# CITY OF PITTSFIELD, MA HAZARD MITIGATION PLAN UPDATE

## MAY 2025


**City of Pittsfield**
70 Allen Street
Pittsfield, MA 01201

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https://www.cityofpittsfield.org/

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## Acknowledgements

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- Robert Van Der Kar, Conservation Agent, City of Pittsfield
- James Ziter, Deputy Chief Fire Department, City of Pittsfield

## Local Adoption Resolution

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))

CITY OF PITTSFIELD, MASSACHUSETTS
CITY COUNCIL
**A RESOLUTION ADOPTING THE**
**CITY OF PITTSFIELD, MA HAZARD MITIGATION PLAN UPDATE**
RESOLUTION NO. ____________

WHEREAS the City of Pittsfield recognizes the threat that natural hazards pose to people and property within the City of Pittsfield; and

WHEREAS the City of Pittsfield has prepared a multi-hazard mitigation plan, hereby known as CITY OF PITTSFIELD, 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 CITY OF PITTSFIELD, MA HAZARD MITIGATION PLAN UPDATE identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the City of Pittsfield from the impacts of future hazards and disasters; and

WHEREAS adoption by the City of Pittsfield City Council demonstrates its commitment to hazard mitigation and achieving the goals outlined in the CITY OF PITTSFIELD, MA HAZARD MITIGATION PLAN UPDATE.

NOW THEREFORE, BE IT RESOLVED that the City of Pittsfield City Council formally approves and adopts the CITY OF PITTSFIELD, MA HAZARD MITIGATION PLAN UPDATE, in accordance with M.G.L. c. 40.

ADOPTED AND SIGNED this

By: ___________________________________ Peter White, Council President & Councilor-at-Large

By: ___________________________________ Peter M. Marchetti, Mayor

# Record of Changes

This City of Pittsfield, 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 City.

*Table 1. Summary of Changes.*

| Date of Change | Entered By | Summary of Changes |
|---|---|---|
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# 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 City of Pittsfield, 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 City of Pittsfield. 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 City of Pittsfield 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 City's risk and vulnerability to natural hazards.

This plan is a result of a collaborative effort between the City of Pittsfield 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), Town of Dalton, Town of Hinsdale and the Pittsfield Housing Authority.

## Guiding Principles for Plan Development

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

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

This plan update meets the requirements outlined in 44 CFR § 201.6(d)(3). These requirements are included 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 2025. These are included throughout the plan for reference and explanation.

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

> ***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
- Drought
- Earthquakes
- Flooding from Precipitation
- Flooding from Dam Failure or Overtopping
- Hurricanes and Tropical Storms

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

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

## 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 City of Pittsfield Hazard Mitigation Plan 2019 and the City of Pittsfield Community Resilience Building Workshop Summary of Findings 2019 were revised to develop this current list. Information about the goal development process is in Chapter 6 (Mitigation Strategy). The goals are considered "broad policy-type statements"[4] that represent the long-term vision for mitigating risk to natural hazards in the City of Pittsfield.

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

| | |
|---|---|
| **Save Lives and Property** | Protect lives, property, and infrastructure by proactively reducing risks from natural hazards and adapting to climate change. |
| **High Hazard Potential Dams** | Assess the vulnerabilities of high-hazard dams and implement strategies to reduce risks, while protecting and preserving the natural ecosystems they support. |
| **Local Plans & Regulations** | Develop and implement sustainable policies and regulations to mitigate risks from natural hazards and climate change, promoting resilience at the local and regional levels. |
| **Buildings & Infrastructure Projects** | Plan, design, and execute infrastructure projects that enhance resilience to flooding and other natural hazards, reducing long-term risk to the community. |
| **Natural & Cultural Resources** | Preserve and protect natural and cultural resources by implementing strategies that mitigate the impacts of natural hazards and climate change on ecosystems, water resources, and open spaces. |
| **Education** | Enhance community resilience by expanding educational initiatives for City employees and residents, promoting awareness and engagement in hazard mitigation and climate adaptation efforts. |

*Figure 1. Goal Statements.*

## Land Use and Development

### Changes in Development

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

Pittsfield has not seen significant growth or major changes in development since the last plan update in 2019, primarily due to the general lack of population growth driving new construction and economic development in the community. Pittsfield's population has been remarkably steady over recent years, with very little change according to U.S. Census Bureau data between 2010 and 2020. In fact, the City experienced a net loss of nearly 800 residents (or 1.8 percent) during this period, a trend that has continued through today and is expected to continue. Current projections from the UMass Donahue Institute estimate that Pittsfield's population may slightly decline by nearly 5,000 people by 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.*

Despite this limited growth there have been some shifts in how the City plans, encourages, and regulates changes in land use and new development or redevelopment projects. For example, development over the last five years has shifted towards increasing flexibility and density of uses within Downtown Pittsfield. The creation of the Downtown Creative District as a district based on form-based code aims to maximize space with a mix of artistic, commercial, and residential uses in the downtown. This form-based code is in the process of being replicated in the West-Side neighborhoods of Pittsfield as well. This consolidation of uses decreases the amount of development done in proximity to sensitive or hazard areas that have not previously been disturbed. Another example is the City's Flexible Development Ordinance, another zoning tool intended to revamp some of the sprawl-inducing regulations. The primary purpose of the ordinance is to preserve open space by allowing homes to be clustered together in one portion of a development site while preserving the rest of the land (including environmentally sensitive or hazard areas) as open space. The ordinance provides density bonuses as an incentive for additional open space, affordable housing, handicapped accessible housing, and environmentally friendly construction.

Development over the past several years has principally been geared around developing more housing stock—especially affordable housing stock. This has involved construction of new housing stock and restoration of old housing stock. This development has stayed relatively removed from hazard areas and is not expected to change the community's overall vulnerability, due in part to the above zoning updates in combination with other existing codes and regulations that discourage hazardous development. This includes the administration of zoning and subdivision regulations, building codes, and special permit or site plan reviews that ensure new or improved development projects address risk reduction through various provisions such as stormwater drainage, floodplain management, wetlands protection, and more. These codes and standards are effectively enforced through multiple City departments, boards, and commissions and they are periodically reviewed and updated to incorporate recommended best practices. For example, in December 2024 the City Council adopted new provisions within its Zoning Ordinance to ensure its local floodplain management regulations were aligned with the State's latest Model Floodplain Bylaw.

Two notable changes in development since 2019 that should be highlighted are the removal of the Bel Air Dam and the restoration of Wahconah Park. The removal of the Bel Air Dam is a major project being undertaken by the City of Pittsfield in coordination with the State, with completion anticipated within the next year. This is a high hazard potential dam that was previously determined to be unsafe and structurally deficient, and its removal will greatly reduce the flood hazard posed to communities downstream including several low-income neighborhoods as well as the Berkshire Medical Center. More information on the Bel Air Dam is provided in Chapter 4 (Risk Assessment). The Wahconah Park's restoration project is a massive undertaking by the City to retore the historic baseball stadium located at Wahconah Park to its former glory. The entire project will take place within a designated floodplain area, in proximity to wetlands and to the Housatonic River. The existing parking lot has a history of flooding, which will be mitigated through improved stormwater management conveyance using a combination of grey and green infrastructure techniques. Engineered site plans have already been developed and will move into local and DEP permitting by early spring 2025. The development will be closely monitored by the Conservation Commission, MassDEP and the Pittsfield Community Development Board for compliance with the codes and regulations cited above. These entities will ensure that development is completed safely and without exacerbating existing hazards or creating new vulnerabilities.

In summary, the long-term development outlook for Pittsfield is one of slow, managed growth, with no changes in development that are determined to be increasing the risks and vulnerabilities of the community to hazards. Development and redevelopment projects will continue to occur, but much of this will be located around areas already developed, while existing land use policies and regulations effectively discourage construction in hazard-prone areas. As demonstrated above through its recent zoning updates, the City continues to work toward more vigilant oversight of all projects and effective land use controls to minimize the potential impacts created by development in environmentally sensitive areas. These include better alternative to traditional subdivision development that will allow for greater flexibility and creativity of design, while encouraging a less sprawling and more efficient and resilient forms of development. These activities will help preserve and even enhance the natural and beneficial functions of the City's natural resources while continuing to decrease the community's overall vulnerability to hazards for many years to come.

## 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))

The City of Pittsfield continues to invest in parks, open space, and critical infrastructure, as outlined in the 2019 City of Pittsfield Hazard Mitigation Plan. While these priorities remain central, the City has increasingly shifted focus—where funding allows—to address evolving social, environmental, and economic needs, particularly in the areas of public safety, housing, and climate resiliency.

The 2019–2024 Open Space and Recreation Plan (OSRP) reaffirms the City's commitment to maintaining park facilities and preserving natural resources, including lakes, wetlands, and wildlife habitats. Similarly, the Capital Improvement Plan (CIP) for Fiscal Years 2022–2026 highlights sustained investment in roadway infrastructure, municipal facilities, and public safety buildings. A notable expansion of priorities is reflected in the City's planned $55 million police headquarters, a major investment in community safety.

The FY2022–2026 CIP also integrates significant federal funding through the American Rescue Plan (ARP), enabling a strategic pivot toward climate resilience, green infrastructure, and energy-efficient technologies. Additionally, the City has increased its focus on environmental justice, engaging communities in high-need areas such as Morningside and Westside through targeted outreach and planning efforts.

The Community Development Block Grant (CDBG) Five-Year Plan (2021–2025) underscores the importance of the 2019 Hazard Mitigation Plan, which was adopted as a standalone document separate from the broader Berkshire County strategy. Since 2019, the City has undertaken several key hazard mitigation projects, including:

- Flood mitigation at Wahconah Park,
- Culvert upgrades on Churchill and West Streets,
- Floodplain education programs,
- Green infrastructure and drainage assessments, and
- Emergency communications and evacuation planning.

The 2019 OSRP also identifies the increasing risk of flooding caused by outdated stormwater infrastructure, recommending mitigation strategies such as expanded drainage capacity, retention basins, and low-impact development (LID) techniques to manage runoff from severe storms. Progress on each mitigation action identified in the 2019 Hazard Mitigation Plan is detailed in Chapter 6 (Mitigation Strategy). Each action is categorized as Completed, Completed & To Be Continued, In Progress, Delayed, or Cancelled, with explanatory notes and references to whether it has carried forward into the current planning cycle.

In support of long-term resiliency, the City regularly reviews and updates zoning ordinances, building codes, and permitting procedures to incorporate risk reduction principles—especially regarding stormwater management, floodplain protection, and climate adaptation. By integrating hazard mitigation goals into major planning documents, policies, and funding decisions, Pittsfield has demonstrated a strong and evolving commitment to reducing risk and enhancing community resilience since the 2019 update.

## Authority and Assurances

The City of Pittsfield 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 City adheres 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 City of Pittsfield 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 City of Pittsfield, 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 City of Pittsfield, 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 City of Pittsfield 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 City'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 City of Pittsfield Hazard Mitigation Plan Update. It also includes a plan for continuing public outreach and monitoring the implementation of the identified mitigation actions.

