to utility poles and lines" was discussed as a major concern due to extreme winter storms, dying trees, and wind events causing problems with downed power lines. A brief discussion about the mitigation actions and next steps completed the meeting.

The third HMPC Meeting was held on November 4, 2024. The meeting started with planning out the first public meeting and its related outreach. The HMPC stated that they were going to have an article posted in *iBerkshires* – an online platform that shares information related to the Berkshire region. The discussion then turned to the ranking of natural hazards. Members of the HMPC shared that flooding is a major concern due to the presence of the Hoosic River and the lower elevation of the Town. The HMPC then went on to review problem statements related to the natural hazards and some important takeaways included the need to address the Sand Springs and White Oaks neighborhoods, which if flooded, could become isolated and cut off from services. The need to update flood maps would help the Department of Public Works feel better prepared to react in case of a major flood, as well. The Town noted that it has no issue with water supply, particularly during droughts because of their access to a low-lying aquifer that is "ancient" and has proven resilient. The consulting team shared the plan's draft goal statements which the HMPC approved of. The meeting then turned to talking about the capability assessment portion of the plan. The Town has strong planning and regulatory capabilities but noted some staff turnover and acknowledged the need for funding and increased communication with residents to minimize risk. An important mitigation action came out of this meeting which related to the Department of Public Works' desire to assess all the Town's bridges and culverts to create an asset program to keep track of what is present in the Town.

The fourth and final HMPC Meeting was held on December 19, 2024. The meeting began with a discussion of the timeline for completion, as well as a plan for outreach for public review of the updated draft plan. The HMPC shared that they would put the draft plan on the Town's website in addition to having hard copies available at the Town Hall, Library, and Council on Aging. Additional outreach for the second and final public meeting was discussed and the HMPC decided on a hybrid meeting that would be held via Zoom and in-person at the Council on Aging Common Space. A brief overview of the mitigation actions and their prioritization was discussed so that the Town could review each of them on their own time and reach out to the consulting team with any feedback. A run through of the plan's chapters and content was provided at the end of the meeting.

The HMPC also participated in two public meetings, one on November 4, 2024, and one on January 28, 2025. Finally, the HMPC reviewed the draft Town of Williamstown, MA Hazard Mitigation Plan Update prior to sending it to the Massachusetts Emergency Management Agency (MEMA) for their review in

March 2025.

Public Outreach

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

The Public Outreach Strategy was designed to involve the whole community in the mitigation planning process. The public was engaged in the planning process during the drafting of the plan and prior to plan approval through two public workshops (a flyer for the workshop is shown below). Each public meeting was held virtually. The public was also given a chance to look over the plan and provide feedback prior to its review by MEMA or FEMA. The purpose of public engagement was to:

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

Each public meeting included a PowerPoint presentation and plenty of opportunities for questions and discussion. Members from the HMPC participated in each meeting.

***COMMUNITY LIFELINES** are the most fundamental services in the community that, when stabilized, enable all other aspects of society.*

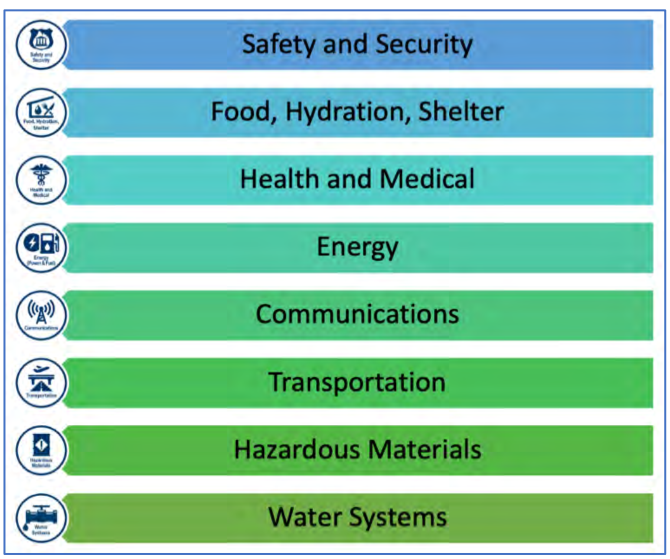


Figure 4. Community Lifelines.

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

Outreach for the public meetings and for plan review was sent via press release, email blasts, connecting with vulnerable populations such as the elderly community via the Council on Aging, and reaching out to local and regional partners like the Town's educational institutions, National Grid, and the Berkshire Regional Planning Commission (BRPC). The Town website (https://williamstownma.gov/https://www.nortonma.org/) included announcements for meetings, the press releases were sent to local organizations, using online platforms, and posted around the Town at frequented buildings. The Town thought it best to have the Hazard Mitigation Plan Update Public Meetings align with the other Town-wide meetings like the monthly Selectboard Meeting and at the Council on Aging luncheon to increase participation.

Information gathered during the public meetings contributed to the plan's development. The first public meeting was held via Zoom and in person during a Selectboard Meeting on **November 4, 2024**. An accurate list of participants was not gathered due to the Zoom format.

Figure 5. Public Meeting Flyer.

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

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

The second public meeting was held on **January 28, 2025,** virtually on Zoom and in-person at the Council on Aging. Most meeting participants were in person, though one participant joined on Zoom alongside the consulting team. This meeting included personal preparedness and mitigation action recommendations. The consulting team and the HMPC determined that it was a good idea to expand the scope of the meeting to attract more participants. People seemed interested in learning how to register for the reverse 911 system, mitigate risks to their homes, and access additional information from Ready.gov.

The types of mitigation actions discussed throughout the meeting included:

- Town residents sign up for the Code Red emergency notification system through the Town's website.
- Department of Public Works to evaluate shelter capacity and determine each shelter's structural ability to withstand natural events.
- Town to conduct assessments of municipal infrastructure (water, sewer, stormwater) to create a record of their condition and plan for improvements.
- Town to add a generator to the public library so it can function as a heating and cooling center.
- Town to add a generator to the Williamstown Elementary School to serve as a permanent shelter.
- Tree Warden to prioritize removal of dangerous trees from street rights-of-way.
- Town to revise bylaws to require low impact development techniques and incorporate green stormwater infrastructure.
- Town to create a flood awareness, education and outreach campaign.
- Town to improve communication strategy to residents about hazard mitigation and emergency preparedness.
- Town to conduct more outreach to seniors regarding emergency preparedness.
- Town to conduct outreach to owners of the Pines Lodge Mobile Home Park to ensure proactive maintenance.

During the meeting, the consulting team outlined the plan for the Town, which included 20 mitigation actions, twelve of which relate to Structure and Infrastructure Projects, four relate to Natural Systems Protection, two relate to Local Plans and Regulations, and two relate to Education and Awareness Programs. The projects are spread across various departments, including the Department of Public Works, Building Commissioner, Tree Warden, Library Trustees, School District, Fire Department, and Conservation Commission. The consulting team also highlighted specific actions such as evaluating shelter capacity, conducting assessments of municipal infrastructure, adding generators to the public library and the Williamstown Elementary School, prioritizing removal of dangerous trees, and creating a flood awareness campaign. One participant stressed their concern about heat as a natural hazard that may impact the Town. The meeting concluded by offering tips for homeowners to mitigate risks to their homes, such as elevating utilities, purchasing flood insurance, maintaining sump pumps, directing downspouts away from homes, inspecting roofs, sealing gaps in homes, and trimming trees.

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

Table 5. Where Public Engagement Informed the Plan's Development.

Area of the Plan Impacted	Contributions from the HMPC and the Public
Planning Area Profile	• The HMPC updated the list of critical facilities, shown in Chapter 2. They also contributed information regarding current land use practices and priorities and insight regarding environmental justice and vulnerable populations present in the community.
Planning Process	• Participated in every aspect of the planning process and made recommendations regarding how to engage the public and key stakeholders. Worked to advertise and share information with the public to increase engagement at public meetings and for public review.
Risk Assessment	• Described extent of hazard impacts based on previous events. • Offered first-hand insight and experiences of Town residents. • Added the qualitative review to the risk analysis for determination of the hazard risk ranking. • Provided data and resources to support the assessment.
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	• Reviewed and updated mitigation actions from previous plan(s). • Identified and prioritized mitigation actions based on their concerns. • Focused on the concerns raised by community members.
Implementation Plan	• Committed to integrating this plan more thoroughly throughout the Town government and to posting the plan on the Town's website. • Aimed to meet annually and post-disaster to support mitigation actions and ensure alignment of plan goals/objectives across Town projects.

List of Key Stakeholders Invited to Public Meetings

- Berkshire Regional Planning Commission
- Clark Art Institute
- Neighboring Communities
- National Grid
- Town Residents
- Williamstown Town Departments
- Williamstown Boards and Committees
- Williams College

Review of Draft Plan

The Town made the plan available for public review in February 2025. A press release announcing the availability to review the plan was sent and the announcement was posted to the Town website. The HMPC sent emails to Town employees, committees, and boards. Hard copies of the plan were kept in the Town Hall, Library, and Council on Aging. An electronically available comment form via Google was provided for the public to offer feedback on the plan's content. The Community Development Director was also available to receive comments from the public.

Chapter 4. Risk Assessment

Hazard Identification

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

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

In completing the updated hazard identification process, the HMPC considered the results of the Town's Municipal Vulnerability Preparedness (MVP) planning effort (completed in 2018), as well as the "ResilientMass Plan" (2023[55]) which is the formal update to the 2018 State Hazard Mitigation and Adaptation Plan (SHMCAP). As a result of this process all hazards from the prior hazard mitigation plan (adopted in 2019) remain in this updated risk assessment. Coastal hazards were not included because Williamstown is in Western Massachusetts. For this updated assessment, some hazards have been consolidated or renamed to be consistent with the ResilientMass Plan, as further described below. The top natural hazards identified for the MVP effort are thoroughly covered in this assessment, which are flooding, winter storms, wildfires, wind events, and extreme weather. Invasive species as a hazard was added to reflect the concern for this becoming a more prevalent challenge with projected climate change; and to ensure that the risk assessment is aligned with the ResilientMass Plan. The profiled hazards are as follows:

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

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

- Landslides
- Other Severe Weather
- Severe Winter Storms
- Tornadoes
- Wildfires

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

Massachusetts Emergency Declarations

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

Table 6. Massachusetts Emergency Declarations.

Massachusetts Emergency	Start	Termination	Corresponding Federal Disaster Declaration	FEMA Public Assistance Available	Applicable to Williamstown?
Storm Lee	9/15/2023	9/16/2023	Not applicable	Not applicable	Yes
Severe Weather and Flooding	9/12/2023	9/16/2023	Not applicable	Not applicable	Yes
Shelter Capacity Crisis	8/8/2023	Pending	Not applicable	Not applicable	Yes, but not a natural hazard and not a FEMA declaration for Massachusetts
COVID-19	3/10/2020	5/11/2023	DR-4496-MA	All counties	Yes

Massachusetts Emergency	Start	Termination	Corresponding Federal Disaster Declaration	FEMA Public Assistance Available	Applicable to Williamstown?
Merrimack Valley Gas Explosion	9/14/2018	10/4/2018	Not applicable	Not applicable	No
Coastal Storm	3/3/2018	3/6/2018	DR-4372-MA	Essex, Norfolk, Plymouth, Bristol, Barnstable, and Nantucket Counties	No
Winter Storm	2/9/2015	2/25/2015	Not applicable	Not applicable	No
Winter Storm	1/26/2015	1/28/2015	DR-4214-MA	Worcester County and eastward	No
Winter Storm	2/8/2013	2/13/2013	DR-4110-MA	All counties	Yes
Hurricane Sandy	10/27/2012	11/1/2012	DR-4097-MA	Suffolk, Bristol, Plymouth, Barnstable, Dukes, and Nantucket Counties	No
Nor'easter	10/29/2011	11/7/2011	DR-4051-MA	Berkshire, Franklin, Hampshire, Hampden, Worcester, and Middlesex Counties	Yes
Hurricane Irene	8/26/2011	9/6/2011	DR-4028-MA	Berkshire, Franklin, Hampshire, Hampden,	Yes

Massachusetts Emergency	Start	Termination	Corresponding Federal Disaster Declaration	FEMA Public Assistance Available	Applicable to Williamstown?
				Norfolk, Bristol, Plymouth, Barnstable, and Dukes Counties	
Tornadoes	6/1/2011	6/19/2011	DR-1994-MA	Hampden and Worcester Counties	No

Link to Massachusetts Climate Change Assessment

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

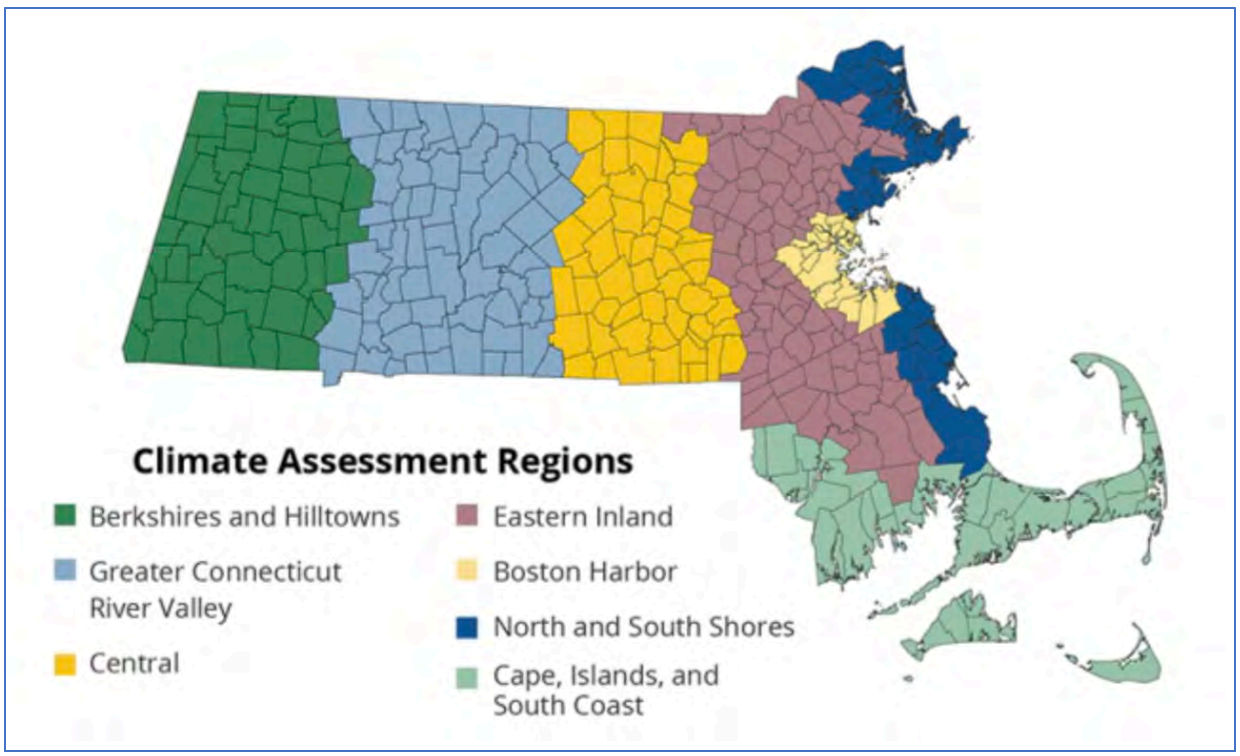


Figure 6. Climate Assessment Regions. Williamstown is in the Berkshires and Hilltowns Region.

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

Table 7. Top Impacts of Climate Change per Sector in Berkshires and Hilltowns Region.

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

Sector	Top Impacts per Sector	Comments
	Damage to tourist attractions and amenities, particularly those associated with seasons	All hazards may impact seasonal tourism, from flooding to droughts, and from invasive species to wildfires. Changes in temperatures and winter storms will affect winter recreation.

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

Table 8. How This Plan Addresses the Top Impacts of Climate Change per Sector.

Sector	Top Impacts per Sector	Approach to Incorporating Impacts
Human	Increase in vector-borne disease incidence and bacterial infections	Vector-borne and infectious diseases are a hazard profiled in this plan.
	Reduction in food safety and security	Local droughts that impact food security will be addressed. Food safety and security nationwide will not be directly addressed, but the capability assessment will help describe townwide capabilities for food security.
Infrastructure	Damage to buildings	Damage to buildings is addressed in the vulnerability assessment for each hazard.
	Reduction in clean water supply	Droughts are profiled in this plan. Hazards that can secondarily affect water supply such as invasive species and severe storms (which can cause power outages) are also profiled.
	Damage to electric transmission and distribution	Severe weather events that damage transmission and distribution are hazards profiled in this plan.
Natural Environment	Freshwater ecosystem degradation	Changes in precipitation, drought, and invasive species are all hazards addressed in this plan.

Sector	Top Impacts per Sector	Approach to Incorporating Impacts
	Forest health degradation	Extreme temperatures, changing precipitation, wildfires, and invasive species are all hazards addressed in this plan.
Governance	Increase in costs of responding to climate migration	The capability assessment and related mitigation actions will help address response functions.
	Increase in demand for State and municipal services	The capability assessment and related mitigation actions will help address increased demands for municipal services.
Economy	Reduction in availability of affordably priced housing	The individual hazards addressed in this plan can reduce the availability of affordably priced housing, and the specific actions for each hazard will help protect housing options and opportunities.
	Damage to tourist attractions and amenities, particularly those associated with seasons	The hazards that may impact seasonal tourism are discussed in this plan.

B1. Does the plan include a description of the type, location, and extent of all natural hazards that can affect the jurisdiction? Does the plan also include information on previous occurrences of hazard events and on the probability of future hazard events? (Requirement 44 CFR §201.6(c)(s)(i))

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

Hazard Profiles

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

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

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

Table 9. 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.
Probability of Future Events	Describes likelihood of future hazard occurrences in the town based on best available and climate-informed science.
Vulnerability Assessment	Describes potential impact on the community, including estimated potential losses and the anticipated effects of climate change.

To describe previous occurrences, this plan update highlights major events from history but relies primarily on a roughly ten-year lookback (2014/2015 through 2023/2024) ending with any events from the date of plan development 2024). This helps maintain a concise narrative. Where applicable, narratives about warning times (i.e., floods, heat advisories, and wildfires) are incorporated into the *"Extent"* subsections.

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

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

Average and Extreme Temperatures

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

Description

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

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

A heat wave is defined as three or more days of temperatures of 90°F or above. A basic definition of a heat wave implies that it is an extended period of unusually high atmosphere-related heat stress, which causes temporary modifications in lifestyle, and which may have adverse health consequences for the affected population. Heat waves cause more fatalities in the U.S. than the total of all other meteorological events combined. According to the EPA, more than 11,000 Americans have died from heat-related causes (EPA, 2016) since 1979.[56]

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

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

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) explains that recent efforts to characterize extreme heat have underscored that risks are present throughout the entire commonwealth. Therefore, the entire town of Williamstown is subject to extreme heat. As with the entire commonwealth, Williamstown is also exposed to extreme cold temperatures.

Previous Occurrences

Extreme Cold: The ResilientMass Plan notes that since 1995, there have been 120 cold weather events within the Commonwealth, ranging from Cold/Wind Chill to Extreme Cold/Wind Chill events. The NOAA Storm Events database (https://www.ncdc.noaa.gov/stormevents/) for Berkshire County lists numerous extreme cold and/or wind chill events for the area of Williamstown during the timeframe 2014-2024, with 37 separate dates listed from all years except 2020.

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

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

The NOAA Storm Events database (https://www.ncdc.noaa.gov/stormevents/) for Berkshire County lists numerous extreme heat events for the area of Williamstown in the timeframe 2014-2024. These are listed below, with notations for temperatures and dates differing from entry to entry as reported by the various contributors:

Table 10. NCEI Severe Storm Database Entries Covering Heat in Williamstown.

Date	Description
7/1/18	A hot and humid airmass brought excessively high heat indices to western Massachusetts during the beginning of July. Temperatures soared as high as the mid to upper 90s on July 1st, the hottest day of the stretch. Combined with dewpoints in the mid-70s, heat indices reached near 105 degrees in the warmest areas. July 4th marked the fourth consecutive day with a high temperature in the 90s at Pittsfield. In addition to the hot daytime temperatures, overnight low temperatures only falling into the 70s was common, which exacerbated heat-related problems. The extensive heat prompted the opening of many cooling centers across the region.
8/29/18	Hazy, hot and humid conditions enveloped the region from Tuesday, August 28th through Wednesday, August 29th. This prompted a heat advisory to be issued both days for all locations below 1000 feet. Maximum heat index values ranged from the low 90's to the low 100's.
9/3/18	A late-season heat wave impacted western Massachusetts during the first week of September. A persistent warm and moist airmass characterized by daytime highs in the upper 80s to low 90s and dewpoints in the 70s resulted in heat index values reaching 90-100 degrees during the afternoon hours. This heat wave coincided with the first week of school for many, and the heat prompted some schools to dismiss classes early and postpone or cancel sports practices.
7/19/19	A heat wave gripped western Massachusetts from July 19th through the 21st. Temperatures soared to the low 90s with dewpoints in the low to mid-70s. This resulted in heat index values in the 95 to 105 range in the warmest valleys. Saturday, July 20th was the hottest day for most areas. Due to the excessive heat, cooling centers were opened and pool hours were extended. The hot and humid airmass provided fuel for thunderstorms that formed along the Lake Ontario shoreline during the late afternoon of the 20th. One storm advanced into Berkshire County in the evening, resulting in a report of wind damage.
7/19/20	Temperatures soared into the 90s throughout the lower elevations of western Massachusetts on July 19th, reaching as high as the mid-90s. The combination of the heat and a humid airmass brought heat indices into the 95 to 105 degree range. Heat indices exceeded 95 degrees again in some of the lower elevations again on July 20th, but were not quite as high as the previous day.

Date	Description
7/27/20	Another hot and humid airmass impacted western Massachusetts on the 27th, with heat indices reaching 95 degrees in some portions of Berkshire County.
6/28/21	A hot and humid airmass developed over western Massachusetts on June 28th and persisted through June 30th. Heat indices ranged between 95F to 105F.
8/11/21	A dome of high pressure settled across western Massachusetts bringing high heat and humidity each day, mainly during the afternoon hours. Heat indices reached 95 to 102 degrees each of these days.
8/26/21	A hot and humid air mass developed ahead of an approaching cold front across western Massachusetts... Heat indices reached 95 to 101 degrees across Berkshire County during the afternoon hours.
8/4/22 & 8/8/22	A dome of high pressure brought a stretch of hot and humid weather resulting in heat indices reaching between 95F and 104F degrees across western Massachusetts on both August 4 and August 8, 2022.

Evidence demonstrates that several extreme heat events occurred in Williamstown in July-August 2022, 20323, and 202. However, the Town did not need to open its cooling centers (the Police Station, The Harper Center (Council on Aging), and library) in 2022, 2023 and 2024.

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

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

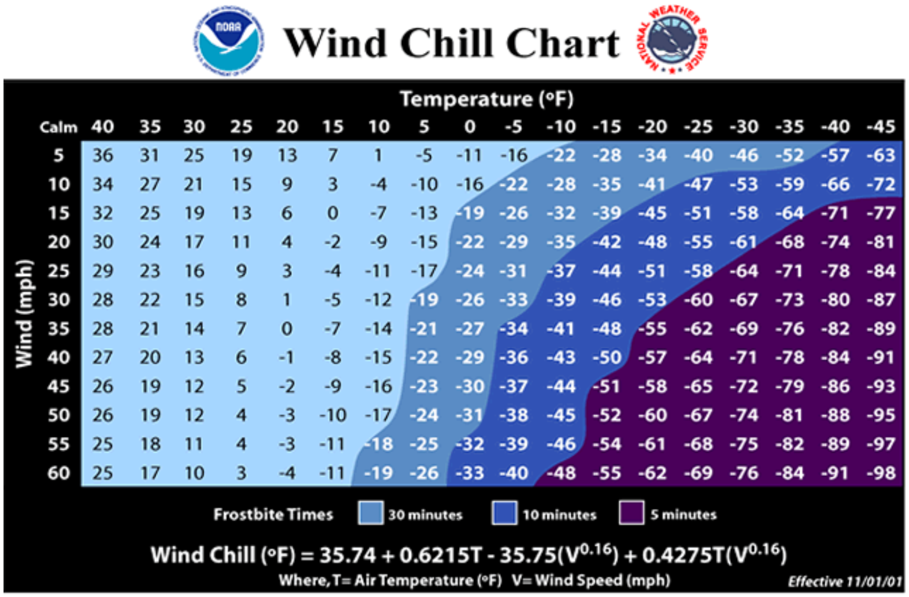
Table 11. USDA Disasters Events That Refer to Extreme Temperatures.

Year	Event	Event “Begin Dates”
2019	Cool/Cold, Below-normal Temperatures	4/1/2019
2016	Frost, Freeze	2/10/2016, 2/12/2016, 2/14/2016
2016	Drought, Wind/High Winds, Fire/Wildfire, Heat, Excessive Heat, High Temp., Insects	7/5/2016

Year	Event	Event "Begin Dates"
2015	Frost, Freeze, Winter Storms, Ice Storms, Snow, Blizzard	1/1/2015
2014	Frost, Freeze	12/22/2014
2013	Frost, Freeze	5/13/2013
2013	Excessive rain, moisture, humidity, Heat, Excessive heat High temp. (incl. low humidity)	5/8/2013
2012	Frost, Freeze	3/1/2012
2012	Drought, Heat, Excessive heat High temp. (incl. low humidity)	6/2/2012

Extent

Extreme Cold: The extent (severity or magnitude) of extreme cold temperatures is generally measured through the Wind Chill Temperature Index. Wind Chill Temperature is the temperature that people and animals feel when they are outside, and it is based on the rate of heat loss from exposed skin by the effects of wind and cold. As the wind increases, the body loses heat at a faster rate, causing the skin's temperature to drop. The National Weather Service (NWS) issues a Wind Chill Advisory if the Wind Chill Index is forecast to dip to –15°F to – 24°F for at least 3 hours, based on sustained winds (not gusts). The NWS issues a Wind Chill Warning if the Wind Chill Index is forecast to fall to –25°F or colder for at least 3 hours. On November 1, 2001, the NWS implemented a Wind Chill Temperature Index (Figure 7) designed to more accurately calculate how cold air feels on human skin.



Wind Chill Chart

Temperature (°F)

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

Frostbite Times: 30 minutes, 10 minutes, 5 minutes

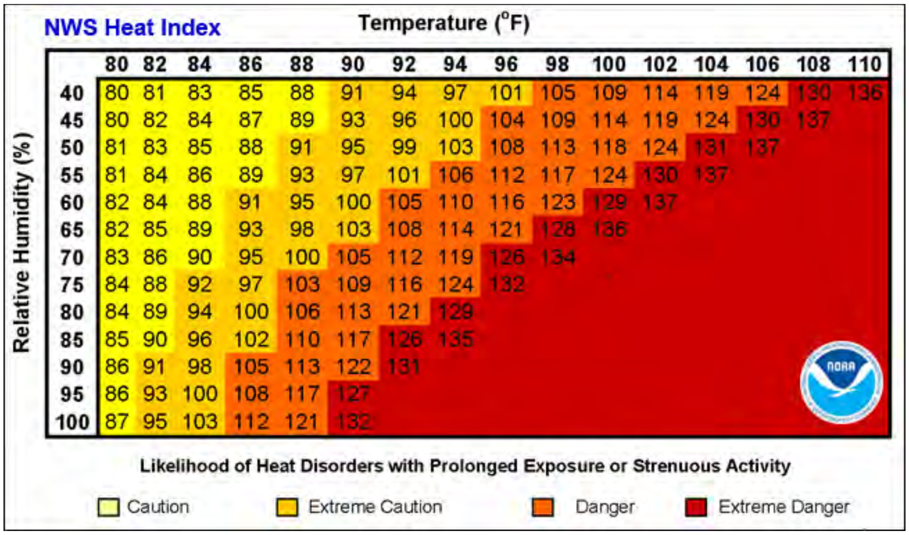
Wind Chill (°F) = $35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$

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

Effective 11/01/01

Figure 7. NWS Wind Chill Temperature Index and Frostbite Risk.

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


NWS Heat Index

Temperature (°F)

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

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution Extreme Caution Danger Extreme Danger

Figure 8. NWS Heat Index Chart.

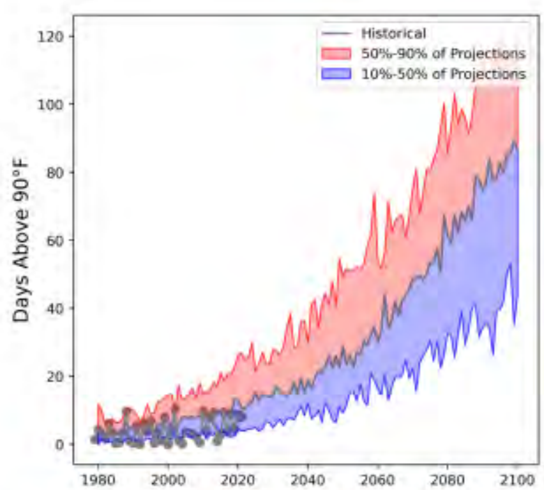
The NWS advisory and warning products are applicable to all extreme temperature events that may affect Williamstown, as they are used throughout Massachusetts on a routine basis and appropriately characterized the most recent extreme cold and heat events over the last few years. Extreme temperatures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

Probability of Future Events

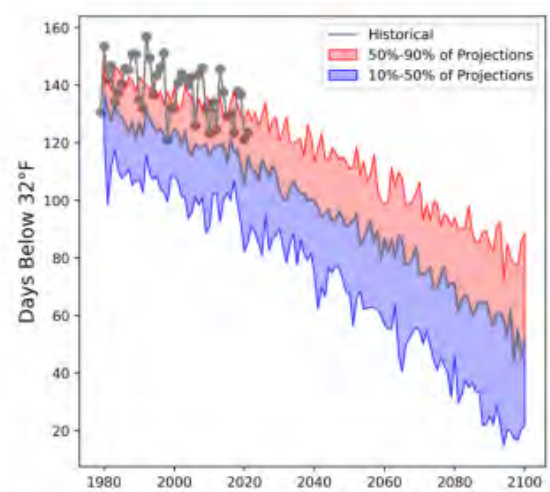
The ResilientMass Plan notes that Massachusetts averaged three declared cold weather events and two extreme cold weather events annually between January 2018 and October 2022. The years 2018 and 2019 were particularly notable, with 10 cold weather events in each year, including five extreme cold/wind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

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

Various climate forecasts support the trends of an increased frequency of extreme hot weather events and a decreased frequency of extreme cold weather events. High, low, and average temperatures in Massachusetts are all likely to increase significantly over the next century as a result of climate change. The graphics below (from ResilientMass, 2018) show the projected annual days with maximum temperature above 90 degrees and projected annual days with minimum temperature below 32 degrees.



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



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

Figure 9. Projected Annual Days with Temperatures above 90 Degrees (left) and Below 32 Degrees (right).

Vulnerability Assessment

Exposure

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

Built Environment Impacts

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

Extreme cold weather poses a significant threat to utility production, which in turn threatens facilities and operations that rely on utilities, specifically climate stabilization. As temperatures drop and stay low, increased demand for heating places a strain on the 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.

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

Population Impacts

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

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

Older adults are often at elevated risk due to a high prevalence of pre-existing and chronic conditions. In Williamstown, 22.4% of the population is over age 64. People who live in older housing stock and in housing without air conditioning have increased vulnerability to heat-related illnesses. Power failures are more likely to occur during heat waves, affecting the ability of residents to remain cool during extreme heat. Individuals with pre-existing conditions and those who require electric medical equipment may be at increased risk during a power outage. Heat impacts are more likely to be felt by residents without air conditioning, by those who work outdoors, and those with underlying health conditions.

Extreme heat can pose severe and life-threatening problems for people. According to the NWS, it is one of the leading weather-related killers in the 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
- Very low- and low-income persons
- People who are socially isolated
- People with mobility restrictions or mental impairments
- People taking certain medications (e.g., for high blood pressure, depression, insomnia)
- People engaged in vigorous outdoor exercise or work or those under the influence of drugs or alcohol.

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

Environment Impacts

Extreme heat can lead to water quality issues (e.g., excess algal growth, decreased oxygen), wildlife concerns (e.g., shifts in species distribution), and impact vegetative growth when combined with drought.

Problem Statements for Extreme Temperatures

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

Table 12. Problem Statements for Extreme Temperatures.

Assets	Problems Associated with Extreme Temperatures
People (including underserved communities and socially vulnerable populations)	• Extreme heat will be a significant public health threat to all residents, but especially for vulnerable populations living in older homes or homes without air conditioning. • The elderly and those with mobility issues may not be able to leave their homes and travel safely. • People working in businesses without air conditioning may be at risk of heat illness. • First responders may also be impacted by extreme temperatures. • Pets may be adversely impacted by extreme heat.
Structures (including facilities, lifelines, and critical infrastructure)	• Library is used as heating/cooling center but needs a generator. • Senior Center (Council on Aging) needs a generator for vulnerable residents during extreme temperatures. • Older homes without insulation and single-pane glass are difficult to heat and cool and may not provide safe living conditions. • Businesses that require refrigerated trucks or refrigeration units may see business losses and increased utility costs. • The electric grid may become stressed and fail during extreme heat events.
Systems (including networks and capabilities)	• Extreme heat mitigation and adaptation have not been fully integrated into existing local plans and regulations for new development, though progress is being made.
Natural, historic, and cultural resources	• Extreme heat may lead to, or exacerbate, impacts to natural systems related to wildfires and invasive species (refer to those sections).
Activities that have value to the community	• Recreational activities may be adversely impacted by extreme heat.

Droughts

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

The Town of Williamstown Community Resilience Building Workshop Summary of Findings (2018) lists "drought" as one of the top hazards of concern.

Description

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

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

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

Hundreds of private wells are believed present in Williamstown. Private well owners can be vulnerable to droughts. With declining groundwater levels, well owners may experience dry wells or sediment in their water due to the more intense pumping required to pull water from the bedrock or overburden aquifer. Wells may also develop a concentration of pollutants, which may include nitrates and heavy metals depending on local geology.

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

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

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

Location

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

Previous Occurrences

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

Although short or relatively minor droughts occurred over the 50 years following the drought of the 1960s, the next long-term event began in March 2015 when Massachusetts began experiencing widespread abnormally dry conditions. In July 2016, based on a recommendation from the Drought Management Task Force (DMTF), the Secretary of the Executive Office of Energy and Environmental Affairs (EOEEA) declared a Drought Watch for Central and Northeast Massachusetts and a Drought Advisory for Southeast Massachusetts and the Connecticut River Valley. Drought warnings were issued in five out of six drought regions of the state. Many experts stated that this drought was the worst in more than 50 years. DMTF declared an end to the drought in May 2017 with a return to wetter-than-normal conditions. Public water supplies for Williamstown were not significantly impacted by the drought of 2015-2017, although private wells and cover crops were affected. According to the Community Resilience Building Workshop Summary of Findings for Williamstown (2018), “farmers experienced some drying up of wells and crop loss to the extent that they had to import hay to feed their livestock.”

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

Table 13. USDA Disasters Events That Refer to Drought.

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

The droughts of 2020, 2022, and 2024 are considered flashy droughts. The drought of 2020 was sufficiently impactful in Berkshire County to be included in the USDA data table above.

The following graphics depict the drought status mapping in 2022 and 2024 at their greatest extent. The press release for the drought of 2024 is presented on the following page; note the connection to the wildfire season of 2024, which is described later in this chapter.

The drought of 2022 was typical of a flashy drought; it was most severe in August, but alleviated with rainfall in September 2022.	**The drought of 2024** followed a rainy spring and summer, and was most severe in October/November, but alleviated with rainfall in late November 2024.

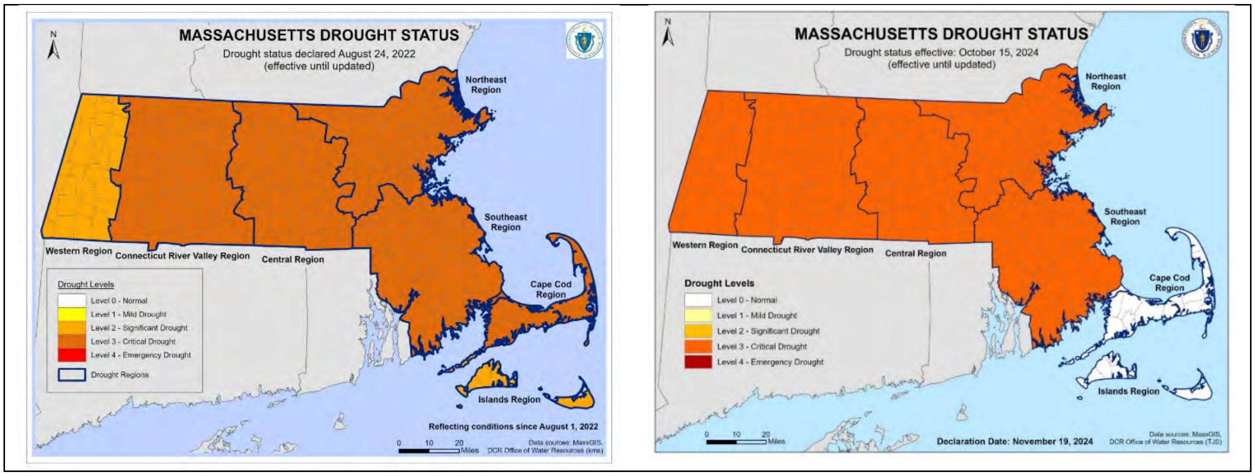


Figure 10. Drought Mapping of 2022 and 2024.

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.

Applying the same ten-year lookback as the severe storms database review, USDA payments to Massachusetts agricultural sectors for drought impacts associated with events from 2012 through 2022 were reviewed. This timeframe includes the droughts of 2015-2017 and 2020. USDA reimbursements for droughts in Williamstown have summed to $9,500 in this timeframe. This is consistent with the statements by the HMPC that agricultural impacts of drought are a concern in Williamstown.

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.

Extent

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

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

These indices are monitored weekly to generate a monthly hydrological conditions report and used to determine the onset, severity, and end of droughts. Five levels of increasing drought severity are defined in the DMP: *Normal, Mild, Significant, Critical,* and *Emergency*. The drought levels are associated with actions outlined in the DMP. Recommendations of drought levels are made by the DMTF to the Secretary of the EEA, who then declares the drought level for each region of the state.

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

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

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

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

The Massachusetts drought warning and characterization products are applicable to all droughts that may occur in Williamstown, as they are used throughout Massachusetts on a routine basis and appropriately characterized previous droughts affecting Williamstown. 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.

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 14 summarizes this data and indicates the projected number of consecutive dry days according to the "high" and "low" limits of the Northeast Climate Adaptation Science Center (NE CASC) data. The Town of Williamstown is represented by the Berkshires and Hilltowns region.

Table 14. Number of Consecutive Dry Days (CDD) and Days without Rain (DWR) per Year.

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

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

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

Vulnerability Assessment

Exposure

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

Built Environment Impacts

Major water users are more susceptible to drought, and these include water utilities and agricultural users. With an increased probability of drought and drought magnitude, water utilities should continuously review and update planning for extreme drought scenarios.

Population Impacts

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

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

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

Environment Impacts

Drought can impact agricultural areas in the Town and there are some natural areas which 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. Sometimes the environmental damage caused by a drought is temporary, and other times it is irreversible.

Problem Statements for Drought

Table 15. 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 from private wells during an emergency drought event. If the water sources are at emergency levels, having a plan to get vulnerable people water should be considered. If rates are increased to lower water demand, this may also adversely impact underserved and vulnerable communities.
Structures (including facilities, lifelines, and critical infrastructure)	• Agricultural users may be impacted during a drought event.
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.
Natural, historic, and cultural resources	• Water quality may be adversely impacted by major droughts.
Activities that have value to the community	• None applicable.

Earthquakes

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

Description

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

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

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

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

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

Location

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

Previous Occurrences

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

To determine whether earthquakes have occurred more recently near or in Williamstown, all events listed by Weston Observatory were reviewed for all towns in Massachusetts since the date of last edition of this plan. Listed earthquakes above magnitude 2.0 include the following very minor earthquakes:

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

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

Most recently, a 4.8 magnitude earthquake centered in New Jersey on April 5, 2024 was felt in Williamstown; according to Town staff the shaking knocked over several portable toilets.

Extent

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

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

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

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

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

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

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

Table 16. 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 17. 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

Moment Magnitude	Typical Maximum Modified Mercalli Intensity
7.0 and above	VIII or higher

Source: USGS

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

Probability of Future Events

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

Vulnerability Assessment

Exposure

A major earthquake could cause severe damage to Williamstown 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

Historic data for earthquake events indicate that between 1991 and 2023, no major (>5.0 magnitude) earthquakes were recorded in Berkshire County during this period, causing no damage to property. The entire built environment of Williamstown is vulnerable to earthquakes. Older, unreinforced masonry buildings are very susceptible to earthquakes.

To identify built environment impacts to the Town, FEMA's risk assessment software, Hazus, was implemented. The economic loss results of the 1500-year event are shown in Table 18 while the results for the 2500-year event are shown in Table 19. The Town's Average Annual Loss (AAL) is modeled to be $7,635.

Table 18. Building Loss for a 1500-Year Scenario.

Loss Type	Residential ($Million)	Commercial ($Million)	Other Occupancy ($Million)	Total ($Million)
Building Loss	0.92	0.63	0.50	**2.05**
Content Loss	0.26	0.21	0.26	**0.73**
Business Inventory Loss	0.00	0.00	0.01	**0.01**
Business Income Loss	0.01	0.19	0.01	**0.21**
Business Relocation Loss	0.05	0.13	0.08	**0.26**
Rental Income Loss	0.03	0.10	0.01	**0.14**
Wage Loss	0.00	0.25	0.04	**0.29**
Total	**1.27**	**1.51**	**0.91**	**3.69**

Table 19. Building Loss for a 2500-Year Scenario.

Loss Type	Residential ($Million)	Commercial ($Million)	Other Occupancy ($Million)	Total ($Million)
Building Loss	1.97	1.24	1.02	**4.23**
Content Loss	0.61	0.50	0.59	**1.70**
Business Inventory Loss	0.00	0.06	0.01	**0.07**
Business Income Loss	0.01	0.32	0.02	**0.35**
Business Relocation Loss	0.10	0.23	0.17	**0.50**
Rental Income Loss	0.06	0.17	0.02	**0.25**
Wage Loss	0.03	0.43	0.06	**0.52**
Total	**2.78**	**2.95**	**1.89**	**7.62**

Population Impacts

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

Hazus was used to model injuries and fatalities for the 1500- and 2500-year events. For the 1500-year event, there were no modeled injuries and no modeled injuries requiring medical attention. For the 2500-year event there was one modeled minor injury and no modeled injuries requiring medical attention.

Environment Impacts

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

Problem Statements for Earthquakes

Table 20. 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 located in Williamstown. • Utility systems impacted.
Systems (including networks and capabilities)	• None apparent or projected.
Natural, historic, and cultural resources	• Historical buildings constructed out of unreinforced masonry are susceptible and may be impacted.
Activities that have value to the community	• None apparent or projected.

Flooding from Precipitation and Dam Overtopping

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

> The Town of Williamstown Community Resilience Building Workshop Summary of Findings (2018) lists "flooding from rivers and streams" as the top hazard of concern.

Description

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

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

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

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

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

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

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

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

Location

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

Previous Occurrences

The previous edition of this plan and the CRB report (2018) includes narratives about previous flood events:

- The floodplains of particular note in the town are associated with the Hoosic and Green Rivers, particularly in the town center. These are the main areas of flooding, typically during regular spring meltwater conditions and during storms. Ice jams are known to occur along the Green River and Broad Brook.
- Broad Brook is another area of concern as it has a steep slope that allows velocities to transport large amounts of sediment up to and including large boulders during storm events which can be heard hitting bridge footings. The sediment and debris fills the stream channel near Route 7, threatening to blow water flow and causing extensive flooding of the area and road. This area is nicknamed “the boulder field” by town workers. n ice jam event in January 2018 redirected flood waters over the driveway of Steinerfilm which goes under the Pan Am railroad tracks to a depth of more than five feet and trapping 40 workers at the facility. Town staff rescued the workers by loading them onto the bed of an ex-military vehicle owned by the Town equipped to drive through floodwaters.
- The Pan Am Rail corridor near Bridges Pond is another area of concern for flooding, as part of the tracks become inundated and there is concern that some of the track embankments could become undermined due to flooding from storms and beaver activity. The limited communications from the railroad related to the potential for derailment is of concern for local emergency personnel.
- In late August 2011, Tropical Storm Irene tracked over the region bringing widespread flooding and damaging winds. Riverine and flash flooding resulted from an average of 3-6 inches of rain and upwards of 9”, within a 12-hour period. Widespread road closures occurred throughout the region. In Williamstown this event was a 1% annual chance flood event. Several days later in September 2011, the remnants of Tropical Storm Lee brought 4”-9” of heavy rainfall to the region. Due to the saturated soils from Tropical Storm Irene, this rainfall led to widespread minor to moderate flooding on rivers as well as small streams and creeks.
- The Spruces Mobile Home Park was severely flooded during Tropical Storm Irene in 2011 with 160 of the 225 mobile homes destroyed beyond repair and flood heights exceeding five feet.

The underground utilities in a third of the park were compromised beyond repair. All residents were permanently displaced following the disaster, and the Town has converted this area into a public park using HMGP funding.

- Other areas of concern for flooding include the Sand Springs Road subdivision, the White Oaks neighborhood, the neighborhood of Berkshire Drive and Colonial Drive, and the North Hoosic neighborhood. These areas are all within the SFHA. Repeated flooding of commercial properties from Christmas Brook and its tributaries has occurred in the downtown area, along Water Street, at Meacham and Latham Streets. The steep slopes along Sloan Road, Scott Hill Road, and Stone Hill Road are newer areas of flood concern.

Source: Town of Williamstown, 2018.

- A high-intensity, short-duration storm event that occurred on May 29, 2013 (addressed below in the discussion of data from the NCEI) flooded properties, destroyed infrastructure, and caused severe stream channel and land erosion. The Treadwell Hollow Road stream crossing was completely destroyed (see upper photo at right). Streambank erosion and exposure of infrastructure was widespread (see lower photo at right).
- In addition, portions of the main sewer interceptor line running from Clarksburg to North Adams along the Hoosic River have been exposed several times due to river bank erosion during extreme flood events. Another sewer main along the Green River has been exposed. Rip rap has been added at all areas to stabilize the banks, but the lines are still at risk.

Ice jams are known to have occurred in and near Williamstown. According to the previous edition of this plan, the most recent such occurrence was in January 2018, when two inches of rain and an unusually warm weather of 50 F, which followed a period of prolonged and unusually cold weather, caused flooding from snow and ice melt across Berkshire County.

As noted earlier, this plan update relies primarily on a roughly ten-year lookback (2014/2015 through 2023/2024). The NOAA Storm Events database (https://www.ncdc.noaa.gov/stormevents/) for Berkshire County lists only one flood event impacting Williamstown for the period 2014-2023. To help augment the record, the year 2013 was added to the search, adding three additional flood events.

Table 21. NCEI Severe Storm Database Entries Covering Floods in Williamstown.

Date	Description	Losses Reported
5/29/13	*Flash Flood.* A warm front lifted northward across western Massachusetts. Although the day began cloudy, some breaks of sun started to occur by early afternoon. At the same time, a potent upper level disturbance over Ontario started to approach the region and a strong jet streak was located just to the north. With a moist southerly flow moving into the region at the surface, it became rather humid as well. With all these ingredients coming together, thunderstorms developed across upstate New York by mid afternoon and began to spread eastward. The thunderstorms reached Berkshire County by the evening hours. Many of the thunderstorms organized into a strong squall line, producing wind damage. With the region already rather saturated from repeated thunderstorms over the past week, the additional heavy rainfall that occurred caused flash flooding in some areas. This caused roads to be closed due to being impassable by flowing water. Portions of Williamstown were hit quite hard, as at least eight roads were damaged due to flooding. Two homes were without road access as a result of the flooding. Thunderstorms pushed east of the area by around midnight, ending the threat of severe weather. Flash flooding was reported along Northwest Hill Road near Williamstown. A garage and its concrete slab was swept away from the force of the flooding. Several culverts along Treadwell Hollow Road in Williamstown were reported to be damaged due to flash flooding. Two homes were without road access as a result of the flooding. Route 43 was reported to be impassable due to flooding.	---
8/9/13	*Flash Flood:* A cold front, aided by strong upper level dynamics, was approaching the region from the Great Lakes. Ahead of this front, a large area of heavy rainfall and embedded thunderstorms moved across the region. Areas of heavy rainfall repeatedly moved across the same portions of the Berkshires. This heavy rainfall of more than three inches in just a few hour period caused streams and creeks to overflow their banks, resulting in flash flooding. Roads were closed as a result of the flooding and water rushed into some basements. By the afternoon hours, the heavy rain had ended and the water begun to recede. Heavy rainfall resulted in flash flooding in Williamstown. Water rushed over roadways and flooded basements.	---

Date	Description	Losses Reported
9/1/13	*Flash Flood:* A moist and humid air mass was in place across the region on Sunday, September 1st. A surface frontal boundary was situated across southern New York into southern New England during the morning hours. During the day, the frontal boundary slowly lifted northward. With enough instability in place due to daytime heating, some showers and thunderstorms developed along this frontal boundary. The showers and thunderstorms tracked over the same locations during the afternoon hours across Berkshire County. As a result of the persistent heavy rain, flash flooding occurred, causing roads to be flooded in the Williamstown area. By the evening hours, the showers and thunderstorms were located north of the region and beginning to weaken, and the threat for flash flooding ended. Several locations along Route 7 in Williamstown experienced flash flooding due to heavy rainfall. In addition, several other local roads in Williamstown were impacted by flood waters.	---
12/18/23	*Flood.* An area of low pressure tracked up the East Coast and intensified in the process as it brought widespread moderate to heavy rainfall across western Massachusetts. The rain fell light to moderate in intensity during the early morning hours, then became heavier during the later morning and early afternoon hours before tapering off. Rainfall totals were between 2 and 4 inches. This rain led to both areal and river flooding across the region. Heavy rains caused portions of Walden Street in the Town of Williamstown to become flooded.	$5,000

Town staff note that Williams College replaced a culvert on Lathan Street in 2019 which has helped to reduce the occurrence of flooding from poor drainage in the vicinity.

Extent

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

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

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

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

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

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

Probability of Future Events

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

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

Vulnerability Assessment

Exposure

In Williamstown, the current 1% annual chance regulatory floodplain (100-year floodplain) covers about 1,021 acres, or approximately 1.8 percent of the Town. In addition to the 100-year floodplains, stormwater has the potential to cause localized flooding.

The fire station, DPW building, and the Wastewater Treatment Plant (WTP) are adjacent to the floodplain and may be impacted during a flood event. There are approximately 259 buildings in the floodplain including all building occupancies. Additionally, several roads experience flooding including Water Street, Meacham Street, and Latham Street. There are several culverts that are clogged which can contribute to flood impacts. The railroad also crosses the floodplain and may be impacted. Six structures listed on the National Register of Historic Places are in the floodplain. According to EPA's Toxic Release Inventory (TRI) database, two facilities which contain hazardous materials are in the 100-year floodplain, including Cable Mills and Hartman's Wheel Alignment. Table 22 shows the types of buildings exposed to the flood and their value. The number in parathesis shows the total number of buildings and building values for the Town.

Table 22. Buildings in 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	200 (3,339)	$50,486,920 ($1,124,225,077)
Mobile Home	2 (40)	$244,182 ($5,327,444)
Multi-Family	4 (180)	$39,346,979 ($391,853,681)

Commercial	26 (269)	$14,112,120 ($480,054,282)
Agricultural	6 (47)	$715,422($8,762,583)
Educational	9 (112)	$1,241,523 ($1,372,461,560)
Government	7 (30)	$334,083 ($57,62,400)
Religious/Non-Profit	1 (20)	$545,520 ($21,066,509)
Industrial	1 (8)	$77,116 ($59,385,182)
Garage/Outbuilding	10 (25)	$110,956 ($2,035,781)
Total	**259 (4,070)**	**$107,214,823 ($3,470,934,498)**

The population exposed to the 100-year floodplain is shown in Table 23. The column on the left shows the population in and around the floodplain (wherever the Census Block overlapped with the floodplain boundary) while the column on the right shows the total population numbers for the Town. The population exposed to the flood hazard is older than the Town as a whole.

Table 23. Population Exposed to 100-Year Floodplain (2020 U.S. Census).

Demographics	**Population in and Adjacent to Floodplain**	**Total Population**
Population	2,276	7,513
Households	1278	3009
White	1,993 (87.6%)	6,047 (80.5%)
Black	35 (1.5%)	262 (3.5%)
American Indian	4 (0.2%)	12 (0.2%)
Asian	86 (3.8%)	500 (6.7%)
Pacific Islander	0 (0%)	0 (0%)
Other Race	37 (1.6%)	172 (2.3%)
Two or More Races	121 (5.3%)	520 (6.9%)
Hispanic or Latino:	88 (3.9%)	462 (6.1%)
Population under 18:	347 (15.2%)	1,063 (14.1%)
Population over 64:	567 (24.9%)	1,680 (22.4%)
Annual Income < $30K/year	209 (16.4%)	499 (16.6%)
Population in EJ Zone*:	365 (16.0%)	1,815 (24.2%)

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

The 100-year Floodplain (FEMA) with the Town's critical facilities is shown in Figure 11.

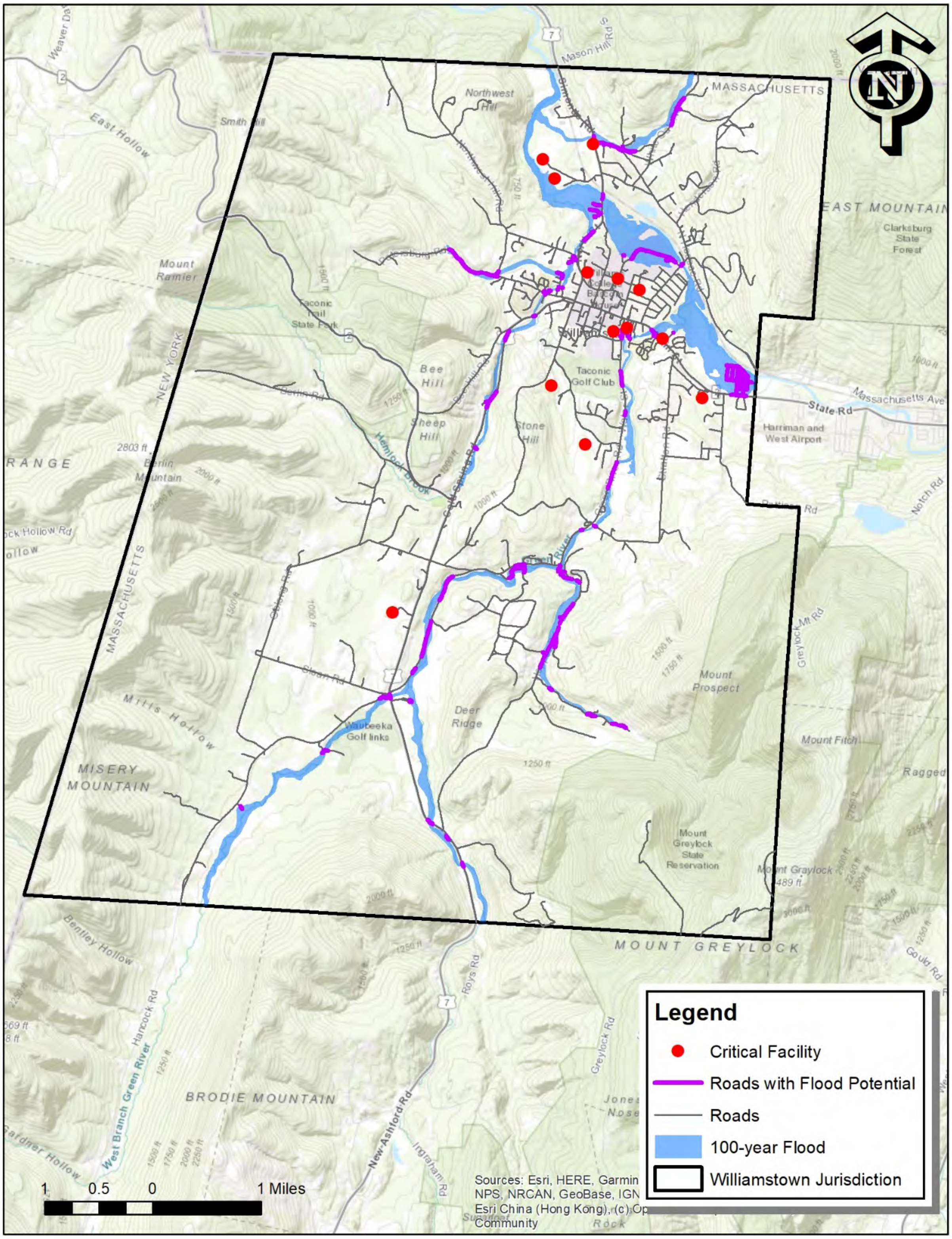


Figure 11. Williamstown Critical Facilities and 100-Year Floodplain.

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

One high hazard dam and one low hazard dam are located in Williamstown; and another high hazard dam is located just east of the Town border. Table 24 identifies the dams within the Town.

Table 24. Dams in Vicinity.

Name	**Ownership**	**Hazard Type**
Williamstown Reservoir Dam	Public	High Hazard
Harmon Pond Dam	Private	Low Hazard
Bee Hill Dam	Public	N/A
Haley Pond Dam	Private	N/A
Hoyt Pond Dam	Private	N/A
Lower Hopkins Pond Dam	Private	N/A
Nichols Pond Dam	Private	N/A
Taconic Park Dam	Public	N/A
Galusha Farm Dam	Private	N/A
Galusha Farm #2 Dam	Private	N/A

The Town's dams are shown in Figure 12 along with the high hazard breach inundation areas.

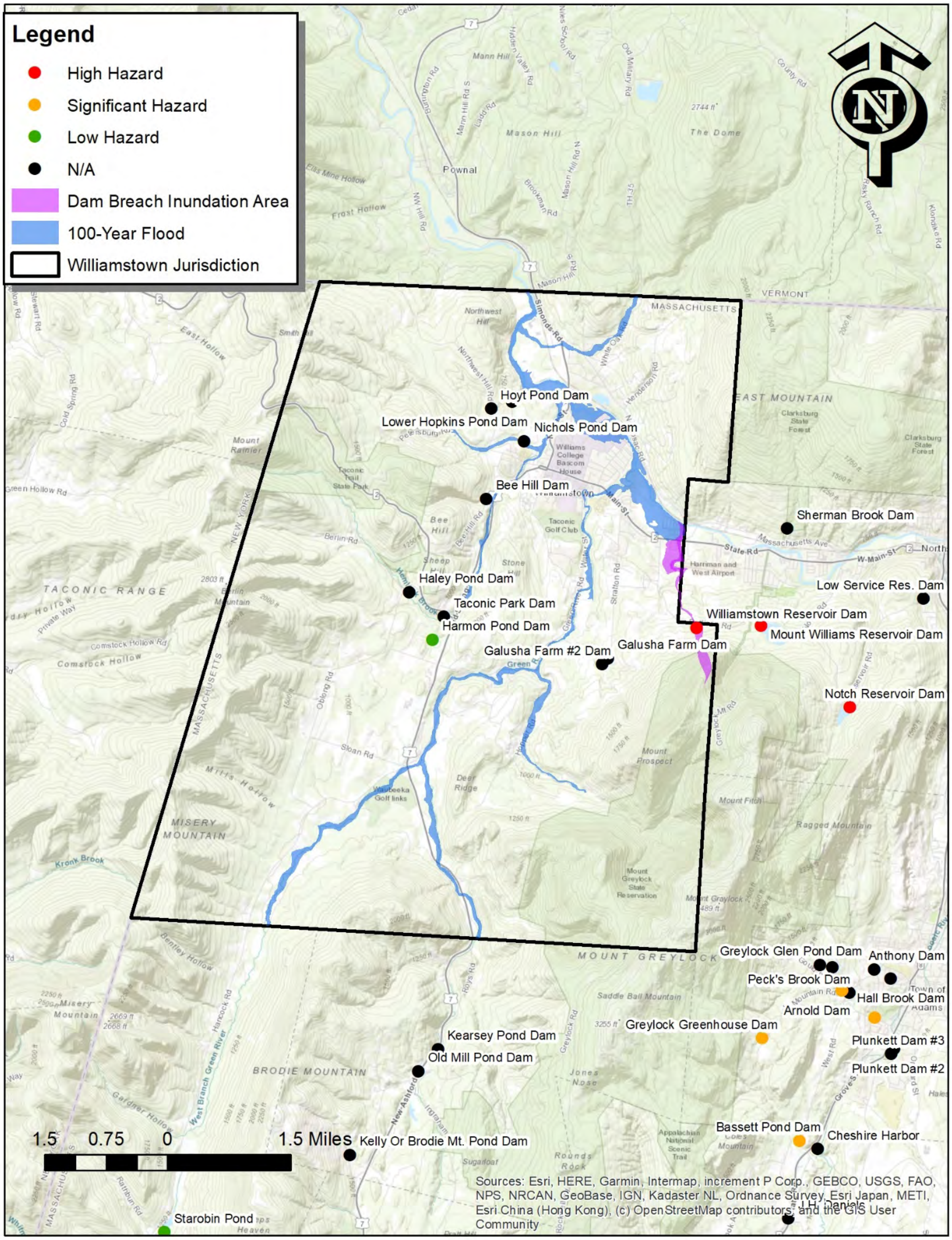


Figure 12. Williamstown Dam Locations.

To determine the exposure of the high hazard dam, the inundation map was collected from the Emergency Action Plan (EAP). This map was 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.

Table 25 shows the high hazard dam, the size of the inundation area resulting from a breach, and any critical facilities in the inundation area. Several roads are also exposed to the dam inundation area including Main Street, Frenier Avenue, Hamel Avenue, Harwood Street, and Luce Road. Parts of the Harriman and West Airport runway may also be impacted too.

Table 25. Critical Facilities Exposed to Dam Inundation Area.

Dam	Area (Acres)	Critical Facilities Exposed
Williamstown Reservoir Dam	127.3	• None

The buildings, categorized by building occupancy, exposed to the dam inundation areas are shown in the table below. The government building is a pump station.

Table 26. Buildings in Williamstown Reservoir Dam Inundation Area.

Building Type	Number of Buildings in 100-Year Floodplain (Total in Town)	Building Value in 100-Year Floodplain (Total in Town)
Single Family	41 (3,339)	$ 270,844 ($1,124,225,077)
Mobile Home	0 (40)	$0 ($5,327,444)
Multi-Family	2 (180)	$ 3,008,044 ($391,853,681)
Commercial	2 (269)	$ 270,844 ($480,054,282)
Agricultural	0 (47)	$0 ($8,762,583)
Educational	0 (112)	$0 ($1,372,461,560)
Government	1 (30)	$ 67,343 ($57,62,400)
Religious/Non-Profit	0 (20)	$0 ($21,066,509)
Industrial	0 (8)	$0 ($59,385,182)
Garage/Outbuilding	0 (25)	$0 ($2,035,781)
Total	**46 (4,070)**	**$3,617,075 ($3,470,934,498)**

Built Environment Impacts

To identify built environment impacts to the Town, FEMA's risk assessment software, Hazus, was implemented. Building footprint data and parcel data were used to update the model while the latest floodplain was also integrated into the software. The economic loss results of the 100-year event are shown in Table 27. The Town's AAL is calculated to be $614,700.

Table 27. Building Loss for the 100-Year Flood Scenario.

Loss Type	Residential ($Million)	Commercial ($Million)	Other Occupancy ($Million)	Total ($Million)
Building Loss	5.44	3.08	0.36	**8.87**
Content Loss	2.59	9.50	0.90	**12.99**
Business Inventory Loss	0.00	1.14	0.15	**1.28**
Business Income Loss	0.22	12.41	0.17	**12.80**
Business Relocation Loss	1.84	2.15	0.08	**4.07**
Rental Income Loss	1.29	1.57	0.02	**2.88**
Wage Loss	0.52	12.66	5.40	**18.58**
Total	**11.9**	**42.51**	**7.08**	**61.47**

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 issues which should be considered.

Population Impacts

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

Using the Hazus software, the 100-year flood scenario results showed that there would be over 100 displaced households and over 50 people seeking public shelter.

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

Environment Impacts

One of the major environmental impacts of a major flood would be the potential release of hazardous materials. According to EPA's Toxic Release Inventory (TRI) database, two facilities which contain hazardous materials are in the 100-year floodplain.

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

Problem Statements for Flood

Table 28. Problem Statements Related to Flooding.

Assets	Problems Associated with Flood
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)	• Broad Brook as a major concern in Williamstown. The stream is very flashy and is the most dangerous of the Hoosic River tributaries. • The Fire Station, DPW building, and WTP are exposed to the 100-year floodplain. • Approximately 259 buildings are in the floodplain including buildings of all occupancies. • Pump station is in dam breach inundation area. • Some culverts in Willliams town are undersized. • Areas of concern for flooding include the Sand Springs Road subdivision, the White Oaks neighborhood, the Berkshire Drive and Colonial Drive neighborhood, and the North Hoosic neighborhood. • Steep slopes along Sloan Road, Scott Hill Road, and Stone Hill Road are relatively newer areas of flood concern.

Assets	Problems Associated with Flood
	• Portions of the main sewer interceptor line running from Clarksburg to North Adams along the Hoosic River have been exposed several times due to riverbank erosion during extreme flood events. • The railroad embankment is at risk to washouts/slides due to severe precipitation and/or river flooding. Recent railroad embankment failures in New England have caused extended shutdowns. • Beaver dams are an issue causing flooding impacts in different parts of the community.
Systems (including networks and capabilities)	• Broad Brook as a major concern in Williamstown. The stream is very flashy and is the most dangerous of the Hoosic River tributaries. The stream jumps its banks and blocks access to public works. The Town plans ahead to make sure equipment is available. • Road closures may interrupt community response systems including Water Street, Meacham Street, and Latham Street.
Natural, historic, and cultural resources	• Six structures are listed on the National Register of Historic Places in the floodplain.
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 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.

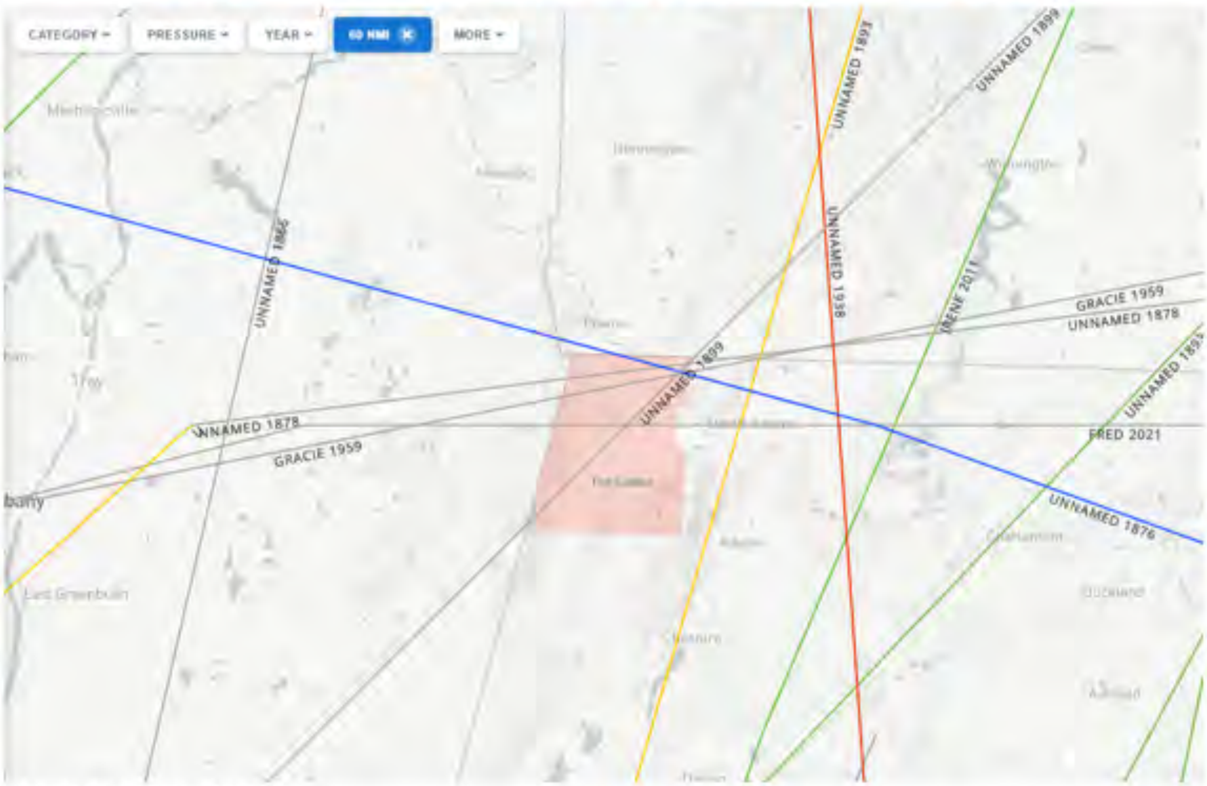
Location

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

Previous Occurrences

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

Historical Tropical Storm Tracks in the Town of Williamstown



Graphic courtesy of NOAA

A number of tropical storms and hurricanes have passed near or through Williamstown since recordkeeping began. Unnamed storms crossed through the city in 1893, 1949, and 1968; these tropical storms are not believed to have caused significant damage. Category 1 hurricanes in 1878 and 1893 are believed to have caused some wind damage. The 1938 hurricane was a Category 3 storm and caused widespread wind damage throughout New England, as did Hurricane Gloria (1985) as a Category 1 storm. T.S. Irene (2011) and T.S. Isaias (2020) were recent damaging storms, causing widespread wind damage and flooding in the region.

Figure 13. Historical Tropical Storm Tracks In Williamstown.

As noted elsewhere, this Plan update relies primarily on a ten-year lookback (2014/2015 through 2023/2024) ending with the date of plan development. During that ten-year period, only one Massachusetts emergency declaration (Storm Lee of 2023) was associated with a tropical system, but it is not listed in the NCEI database of severe storms for Berkshire County. T.S. Isaias of 2020 is the sole tropical storm appearing in the inventory for Berkshire County for the last ten years:

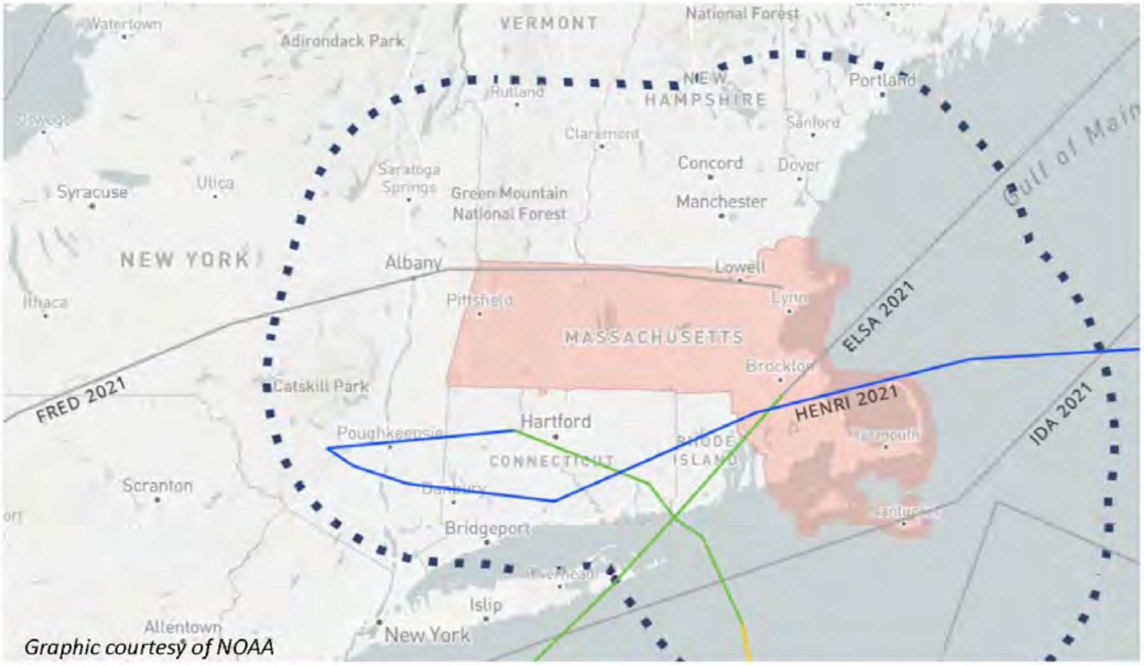
- August 4, 2020: Tropical Storm Isaias tracked northeast from the eastern Carolinas across the mid-Hudson Valley and into New England. The center of the storm passed close to Albany, NY on August 4th. This storm brought tropical storm force winds and moderate rainfall to western Massachusetts through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

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

- T.S. Elsa - July 9, 2021
- T.S. Fred - August 19, 2021 (T.S. Fred passed through Williamstown)
- T.S. Henri - August 22-23, 2021
- T.D. Ida - September 1, 2021

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

Impacts of the 2021 Hurricane Season on Massachusetts



Graphic courtesy of NOAA

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 14. Tracks for Tropical Storms that Impacted Massachusetts 2021.

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

Extent

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 today to estimate wind strengths, but is more common in coastal communities and not typical for the Berkshires.

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

Table 29. Saffir-Simpson Scale.

Saffir-Simpson Hurricane Wind Scale

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

Source: National Hurricane Center, NOAA

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

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

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

Probability of Future Events

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

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

Vulnerability Assessment

Exposure

High winds and heavy rain and/or hail associated with hurricanes and tropical storms can cause damage to utilities, structures, roads, trees (potentially causing vehicle accidents) and injuries and death. Other associated concerns are debris management issues including debris removal and identification of disposal sites. All assets in Williamstown should be considered exposed to high winds while specific areas are exposed to hurricane surge. Figure 16 shows the 100-year windspeeds identified in the ASCE 7-98 publication.

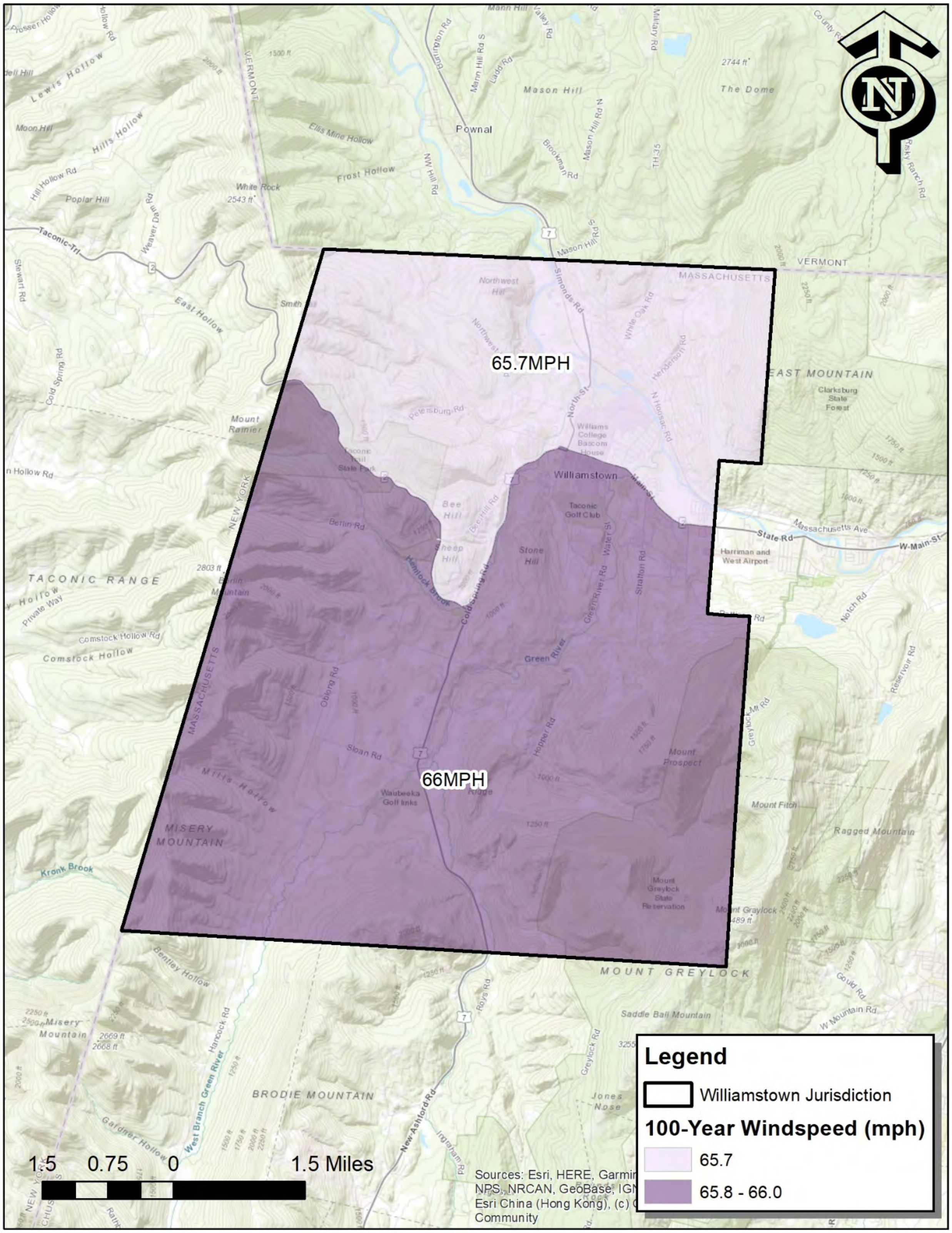


Figure 15. 100-Year Windspeeds (ASCE 7-98).

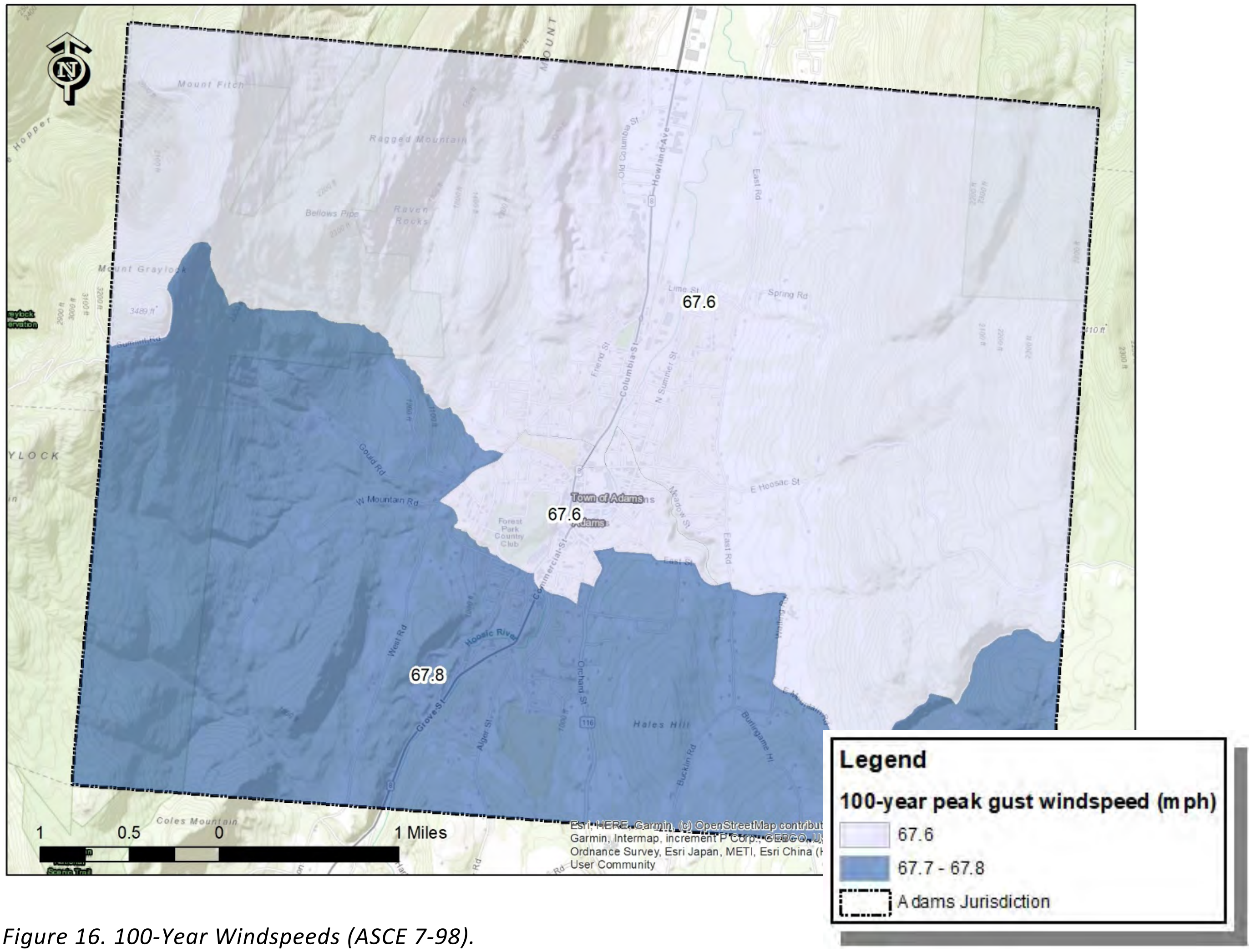


Figure 16. 100-Year Windspeeds (ASCE 7-98).

Built Environment Impacts

To identify built environment impacts to the Town resulting from wind damage, FEMA's risk assessment software, Hazus, was implemented. The economic loss results of the 500-year event are shown in Table 30 while the results for the 1000-year event are shown in Table 31. The Town's AAL is calculated to be $6,260.

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

Loss Type	Residential ($Million)	Commercial ($Million)	Other Occupancy ($Million)	Total ($Million)
Building Loss	6.24	0.50	0.99	7.73
Content Loss	2.74	0.08	0.30	3.12
Business Inventory Loss	0.00	0.00	0.00	0.00
Business Income Loss	0.00	0.07	0.21	0.28
Business Relocation Loss	0.12	0.05	0.23	0.40
Rental Income Loss	0.07	0.03	0.02	0.12
Wage Loss	0.00	0.08	0.53	0.61
Total	**9.17**	**0.81**	**2.28**	**12.26**

Table 31. Building Losses Due to Wind for a 1000-Year Scenario.

Loss Type	Residential ($Million)	Commercial ($Million)	Other Occupancy ($Million)	Total ($Million)
Building Loss	9.92	0.94	1.80	12.66
Content Loss	4.44	0.18	0.58	5.20
Business Inventory Loss	0.00	0.01	0.00	0.01
Business Income Loss	0.00	0.13	0.32	0.45
Business Relocation Loss	0.26	0.11	0.42	0.79
Rental Income Loss	0.15	0.06	0.03	0.24
Wage Loss	0.00	0.16	0.84	1.00
Total	**14.77**	**1.59**	**3.99**	**20.35**

Population Impacts

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

For the 500-year event, Hazus predicts that there will be no displaced households and no people seeking public shelter from the high windspeeds. For the 1000-year event, Hazus predicts that there will be 3 displaced households and 2 people seeking public shelter from the high windspeeds.

Environment Impacts

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

Problem Statements for Hurricanes/Tropical Storms

Table 32. Problem Statements for Hurricanes/Tropical Storms.

Assets	Problems Associated with Hurricanes and Tropical Storms
People (including underserved communities and socially vulnerable populations)	• Vulnerable populations may need to be evacuated and could be displaced from their homes.
Structures (including facilities, lifelines, and critical infrastructure)	• Wind may cause trees to fall into structures and infrastructure, and roadways. The Town removes street trees when possible, but many trees are not the Town's responsibility. • 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. National Grid is believed very vulnerable in the town, and backups are needed (such as the Williams College microgrid).
Systems (including networks and capabilities)	• First responders may have difficulty reaching people if roads are closed due to tree debris.

Assets	Problems Associated with Hurricanes and Tropical Storms
Natural, historic, and cultural resources	• Historic buildings may experience damage during high wind events, especially the roofing and windows. Water entering these buildings could impact important historic and cultural artifacts.
Activities that have value to the community	• A severe hurricane wind and rain event could negatively impact outdoor activities in the Town.

Invasive Species

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

Description

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

Some examples of invasive insect species include:

- Nantucket Pine Tip Moth (native pest) is a moth with heads, bodies, and appendages covered with gray scales with mottled rusty-red markings. Larvae cause damage to young trees (up to five years old) by feeding inside growing shoots, buds, and conelets. The preferred host is the loblolly pine.
- Bark Beetles (native pest) include more than 600 species of beetles which serve in important ecological roles in small numbers where they live in dead, weakened, and dying host conifer trees.
- Forest Tent Caterpillar (native pest) has the biggest footprint of any indigenous tent caterpillar in North America (Furniss and Carolin 1977) and is a major defoliator of a variety of deciduous hardwood trees. The caterpillars spin silken mats on the trunks and large branches of trees

where they molt and feed. Forest Tent Caterpillars can reach outbreak proportions causing massive defoliation of host trees and becoming a nuisance to people.

- Pine Reproduction Weevils (native pest) is a very dark, elongate, oval insect up to 1/2 inch long with indistinct to distinct gray or pale orange spots of scales on the wings and thorax. They feed at night on the conifer seedlings or near the tips of branches of larger plants. Females lay their eggs on the roots of these trees. The weevils breed in all species of pines, hemlocks, junipers, spruces, firs, and cedars.
- Hardwood Borers (native pest) usually attack hardwoods experiencing some kind of stress although the clear-wing moths attack healthy trees. These insects attack the tree year after year and may eventually weaken it enough that it is prone to wind breakage. Some borers develop in the root system damaging young trees.
- Hemlock Wooly and Balsam Wooly Adelgid (non-native pest) is a very small, invasive, aphid-like insect that attacks North American hemlocks (Hemlock Wooly) and firs (Balsam Wooly). They can be identified by the white wooly masses that form on the underside of branches at the base of the tree’s needles. They stay at this location for the rest of their lives. Their feeding disrupts the flow of nutrients to the tree twigs and needles leading to a decline in tree health and mortality in 4 to 10 years.
- Gypsy Moth (non-native pest) is an insect which feeds on a large variety of tree leaves from oak, maple, apple, crabapple, hickory, basswood, aspen, willow, birch, pine, spruce, hemlock, and others. It does prefer oak tree leaves, however. Periodically, large populations can cause defoliation damaging and killing trees they are feeding on.
- Spotted Lanternfly (non-native pest) is an invasive insect first detected in the U.S. in 2014. It feeds on a variety of fruit, ornamental, and wood trees and could seriously impact the grape, orchard, and logging industries.

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

Previous Occurrences
Invasive species do not represent a singular event but rather an ongoing or emerging problem, so it is difficult to measure the frequency of occurrences. A comprehensive list of invasives can be found at https://www.massnrc.org/mipag/invasive.htm. Invasives of current concern to forest health

(https://www.mass.gov/service-details/current-forest-health-threats) in Berkshire County are reportedly:

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

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

Table 33. Statewide Budgets for Addressing Invasive Species.

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

Williamstown's Open Space and Recreation Plan (2016) notes that "The greatest challenges facing Williamstown's environmental quality at the current time are the large scale macro level changes from climate change and the spread of invasive species." The plan further states that "While at the current time the most pressing threat to Williamstown's forests is the presence of the Emerald Ash Borer in nearby Dalton and Pittsfield, it is likely that additional destructive invasive pests will establish themselves in Williamstown. The hemlock wooly adelgid and the Asian longhorned beetle are not currently immediate threats to Williamstown but could be in the future." The CRB (2018) recommended promoting a Forest Management plan for invasive insects.

The previous edition of this hazard mitigation plan notes the following:

- The presence of the Emerald Ash Borer, first found in Massachusetts in the neighboring town of Dalton in 2012, has quickly spread throughout central Berkshire County. This rapidly-spreading invasive insect quickly kills its host trees within a few years of settling in an area, leading to massive die-offs of all ash trees within an area. This will increase the amount of dead limbs, brush and standing dead trees throughout forests in the county. UMass Extension states that, as a component of Massachusetts forests, the highest percentages of ash are located in Berkshire County.
- Other invasive insects such as the Hemlock Wooly Adelgid threaten healthy hemlock stands and the Asian Longhorn Beetle threatens ash, maples, elms, poplar and willow.
- Climate change is expected to impact forest species composition in a variety of ways, with cooler species such as sugar maples and hemlocks retreating northward and higher in elevation and invasive forest pests increasing tree mortality of key species. As hemlocks are a species that tend to be found in cool, steeply sloped ravines, the dieback of this species could result in an increase in unstable slopes.

Over the course of the meetings held during the development of this plan, Town staff confirmed that the Emerald Ash Borer has caused significant damage and killed many trees in Williamstown. These dead trees are then a risk relative to severe weather events with high winds.

Extent

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

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

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

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

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

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

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

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

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

Table 34. Early Detection Information for Addressing Invasive Species.

Species	Common Name	Current County of Distribution (November 2010)	Notes
Arthraxon hispidus	Hairy joint grass; jointhead; small carpetgrass	Franklin (historically)	This species is not currently known in Massachusetts; it was last collected in Deerfield in 1973. This is an annual grass that co-occurs with Japanese stilt grass further south.
Butomus umbellatus	Flowering rush	Essex, Middlesex	*Butomus umbellatus* is an aquatic perennial herb which reproduces by seed dispersal or vegetatively by bulbils
Carex kobomugi	Japanese sedge; Asiatic sand sedge	Barnstable (historically)	Native to northeastern Asia, Carex kobomugi is an invasive plant that invades coastal sand dunes and can outcompete native dune-binding grasses. This species was last collected in 1973.
Egeria densa	Brazilian waterweed; Brazilian elodea	Essex, Middlesex, Norfolk, Plymouth, Worcester	This species is often confused with Hydrilla and native *Elodea* spp. but has larger, nickel-sized flowers. This is a submerged aquatic species whose rapid growth often leads to dense mats on the water surface, which crowds out native plants and damages fish and aquatic habitat. The mats can also impede boat traffic.
Glyceria maxima	Tall mannagrass; reed mannagrass	Essex	This perennial grass invades low shrub-swamps and other wetland
Heracleum mantegazzianum	Giant hogweed	Berkshire, Franklin, Hampden, Hampshire, Middlesex, Norfolk,	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.