**Appendices**

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

# Chapter 2: Planning Area Profile

The City of Pittsfield has a population of 43,927,[5] and is in Berkshire County in the westernmost part of the State and within the Berkshire Hills. The City has approximately 42.5 square miles of land area. Pittsfield is bordered by Lanesborough in the north, Richmond and Lenox in the south, Hancock in the west, and Washington and Dalton in the east. Pittsfield is known as a "major center" for government, business, and recreation which serves both residents and visitors from both in and out of the State.[6]

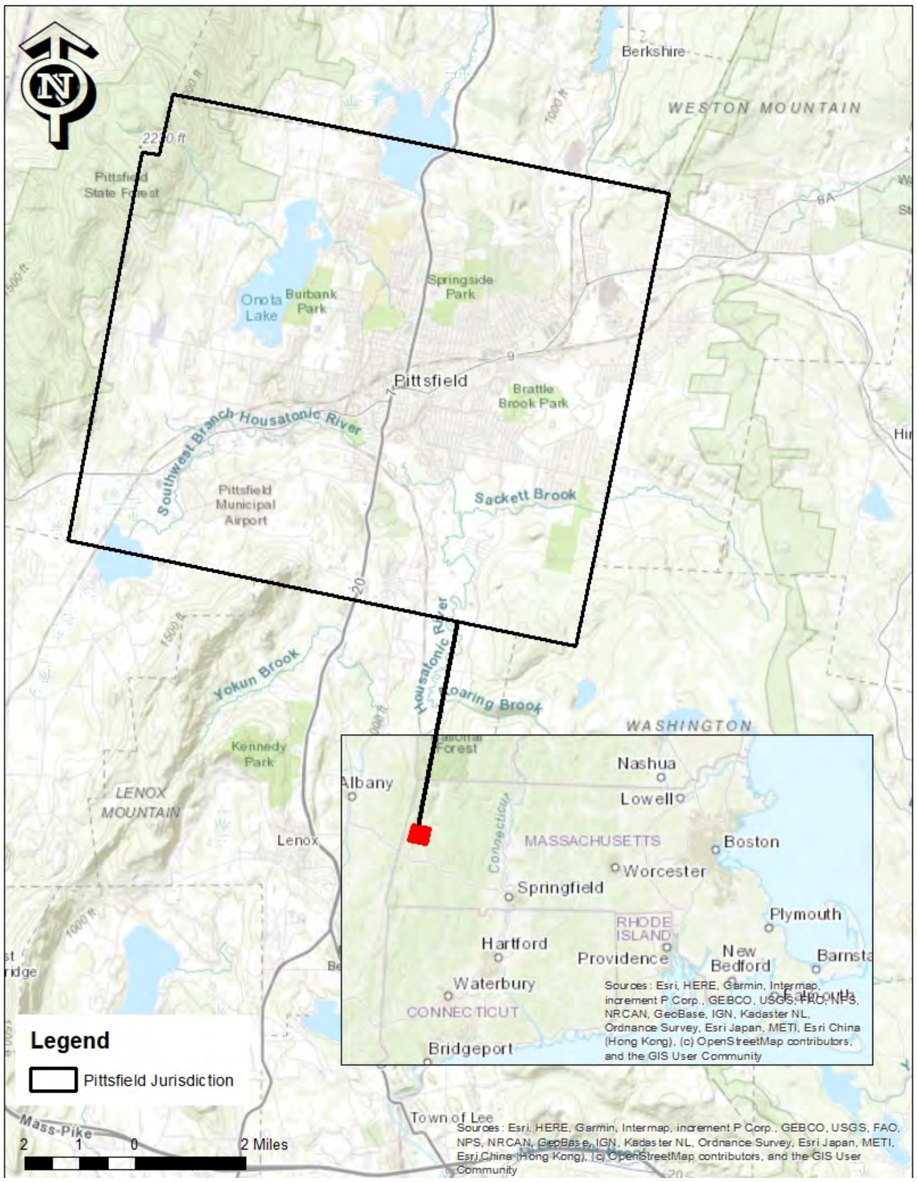

*Figure 2. Planning Area Map.*

Pittsfield's history pre-dates colonial times and the arrival of European settlers. The area was first settled by Native Americans due to the proximity of rivers and lakes which provided an abundance of resources. In 1738, Colonel Jacob Wendell bought 24,000 acres of land originally known as "Pontoosuck" – a Mohican Indian word meaning "a field or haven for winter deer."[7] Wendell formed a partnership with Philip Livingston and Colonel John Stoddard who also had claim to some of the land in the area. As people began to clear the land in 1743, there

[5] "QuickFacts Pittsfield city, Massachusetts." (2020). United States Census Bureau. Retrieved from https://www.census.gov/quickfacts/fact/table/pittsfieldcitymassachusetts/PST045224.

[6] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.

[7] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.

was a conflict between the European settlers and Native Americans, which was exacerbated by the French and Indian War. This conflict forced new settlers to leave the area, and the land remained unoccupied by those of European decent for several years. In 1752, settlers, especially from Westfield, Massachusetts, arrived in the region and a village began to grow. It was incorporated as the Pontoosuck Plantation in 1753. In 1761, with 200 residents, the plantation became known as the Township of Pittsfield, named in honor of the British Prime Minister William Pitt.[8]

By the end of the Revolutionary War, Pittsfield had almost 2,000 residents. The area remained primarily agricultural, however there were some mills that produced lumber, grist, paper, and textiles that were scattered along the many brooks present in the community. After Merino sheep from Spain were introduced to the region in 1807, the area became the center of woolen manufacturing in the United States and was said to be "an industry that would dominate the community's employment opportunities for almost a century."[9]

In addition to manufacturing, farming played a significant role in the 1800's. The Shakers were a group that left an "imprint" on the City and the neighboring Town of Hancock.[10] Even in present day, the Hancock Shaker Village, a living history museum located in Pittsfield, is an "international tourist attraction."[11] It is home to 20 historic buildings that are set on 1,200 acres of farm, field, meadow, and woodland.[12]

The Township of Pittsfield was a "bustling metropolis" in the 1800's and was incorporated as a City in 1891.[13] Due to the success of William Stanley's newly relocated Electric Manufacturing Company, the "forerunner" of the corporate giant now known as General Electric (GE), Pittsfield's population grew to more than 50,000 in 1930.[14] GE continues to be one of the City's largest employers.[15]

The City is governed by a Mayor and City Council form of government. There are seven City Councilors that represent each of the seven wards in the City as well as four City Councilors At-Large.[16]

## People

As of 2020, 80% of the City identified as White, 5.3% identified as Black or African American, 0.4% identified as American Indian and Alaska Native, 1.4% identified as Asian, 9.0% identified as Hispanic or

[8] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[9] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[10] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[11] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[12] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[13] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[14] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[15] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[16] "Pittsfield City Council." (n.d.) City of Pittsfield, Massachusetts. Retrieved from https://www.cityofpittsfield.org/government/city_council/index.php.

Latino, and 10% identified as Two or More Races.[17] About 6.8% of the population is foreign-born and 10.2% of the population speaks a language other than English at home.[18] There are approximately 19,566 households in Pittsfield.[19] The median household income is $68,386.[20] The number of people living below the poverty level is 13.6%.[21] Almost 93% percent of the City, aged 25 years or older, is a high school graduate or higher.[22]

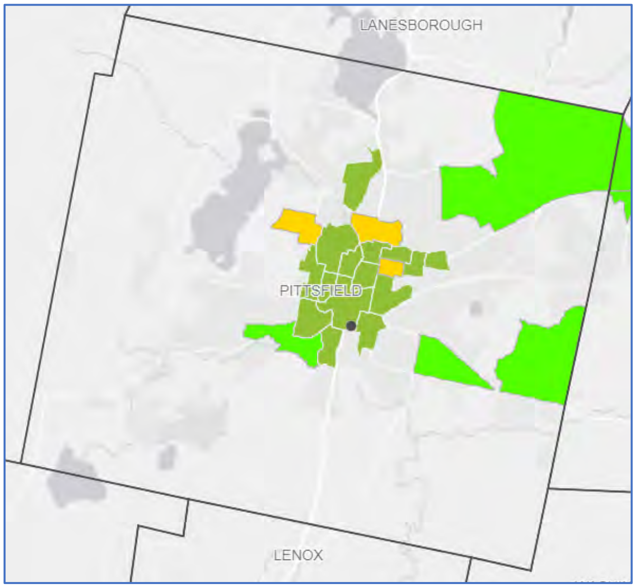


*Figure 3. City of Pittsfield Environmental Justice Populations.*

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

• Annual median household income is 65% or less of the state's annual median household income.

• Minorities make up 40% or more of the City or town's population.

• Twenty-five percent or more of households speak English "less than very well."

• 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.[23]

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

[17] "QuickFacts Pittsfield city, Massachusetts." (2020). United States Census Bureau. Retrieved from https://www.census.gov/quickfacts/fact/table/pittsfieldcitymassachusetts/PST045224.
[18] "QuickFacts Pittsfield city, Massachusetts." (2020). United States Census Bureau. Retrieved from https://www.census.gov/quickfacts/fact/table/pittsfieldcitymassachusetts/PST045224.
[19] "QuickFacts Pittsfield city, Massachusetts." (2020). United States Census Bureau. Retrieved from https://www.census.gov/quickfacts/fact/table/pittsfieldcitymassachusetts/PST045224.
[20] "QuickFacts Pittsfield city, Massachusetts." (2020). United States Census Bureau. Retrieved from https://www.census.gov/quickfacts/fact/table/pittsfieldcitymassachusetts/PST045224.
[21] "QuickFacts Pittsfield city, Massachusetts." (2020). United States Census Bureau. Retrieved from https://www.census.gov/quickfacts/fact/table/pittsfieldcitymassachusetts/PST045224.
[22] "QuickFacts Pittsfield city, Massachusetts." (2020). United States Census Bureau. Retrieved from https://www.census.gov/quickfacts/fact/table/pittsfieldcitymassachusetts/PST045224.
[23] "Environmental Justice Populations in Massachusetts." (2024). Commonwealth of Massachusetts. https://www.mass.gov/info-details/environmental-justice-populations-in-massachusetts.

comes from the Executive Office of Energy and Environmental Affairs (EEA) who uses American Community Survey data.[24]

The center of Pittsfield meets the "Minority" Environmental Justice (EJ) Criteria shown in yellow, as well as the "Income" EJ Criteria shown in neon green, and the "Minority and Income" EJ Criteria shown in dark green. There are also three block groups in the eastern part of the City that meet the "Income" EJ Criteria.

## Land Use and Development (Structures)

The City's landscape is a "mix of lowlands and hillsides."[25] The lowlands are in the City's center while the hillsides rise along the eastern and western boundaries. There are large concentrations of "steeply sloped" lands in the Pittsfield State Forest, Oak Hill, the Boulders, Sykes Mountain, the Bouquet Ski Area, and the South Mountain.[26]

Pittsfield is known as the "urban center of Berkshire County" however almost 70% of its land remains undeveloped due to a large portion of the city being forestland.[27] Approximately 22% of Pittsfield's land area is permanently protected from development.[28]

The City's "favorable geographic conditions" had impacted growth and development in the City.[29] Due to flat lowlands, access to water resources, and a central location, Pittsfield has become a center of commerce and industry.[30] Alongside its growth in industry, farming and agriculture exist as well, which led to the unique identity of "a major City with the appearance of a very rural setting."[31] There are many governmental services in the City which have made Pittsfield hold significant roles in the County. There has also been a trend of a growing retirement and/or second-home community due to the City's proximity to the Greater New York Metropolitan Area.[32]

Pittsfield's Zoning Ordinance follows a "traditional Euclidean code" which supports a separation of uses by district.[33] A recent update to the City's Zoning Map is the Downtown Arts District, which is an overlay district that serves to foster the mixing of uses and further break down some of the issues that come with "rigid" Euclidean zoning. Additionally, there has been an updated Flexible Development Ordinance,

[24] "Environmental Justice Populations in Massachusetts." (2024). Commonwealth of Massachusetts. https://www.mass.gov/info-details/environmental-justice-populations-in-massachusetts.
[25] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[26] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[27] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[28] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[29] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[30] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[31] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[32] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[33] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.

which is intended to preserve open space by allowing homes to be clustered together in one portion of a development site while preserving the rest of the area as open space.[34] Additional overlay districts include the Smart Growth Overlay District and Battery Energy Storage System Overlay District.[35]

The following table, adapted from the City's Open Space and Recreation Plan, outlines the various Zoning Districts and the percentage of land used in the City.