Species	Common Name	Current County of Distribution (November 2010)	Notes
		Suffolk, Worcester	
Hydrilla verticillata	Hydrilla; water-thyme; Florida elodea	Barnstable, Plymouth, Worcester	Hydrilla is an invasive non-native submerged plant. This plant grows and reproduces rapidly, displacing native species, hampering recreational uses, and slowing water flow. Hydrilla, once established, can replace native vegetation and affect fish populations.
Myriophyllum aquaticum	Parrot-feather; water-feather; Brazilian watermilfoil	Norfolk	Parrot-feather is a perennial aquatic plant native to South America. This plant typically grows in freshwater, with a preference for areas with high nutrient contents. Parrot-feather has been introduced worldwide for use in indoor and outdoor aquaria.
Nymphoides peltata	Yellow floating heart	Hampden, Middlesex, Worcester	Yellow floating heart is native to Asia and now is found in over 15 states in the U.S. This plant forms dense mats on the water surface, restricting light penetration into the water and decreasing air exchange between the water's surface and the atmosphere. Algae can be shaded out by this plant, resulting in food chain disruptions for an entire lake.
Persicaria perfoliata syn.: Polygonum perfoliatum	Mile-a-minute vine or weed; Asiatic tearthumb	Barnstable, Essex, Franklin, Norfolk, Plymouth, Suffolk	Mile-a-minute vine is a barbed vine that can grow up to 6 inches a day. This vine smothers other herbaceous plants, shrubs, and even trees by growing over them and blocking their access to sunlight.

Species	Common Name	Current County of Distribution (November 2010)	Notes
Peuraria montana ssp. lobata	Kudzu; Japanese arrowroot	Barnstable, Bristol, Essex, Middlesex, Plymouth, County	Kudzu is native to Japan and southeast China and was introduced to the U.S. during the Philadelphia Centennial Exposition in 1876. Once established, kudzu can grow at a rate of a foot per day, with mature vines as long as 100 feet.
Senecio jacobaea	Tansy ragwort; stinking Willie; stinking Billy	Essex County Suffolk County Worcester County	This biennial herb is a weedy plant that infests woodlands, pastures, and hayfields. This plant is toxic to all classes of livestock but most toxic to cattle and horses. The plant can cause chronic liver disease, and affected animals usually die within a few weeks after ingesting it
Trapa natans	Water chestnut	Berkshire, Bristol, Essex, Franklin, Hamden, Hampshire, Middlesex, Suffolk, Worcester	Water chestnut is an annual aquatic species with both floating and submerged leaves.

The extent associated with Emerald ash borer, Hemlock wooly adelgid, and Asian longhorn beetle identified under Previous Occurrences are not well addressed by the classification systems presented in this section, as they are insects. Massachusetts DCR maintains online resources and fact sheets for Emerald ash borer, Hemlock wooly adelgid, and Asian longhorn beetle; and these resources are appropriate for Williamstown. If invasive terrestrial and aquatic vegetation become problematic in Williamstown, the above resources can help characterize them.

Probability of Future Events

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

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

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

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

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

Vulnerability Assessment

Exposure

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

Built Environment Impacts

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

Population Impacts

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

Environment Impacts

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

Problem Statements for Invasive Species

Table 35. Problem Statements for Invasive Species.

Assets	Problems Associated with Invasive Species
People (including underserved communities and socially vulnerable populations)	• None apparent or projected.
Structures (including facilities, lifelines, and critical infrastructure)	• None apparent or projected.
Systems (including networks and capabilities)	• Additional Town resources may be required in areas noted below.

Natural, historic, and cultural resources	• Japanese knotweed, and bittersweet invasive species are problematic in the Town. • Emerald Ash Borer continues to kill or damage trees which then become hazards. • Additionally, aquatic invasive species have been identified in the Town.
Activities that have value to the community	• Recreational activities may be adversely impacted, depending on location, and especially in parks and natural areas.

Landslides

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

Description

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

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

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

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

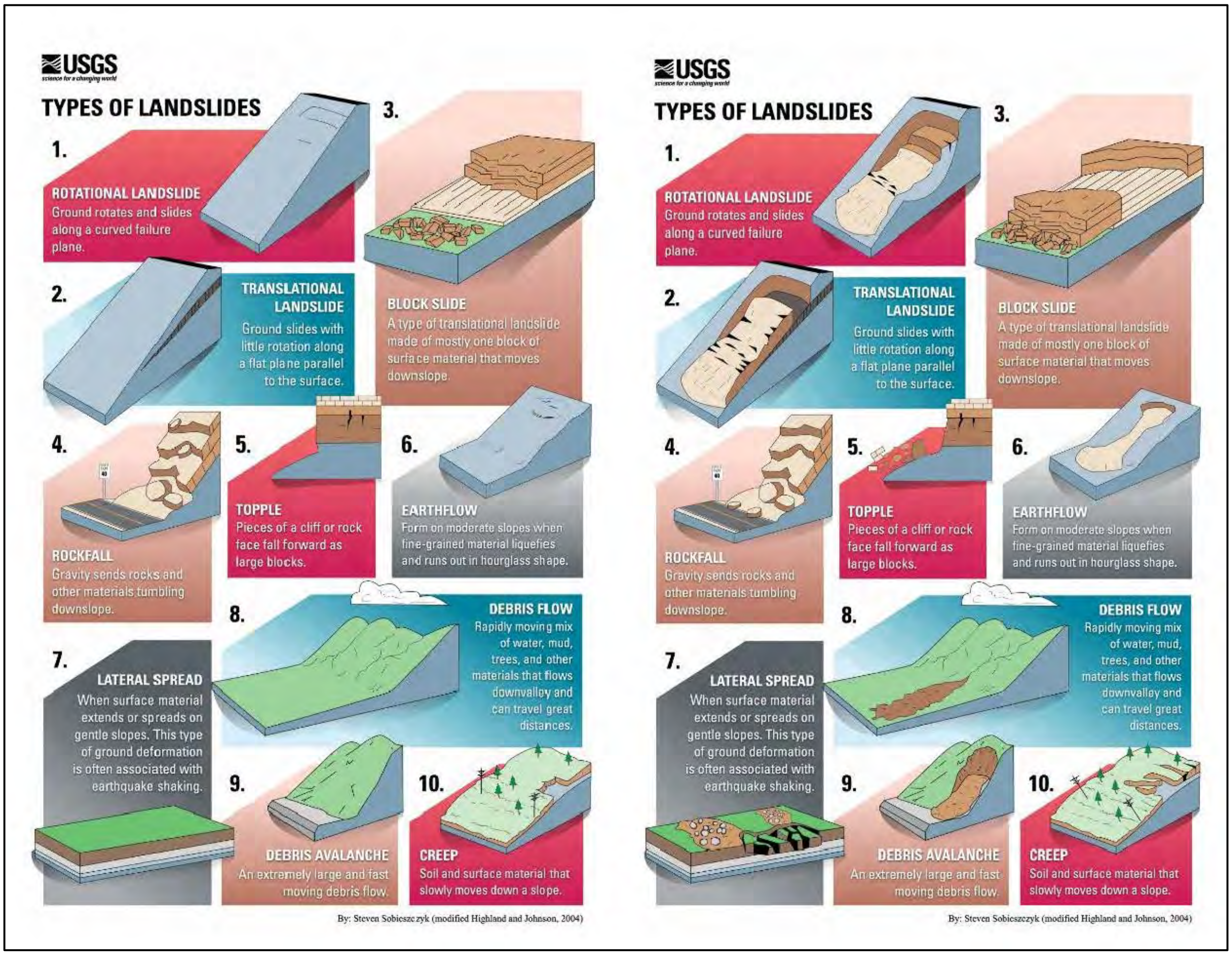


Figure 17. Types of Landslides.

Location

In 2013, the Massachusetts Geological Survey and University of Massachusetts Amherst published a Slope Stability Map of Massachusetts (Figure 18). 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 but appear to be particularly unstable in northern Berkshire County. Landslide risk is therefore assumed present in Williamstown.

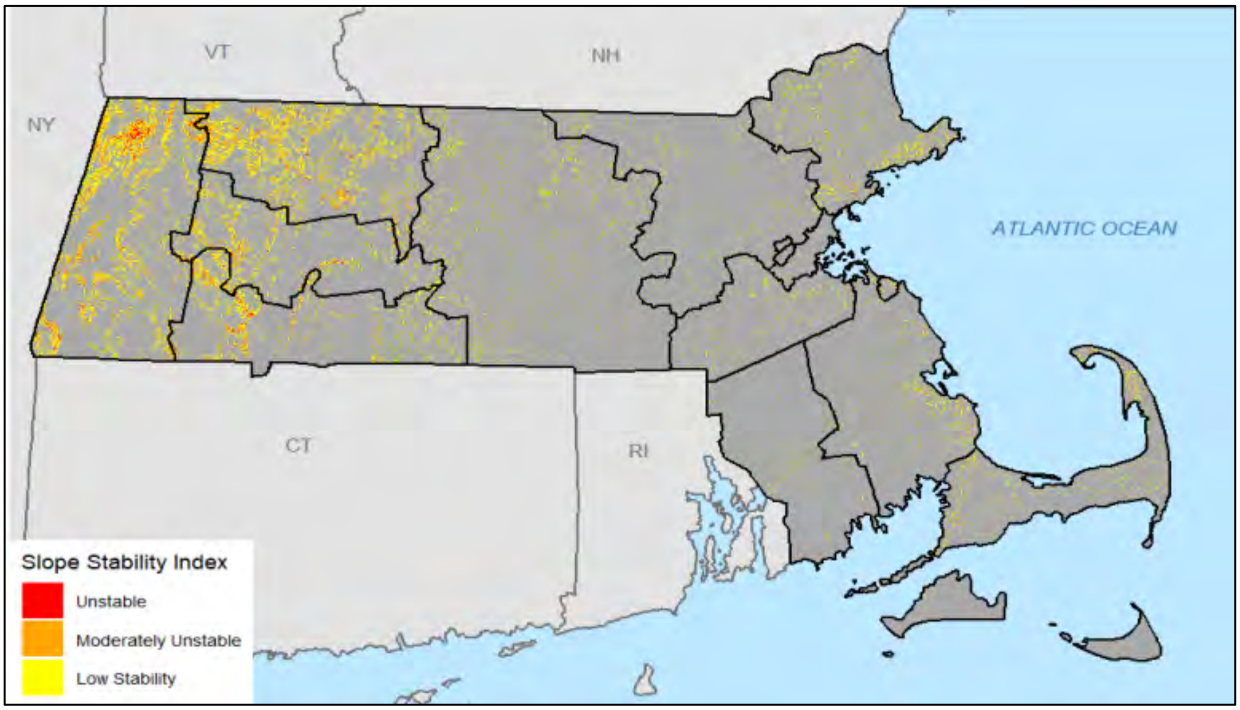


Figure 18. Slope Stability Map of Massachusetts (Created by ERG using data from Mabee & Duncan (2013)).

Previous Occurrences

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

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

The NCEI severe storm database reported a “debris flow” near Adams. This is a relatively rare use of the database, as landslides are rarely reported to NCEI. According to the entry, on December 25, 2020, “an area of low pressure tracking from the Great Lakes to Hudson Bay advected in an unseasonably warm air mass into the region” and “Rain gradually overspread the region from west to east during the day on December 24 with the steadiest, heaviest rainfall during the overnight hours and early morning hours of December 25. Rain showers continued through the day on December 25 and changed to snow showers during the evening and overnight hours of December 25-26 as colder air returned. The region still dealt with nearly the entire snowpack from the blockbuster winter storm from December 16-17. While the snow compacted over time, very little water was lost from the snow. Observations concluded that between 1.5 to 2.5 inches of water was in the snowpack prior to this event and most if not all of this snow melted. Rainfall totals across western Massachusetts ranged from 1.00 to 2.50 inches. These amounts do not include the additional 1.50 to 2.50 inches of water that melted from the snowpack. The combination of warm air, rainfall and melting snowpack likely led to a debris flow outside the west portal of the Hoosac Tunnel near North Adams. Eight inches of mud and stone had to be cleared from the rails, resulting in two freight trains being delayed.”

The Community Resilience Building Summary Report for Williamstown does not identify landslides as a primary concern to Williamstown. The 2019 HMP notes that landslides affect small areas at a very low frequency with a limited severity, with the areas of highest mapped risk associated with Mount Greylock, Mount Prospect, Berlin Mountain, Mount Rainer, and Northwest Hill. In particular, areas of landslide risk are located along the ravines associated with mountain streams such as Hemlock Brook and its tributaries, Sweet Brook, and others. Other areas noted by Town officials prone to subsidence are located on Scott Road, Pine Cobble Road, North Hoosac Road, Green River Road, and Bee Hill Road (above Hemlock Brook). At this time, Town officials note that an important section of Hoosic Road is sliding; and that Pine Cobble Road continues to have landslide risk.

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 18), with areas of higher slope instability considered to also be more susceptible to the landslide hazard.

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

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

Rigorous landslide classification systems are not used in Williamstown and have only occasionally been used in Massachusetts. However, if a significant or damaging landslide occurred in Williamstown, 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.

Probability of Future Events

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

Vulnerability Assessment

Exposure

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

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

The other building data was overlaid with the unstable and moderately unstable areas. There were 27 buildings identified in the moderately unstable area and no buildings identified in the unstable areas. The one government building is in the State Park. Table 36 shows the result of this analysis.

Table 36. Buildings in Moderately Unstable Area.

Building Type	Number of Buildings in Moderately Unstable Areas (Total in Town)	Building Value in Moderately Unstable Areas (Total in Town)
Single Family	25 (3339)	$7,220,568 ($1,124,225,077)
Mobile Home	0 (40)	$0 ($5,327,444)
Multi-Family	1 (180)	$142,663 ($391,853,681)
Commercial	0 (269)	$0 ($480,054,282)
Agricultural	0 (47)	$0 ($8,762,583)
Educational	0 (112)	$0 ($1,372,461,560)
Government	1 (30)	$53,759 ($57,62,400)
Religious/Non-Profit	0 (20)	$0 ($21,066,509)
Industrial	0 (8)	$0 ($59,385,182)
Garage/Outbuilding	0 (25)	$0 ($2,035,781)
Total	**27 (4070)**	**$7,416,989 ($3,470,934,498)**

None of the structures in the moderately unstable areas also have environmental justice concerns.

Figure 19 shows the landslide susceptibility map for the Town. The red and pink areas are more susceptible to landslides.

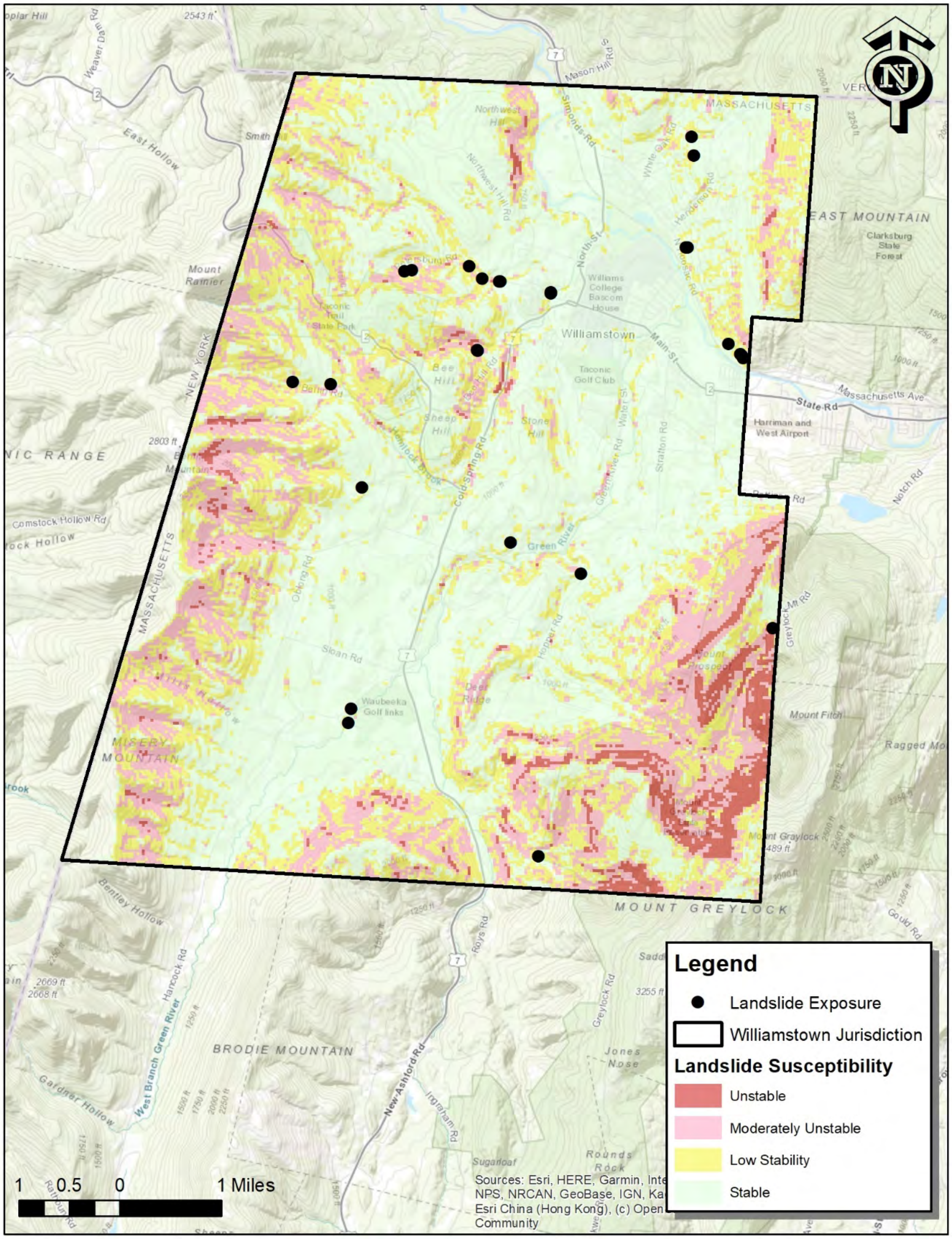


Figure 19. Landslide Map.

Built Environment Impacts

Historic data for landslide events indicate that between 1993 and 2023, no landslide events were recorded in Williamstown. Still, there is a likelihood even if it's slight. Assuming a total loss for a building due to a 100-year landslide event, and the average value of a building in the moderately susceptible zone is $274,703, this would result in an AAL of $2,747.

Population Impacts

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

Environment Impacts

There are some unstable and moderately unstable areas around the transportation routes (roads and railways) used to move hazardous materials.

Problem Statements for Landslides

Table 37. Problem Statements for Landslides.

Assets	Problems Associated with Landslides
People (including underserved communities and socially vulnerable populations)	• Vulnerable populations in isolated areas may be cut off if a landslide impacts specific roads.
Structures (including facilities, lifelines, and critical infrastructure)	• A very susceptible area is located along Hoosic Road between Williamstown and Vermont. • Historically, the Pine Cobble neighborhood has been impacted and has elevated risk. • Some residential structures reside adjacent to moderately unstable areas and could be impacted. • Roadways may be impacted by landslides.
Systems (including networks and capabilities)	• Roads may be impacted reducing the Town's response capabilities.

Assets	Problems Associated with Landslides
Natural, historic, and cultural resources	• Parks and other natural areas reside in or adjacent to the unstable or moderately unstable areas. • 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.
Activities that have value to the community	• Trail recreation in open space areas could be impacted.

Other Severe Weather

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

> The Town of Williamstown Community Resilience Building Workshop Summary of Findings (2018) lists "wind" and "severe weather" two of the top hazards of concern.

Description

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

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

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

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

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

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

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

Location

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

Previous Occurrences

The NOAA Storm Events database (https://www.ncdc.noaa.gov/stormevents/) for Berkshire County lists numerous severe storms affecting the area of Williamstown from 2014/2015 through 2023/2024. The individual damage figures for these events appear nominal but given the frequency of events, the overall losses from severe storms are striking. Some of these events were truly associated with winter storms, but the lack of snowfall contributed to them being classified as high wind events by NOAA.

Table 38. NCEI Severe Storm Database Entries Covering Other Severe Storms in Williamstown.

Date	Description	Losses Reported
6/25/14	*Lightning:* A very moist and humid air mass was in place across the region on Wednesday, June 25th. As a slow moving cold front approached from the west, bands of heavy rain showers and thunderstorms developed ahead of the boundary. A lightning strike downed a tree on Route 43 (Water Street) in Williamstown. The road was briefly closed as a result of the downed tree, which had to be removed. The local utility company reported 239 customers without power in the town.	$2,000
7/8/14	*Thunderstorm Wind:* A very warm and humid air mass was in place over the region on Tuesday, July 8th. The region was ahead of a strong cold front that was moving eastward from the Great Lakes Region. Aided by a strong jet streak aloft and a potent upper level shortwave trough, the cold front triggered a line of thunderstorms that produced damaging winds across upstate New York during the afternoon and early evening hours. As the line of thunderstorms reached western New England by the late evening, they weakened considerably. However, one portion of the line remained strong enough to produce damaging winds in Williamstown. A large tree was downed due to thunderstorm winds on a house on Cole Avenue in Williamstown.	---
2/25/16	*Thunderstorm Wind:* A strong area of low pressure was located over the Ohio Valley on Wednesday, February 24th and the storm headed northeast towards the region. A warm front extended out of this storm, allowing for periods of rainfall during the day Wednesday, February 24th and into the evening hours. As the warm front passed through the region during the overnight hours, temperatures became quite mild for late February reaching into the 50s and 60s. In addition, thunderstorms ahead of the storm's cold front moved from	---

	the mid-Atlantic states up towards western Massachusetts. The narrow line of thunderstorms became severe over the northern Berkshires, producing damaging wind gusts. The strongest gusts occurred in the Williamstown area, downing several trees and damaging some homes. • A fence was damaged due to thunderstorm wind gusts along Galvin Road in Williamstown and pieces of it were thrown through the 2nd floor window of a home. In addition, several trees were damaged along Galvin Road and some of them fell on homes, damaging the roofs. • A house was damaged due to thunderstorm winds along Massachusetts Avenue in Williamstown. In addition, some tree tops were snapped along and just north of Massachusetts Avenue as well.	
10/30/17	*Strong Wind:* A low pressure system developed off the southeast coast and rapidly intensified as it tracked northward tapping into tropical moisture. The powerful low moved across eastern New York and western New England Sunday night into early Monday morning bringing damaging winds, power outages, heavy rainfall and flooding to the region. As the system departed, strong winds ensued and caused numerous power outages and trees down across western Massachusetts. Total rainfall amounts reported across Berkshire county, MA ranged from 1.91 inches near Williamstown to 4.5 inches near Becket. A CWOP station near Williamstown measured a wind gust of 50 mph.	$1,000
6/21/21	*Thunderstorm Wind:* A severe thunderstorm moved across western Massachusetts during the evening hours of Monday, June 21, 2021. A tree was downed on US Route 7 at Cold Spring Road.	---

Although not yet in the NCEI database, Town staff reported that a microburst occurred in July 2024 in Williamstown that knocked down many trees.

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

Table 39. USDA Disasters Events That Refer to Severe Storms.

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

The principal concern of Town staff related to severe weather is the potential for power and other utility outages related to raised (and exposed) utility lines. According to the CRB report (which lists power outage as one of the top hazards for Williamstown), the combination of mountainous terrain and limited demand limits the redundancy of service for electricity, landline telephone, and cell phone service. During severe weather, cell service is often incapacitated which has direct implications for emergency management and town-wide communications. Town staff continue to believe that National Grid electrical infrastructure is vulnerable to severe weather (they reported that there were many power outages throughout the summer of 2024) and that more backups are needed such as the microgrid at Williams College.

Extent

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

Hailstorms are not typically characterized by intensity or duration; instead, the size of hailstones is described. 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 storms and hail events in Williamstown, as they have been used for many of the severe storms that have occurred in the Berkshires. Severe storms have not been characterized outside of these systems of classification.

Probability of Future Events

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

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

An average of 21 people per year died from lightning strikes in the United States from 2013 to 2023. Most lightning deaths and injuries occur outdoors, with 45% of lightning casualties occurring in open fields and ballparks, 23% under trees, and 14% involving water activities. The ResilientMass Plan notes that 8 fatalities and 148 injuries have occurred in Massachusetts as a result of lightning events between 1990 and 2022 (NOAA, 2022). Given that thunderstorm event frequency is expected to slightly increase as a result of climate change, it is likely that risks associated with lightning may increase.

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

Vulnerability Assessment

Exposure

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

Built Environment Impacts

Severe thunderstorms, and their associated hail and lightning events, brought about property damage in Williamstown and adjacent towns in previous years. From 2014 until 2023, there was $313,800 in property damage and $208.25K in crop damage to Williamstown and adjacent towns. This equates to an AAL of $52,205.

Population Impacts

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

Environment Impacts

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

Problem Statements for Other Severe Weather

Table 40. Problem Statements for Other Severe Weather.

Assets	Problems Associated with Other Severe Weather
People (including underserved communities and socially vulnerable populations)	• People in Williamstown have been frequently disrupted by severe weather events and other more frequent wind and thunderstorm events. Vulnerable populations may be isolated if roads are closed.
Structures (including facilities, lifelines, and critical infrastructure)	• Wind may cause trees to fall into structures and infrastructure, and roadways. The Town removes street trees when possible, but many trees are not the Town's responsibility. • 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. National Grid is believed very vulnerable in the town, and backups are needed (such as the Williams College microgrid). • Given the frequency of events in and around Williamstown, the impacts occur often and can occur anywhere in the Town.
Systems (including networks and capabilities)	• First responders may have difficulty reaching people if roads are closed due to tree debris.

Assets	Problems Associated with Other Severe Weather
Natural, historic, and cultural resources	• These can be adversely impacted depending on the specific locations of damage.
Activities that have value to the community	• These can be adversely impacted depending on the specific locations of damage.

Severe Winter Storms

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

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

Description

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

Storm systems powerful enough to cause blizzards usually form when the jet stream dips far to the south, allowing cold air from the north to clash with warm air from the south. Blizzard conditions often develop on the northwest side of an intense storm system. The difference between the lower pressure in the storm and the higher pressure to the west creates a tight pressure gradient, resulting in strong winds and extreme conditions due to the blowing snow. Blowing snow is wind-driven snow that reduces visibility to 6 miles or less, causing significant drifting. Blowing snow may be snow that is falling and/or loose snow on the ground picked up by the wind.

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

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. Coastal communities of the Commonwealth are more susceptible to the impacts of a Nor'easter, which can bring heavy snow. Overall, winter storms can affect the entirely of Massachusetts, including the geographic extent of Williamstown.

Previous Occurrences

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

- Massachusetts Severe Winter Storm, Snowstorm, and Flooding (DR-4110-MA)

  Incident Period: February 8, 2013 – February 9, 2013
  Public Assistance (PA) reimbursements eligible for entire state

DR-4110 was likewise subject to a concurrent emergency declaration in Massachusetts. The PA assistance reimbursements associated with DR-4110 for the Town totaled approximately $205,000. This indicates that severe winter storms comprise a notable expenditure for Williamstown.

The NOAA Storm Events database (https://www.ncdc.noaa.gov/stormevents/) for Berkshire County lists numerous severe winter storm events impacting the northern Berkshires region for the period 2014-

2023, but Williamstown is not specifically mentioned in any entry. A selection of events is provided below.

Table 41. NCEI Severe Storm Database Entries Covering Winter Storms in Williamstown.

Date	Description
12/14/13	Snow fell at rates in excess of one inch per hour over much of the region. During the overnight hours, some sleet mixed in with the snow, especially across southern parts of Berkshire County. By the end of the storm, snowfall amounts ranged from nearly around 6 inches in Pittsfield to about 11 inches in Adams.
1/1/14	A long lasting snowstorm occurring across all of western Massachusetts between the evening of New Years Day and the morning of January 3rd, 2014. By the morning hours of Friday, January 3rd, snowfall amounts ranged from 4 inches in the southern Berkshires to 10 inches in the northern Berkshires. In addition, temperatures remained very cold and with a cold northwest wind, wind chill values were below zero.
2/5/14	A widespread snowfall occurred across all of western Massachusetts on Wednesday, February 5th. By the time the storm finished, the entire region received a widespread 6 to 12 inches of snow. The heaviest amounts occurred across the high terrain of the Berkshires.
2/13/14	An exceptional winter storm impacted all of western Massachusetts between Thursday, February 13th and the morning of Friday, February 14th. By the time snow ended, 9 to 21 inches of snow was reported in Berkshire County. The highest amounts were across the high terrain of the Berkshires. Very strong winds, gusting as high as 40 mph, occurred as the storm pulled away. This led to significant blowing and drifting of the snowfall through the entire day on February 14th.
2/1/15	Most areas in the Berkshires received around a foot of snowfall.
2/7/15	A three day period of snowfall impacted all of western Massachusetts between February 7th and 9th, 2015. By the time all of the snow ended, amounts ranged between 6 and 16 inches across the area, with the heaviest amounts in the higher terrain of the northern Berkshires.
2/12/17	Two low pressure systems approached the northeastern US on Sunday, February 12. The snow was heavy at times during the morning and early afternoon, with accumulation rates of 1 to locally 2 inches per hour at times. In total, 7 to 12 inches of snowfall occurred through most of western Massachusetts, with lesser totals over southern portions where sleet occurred.

Date	Description
3/7/18	A weakening low pressure system brought some light snow to western Massachusetts during the early to mid-morning hours of March 7th, 2018. Meanwhile, a Nor'easter strengthened rapidly along the Atlantic Coast, which resulted in increasing snow intensity during the afternoon and evening hours. Heavy snow bands rotated northwestward and stalled across the area, resulting in one to two and a half feet of accumulation in most areas by the morning of March 8th. The snow led to very difficult travel conditions and resulted in numerous school closures.
2/12/19	A winter storm brought widespread wintry precipitation to Massachusetts on Tuesday, February 12th through Wednesday, February 13th, 2019. Precipitation started out as snow but then quickly transitioned to a period of sleet and then freezing rain throughout the event. This mix of wintry precipitation resulted in hundreds of closings and delays. Strong winds followed, especially across the Berkshires, which led to power outages across the region.
3/23/20	A late season snowfall impacted western Massachusetts. This was brought on by an anomalously cold air mass interacting with a coastal low pressure system. Snowfall totals ranged from one inch in southeast Berkshire County up to almost nine inches in northeast Berkshire County.
1/6/22	A winter storm dumped anywhere from a few inches over the lower elevations in the eastern parts of the Berkshires to 16 inches of snow over the higher terrain over the western parts of the Berkshires in western Massachusetts January 16-17. This resulted in snow emergencies over parts of the area. It was also windy with gusts between 30-45 mph.
12/11/22	A low pressure system brought widespread accumulating snowfall across western Massachusetts on December 11, 2022 before tapering off during the early morning hours on December 12, 2022. Bands of moderate to heavy snow developed during the late afternoon and evening hours bringing a widespread 6 to 10 inches of accumulation to the area.
12/15/22	A high-impact, long-duration winter storm affected the region from December 15-17, 2022. This was an elevation-dependent storm with heavy snowfall for the higher elevations and a mix of rain and snow in the valleys. Snowfall totals of 10-20 inches were common across areas above 1000 feet with mainly 6 inches or less below. This was a heavy, wet snow and the weight of the snow caused downed trees and power lines resulting in scattered power outages.

Date	Description
3/13/23	A powerful Nor'Easter resulted in widespread heavy wet snow and gusty northwest winds between 35-50 mph across western Massachusetts March 13-March 15, 2023. Anywhere from 15 to 30 inches of snow with locally higher amounts in excess of 30 inches fell over the higher terrain of the Berkshires. Valley locations received lesser amounts with totals generally ranging between 7 to 15 inches. Numerous downed trees and powerlines resulted in widespread power outages. Some locations were without power for at least 1 or 2 days. Portions of some communities were inaccessible due to the snow. Several warming stations opened to assist those without power. Overall, this event led to the closing of many school districts, and resulted in chain up laws and bans of empty tractor trailers and/or tandems on some area interstates. A State of Emergency was issued for several jurisdictions as a result of the storm.
1/14/24	Widespread heavy snow showers and snow squalls tracked across western Massachusetts on January 14, 2024 ahead of an approaching arctic cold front. Visibilities reduced to near zero in many of these squalls and winds occasionally gusted between 30 and 45 mph. A few localized wind gusts exceeded 45 mph, including at the Pittsfield Municipal Airport and Harriman-and-West Airport in North Adams.

According to the CRB report, the secondary impacts of snowfall are important considerations in Williamstown. When severe weather shuts down the entire town, the negative economic impacts to businesses is significant. Furthermore, Williamstown's aging population means increased vulnerability to prolonged power outages and particularly among the medically vulnerable populations of any age.

Extent

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

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

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

Table 42. 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 Williamstown, 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.

According to some resources, the Sperry-Piltz Ice Accumulation Index (SPIA® Index) is becoming a resource for addressing 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 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 Williamstown.

Probability of Future Events

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

Vulnerability Assessment

Exposure

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

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

The entire Town should be considered exposed to the severe winter storm hazard. They report that there have been more sleet/slush/ice events than in the past.

Built Environment Impacts

The entire built environment of Williamstown is vulnerable to a severe winter storm. New England’s climate offers no immunity to the potential damaging effects of severe winter storms. Some minimum damage is anticipated annually, with potential extensive damage occurring about once every 10 years. In the past, there has been freezing of fire protection lines to healthcare and other facilities. Fire protection lines to police and fire stations could also be impacted in the future.

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. From 2014 until 2023, there was $1,000 in winter storm damage in Williamstown and surrounding towns. This equates to an AAL of $100. Note that the PA reimbursement for the winter storm in 2013 is not included in this figure, as the AAL of $100 is based on the last ten years.

Population Impacts

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

Environment Impacts

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

Problem Statements for Severe Winter Storms

Table 43. Problem Statements for Severe Winter Storms.

Assets	Problems Associated with Severe Winter Storms
People (including underserved communities and socially vulnerable populations)	• Vulnerable populations may be stranded during a winter storm event and may not be able to travel to emergency services.
Structures (including facilities, lifelines, and critical infrastructure)	• Roof ice dams may cause damage to structures. • The electrical grid and roadways are susceptible to failure and loss of use during storms.
Systems (including networks and capabilities)	• First responders may have difficulty reaching people if roads are closed due to road closures.

Assets	Problems Associated with Severe Winter Storms
Natural, historic, and cultural resources	• Severe storms may damage trees in natural areas, and historical and cultural sites.
Activities that have value to the community	• Outdoor activities may be adversely impacted by severe winter storms.

Tornadoes

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

Description

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

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

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

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

Location

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

Previous Occurrences

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

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

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

Notwithstanding the many previous occurrences in Massachusetts, only one tornado has touched down in Williamstown (an F1 in 1970).

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 44. 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 Williamstown, as they are used throughout Massachusetts on a routine basis and appropriately characterized the tornado (retroactively) that passed through Williamstown. Tornadoes have not been characterized outside of the EF scale or the NWS watch/warning system.

Probability of Future Events

According to the ResilientMass Plan, the Commonwealth experienced 190 tornadoes from 1950 to 2021, or an average annual occurrence of 2.6 tornado events per year. From 1995 to 2021, the average frequency of these events has been 2.06 events per year (NOAA, 2018). Massachusetts experienced an average of 1.4 tornadoes per 10,000 square feet annually between 1991 and 2010, less than half of the national average of 3.5 tornadoes per 10,000 square feet per year (NOAA, n.d.). As highlighted in the

National Climate Assessment, tornado activity in the U.S. has become more variable, and increasingly so in the last two decades. While the number of days per year that tornadoes occur has decreased, the number of tornadoes on these days has increased. Climate models show projections that the frequency and intensity of severe thunderstorms (which include tornadoes, hail, and winds) will increase (USGCRP, 2017). Overall, it is unclear if tornado frequency will increase with climate change given the difficulty to draw conclusions based on thunderstorm statistics and the difficulty in identifying long-term trends.

Vulnerability Assessment

Exposure

High winds, heavy rain, lightning and/or hail associated with tornados, thunderstorms and microbursts can cause damage to utilities, structures, roads, trees (potentially causing vehicle accidents) and injuries and death. The entire Town should be considered exposed to the tornado hazard. Microbursts are also a concern in Williamstown, as noted in the section about “other severe weather.”

Built Environment Impacts

As Hazus doesn’t support tornadoes, and in the absence of other readily available tornado models, historical data was used to determine potential losses and probabilities. From 1955 until 2023, there were 19 tornado events in Berkshire County with $28.254M in property damage, 7 deaths, and 60 injuries. These 19 events included two F4, six F2, five F1, four F0, one EF1, and one EF0 events. The County’s average annual loss would be $409,478.

Population Impacts

Populations considered most vulnerable to tornado impacts in Williamstown are identified based by 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 Williamstown. The Town should be aware of the potential needs of residents within these population segments in the event of a hazard occurrence.

Environment Impacts

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

Problem Statements for Tornadoes

Table 45. 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)	• 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. • 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)	• Wind may cause trees to fall into structures and infrastructure, and roadways. The Town removes street trees, when possible, but many trees are not the Town's responsibility. • The electric grid may go down during high wind events. National Grid is believed very vulnerable in the town, and backups are needed (such as the Williams College microgrid) • Landline telephone systems may be impacted by winds and downed trees.
Natural, historic, and cultural resources	• Historic and cultural resources may be impacted by tornado winds. • Winds may damage trees and cause natural areas to close for cleanup.
Activities that have value to the community	• Outdoor events could be impacted by potential tornado activity.

Wildfires/Brushfires

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

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

Description

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

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

- Fuel: Without fuel, a fire will stop. Fuel can be removed naturally (when the fire has consumed all burnable fuel) or manually by mechanically or chemically removing fuel from the fire. In structure fires, removal of fuel is not typically a viable method of fire suppression. Fuel separation is important in wildfire suppression and is the basis for controlling prescribed burns and suppressing other wildfires. The type of fuel present in an area can help determine overall susceptibility to wildfires. According to the Forest Encyclopedia Network, four types of fuel are present in wildfires:
    - Ground Fuels: organic soils, forest floor duff, stumps, dead roots, buried fuels
    - Surface Fuels: the litter layer, downed woody materials, dead and live plants to 2 meters tall
    - Ladder Fuels: vine and draped foliage fuels
    - Canopy Fuels: tree crowns
- Heat: Without sufficient heat, a fire cannot begin or continue. Heat can be removed through the application of a substance, such as water, powder, or certain gases, that reduces the amount of heat available to the fire. Scraping embers from a burning structure also removes the heat source.
- Oxygen: Without oxygen, a fire cannot begin or continue. In most wildland fires, this is commonly the most abundant element of the fire triangle and is therefore not a major factor in suppressing wildfires.

- Uninhibited Chain Reaction: The chain reaction is the feedback of heat to the fuel to produce the gaseous fuel used in the flame. In other words, the chain reaction provides the sustained heat necessary to maintain the fire. Fire suppression techniques, such as dry chemical extinguishers, break up the uninhibited chain reaction of combustion to stop a fire.

Location

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

Previous Occurrences

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

Table 46. Statewide Brush Fire Counts.

Year	Total # of Events	Injuries/deaths (civilians and fire service)	Losses
2019	2,974	12/0	$136,357
2018	3,253	1/5	$493,145
2017	4,206	20/0	$215,156
2016	7,834	40/0	$1,526,654
2015	6,962	35/0	$323,211
2014	4,627	25/0	$209,857
2013	4,968	31/3	$297,854
2012	5,857	38/0	$705,457

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

Table 47. Outdoor and Total Fire Event Figures for Williamstown.

Year	Total Outdoor Fires	Total Fire Events	Reported Losses for Outdoor Fires
2012	4	11	$26,109
2013	5	23	$6,804
2014	6	18	$49,633
2015	11	27	$282,556
2016	3	7	$600
2017	3	11	$6,736
2018	3	17	$7,500
2019	4	14	$194,886
2020	1	14	Not available
2021	2	12	Not available

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

Table 48. Estimated Brush Fire Event Figures for Williamstown.

Year	Estimated Brush Fires	Estimated Brush Fire Losses	Wildfires Listed in 2019 Hazard Mitigation Plan for Williamstown
2012	2	$136	3
2013	3	$59	2
2014	3	$283	1

Year	Estimated Brush Fires	Estimated Brush Fire Losses	Wildfires Listed in 2019 Hazard Mitigation Plan for Williamstown
2015	6	$1,318	7
2016	2	$3	1
2017	2	$47	--
2018	2	$81	--
2019	2	$1,296	--
2020	1	$123*	--
2021	1	$85*	--

*Estimated from Countywide figures

The previous plan did not quantify wildfire risk. Overall, Williamstown experiences a small number of brush fires and wildfires each year. The previous edition of this plan additionally noted that the average acreage burned per year in Williamstown is 0.3 acres.

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

Table 49. USDA Disasters Events That Refer to Wildfires.

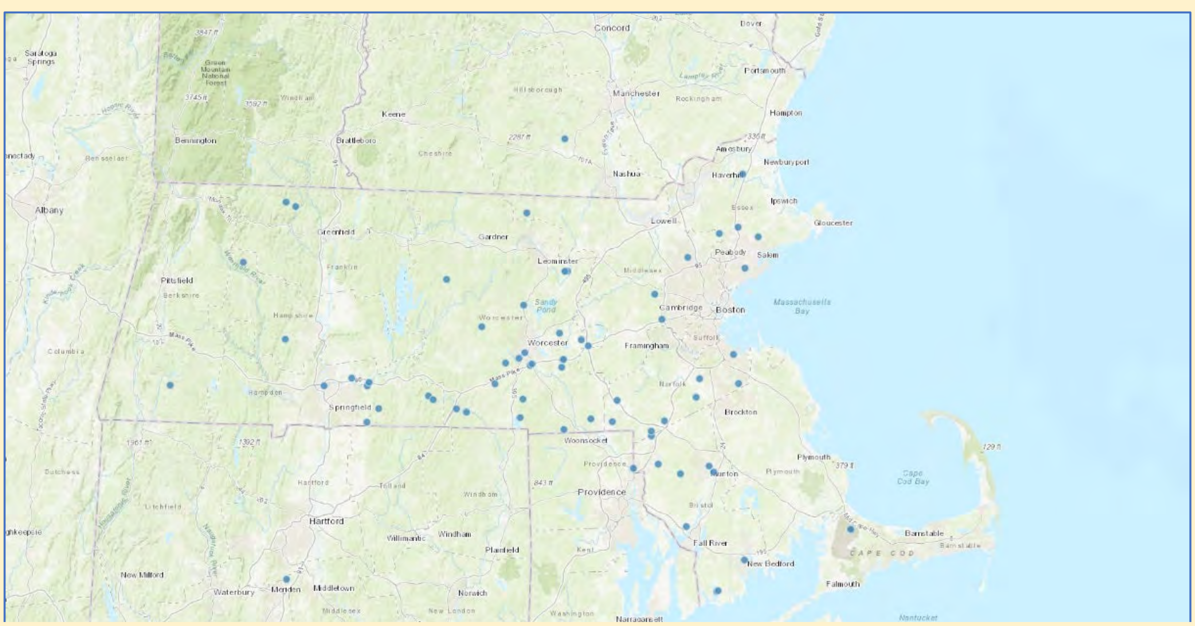
Year	Event	Event "Begin Dates"
2016	Drought, Wind/High Winds, Fire/Wildfire, Heat, Excessive Heat, High Temp., Insects	7/5/2016

During the meetings that were convened for this plan update, Town staff noted that a large forest fire occurred in May 2021, which burned nearly 1,000 acres in the East Mountain, Pine Cobble, and Clarksburg State Forest and had over 120 firefighters responding throughout. One firefighter was injured. This was reportedly the largest wildfire in Massachusetts in 20 years. However, the fall 2024 wildfire season eclipsed the occurrences of the last few years in terms of the number of 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 the region, 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.



Williamstown has several areas including Pine Cobble State Forest that they now consider to be fire adapted landscapes. With the prevalence of invasive species damaging trees, significant dead wood and vegetation is available for a wildfire.

Extent

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

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

The National Wildfire Coordinating Group defines seven classes of wildfires:

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

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

The various wildfire classification systems coupled with the detection and warning systems are believed appropriate for Williamstown given the fact that extensive wildfires have occurred in the community. Wildfires have not been characterized outside of these systems of classification.

Probability of Future Events

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

Vulnerability Assessment

Exposure

To help identify potential wildfire areas for Williamstown, the U.S. Forest Service's Wildfire Risk to Communities spatial data was downloaded. This data was developed in 2020 using the vegetation and wildland fuels from the LANDFIRE 2014 model with the burn probability coming from the Forest Service Fire Simulation System (FSim). To create a product with a finer resolution, the data was upsampled to the native 30m resolution of the LANDFIRE fuel and vegetation data spreading the values of the modeled burn probability into developed areas represented in LANDFIRE fuels as non-burnable. The areas with a 0.02% annual probability of burning were identified and overlaid with the critical facilities and other buildings. There were no critical facilities found in the 0.02% burn probability areas and only one commercial building found there. Table 50 shows the result of this analysis.

Table 50. Buildings in 0.015% Annual Chance Area.

Building Type	Number of Buildings in 0.02% Annual Chance Area (Total in Town)	Building Value in 0.02% Annual Chance Area (Total in Town)
Single Family	11 (3339)	$6,159,647 ($1,124,225,077)
Mobile Home	0 (40)	$0 ($5,327,444)
Multi-Family	0 (180)	$0 ($391,853,681)
Commercial	0 (269)	$0 ($480,054,282)
Agricultural	2 (47)	$172,381 ($8,762,583)
Educational	0 (112)	$0 ($1,372,461,560)
Government	0 (30)	$0 ($57,62,400)
Religious/Non-Profit	0 (20)	$0 ($21,066,509)

Building Type	Number of Buildings in 0.02% Annual Chance Area (Total in Town)	Building Value in 0.02% Annual Chance Area (Total in Town)
Industrial	0 (8)	$0 ($59,385,182)
Garage/Outbuilding	0 (25)	$0 ($2,035,781)
Total	**13 (4070)**	**$6,332,028 ($3,470,934,498)**

Most of the areas exposed were residential properties. Figure 20 shows the burn probability map from the USFS overlaid on the Town. There have been recent brush fires in the southeast part of the Town.