*Table 1. Open Space and Recreation Plan Zoning District Table (2019-2024).*

| Zoning District | Percent of City |
|---|---|
| Commercial, Warehousing, and Storage | 0.8% |
| Downtown Business | 0.4% |
| General Business | 1.5% |
| General Industrial | 4.4% |
| Grouped Business | 0.4% |
| High Density Multi-Family Residence | 3.3% |
| Light Industrial | 1.9% |
| Limited Industrial | 3.6% |
| Low Density One-Family Residence | 31.9% |
| Medium Density One-Family Residence | 27.9% |
| High Density One-Family Residence | 16.4% |
| One- and Two- Family Residence | 6.4% |
| Neighborhood Business | 0.0% |
| Garden Apartments | 1.1% |

## Natural Resources

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

[34] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[35] Zoning Districts (Article 23-3). (n.d.). City of Pittsfield, Massachusetts.

## Rivers, Lakes, and Other Water Bodies

The City's surface water includes Pontoosuc Lake which is located along the northern border with neighboring Lanesborough, Onota Lake which is in the northwest of the City, and the Housatonic River which travels through the City center. Other smaller surface waters include Goodrich Pond, Morewood Lake, Mud Pond, Pecks Road, Richmond Pond, and Silver Lake.[36]

Most of Pittsfield lies within the Housatonic River Watershed and the main branches of the River (the East Branch, West Branch, and Southwest Branch) eventually join the Main Branch of the Housatonic River in the City Center. There are 20 named perennial streams that provide water to the rivers, lakes, and ponds within the City as well as several unnamed perennial and intermittent streams. A complete list of the 26 streams, lakes, and ponds located in Pittsfield are provided below:

1. Barton Brook
2. Brattle Brook
3. Churchill Brook
4. Daniels Brook
5. Goodrich Pond
6. Hawthorne Brook
7. Jacoby Brook
8. Lulu Brook
9. Maloy Brook
10. May Brook
11. Morewood Lake
12. Mud Pond
13. Mud Pond Brook
14. New Lebanon Brook
15. Onota Brook
16. Onota Lake
17. Parker Brook
18. Pontoosuc Lake
19. Richmond Pond
20. Sackett Brook
21. Shaker Brook
22. Silver Lake
23. Smith Brook
24. Sykes Brook
25. Unkamet Brook
26. Wampenum Brook.[37]

Alongside these water bodies, there is also a "significant amount of wetlands" which amount to approximately 9% of the total land area of Pittsfield or about 2,400 acres. Many of the wetlands sit adjacent to river systems, but some are more isolated. The isolated wetlands offer a wetland habitat in an upland environment while also providing flood storage capacity.[38]

## Open Space and Recreation

Pittsfield has an abundance of local, state, and private open space or park land resources. As mentioned previously, though a "more urban community," the undeveloped areas are largely forested and account

[36] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[37] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[38] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.

for 46% of the City's land use.[39] The forested land is home to many natural plant communities and a variety of different tree species. Much of Pittsfield's open spaces offer recreational opportunities for visitors and residents while also preserving key natural resources and habitats. Open space and recreational opportunities include a State Forest, two major lakes, golf courses, a softball complex, several ball fields, and river access points.[40]

## Critical Facilities and Infrastructure

Critical facilities and infrastructure are considered community lifelines; Cities 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 City's resilience and economic vitality.

### Water and Sewer Service

The City relies on six surface water reservoirs to supply water to residents. According to the City's Open Space and Recreation Plan, the water supply in Pittsfield can be "distinguished as two separate systems" which include:

1. The Cleveland Reservoir System
2. The Ashley/Farnham Reservoir Complex.[41]

The Cleveland Reservoir System serves as the principal water supply and provides approximately two-thirds of the City's water supply. The Cleveland Reservoir has a storage capacity of 1,600 million gallons (MG) and supplies about 7.5 million gallons per day (MGD) into the system after treatment.[42]

The City's Sewer Division is responsible for the operation and maintenance of the Pittsfield Sewer Collection System. This system includes 182 miles of sewer pipes as well as six sewer pumping stations.[43] Pittsfield has a sewage treatment plant that is located east of Holmes Road. Sewer is currently available to about 95% of City residents and though no expansion of the existing system is planned, the City did secure a grant to replace the Pecks Road sewer line with a sewer of "greater capacity."[44]

### Energy

According to the Massachusetts Executive Office of Technology Services and Security, the City of Pittsfield is serviced by NSTAR Electric that is doing business as (d/b/a) Eversource Energy.[45] The City is

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[39] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[40] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[41] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[42] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[43] "Sewer Division." (n.d.). City of Pittsfield, Massachusetts. Retrieved from https://www.cityofpittsfield.org/departments/public_works_and_utilities/sewer_division.php.
[44] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[45] "Electricity Providers by Municipality. (2021). Massachusetts Executive Office of Technology Services and

also part of the "Community Choice Power Supply Program" which "supports local renewable energy projects and maximizes consumers protections, all at a price at or below the average price of Basic Service power from the utility."[46] This is a community sustainability effort that Pittsfield began exploring in 2015.[47]

## 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 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."*

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

The City of Pittsfield has approximately 53 critical facilities. The list of critical facilities in Pittsfield 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 Hazard Mitigation Planning Committee (HMPC) throughout the planning process. There are 28 critical facilities that have generators - these sites support several of the community's health and social services and include Fire Stations, the Police Department, the Athenaeum, schools, assisted living facilities, and water

Security. Retrieved from https://ma-eeac.org/wp-content/uploads/Appendix-B-Maps-of-Service-Areas.pdf.

[46] "Community Choice Power Supply Program." (n.d.). City of Pittsfield, Massachusetts. Retrieved from https://www.cityofpittsfield.org/departments/community_development/municipal_aggregation.php.

[47] "Community Choice Power Supply Program." (n.d.). City of Pittsfield, Massachusetts. Retrieved from https://www.cityofpittsfield.org/departments/community_development/municipal_aggregation.php.

maintenance facilities. The emergency shelters within Pittsfield are the John T. Reid Middle School, the Church known as The Pearl, and the Rosewood Family Shelters (Service Net). The Berkshire Community College Field House is a backup shelter.

*Table 2. List of Critical Facilities in the City of Pittsfield.*

| Name | Address |
|---|---|
| 510 Medical Walk-In | 510 North Street |
| Action Ambulance | 121 West Housatonic Street |
| Action Ambulance Garage and offices | 77 Seymour Street |
| Allendale Elementary School | 180 Connecticut Avenue |
| Berkshire Athenaeum | 1 Wendell Avenue |
| Berkshire Community College Field House | 1350 West Street |
| Berkshire County House of Correction | 467 Cheshire Road |
| Berkshire Medical Center | 725 North Street |
| Berkshire Medical Center Hillcrest Campus | 165 Tor Court |
| Berkshire Place | 220 South Street |
| BRTA Maintenance & Operations Facility | 67 Downing Industrial Parkway |
| Bus Operations | 442 Merrill Road |
| Capeless Elementary School | 86 Brooks Avenue |
| Casella | 500 Hubbard Avenue |
| Church - The Pearl | 55 Fenn Street |
| City Hall | 70 Allen Street |
| County Ambulance | 175 Wahconah Street |
| County Ambulance | 323 Dalton Avenue |
| Crosby Elementary School | 517 West Street |
| Egremont Elementary School | 84 Egremont Avenue |

| Name | Address |
|---|---|
| EPOCH Melbourne Place Assisted Living | 140 Melbourne Road |
| Fire Station # 1 | 311 West Housatonic Street |
| Fire Station # 2 | 9 Somerset Avenue |
| Fire Station # 5 | 54 Pecks Road |
| Fire Station # 6 | 8 Holmes Road |
| Froio Senior Center | 330 North Street |
| Hibbard School Warehouse Facility | 280 Newell Street |
| Highway Yard | 232 West Housatonic Street |
| Hillcrest Commons | 169 Valentine Road |
| Inspectional Services | 100 North Street |
| Intermodal Center | 2 Columbus Avenue |
| John T. Reid Middle School | 950 North Street |
| Miss Hall's School | 492 Holmes Road |
| Morningside Community Elementary School | 100 Burbank Street |
| Mt. Greylock Extended Care | 1000 North Street |
| Pittsfield Fire Department | 74 Columbus Avenue |
| Pittsfield Generating | 235 Merrill Road |
| Pittsfield High School | 300 East Street |
| Pittsfield Municipal Airport (PSF) | 832 Tamarack Road |
| Police Department | 39 Allen Street |
| Public Works Storage | 40 Downing Industrial Parkway |
| Renal Dialysis Center | 8 Conte Drive |
| Rosewood Family Shelters (Service Net) | 320 Onota Street |

| Name | Address |
|---|---|
| Sacred Heart Head Start Program | 1 Meadow Lane |
| Silvio O Conte Community School | 200 West Union Street |
| Springside of Pittsfield | 255 Lebanon Avenue |
| Stearns School | 75 Lebanon Avenue |
| Taconic High School | 96 Valentine Road |
| Theodore Herberg Middle School | 501 Pomeroy Avenue |
| Urgent Care Center | 505 East Street |
| Waste Water Treatment Plant | 901 Holmes Road |
| Water Chlorinator | Mountain Drive |
| Williams School | 50 Bushey Road |

### Critical Transportation Infrastructure

There are four major routes that serve the City of Pittsfield. These routes are:

1. Route 9 – runs east/west and begins in the City's center.
2. Route 20 – runs east/west and connects to New York.
3. Route 8 – runs north/south in the eastern part of the City.
4. Route 7 – runs/north south and connects to Connecticut and Vermont. [48]

The City's roadways are said to "exhibit some of the highest traffic volumes in Berkshire County." [49]

The Berkshire Regional Transit Authority (BRTA) owns and operates the Joseph Scelsi Intermodal Transportation Center, which is a long-distance ground travel terminal that serves Pittsfield and the surrounding areas. The Intermodal Transportation Center is located downtown and connects to Amtrack, intercity bus, and fixed route services.[50]

There are ten different bus routes that are operated by the BRTA which offer intra- and inter-city bus services. The local service travels as far as North Adams and Great Barrington, which are communities about 20 miles away. Longer-distance services are provided by either Greyhound or Bonanza bus lines

[48] City of Pittsfield Master Plan. (2009). City of Pittsfield, Massachusetts.
[49] City of Pittsfield Master Plan. (2009). City of Pittsfield, Massachusetts.
[50] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.

from Pittsfield's downtown terminal. The fixed bus routes within the City are "designed as commuter routes, moving people to commercial hubs and jobs within the region."[51]

The Conrail Railroad provides a freight rail service within the City of Pittsfield. Amtrak's Boston to Chicago passenger route makes two stops (one in each direction) in Pittsfield every day. There is also the Ashuwillticook Rail Trail, located near the Berkshire Mall, that offers recreational opportunities via a pedestrian and bicycle path that extends 11.2 miles from Lanesborough all the way north to Adams. Pedestrians also have access to several sidewalk networks, especially in densely populated areas.[52]

### Dams

The City of Pittsfield has several high hazard potential dams (HHPD) as well as a couple of significant hazard dams. The City owns dams in Pittsfield as well as beyond the borders of the City. Chapter 4 (Risk Assessment) details the dams and the risk they pose. The table below shows the list of significant and high hazard dams within the City limits.