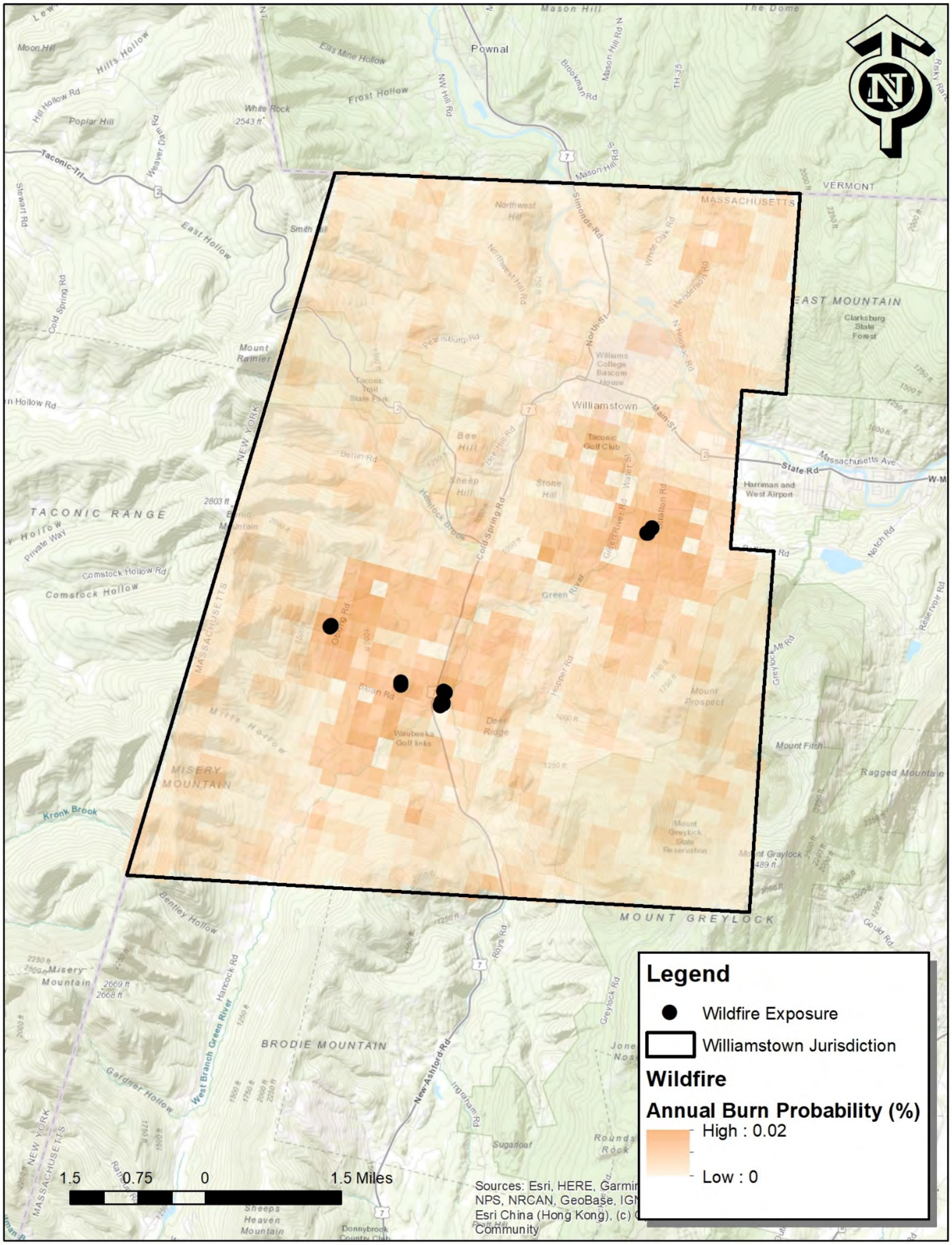


Figure 20. Wildfire Burn Probability Map.

Built Environment Impacts

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

No property damage, injuries or deaths have been recorded for the reported for major wildfires in Williamstown between 2004 and 2023. Using the wildfire probabilities and building values, a loss estimate was produced for the 0.02% scenario. The losses are $6,332,028 for the .02% event and the AAL will be $1,266.

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

Population Impacts

Populations considered most vulnerable to wildfire impacts are identified based on a number of factors including their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing. Senior and low-income populations in Williamstown 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. 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 the trees and parks.

Problem Statements for Wildfires

Table 51. 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.
Structures (including facilities, lifelines, and critical infrastructure)	• Some structures are found in higher probability burn areas. 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 Williamstown.
Activities that have value to the community	• Recreational activities may be adversely impacted by wildfires, depending on location.

National Flood Insurance Repetitive Loss Properties

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

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

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

According to data provided by MEMA, repetitive loss properties and severe repetitive loss properties are not located in Williamstown.

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

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

Hazard Ranking

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

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

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

Table 52 provides the hazard characteristic, level description, level criteria, level index value, and weighting value.

Table 52. 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 53 provides the hazard ranking for Williamstown. Each hazard characteristic is assigned a value between 1 (lowest value) and 4 (highest value). When the risk values were calculated, if the value was greater than 2.7, it was assigned as a high risk hazard. If the value was greater than 2 and less than or equal to 2.7, it was assigned as a moderate risk. If the value was less than or equal to 2, it was assigned as a low risk hazard. The flooding from precipitation and dam failure, severe winter storms, and other severe weather hazard were ranked highest. The average and extreme temperatures, tornadoes, wildfires/brushfires, hurricanes/tropical storms, drought, invasive species, and landslides were all ranked as moderate. The earthquake hazard is ranked as low.

Table 53. Final Hazard Ranking of Hazards for Williamstown.

Hazards	Probability	Impact	Spatial Extent	Warning Time	Duration	Value	Rank
Flooding from Precipitation and Dam Failure	4	3	2	3	2	3	High
Severe Winter Storms	4	2	4	1	3	3	High
Other Severe Weather	4	2	4	2	1	2.9	High
Wildfires/Brushfires	3	2	3	3	3	2.7	Mod.
Average and Extreme Temperatures	4	1	4	1	2	2.6	Mod.
Hurricanes/Tropical Storms	3	2	4	1	2	2.6	Mod.
Droughts	2	2	4	1	4	2.5	Mod.
Landslides	2	3	2	4	1	2.4	Mod.
Tornadoes	2	4	1	3	1	2.4	Mod.
Invasive Species	3	1	2	3	4	2.3	Mod.
Earthquakes	1	1	4	4	1	1.9	Low

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

Table 54. Impacts from Population and Land Use.

Hazards	Changes in Population Patterns	Changes in Land Use and Development
Flooding from Precipitation and Dam Failures	There is a growing elderly population exposed to the floodplain: • Around Main St. west of Williams College. • West of Route 7. • In South Williamstown • Around Green River Rd.	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.
Droughts	The Town's elderly population has increased from 13.7% in 2010 to 22.4% in 2020. The number of people living below the poverty line has decreased since 2010.	All new developments will create more demand for limited water resources.
Landslides	There is a growing elderly population around Petersburg Rd. exposed to a moderate landslide susceptibility area.	Existing land use regulations will help to keep development out of landslide-prone areas.
Extreme Temperatures	The Town's elderly population has increased from 13.7% in 2010 to 22.4% in 2020. The number of people living below the poverty line has decreased since 2010.	All new developments will exacerbate heat island effect if the development includes tree removal and adding black surfaces such as asphalt and roofs.
Wildfires	There is a growing elderly population in South Williamstown with a moderate wildfire susceptibility.	Development in or adjacent to a forested or brushland area can lead to a higher risk of wildfire.
Infectious Diseases	The Town's elderly population has increased from 13.7% in 2010 to 22.4% in 2020. The number of people living below the poverty line has decreased since 2010.	Shouldn't be impacted by changes in land use and development.

Hazards	Changes in Population Patterns	Changes in Land Use and Development
Invasive Species	Shouldn't be impacted by population changes.	Shouldn't be impacted by changes in land use and development.
Hurricanes and Tropical Storms	The Town's elderly population has increased from 13.7% in 2010 to 22.4% in 2020. The number of people living below the poverty line has decreased since 2010.	Shouldn't be impacted by changes in land use and development.
Severe Winter Storms	The Town's elderly population has increased from 13.7% in 2010 to 22.4% in 2020. The number of people living below the poverty line has decreased since 2010.	Shouldn't be impacted by changes in land use and development.
Tornadoes	The Town's elderly population has increased from 13.7% in 2010 to 22.4% in 2020. The number of people living below the poverty line has decreased since 2010.	Shouldn't be impacted by changes in land use and development.
Other Severe Weather	The Town's elderly population has increased from 13.7% in 2010 to 22.4% in 2020. The number of people living below the poverty line has decreased since 2010.	Shouldn't be impacted by changes in land use and development.
Earthquakes	Not considered.	Not considered.

Problem Statements Summary

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

Table 55. Problem Statements Summary.

Hazard	Problem Summary
Flooding from Precipitation	• Broad Brook as a major concern in Williamstown. The stream is very flashy and is the most dangerous of the Hoosic River tributaries. The stream jumps its banks and blocks access to public works. The Town plans ahead to make sure equipment is available. • Older populations and lower income households in the floodplain may have difficulty evacuating. • The Fire Station, DPW building, and WTP are exposed to the 100-year floodplain. • Approximately 259 buildings are in the floodplain including buildings of all occupancies. • Pump station is in dam breach inundation area. • There are some undersized culverts. • Areas of concern for flooding include the Sand Springs Road subdivision, the White Oaks neighborhood, the Berkshire Drive and Colonial Drive neighborhood, and the North Hoosic neighborhood. • Steep slopes along Sloan Road, Scott Hill Road, and Stone Hill Road are relatively newer areas of flood concern. • Portions of the main sewer interceptor line running from Clarksburg to North Adams along the Hoosic River have been exposed several times due to riverbank erosion during extreme flood events. • The railroad embankment is at risk to washouts/slides due to severe precipitation and/or river flooding. Recent railroad embankment failures in New England have caused extended shutdowns. • Beaver dams are an issue causing flooding impacts in different parts of the community.
Severe Winter Storms	• Vulnerable populations may be stranded during a winter storm event and may not be able to travel to emergency services.

Hazard	Problem Summary
	• The electrical grid and roadways are susceptible to failure and loss of use during storms. • Roof ice dams may cause damage to structures. • The Town is concerned about vulnerability of the fire lines to critical facilities. • First responders may have difficulty reaching people if roads are closed due to road closures.
Other Severe Weather	• First responders may have difficulty reaching people if roads are closed due to tree debris. • Storm damage to wind-susceptible buildings such as carports, greenhouses, and open-walled buildings. Additional damage to commercial buildings with HVAC located on roofs. • Wind may cause trees to fall into structures and infrastructure, and roadways. The Town removes street trees when possible, but many trees are not the Town's responsibility. • The electric grid may go down during high wind events. National Grid is believed very vulnerable in the town, and backups are needed (such as the Williams College microgrid) • Landline telephone systems may be impacted by winds and downed trees. • The rod and gun club structures are believed vulnerable.
Wildfires/Brushfires	• Populations with severe asthma may be adversely impacted by wildfires in the vicinity. • 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.
Average and Extreme Temperatures	• Library is used as heating/cooling center but needs a generator. • Senior Center (Council on Aging) needs a generator for vulnerable residents during extreme temperatures.

Hazard	Problem Summary
	• Extreme heat will be a significant public health threat to all residents, but especially for vulnerable populations living in older homes or homes without air conditioning. • The elderly and those with mobility issues may not be able to leave their homes and travel safely. • People working in businesses without air conditioning may be at risk of heat illness. • First responders may also be impacted by extreme temperatures. • Pets may be adversely impacted by extreme heat.
Hurricanes/Tropical Storms	• 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. • Wind may cause trees to fall into structures and infrastructure, and roadways. The Town removes street trees when possible, but many trees are not the Town's responsibility. • The electric grid may go down during high wind events. National Grid is believed very vulnerable in the town, and backups are needed (such as the Williams College microgrid).
Droughts	• Vulnerable communities may have difficulty accessing potable water from private wells during an emergency drought event. • Agricultural users may be impacted with reduced water. • 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.
Landslides	• A very susceptible area is located along on Hoosic Road between Williamstown and Vermont. • Historically, the Pine Cobble neighborhood has been impacted and has elevated risk.

Hazard	Problem Summary
	• Some residential structures reside adjacent to moderately unstable areas and could be impacted. • Roadways may be impacted by landslides. • Trail recreation in open space areas could be impacted.
Tornadoes	• Vulnerable populations may need support seeking protected shelter. Those without cell phones may not get weather alerts. • Structures and critical infrastructure can all be impacted by tornadoes. • Roadways may be blocked due to downed trees and other debris. • The electric grid may be impacted by winds and downed trees.
Invasive Species	• Emerald Ash Borer, Japanese knotweed, and bittersweet invasive species are problematic in the Town. • Emerald Ash Borer continues to kill or damage trees which then become hazards. • Additionally, aquatic invasive species have been identified in the Town.
Earthquakes	• Elderly people may fall during an event. • Unreinforced masonry and utility lifelines impacted. Multi-story masonry residential buildings are located in Williamstown.

Chapter 5: Capability Assessment

Overview

The capability assessment is an evaluation of the existing tools and resources available to the Town of Williamstown 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 Williamstown'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 Williamstown's hazard mitigation plan, but to also help ensure that those goals and actions are realistically achievable under current local conditions. As highlighted in FEMA's 2022 Local Mitigation Planning Policy Guide, *"describing the current capabilities provides a rationale for which mitigation projects can be undertaken to address the vulnerabilities identified in the Risk Assessment."*[57]

The capability assessment for the Town of Williamstown includes a comprehensive examination of several components as summarized in Table 56. It was prepared using the latest guidance and worksheets provided in FEMA's 2023 Local Mitigation Planning Handbook.[58]

Table 56. 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.
NFIP Participation and Compliance	Summary of information relevant to the community's participation in the NFIP and continued compliance with NFIP requirements.

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

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

Review and Incorporation of Existing Plans, Studies, and Reports

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

The first step in completing the updated capability assessment was to gather and review any relevant local plans, studies, or reports completed or updated since the previous hazard mitigation plan was adopted in 2019. This information was used to help gain a current understanding of the Town's current ability to mitigate risk, and how local capabilities may have changed over the past five years. The 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan (the "ResilientMass" Plan), as well as other plans adopted by the Town of Williamstown 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 57 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 57. 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 findings of the 2022 Climate Assessment with additional

	analysis on all current hazards that may impact the Commonwealth, as well as future risks that will increase the likelihood, frequency, and duration of hazards. Of perhaps most relevance to local communities, the ResilientMass Plan identifies the most urgent priority impacts of these risks to various regions across the Commonwealth. The ResilientMass Plan was incorporated as a key source of information for this plan update. This included the integration and consideration of the latest climate data and information for 15 hazards impacting the Commonwealth now and, in the future, with particular emphasis on those unique impacts determined for the Berkshires and Hilltowns region. In addition, the goals and actions included in Chapter 7 (State Strategy, Actions, and Implementation Plan) were reviewed and considered as part of the update process for Williamstown'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 Williamstown's updated plan address the key themes identified in the ResilientMass Plan.
Envisioning Williamstown 2035: A Comprehensive Plan for the Future (2023)	Envisioning Williamstown 2035 serves as the Town's official, long-range planning document to guide future growth, land use, and development while protecting the character of the town. It serves as a foundation for public policy, programs, land use decisions, capital improvements, and infrastructure upgrades across the community. The plan addresses some natural hazards (flooding, erosion, drought, etc.) and the anticipated impacts to the community from climate change, and it aligns well with reducing known hazards risks. Notably the Plan establishes the Town's commitment to hazard and climate resilience, demonstrated by an overarching community planning framework of "Sustainability and Community Resilience." This framework is reflected throughout various parts of the Plan, including multiple objectives and strategies that are consistent with hazard risk reduction (for example, prioritizing municipal infrastructure updates to reduce flooding, and modifying municipal standards to require low impact development, blue-green infrastructure, and nature- based solutions to reduce impervious cover that exacerbates flooding). Envisioning Williamstown 2035 was reviewed and considered a critical document for incorporating into this hazard mitigation plan update. The description of current conditions, opportunities, and challenges helped inform the capability and risk assessments. In addition, the community

	planning themes, frameworks, and specific implementation actions for building resilience to climate change and natural hazards were incorporated into discussions with the HMPC as it relates to the updated Mitigation Strategy, with an emphasis on integrating and prioritizing actions that are consistent and mutually supportive of both plans.
Open Space and Recreation Plan (2024, Final Draft)	The purpose of the Open Space and Recreation Plan (OSRP) is to document Williamstown's existing wealth of undeveloped, open space and outdoor recreation lands to develop informed strategies and actions to protect and enhance these resources for current and future generations. The Plan evaluates the available natural and recreational resources and establishes clear and consistent goals for prioritizing improvements and acquisitions which will best reflect the community's interest in promoting, reserving and enhancing its open space and recreational facilities. The OSRP is an effective tool for supporting Williamstown's open space preservation goals while also addressing some specific natural hazards identified in the plan. It served as a key source of information related to Williamstown's natural environment 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 as local flood and erosion hazards, stormwater runoff, drought, and invasive species which were incorporated into the risk assessment. This also included information on existing goals and recommended actions that will help the community to mitigate hazards or adapt to climate change for the mitigation strategy.
Town of Williamstown 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, Williamstown was awarded an MVP Planning Grant to assess its vulnerability to and prepare for climate change impacts, build community resilience, and receive designation from the Executive Office of Energy and Environmental Affairs (EEA) as an MVP Community. Communities with this designation become eligible for MVP Action Grant funding and other opportunities to support the implementation of priority climate adaptation actions. In completing the MVP planning process, the Town of Williamstown followed the Community Resilience Building (CRB) framework with technical assistance provided by the Berkshire Regional Planning Commission (BRPC), a state-certified MVP Provider. 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 May 21, 2018, with the following central objectives: 1. Defined the top natural and climate-related hazards in Williamstown 2. Identified existing or future strengths and vulnerabilities 3. Developed Prioritized Actions for Town departments to take, working with the broader stakeholder network 4. Identified opportunities to collaboratively advance actions to increase resilience and reduce risk to persons, property and the natural environment, both now and in the future The resulting Summary of Findings Report and supporting materials served as a primary source of information and community-based input for incorporation into the update of this plan. These inputs include the identification of top climate-influenced hazard categories (flood – including ice jams, power outages, severe storms, and drought/fire) and vulnerable areas or community assets (infrastructural, societal, and environmental), current community concerns and challenges presented by these hazards, current strengths and assets, and specific, prioritized recommendations to improve resilience in Williamstown.
Emergency Action Plan – Williamstown Reservoir Dam (2023)	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 EAP for the Williamstown Reservoir Dam was 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.
FEMA Flood Insurance Study, Town of	Last published by FEMA on October 3, 1983, this report constitutes the currently effective Flood Insurance Study (FIS) report for Williamstown. The

Williamstown, MA (1983)	FIS provides information on the existence and severity of flood hazards for the study area. FEMA FIS reports provide flood hazard data that are used to establish flood insurance rates and to assist communities in efforts to implement sound floodplain management. Although considered very outdated, the FIS and accompanying Flood Insurance Rate Maps (FIRMs) include relevant data and information on community-wide flood hazards for Williamstown, including but not limited to descriptions of principal flood problems, flooding sources, FEMA flood zone designations, base flood elevations, and discharge rates of flooding sources. This data and information were reviewed and incorporated into the plan update process by informing the risk assessment, especially as it relates to the hazard profile and vulnerability assessment that was prepared for the flood hazard.

In addition to the above plans which were determined to be most relevant for incorporation into the hazard mitigation plan update, the following plans, studies, reports, and other technical documents were reviewed to gain a clearer understanding of local capabilities and their existing or potential effects on hazard risk reduction. More information on some of these documents is provided in Table 58 in the next section.

- ***Annual Report (2023)*** – The Annual Town Report contains updated facts about Williamstown and a series of reports and information from the Town's various departments, boards, commissions, and other officials.
- ***Williamstown CARES Final Report (2023)*** – The purpose of the Williamstown CARES (Community Assessment Research) Project purpose was to develop a thorough understanding of perceptions of community safety and wellbeing in Williamstown in order to provide recommendations to the Town for aligning policies and practices with community needs. While the project developed in response to national and local discussions on the scope and nature of policing, it focused broadly on topics of safety and wellbeing to establish a deeper understanding of how safety, wellbeing, policing, and other services intersect in Williamstown.
- ***Comprehensive Emergency Management Plan (2022)*** – The Town's Comprehensive Emergency Management Plan (CEMP) provides a framework for a community-wide emergency management system to ensure a coordinated response to emergencies and coordinated support of certain pre-planned events. The CEMP addresses the roles and responsibilities of all community departments, agencies, government organizations, volunteers, and other community partners that may be involved in response operations, and identifies how regional, state, federal, private sector, and other resources may be activated to address disasters and emergencies in the community. Although the plan is focused on actions and activities in response to an emergency or disaster event, it does provide general guidance on the roles and responsibilities of Town departments and partners for the prevention and mitigation of

anticipated incidents. The CEMP also includes a summary of a threat, hazard, and vulnerability analysis completed by Town than briefly summarizes potential impacts to the community.

- ***Housing Needs Assessment (2022)*** – The Town of Williamstown requested the assistance of BRPC to perform an assessment of the current state of housing in the Town in preparation for the development of a Housing Production Plan. This report provides detailed information about the existing housing stock and will assist in clarifying the need for elderly, accessible, and affordable housing in Williamstown.
- ***The Williamstown Farmland Project – Final Report (2020)*** – The Williamstown Farmland Project" was a collaborative effort by three students in the Williams College Environmental Studies program as well as their professor, Williamstown's town planner, and the executive director of the Williamstown Rural Lands Foundation (WRLF). During the fall of 2020, this team worked to identify contemporary risks to farmland operated by the sixteen remaining active farms in Williamstown. This report summarizes their findings along with a variety of tools and recommendations that can be used for immediate farmland conservation in Williamstown.
- ***ADA Self-Assessment & Transition Plan (2018)*** – This plan includes a self-evaluation of the Town's public facilities, programs, services, activities and events to determine compliance with the Americans with Disabilities Act (ADA) and identify any barriers to accessibility. It also includes a transition plan that prioritizes identified barriers and corrective actions.
- ***PARAC Committee Final Report (2018)*** – This report provides a set of prioritized recommendations developed by the Williamstown Parks and Recreation Advisory Committee (PARAC) for enhancements to Williamstown's parks and recreation offerings and activities. It also includes a vision statement along with four goals used to guide the PARAC's process in developing their recommendations to the Williamstown Select Board.
- ***Build-Out Analysis – Final Report (2016)*** – This report summarizes the most recent build-out analysis completed for Williamstown. The analysis estimates the effects the cumulative growth may have upon a town's land area once all developable land has been consumed and converted to the uses permitted under the current regulatory framework. The report can be used for a variety of purposes including to inform the Planning Board and other local boards while making development decisions.
- ***Economic Development Plan (2015)*** – This report proposes strategies for increasing the probability of economic growth in Williamstown. The report and recommendations were developed between January and December 2015 by the Williamstown Economic Development Committee (EDC). The report incorporates information gathered at the time, including broad community input, expert testimony, and research comparing Williamstown to twelve peer communities. The results of this work resulted in the recommendation of specific actions for implementation by Town government as submitted to the Selectboard for further action.

Planning and Regulatory Capabilities

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

Table 58 is based off Worksheet 4 from FEMA's Local Mitigation Planning Handbook. It was used by the HMPC to document and review the current 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 58. 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 its first comprehensive plan in 20 years, titled *Envisioning Williamstown 2035: A Comprehensive Plan for the Future*. As further described in Table 57, the plan addresses natural hazards and the anticipated effects of climate change, and it aligns well with reducing known hazards risks. The Plan establishes the Town's commitment to hazard and climate resilience and includes several priority objectives and strategies focused on risk reduction. The Plan can effectively be used to support and implement mitigation actions. Completed in 2023.

Planning/Regulatory Tool	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
Open Space & Recreation Plan	Yes	In coordination with the BRPC, the Town completed a final draft Open Space and Recreation Plan in early 2024 as an update to the 2016 OSRP (see Table 57 for a complete description). While the focus of the Plan is not reducing hazard risks, the co-benefits of natural resource protection and hazard mitigation are recognized and described accordingly and will continue to do so in plan updates. Anticipated climate change impacts and climate resilience are also addressed throughout the plan, making it an effective tool for supporting future risk reduction efforts for the Town. The plan has been approved by EEA's Division of Conservation Services (DCS), maintaining the Town's eligibility for DCS grant programs through April 2031.
Climate Adaptation Plan	No	Not a plan per se, however climate adaptation is addressed in the Town's MVP Summary of Findings Report. It identifies Williamstown's top climate change hazards (flood, power outage, severe storms, drought/fire) and vulnerable areas or community assets (infrastructural, societal, and environmental), current community concerns and challenges presented by these hazards, current strengths and assets, and specific, prioritized recommendations to improve the Town's resilience. The report's findings and recommendations can be used to support the implementation of mitigation actions. Report was published in 2018.
Floodplain Management Plan	No	No standalone plan, however, floodplain management is addressed by the Town through other plans (HMP, MVP, OSRP, etc.) and regulations as described above and elsewhere in this survey.
Stormwater Management Plan	No	N/A

Planning/Regulatory Tool	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
Capital Improvements Plan	No	The last CIP was completed in 2019. The Town is currently rebuilding this capacity, which was disrupted/lost during the COVID-19 pandemic and due to multiple retirements and other staff turnover.
Housing Production Plan	No	No plan however the Town has completed a Housing Needs Assessment in support of preparing such a plan (see brief description provided in the previous section following Table 57).
Transportation Plan	No	Williams College is underway on a transportation plan for the campus and town core with VHB.
Economic Development Plan	Yes	Completed in 2015 (see brief description provided in the previous section following Table 57).
Historic Preservation Plan	No	No specific plan, however historic preservation is addressed in the Town's comprehensive plan (Envisioning Williamstown 2035) and the Town does have an active Historical Commission with appointments made by the Town Manager.
Emergency Operations Plan	Yes	Updated in 2022 (see brief description provided in the previous section following Table 57).
Continuity of Operations Plan	No	N/A
Community Wildfire Protection Plan	No	N/A
Building Code, Permitting, and Inspections		
Building Code	Yes	Version/Year: MA State Building Code (780 CMR), Ninth Edition, 2017
ISO Building Code Effectiveness Grading Schedule (BCEGS®) Classification	Yes	BCEGS Commercial Class: Unknown BCEGS Residential Class: Unknown
ISO Public Protection Classification (PPC©)	Yes	PPC Grade (Community Classification): 04/0X ** Effective 4/28/2016*

Planning/Regulatory Tool	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
Special Permit / Site Plan Review Requirements	Yes	Per Article VIII of the Town's Zoning Bylaw, new development proposals are subject to the requirements of the Town's Development Plan Review process, which includes site plan review conducted by the Planning Board and involves review and comment from the Conservation Commission and Public Works Department. Among other factors the site plans must indicate wetlands, floodplains, and floodway boundaries and analysis of potential stormwater runoff and erosion. Very effective in supporting hazard risk reduction efforts as new development can be strictly conditioned or denied based on this process.
Zoning, Land Use, and Development Regulations		
Zoning Bylaw	Yes	Adopted as Chapter 70 of Town Code with purposes to promote the health, safety, convenience and general welfare of community members of Williamstown; to promote a diverse and affordable mix of housing types; to protect and conserve the value of property within the Town; to preserve and increase the beauty and amenities of the Town; to conserve, insofar as possible, natural conditions and to secure safety from fire, congestion or confusion, by encouraging the most appropriate uses of land within the town. Very effective in supporting hazard risk reduction, especially through provisions that address stormwater management, erosion control, floodplain management, development plan review, and special permits.

Planning/Regulatory Tool	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
Subdivision Regulations	Yes	Adopted as Chapter 170 of Town Code with purposes to guide the development of land into lots served with adequate roads and utilities, and to assure that all the purposes of the Commonwealth's Subdivision Control Law are served in Williamstown. Regulations include design standards, stormwater drainage and erosion control requirements, and environmental protection requirements that can help reduce some hazard risks during the subdivision process, but they do not place explicit focus on hazard mitigation or risk avoidance.
Floodplain Regulations	Yes	Requirements for the Floodplain District (Section 70-7.4 of the Zoning Bylaw) establish and regulate activities within flood hazard areas with the purpose of ensuring public safety through reducing the threats to life and personal injury; eliminating new hazards to emergency response officials; preventing the occurrence of public emergencies resulting from water quality contamination and pollution due to flooding; avoiding the loss of utility services which if damaged by flooding would disrupt or shut down the utility network; eliminating costs associated with the response and cleanup of flooding conditions; and reducing damage to public and private property. Last amended in 2006, these regulations have been effective at reducing the long-term risk of flood hazards throughout the Town's identified special flood hazard areas. The permitting process continues to prevent irresponsible development in flood-prone areas, lowering the risk of hazards being created or exacerbated by development.

Planning/Regulatory Tool	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
Wetlands Protection Regulations	Yes	The Town does not have its own Municipal Wetlands Bylaw but does administer the regulations required under the State's Wetland Protection Act (WPA). The Conservation Commission presides over cases involving activities proposed in protected areas including wetlands, floodplains, and other areas subject to control under the WPA. The Commission's approval process and the Massachusetts Department of Environmental Protection (DEP) prevent reckless development in hazard prone areas, helping to mitigate the risk of hazards.
Stormwater Management Regulations	Yes	Requirements for Stormwater Management (Section 70-5.3 of the Zoning Bylaw) establishes stormwater management standards for construction and post-development conditions that result from development and redevelopment projects to minimize adverse impacts off site and downstream which would be borne by abutters and the public. Effective at minimizing adverse impacts to stormwater drainage and flood risk caused by land development/redevelopment projects while promoting the use the State's recommended best management practices for stormwater system design.
Other hazard-specific regulations or ordinances?	Yes	Requirements for the Upland Conservation District (Section 70-7.4 of the Zoning Bylaw) are intended to protect public health and safety, and more specifically to protect persons and property against the hazards of floodwater inundation and unsuitable and unhealthy development of steep slopes, unsuitable soils, swamp land, marsh land, and watercourses. The District, which regulates land higher than 1,300 in elevation, prohibits residential development and requires a special permit for any other development.

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 until July 1, 2025. The tenth edition is based on modified versions of the following 2021 codes as published by the International Code Council (ICC), which is a significant improvement over the ninth edition which was based off 2015 codes.

- 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 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 2024 adoption of higher standards, including those based on the latest (2021) International Codes through the tenth edition, will result in score increases.

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.

The Town of Williamstown administers the MSBC for all applicable projects and maintains a demonstrated commitment to code adoption and enforcement services.

Safe Growth Survey

As part of the assessment of planning and regulatory capabilities, the Town's Community Development Director 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 Williamstown 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 59. This includes describing how strongly the Town's planning staff agrees or disagrees with 25 statements as they relate to Williamstown'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 59. Safe Growth Survey Results.

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

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

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

25. The community considers and addresses potential impacts of its plans, policies, or regulations on Environmental Justice (EJ) neighborhoods or other socially vulnerable populations.	1 2 $\boxed{3}$ 4 5

Administrative and Technical Capabilities

Table 60 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 60. 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 is an elected Board, responsible for overseeing the long-term land use patterns of Williamstown through the Zoning Bylaw, Subdivision Control Law, and Master Planning process. It is involved with developing planning policy on a wide range of planning issues including: land use, environmental, economic development, housing, transportation and open space. The Planning Board reviews all Preliminary and Definitive Subdivision plans, in addition to Approval Not Required plans, Site Plans, and a handful of Special Permits. The Planning Board is also responsible for creating long term planning documents and researching demographic and economic trends and how they may impact the community. The Board uses this information when developing zoning bylaw amendments. Very effective and supportive for hazard risk reduction.

Administrative/Technical Resource	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
Conservation Commission	Yes	The Conservation Commission is responsible for administration of the Massachusetts Wetlands Protection Act, which requires approval for activities that involve "digging, dredging, or altering" wetlands or areas near wetlands. The Commission also oversees the management of nine parcels of land owned by the Town which are dedicated to a variety of conservation and recreation goals. Effective at supporting flood hazard risk reduction and other nature-based solutions for climate resilience and adaptation.
Capital Planning Committee	No	Per Town Code the Finance Committee shall also serve as the Capital Planning Committee; however, this capability has suffered in recent years and is currently undergoing a rebuilding process. Also, as recommended in Envisioning Williamstown 2035, the completion of a town-wide municipal facilities and infrastructure assessment and the effective utilization of asset management plans will inform and guide the capital improvement planning process.
Climate Action Committee	Yes	In May 2024, Williamstown's Net Zero Task Force adopted a Climate Action Plan to guide town efforts to achieve net zero emissions. The plan complements the Envisioning Williamstown 2035 Plan and builds on several initiatives already completed or underway.
Other relevant boards/committees?	Yes	Community Preservation Committee; Board of Health; Historical Commission; Council on Aging; Diversity, Inclusion and Racial Equity Committee; Housing Authority; Zoning Board of Appeals
Staff		

Administrative/Technical Resource	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
Community Planner	Yes	The Community Development Director oversees Town staff engaged both in long-term planning policy and short-term regulation of development activities. The Community Development Department is committed to public safety and community support, working to assist all members of the community throughout each stage of the development process. It partners three basic functions of Town government that oversee development activities: Building Officials, Board of Health and Health Inspector, and Planning and Land Use. All three basic functions of the Department work together to forward the goal of protecting both the town's built and natural environment to ensure a safe, healthy, and thriving Williamstown.
Chief Building Official	Yes	Building Commissioner, supported by multiple inspectors. Responsible for reviewing permit applications and issuing building permits in compliance with the MSBC and coordinating with stakeholders on a range of development projects. In addition to inspecting ongoing projects, responsible for performing annual reviews of certain public buildings throughout the community. Very effective in support of hazard risk reduction and disaster recovery and redevelopment.
Civil Engineer	No	The Town does not have in-house civil engineering but consults with and hires local firms when necessary.

Administrative/Technical Resource	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
Emergency Manager	Yes	The Town's Emergency Management Director (EMD), served by the Town's Chief of Police, is responsible for maintaining and managing the activation of the Comprehensive Emergency Management Plan and operating the emergency operations center. On a day-today basis, the EMD coordinates emergency planning for Williamstown, working with the leadership of many Town departments to share situational awareness and mobilize needed resources. In emergency response situations the EMD manages EOC operations, facilitates emergency response coordination, advises the Town Manager and Decision Team on available courses of action to inform decision-making.
Floodplain Administrator	Yes	The Town's Community Development Director is designated as the floodplain administrator, with duties of floodplain management and implementation of the commitments and requirements of the NFIP.
Sustainability/Climate Coordinator	No	This position is temporarily suspended due to the current staffer dropping to 50% time to care for family. Will return to this work once back to full time status.
GIS Coordinator	No	This skill set has atrophied due to COVID and multiple retirements. The Department of Public Works and Community Development plan to restore this functionality.
Public Information Officer/Specialist	No	N/A
Other relevant staff resources?	Yes	The Department of Public Works is critical for this work as is the Police Department.
Technical		
Grant writing	Yes	The Town has been successful in pursuing and administering numerous grants across multiple departments.

Administrative/Technical Resource	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
GIS mapping and analysis	Yes	Working on restoring this capability with modern cloud systems.
Hazard data and information	Yes	Captured and stored by multiple departments.
Maintenance programs to reduce risk *(e.g., tree trimming, drainage clearance)*	Yes	The Department of Public Works performs a variety of routine but critical maintenance activities including street sweeping, snow plowing, drainage clearance and restoration, tree trimming, and post-storm debris cleanup/removal. National Grid is an active partner with the Town in both tree trimming/pruning activities and hazardous tree removal to help mitigate power outages and other disruptions caused by severe storms.
Acquisition of land for open space, recreation, and other public use	Yes	Working with local non-profit partners.
Warning systems/services *(e.g., Reverse 911, outdoor warning signs)*	Yes	The Town uses CodeRED, an electronic emergency notification system that enables public safety personnel to notify residents and businesses of emergencies that may require action. Alerts are sent via telephone, text message, email, and social media. Any time there is an urgent public safety message, officials will send messages to alert enrolled community members of emergency details, instructions, or precautions that should be taken to make well-informed decisions and remain safe. Very effective emergency communications system for those who are enrolled in terms of preparing for imminent hazard threats.
Mutual Aid Agreements	Yes	Formal mutual aid agreements are held by both Fire and Police, and the Town is an active member of the Northern Berkshire REPC. In general, the first responder communities in the Berkshires coordinate and work well together during emergency situations. The Town has also opted in with MEMA under statewide mutual aid agreements (Public Safety and Public Works).

Financial Capabilities

Table 61 is based off Worksheet 4 from FEMA's Local Mitigation Planning Handbook. It was used by the HMPC to identify and review the Town's eligibility and access to funding sources that can be used to support the implementation of hazard mitigation projects.

Table 61. Financial Findings.

Financial Tool/Source	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
General funds	Yes	General funds have been and may continue to be used for hazard mitigation activities through recommendations from the Finance Committee.
Capital Improvement Program (CIP) funding	Yes	Once re-established the Town's Capital Improvement Program may help to identify and possibly fund initiatives or projects supportive of hazard risk reduction.
Special purpose taxes	No	Have not been used in the past, but it's possible in the future.
Fees for water, sewer, gas, or electric services	Yes	All utilities are enterprise funds.
Stormwater utility fee	No	N/A
Development impact fees	No	N/A
General obligation bonds and/or special purpose bonds	Yes	Appropriations for debt service can be raised with voter approval, including expenditures for projects that could support hazard risk reduction efforts.
FEMA Hazard Mitigation Assistance (HMA) funds	Yes	In 2012 the Town received over $6 million to acquire, remediate, and close the Spruces Mobile Home Park following flood damages from Tropical Storm Irene (converting the developed floodplain area to permanently protected open space and a public park). FEMA's current HMA grant programs (BRIC, FMA, HMGP) remain a good source of external funding for implementing eligible and cost-effective mitigation projects in coordination with MEMA.

Financial Tool/Source	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
HUD Community Development Block Grant (CDBG) funds	Yes	The Town is eligible for HUD CDBG and CDBG-DR funding that could be used to support the implementation of hazard mitigation actions. In 2013, as part of the Tropical Storm Irene disaster recovery process, CDBG-DR funding was received to prepare infrastructure for replacement housing for residents who were displaced as part of the acquisition and demolition of the Spruces Mobile Home Park.
Other federal funding programs	Yes	NOAA, EPA, USACE, and other federal agencies do make grant funding available for a variety of resilience-themed projects and initiatives that the Town may be eligible to pursue in the future. This includes both pre- and post-disaster funding programs that can be very effective in supporting the implementation of cost-effective hazard mitigation projects, many of which are described in FEMA's Mitigation Resource Guide.[59]
Massachusetts Municipal Vulnerability Preparedness (MVP) Action Grant funds	Yes	The MVP Action Grant offers financial resources to communities that are seeking to advance priority climate adaptation actions to address climate change impacts resulting from extreme weather, sea level rise, inland and coastal flooding, severe heat, and other climate impacts. As a designated "MVP Community" the Town is eligible to apply for grants on its own, or as part of a regional partnership of multiple municipalities provided that the lead applicant is MVP-designated.
Massachusetts Community Preservation Act (CPA) funds	Yes	In 2002 the Town passed the Community Preservation Act (CPA). Passage of CPA allowed the Town to establish a Community Preservation Fund to support open space, historic preservation, outdoor recreation, and community housing. Monies for the fund come from a property tax surcharge (2% of first $100k for residential) and matching dollars from the state. Can be used as an effective tool for hazard risk reduction.

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

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

Education and Outreach Capabilities

Table 62 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 62. Education and Outreach Findings.

Education & Outreach Program/Method	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
Community newsletter(s)	No	Not currently, though the Town's Diversity, Inclusion and Racial Equity Committee is seeking to collaborate with Williams College's Davis Center to create and circulate a town newsletter containing diverse events.
Web-based / social media	Yes	The Town maintains a website and uses social media platforms (Facebook, X, Instagram) to conduct outreach and communicate with community members.
Public Access TV, radio, etc.	Yes	WilliNet is a non-profit, public access TV station broadcasting on Spectrum channels 1302 and 1303 in Williamstown. It provides community members free access to video technology and training, and shows Town government proceedings, school committee business, community events, and locally created and sponsored programming.

Education & Outreach Program/Method	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
Community gatherings, festivals, celebrations, or other events	Yes	4th of July and Holiday Walk
Hazard awareness campaigns *(e.g., Severe Weather Awareness Week)*	No	N/A
Organizations that represent, advocate for, or interact with underserved or vulnerable populations	Yes	Williamstown Food Pantry, Remedy Hall, other community groups
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, etc.	Yes	Local COOL Committee and other groups. The COOL Committee focuses on local climate actions to reduce greenhouse gas emissions and includes representatives of the community, Town government, and Williams College. Together it brings expertise in environmental policy, climate science, renewable energy, sustainability management, community engagement, energy modeling and efficiency, planning, engineering, business, and biology.
Ongoing public education or information program *(e.g., responsible water use, fire safety, household preparedness)*	No	N/A
Natural disaster or safety-related school programs	Yes	Emergency planning and drills are held at the schools through coordination with the regional school district and local and state first responders.
StormReady® certification	No	N/A
Firewise USA® certification	No	N/A
Public-private partnership initiatives addressing disaster-related issues	No	N/A

National Flood Insurance Program (NFIP) Participation and Compliance

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

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

The Town of Williamstown has participated in the NFIP since 1977. As summarized in Table 63, the HMPC used Worksheet 5 from FEMA's *Local Mitigation Planning Handbook* to collect information regarding the Town's participation in and compliance with the NFIP. This worksheet, in addition to a separate *NFIP Survey* for the Town's Community Development Director, helped the HMPC to identify areas for improvement and other ideas that could be potential mitigation actions.

Table 63. NFIP Participation and Compliance Findings.

NFIP Topic	Source of Information	Comments
Insurance Summary		
How many NFIP policies are in the community? What is the total premium and coverage?	FEMA NFIP Services, Flood Insurance Data and Analytics; State NFIP Coordinator, FEMA (CIS)	As of July 31, 2024, a total of 57 NFIP policies are in force. The total premium is $59,475 for a total of $12,112,000 in coverage.
How many claims have been paid in the community?	FEMA NFIP Services, Flood Insurance Data	There has been a total of 24 claims paid since 1977, totaling $152,891 in losses. There have been six claims paid for substantial damage.

NFIP Topic	Source of Information	Comments
What is the total amount of paid claims? How many of the claims were for substantial damage?	and Analytics; State NFIP Coordinator, FEMA (CIS)	
How many structures are exposed to flood risk within the community?	GIS analysis (FEMA FIRMs + building footprint data)	It has been estimated that 259 structures are at risk to the 1-percent annual chance flood.
Are there any repetitive or severe repetitive loss structures in the community?	MEMA / FEMA	No recorded NFIP repetitive loss properties in Williamstown.
Describe any areas of flood risk with limited NFIP policy coverage	HMPC	No address-specific data is available, 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 57 current policies under the NFIP in comparison to 259 structures estimated to be exposed to high flood risk).
Staff Resources		
Who is responsible for floodplain management in the community? Do they serve any roles other than Community Floodplain Administrator (FPA)?	Community FPA	The duties of floodplain management and implementation of the commitments and requirements of the NFIP have been assigned to the Community Development Director.
Is the Community FPA or NFIP Coordinator a Certified Floodplain Manager?	Community FPA	No
Is floodplain management an auxiliary function?	Community FPA	Yes, for the Community Development Director.
Explain NFIP administration services (e.g., permit review, GIS,	Community FPA	All development in the Floodplain Zone Overlay, including structural and non-structural activities, are reviewed for compliance with the Town’s

NFIP Topic	Source of Information	Comments
inspections, engineering capability).		Zoning Bylaws and above rules and regulations. The Town complies with the NFIP by enforcing floodplain 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?	Community FPA	None identified.
Compliance History		
Is the community in good standing with the NFIP?	Community FPA, State NFIP Coordinator, FEMA	Yes
Are there any outstanding compliance issues (i.e., current violations)?	Community FPA	No. In the last 20 years the majority of the Hoosic floodplain has become publicly owned, preventing floodplain development.
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	State NFIP Coordinator, FEMA (CIS)	Last CAC was 6/25/2018 Last CAV was 9/15/1997
Is a CAV or CAC scheduled or needed?	Community FPA	Not at this time.
Regulation		
When did the community enter the NFIP?	State NFIP Coordinator, FEMA (CIS)	7/5/1977 (Regular Entry) 2/18/1972 (Emergency Entry)
Are the FIRMs digital or paper?	Community FPA	Digital (digitized from FIRM products)

NFIP Topic	Source of Information	Comments
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 Bylaws which comply with FEMA/NFIP minimum requirements. As described earlier in this chapter, higher regulatory standards are also met through the Town's enforcement of the Massachusetts State Building Code (780 CMR). Other NFIP development requirements are included in the Town's administration of the Commonwealth's Wetlands Protection Act Regulations (310 CMR).
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 Floodplain District. All development in the district, including structural and nonstructural activities, whether permitted by right or by special permit, must be in compliance with the Town's Zoning Bylaws and above referenced State regulations. Substantial monitoring and compliance activities are also performed under the Building Commissioner's administration of the State Building Code and the Conservation Commission's administration of the State Wetlands Protection Act.
Community Rating System (CRS)		
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?	Verisk	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 64 provides some additional information in response to the updated requirements included in FEMA's 2022 Local Mitigation Planning Policy Guide (Element C2-a):[60]

Table 64. Additional NFIP Participation and Compliance Information.