*Table 3. Significant and High Hazard Dams in Pittsfield.*

| Dam Name | Owner | Hazard Potential |
|---|---|---|
| Onota Lake Dam | City of Pittsfield | High |
| Richmond Pond Dam | Private | Significant |
| Pontoosuc Lake Dam | MassDCR | High |
| Pecks Lower Pond Dam (also called Gillette) | Private | High |
| Government Mill Dam | Private | Significant |
| Bel Air Dam (scheduled for removal in 2026) | City of Pittsfield | High |
| Parker Pond Dam | Private | Significant |

## Economy

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

1. Educational services, healthcare and social assistance
2. Retail trade
3. Professional, scientific, and management, and administrative and waste management services.[53]

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[51] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[52] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[53] "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.

The City of Pittsfield is home to several famous residents who made "significant contributions to our nation's history" such as Reverend Thomas Allen, the "Fighting Parson" in the Revolutionary War, Herman Melville, author of Moby Dick, and several other military and historical figures such as William F. Bartlett, Lieutenant Colonel Charles W. Whittlesey, and Samuel Harrison.[54]

There are many historically significant buildings and properties in Pittsfield. According to the City of Pittsfield's Open Space and Recreation Plan, there are 540 historic properties and areas that can be found on the Massachusetts Cultural Resource Information System (MACRIS). These sites include buildings, burial grounds, structures, and objects.[55]

The City also has several places listed on the National Register of Historic Places as noted in the City's 2019-2024 Open Space and Recreation Plan. The 22 sites, listed in alphabetical order, can be found below:

1. A.H. Rice Silk Mill
2. Allen Hotel – Wendall Avenue
3. Arrowhead – Herm Melville's House
4. Berkshire Life Insurance Company Building – North Street
5. Charles Whittlesey Power House – South Street
6. Eaton, Crane and Pike Company Factory – South Church Street
7. Fenn Streets and Wendell Avenue
8. Morewood School – South Mountain Road
9. Old Central Fire Station – Allen Street
10. Old Central High School – First Street
11. Old Town Hall – East Street

[54] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.
[55] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.

12. Park Square Historic District – Roughly bounded by East Housatonic, South, North and
13. Pilgrim Memorial Church and Parish House
14. Pittsfield Cemetery
15. Providence Court – East Street
16. Samuel Harrison House – Third Street
17. South Mountain Concert Hall – New South Mountain Road
18. Springside Park – North Street and Springside Avenue
19. Upper North Street Commercial District – North Street and Eagle Street
20. Wahconah Park – Wahconah Street
21. William Russel Allen House – East Street
22. Wollison-Shipton Building – North Street.[56]

[56] City of Pittsfield Open Space and Recreation Plan. (2019-2024). City of Pittsfield, Massachusetts.

# Chapter 3. Planning Process

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

- Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288), as amended by the Disaster Mitigation Act of 2000
- Code of Federal Regulations – Title 44, Chapter 1, Part 201 (§201.6: Local Mitigation Plans)
- Federal Emergency Management Agency Local Mitigation Planning Policy Guide, (Effective April 11, 2025)
- In addition, the plan was prepared with the suggestions found in the Demonstrating Good Practices Within Local Hazard Mitigation Plans, FEMA Region 1, January 2017.

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

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

The planning process for this updated mitigation plan began in September 2024 and concluded in May 2025 (this does not include the months of plan review and adoption). The City developed a Municipal Vulnerability Preparedness (MVP) Program Summary of Findings Report in 2019. This planning effort contributed to the update of the mitigation plan. Below is a graphical display of the plan development timeline.

*Table 4. Planning Process Schedule.*

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

Thomas Sammons, Fire Department Chief and Emergency Management Director, facilitated all activities related to the Mitigation Plan Update, including meeting logistics, data gathering, and public outreach. The Consulting Team met with Chief Sammons on September 20, 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

Chief Sammons developed the Hazard Mitigation Planning Committee (HMPC) and was the point of contact for the Consulting Team. The HMPC included City employees and officials who represented five sectors of the community shown in the table below. A full list of HMPC members is shown in the table after that. The HMPC met four times, October 29, 2024, December 18, 2024, February 12, 2025, and April 1, 2025. All the meetings were conducted via Zoom, however sometimes City employees gathered at City offices. A list of participants at each of these meetings is included in the Appendix.

Table 5. Sectors of the Community Represented On HMPC.

| Sectors of the Community | HMPC Members |
|---|---|
| • Emergency Management | • City Planner<br>• Fire Department Chief & Emergency Management Director<br>• Fire Department Deputy Chief<br>• Fire Department Senior Financial Manager<br>• Health Department Director<br>• Mayor<br>• Massachusetts Emergency Management Agency (MEMA) Local Coordinator – Operations<br>• Pittsfield Housing Authority Safety Officer<br>• Police Captain |
| • Economic Development | • City Engineer<br>• City Planner<br>• Community Development Director<br>• Permitting Coordinator<br>• Mayor |
| • Land Use and Development | • Building Commissioner<br>• Building Inspector<br>• City Engineer<br>• City Planner<br>• Community Development Director<br>• Conservation Agent<br>• Department of Public Works Commissioner<br>• GIS Coordinator<br>• Mayor<br>• Natural Resource Program Manager<br>• Permitting Coordinator |

| Sectors of the Community | HMPC Members |
|---|---|
| • Health and Social Services | • AdLib independent Living Advocate<br>• City Planner<br>• Community Development Director<br>• Council on Aging<br>• Director of Administrative Services - Mayor's Office<br>• Executive Director – Pittsfield Housing Authority<br>• Fire Department Chief & Emergency Management Director<br>• Fire Department Deputy Chief<br>• Fire Department Senior Financial Manager<br>• Health Department Director<br>• Housing Program Manager<br>• Mayor<br>• Pittsfield Housing Authority Safety Officer<br>• Pittsfield Public Schools Head of Custodial Services<br>• Police Captain<br>• School Safety Coordinator<br>• Superintendent of Schools |
| • Infrastructure | • Building Commissioner<br>• Building Inspector<br>• City Engineer<br>• City Planner<br>• Community Development Director<br>• Department of Public Works Commissioner<br>• GIS Coordinator<br>• Mayor<br>• Permitting Coordinator |

*Table 6. HMPC Members.*

| First Name | Last Name | Title | Affiliation | Phone | Email |
|---|---|---|---|---|---|
| Andy | Cambi | Health Department Director | City of Pittsfield | 413-499-9411 | acambi@cityofpittsfield.org |
| Jeffrey | Clemons | Building Commissioner | City of Pittsfield | 413-499-9440 | jclemons@cityofpittsfield.org |
| Joseph | Curtis | Superintendent of Schools | Pittsfield Schools | 413-499-9500 | jcurtis@pittsfield.net |
| Tina | Danzy | Executive Director - Pittsfield Housing Authority | Pittsfield Housing Authority | 413-443-5936 | tinadanzy@pittsfieldhousing.org |
| Justine | Dodds | Community Development Director | City of Pittsfield | 413-499-9368 | jdodds@cityofpittsfield.org |
| Anne | Ferin | Senior Financial Manager (Fire Department) | City of Pittsfield | 413-448-9764 | aferin@cityofpittsfield.org |
| Ryan | Grennan | GIS Coordinator | City of Pittsfield | 413-448-9853 | rgrennan@cityofpittsfield.org |
| Matthew | Hill | Police Captain | City of Pittsfield | 413-448-9700 x563 | mhill@cityofpittsfield.org |
| Nate | Joyner | Housing Program Manager | City of Pittsfield | 413-499-9358 | njoyner@cityofpittsfield.org |
| Eric | Lamoureaux | School Safety Coordinator | Pittsfield Schools | 413-770-1315 | elamoureaux@pittsfield.net |
| Albert | Leu | Building Inspector | City of Pittsfield | 413-499-9440 | aleu@cityofpittsfield.org |
| Peter | Machetti | Mayor | City of Pittsfield | 413-499-9321 | pmarchetti@cityofpittsfield.org |
| Peter | Marino | Safety Officer - Pittsfield Housing Authority | Pittsfield Housing Authority | 413-443-5936 | petemarino@pittsfieldhousing.org |

| First Name | Last Name | Title | Affiliation | Phone | Email |
|---|---|---|---|---|---|
| Christopher | Marsden | Local Coordinator - Operations | MEMA | 413-750-1410 | christopher.marsden2@mass.gov |
| James | McGrath | Natural Resource Program Manager | City of Pittsfield | 413-499-93445 | jmcgrath@cityofpittsfield.org |
| Daniel | Moore | Head of Custodial Services | Pittsfield Schools | 413-499-9528 | dtmoore@pittsfield.net |
| Ricardo | Morales | Commissioner of Public Works | City of Pittsfield | 413-448-9768 | rmorales@cityofpittsfield.org |
| Valerie | Pease | Advocate | AdLib Independent Living | 413-442-7047 x14 | vpease@adlibcil.org |
| Kevin | Rayner | City Planner | City of Pittsfield | 413-499-9366 | krayner@cityofpittsfield.org |
| Jennifer | Reynolds | Council on Aging | City of Pittsfield | 413-499-9346 | jreynolds@cityofpittsfield.org |
| Thomas | Sammons | Fire Chief/Emergency Management Director | City of Pittsfield | 413-448-9764 | tsammons@cityofpittsfield.org |
| Tyler | Shedd | City Engineer | City of Pittsfield | 413-499-9417 | tshedd@cityofpittsfield.org |
| Amber | Spring | Permitting Coordinator | City of Pittsfield | 413-448-9673 | aspring@cityofpittsfield.org |
| Catherine | Van Bramer | Director of Administrative Services - Mayor's Office | City of Pittsfield | 413-499-9322 | cvanbramer@cityofpittsfield.org |
| Robert | Van Der Kar | Conservation Agent | City of Pittsfield | 413-499-9359 | rvanderkar@cityofpittsfield.org |
| James | Ziter | Deputy Chief Fire Department | City of Pittsfield | 413-448-9764 | jziter@cityofpittsfield.org |

| First Name | Last Name | Title | Affiliation | Phone | Email |
|---|---|---|---|---|---|
| Andy | Cambi | Health Department Director | City of Pittsfield | 413-499-9411 | acambi@cityofpittsfield.org |

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 City of Pittsfield has a Mayor, an elected Zoning Board of Appeals, and a Community Development Board. The Zoning Board and Community Development Board are responsible for overseeing the long-term land use patterns of Pittsfield through their Zoning Ordinances, Subdivision Regulations, Master Plan, and a 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 Fire Chief with the support of other members of the HMPC conducted outreach specifically to local and regional agencies involved in hazard mitigation, City boards and departments that regulate development, neighboring communities, as well as organization representatives that serve socially vulnerable populations, businesses, and academic institutions.

The first HMPC Meeting was held on October 29, 2024. The meeting began with introductions and an overview of the hazard mitigation plan update process. Roles and responsibilities of the HMPC were outlined and additional stakeholders were identified to be invited to future meetings. The HMPC outlined vulnerable populations which included the homeless population in the City, the Berkshire Dream Center, Service Net which provides shelter and housing services, and an elderly population located in the eastern part of Pittsfield. A review of previous plans and reports highlighted several existing plans, some of which were in the process of being updated such as the Open Space and Recreation Plan. Other plans were more outdated, such as the City's 2009 Master Plan. Regarding a change in capabilities within the City, the HMPC shared they were working on bringing on a Deputy Commissioner for the Department of Public Works who would focus on hazard mitigation and emergency response.

The meeting then went on to review critical facilities in the City and any new developments, which included the new Wastewater Treatment Plant and permitted housing that was being developed in the West Housatonic area. A discussion on hazards faced by Pittsfield provided a chance for the HMPC to share specific information on the City's past experiences. Major takeaways included having the Senior Center as a cooling center, increased flood-related damage due to rain events, more severe winter storms, and potential landslide concerns due to high slope areas. The HMPC did share that the City's drinking water supply is resilient due to extra capacity and that the Eversource Power Company has a robust program in place to mitigate risk from tree limbs cutting down power. The City wants to expand upon the ongoing Eversource tree work with a similar program. The meeting wrapped up with initial goal statements that the HMPC would review for the next meeting.

The second HMPC Meeting was held on December 18, 2024. The meeting began with public outreach strategies for the first public meeting. The HMPC suggested using the Senior Center for in-person gathering as well as the Pittsfield City TV (PCTV) which offers live video and recording resources. Outreach efforts would include reaching out to local and regional agencies, special districts, vulnerable populations, and working families with children. The meeting then went on to discuss the inventory of dams in the City which the HMPC provided Emergency Action Plans (EAPs) and details for, as needed. Regarding critical facilities, the HMPC shared that the Waste Transfer Station was no longer a burn facility, and that Reed Middle School could be an emergency shelter alongside the field house at Berkshire Community College. The Sheriff’s Department also has a back-up generator that could provide power if needed.

The meeting then moved onto a review of the risk assessment and the HMPC had a chance to provide feedback on what the consulting team identified as primary concerns. The HMPC did note that neighboring communities have had wildfires and brushfires that have put Pittsfield at risk, as well as an overall concern about old, unreinforced structures that could be impacted by earthquakes. As for community-wide risks, many of the schools in Pittsfield do not have air conditioning. The HMPC suggested several mitigation actions which included formally identifying the Reed Middle School as a local emergency shelter, increased education and awareness on hazards, and coordination with local academic institutions that are on State property that could support local efforts in the face of natural hazards. The meeting ended with a discussion of the City’s capability assessment. Pittsfield was classed as a 3 on the ISO Fire Protection rating and the HMPC noted that affordability related to flood insurance policies was a concern for the community.

The third HMPC Meeting was held on February 12, 2025. The meeting began with general discussion on hazard mitigation efforts. The City has been updating emergency management items such as phone numbers for communication systems that already exist (e.g., CodeRED). The risk assessment and hazard rankings were reviewed and the HMPC noted that wildfires were appropriately ranked, though air quality because of fires should be identified as a hazard. For hurricanes and tropical storms, the HMPC noted that a focus on wind and rain should be prioritized. The City is also facing harmful algal blooms caused by drought and heat. The HMPC shared that flood maps for Pittsfield were currently outdated and needed to be reviewed. When discussing extreme temperatures, the HMPC stressed how vulnerable the unsheltered and unhoused population in the City could become and how the City should work to provide shelter, especially during the summer and winter months. To manage drought and assist in conservation efforts, Pittsfield is working to get all residents on water meters.

A capability assessment review followed the hazard discussion. The HMPC noted that the City could have more staff capacity, as well as having the City promote energy assessments for homes. The HMPC wanted to explore the feasibility of a stormwater utility in the future. The meeting wrapped up with logistics for the second public meeting which would be held at the Senior Center.

The fourth and final HMPC Meeting was held on April 1, 2025. The consulting team shared the timeline for completion of the draft plan and then discussed some logistics for the second public meeting. A review of the plan content, chapters, and finalizing the mitigation action tracker were also discussed. The HMPC noted that invasive species should have a moderate hazard ranking due to the risk of the Emerald Ash Borer that has damaged Elm trees in the area. Logistics for the final plan review were then discussed. The HMPC planned to share hard copies at the Fire Department and City Hall, as well as an online version. The Mayor’s Office would also support any outreach efforts.

HHPD1: Did the plan describe the incorporation of existing plans, studies, reports and technical information for HHPDs?

In addition to the four HMPC meetings, the City and consulting team met to discuss High Hazard Potential Dams on January 22, 2025. The meeting was held with members of the HMPC and dam owners. The meeting discussed the importance of including dams within the updated plan. The consulting team reported on the collection of Emergency Action Plans (EAPs) for six City-owned dams and the use of GIS to analyze inundation areas and risks. Some dams, such as the State-owned Pontoosuc Lake Dam, were missing EAPs which needed to be collected and included in the plan update. The meeting participants addressed the ongoing efforts related to the Bel Air Dam's removal and brainstormed mitigation actions to enhance understanding of the risks associated with the identified dams. There were concerns about some dams that were in disrepair, particularly privately-owned ones. It was suggested that the City advocate for funding to support necessary studies and repairs.

The meeting continued with discussions on the Ashley Lake Reservoir Dam, which had satisfactory inspection results, and the need for Phase One inspections for dams associated with the City's water system. The consulting team reviewed dam safety, highlighting the Bel Air Dam's upcoming project in Summer 2025 and confirming that the Onota Lake Dam is in good condition. The group also discussed Pecks Lower Pond Dam and ongoing concerns regarding the Pontoosuc Lake drawdown permit. The meeting concluded with discussions on improving emergency communication for dam-related issues, including a common banner on community websites and better integration of communication tools among neighboring communities, beyond just the City of Pittsfield.

The HMPC also participated in two public meetings, one on January 27, 2025, and one on April 7, 2025. Finally, the HMPC reviewed the draft City of Pittsfield, MA Hazard Mitigation Plan Update prior to sending it to the Massachusetts Emergency Management Agency (MEMA) for their review in May 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.

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

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

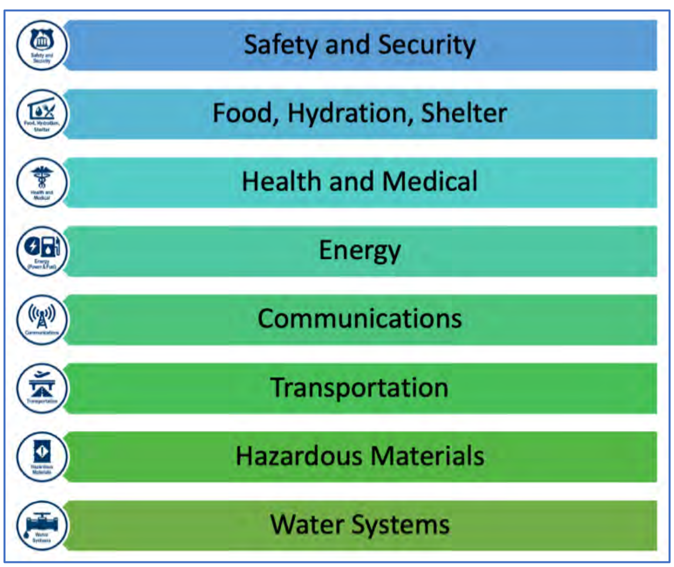



*Figure 4. Community Lifelines.*

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 Senior Center, using the City's social media pages, posting at the City Hall and the Fire Department, and reaching out to local and regional partners. The City website (https://www.cityofpittsfield.org/) included announcements for meetings, the press releases were sent to local organizations, using online platforms like the City's webpage, and posted around the City at frequented buildings such as the City Hall and Fire Department.

Information gathered during the public meetings contributed to the plan's development. The first public meeting was held via Zoom and in person at the Ralph J. Froio Senior Center on **January 27, 2025**. 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 the risks you have identified? Think of activities to protect the people, buildings, and infrastructure named previously.

The second public meeting was held on **April 7, 2025,** virtually on Zoom as well as in-person at the Ralph J. Froio Senior Center. There were approximately 15 people in-person. When asked what natural hazards may impact the City of Pittsfield, the following responses were generated in the word cloud below.


*Figure 6. Public Meeting Responses to Natural Hazards Impacts on City of Pittsfield.*

Additionally, when meeting participants were asked about problems that they have experienced due to natural hazards, responses included:

- Power loss (sometimes for several days)
- Downed trees or tree limbs
- Roof damage
- Basement flooding
- Road washouts
- Inability to travel
- Property loss
- Smoke from wildfires
- Street closures.

The meeting participants also discussed ways the City could mitigate natural hazard risks which include suggestions such as improving infrastructure, cleaning storm drains, trimming trees over power lines, providing educational resources, engaging community leaders and condominium complex managers, preparing, innovating, communicating, placing instructive videos on PCTV (Pittsfield Community Television), making the City website easier to use for information, and getting back-up generators. The meeting also provided an opportunity for the consulting team to share information on disaster preparedness and the plan's contents and timeline.

The second public meeting was written about in *iBerkshires*, a local news source for the Berkshire Region. The article can be found here [https://www.iberkshires.com/story/78591/Pittsfield-Talks-Hazard-Mitigation.html](https://www.iberkshires.com/story/78591/Pittsfield-Talks-Hazard-Mitigation.html) as well as in the Appendix.

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 7. Where Public Engagement Informed the Plan.*

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

### List of Key Stakeholders Invited to Public Meetings

- Local Organizations
- Pittsfield Boards and Committees

- Pittsfield City Departments
- Neighboring Communities
- City Residents

## Review of Draft Plan

The City made the plan available for public review in May 2025. A press release announcing the availability to review the plan was sent and the announcement was posted to the City website. The HMPC sent emails to City employees, committees, and boards. Hard copies of the plan were kept in the Fire Department and City Hall. An electronic version would also be made available on the City's website. An electronically available comment form via Google was provided for the public to offer feedback on the plan's content. The Fire Department Chief was available to receive comments from the public if needed.

# 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 City'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 City's Municipal Vulnerability Preparedness (MVP) planning effort (completed in 2019), as well as the "ResilientMass Plan" (2023[57]) 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 Pittsfield is a land-locked community in Western Massachusetts. For this updated assessment, some hazards have been consolidated or renamed to be consistent with the ResilientMass Plan, as further described below. The top natural hazards identified for the MVP effort are thoroughly covered in this assessment, 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
- Flooding from Dam Failure or Overtopping
- Hurricanes and Tropical Storms
- Invasive Species
- Landslides

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

- 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 City of Pittsfield 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 Pittsfield 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 8. Massachusetts Emergency Declarations.*

| Massachusetts Emergency | Start | Termination | Corresponding Federal Disaster Declaration | FEMA Public Assistance Available | Applicable to Pittsfield? |
|---|---|---|---|---|---|
| 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 Pittsfield? |
|---|---|---|---|---|---|
| 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, Norfolk, Bristol, | Yes |

| Massachusetts Emergency | Start | Termination | Corresponding Federal Disaster Declaration | FEMA Public Assistance Available | Applicable to Pittsfield? |
|---|---|---|---|---|---|
| | | | | 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. Pittsfield is in the "Berkshires and Hilltowns" region shown in dark green in the figure below.