Required Information	Response
Adoption of NFIP minimum floodplain management criteria via local regulation.	Zoning bylaws, Article VII, Floodplain District (§70.7-4). Adopted with the recodification of the current zoning bylaw in 1991.
Adoption of the latest effective Flood Insurance Rate Map (FIRM), if applicable.	The Town's Zoning Bylaw at §70-2.3 (Location of Districts) establishes the Floodplain District as shown on the official Flood Insurance Rate Map (FIRM) for the Town of Williamstown dated April 3, 1984.
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 63.
Appointment of a designee or agency to implement the addressed commitments and requirements of the NFIP.	The Community Development Director has been designated to serve as the Town's Community Floodplain Administrator.
Description of how participants implement the substantial improvement/substantial damage provisions of their floodplain management regulations after an event.	The Town will implement 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. The Building Department with its partners at the Commonwealth Department of Public Licensure conducted this work in 2011 during Hurricane Irene recovery. This was the last time this was completed.

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

Summary and Conclusions

The Town of Williamstown is a small community but with relatively strong capabilities and resources to support the implementation of hazard mitigation actions. This chapter provides documentation on the existing local authorities, policies, programs, and resources to support hazard mitigation and long-term resilience to climate change and other future conditions.

Some of the strongest hazard mitigation capabilities for Williamstown are found through the adoption and maintenance of local plans and the routine administration and enforcement of strong codes and regulations. As evidenced by the recent update to the Town's comprehensive plan, *Envisioning Williamstown 2035*, there is a strong local commitment to mitigating the risks posed by natural hazards and climate change through an overarching framework of "sustainability and community resilience." Anticipated climate change impacts and the need for climate resilience was also addressed throughout the Town's recent update to its Open Space and Recreation Plan, so as recommended in the previous plan, the Town has effectively integrated a renewed focus on hazard mitigation directly in local planning efforts.

The Town also continues to review and occasionally update its regulations and procedures that can help reduce natural hazard risks. This includes the administration of zoning regulations, building codes, and special permit and site plan review procedures that ensure new or improved development projects address risk reduction through various provisions such as stormwater and floodplain management, erosion control, and the prohibition of residential development on steep slopes. The acquisition and preservation of natural hazard areas has also been an effective mitigation tool, as over the last 20 years the majority of the Hoosic River floodplain has become publicly owned, preventing hazardous development and protecting the natural and beneficial functions of these sensitive lands.

The Town employs committed staff across numerous departments to administer existing local programs, regulations, and other activities, who are supported by many local boards and committees as described earlier in this chapter. The oversight and enforcement of local codes and regulations is considered very effective, as is the routine maintenance of key infrastructure and other town-owned assets. As noted in the previous plan, staff in the Department of Public Works have a "can do" attitude of addressing immediate public safety issues and repairing or replacing damaged infrastructure proactively where possible. The Town benefits from effective collaboration and coordination across various departments and consults with local firms for services or expertise that it does not maintain in-house. In addition, Town staff have good working relationships with their facility colleagues at Williams College, each supporting the other where possible (for example this includes the Water Street project, where the College has funded an extensive infrastructure project that is intended to reduce flooding in this commercial district). Though the Town's administrative and technical capabilities are considered strong, existing staff resources do occasionally get stretched thin with staff turnover and departments often working on balancing day-to-day functions with multiple projects or priorities that take significant time. Some internal resources have been lost or temporarily disrupted due to the Covid-19 pandemic, retirements, or other issues (including GIS capabilities, some staff positions, etc.) but the key capabilities remain in place (e.g., planning and regulatory/code enforcement, public works, emergency response).

The Town's financial capabilities are also relatively strong in terms of its ability to leverage local and external funding sources to support hazard mitigation projects. The Town has had success with leveraging available grant funding from FEMA and other federal agencies for mitigation projects, such as the acquisition and conversion of the former Spruces Mobile Home Park into permanently protected floodplain open space and a public park. The Town can also lean on available State-level grant programs to support its flood mitigation and climate adaptation efforts, with local financing (including required grant match contributions) possibly coming from a variety of mechanisms including the Town's annual budget process, general obligation bonds, or Community Preservation Fund. The Town is also currently rebuilding its capacity for long-term capital improvement planning which will expand its capabilities for critical infrastructure maintenance and future investments in hazard mitigation and climate resilience.

The Town is also fortunate to have many methods and tools to support public education and outreach initiatives that can support hazard mitigation, such as a regularly maintained website, social media, public access TV, and community gathering events. Several departments, local boards or commissions, and other organizations as described in this chapter conduct outreach campaigns and/or deliver educational programming and the Town benefits from several that engage directly with vulnerable populations. Residents have highlighted these strengths of the Town with specific reference to its first responder community and the contributions of Williams College. These local resource connections can be used to help with increasing risk awareness and promoting emergency preparedness and hazard mitigation activities that can be accomplished on community-wide, neighborhood, and site-specific scales. As expressed in previous planning efforts, it is widely believed that such outreach should be increased to better communicate with and educate residents and business owners on how to prepare for and hopefully mitigate losses from emergency situations.

Although the Town of Williamstown has strong 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. Each of these opportunities were then considered by the HMPC during the plan update process as potential new mitigation actions to be included in the Mitigation Strategy.

Opportunities to Expand and Improve on Capabilities to Reduce Risk

Planning and Regulatory Capabilities

- Conduct regulatory reviews and updates to the following Town bylaws and regulations to require or promote hazard resistant, climate-adaptive standards for new development. Use existing methods or tools for incorporating green infrastructure, low impact development, and other nature-based solutions (such as Mass Audubon's Bylaw Review Tool).

    - Floodplain District (Zoning Bylaws, Section 70-7.4 A) – last amended in 2006, should be updated to at a minimum include language consistent with the State's latest model floodplain bylaw.
    - Development Plan Review (Zoning Bylaws, Section 70-8.2) and Special Permits (Zoning Bylaws, Section 70-8.4)
    - Stormwater Management (Zoning Bylaws, Section 70-5.3 B) – last updated in 2011 without consideration of future climate conditions. Should be updated to incorporate the latest updates to NOAA's precipitation frequency data presented in Atlas 14.
    - Subdivision Regulations (Chapter 170) – adopted in 1993, can do more in terms of stormwater management and flood hazard avoidance through promoting conservation/clustering, allowing density transfers, or other methods to restrict or prohibit the subdivision of land within or adjacent to natural hazard areas.
    - Wetlands Protection – consider adopting Town-specific regulations that go beyond the minimum standards set forth by the Massachusetts Wetlands Protection Act, such as increasing required buffer zones or minimum natural vegetative buffer strips.
- Develop a stormwater management plan that assesses and encourages efforts required to reduce flooding, including capital projects such as upgrading culverts and other drainage systems in addition to promoting green infrastructure and other nature-based solutions.
- Integrate the Town's community resilience building efforts (HMP, MVP, Master Plan, and other resilience-themed plans/reports) into a consolidated, public-facing website or online dashboard.
- Develop methods to help ensure the Town limits expenditures on capital projects that would encourage development and/or redevelopment in areas vulnerable to natural hazards. This could include infrastructure policies that limit the extension of existing infrastructure or facilities.
- Coordinate closely with Williams College on the alignment and cross-integration of this hazard mitigation plan with their own resiliency planning and project implementation efforts, including but not limited to the pursuit of federal and state grant funding opportunities.
- Incorporate hazard mitigation and climate adaptation/resilience building actions into the next update of the Town's Climate Action Plan, which is currently more focused on climate change mitigation (reducing greenhouse gas emissions).

Administrative and Technical Capabilities

- Seek and implement more capacity building initiatives for Town staff as appropriate, including but not limited to continuing education and professional development opportunities.
- Develop systems or practices that can help the Town to better cope with staff turnover or other disruptions to routine government functions and duties that support risk reduction.

- Build and maintain in-house GIS capabilities to support hazard mitigation and other community planning/project initiatives. This includes maintaining GIS hardware, software licenses, data layers in addition to staff with required skills and training.
- Continue to coordinate with the BRPC for assistance as it relates to administrative and technical support, capability enhancements, and/or other resource needs.
- Leverage the local COOL Committee in support of climate adaptation initiatives (expanding beyond climate change mitigation activities).

Financial Capabilities

- Re-establish the Town's Capital Improvement Program (CIP) to better plan for and prioritize infrastructure investments and other capital needs using a variety of funding sources. As part of this process, integrate hazard risk reduction and climate resilience as a key principle and a screening/evaluation factor for prioritizing recommended improvements. Other specific features could include:
    - Restrict or prohibit expenditures on projects that would encourage development and/or redevelopment in areas vulnerable to natural hazards, including the extension of existing public infrastructure, facilities, or services.
    - Require the consideration of green infrastructure and other nature-based solutions for hazard/climate resilience into the overall scope of work for all capital improvement projects.
- Leverage the Town's Community Preservation Act (CPA) funding where possible to support additional open space acquisition/restorations, green infrastructure installations, or other projects that advance flood mitigation and watershed management in addition to other CPA objectives. Update and incorporate hazard resilience factors into the Community Preservation Committee's application prioritization/selection process for recommendation to town meeting.
- Consider the designation or hiring of a dedicated resource development director / grants administrator for the Town to provide support across multiple departments that pursue and implement their own grant-funded projects.
- Continue exploring co-funding opportunities with Williams College to improve stormwater management and deployment of green infrastructure in the downtown area.
- Continue to coordinate with BRPC on positioning the Town to pursue and capture future grant funding for hazard risk reduction projects. This is particularly true for federal mitigation grants available through FEMA's HMA grant programs as well as MVP Action Grants through the Massachusetts MVP program.

Education and Outreach Capabilities

- Increase use of the Town's website and social media platforms, WilliNet, and other readily available outreach mechanisms to support low-cost public education initiatives on emergency preparedness and hazard mitigation actions for homeowners, business owners, etc.
- Work with the Mount Greylock Regional School District to incorporate hazard and climate resilience into existing curriculum and educational programming for K-12 students.
- Identify and seek to address any unmet needs related to targeted outreach and education for the community's more vulnerable populations (i.e., environmental justice communities, seniors, residents with special needs, etc.). This could be done through existing communication networks managed some of the Town's existing boards/commissions (e.g., Board of Health; Council on Aging; Diversity, Inclusion and Racial Equity Committee; Housing Authority), Williams College, and/or through collaboration with the Williamstown Food pantry, Remedy Hall, and other community groups.
- Increase and track the enrollment in the Town's CodeRed emergency notification system. Conduct outreach to address gaps in enrollment, especially for the community's more vulnerable residents to ensure they are properly notified of imminent hazard threats and the preparedness/response actions they may need to take (evacuation, sheltering, cooling/warming center options, etc.).

Possible New Actions Related to NFIP Participation and Compliance

- Support efforts to update the Town's existing but outdated flood hazard maps to reflect current and future conditions.
- Adopt the State's latest (2020) Model Floodplain Bylaw.
- Promote the availability of flood insurance to all property owners and renters, especially those in areas of high to moderate flood risk.
- Review the State's *Local Floodplain Action Guide* (forthcoming in 2025) for possible regulatory or administrative improvements.
- Develop a post-disaster substantial damage plan based on the latest guidance from FEMA and the State's Flood Hazard Management Program.

Chapter 6. Mitigation Strategy

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

Mitigation Goals

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

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

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

The HMPC developed the goal statements in Figure 21 to represent their vision and priorities for the Town of Williamstown in terms of hazard mitigation. All the hazards identified in this plan, while not named specifically in the goals, are implied and many are named specifically in the mitigation actions. When achieved by way of implementing the mitigation actions identified in this plan, the Town will mitigate risk posed by all identified hazards.

Save Lives and Property

- Reduce risk to life and property from natural hazards and climate change to support a dynamic, inclusive, sustainable, and resilient community.

Local Plans and Regulations

- Develop plans and policies that support the Town's growth and hazard mitigation capacity through regulations, planning, and collaboration at the regional level.

Building and Infrastructure Projects

- Implement projects focused on buildings and infrastructure to mitigate risks from natural hazards, support climate change adaptation.

Natural and Cultural Resources

- Implement actions that create environmental sustainability and support cultural resources to increase resilience to natural hazards and climate change.

Outreach and Education

- Expand education and awareness programs for Town residents and employees to support the implementation of hazard mitigation and climate adaptation efforts in municipal operations, businesses, and homes.

Figure 21. Goal Statements.

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

The Williamstown Multi-Hazard Mitigation Plan Update, June 2019 included 26 mitigation actions. For the purposes of this plan, all the actions were reviewed for their status and relevance. Table 65 shows the previous plan's 26 mitigation actions and the status of each. In addition to their status, if an action was moved forward to this plan the final column indicates the title of the new action.

Table 65. Status of Previous Plan's Hazard Mitigation Actions.

Action #	Action Title	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title/Description (if applicable)
1	Incorporate new FEMA 100-year floodplain data and maps into existing and future planning efforts	Delayed	Still waiting for updated FEMA mapping	YES - updated/revised description provided at right, if applicable	Incorporate the new FEMA 100-year floodplain data and maps into existing and future planning efforts.
2	Continue to strictly enforce 100-year floodplain bylaws and encourage flood-proofing or relocation of existing structures in 100-year floodplain zones	Partially Completed / In Progress	Existing capability.	NO - explanation provided at left	
3	Continue to limit the expansion of infrastructure in hazard-prone areas	Partially Completed / In Progress	Existing capability.	YES - updated/revised description provided at right, if applicable	Continue to limit the expansion of infrastructure in hazard-prone areas and proactively manage threats to existing at risk infrastructure.
4	Insure the integrity of large beaver dams or breach them in a controlled manner	Partially Completed / In Progress	These are reviewed on an as needed basis by DPW / Conservation Commission	YES - updated/revised description provided at right, if applicable	Ensure the integrity of large beaver dams or breach them in a controlled manner.
5	Continue to work with Fish & Wildlife to investigate permanent measures to minimize beaver impacts	Canceled	DPW is likely not well positioned to assist on this.	NO - explanation provided at left	
6	Determine which major transportation routes are in inundation areas for dams of High or Significant Hazard	Partially Completed / In Progress	Most impact is across the town line in North Adams	NO - explanation provided at left	

Action #	Action Title	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title/Description (if applicable)
7	Continue to prioritize and improve stormwater management systems that are located in hazard prone areas or are inadequate	Partially Completed / In Progress	This is ongoing work that is completed with each DPW full depth rebuild of a street	YES - updated/revised description provided at right, if applicable	Develop, implement and maintain a list of prioritized improvements for stormwater systems and other critical infrastructure.
8	Develop bylaws that require on-site containment of stormwater for new development	Completed	Existing 2011 bylaw continues to prove sufficient.	NO - explanation provided at left	
9	Encourage low-impact development techniques, especially in flood-prone areas (as part of a comprehensive new stormwater bylaw)	Delayed	Needs to be integrated into new subdivision and road acceptance regulations	YES - updated/revised description provided at right, if applicable	Revise bylaws to require low impact development techniques and incorporate green stormwater infrastructure.
10	Update an Emergency Action Plan (EAP) for Williamstown Reservoir Dam, and encourage the City of North Adams to develop an EAP for, and inspect the, Mt. Williams Reservoir	Completed	The Town of Williamstown has an Emergency Action Plan for the Williamstown Reservoir Dam. It is unclear if the City of North Adams has an EAP for the Mt. Williams Reservoir.	NO - explanation provided at left	
11	Continue to have information available for landowners in hazard-prone areas that discuss hazard mitigation (using Berkshire County Board of Health's	Partially Completed / In Progress	Existing capability.	YES - updated/revised description provided at right, if applicable	Create a flood awareness education and outreach campaign.

Action #	Action Title	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title/Description (if applicable)
	brochures); utilize the Town website for publishing information				
12	As necessary, update historic structures, businesses and critical facilities located in hazard-prone areas, including 100-year floodplains and dam failure inundation areas	Delayed	No progress has been made on this issue	YES - updated/revised description provided at right, if applicable	Update historic structures, businesses and critical facilities located in hazard-prone areas, including the 100-year floodplain and dam failure inundation areas.
13	Install accessible dry hydrants in needed areas	Completed	Fire District has pursued this in many locations within town.	NO - explanation provided at left	
14	Support the Hoosac Water Quality District's efforts to reduce I&I and other factors that overwhelm the system during severe precipitation events; support City of North Adams efforts to address I&I	Partially Completed / In Progress	Existing capability ongoing progress	NO - explanation provided at left	
15	Support the Williamstown Fire District's efforts to construct a modern fire station	Completed	Groundbreaking on new station in September	NO - explanation provided at left	
16	Develop and publicize local and regional evacuation routes and shelter locations; utilize the town website for publishing information	Delayed	Delayed by COVID & retirements	YES - updated/revised description provided at right, if applicable	Create a flood awareness education and outreach campaign.
17	Continue to fill communications gaps by adding new towers, using existing	Completed	New tower on Oblong Road, 2022.	NO - explanation provided at left	

Action #	Action Title	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title/Description (if applicable)
	towers were possible; evaluate if new fire station can fill gap				
18	Continue evaluating shelter capacity for Williamstown residents and determine each shelter's structural ability to withstand natural disaster events; this is a priority action identified by MVP planning process	Delayed	Delayed by COVID & retirements	YES - updated/revised description provided at right, if applicable	Evaluate shelter capacity for Williamstown residents and determine each shelter's structural ability to withstand natural disaster events; this is a priority action identified in the MVP planning process.
19	Review local agreements for use of shared mass care shelters in the event of a disaster	Delayed	Delayed by COVID & retirements	YES - updated/revised description provided at right, if applicable	Evaluate shelter capacity for Williamstown residents and determine each shelter's structural ability to withstand natural disaster events; this is a priority action identified in the MVP planning process.
20	Determine ability of town governmental centers to withstand a variety of natural hazard events	Completed + To Be Continued	New PD completed in 2019 is built to modern standard. Town Hall is insufficient.	NO - explanation provided at left	
21	Educate local officials to help them develop plans to protect critical documents and materials	Canceled	Delayed by COVID & retirements	NO - explanation provided at left	

Action #	Action Title	Current Status	Current Status Description/Explanation	Keep for Updated Plan?	Updated Action Title/Description (if applicable)
22	Improve record-keeping of local natural disasters and their impacts	Partially Completed / In Progress	Existing ongoing capability	NO - explanation provided at left	
23	Develop local shelter plan: formal agreements, protocols for opening & operating, public outreach to inform residents	Delayed	Delayed by COVID & retirements	YES - updated/revised description provided at right, if applicable	Evaluate shelter capacity for Williamstown residents and determine each shelter's structural ability to withstand natural disaster events; this is a priority action identified in the MVP planning process.
24	Designate and announce cooling/warming centers	Partially Completed / In Progress	Existing ongoing capability	NO - explanation provided at left	
25	Continue participation in Northern Berkshire Regional Emergency Planning Committee	Partially Completed / In Progress	Existing ongoing capability	NO - explanation provided at left	
26	Update eCEMP and paper copy of CEMP and distribute to key personnel	Completed	Police Department updated the CEMP.	NO - explanation provided at left	

Municipal Vulnerability Preparedness Plan

The Municipal Vulnerability Preparedness (MVP) plan was developed in June 2018 and is called the Community Resilience Building Workshop Summary of Findings and includes 28 recommendations. The MVP is part of a Massachusetts state-wide initiative through the Executive Office of Energy and Environmental Affairs (EEA) to provide support to cities and towns to plan for resiliency and implement climate change adaptation actions. The recommendations identified in Williamstown'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.

Top Recommendations to Improve Resilience	Notes / Comments
HIGHEST PRIORITIES	
Develop an overall Shelter Strategy; consider school buildings for sites	Incomplete
Develop a prioritized list of critical infrastructure, including bridges, culverts, pipelines, that need evaluation/improvement/replacement including specific sites identified at Workshop	Ongoing as part of the Town's Capital Plan.
Seek grant funding to replace or expand infrastructure	Ongoing as part of the Town's Capital Plan.
Establish a system to monitor beaver activity to prevent flooding at Railroad/other locations	Incomplete
Establish public information/outreach/education program on issues and procedures, including voluntary sign up for Code Red, sheltering, preparedness, evacuation procedures, etc.	Complete
Adopt, educate, assist and enforce use of flood mitigations methods/strategies for property owners in flood prone areas	Incomplete
Study extension of public water system to areas on well water	Incomplete
Update Town-wide All Hazards Plan	Incomplete
MODERATE PRIORITIES	
Expand Council on Aging resources for growing elderly population	Ongoing
Advocate for protecting vulnerable electrical grid	Ongoing
Assign Select Board members as community liaisons to transient community	Incomplete
Create short-term warming and cooling sites w/backup generators at Elementary school and Senior Ctr.	Complete
Agricultural Committee to research/educate farmers on resources	Complete
Encourage volunteerism and create incentives, especially for Fire District	Incomplete
Investigate enlarging storm sewer system in Colonial village/other locations	Ongoing
Engage and coordinate with Railroad owner/operator for hazardous spills response procedures	Incomplete / Delayed by railroad purchase by CSX and assignment of operating

Top Recommendations to Improve Resilience	Notes / Comments
	responsibility to G&W owned Berkshire and Eastern
Broad Brook cobbles – maintain as needed work with Fed./state agencies on permitting	Ongoing
Gravel roads – maintain and enlarge drainage as needed	Ongoing / Highway Superintendent working to integrate Vermont Better Road practices into our maintenance schedule. https://vtrans.vermont.gov/sites/aot/files/Better%20Roads%20Manual%20Final%202024.pdf
Urban tree cover – proactively seek financial resources for new trees	Ongoing, Town was awarded $25,000 for street trees for spring 2025 from the Woodlands Partnership for the 4th year in a row.
LOWER PRIORITIES	
Assess condition of bridges at stream crossings impacted by ice/cobbles (Rte. 7 and Cole, etc.)	Ongoing
Flooding at Colonial Village	Not relevant
Promote Forest Management plan for invasive insects, downed timber and replanting pro	Ongoing
Land subsidence on Scott Road – assess conditions/control water uphill of site	Ongoing / Delayed
Hoosic Water Quality District monitoring - assess sewer treatment plant capacity and low flow	Ongoing
Work with utilities to assess vulnerable power lines for relocation underground	Incomplete
Investigate feasibility of extending water system to northeast section of town	Incomplete
Educate residents to prep for drought – conservation measures; use of drought tolerant lawn and plants; identify resources	Incomplete
Make residents aware of presence of geologic fault line; include in emergency preparedness literature and public education program	Incomplete

Comprehensive Range of Mitigation Actions

C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))

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

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

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

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

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

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

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

Figure 22. Process of Identifying a Range of Mitigation Actions.

The HMPC and the public considered four mitigation action categories defined in Figure 23 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 23. Types of Mitigation Actions.

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

Table 66. 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

Mitigation Action Category	Examples of Mitigation Actions
	• 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 • 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

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.

Potential mitigation actions for each identified hazard and problem identified in the Risk Assessment are shown Table 76 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 67. Possible Mitigation Actions for Each Hazard.

Hazard	Possible Mitigation Actions
Flooding from Precipitation	• Investigate mitigation possibilities for critical facilities in the floodplain. • Create a flood awareness and education campaign. • Address beaver issues that may cause flooding.
Severe Winter Storms	• Identify shelter capacity of residents and a way to transport vulnerable populations to the shelters. • Mitigate the risk posed by power outages and roadway disruptions.
Other Severe Weather	• Trim trees away from power lines and roadways to reduce disruption from trees coming down during storms.
Wildfires/Brushfires	• Develop a joint emergency response plan for railway incidents including wildfires.
Average and Extreme Temperatures	• Put generators on the library and the Senior Center so they may be used as a heating or cooling centers.
Hurricanes/Tropical Storms	• Trim trees away from power lines and roadways to reduce disruption from trees coming down during storms.
Droughts	• Implement outdoor water use restrictions and other water conservation measures for periods of drought.
Landslides	• Develop a soil stabilization plan for high hazard areas.
Tornadoes	• Trim trees away from power lines and roadways to reduce disruption from trees coming down during storms.
Invasive Species	• Remove invasive species along roadways. • Develop a plan to mitigate the risk posed by beaver dams.
Earthquakes	• Identify any structural vulnerabilities in Town-owned critical facilities.

Mitigation Action Plan

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

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

Table 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 19. Actions that scored 15 points or higher were ranked as High priority. Actions that scored between 13-14 points were considered Medium, and actions that scored under 12 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 and Dam Failure, Severe Winter Storms, Other Severe Weather) = 3 Medium (Wildfires and Brush Fires, Extreme Temperatures, Hurricanes and Tropical Storms, Droughts, Landslides, Tornadoes, Invasive Species) = 2 Low (Earthquakes) = 1
2	Approximate Cost	How much will the measure cost to implement?	Low (Under $250k) = 3 Medium ($25k - $250k) = 2 High over $250k) = 1
3	Equity Focus	Does the measure provide support to Environmental Justice (EJ) and other Vulnerable Populations?	Direct Support = 3 Indirect Support = 2 No Support = 0
4	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
5	Protection of Critical Facilities or Infrastructure	Does the measure provide protection of critical facilities and infrastructure?	Yes = 3 No = 0
6	Natural Resource Protection	Does the measure provide protection of natural resources?	Yes = 2 No = 0

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

All the actions are listed in Table 68 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 68. Williamstown Hazard Mitigation Actions.

1	**Incorporate the new FEMA 100-year floodplain data and maps into existing and future planning efforts.**	
High	**Action Description**	Review all local regulation for compliance with new FEMA Maps when promulgated.
	Lead Position	Director of Community Development
	Supporting Agencies	Hoosic River Watershed Association
	Cost	Low
	Potential Funding Sources	Berkshire Regional Planning Commission (BRPC): District Local Technical Assistance FEMA: Building Resilient Infrastructure and Communities (BRIC) FEMA: Flood Mitigation Assistance (FMA) Grant
	Hazards	Flooding from Precipitation and Dam Failure
	Implementation Schedule	2026-2028

2	**Evaluate shelter capacity for Williamstown residents and determine each shelter's structural ability to withstand natural disaster events; this is a priority action identified in the MVP planning process.**	
High	**Action Description**	Develop local mass care shelter plans that include formal agreements, protocols for opening & operating, and public outreach to inform residents.
	Lead Position	Building Commissioner
	Supporting Agencies	Town Manager, Fire Department
	Cost	Low

	Potential Funding Sources	Massachusetts Emergency Management Agency (MEMA): Emergency Management Performance Grant (EMPG) Western Region Homeland Security Advisory Council (WRHSAC) U.S. Department of Housing and Urban Development (HUD): Emergency Solutions Grants (ESG)
	Hazards	Severe Winter Storms, Other Severe Weather, Extreme Temperatures, Hurricanes and Tropical Storm, Tornadoes
	Implementation Schedule	2025-2027

3	**Analyze potential risk from natural hazards and climate change to new Police Department and Fire Station.**	
High	**Action Description**	Conduct a forward analysis of climate change impacts on flooding near these critical facilities. They are outside of the special flood hazard area but may be at risk.
	Lead Position	Director of Community Development
	Supporting Agencies	Town Manager
	Cost	Low
	Potential Funding Sources	EEA: Municipal Vulnerability Preparedness (MVP) Program FEMA: Building Resilient Infrastructure and Communities (BRIC) FEMA: Hazard Mitigation Grant Program (HMGP)
	Hazards	Flooding from Precipitation and Dam Failure
	Implementation Schedule	2026-2030

4	**Conduct assessments of all municipal infrastructure (water, sewer, stormwater, etc.) to create a record of the condition, and to assist with the planning for improvements over time. Special attention needs to focus on the possibility of bring the public water system to the High School.**	
High	**Action Description**	Conduct assessments of all municipal infrastructure (water, sewer, stormwater, etc.) to create a record of the condition, and to assist with the planning for improvements over time. Having an infrastructure plan and schedule will also help prioritize items in the Capital Improvement Plan (CIP). This plan should include retirement of the City of North Adams water system within Williamstown by providing these residents with Town water and working with the owners of the Waubeeka Springs water system to ensure continued survival of the private water system serving the 5 Corners area. The High School uses well water, not public water and the extension of the public water system to Cold Spring Road needs to be assessed.
	Lead Position	Department of Public Works Director

	Supporting Agencies	Town Manager
	Cost	High
	Potential Funding Sources	Massachusetts State Revolving Fund (SRF) Drinking Water State Revolving Fund (DWSRF) U.S. Environmental Protection Agency (EPA): Grants for water infrastructure projects
	Hazards	Extreme Temperatures, Drought, Invasive Species
	Implementation Schedule	2025-2030

5	Retire the North Adams 1880 water system in Williamstown.	
High	Action Description	The Blackinton Mill Water Main that serves approximately 60 households in Williamstown should be retired immediately and replaced with connections to the Williamstown Water System. The Mill System is highly fragile due to age and vulnerable to flood damage at Broad Brook.
	Lead Position	Department of Public Works Director
	Supporting Agencies	Community Development
	Cost	High
	Potential Funding Sources	Massachusetts State Revolving Fund (SRF) Drinking Water State Revolving Fund (DWSRF) U.S. Environmental Protection Agency (EPA): Grants for water infrastructure projects
	Hazards	Flooding from Precipitation and Dam Failure, Severe Winter Storms, Other Severe Weather, Extreme Temperatures, Hurricanes and Tropical Storms, Droughts
	Implementation Schedule	2025-2030

6	Evaluate sewer and water line stream crossings and prioritize flood resilient replacement crossings.	
High	Action Description	Identifying vulnerabilities to flooding in the sewer and water systems is necessary to reduce the risk of damage during flood events that may cause disruptions in service. Old crossings may collapse during extreme weather events leading to infrastructure failures. Damage to sewer lines during flood events could lead to sewage spills and contaminated water sources.
	Lead Position	Department of Public Works Director

	Supporting Agencies	0
	Cost	High
	Potential Funding Sources	Massachusetts Executive Office of Energy and Environmental Affairs (EEA): Municipal Vulnerability Preparedness (MVP) Program Massachusetts Environmental Trust (MET) Grants FEMA: Building Resilient Infrastructure and Communities (BRIC) FEMA: Flood Mitigation Assistance (FMA) Grant
	Hazards	Flooding from Precipitation and Dam Failure, Severe Winter Storms, Other Severe Weather
	Implementation Schedule	2026-2030

7	**Add a generator to the Milne Public Library so it can function as a heating and cooling center.**	
High	Action Description	During power outages and extreme temperatures residents can use the Milne Public Library to charge devices and get a reprieve from the weather.
	Lead Position	Library Trustees Chair
	Supporting Agencies	Milne Public Library Administrative Staff, Town Administrator
	Cost	Medium
	Potential Funding Sources	Massachusetts Emergency Management Agency (MEMA): Emergency Management Performance Grant (EMPG) Massachusetts Public Library Construction Program (MPLCP) FEMA: Building Resilient Infrastructure and Communities (BRIC)
	Hazards	Severe Winter Storms, Other Severe Weather, Extreme Temperatures, Hurricanes and Tropical Storms, Tornadoes
	Implementation Schedule	2025-2027

8	**Add a generator to Williamstown Elementary School (WES) to serve as permanent emergency shelter walkable to most of the Town's population base.**	
High	Action Description	Generator needed at WES to serve as year round emergency shelter.
	Lead Position	School Superintendent
	Supporting Agencies	Department of Public Works
	Cost	Medium

	Potential Funding Sources	Massachusetts Clean Energy Center (MassCEC) Resilient Power Program Massachusetts Emergency Management Agency (MEMA): Emergency Management Performance Grant (EMPG) FEMA: Building Resilient Infrastructure and Communities (BRIC)
	Hazards	Severe Winter Storms, Other Severe Weather, Extreme Temperatures, Hurricanes and Tropical Storms, Tornadoes
	Implementation Schedule	2025-2027

10	**Prioritize removal of dangerous trees such as infected Ash trees and Beech trees from street rights of way.**	
Medium	**Action Description**	Removing hazardous trees improves resilience and safety of street corridors.
	Lead Position	Tree Warden
	Supporting Agencies	National Grid
	Cost	Medium
	Potential Funding Sources	Massachusetts Department of Conservation and Recreation (DCR): Urban and Community Forestry Challenge Grants Urban and Community Forestry Environmental Justice Grant Program
	Hazards	Severe Winter Storms, Other Severe Weather, Extreme Temperatures, Hurricanes and Tropical Storms, Tornadoes
	Implementation Schedule	2025-2030

9	**Revise bylaws to require low impact development techniques and incorporate green stormwater infrastructure.**	
Medium	**Action Description**	Promote modern best practices in stormwater management.
	Lead Position	Planning Board Chair
	Supporting Agencies	Berkshire Regional Planning Commission
	Cost	Medium
	Potential Funding Sources	Community One Stop for Growth Massachusetts Department of Environmental Protection (MassDEP): 319 Nonpoint Source Competitive Grants Massachusetts Clean Water Trust

	Hazards	Flooding from Precipitation and Dam Failure, Severe Winter Storms, Other Severe Weather, Hurricanes and Tropical Storms
	Implementation Schedule	2026-2029
11	Create a flood awareness education and outreach campaign.	
Medium	Action Description	Provide outreach and education to homeowners who could be impacted by flood and other natural hazards. Work with regional partners to expand Town's capacity for engagement.
	Lead Position	Conservation Commission Chair
	Supporting Agencies	Council on Aging
	Cost	Low
	Potential Funding Sources	Massachusetts Executive Office of Energy and Environmental Affairs (EEA): Municipal Vulnerability Preparedness (MVP) Program
	Hazards	Flooding from Precipitation and Dam Failure
	Implementation Schedule	2026-2030

13	Continue to limit the expansion of infrastructure in hazard-prone areas and proactively manage threats to existing at risk infrastructure.	
Medium	Action Description	Review all infrastructure work for hazard impact, particularly flooding, and work to minimize known existing threats.
	Lead Position	Department of Public Works Director
	Supporting Agencies	Community Development
	Cost	Low
	Potential Funding Sources	Massachusetts Executive Office of Energy and Environmental Affairs (EEA): Municipal Vulnerability Preparedness (MVP) Program FEMA: Building Resilient Infrastructure and Communities (BRIC) FEMA: Flood Mitigation Assistance (FMA) Grant
	Hazards	Flooding from Precipitation and Dam Failure, Severe Winter Storms, Other Severe Weather
	Implementation Schedule	2025-2030

12	Rebuild Main Street with a pedestrian and multi-modal focus and bury the overhead utilities.	
Medium	Action Description	Project should improve traffic flow, reduce pedestrian conflict, and provide storm impact resilience to the grid.
	Lead Position	Department of Public Works Director
	Supporting Agencies	Community Development
	Cost	High
	Potential Funding Sources	Private Donations
	Hazards	Severe Winter Storms, Other Severe Weather, Extreme Temperatures, Hurricanes and Tropical Storm, Tornadoes
	Implementation Schedule	2025-2030

14	Develop a Joint Emergency Response Plan for a railway incident including a wildfire.	
Medium	Action Description	Engage and coordinate with Railroad owner/operator for hazardous spills response procedures. Conduct a Joint Training and Tabletop Exercise.
	Lead Position	Fire Chief
	Supporting Agencies	Town Administrator
	Cost	Low
	Potential Funding Sources	Pipeline and Hazardous Materials Safety Administration (PHMSA): Hazardous Materials Emergency Preparedness (HMEP) Grant Pipeline and Hazardous Materials Safety Administration (PHMSA): Assistance for Local Emergency Response Training (ALERT) Federal Railroad Administration (FRA): Transportation Emergency Response Training Grant
	Hazards	Wildfires/Brushfires, Extreme Temperatures, Droughts
	Implementation Schedule	2026-2028

15	Plan for soil stabilization in known hazard zones to prevent landslides, earthquake impacts and associated damages.	
Low	Action Description	Scott Hill and North Hoosac Roads have active sliding issues and should be stabilized.
	Lead Position	Department of Public Works Director

	Supporting Agencies	Town Manager
	Cost	High
	Potential Funding Sources	MA Chapter 90 Road Funding U.S. Department of Agriculture: Natural Resources Conservation Service (NRCS): Environmental Quality Incentives Program (EQIP) Massachusetts Executive Office of Energy and Environmental Affairs (EEA): Massachusetts Healthy Soils Action Plan Grants
	Hazards	Landslides, Earthquake
	Implementation Schedule	2026-2030

16	**Develop, implement and maintain a list of prioritized improvements for stormwater systems and other critical infrastructure.**	
Low	**Action Description**	Develop, implement and maintain a list of prioritized improvements for stormwater systems and other critical infrastructure. Prioritize and improve stormwater management systems that are in hazard prone areas or are inadequate. Develop a prioritized list of critical infrastructure, including bridges, culverts, pipelines, that need evaluation/improvement/replacement including specific sites identified in MVP.
	Lead Position	Department of Public Works Director
	Supporting Agencies	Community Development
	Cost	High
	Potential Funding Sources	Massachusetts Department of Environmental Protection (MassDEP): Massachusetts Stormwater Management Funding Programs Massachusetts Executive Office of Energy and Environmental Affairs (EEA): Municipal Vulnerability Preparedness (MVP) Program Community One Stop MassWorks Infrastructure Program Housing Works Infrastructure Program
	Hazards	Flooding from Precipitation and Dam Failure, Severe Winter Storms, Other Severe Weather
	Implementation Schedule	2025-2030

17	**Ensure the integrity of large beaver dams or breach them in a controlled manner.**

Low	Action Description	Work with private property owners to manage this possible flash flooding threat. Particular focus should be paid to the issue during times of drought when breaches and planning for deceiver type devices are easiest to use.
	Lead Position	Conservation Commission Chair
	Supporting Agencies	Community Development
	Cost	Low
	Potential Funding Sources	DPW Operating Funds Private Property Owner Funding
	Hazards	Flooding from Precipitation and Dam Failure, Other Severe Weather, Invasive Species
	Implementation Schedule	2025-2030

18	**Promote Forest Management Plan and best practices for invasive insects, downed timber and replanting programs.**	
Low	Action Description	The purpose of this action is to improve forest resiliency and dampen possible fire danger.
	Lead Position	Conservation Commission Chair
	Supporting Agencies	Tree Warden
	Cost	Medium
	Potential Funding Sources	Massachusetts Department of Conservation & Recreation (DCR): Massachusetts Grants for Forestry and Forest Fire Control Massachusetts Division of Fisheries and Wildlife: MassWildlife Habitat Management Grant U.S. Forest Service's Community Wildfire Defense Grant Program: Community Wildfire Defense Grant Natural Resources Conservation Service (NRCS): Regional Conservation Partnership Program (RCPP)
	Hazards	Severe Winter Storms, Other Severe Weather, Wildfires and Brush Fires, Extreme Temperatures, Hurricanes and Tropical Storms, Droughts, Landslides, Tornadoes, Invasive Species
	Implementation Schedule	2026-2030

19	**Evaluate safety of culverts and bridges. Prioritize replacement of all undersized crossings.**	
Low	Action Description	0

	Lead Position	Department of Public Works Director
	Supporting Agencies	0
	Cost	High
	Potential Funding Sources	Massachusetts Division of Ecological Restoration (DER): Culvert Replacement Municipal Assistance Grant Program FEMA: Building Resilient Infrastructure and Communities (BRIC) FEMA: Flood Mitigation Assistance (FMA) Grant
	Hazards	Flooding from Precipitation and Dam Failure, Severe Winter Storms, Other Severe Weather
	Implementation Schedule	2026-2028

20	**Update historic structures, businesses and critical facilities located in hazard-prone areas, including the 100-year floodplain and dam failure inundation areas.**	
Low	**Action Description**	Identify which structures are at risk and if they require retrofit to increase resilience.
	Lead Position	Building Commissioner
	Supporting Agencies	Historical Commission
	Cost	High
	Potential Funding Sources	Massachusetts Historical Commission: Historic Preservation Grants National Trust for Historic Preservation: Historic Preservation Grants
	Hazards	Flooding from Precipitation and Dam Failure, Severe Winter Storms, Other Severe Weather
	Implementation Schedule	2027-2030

Table 69shows the mitigation actions that specifically target vulnerable populations and Table 70shows the mitigation actions that specifically target buildings and infrastructure. Each table lists the actions in order of priority.

Table 69. Actions that Target Vulnerable Populations.

Action #	Action Title
2	Evaluate shelter capacity for Williamstown residents and determine each shelter's structural ability to withstand natural disaster events; this is a priority action identified in the MVP planning process.

4	Conduct assessments of all municipal infrastructure (water, sewer, stormwater, etc.) to create a record of the condition, and to assist with the planning for improvements over time. Special attention needs to focus on the possibility of bringing the public water system to the high school.
5	Retire the North Adams 1880 water system in Williamstown.
7	Add a generator to the Milne Public Library so it can function as a heating and cooling center.
8	Add a generator to Williamstown Elementary School (WES) to serve as permanent emergency shelter walkable to most of the Town's population base.
11	Create a flood awareness education and outreach campaign.

Table 70. Actions that Target Buildings and Infrastructure.

Action #	Action Title
2	Evaluate shelter capacity for Williamstown residents and determine each shelter's structural ability to withstand natural disaster events; this is a priority action identified in the MVP planning process.
3	Analyze potential risk from natural hazards and climate change to new Police Department and Fire Station.
4	Conduct assessments of all municipal infrastructure (water, sewer, stormwater, etc.) to create a record of the condition, and to assist with the planning for improvements over time. Special attention needs to focus on the possibility of bringing the public water system to the high school.
5	Retire the North Adams 1880 water system in Williamstown.
6	Evaluate sewer and water line stream crossings and prioritize flood resilient replacement crossings.
7	Add a generator to the Milne Public Library so it can function as a heating and cooling center.
8	Add a generator to Williamstown Elementary School (WES) to serve as permanent emergency shelter walkable to most of the Town's population base.
9	Revise bylaws to require low impact development techniques and incorporate green stormwater infrastructure.
12	Rebuild Main Street with a pedestrian and multi-modal focus and bury the overhead utilities.
16	Develop, implement and maintain a list of prioritized improvements for stormwater systems and other critical infrastructure.
19	Evaluate safety of culverts and bridges. Prioritize replacement of all undersized crossings.
20	Update historic structures, businesses and critical facilities located in hazard-prone areas, including the 100-year floodplain and dam failure inundation areas.

Possible Funding Sources

All the mitigation actions included in this plan have identified one or more potential funding sources. The HMWG focused on projects eligible for MVP Grant funding and FEMA BRIC funding. Below is a list of some of the federal and state funding mechanisms that may assist in implementing mitigation actions.

Federal Emergency Management Agency (FEMA) Mitigation Grants

The Federal Emergency Management Agency (FEMA) makes grant funding available for a range of mitigation activities via several Hazard Mitigation Assistance (HMA) programs. These grant programs provide funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages. They are not intended to fund repair, replacement, or deferred maintenance activities but are rather designed to assist in developing long-term, cost-effective improvements that will reduce risk to natural hazards.

- **Building Resilient Infrastructure and Communities (BRIC)**
  BRIC is a new FEMA hazard mitigation program designed to replace the agency's former HMA Pre-Disaster Mitigation (PDM) grant program, aiming to categorically shift the federal focus away from reactive disaster spending and toward research-supported, proactive investment in community resilience. It is a result of recent amendments made to Section 203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) by Section 1234 of the Disaster Recovery Reform Act of 2018 (DRRA). BRIC will support states, local communities, tribes, and territories as they undertake hazard mitigation projects reducing the risks they face from natural hazards. The BRIC program's guiding principles are supporting communities through capability- and capacity-building; encouraging and enabling innovation; promoting partnerships; enabling large projects; maintaining flexibility; and providing consistency.

- **Hazard Mitigation Grant Program (HMGP)**
  The HMGP is authorized under Section 404 of the Stafford Act. The HMGP provides grants to states, tribes, and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. A key purpose of the HMGP is to ensure that any opportunities to take critical mitigation measures to protect life and property from future disasters are not lost during the recovery and reconstruction process following a disaster. HMGP is typically available only in the months after a federal disaster declaration, as funding amounts are determined based on a percentage of the funds spent on FEMA's Public and Individual Assistance programs.

- **Flood Mitigation Assistance (FMA) Program**
  The FMA program was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the NFIP. FEMA provides FMA funds to assist states and communities with implementing measures that reduce

or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the NFIP. The long-term goal of FMA is to reduce or eliminate claims under the NFIP through mitigation activities. One limitation of the FMA program is that it is generally used to provide mitigation for structures that are insured or located in Special Flood Hazard Areas (SFHAs) as mapped by FEMA. Federal funding for this nationally competitive grant program is generally an annual allocation (subject to Congressional appropriation) and eligibility is linked to a community's good standing in the NFIP.

Municipal Vulnerability Preparedness Action Grants[61]

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
- 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

[61] State of Massachusetts. *MVP Action Grant.* https://www.mass.gov/service-details/mvp-action-grant.

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 Community Development Director is the primary point of contact for the Hazard Mitigation Plan's implementation and maintenance. The Hazard Mitigation Planning Committee (HMPC) will implement the mitigation strategy and specific mitigation actions outlined in this plan, and update and maintain the plan according to the guidelines below. The HMPC includes key stakeholders in the Town, who will use the plan's goals, as well as continued analysis of hazard risks and capabilities, to weigh the available resources against the costs and benefits for each mitigation action. The Town understands the value of this plan and its positive mitigation impact and intends to continue updating this plan and implementing its strategies.