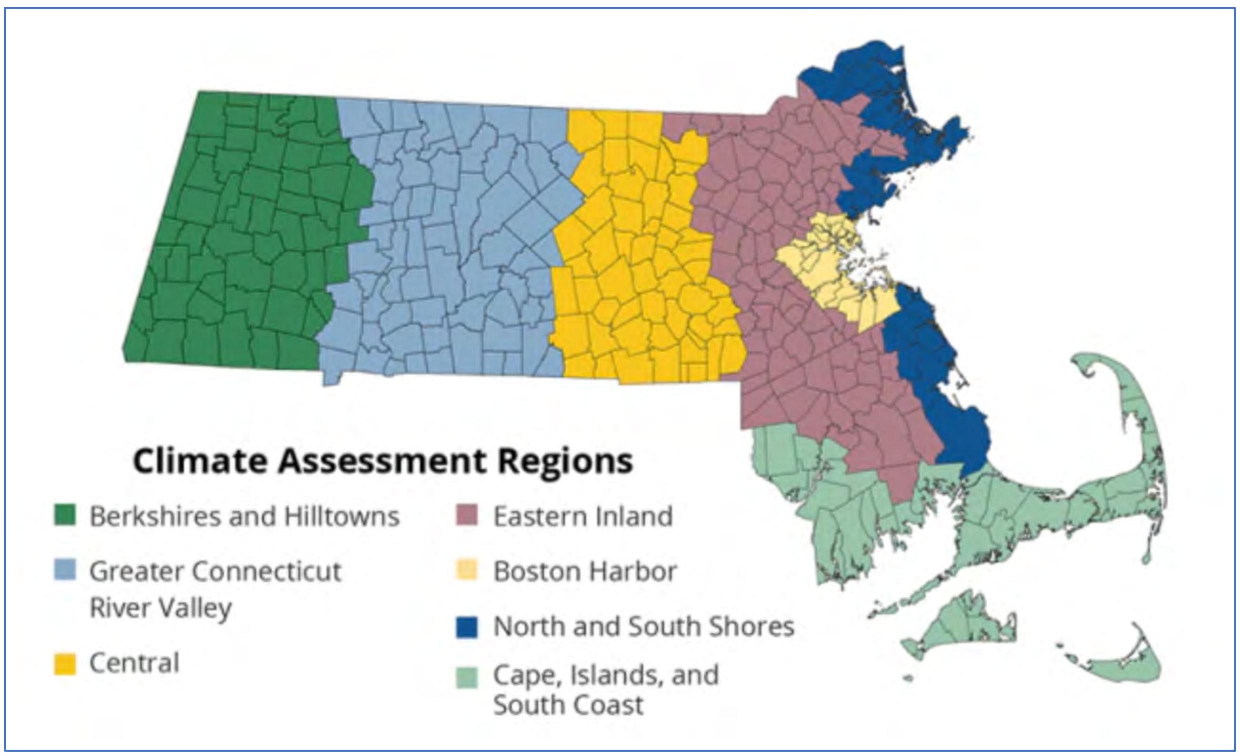



*Figure 7. Climate Assessment Regions. Pittsfield is in the Berkshires and Hilltowns Region.*

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

*Table 9. 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 |
| | 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 City proposes to incorporate these top climate change impacts in this edition of its plan as outlined below.

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

| Sector | Top Impacts per Sector | Approach to Incorporating Impacts |
|---|---|---|
| **Human** | 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 Citywide capabilities for food security. |
| **Infrastructure** | Damage to buildings | Damage to buildings is addressed in the vulnerability assessment for each hazard. |
| | Reduction in clean water supply | Droughts are profiled in this plan. Hazards that can secondarily affect water supply such as invasive species and severe storms (which can cause power outages) are also profiled. |
| | Damage to electric transmission and distribution | Severe weather events that damage transmission and distribution are hazards profiled in this plan. |
| **Natural Environment** | Freshwater ecosystem degradation | Changes in precipitation, drought, and invasive species are all hazards addressed in this plan. |
| | Forest health degradation | Extreme temperatures, changing precipitation, wildfires, and invasive species are all hazards addressed in this plan. |
| **Governance** | Increase in costs of responding to climate migration | The capability assessment and related mitigation actions will help address response functions. |
| | Increase in demand for State and municipal services | The capability assessment and related mitigation actions will help address increased demands for municipal services. |
| **Economy** | Reduction in availability of affordably priced housing | The individual hazards addressed in this plan can reduce the availability of affordably priced housing, |

| Sector | Top Impacts per Sector | Approach to Incorporating Impacts |
|---|---|---|
| | | 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 City. 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 11. Hazard Characterization.*

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

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

To describe previous occurrences, this plan update highlights major events from history but relies primarily on a roughly ten-year lookback (2014 through 2024) ending with any events from the date of plan development (2024-2025). This helps maintain a concise narrative. Where applicable, narratives about warning times (i.e., floods, heat advisories, and wildfires) are incorporated into the *"Extent"* subsections.

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

## Average and Extreme Temperatures

The City of Pittsfield Community Resilience Building Workshop Summary of Findings (2019) lists "extreme temperatures" (both cold and heat) as one of the top hazards of concern.

According to the ResilientMass Plan, extreme heat for Massachusetts is usually defined as daily high temperatures above 90 degrees Fahrenheit (°F) which may be accompanied by high humidity. Extreme cold is also considered relative to the normal climatic lows in a region. Extreme cold is a period of excessively low temperatures, particularly with the addition of wind chill. The ResilientMass Plan notes that typically in Massachusetts the highest temperatures are experienced in the southeast while the coldest are typical in the northwest where Pittsfield 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.[58]

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

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

### Location

The Massachusetts Climate Assessment (2022) explains that recent efforts to characterize extreme heat have underscored that risks are present throughout the entire commonwealth. Therefore, the entire

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

City of Pittsfield is subject to extreme heat. As with the entire commonwealth, Pittsfield is also exposed to extreme cold temperatures.

According to the CRB report (2019), extreme temperatures are impacting the ability to effectively heat or cool buildings. Cooling capacity is an issue at locations throughout the City, but particularly at senior housing buildings such as Providence Court where air conditioning is available in the common areas but not in the individual housing units. Thus, seniors may be vulnerable to health problems amid high 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 Pittsfield during the timeframe 2014-2023, with 37 separate dates listed from all years except 2020.

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

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

The NOAA Storm Events database (https://www.ncdc.noaa.gov/stormevents/) for Berkshire County lists numerous extreme heat events for the area of Pittsfield 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 12. NCEI Severe Storm Database Entries Covering Heat in Pittsfield.*

| 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 |

| Date | Description |
|---|---|
| | 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 1,000 feet. Maximum heat index values ranged from the low 90's to the low 100's. |
| 9/3/18 | A late-season heat wave impacted western Massachusetts during the first week of September. A persistent warm and moist airmass characterized by daytime highs in the upper 80s to low 90s and dewpoints in the 70s resulted in heat index values reaching 90-100 degrees during the afternoon hours. This heat wave coincided with the first week of school for many, and the heat prompted some schools to dismiss classes early and postpone or cancel sports practices. |
| 7/19/19 | A heat wave gripped western Massachusetts from July 19th through the 21st. Temperatures soared to the low 90s with dewpoints in the low to mid-70s. This resulted in heat index values in the 95 to 105 range in the warmest valleys. Saturday, July 20th was the hottest day for most areas. Due to the excessive heat, cooling centers were opened, and pool hours were extended. The hot and humid airmass provided fuel for thunderstorms that formed along the Lake Ontario shoreline during the late afternoon of the 20th. One storm advanced into Berkshire County in the evening, resulting in a report of wind damage. |
| 7/19/20 | Temperatures soared into the 90s throughout the lower elevations of western Massachusetts on July 19th, reaching as high as the mid-90s. The combination of the heat and a humid airmass brought heat indices into the 95 to 105 degree range. Heat indices exceeded 95 degrees again in some of the lower elevations again on July 20th but were not quite as high as the previous day. |
| 7/27/20 | Another hot and humid airmass impacted western Massachusetts on the 27th, with heat indices reaching 95 degrees in some portions of Berkshire County. |
| 6/28/21 | A hot and humid airmass developed over western Massachusetts on June 28th and persisted through June 30th. Heat indices ranged between 95F to 105F. |
| 8/11/21 | A dome of high pressure settled across western Massachusetts bringing high heat and humidity each day, mainly during the afternoon hours. Heat indices reached 95 to 102 degrees each of these days. |

| Date | Description |
|---|---|
| 8/26/21 | A hot and humid air mass developed ahead of an approaching cold front across western Massachusetts...Heat indices reached 95 to 101 degrees across Berkshire County during the afternoon hours. |
| 8/4/22 & 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. |

According to the CRB report (2019), extreme temperatures are leading the City to make greater use of cooling shelters. Evidence demonstrates that several extreme heat events occurred in Pittsfield in July-August 2022 and July-August 2023 and in June 2024. Most recently, the Pittsfield Health Department issued a Heat Advisory on June 17, 2024 and the City of Pittsfield opened the Senior Center at 330 North Street as a cooling center. Cooling centers were also opened in July and August 2018, July 2019, June 2021, August 2022. The HMPC noted that the City's shelter (Reid Middle School) does not have air conditioning in the shelter area; this could be problematic if sheltering is needed following a summertime disaster.

Cold events are typically reported with winter storms and will be described in the winter storm section of this chapter. The City last opened warming centers in February 2023, which included the Senior Center, the Berkshire Athenaeum at 1 Wendell Avenue, and the First United Methodist Church at 55 Fenn Street.

The CRB report (2019) notes that in 2016, the school system was impacted by severe winter weather and cold to the point that all of the school district's snow days were used. This forced the school year to extend later into the summer months. Pittsfield was also on the verge of closing schools for excessive heat days in 2018.

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.