Continued Public Participation

D1. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))

Public participation is an integral component of the mitigation planning process and will continue to be essential as this plan is implemented and updated over time. Based on the high level of interest in the mitigation planning process and in the Municipal Vulnerability Preparedness project, Town residents and stakeholders are interested in hazard mitigation and climate adaptation. The HMPC included several education and outreach mitigation actions designed to engage the public. The Town intends to involve the public throughout the five-year implementation of this plan, as well as in the reviewing and updating processes. The Community Development 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 this plan. Efforts to involve the public include:

- Advertising on the Town's website and through standard meeting laws.
- Posting news and announcements on the Town's social media pages.
- 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 plan on the Town's website and keep a hard copy in the Community Development office, the Library, and the Senior Center 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

D2. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))

The HMPC and the Town of Williamstown recognize the importance of keeping the mitigation plan up to date. The HMPC will meet twice a year for the purposes of implementing and maintaining the Hazard Mitigation Plan. They will notify the public prior to meetings. This work includes monitoring, evaluating, and updating the plan over a five-year period. Overall, the responsibility for monitoring the Plan rests with the Community Development Director.

Process to Track Actions

***MONITORING** means tracking the implementation of the plan over time.*

The Community Development Director and the HMPC will maintain the Mitigation Action Tracker (a tool to record the status of each mitigation action). They will send a reminder email with a link to the web-based Mitigation Action Tracker on a semi-annual basis (January and July) to all Department Heads responsible for a mitigation action and to relevant Town committees. They may also distribute the Mitigation Action Progress Worksheet (shown in Appendix C) for Department Heads who prefer a form over a digital spreadsheet.

If the Town experiences a large-scale disaster, the Community Development Director will assemble an HMPC meeting to update the list of mitigation actions and review their order based on current priorities.

Process to Evaluate Effectiveness of the Plan

***EVALUATING** means assessing the effectiveness of the plan at achieving its stated purpose and goals.*

The HMPC has agreed to meet on a bi-annual basis to review the implementation of the mitigation plan. The first meeting will take place in July; the second, in January.

At the first meeting (July 2025), the HMPC will review the effectiveness of the planning process, public and stakeholder engagement, risk analysis, and the mitigation strategy, including its implementation. It is recommended that the HMPC use the worksheet provided in Appendix C. Beyond considering the planning process, the HMPC will seek to answer the following questions to determine if the plan is effective at mitigating risk to Town residents, the built environment, and the natural environment.

- Can the HMPC identify success stories of losses avoided because of hazard mitigation measures implemented? Can the HMPC identify political, social, and economic successes?

- Have the mitigation actions implemented achieved benefits beyond the cost of mitigation?
- Have the implemented mitigation actions saved lives or protected property?
- Does the list of mitigation actions coincide with the Town's priorities? Do additional actions need to be added?

Process to Update the Plan

***UPDATING** means reviewing and revising the plan at least once every five years.*

At each semi-annual meeting, the HMPC will review the plan's goal statements and mitigation action status. If necessary, the goal statements and mitigation actions may be revised to reflect current Town priorities. In addition, the HMPC will discuss methods for continuing to integrate the mitigation plan with other plans, processes, and projects in the Town.

Year 1	Year 2	Year 3	Year 4	Year 5
•Seek grant funding for mitigation actions •Gather the HMPC in January and July	•Seek grant funding for mitigation actions •Gather the HMPC in January and July	•Seek FEMA BRIC funding for plan update •Seek grant funding for mitigation actions •Gather the HMPC in January and July	•Begin the plan update process •Seek grant funding for mitigation actions •Gather the HMPC in January and July	•Complete the plan update process - adopt the new plan •Seek grant funding for mitigation actions •Gather the HMPC in January and July

Figure 24. 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.[62] Towns and cities interested in accessing the HHPD grant must have an approved local hazard mitigation plan and meet criteria outlined in Element G: High Hazard Potential Dams. Element G is optional for local governments. While this Plan update did not address Element G requirements, the Town of Williamstown will consider

[62] Local Mitigation Planning Policy Guide, FEMA, Effective April 19, 2023, p.32.

adding Element G during the next Plan update. Meeting the requirements of Element G include answering the following questions:

- Did the plan describe the incorporation of existing plans, studies, reports and technical information for HHPDs?
- Did the plan address HHPDs in the risk assessment?
- Did the plan include mitigation goals to reduce long-term vulnerabilities from HHPDs?
- Did the plan include actions that address HHPDs, and prioritize mitigation actions to reduce vulnerabilities from HHPDs?

Responsible Parties for Plan Implementation and Maintenance

Williamstown, MA

Andrew Groff

Community Development Director

Town of Williamstown

31 North Street, Williamstown, MA 01267

Phone: 413-458-3500 x 107

Email: agroff@williamstownma.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

System to Integrate this Plan with Existing Planning Mechanisms

D3. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))

***INTEGRATE** means to include hazard mitigation principles, vulnerability information and mitigation actions into other existing community planning to leverage activities that have co-benefits, reduce risk and increase resilience.*

For the Town of Williamstown 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 most recent update to its comprehensive plan, Envisioning Williamstown 2035, effectively demonstrates this type of integration by stressing the importance of community sustainability and climate resilience across all elements of this separate planning document that will guide future growth and community development.

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 Williamstown. 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):

- Envisioning Williamstown 2035: A Comprehensive Plan for the Future (2023)
- Open Space and Recreation Plan (2024)
- Municipal Vulnerability Preparedness / Community Resilience Building Summary of Findings Report (2020)
- Economic Development 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

***PLANNING MECHANISMS** refers to the governance structures used to manage local land use development and community decision-making, such as budgets, comprehensive plans, capital improvement plans, economic development strategies, climate action plans or other long-range plans.*

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, Climate Action Plan, or related climate adaptation planning efforts.

Acronyms

AAL	Average Annual Loss
ADA	Americans with Disabilities Act
ALERT	Assistance for Local Emergency Response Training
APA	American Planning Association
APHIS	Animal and Plant Health Inspection Service
ASCE	American Society of Civil Engineers
BBRS	Board of Building Regulations and Standards
BCEGS	Building Code Effectiveness Grading Schedule
BRIC	Building Resilient Infrastructure and Communities
BRPC	Berkshire Regional Planning Commission
BRTA	Berkshire Regional Transit Authority
BTU	British Thermal Unit
C2ES	Center for Climate and Energy Solutions
CAC	Community Assistance Contact
CARE	Community Assessment Research
CAV	Community Assistance Visit
CDBG	Community Development Block Grant
CDC	Centers for Disease Control and Prevention
CDD	Consecutive Dry Days
CEC	Clean Energy Center
CEMP	Comprehensive Emergency Management Plan
CMR	Code of Massachusetts Regulations
CFR	Code of Federal Regulations
CIP	Capital Improvement Program
CIS	Community Information System
CMR	Code of Massachusetts Regulations
COOL	CO_2 Lowering
COOP	Continuity of Operations Plan
CPA	Community Preservation Act
CRB	Community Resilience Building
CRS	Community Rating System
CZM	Coastal Zone Management
DAR	Department of Agricultural Resources
DCR	Department of Conservation and Recreation
DEI	Diversity, Equity, and Inclusion
DEP	Department of Environmental Protection
DER	Department of Ecological Restoration

DMA	Disaster Mitigation Act
DMP	Drought Management Plan
DMTF	Drought Management Task Force
DPW	Department of Public Works
DRRA	Disaster Recovery Reform Act
DWR	Days Without Rain
EAP	Emergency Action Plan
EDC	Economic Development Committee
EF	Enhanced Fujita
EJ	Environmental Justice
EMD	Emergency Management Director
EMPG	Emergency Management Performance Grant
EOC	Emergency Operations Center
EOEEA	Executive Office of Energy and Environmental Affairs
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FMA	Flood Mitigation Assistance
FPA	Floodplain Administrator
FRA	Federal Railroad Administration
FSim	Forest Service Fire Simulation System
FY	Fiscal Year
GHG	Greenhouse Gas
GIS	Geographic Information Systems
HHPD	High Hazard Potential Dam
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMEP	Hazardous Materials Emergency Preparedness
HMP	Hazard Mitigation Plan
HMPC	Hazard Mitigation Planning Committee
HooRWA	Hoosic River Watershed Association
HUD	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	International Organization for Standardization
ISPSC	International Swimming Pool and Spa Code
M/S	Meters per Second
MCDA	Multi-Criteria Decision Analysis
MEMA	Massachusetts Emergency Management Agency
MGL	Massachusetts General Law
MIPAG	Massachusetts Invasive Plant Advisory Group
MoCa	Museum of Contemporary Art
MPH	Miles Per Hour
MSBC	Massachusetts State Building Code
MVP	Municipal Vulnerability Preparedness
NCDC	National Climatic Data Center
NCEI	National Centers for Environmental Information
NE CASC	Northeast Climate Adaptation Science Center
NESIS	Northeast Snowfall Impact Scale
NFIP	National Flood Insurance Program
NFIRA	National Flood Insurance Reform Act
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRCS	National Resource Conservation Service
NWS	National Weather Service
OSRP	Open Space and Recreation Plan
PA	Public Assistance
PARAC	Parks and Recreation Advisory Committee
PDM	Pre-Disaster Mitigation
PHMSA	Pipeline and Hazardous Materials Safety Administration
PhD	Doctor of Philosophy
PPC	Public Protection Classification
PPQ	Plant Protection and Quarantine
PWS	Public Water Systems
RCPP	Regional Conservation Partnership Program
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 Ice Accumulation

TD	Tropical Depression
TRI	Toxic Release Inventory
TS	Tropical Strom
US	United States
USC	U.S. Code
USDA	United States Department of Agriculture
USGS	United States Geological Survey
USGCRP	U.S. Global Change Research Program
WES	Williamstown Elementary School
WRLF	Williamstown Rural Lands Foundation
WTP	Wastewater Treatment Plant
WPA	Wetlands Protection Act

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 7/16/2024	HMPC #1 8/15/2024	HMPC #2 9/19/2024	HMPC #3 11/4/2024	HMPC #4 12/19/2024
Mina	Amundsen	Director of Planning / Construction	Williams College	413-597-2303	mma3@williams.edu	☐	☐	☐	☐	☐
Jamie	Art	General Counsel	Williams College	413-597-4860	jba1@williams.edu	☐	☐	☐	☐	☐
Peter	Beck	Planning Board Chair	Town of Williamstown	413-458-3500	peterlewisbeck@gmail.com	☐	☐	☐	☐	☐
Joe	Bergeron	Acting Superintendent	Mount Greylock School District	413-458-9582 x4005	jbergeron@mgrsd.org	☐	☐	☑	☐	☐
Susan	Briggs	Executive Director of Chamber of Commerce	Town of Williamstown	413-458-9077	info@williamstownchamber.com	☐	☐	☑	☑	☑
Chuck	Chandler	Police Department/Accreditation Manager	Town of Williamstown	413-458-5733	cchandler@williamstownma.gov	☐	☐	☑	☐	☐
Craig	Clough	Director of Public Works	Town of Williamstown	413-458-3500	cclough@williamstownma.gov	☐	☐	☐	☑	☐
Ryan	Contenta	Building Commissioner	Town of Williamstown	413-458-3500	RContenta@Williamstownma.gov	☐	☐	☐	☐	☐
Joanne	DeRose	Director, Community & Customer Management, Western Mass	National Grid	1-800-322-3223	joanne.derose@nationalgrid.com	☐	☐	☐	☐	☐
Andrew	Groff	Director of Community Development	Town of Williamstown	413-597-8284	agroff@williamstownma.gov	☑	☑	☑	☑	☑
CJ	Hoss	Community Planning Program Director	Berkshire Regional Planning Commission	413.442.1521 x44	choss@berkshireplanning.org	☐	☐	☐	☐	☐
Robert (Bob)	Ide	Community Manager	National Grid	413-800-5054	robert.ide@nationalgrid.com	☐	☐	☐	☑	☐
Phil	McKnight	Conservation Commission, Chair	Town of Williamstown	413-458-3500	pmcknight@williams.edu	☐	☐	☐	☐	☐
Robert	Menicocci	Town Manager	Town of Williamstown	413-458-3500	rmenicocci@williamstownma.gov	☑	☐	☐	☐	☐
Brian	O'Grady	Council on Aging	Town of Williamstown	413-458-3500	bogrady@williamstownma.gov.	☐	☑	☑	☐	☑
Craig	Pedercini	Fire Chief	Williamstown Fire District	413-458-8113	cf1williamstown@gmail.com	☐	☐	☐	☐	☐
Bill	Powers	Director of Facilities	Clark Art Institute	413 441 5830	bpowers@Clarkart.edu	☐	☑	☐	☐	☐
Gina	Puc	Community Relations	Williams College	413-597-4233	gp9@williams.edu	☐	☑	☐	☐	☐
Ruth	Russell	Health Inspector	Town of Williamstown	413-458-3500	rrussell@williamstownma.gov	☐	☑	☑	☑	☐
Robin	Sher	Clark Art Finance and Operations Director	Clark Art Institute	413-458-2303	rsher@clarkart.edu	☐	☐	☐	☐	☐
Alison	Warner	Campus Safety Chief	Williams College	413-597-4769	awarner@williams.edu	☐	☐	☐	☐	☐
Rob	Winuk	Director Of Facilities	Mount Greylock School District	413-652-3394	rwnuk@mgrsd.org	☐	☐	☐	☐	☐
Mike	Ziemba	Police Chief	Town of Williamstown	413-458-3500	mziemba@williamstownma.gov	☐	☐	☐	☐	☐

HMPC Meeting Agendas

KICK OFF MEETING AGENDA

TOWN OF WILLIAMSTOWN, MA HAZARD MITIGATION PLAN UPDATE

DATE:	07/16/2024
TIME:	10:00-11:00AM
ZOOM:	https://us02web.zoom.us/j/86898670752?pwd=Ynvkt1XZ6vgO1kIGAuZFbOv2ZcjFS1.1 Meeting ID: 868 9867 0752 Passcode: 829517

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 August**

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 August

HMPC MEETING #1 AGENDA

TOWN OF WILLIAMSTOWN, MA HAZARD MITIGATION PLAN UPDATE

DATE: THURSDAY, 08/15/2024

TIME: 10:00-11:30AM

ZOOM: https://us02web.zoom.us/j/89477702541?pwd=jn3bzzySzYjcs9rAp2Bv9JexB9dKsq.1
MEETING ID: 894 7770 2541
PASSCODE: 174320

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**
IV. **Capability Assessment**
V. **Hazard Identification**
VI. **Goals and Mitigation Actions**
VII. **Next Steps**

ACTION ITEMS

I. Capability Assessment Surveys
II. Update Critical Facility List
III. Share GIS Data and Maps
IV. Identifying New Mitigation Actions

HMPC MEETING #2 AGENDA

TOWN OF WILLIAMSTOWN, MA HAZARD MITIGATION PLAN UPDATE

DATE: THURSDAY, 09/19/2024

TIME: 10:00-11:30AM

ZOOM: https://us02web.zoom.us/j/86857034386?pwd=FzAOOtroXWspDjuL2aZ58o2YC2QbJB.1
MEETING ID: 868 5703 4386
PASSCODE: 578430

AGENDA ITEMS

I. **Public Meeting Outreach**
   i. Outreach Efforts
II. **Capability Assessment Update**
   i. Key Plans Reviewed
   ii. Where are Strengths and Challenges Discussion
III. **Risk Assessment**
   i. Hazards and Critical Facilities Identified
   ii. Hazus Impacts
   iii. Problems Identified Including High Hazard Areas
   iv. Mitigation Actions Discussion
IV. **Mitigation Strategy**
   i. Goal Statements
   ii. Developing Mitigation Actions
V. **Town Priorities and Changes in Development**

ACTION ITEMS

VI. **Pictures**
VII. **Outreach for Public Meeting**
VIII. **Mitigation Actions**

HMPC MEETING #3 AGENDA

TOWN OF WILLIAMSTOWN, MA HAZARD MITIGATION PLAN UPDATE

DATE: 11/4/2024

TIME: 10:00-11:30AM

ZOOM: https://us02web.zoom.us/j/87597801964?pwd=q8uukJzkA7hSXtbEnL1LO1aPboQjx4.1
Meeting ID: 875 9780 1964
Passcode: 379669

AGENDA ITEMS

I. **Project Update**
II. **Risk Assessment**
    i. Risk Ranking
    ii. Problem Statements
III. **Capability Assessment Update**
    i. Opportunities Identified
IV. **Public Meeting**
    i. Outreach Efforts
V. **Mitigation Strategy**
    i. Discuss New Actions
VI. **Plan Implementation**

ACTION ITEMS

I. Public Meeting Outreach
II. HMPC #4 Date
III. New Mitigation Actions

HMPC MEETING #4 AGENDA

TOWN OF WILLIAMSTOWN, MA HAZARD MITIGATION PLAN UPDATE

DATE: THURSDAY, 12/19/2024
TIME: 12:00-1:30PM
ZOOM: https://us02web.zoom.us/j/82534747128?pwd=Iab3pjqrHQPTNNnv933Wd7h0DJb2rD.1
MEETING ID: 825 3474 7128
PASSCODE: 339590

AGENDA ITEMS

I. **Project Update**
II. **Public Engagement**
    i. Outreach for Public Meeting and Plan Review
III. **Final Hazard List Ranking**
IV. **Mitigation Actions**
    i. Final List and Prioritization
V. **Plan Review**
    i. What to Look For
VI. **Timeline for Completion**

ACTION ITEMS

I. Public Meeting Outreach
II. Plan Review

Public Outreach

Meeting # 1

Participants:

- Andrew Groff
- Robert Menicocci
- Stephanie Boyd
- Randal Fippenger
- Jeffery Johnson
- Jane Patton
- Matt Neely

TOWN OF WILLIAMSTOWN, MA

PUBLIC MEETING

SHARE YOUR IDEAS FOR REDUCING RISK TO NATURAL HAZARDS AND CLIMATE CHANGE

Do you wonder if Williamstown can flood, experience a tornado, or have an earthquake? What can prevent those natural hazards and climate change from wreaking havoc in our community?

Join the meeting to learn about this important project and to share your ideas for making Williamstown more resilient to natural hazards and climate change.

Williamstown has formed a Hazard Mitigation Planning Committee to identify risks and projects to mitigate those risks. The Town is working with a consultant hired by the Massachusetts Emergency Management Agency to develop a Hazard Mitigation Plan Update that will be approved by the Federal Emergency Management Agency and adopted by the Town. This plan allows Williamstown to apply for pre- and post-disaster mitigation funds.

11/4/2024

7:00pm

Select Board Meeting at Town Hall & Via Zoom

HTTPS://WILLIAMSTOWNMA.GOV/ FOR MEETING DETAILS OR CONTACT, ANDREW GROFF, DIRECTOR OF COMMUNITY DEVELOPMENT AT 413-597-8284 OR AGROFF@WILLIAMSTOWNMA.GOV

PUBLIC MEETING #1 AGENDA

TOWN OF WILLIAMSTOWN, MA HAZARD MITIGATION PLAN UPDATE

DATE: MONDAY, NOVEMBER 4, 2024

TIME: 7:00PM AT THE SELECT BOARD MEETING

IN-PERSON: Town Hall, 31 North Street, Williamstown, MA 01267

ZOOM:

Meeting ID:
Passcode:

AGENDA ITEMS

1. **Introductions**
2. **What is Hazard Mitigation?**
3. **What is a Hazard Mitigation Plan?**
4. **Identify Natural Hazards and High Hazard Areas**
5. **Identify Critical Facilities**
6. **Brainstorm Possible Mitigation Actions**
7. **Next Steps**

iBerkshires.com

Williamstown Select Board to Hear Update on Hazard Mitigation Plan

By Stephen Dravis
iBerkshires Staff
05:48PM / Saturday, November 02, 2024

WILLIAMSTOWN, Mass. — Residents have a chance to share their concerns about the town's preparedness for potential natural disasters as Williamstown updates its Hazard Mitigation Plan.

Emergency management consultant Jamie Caplan of Northampton is working with the town to refresh the plan, last updated in 2019, that expired this summer.

At Monday's Select Board meeting, her firm will be providing an update on the plan, which the town plans to submit to the state this spring. Both the Massachusetts Emergency Management Agency and Federal Emergency Management Agency review and approve such plans, which make municipalities eligible for pre-disaster mitigation funding, Caplan said recently.

"At the meeting on Monday with the Select Board, we will identify all of those hazards — anything possible, but only natural hazards," Caplan said. "We will discuss their list of critical facilities, buildings and infrastructure.

"Based on that, we do a risk analysis. When we come up with what the risks are, we come up with ways to mitigate the risks. Those projects we call mitigation actions."

"We" in this case includes the experts from Jamie Caplan Consulting, who are under contract with the commonwealth to work with towns and cities, alongside a committee of local stakeholders.

Caplan said her firm started working on the Williamstown plan this summer. The process includes gathering input from community partners.

"Part of updating the plan includes bringing a list of organizations together that have a stake in how to mitigate risk: public and private partners, hospitals, watershed groups, the Berkshire Regional Planning Commission, Caplan said.

"We make an effort to identify groups and see if we can get representatives to attend the public meetings or sit on the Hazard Mitigation Planning Committee. The committee meets four times during the project. We had our kickoff meeting in July, and, before the plan is finished, we meet four times. The committee has its third meeting on Monday."

The committee's goal is to look at what natural disasters are possible, which ones are most likely and, most importantly, how the town is positioned to respond in the event of an emergency.

"We look at our list of natural hazards, which has to be consistent with the state's list," Caplan said. "We emphasize mitigating risks of all hazards but prioritize the highest risk hazards. Things like flooding are at the top of the list. We're also looking at invasive species. We have to consider climate change and how it impacts all hazards. We consider how climate change has made the seasons shift, the timing and intensity of winter storms. We're seeing huge fluctuations in temperature that break up the roads."

As part of the Hazard Mitigation Planning Committee's process, it holds two formal public input sessions, Caplan said. The first opportunity is Monday. Another session will be held in February; that may or may not be in conjunction with a Select Board meeting as the committee decides, Caplan said.

"We hope people will come on Monday," she said. "It will be educational, and hopefully members of the public will be able to ask questions."

iBerkshires • 102 Main Street
North Adams, MA 01247 • tel: 413.663.3384 • fax: 413.664.4251 • info@iberkshires.com

Meeting # 2

Participants:

- Reiko Yamada
- Ed Jones
- Anne Jones
- Paula McKenna
- Franz Burnet Gocht
- Judy Boucher
- Sarah Kline
- Karen Kelly
- Geoff King
- Sandra King
- Marilyn Vince
- Marily Danylin
- Andrew Groff
- Brian O'Grady

TOWN OF WILLIAMSTOWN, MA

PUBLIC MEETING

SHARE YOUR IDEAS FOR REDUCING RISK TO NATURAL HAZARDS AND CLIMATE CHANGE

Do you wonder if Williamstown can flood, experience a tornado, or have an earthquake? What can prevent those natural hazards and climate change from wreaking havoc in our community?

Join the **second public meeting** to learn about this important project and to share your ideas for making Williamstown more resilient to natural hazards and climate change.

Williamstown has formed a Hazard Mitigation Planning Committee to identify risks and projects to mitigate those risks. The Town is working with a consultant hired by the Massachusetts Emergency Management Agency to develop a Hazard Mitigation Plan Update that will be approved by the Federal Emergency Management Agency and adopted by the Town. This plan allows Williamstown to apply for pre- and post-disaster mitigation funds.

01/28/2025

1:00 pm – 2:00 pm

Council on Aging & Via Zoom

HTTPS://WILLIAMSTOWNMA.GOV/ FOR MEETING DETAILS OR CONTACT, ANDREW GROFF, DIRECTOR OF COMMUNITY DEVELOPMENT AT 413-597-8284 OR AGROFF@WILLIAMSTOWNMA.GOV

PUBLIC MEETING #2 AGENDA

TOWN OF WILLIAMSTOWN, MA HAZARD MITIGATION PLAN UPDATE

DATE: TUESDAY, JANUARY 28, 2025

TIME: 1:00-2:00PM

ZOOM: https://us02web.zoom.us/j/81602198653?pwd=a5CblglTbeAG5bMD41b7McDYAjVwdY.1

Meeting ID: 816 0219 8653

Passcode: 640551

AGENDA ITEMS

I. **Introduction**
   i. Disaster Preparedness, Mitigation, Response, Recovery

II. **What is Hazard Mitigation?**
   i. Benefits of Hazard Mitigation Plan
   ii. How the Plan was Developed

III. **Ways to Prepare Your Home and Family**
   i. Learn and Plan
   ii. Check and Build
   iii. Practice and Help

IV. **Risk Assessment Process**
   i. Identified Hazards and Critical Facilities

V. **Hazard Mitigation Strategy**
   i. Mitigation Plan Goals
   ii. Review of Actions

VI. **Plan Review**
   i. What to Expect and How to Review

VII. **Timeline for Completion**

Appendix B. Mitigation Actions.

Priority Ranking Points

Table 71. Priority Ranking Points for Each Action.

Action #	Action Title	Hazards Addressed	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
1	Incorporate the new FEMA 100-year floodplain data and maps into existing and future planning efforts.	3	3	2	3	3	2	2	18
2	Evaluate shelter capacity for Williamstown residents and determine each shelter's structural ability to withstand natural disaster events; this is a priority action identified in the MVP planning process.	3	3	3	3	3	0	2	17
3	Analyze potential risk from natural hazards and climate change to new Police Department and Fire Station.	3	3	2	3	3	0	2	16
4	Conduct assessments of all municipal infrastructure (water, sewer, stormwater, etc.) to create a record of the condition, and to assist with the planning for improvements over time. Special attention needs to focus on the possibility of bringing the public water system to the High School.	2	1	3	3	3	2	2	16

Action #	Action Title	Hazards Addressed	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
5	Retire the North Adams 1880 water system in Williamstown.	3	1	3	3	3	0	2	15
6	Evaluate sewer and water line stream crossings and prioritize flood resilient replacement crossings.	3	1	2	2	3	2	2	15
7	Add a generator to the Milne Public Library so it can function as a heating and cooling center.	3	2	3	2	3	0	2	15
8	Add a generator to Williamstown Elementary School (WES) to serve as permanent emergency shelter walkable to most of the Town's population base.	3	2	3	2	3	0	2	15
10	Prioritize removal of dangerous trees such as infected Ash trees and Beech trees from street rights of way.	3	2	0	2	3	2	2	14
9	Revise bylaws to require low impact development techniques and incorporate green stormwater infrastructure.	3	2	2	2	3	0	2	14
11	Create a flood awareness education and outreach campaign.	3	3	3	2	0	0	2	13
13	Continue to limit the expansion of infrastructure in hazard-prone areas and proactively manage threats to existing at risk infrastructure.	3	3	0	2	3	0	2	13
12	Rebuild Main Street with a pedestrian and multi-modal focus and bury the overhead utilities.	3	1	2	2	3	0	2	13

Action #	Action Title	Hazards Addressed	Approximate Cost	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
14	Develop a Joint Emergency Response Plan for a railway incident including a wildfire.	2	3	0	1	3	2	2	13
15	Plan for soil stabilization in known hazard zones to prevent landslides, earthquake impacts and associated damages.	2	1	2	3	0	2	2	12
16	Develop, implement and maintain a list of prioritized improvements for stormwater systems and other critical infrastructure.	3	1	0	2	3	0	2	11
17	Ensure the integrity of large beaver dams or breach them in a controlled manner.	3	3	0	1	0	2	2	11
18	Promote Forest Management Plan and best practices for invasive insects, downed timber and replanting programs.	3	2	0	1	0	2	2	10
19	Evaluate safety of culverts and bridges. Prioritize replacement of all undersized crossings.	3	1	0	1	3	0	2	10
20	Update historic structures, businesses and critical facilities located in hazard-prone areas, including the 100-year floodplain and dam failure inundation areas.	3	1	0	0	0	0	2	6

Types of Mitigation Actions

Table 72. Mitigation Actions Sorted by Action Category.

Mitigation Category	Action #	Action Title
Local Planning and Regulations	1	Incorporate the new FEMA 100-year floodplain data and maps into existing and future planning efforts.
	13	Continue to limit the expansion of infrastructure in hazard-prone areas and proactively manage threats to existing at risk infrastructure.
Structure and Infrastructure Project	2	Evaluate shelter capacity for Williamstown residents and determine each shelter's structural ability to withstand natural disaster events; this is a priority action identified in the MVP planning process.
	3	Analyze potential risk from natural hazards and climate change to new Police Department and Fire Station.
	4	Conduct assessments of all municipal infrastructure (water, sewer, stormwater, etc.) to create a record of the condition, and to assist with the planning for improvements over time. Special attention needs to focus on the possibility of bringing the publ
	5	Retire the North Adams 1880 water system in Williamstown.
	6	Evaluate sewer and water line stream crossings and prioritize flood resilient replacement crossings.
	7	Add a generator to the Milne Public Library so it can function as a heating and cooling center.
	8	Add a generator to Williamstown Elementary School (WES) to serve as permanent emergency shelter walkable to most of the Town's population base.
	9	Revise bylaws to require low impact development techniques and incorporate green stormwater infrastructure.
	12	Rebuild Main Street with a pedestrian and multi-modal focus and bury the overhead utilities.
	16	Develop, implement and maintain a list of prioritized improvements for stormwater systems and other critical infrastructure.
	19	Evaluate safety of culverts and bridges. Prioritize replacement of all undersized crossings.

Mitigation Category	Action #	Action Title
	20	Update historic structures, businesses and critical facilities located in hazard-prone areas, including the 100-year floodplain and dam failure inundation areas.
Natural Systems Protection	10	Prioritize removal of dangerous trees such as infected Ash trees and Beech trees from street rights of way.
	15	Plan for soil stabilization in known hazard zones to prevent landslides, earthquake impacts and associated damages.
	17	Ensure the integrity of large beaver dams or breach them in a controlled manner.
	18	Promote Forest Management Plan and best practices for invasive insects, downed timber and replanting programs.
Education and Awareness	11	Create a flood awareness education and outreach campaign.
	14	Develop a Joint Emergency Response Plan for a railway incident including a wildfire.

Actions Sorted by Goal Statement

Table 73. Mitigation Actions Sorted by Goal Statement.

Goal	Action #	Action Title
Save Lives and Property	2	Evaluate shelter capacity for Williamstown residents and determine each shelter's structural ability to withstand natural disaster events; this is a priority action identified in the MVP planning process.
Local Plans and Regulations	1	Incorporate the new FEMA 100-year floodplain data and maps into existing and future planning efforts.
	13	Continue to limit the expansion of infrastructure in hazard-prone areas and proactively manage threats to existing at risk infrastructure.
Building and Infrastructure Projects	3	Analyze potential risk from natural hazards and climate change to new Police Department and Fire Station.
	4	Conduct assessments of all municipal infrastructure (water, sewer, stormwater, etc.) to create a record of the condition, and to assist with the planning for improvements over time. Special attention needs to focus on the possibility of bringing the public water supply to the high school.
	5	Retire the North Adams 1880 water system in Williamstown.
	6	Evaluate sewer and water line stream crossings and prioritize flood resilient replacement crossings.
	7	Add a generator to the Milne Public Library so it can function as a heating and cooling center.
	8	Add a generator to Williamstown Elementary School (WES) to serve as permanent emergency shelter walkable to most of the Town's population base.
	9	Revise bylaws to require low impact development techniques and incorporate green stormwater infrastructure.
	12	Rebuild Main Street with a pedestrian and multi-modal focus and bury the overhead utilities.
	16	Develop, implement and maintain a list of prioritized improvements for stormwater systems and other critical infrastructure.
	19	Evaluate safety of culverts and bridges. Prioritize replacement of all undersized crossings.
Natural and Cultural Resources	10	Prioritize removal of dangerous trees such as infected Ash trees and Beech trees from street rights of way.

Goal	Action #	Action Title
	15	Plan for soil stabilization in known hazard zones to prevent landslides, earthquake impacts and associated damages.
	17	Ensure the integrity of large beaver dams or breach them in a controlled manner.
	18	Promote Forest Management Plan and best practices for invasive insects, downed timber and replanting programs.
	20	Update historic structures, businesses and critical facilities located in hazard-prone areas, including the 100-year floodplain and dam failure inundation areas.
Outreach and Education	11	Create a flood awareness education and outreach campaign.
	14	Develop a Joint Emergency Response Plan for a railway incident including a wildfire.

Actions Sorted by Hazard

Table 74. Mitigation Actions Sorted by Hazards Addressed.

Specific Hazards Addressed	Action #	Action Title
Flooding from Precipitation and Dam Failure	1	Incorporate the new FEMA 100-year floodplain data and maps into existing and future planning efforts.
	3	Analyze potential risk from natural hazards and climate change to new Police Department and Fire Station.
	11	Create a flood awareness education and outreach campaign.
Severe Winter Storms, Other Severe Weather, Extreme Temperatures, Hurricanes and Tropical Storm, Tornadoes	2	Evaluate shelter capacity for Williamstown residents and determine each shelter's structural ability to withstand natural disaster events; this is a priority action identified in the MVP planning process.
	12	Rebuild Main Street with a pedestrian and multi-modal focus and bury the overhead utilities.
Extreme Temperatures, Drought, Invasive Species	4	Conduct assessments of all municipal infrastructure (water, sewer, stormwater, etc.) to create a record of the condition, and to assist with the planning for improvements over time. Special attention needs to focus on the possibility of bringing the publi
Flooding from Precipitation and Dam Failure, Severe Winter Storms, Other Severe Weather, Extreme Temperatures, Hurricanes and Tropical Storms, Droughts	5	Retire the North Adams 1880 water system in Williamstown.
Flooding from Precipitation and Dam Failure, Severe Winter Storms, Other Severe Weather	6	Evaluate sewer and water line stream crossings and prioritize flood resilient replacement crossings.
	13	Continue to limit the expansion of infrastructure in hazard-prone areas and proactively manage threats to existing at risk infrastructure.

Specific Hazards Addressed	Action #	Action Title
	16	Develop, implement and maintain a list of prioritized improvements for stormwater systems and other critical infrastructure.
	19	Evaluate safety of culverts and bridges. Prioritize replacement of all undersized crossings.
	20	Update historic structures, businesses and critical facilities located in hazard-prone areas, including the 100-year floodplain and dam failure inundation areas.
Severe Winter Storms, Other Severe Weather, Extreme Temperatures, Hurricanes and Tropical Storms, Tornadoes	7	Add a generator to the Milne Public Library so it can function as a heating and cooling center.
	8	Add a generator to Williamstown Elementary School (WES) to serve as permanent emergency shelter walkable to most of the Town's population base.
	10	Prioritize removal of dangerous trees such as infected Ash trees and Beech trees from street rights of way.
Flooding from Precipitation and Dam Failure, Severe Winter Storms, Other Severe Weather, Hurricanes and Tropical Storms	9	Revise bylaws to require low impact development techniques and incorporate green stormwater infrastructure.
Wildfires/Brushfires, Extreme Temperatures, Droughts	14	Develop a Joint Emergency Response Plan for a railway incident including a wildfire.
Landslides, Earthquake	15	Plan for soil stabilization in known hazard zones to prevent landslides, earthquake impacts and associated damages.
Flooding from Precipitation and Dam Failure, Other Severe Weather, Invasive Species	17	Ensure the integrity of large beaver dams or breach them in a controlled manner.
Severe Winter Storms, Other Severe Weather, Wildfires and Brush Fires, Extreme Temperatures,	18	Promote Forest Management Plan and best practices for invasive insects, downed timber and replanting programs.

Specific Hazards Addressed	Action #	Action Title
Hurricanes and Tropical Storms, Droughts, Landslides, Tornadoes, Invasive Species		

Actions Sorted by Lead Position

Table 75. Mitigation Actions Sorted by Lead Position.

Action Lead	Action #	Action Title
Fire Chief	**14**	Develop a Joint Emergency Response Plan for a railway incident including a wildfire.
Planning Board Chair	**9**	Revise bylaws to require low impact development techniques and incorporate green stormwater infrastructure.
Conservation Commission Chair	**11**	Create a flood awareness education and outreach campaign.
	17	Ensure the integrity of large beaver dams or breach them in a controlled manner.
	18	Promote Forest Management Plan and best practices for invasive insects, downed timber and replanting programs.
Director of Community Development	**1**	Incorporate the new FEMA 100-year floodplain data and maps into existing and future planning efforts.
	3	Analyze potential risk from natural hazards and climate change to new Police Department and Fire Station.
Building Commissioner	**2**	Evaluate shelter capacity for Williamstown residents and determine each shelter’s structural ability to withstand natural disaster events; this is a priority action identified in the MVP planning process.
	20	Update historic structures, businesses and critical facilities located in hazard-prone areas, including the 100-year floodplain and dam failure inundation areas.
Department of Public Works Director	**4**	Conduct assessments of all municipal infrastructure (water, sewer, stormwater, etc.) to create a record of the condition, and to assist with the planning for improvements over time. Special attention needs to focus on the possibility of bringing the public water system to the High School.
	5	Retire the North Adams 1880 water system in Williamstown.
	6	Evaluate sewer and water line stream crossings and prioritize flood resilient replacement crossings.
	12	Rebuild Main Street with a pedestrian and multi-modal focus and bury the overhead utilities.

Action Lead	Action #	Action Title
	13	Continue to limit the expansion of infrastructure in hazard-prone areas and proactively manage threats to existing at risk infrastructure.
	15	Plan for soil stabilization in known hazard zones to prevent landslides, earthquake impacts and associated damages.
	16	Develop, implement and maintain a list of prioritized improvements for stormwater systems and other critical infrastructure.
	19	Evaluate safety of culverts and bridges. Prioritize replacement of all undersized crossings.
Library Trustees Chair	**7**	Add a generator to the Milne Public Library so it can function as a heating and cooling center.
School Superintendent	**8**	Add a generator to Williamstown Elementary School (WES) to serve as permanent emergency shelter walkable to most of the Town's population base.
Tree Warden	**10**	Prioritize removal of dangerous trees such as infected Ash trees and Beech trees from street rights of way.

Actions Sorted by Implementation Schedule

Table 76. Mitigation Actions Sorted by Implementation Schedule.

Implementation Schedule	Action #	Action Title
2025-2027	2	Evaluate shelter capacity for Williamstown residents and determine each shelter’s structural ability to withstand natural disaster events; this is a priority action identified in the MVP planning process.
	7	Add a generator to the Milne Public Library so it can function as a heating and cooling center.
	8	Add a generator to Williamstown Elementary School (WES) to serve as permanent emergency shelter walkable to most of the Town's population base.
2025-2030	4	Conduct assessments of all municipal infrastructure (water, sewer, stormwater, etc.) to create a record of the condition, and to assist with the planning for improvements over time. Special attention needs to focus on the possibility of bringing the public water supply to the high school.
	5	Retire the North Adams 1880 water system in Williamstown.
	10	Prioritize removal of dangerous trees such as infected Ash trees and Beech trees from street rights of way.
	12	Rebuild Main Street with a pedestrian and multi-modal focus and bury the overhead utilities.
	13	Continue to limit the expansion of infrastructure in hazard-prone areas and proactively manage threats to existing at risk infrastructure.
	16	Develop, implement and maintain a list of prioritized improvements for stormwater systems and other critical infrastructure.
	17	Ensure the integrity of large beaver dams or breach them in a controlled manner.
2026-2028	1	Incorporate the new FEMA 100-year floodplain data and maps into existing and future planning efforts.
	14	Develop a Joint Emergency Response Plan for a railway incident including a wildfire.
	19	Evaluate safety of culverts and bridges. Prioritize replacement of all undersized crossings.
2026-2029	9	Revise bylaws to require low impact development techniques and incorporate green stormwater infrastructure.

Implementation Schedule	Action #	Action Title
2026-2030	3	Analyze potential risk from natural hazards and climate change to new Police Department and Fire Station.
	6	Evaluate sewer and water line stream crossings and prioritize flood resilient replacement crossings.
	11	Create a flood awareness education and outreach campaign.
	15	Plan for soil stabilization in known hazard zones to prevent landslides, earthquake impacts and associated damages.
	18	Promote Forest Management Plan and best practices for invasive insects, downed timber and replanting programs.
2027-2030	20	Update historic structures, businesses and critical facilities located in hazard-prone areas, including the 100-year floodplain and dam failure inundation areas.

Appendix C. Plan Implementation and Review Supporting Materials.

Plan Update Evaluation Worksheet

Table 77. Plan Update Evaluation Worksheet.

Plan Section	Considerations	Explanation
Planning Process	Should the Town invite any additional stakeholders to participate in the planning process? What public outreach activities have occurred? How can public involvement be improved?	
Risk Assessment	What disasters has the Town, or the region experienced? Should the list of hazards be modified? Are new data sources, maps or studies available? If so, what have they revealed, and should the information be incorporated into the plan update? Has development in the region occurred and could it create or reduce risk?	
Capability Assessment	Has the Town adopted new policies, plans, regulations, or reports that could be incorporated into this plan? Are there different or additional administrative, human, technical, and financial resources available for mitigation planning? Are there different or new education and outreach programs and resources available for mitigation activities?	
Mitigation Strategy	Is the mitigation strategy being implemented as anticipated? Were the cost and timeline estimate accurate? Should new mitigation actions be added to the Action Plan? Should existing mitigation actions be revised or removed from the plan? Are there new obstacles that were not anticipated in the plan that will need to be considered in the next plan update? Are there new funding sources to consider? Have elements of the plan been incorporated into other planning mechanisms?	
Implementation Plan	Was the plan monitored and evaluated as anticipated? What are needed improvements to the plan implementation procedures?	

Mitigation Action Progress Worksheet

Table 78.Mitigation Action Progress Worksheet.

<table>
<tr><th colspan="5">Mitigation Action Progress Worksheet</th></tr>
<tr><td>Progress Report Period</td><td colspan="2">From Date</td><td colspan="2">To Date</td></tr>
<tr><td>Action/Project Title</td><td colspan="4"></td></tr>
<tr><td>Responsible Department</td><td colspan="4"></td></tr>
<tr><td>Contact Name</td><td colspan="4"></td></tr>
<tr><td>Contact Phone/Email</td><td colspan="4"></td></tr>
<tr><td>Project Description</td><td colspan="4"></td></tr>
<tr><td>Project Goal</td><td colspan="4"></td></tr>
<tr><td>Project Objective</td><td colspan="4"></td></tr>
<tr><td>Project Cost</td><td colspan="4"></td></tr>
<tr><td colspan="5">Project Status</td></tr>
<tr><td>Date of Project Approval</td><td>Date of Project Start</td><td>Anticipated Date of Completion</td><td>Project Canceled</td><td>Project Delayed</td></tr>
<tr><td colspan="5">Explanation of Delay or Cost Overruns</td></tr>
<tr><td colspan="5">Project Report Summary</td></tr>
<tr><td colspan="5">What was accomplished for this project during this reporting period?</td></tr>
<tr><td colspan="5">What obstacles, problems, or delays did the project encounter?</td></tr>
<tr><td colspan="5">Plans for next reporting period.</td></tr>
</table>

Appendix D. Hazus Reports

Hazus: Flood Global Risk Report

Region Name: WilliamstownFlood

Flood Scenario: 100year

Print Date: Friday, September 6, 2024

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.

HAZUS™

Table of Contents

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 3 square miles and contains 134 census blocks. The region contains over 3 thousand households and has a total population of 7,513 people. The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 2,476 buildings in the region with a total building replacement value (excluding contents) of 1,576 million dollars. Approximately 86.35% of the buildings (and 60.14% of the building value) are associated with residential housing.