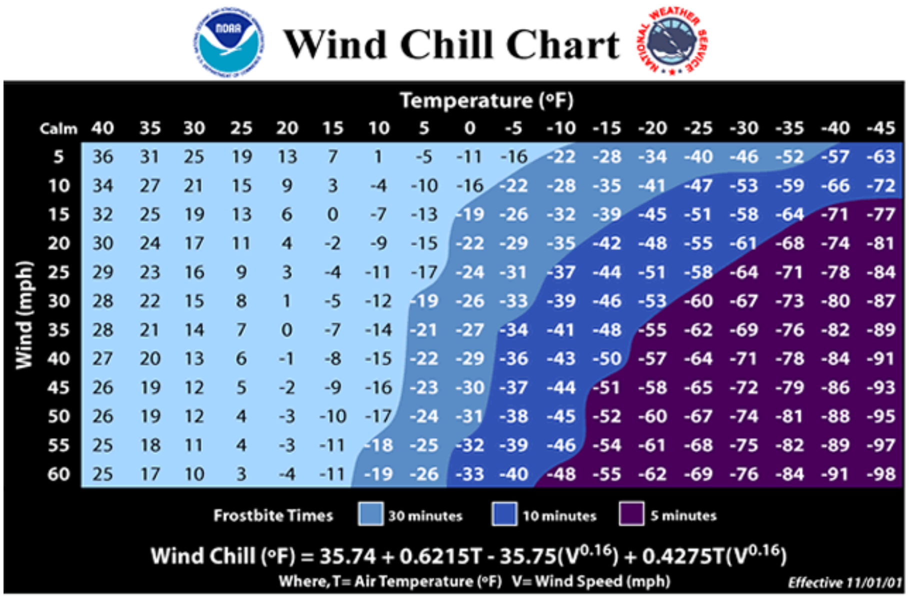
*Table 13. USDA Disasters Events That Refer to Extreme Temperatures.*

| 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 |

| Year | Event | Event "Begin Dates" |
|---|---|---|
| 2016 | Drought, Wind/High Winds, Fire/Wildfire, Heat, Excessive Heat, High Temp., Insects | 7/5/2016 |
| 2015 | Frost, Freeze, Winter Storms, Ice Storms, Snow, Blizzard | 1/1/2015 |
| 2014 | Frost, Freeze | 12/22/2014 |
| 2013 | Frost, Freeze | 5/13/2013 |
| 2013 | Excessive rain, moisture, humidity, Heat, Excessive heat<br>High temp. (incl. low humidity) | 5/8/2013 |
| 2012 | Frost, Freeze | 3/1/2012 |
| 2012 | Drought, Heat, Excessive heat<br>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 8) designed to more accurately calculate how cold air feels on human skin.



Wind Chill Chart

| Wind (mph) \ Temperature (°F): 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

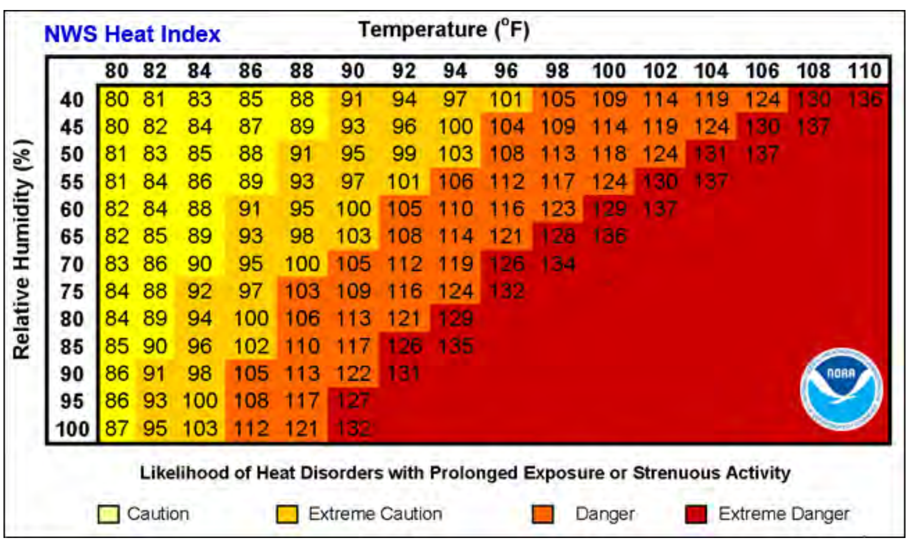
Wind Chill (°F) = 35.74 + 0.6215T - 35.75($V^{0.16}$) + 0.4275T($V^{0.16}$)

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

Effective 11/01/01

*Figure 8. NWS Wind Chill Temperature Index and Frostbite Risk.*

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



NWS Heat Index

| Relative Humidity (%) \ Temperature (°F) | 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 9. NWS Heat Index Chart.*

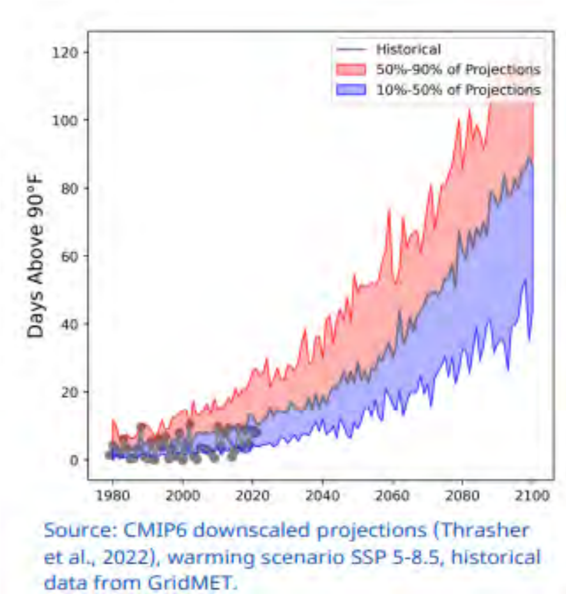
The NWS advisory and warning products are applicable to all extreme temperature events that may affect Pittsfield, as they are used throughout Massachusetts on a routine basis and appropriately characterized the most recent extreme cold and heat events over the last few years. Extreme temperatures have 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.

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

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



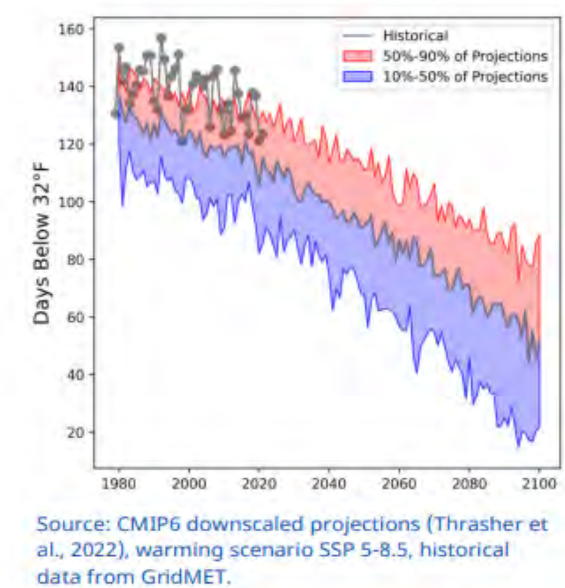




*Figure 10. Projected Annual Days with Temperatures above 90 Degrees (left) and Below 32 Degrees (right).*

According to the CRB report (2019), as these trends of more extreme heat and cold continue, Pittsfield expects to see decreased student attendance on days with extreme temperatures, which exacerbates the pressure to close schools on these days. Additional school closures will result in more direct and indirect costs to the school system, students, and parents.

The previous HMP suggested that "based on recent events in Pittsfield and predicted extreme heat days, the City of Pittsfield can expect to experience extreme heat days annually." This is believed to continue to be true for Pittsfield, along with the potential for extreme cold to also occur annually.

### Vulnerability Assessment

***Exposure***

Extreme temperatures are not a hazard with a defined geographic boundary. The entire City 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. Extreme cold for the region is considered to occur when temperatures are well below normal and accompanied by winds, which introduce wind chill factor that can be extremely harmful to exposed skin. Extreme cold is common in Pittsfield from December through mid-March.

***Built Environment Impacts***

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

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 City, which can result in interruptions and delays in services. Broken pipes may cause flooding in buildings, causing property damage and loss of utility service. Some of the secondary effects presented by extreme/excessive cold include dangerous conditions to livestock and pets.

The previous Pittsfield HMP (May 2019), citing the CRB Workshop Summary of Findings, noted that shifting weather patterns due to climate change are increasing the difficulty of maintaining roadways and that potholes and sinkholes are becoming more problematic due to new patters of freezing and thawing that occur repeatedly throughout the winter season.

Climate change will increase the probability of extreme temperatures which may impact utilities, transportation, and especially older structures. Future development should consider keeping more mature trees, creating less dark asphalt-covered area, and creating more natural areas. According to the ResilientMass Plan, extreme temperatures are projected to increase annual transportation infrastructure maintenance costs by over $140 million (across the Commonwealth) by the end of the century.

***Population Impacts***

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

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

During the Pittsfield HMPC #1 Meeting (October 29, 2024), it was noted that the Senior Center (The Ralph J. Froio Senior Center, managed by the Council on Aging, located at 330 North Street) operates as a Cooling Center. The previous Pittsfield HMP (May 2019) noted that the Senior Center and Athenaeum were both used as designated cooling shelters into August during 2018.

Older adults are often at elevated risk from exposure to extreme temperatures due to a high prevalence of pre-existing and chronic conditions. In the City of Pittsfield, an estimated 20.7% of the population is age 65 and older (U.S. Census, 2020). People who live in older housing stock and in housing without air conditioning have increased vulnerability to heat-related illnesses. Power failures are more likely to occur during heat waves, affecting the ability of residents to remain cool during extreme heat. Individuals with pre-existing conditions and those who require electric medical equipment may be at increased risk during a power outage. Heat impacts are more likely to be felt by residents without air conditioning, those who work outdoors, and those with underlying health conditions such as heart disease.

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

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

Climate change will increase the rate of heat-related illnesses and the need for cool spaces. Outdoor workers and vulnerable populations will need to be considered during extreme heat events. The previous Pittsfield HMP (May 2019) cited the MVP Summary of Findings (2016), stating that schools were impacted by severe winter weather and cold, which used up all of the district's snow days and forced students to attend school later into the summer months. It was noted that as this trend continued, the schools saw decreased attendance on days with extreme temperatures, which exacerbated the pressure to close school on both hot and cold days. Pittsfield was on the verge of calling off school for excessive heat days in 2018.

***Environment Impacts***

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

The previous Pittsfield HMP (May 2019), citing the CRB Workshop Summary of Findings, noted that participants voiced concern about the amount of sand and salt needed to keep streets clear during the winter, the financial burden of purchasing increasing quantities of these materials, and the impact that these materials have on wetlands and protected areas (as well as impacts on the landscapes where they are being mined or extracted).

### 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 14. 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.<br>• The elderly and those with mobility issues may not be able to leave their homes and travel safely.<br>• The unhoused population in Pittsfield lacks options for avoiding extreme heat exposure.<br>• People working in businesses without air conditioning may be at risk of heat illness. |

| Assets | Problems Associated with Extreme Temperatures |
|---|---|
| | • First responders may also be impacted by extreme temperatures.<br>• Pets may be adversely impacted by extreme heat. |
| Structures (including facilities, lifelines, and critical infrastructure) | • Older homes without insulation and single-pane glass are difficult to heat and cool and may not provide safe living conditions.<br>• Businesses that require refrigerated trucks or refrigeration units may see business losses and increased utility costs.<br>• 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).<br>• Extreme heat may lead to water quality concerns such as harmful algal blooms and disinfection byproducts in treated water. |
| Activities that have value to the community | • Recreational activities may be adversely impacted by extreme heat. |

## Droughts

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

### Description

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

1. Meteorological drought is a measure of departure of precipitation from normal.
2. Hydrological drought is related to the effects of precipitation shortfalls on stream flows and on reservoir and groundwater levels.

3. Agricultural drought links various characteristics of meteorological and hydrological drought to agricultural impacts and occurs when there is not enough water available for a particular crop to grow at a particular time.
4. Socioeconomic drought is associated with the supply and demand of economic goods with elements of meteorological, hydrological, and agricultural drought.
5. Ecological drought is an episodic deficit in water availability that drives ecosystems beyond thresholds of vulnerability and impacts ecosystem services.