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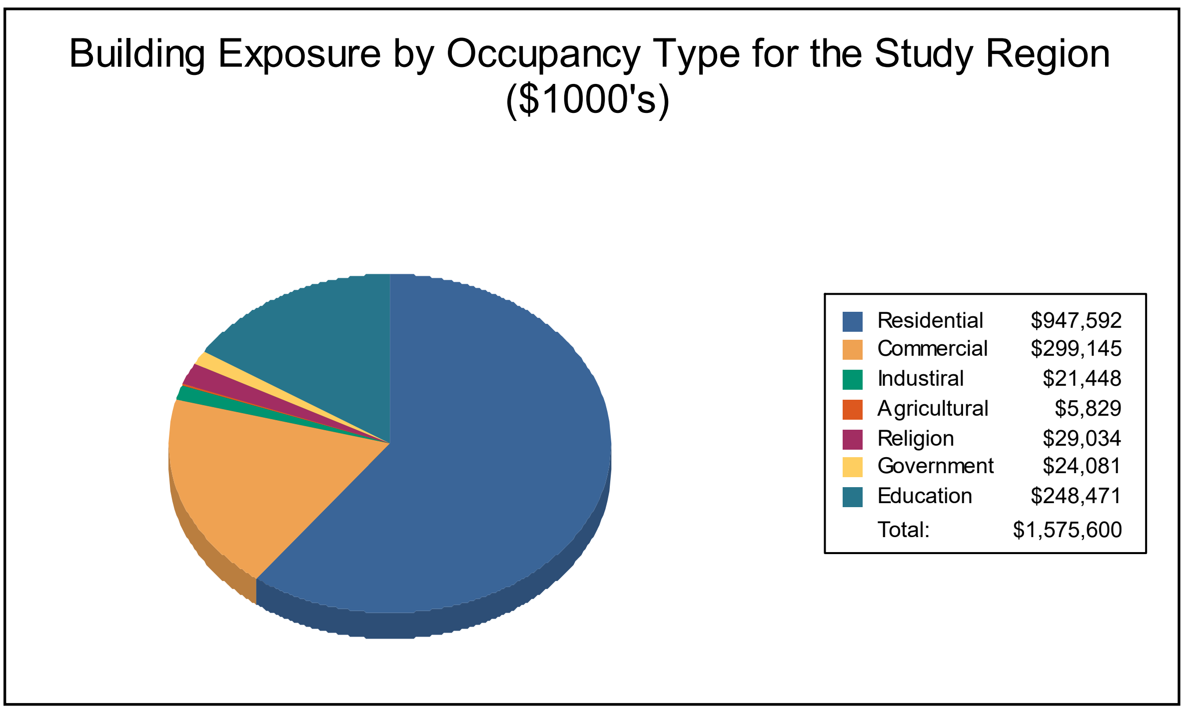
Building Inventory

General Building Stock

Hazus estimates that there are 2,476 buildings in the region which have an aggregate total replacement value of 1,576 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

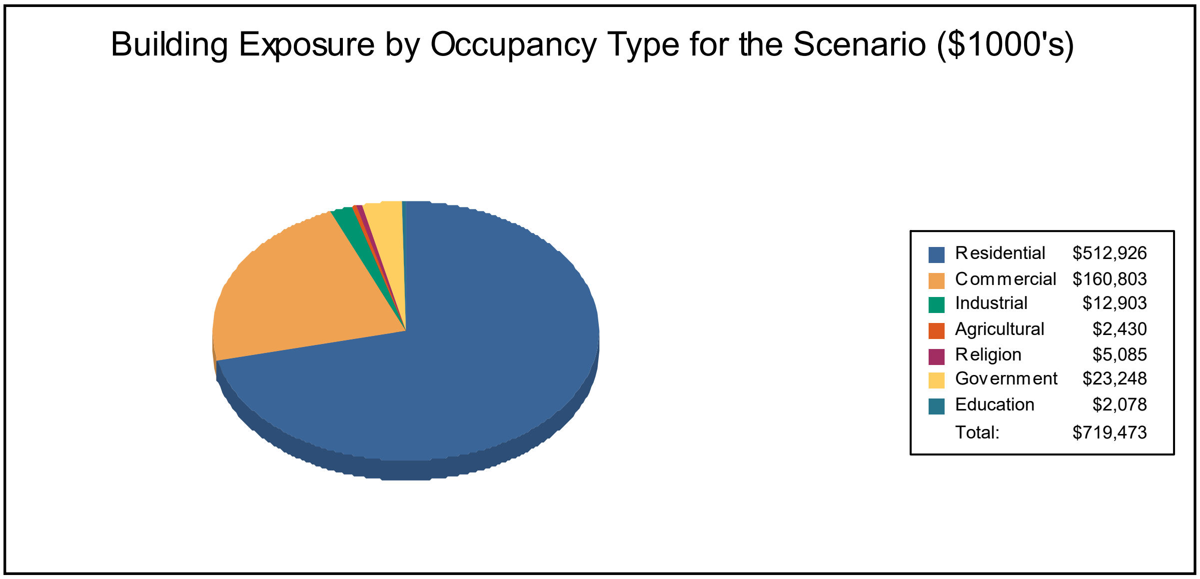
Occupancy	Exposure ($1000)	Percent of Total
Residential	947,592	60.1%
Commercial	299,145	19.0%
Industrial	21,448	1.4%
Agricultural	5,829	0.4%
Religion	29,034	1.8%
Government	24,081	1.5%
Education	248,471	15.8%
Total	**1,575,600**	**100%**



FEMA
RiskMAP
Increasing Resilience Together

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	512,926	71.3%
Commercial	160,803	22.4%
Industrial	12,903	1.8%
Agricultural	2,430	0.3%
Religion	5,085	0.7%
Government	23,248	3.2%
Education	2,078	0.3%
Total	**719,473**	**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, 1 fire station, 1 police station and 1 emergency operation center.

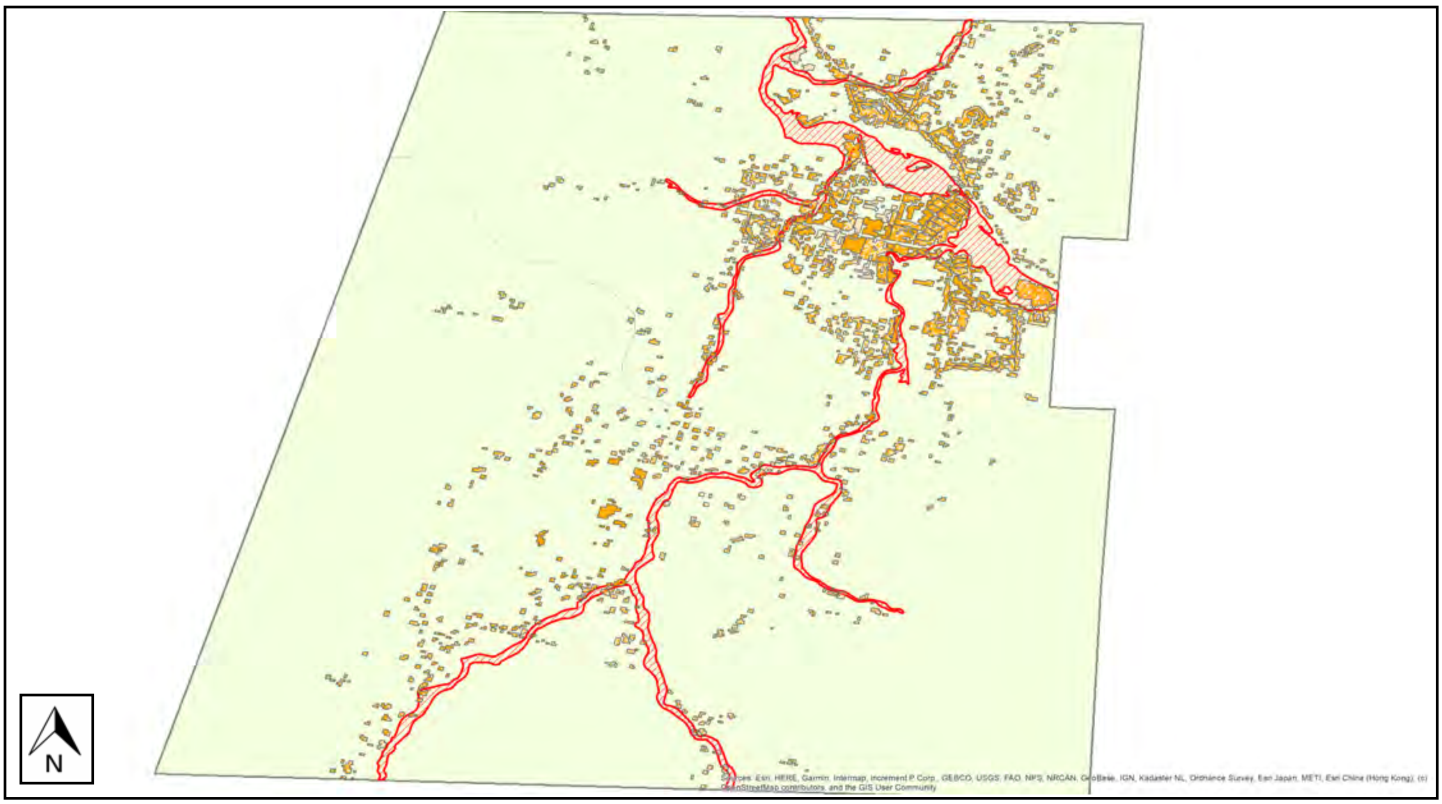
Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	WilliamstownFlood
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 7 buildings will be at least moderately damaged. This is over 76% 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

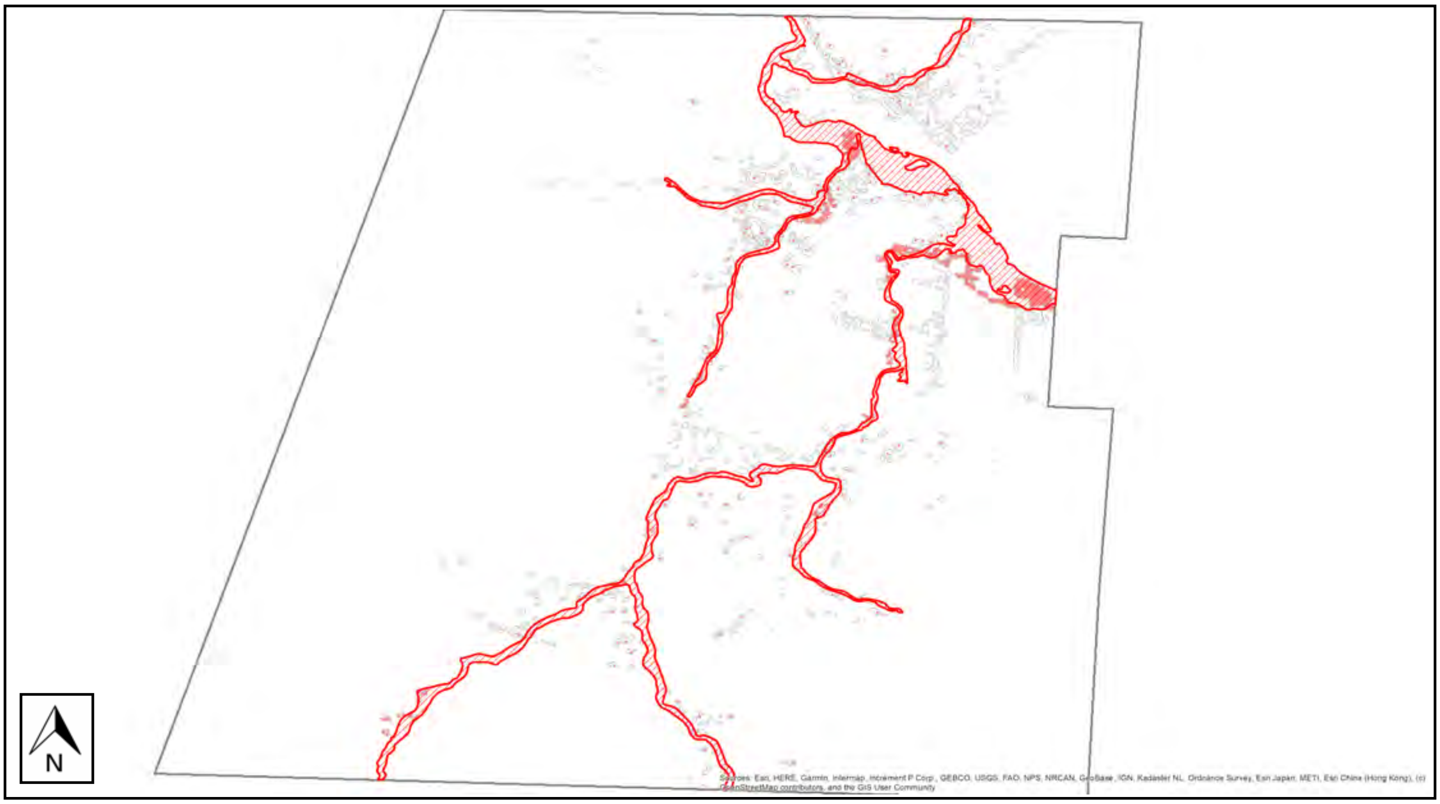


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	3	50	3	50	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	25	86	2	7	2	7	0	0	0	0	0	0
Total	**28**		**5**		**2**		**0**		**0**		**0**	

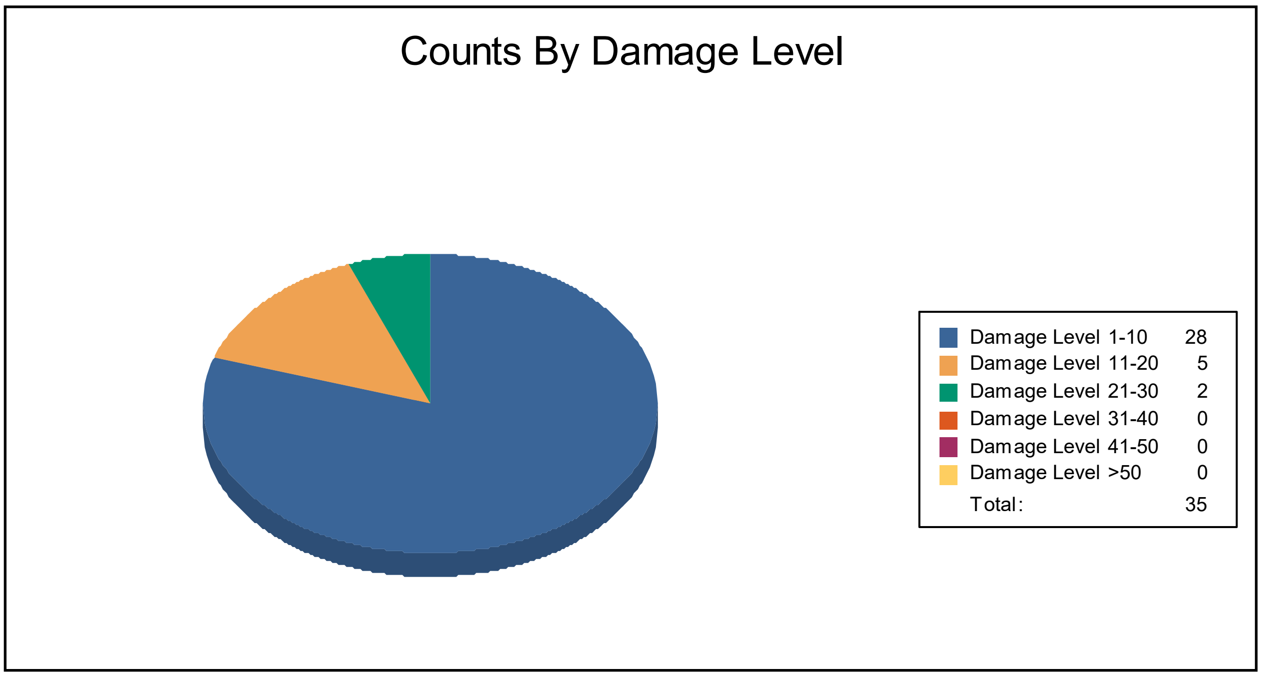


Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0	0	0	0	0	0	0	0	0	0	0
ManufHousing	0	0	0	0	0	0	0	0	0	0	0	0
Masonry	1	50	1	50	0	0	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	27	82	4	12	2	6	0	0	0	0	0	0

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	1	0	0	0
Fire Stations	1	0	0	0
Hospitals	0	0	0	0
Police Stations	1	0	0	0
Schools	5	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

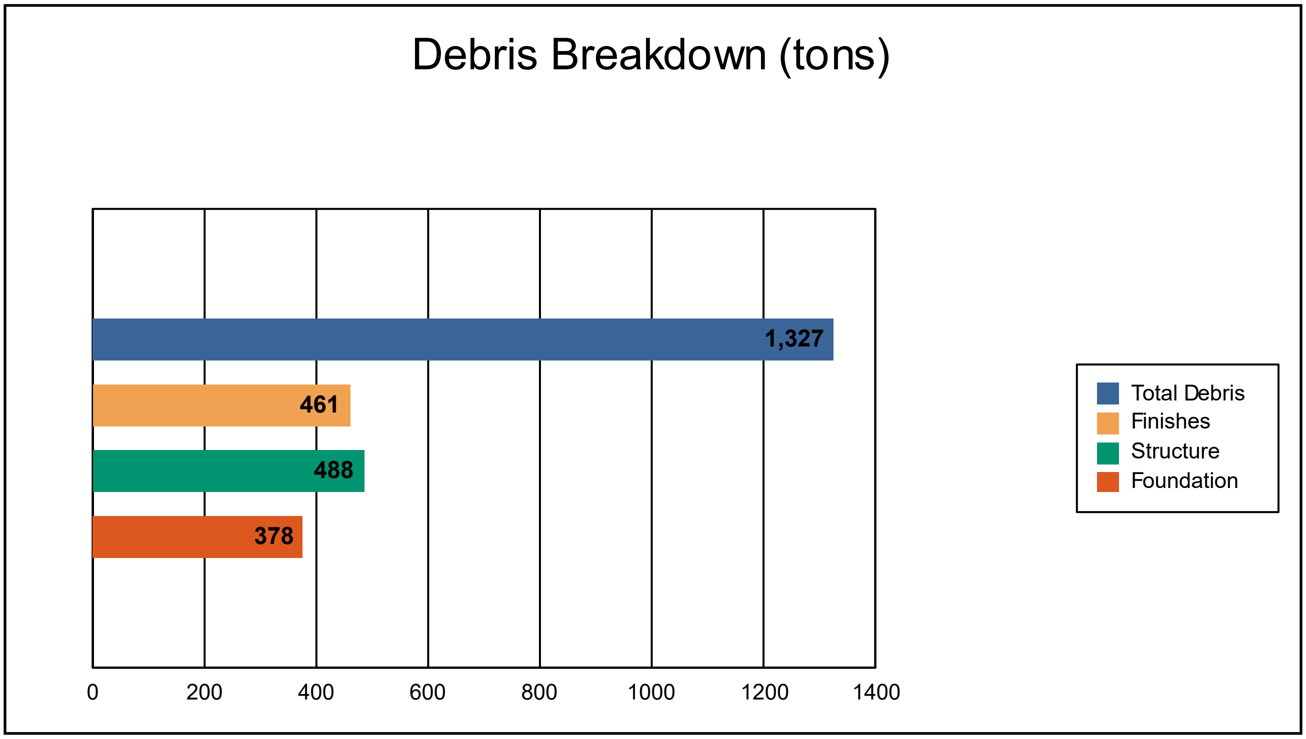
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(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 1,327 tons of debris will be generated. Of the total amount, Finishes comprises 35% of the total, Structure comprises 37% of the total, and Foundation comprises 28%. If the debris tonnage is converted into an estimated number of truckloads, it will require 54 truckloads (@25 tons/truck) to remove the debris generated by the flood.

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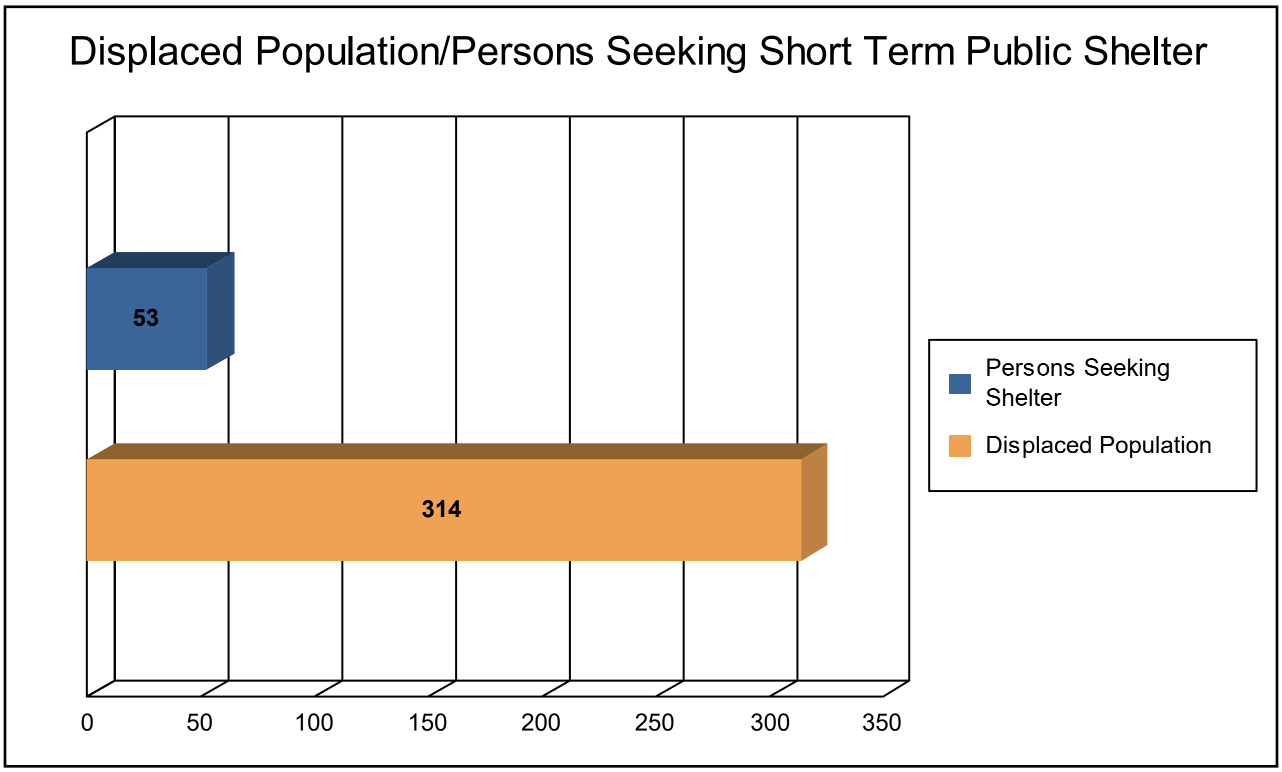
Social Impact

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 105 households (or 314 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 53 people (out of a total population of 7,513) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 61.47 million dollars, which represents 8.54 % 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 23.14 million dollars. 62% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 19.34% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

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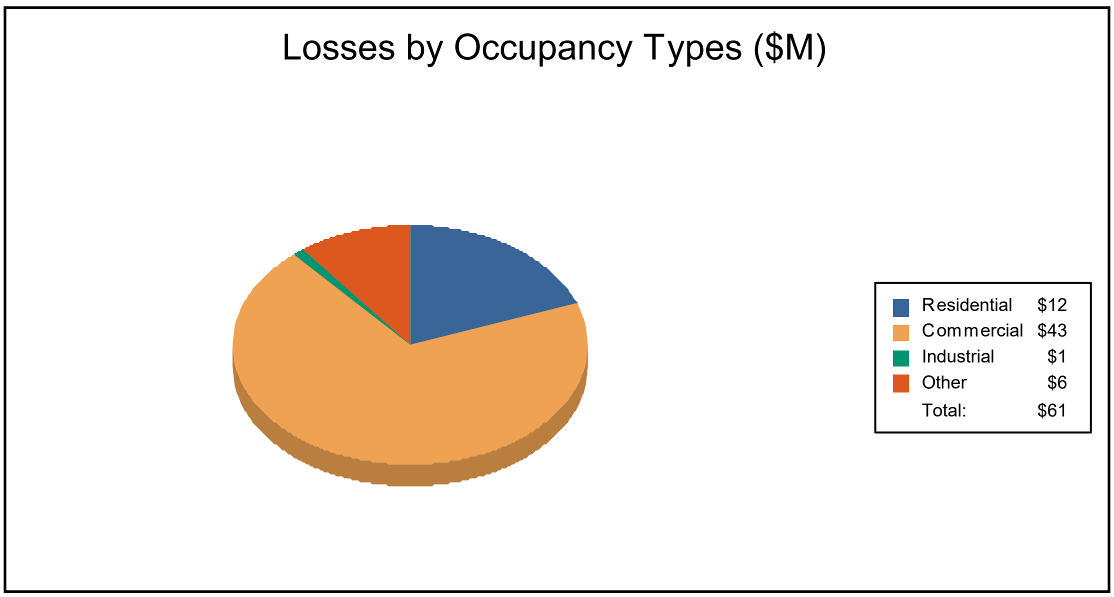
Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	5.44	3.08	0.26	0.10	8.87
	Content	2.59	9.50	0.45	0.45	12.99
	Inventory	0.00	1.14	0.06	0.09	1.28
	Subtotal	**8.03**	**13.71**	**0.76**	**0.64**	**23.14**
Business Interruption						
	Income	0.22	12.41	0.01	0.16	12.80
	Relocation	1.84	2.15	0.00	0.08	4.07
	Rental Income	1.29	1.57	0.00	0.02	2.88
	Wage	0.52	12.66	0.01	5.39	18.58
	Subtotal	**3.86**	**28.80**	**0.02**	**5.66**	**38.33**
ALL	**Total**	**11.89**	**42.50**	**0.79**	**6.30**	**61.47**



Appendix A: County Listing for the Region

Massachusetts

- Berkshire

HAZUS™

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Massachusetts				
Berkshire	7,513	947,592	628,008	1,575,600
Total	**7,513**	**947,592**	**628,008**	**1,575,600**
Total Study Region	**7,513**	**947,592**	**628,008**	**1,575,600**

Hazus: Hurricane Global Risk Report

Region Name: WilliamstownWind

Hurricane Scenario: Probabilistic 500-year Return Period

Print Date: Tuesday, September 17, 2024

Table of Contents

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 46.33 square miles and contains 2 census tracts. There are over 2 thousand households in the region and a total population of 7,513 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 1,576 million dollars. Approximately 86% of the buildings (and 60% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 2,476 buildings in the region which have an aggregate total replacement value of Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provi distribution of the building value by State and County.

Building Exposure by Occupancy Type

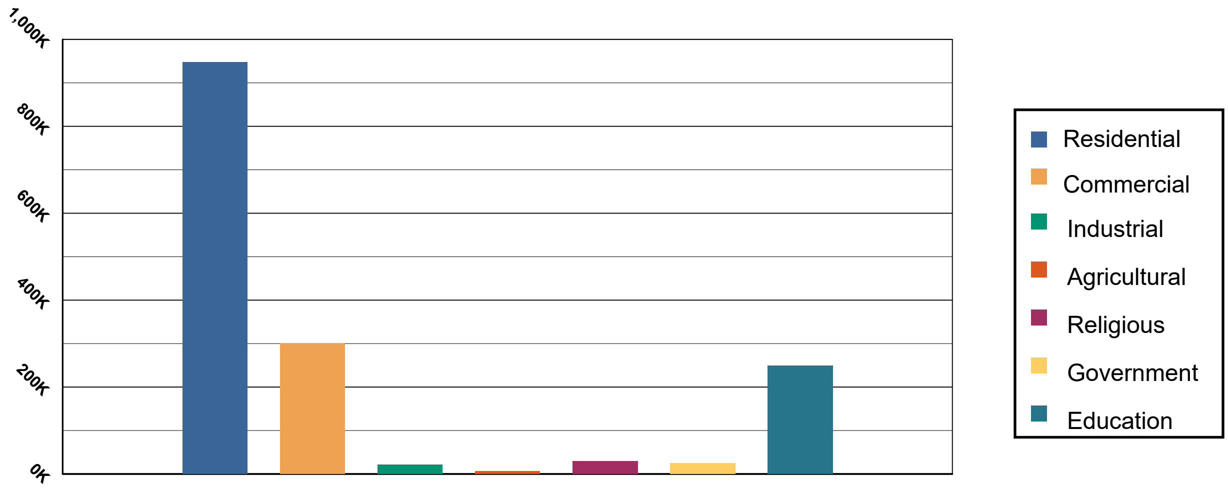


Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	947,681	60.14%
Commercial	299,207	18.99%
Industrial	21,458	1.36%
Agricultural	5,833	0.37%
Religious	29,041	1.84%
Government	24,084	1.53%
Education	248,472	15.77%
Total	**1,575,776**	**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, 1 fire stations, 1 police stations and 1 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 10 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the region. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

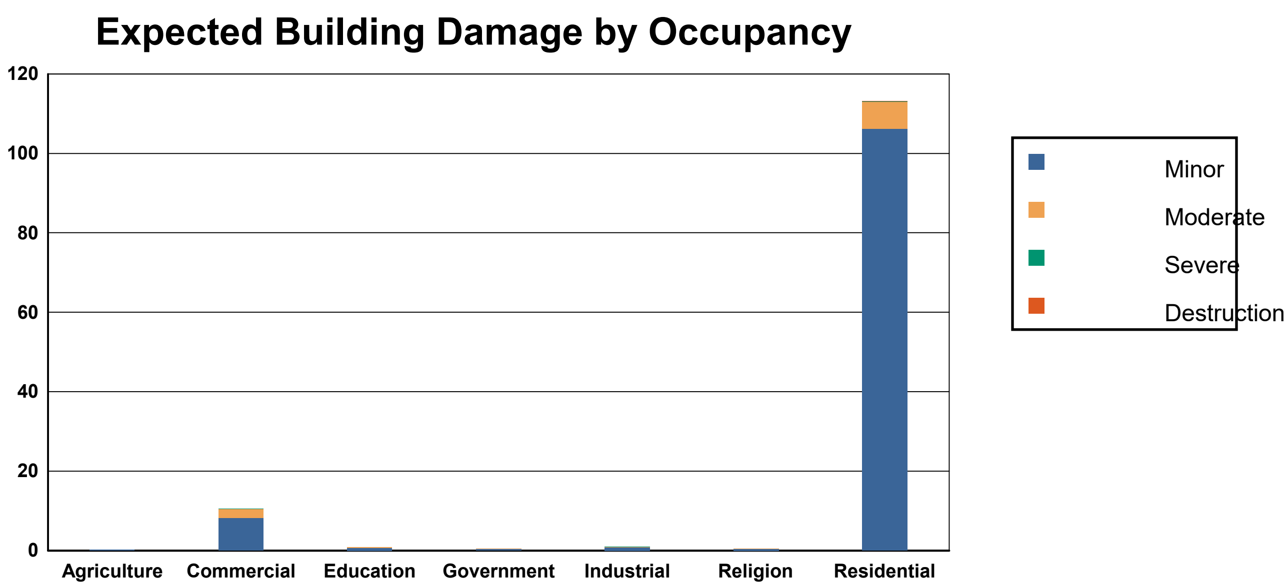


Table 2: Expected Building Damage by Occupancy : 500 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	11	98.11	0	1.53	0	0.31	0	0.05	0	0.00
Commercial	247	95.92	8	3.20	2	0.85	0	0.03	0	0.00
Education	7	88.95	1	7.53	0	3.52	0	0.00	0	0.00
Government	15	96.71	0	2.83	0	0.44	0	0.01	0	0.00
Industrial	25	96.19	1	2.88	0	0.86	0	0.07	0	0.00
Religion	20	97.86	0	1.91	0	0.21	0	0.02	0	0.00
Residential	2,025	94.71	106	4.97	7	0.32	0	0.00	0	0.00
Total	**2,349**		**117**		**10**		**0**		**0**	

Table 3: Expected Building Damage by Building Type : 500 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	15	96.80	0	3.06	0	0.14	0	0.00	0	0.00
Masonry	143	96.59	5	3.21	0	0.21	0	0.00	0	0.00
MH	8	99.10	0	0.67	0	0.16	0	0.00	0	0.07
Steel	68	88.33	6	7.76	3	3.89	0	0.03	0	0.00
Wood	2,124	95.36	98	4.40	5	0.22	0	0.01	0	0.01

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, none of the beds will be in service. By 30 days, none will be operational.

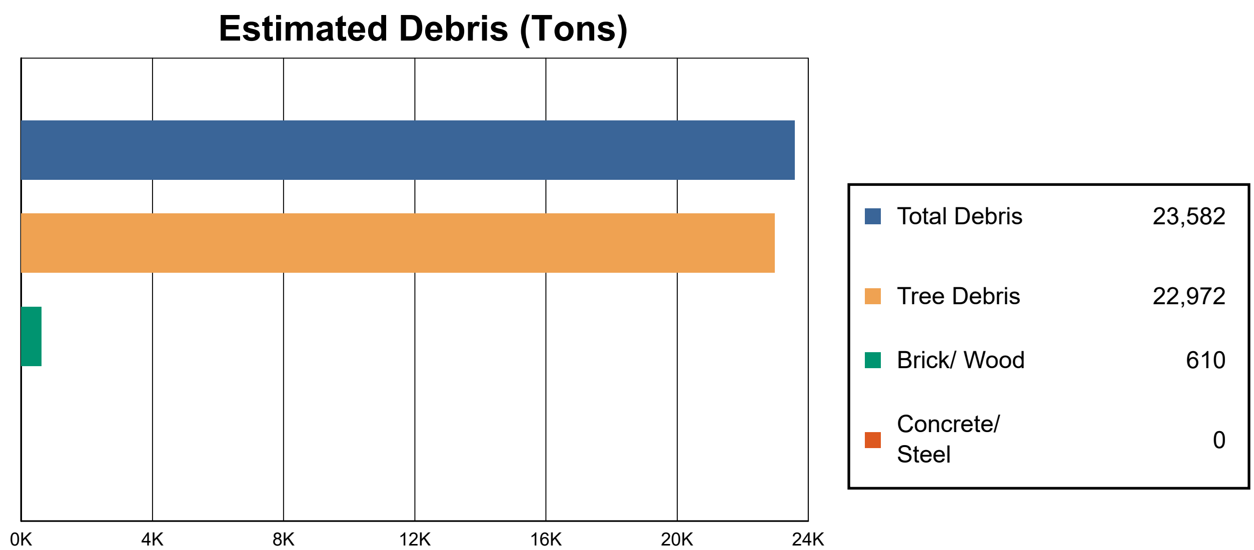
Thematic Map of Essential Facilities

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
EOCs	1	0	0	1
Fire Stations	1	0	0	1
Police Stations	1	0	0	1
Schools	5	0	0	5

Induced Hurricane Damage

Debris Generation

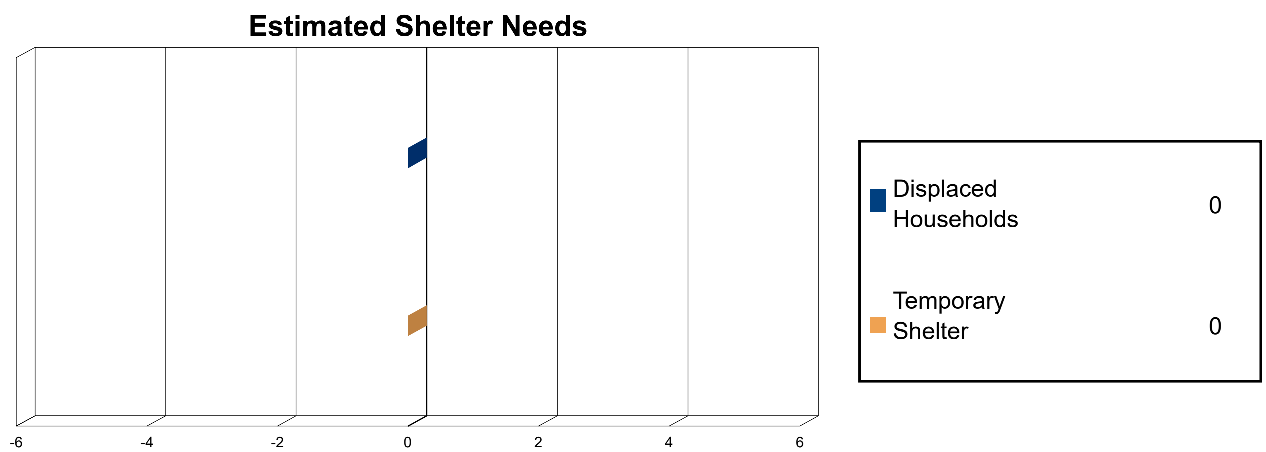


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 23,582 tons of debris will be generated. Of the total amount, 20,584 tons (87%) is Other Tree Debris. Of the remaining 2,998 tons, Brick/Wood comprises 20% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 24 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 2,388 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement



Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 0 households to be displaced due to the hurricane. Of these, 0 people (out of a total population of 7,513) will seek temporary shelter in public shelters.

Economic Loss

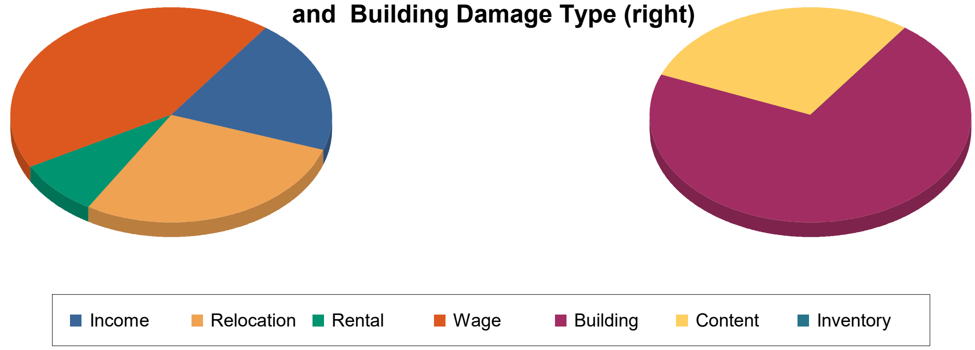
The total economic loss estimated for the hurricane is 12.3 million dollars, which represents 0.78 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 12 million dollars. 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 75% 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

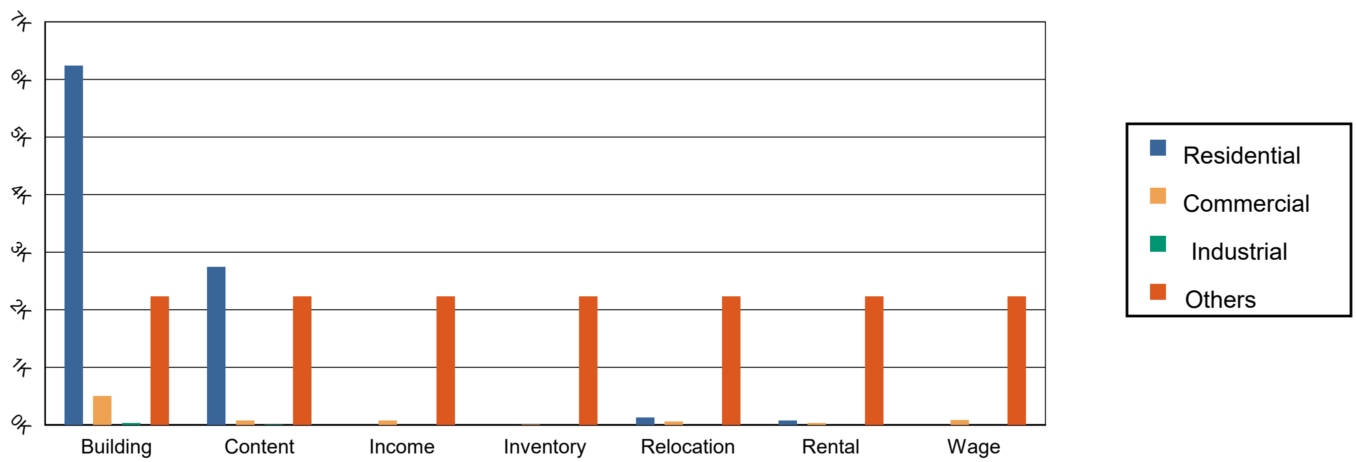


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	6,235.10	499.21	36.81	954.99	7,726.12
	Content	2,744.04	80.57	8.89	289.07	3,122.57
	Inventory	0.00	5.45	1.19	0.91	7.55
	Subtotal	**8,979.14**	**585.24**	**46.89**	**1,244.97**	**10,856.24**
Business Interruption Loss						
	Income	0.00	73.65	0.29	213.45	287.39
	Relocation	122.10	53.93	2.24	225.06	403.34
	Rental	72.14	29.34	0.32	16.81	118.62
	Wage	0.00	81.67	0.49	532.68	614.84
	Subtotal	**194.25**	**238.60**	**3.34**	**988.00**	**1,424.19**

Total

Total	**9,173.39**	**823.84**	**50.23**	**2,232.97**	**12,280.43**

Appendix A: County Listing for the Region

Massachusetts

- Berkshire

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Massachusetts				
Berkshire	7,513	947,681	628,095	1,575,776
Total	**7,513**	**947,681**	**628,095**	**1,575,776**
Study Region Total	**7,513**	**947,681**	**628,095**	**1,575,776**

Hazus: Hurricane Global Risk Report

Region Name: WilliamstownWind

Hurricane Scenario: Probabilistic 1000-year Return Period

Print Date: Tuesday, September 17, 2024

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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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 46.33 square miles and contains 2 census tracts. There are over 2 thousand households in the region and a total population of 7,513 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 1,576 million dollars. Approximately 86% of the buildings (and 60% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 2,476 buildings in the region which have an aggregate total replacement value of Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provi distribution of the building value by State and County.

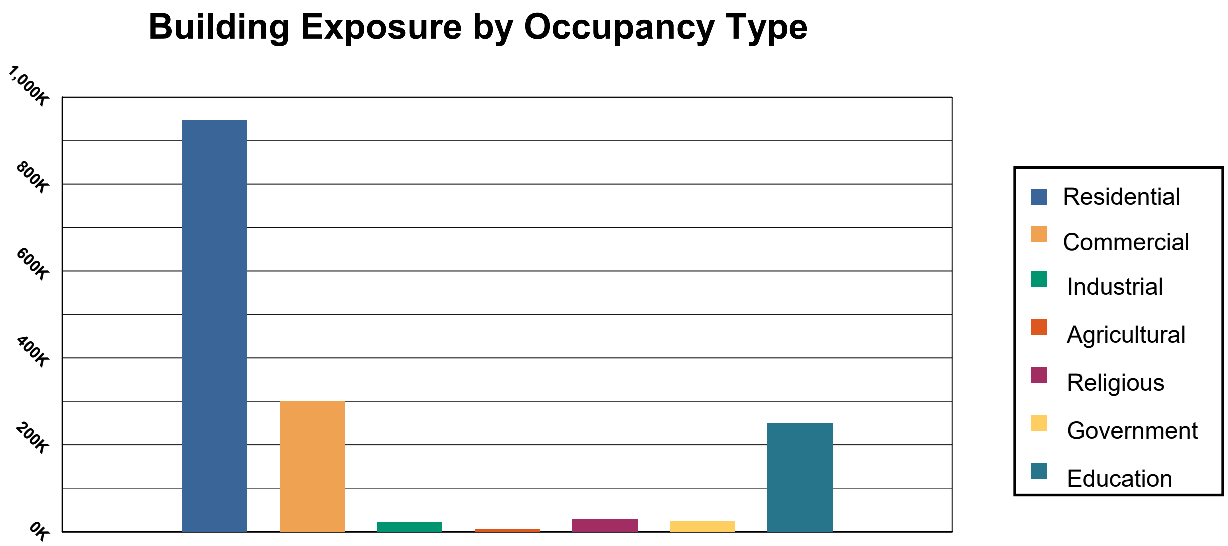


Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	947,681	60.14%
Commercial	299,207	18.99%
Industrial	21,458	1.36%
Agricultural	5,833	0.37%
Religious	29,041	1.84%
Government	24,084	1.53%
Education	248,472	15.77%
Total	**1,575,776**	**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, 1 fire stations, 1 police stations and 1 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 25 buildings will be at least moderately damaged. This is over 1% 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.

Expected Building Damage by Occupancy

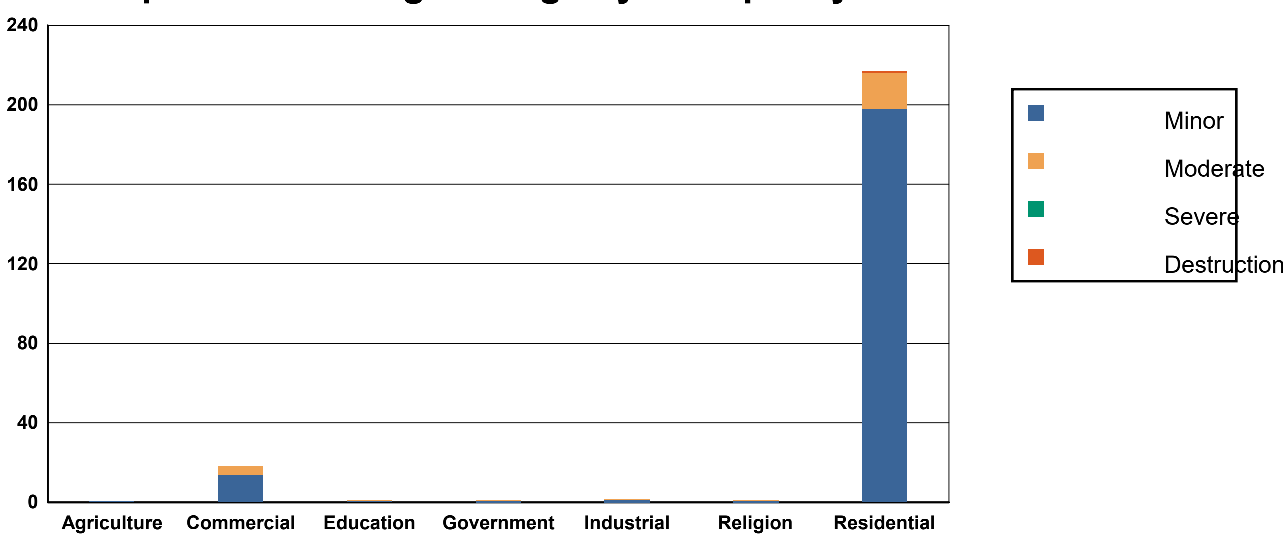


Table 2: Expected Building Damage by Occupancy : 1000 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	11	96.18	0	3.09	0	0.60	0	0.12	0	0.00
Commercial	239	92.84	14	5.34	4	1.75	0	0.07	0	0.00
Education	7	82.48	1	10.60	1	6.91	0	0.01	0	0.00
Government	15	93.99	1	4.97	0	1.01	0	0.03	0	0.00
Industrial	24	93.20	1	4.90	0	1.70	0	0.20	0	0.00
Religion	19	95.75	1	3.73	0	0.45	0	0.06	0	0.00
Residential	1,921	89.86	198	9.27	18	0.83	0	0.01	1	0.04
Total	**2,235**		**216**		**24**		**0**		**1**	

Table 3: Expected Building Damage by Building Type : 1000 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	14	93.95	1	5.48	0	0.56	0	0.01	0	0.00
Masonry	138	93.53	9	5.78	1	0.67	0	0.01	0	0.00
MH	8	97.56	0	1.66	0	0.53	0	0.01	0	0.24
Steel	63	81.57	8	10.85	6	7.49	0	0.08	0	0.00
Wood	2,026	91.00	186	8.33	14	0.62	0	0.02	1	0.03

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.

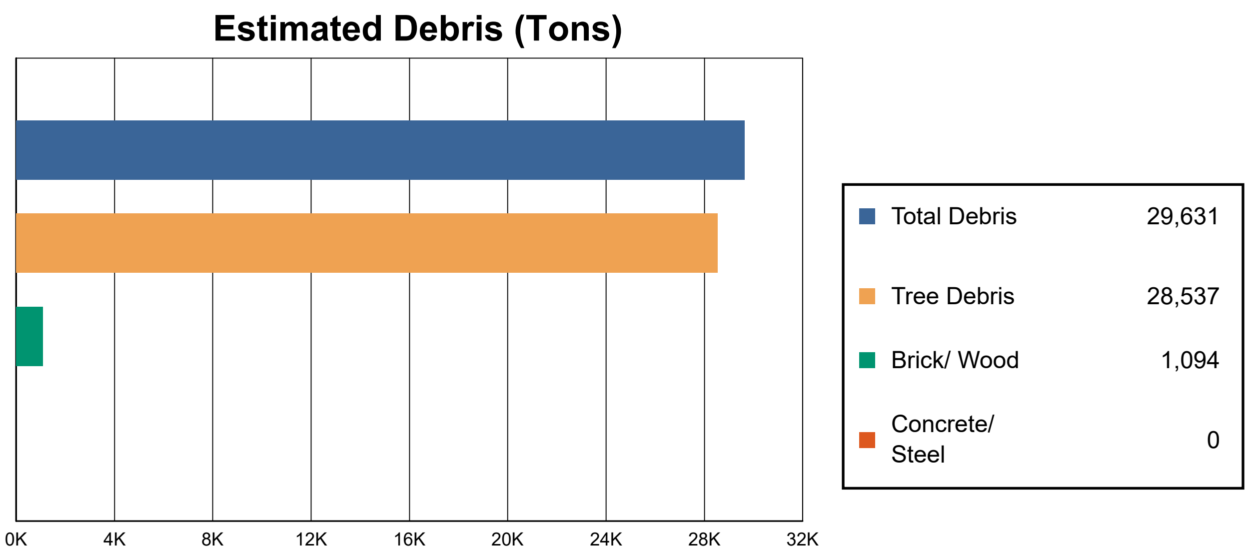
Thematic Map of Essential Facilities

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	1	0	0	1
Fire Stations	1	0	0	1
Police Stations	1	0	0	1
Schools	5	0	0	5

Induced Hurricane Damage

Debris Generation

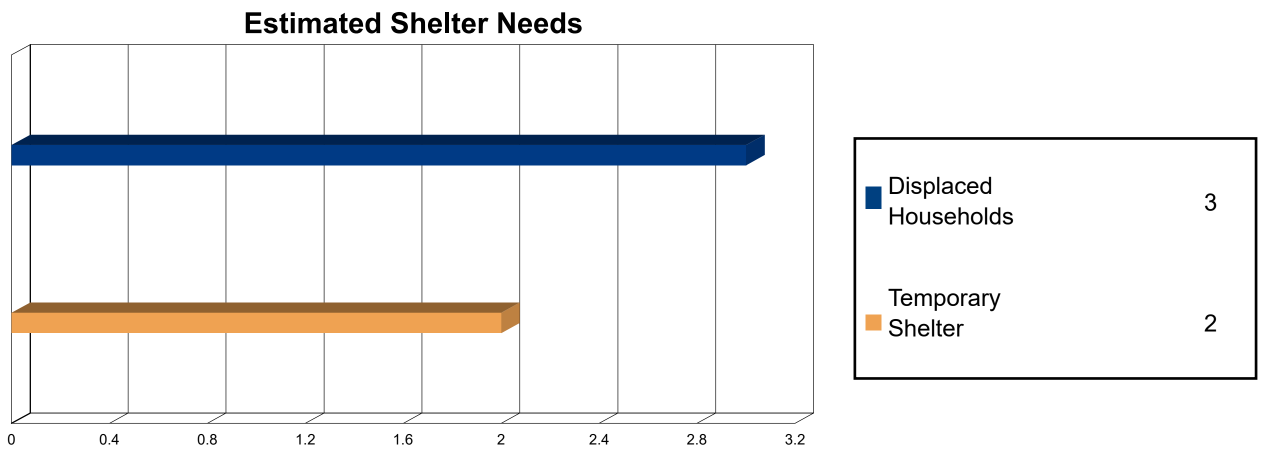


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 29,631 tons of debris will be generated. Of the total amount, 25,613 tons (86%) is Other Tree Debris. Of the remaining 4,018 tons, Brick/Wood comprises 27% 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 44 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 2,924 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 3 households to be displaced due to the hurricane. Of these, 2 people (out of a total population of 7,513) will seek temporary shelter in public shelters.

Economic Loss

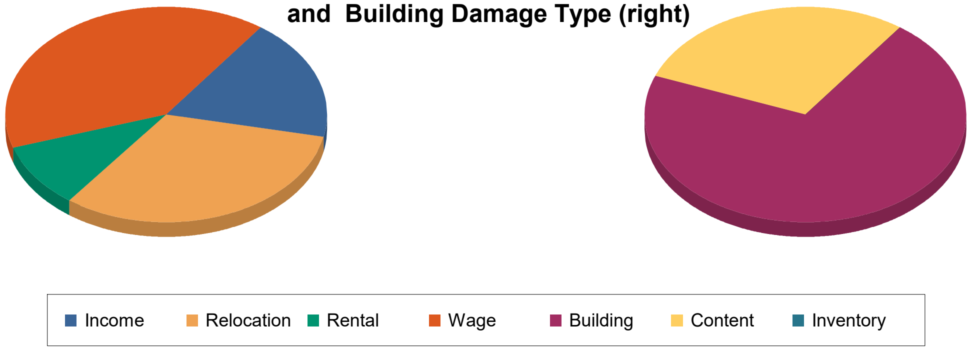
The total economic loss estimated for the hurricane is 20.4 million dollars, which represents 1.29 % of the total replacement value of the region's buildings.

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 20 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 72% 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

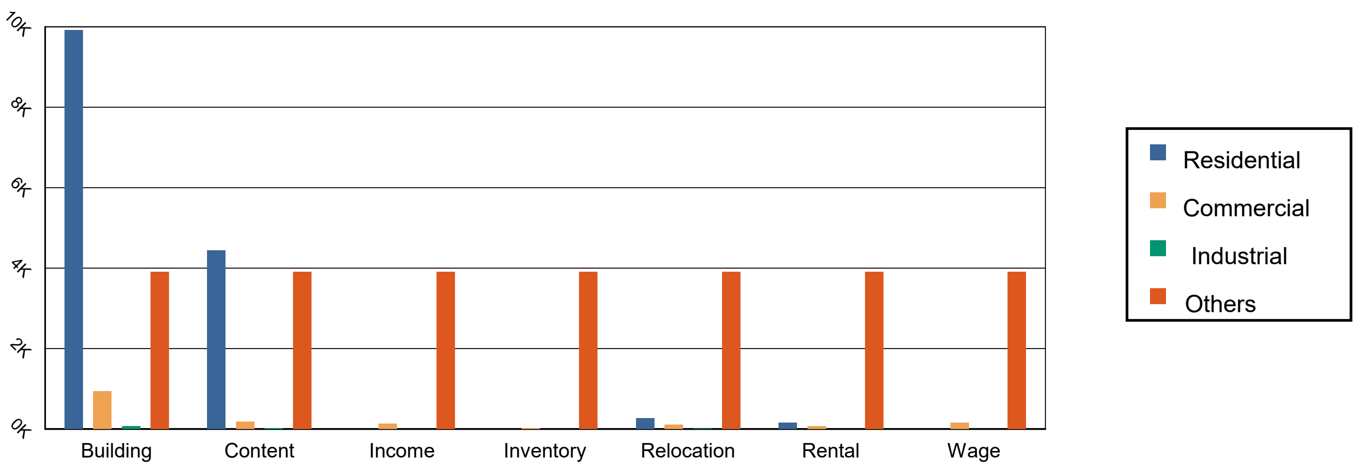


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	9,913.86	938.52	69.41	1,728.46	12,650.26
	Content	4,444.58	179.99	20.80	558.15	5,203.52
	Inventory	0.00	13.37	2.80	1.82	17.99
	Subtotal	**14,358.44**	**1,131.88**	**93.01**	**2,288.43**	**17,871.76**
Business Interruption Loss						
	Income	0.00	134.17	0.94	324.00	459.11
	Relocation	260.46	114.39	5.41	415.54	795.80
	Rental	151.15	63.17	0.85	31.37	246.54
	Wage	0.00	155.70	1.60	843.10	1,000.39
	Subtotal	**411.61**	**467.43**	**8.79**	**1,614.01**	**2,501.84**

Total

Total	**14,770.05**	**1,599.32**	**101.80**	**3,902.44**	**20,373.60**

Appendix A: County Listing for the Region

Massachusetts
- Berkshire

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Berkshire	7,513	947,681	628,095	1,575,776
Total	**7,513**	**947,681**	**628,095**	**1,575,776**
Study Region Total	**7,513**	**947,681**	**628,095**	**1,575,776**

Hazus: Earthquake Global Risk Report

Region Name: WilliamstownEarthq

Earthquake Scenario: 1500year

Print Date: September 18, 2024

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.

Table of Contents

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 46.94 square miles and contains 2 census tracts. There are over 2 thousand households in the region which has a total population of 7,513 peopleF. The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 2 thousand buildings in the region with a total building replacement value (excluding contents) of 1,575 (millions of dollars). Approximately 86.00 % of the buildings (and 60.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 368 and 175 (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 1,575 (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 90% 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, 1 fire stations, 1 police stations and 1 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 543.00 (millions of dollars). This inventory includes over 37.28 miles of highways, 23 bridges, 239.85 miles of pipes.

Table 1: Transportation System Lifeline Inventory

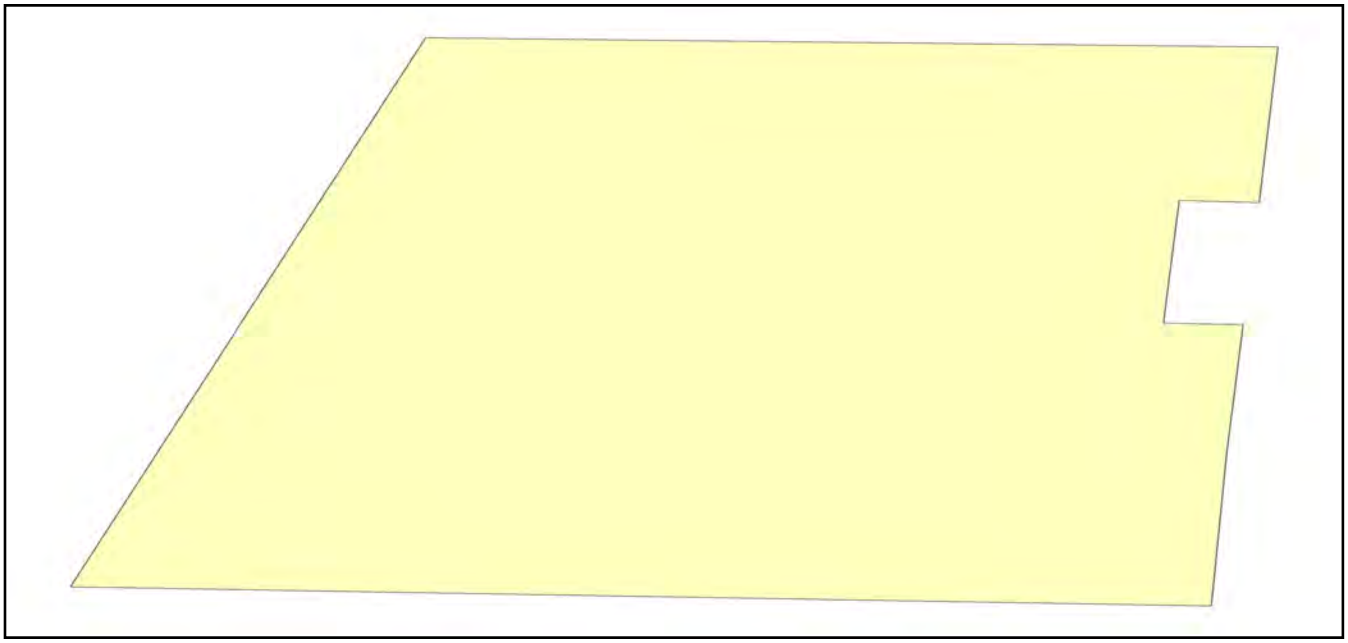
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	23	28.9800
	Segments	9	259.9134
	Tunnels	0	0.0000
		Subtotal	**288.8934**
Railways	Bridges	2	10.3800
	Facilities	0	0.0000
	Segments	1	68.7441
	Tunnels	0	0.0000
		Subtotal	**79.1241**
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	0	0.0000
	Tunnels	0	0.0000
		Subtotal	**0.0000**
Bus	Facilities	0	0.0000
		Subtotal	**0.0000**
Ferry	Facilities	0	0.0000
		Subtotal	**0.0000**
Port	Facilities	0	0.0000
		Subtotal	**0.0000**
Airport	Facilities	0	0.0000
	Runways	0	0.0000
		Subtotal	**0.0000**
		Total	**368.00**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	3.8651
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**3.8651**
Waste Water	Distribution Lines	NA	2.3191
	Facilities	1	156.8418
	Pipelines	0	0.0000
		Subtotal	**159.1609**
Natural Gas	Distribution Lines	NA	1.5461
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**1.5461**
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**0.0000**
Electrical Power	Facilities	1	10.9132
		Subtotal	**10.9132**
Communication	Facilities	1	0.1160
		Subtotal	**0.1160**
		Total	**175.60**

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 10 buildings will be at least moderately damaged. This is over 0.00 % of the buildings in the region. There are an estimated 0 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

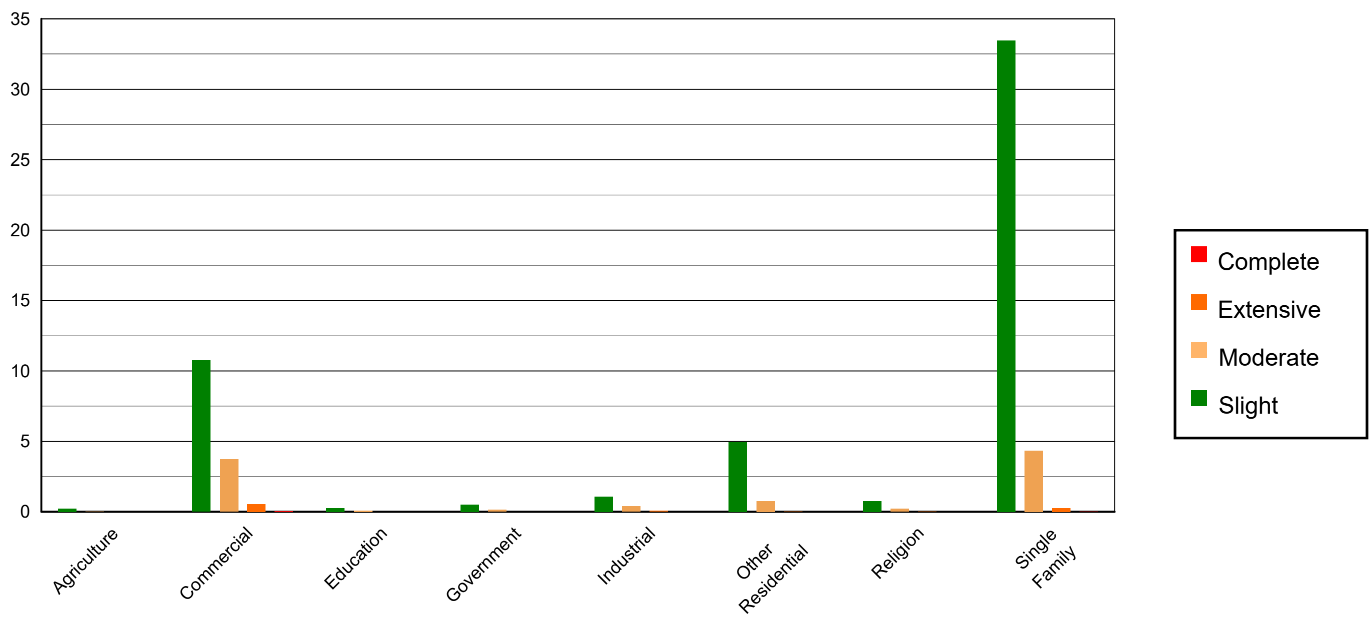


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	10.75	0.45	0.23	0.43	0.02	0.25	0.00	0.01	0.00	0.00
Commercial	241.93	10.02	10.75	20.68	3.73	38.48	0.55	56.95	0.04	53.70
Education	7.62	0.32	0.28	0.55	0.09	0.88	0.01	0.96	0.00	0.94
Government	15.31	0.63	0.53	1.03	0.14	1.47	0.01	1.49	0.00	1.61
Industrial	24.48	1.01	1.06	2.03	0.40	4.08	0.06	6.48	0.00	5.11
Other Residential	218.28	9.05	4.95	9.51	0.75	7.74	0.02	2.10	0.00	1.62
Religion	19.01	0.79	0.74	1.43	0.21	2.18	0.03	3.40	0.00	3.26
Single Family	1875.88	77.73	33.47	64.34	4.35	44.93	0.28	28.61	0.03	33.75
Total	**2,413**		**52**		**10**		**1**		**0**	

HAZUS™ FEMA

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	2186.02	90.58	37.02	71.17	3.29	33.98	0.00	0.00	0.00	0.00
Steel	74.86	3.10	2.84	5.47	1.04	10.73	0.11	11.86	0.00	0.00
Concrete	8.49	0.35	0.27	0.53	0.09	0.90	0.00	0.23	0.00	0.00
Precast	5.52	0.23	0.31	0.60	0.20	2.09	0.04	3.85	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	131.36	5.44	10.86	20.88	4.79	49.42	0.81	83.54	0.07	100.00
MH	7.01	0.29	0.71	1.36	0.28	2.88	0.00	0.52	0.00	0.00
Total	**2,413**		**52**		**10**		**1**		**0**	

*Note:
RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had hospital beds available for use. On the day of the earthquake, the model estimates that only hospital beds (%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, % of the beds will be back in service. By 30 days, % will be operational.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**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	1	0	0	1
PoliceStations	1	0	0	1
FireStations	1	0	0	1

Transportation Lifeline Damage

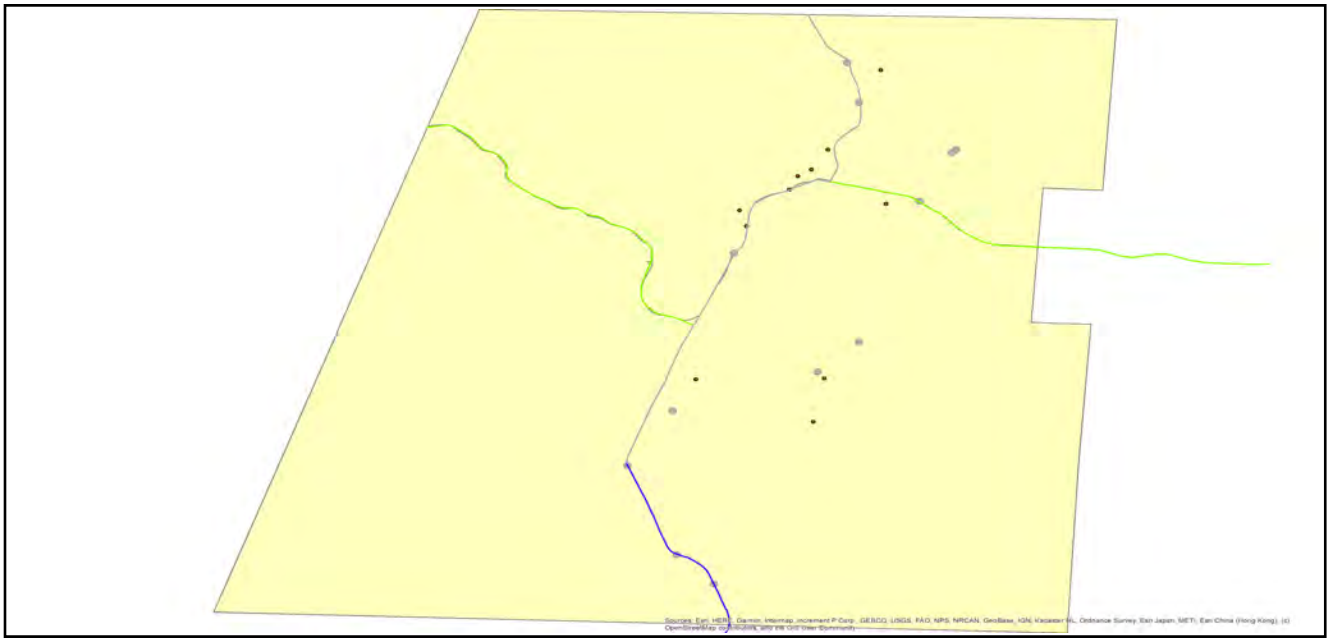


Table 6: Expected Damage to the Transportation Systems

System	Component	Number of Locations_				
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	9	0	0	9	9
	Bridges	23	0	0	23	23
	Tunnels	0	0	0	0	0
Railways	Segments	1	0	0	1	1
	Bridges	2	0	0	2	2
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	0	0	0	0	0
	Runways	0	0	0	0	0

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	1	0	0	1	1
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	1	0	0	1	1
Communication	1	0	0	1	1

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	120	0	0
Waste Water	72	0	0
Natural Gas	48	0	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	2,518	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0 tons of debris will be generated. Of the total amount, Brick/Wood comprises 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 0 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)

Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.00	0.00	0.00	0 (@25 tons/truck)

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 0 households to be displaced due to the earthquake. Of these, 0 people (out of a total population of 7,513) will seek temporary shelter in public shelters.

Displaced Households/ Persons Seeking Short Term Public Shelter

Displaced households as a result of the earthquake	Persons seeking temporary public shelter
0	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	0.00	0.00	0.00	0.00
	Other-Residential	0.02	0.00	0.00	0.00
	Single Family	0.09	0.01	0.00	0.00
	Total	**0**	**0**	**0**	**0**
2 PM	Commercial	0.44	0.06	0.00	0.01
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.12	0.01	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.01	0.00	0.00	0.00
	Other-Residential	0.01	0.00	0.00	0.00
	Single Family	0.04	0.00	0.00	0.00
	Total	**1**	**0**	**0**	**0**
5 PM	Commercial	0.28	0.04	0.00	0.01
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.02	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	0.01	0.00	0.00	0.00
	Single Family	0.04	0.00	0.00	0.00
	Total	**0**	**0**	**0**	**0**

Economic Loss

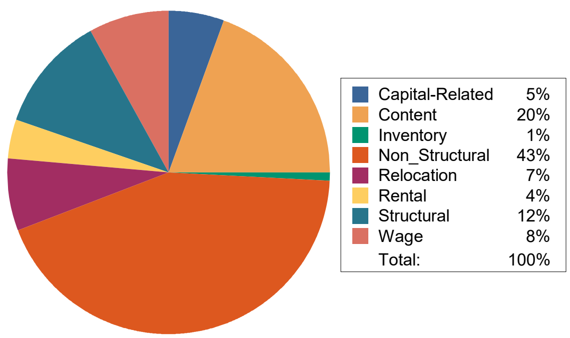
The total economic loss estimated for the earthquake is 5.07 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 3.71 (millions of dollars); 25 % 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 34 % 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)

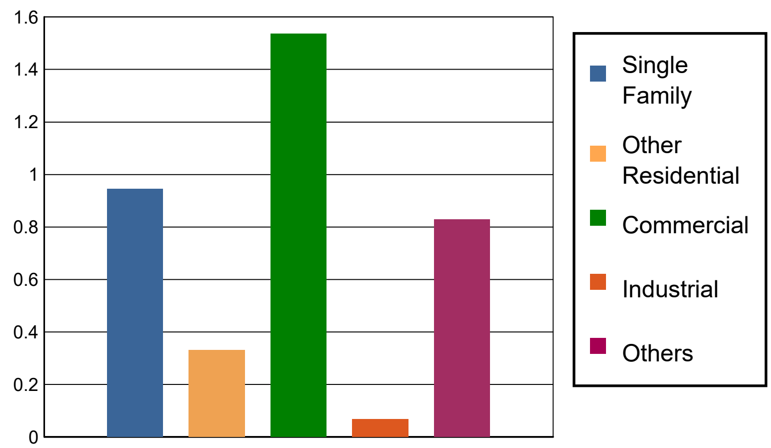


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.0135	0.2528	0.0012	0.0340	0.3015
	Capital-Related	0.0000	0.0057	0.1870	0.0007	0.0077	0.2011
	Rental	0.0131	0.0199	0.1021	0.0005	0.0088	0.1444
	Relocation	0.0424	0.0051	0.1328	0.0043	0.0796	0.2642
	Subtotal	**0.0555**	**0.0442**	**0.6747**	**0.0067**	**0.1301**	**0.9112**
Capital Stock Losses							
	Structural	0.1172	0.0248	0.1922	0.0111	0.0874	0.4327
	Non_Structural	0.5720	0.2034	0.4333	0.0301	0.3680	1.6068
	Content	0.1997	0.0587	0.2125	0.0170	0.2407	0.7286
	Inventory	0.0000	0.0000	0.0238	0.0029	0.0033	0.0300
	Subtotal	**0.8889**	**0.2869**	**0.8618**	**0.0611**	**0.6994**	**2.7981**
	Total	**0.94**	**0.33**	**1.54**	**0.07**	**0.83**	**3.71**

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	259.9134	0.0000	0.00
	Bridges	28.9800	0.0002	0.00
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**288.8934**	**0.0002**	
Railways	Segments	68.7441	0.0000	0.00
	Bridges	10.3800	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**79.1241**	**0.0000**	
Light Rail	Segments	0.0000	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Bus	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Airport	Facilities	0.0000	0.0000	0.00
	Runways	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
	Total	**368.02**	**0.00**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	3.8651	0.0021	0.05
	Subtotal	**3.8651**	**0.0021**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	156.8418	0.9732	0.62
	Distribution Lines	2.3191	0.0011	0.05
	Subtotal	**159.1609**	**0.9743**	
Natural Gas	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	1.5461	0.0004	0.03
	Subtotal	**1.5461**	**0.0004**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Electrical Power	Facilities	10.9132	0.3771	3.46
	Subtotal	**10.9132**	**0.3771**	
Communication	Facilities	0.1160	0.0018	1.55
	Subtotal	**0.1160**	**0.0018**	
	Total	**175.60**	**1.36**	

Appendix A: County Listing for the Region

Berkshire,MA

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Massachusetts					
	Berkshire	7,513	947	628	1,575
Total Region		**7,513**	**947**	**628**	**1,575**

Hazus: Earthquake Global Risk Report

Region Name: WilliamstownEarthq

Earthquake Scenario: 2500year

Print Date: September 18, 2024

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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HAZUS™ FEMA

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 46.94 square miles and contains 2 census tracts. There are over 2 thousand households in the region which has a total population of 7,513 peopleF. The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 2 thousand buildings in the region with a total building replacement value (excluding contents) of 1,575 (millions of dollars). Approximately 86.00 % of the buildings (and 60.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 368 and 175 (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 1,575 (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 90% 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, 1 fire stations, 1 police stations and 1 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 543.00 (millions of dollars). This inventory includes over 37.28 miles of highways, 23 bridges, 239.85 miles of pipes.

Table 1: Transportation System Lifeline Inventory

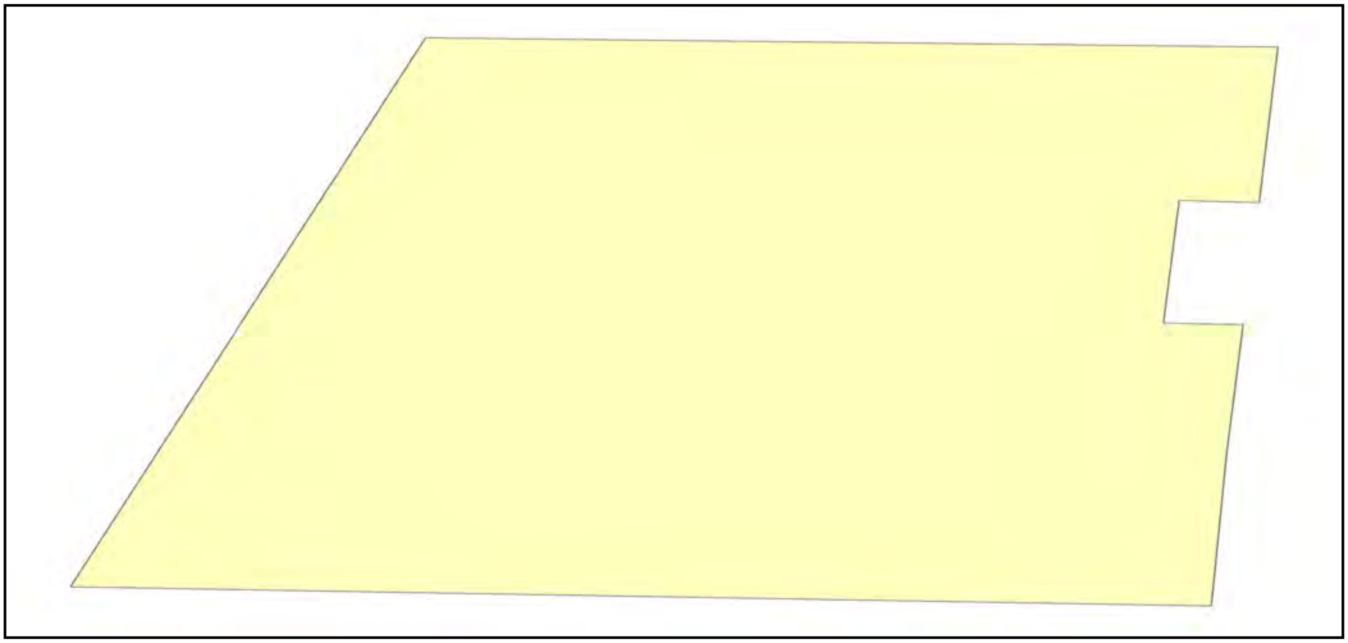
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	23	28.9800
	Segments	9	259.9134
	Tunnels	0	0.0000
		Subtotal	**288.8934**
Railways	Bridges	2	10.3800
	Facilities	0	0.0000
	Segments	1	68.7441
	Tunnels	0	0.0000
		Subtotal	**79.1241**
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	0	0.0000
	Tunnels	0	0.0000
		Subtotal	**0.0000**
Bus	Facilities	0	0.0000
		Subtotal	**0.0000**
Ferry	Facilities	0	0.0000
		Subtotal	**0.0000**
Port	Facilities	0	0.0000
		Subtotal	**0.0000**
Airport	Facilities	0	0.0000
	Runways	0	0.0000
		Subtotal	**0.0000**
		Total	**368.00**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	3.8651
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**3.8651**
Waste Water	Distribution Lines	NA	2.3191
	Facilities	1	156.8418
	Pipelines	0	0.0000
		Subtotal	**159.1609**
Natural Gas	Distribution Lines	NA	1.5461
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**1.5461**
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**0.0000**
Electrical Power	Facilities	1	10.9132
		Subtotal	**10.9132**
Communication	Facilities	1	0.1160
		Subtotal	**0.1160**
		Total	**175.60**

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 19 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

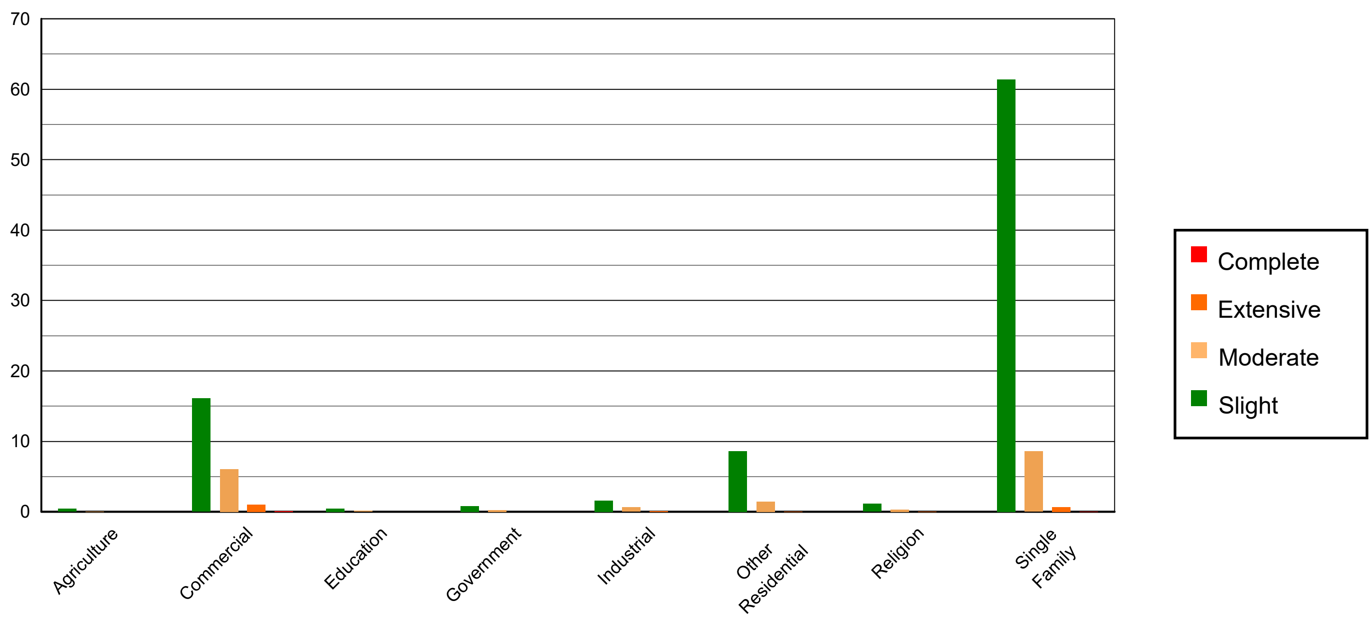


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	10.54	0.45	0.40	0.45	0.05	0.30	0.00	0.06	0.00	0.00
Commercial	233.68	9.88	16.12	17.80	6.09	34.69	1.02	51.61	0.09	53.40
Education	7.39	0.31	0.44	0.49	0.15	0.87	0.02	0.93	0.00	0.92
Government	14.87	0.63	0.84	0.93	0.26	1.46	0.03	1.44	0.00	1.59
Industrial	23.65	1.00	1.59	1.75	0.64	3.62	0.12	5.81	0.01	5.17
Other Residential	213.87	9.04	8.61	9.51	1.46	8.31	0.06	3.07	0.00	1.61
Religion	18.45	0.78	1.15	1.27	0.34	1.93	0.06	2.99	0.01	3.30
Single Family	1843.31	77.92	61.38	67.80	8.58	48.82	0.68	34.09	0.06	34.02
Total	**2,366**		**91**		**18**		**2**		**0**	

HAZUS™ FEMA

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	2149.39	90.85	69.37	76.63	7.37	41.92	0.21	10.58	0.00	0.00
Steel	72.38	3.06	4.36	4.82	1.88	10.73	0.24	12.07	0.00	0.00
Concrete	8.20	0.35	0.46	0.51	0.18	1.04	0.01	0.40	0.00	0.00
Precast	5.26	0.22	0.43	0.47	0.31	1.79	0.07	3.43	0.00	0.31
RM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
URM	124.01	5.24	14.93	16.49	7.35	41.82	1.44	72.79	0.16	99.69
MH	6.53	0.28	0.98	1.09	0.47	2.69	0.01	0.73	0.00	0.00
Total	**2,366**		**91**		**18**		**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

		# Facilities		
Classification	**Total**	**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	1	0	0	1
PoliceStations	1	0	0	1
FireStations	1	0	0	1

Transportation Lifeline Damage

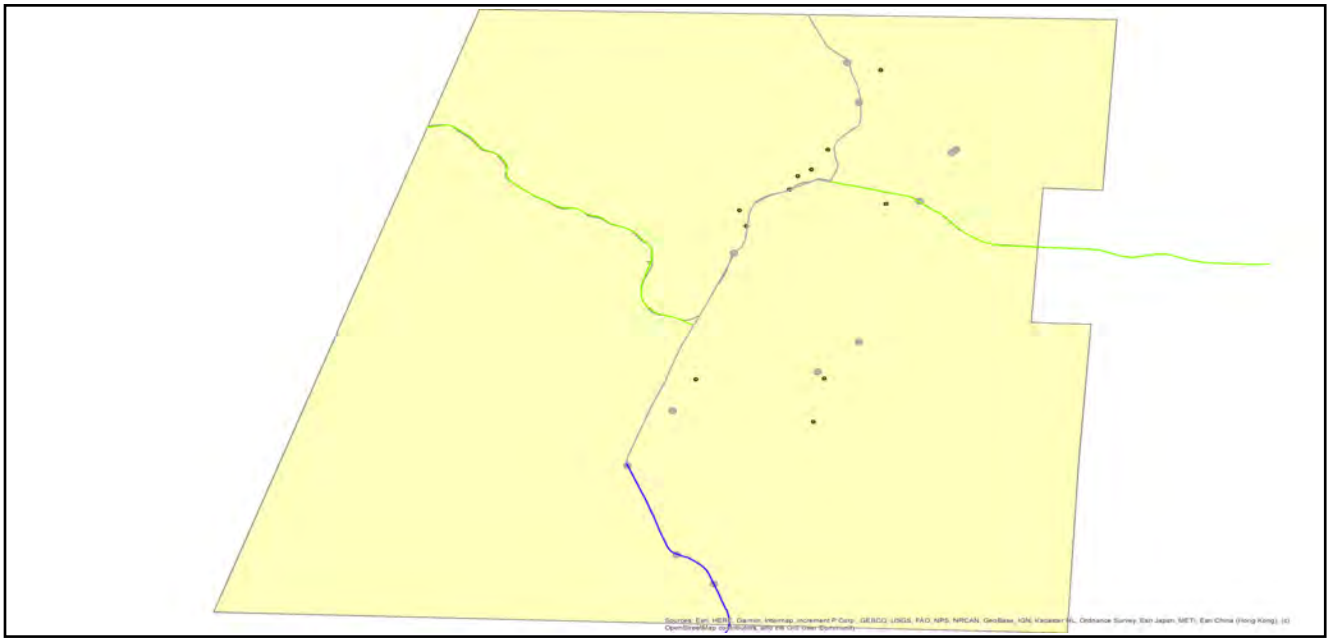


Table 6: Expected Damage to the Transportation Systems

System	Component	Number of Locations_				
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	9	0	0	9	9
	Bridges	23	0	0	23	23
	Tunnels	0	0	0	0	0
Railways	Segments	1	0	0	1	1
	Bridges	2	0	0	2	2
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	0	0	0	0	0
	Runways	0	0	0	0	0

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	1	0	0	1	1
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	1	0	0	1	1
Communication	1	0	0	1	1

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	120	1	0
Waste Water	72	0	0
Natural Gas	48	0	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	2,518	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

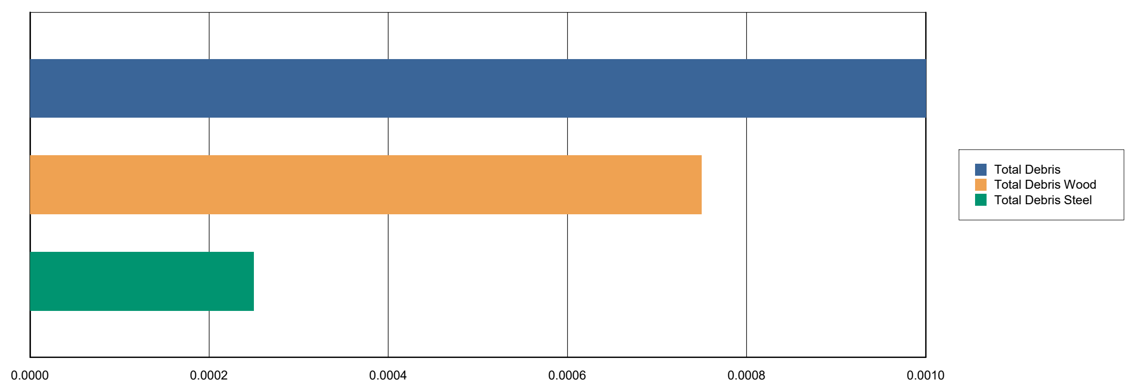
Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there 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 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 40 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)



Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.00	0.00	0.00	40 (@25 tons/truck)

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 0 households to be displaced due to the earthquake. Of these, 0 people (out of a total population of 7,513) will seek temporary shelter in public shelters.

Displaced Households/ Persons Seeking Short Term Public Shelter

Displaced households as a result of the earthquake	Persons seeking temporary public shelter
0	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	0.00	0.00	0.00	0.00
	Other-Residential	0.04	0.00	0.00	0.00
	Single Family	0.18	0.02	0.00	0.00
	Total	**0**	**0**	**0**	**0**
2 PM	Commercial	0.78	0.11	0.01	0.02
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.24	0.03	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.02	0.00	0.00	0.00
	Other-Residential	0.01	0.00	0.00	0.00
	Single Family	0.07	0.01	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	0.05	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	0.01	0.00	0.00	0.00
	Single Family	0.07	0.01	0.00	0.00
	Total	**1**	**0**	**0**	**0**

Economic Loss

The total economic loss estimated for the earthquake is 10.74 (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.

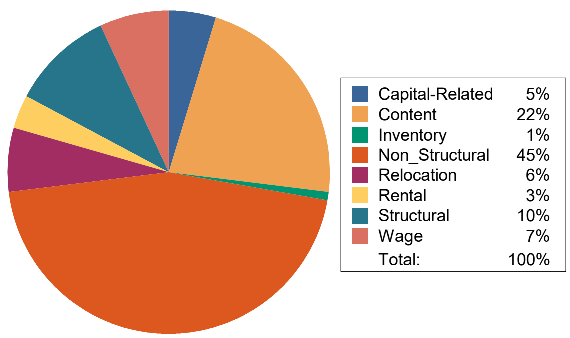
HAZUS™ FEMA

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 7.63 (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 37 % 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)

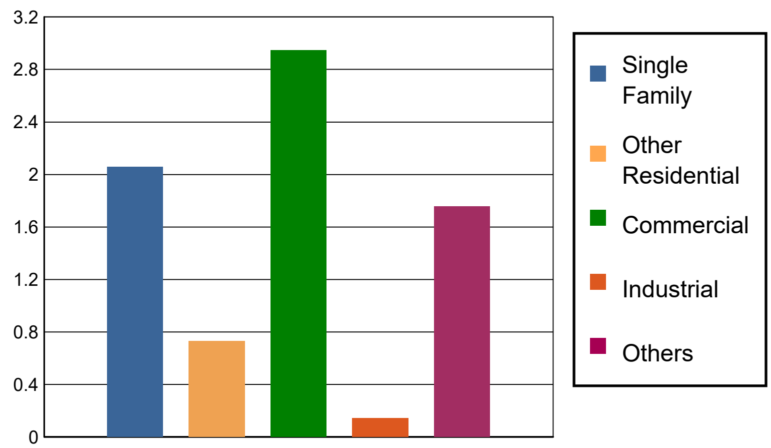


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.0299	0.4318	0.0021	0.0613	0.5251
	Capital-Related	0.0000	0.0127	0.3238	0.0012	0.0151	0.3528
	Rental	0.0265	0.0381	0.1703	0.0010	0.0179	0.2538
	Relocation	0.0867	0.0111	0.2259	0.0073	0.1632	0.4942
	Subtotal	**0.1132**	**0.0918**	**1.1518**	**0.0116**	**0.2575**	**1.6259**
Capital Stock Losses							
	Structural	0.2290	0.0481	0.3259	0.0189	0.1590	0.7809
	Non_Structural	1.2424	0.4499	0.9130	0.0674	0.7791	3.4518
	Content	0.4732	0.1399	0.4990	0.0397	0.5524	1.7042
	Inventory	0.0000	0.0000	0.0555	0.0068	0.0081	0.0704
	Subtotal	**1.9446**	**0.6379**	**1.7934**	**0.1328**	**1.4986**	**6.0073**
	Total	**2.06**	**0.73**	**2.95**	**0.14**	**1.76**	**7.63**

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	259.9134	0.0000	0.00
	Bridges	28.9800	0.0008	0.00
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**288.8934**	**0.0008**	
Railways	Segments	68.7441	0.0000	0.00
	Bridges	10.3800	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**79.1241**	**0.0000**	
Light Rail	Segments	0.0000	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Bus	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Airport	Facilities	0.0000	0.0000	0.00
	Runways	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
	Total	**368.02**	**0.00**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	3.8651	0.0042	0.11
	Subtotal	**3.8651**	**0.0042**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	156.8418	2.2617	1.44
	Distribution Lines	2.3191	0.0021	0.09
	Subtotal	**159.1609**	**2.2638**	
Natural Gas	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	1.5461	0.0007	0.05
	Subtotal	**1.5461**	**0.0007**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Electrical Power	Facilities	10.9132	0.8330	7.63
	Subtotal	**10.9132**	**0.8330**	
Communication	Facilities	0.1160	0.0042	3.62
	Subtotal	**0.1160**	**0.0042**	
	Total	**175.60**	**3.11**	

Appendix A: County Listing for the Region

Berkshire,MA

HAZUS™ FEMA

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Massachusetts					
	Berkshire	7,513	947	628	1,575
Total Region		**7,513**	**947**	**628**	**1,575**