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

According to the CRB report (2019), the City's water supply system is drawn from six City-owned reservoirs, all of which are located outside of Pittsfield. The reservoirs were constructed between the 1930s and 1950s to supply a projected City of 90,000 people, a population level which has not occurred. Thus, the reservoirs are generally considered oversized for the existing demand level and relatively drought resilient. According to the previous HMP, during a severe drought the City would likely "need to implement water conservation measures to limit customer demand but would probably not experience an impact to structures or loss of lives." Complete metering of all water services is underway which will expand the ability of the water system to track water conservation needs.

Fewer than 5% of the population of Pittsfield relies upon private wells. 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 number 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 Pittsfield, 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. According to the previous HMP, public water supplies for Pittsfield were not significantly impacted by the drought of 2015-2017.

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.

According to the CRB report (2019), although excessive heat was a top concern for Pittsfield, the City had not (at the time) experienced adverse impacts of drought. While many cities and towns across the Commonwealth were under severe drought warnings during the extended drought of 2016, Pittsfield's municipal water supplies were sustained.

According to the HMPC, the flashy droughts of 2020 and 2022 did not adversely affect the water system although water conservation restrictions were triggered. It is possible that some private wells and cover crops were affected.

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 15. 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<br>High temp. (incl. low humidity) | 6/2/2012 |

The drought of 2020, a so-called "flashy drought" that impacted southern New England, was sufficiently impactful in Berkshire County to be included in the USDA data table above.

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

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 2024 were reviewed. This timeframe includes the droughts of 2015-2017, 2020, and 2022. The only recorded USDA reimbursements for droughts in Pittsfield totaled $744.52 through the Emergency Livestock Relief Program; this was related to the 2022 flashy drought.

Another severe drought occurred in 2024 as noted in the following figure (which compares the 2022 and 2024 droughts) and in the full-page box on the next page.

**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.

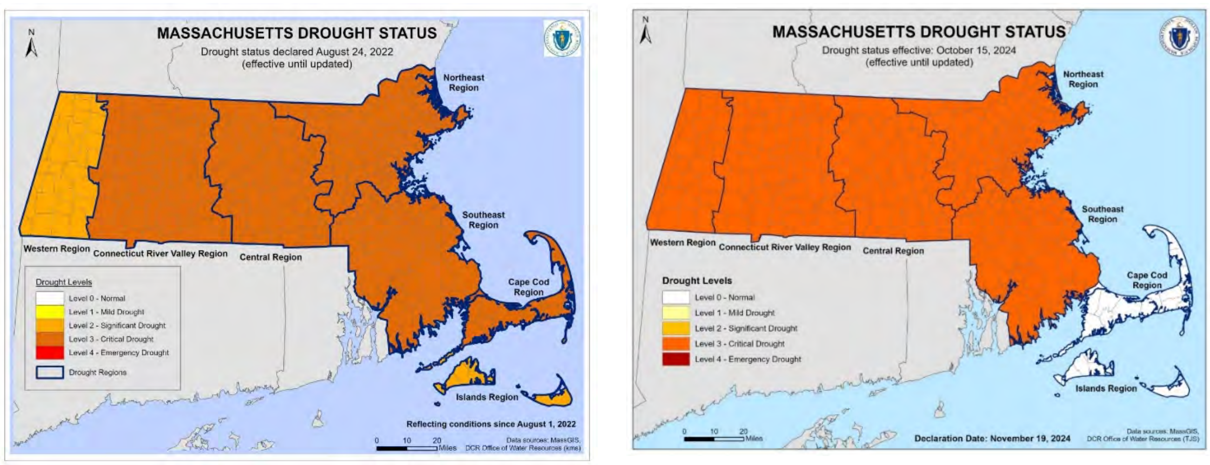



*Figure 11. Drought Mapping of 2022 and 2024.*

***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.

### 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 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.

The City of Pittsfield has a Drought Management Plan as part of their water system Emergency Response Plan.

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 Pittsfield, as they are used throughout Massachusetts on a routine basis and appropriately characterized previous droughts affecting Pittsfield. 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 16 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 City of Pittsfield is represented by the Berkshires and Hilltowns region.

*Table 16. 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 |

| Region | Baseline | | 2030 | | 2050 | | 2070 | | 2090 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CDD | DWR | CDD | DWR | CDD | DWR | CDD | DWR | CDD | DWR |
| 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))<br>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 City would be exposed to drought conditions. The previous Pittsfield HMP (May 2019) noted that while some residents have private wells, the majority of residents rely on the public water system, which could be impacted by drought.

***Built Environment Impacts***

Major water users are more susceptible to drought, and these include water utilities and some commercial users. The City generally has confidence in its water supply, which is drawn from six City-owned reservoirs located outside of the City. However, participants in the City of Pittsfield CRB Workshop (December 6, 2018) expressed concern about protecting the watersheds surrounding the six reservoirs to preserve water quality.

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

***Population Impacts***

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

During the HMPC #1 Meeting (October 29, 2024), it was noted that less than 5% of the City's population relies on private wells for their potable water supply, and the rest rely on the City's reservoirs. The City is working to get more residents on water meters to support conservation efforts. During the HMPC #2 Meeting (December 18, 2024), it was noted that a Drought Management Plan has been developed.

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

### Problem Statements for Drought

*Table 17. Problem Statements for Drought.*

| Assets | Problems Associated with Drought |
|---|---|
| People (including underserved communities and socially vulnerable populations) | • According to the CRB Workshop Summary of Findings (January 2019), the City of Pittsfield population has declined in recent decades, so concerns regarding the public water supply during drought conditions relate to water quality more than quantity.<br>• Vulnerable communities may have difficulty accessing potable water during an emergency drought event. If the water sources are at emergency levels, having a plan to get vulnerable people water should be considered. If rates are increased to lower water demand, this may also adversely impact underserved and vulnerable communities. |
| Structures (including facilities, lifelines, and critical infrastructure) | • Water supply infrastructure may need to be shut down and water quality may become substandard. Businesses requiring water for daily operations may have their operations limited due to water restrictions. |

| Assets | Problems Associated with Drought |
|---|---|
| | • Some of the City's water pump stations are not equipped with backup power.<br>• Upgrades to the drinking water supply infrastructure are necessary and ongoing. |
| 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. Extreme heat combined with drought may lead to water quality concerns such as harmful algal blooms and disinfection byproducts in treated water.<br>• Agricultural users may have difficulty obtaining water for products and livestock forage. |
| Activities that have value to the community | • Use of parks and recreational areas may be adversely impacted by droughts due to the effects on plants, trees, and surface water bodies. |

## 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, electricity, and telephone lines; and often cause landslides, flash floods, fires, avalanches, and tsunamis. Earthquakes can occur at any time without warning.

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

New England's earthquakes appear to be the result of the cracking of the crustal rocks due to compression as the North American Plate is being very slowly squeezed by the global plate movements. As a result, New England epicenters do not follow the major mapped faults of the region, nor are they confined to 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 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 Pittsfield or to occur elsewhere and be felt in Pittsfield. According to the HMPC, there are many areas of Pittsfield with old, unreinforced buildings that could be particularly susceptible to earthquake damage.

### Previous Occurrences

According to the previous edition of this plan, no documented earthquakes have been centered in the City of Pittsfield. 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 Pittsfield, 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)

### 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 Massachusetts 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 18. 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. |

| Modified Mercalli Intensity | Description |
|---|---|
| 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 19. Modified Mercalli Intensity and Moment Magnitude.*

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

*Source: USGS*

The above earthquake characterization systems are applicable to all earthquakes that may occur in Pittsfield, as they are used throughout the northeastern United States on a routine basis and appropriately characterized previous earthquakes that were felt in Pittsfield. 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 Pittsfield having a 2% probability of being exceeded in 50 years.

### Vulnerability Assessment

***Exposure***

A major earthquake could cause severe damage to City of Pittsfield 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. The previous Pittsfield HMP (May 2019) described the historic occurrences of earthquakes as few and of limited severity, noting that Berkshire County could be considered at a low risk for major earthquake damage in the future. Because the region's geologic faults zones do not correlate strongly to earthquake locations or aid in predication of occurrence, it is difficult to determine level of probability.

***Built Environment Impacts***

Historic data for earthquake events indicate that since 1931 no major (>5.0 magnitude) earthquakes were recorded in Berkshire County, causing no damage to property, and the USGS data indicate there is a 0.88% chance of a major earthquake occurring within 50 kilometers of Berkshire County within the next 50 years. The entire built environment of the City of Pittsfield is vulnerable to earthquakes. Older, unreinforced masonry buildings are very susceptible to earthquakes.

Participants in the Pittsfield HMPC #2 Meeting (December 18, 2024) identified the earthquake hazard risk as being related to the numerous unreinforced structures present in the City.

To identify built environment impacts to the City, Hazus, was used to estimate the economic loss results for a 1500-year earthquake and a 2500-year earthquake scenario. The 1500-year event results are shown in

Table 20, and the results for the 2500-year event are shown in Table 21. The City's Average Annual Loss (AAL) is modeled to be $119,546.

*Table 20. Building Loss for a 1500-Year Scenario.*

| Loss Type | Residential ($Million) | Commercial ($Million) | Other Occupancy ($Million) | Total ($Million) |
|---|---|---|---|---|
| Building Loss | 11.16 | 10.88 | 5.09 | 27.13 |
| Content Loss | 2.53 | 3.50 | 1.98 | 8.01 |
| Business Inventory Loss | 0.00 | 0.53 | 0.17 | 0.70 |
| Business Income Loss | 0.15 | 3.13 | 0.08 | 3.36 |
| Business Relocation Loss | 0.78 | 2.61 | 0.98 | 4.37 |
| Rental Income Loss | 0.78 | 1.70 | 0.18 | 2.66 |
| Wage Loss | 0.36 | 4.58 | 0.52 | 5.46 |
| **Total** | **15.76** | **26.93** | **9.00** | **51.69** |

*Table 21. Building Loss for a 2500-Year Scenario.*

| Loss Type | Residential ($Million) | Commercial ($Million) | Other Occupancy ($Million) | Total ($Million) |
|---|---|---|---|---|
| Building Loss | 21.54 | 19.61 | 9.57 | 50.72 |
| Content Loss | 5.30 | 7.21 | 4.07 | 16.58 |
| Business Inventory Loss | 0.00 | 1.10 | 0.34 | 1.44 |
| Business Income Loss | 0.26 | 5.05 | 0.14 | 5.45 |
| Business Relocation Loss | 1.53 | 4.21 | 1.72 | 7.46 |
| Rental Income Loss | 1.46 | 2.69 | 0.31 | 4.46 |
| Wage Loss | 0.61 | 7.38 | 0.87 | 8.86 |
| **Total** | **30.70** | **47.25** | **17.02** | **94.97** |

***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 City 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-Year and 2500-Year events (Berkshire County). For the 1500-Year modeled event, there were an estimated seven minor injuries (requiring medical attention but not hospitalization) and one injury requiring hospitalization. For the 2500-Year event there were an estimated thirteen minor injuries (requiring medical attention but not hospitalization) and two injuries requiring hospitalization but not considered life-threatening.

***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.

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

### Problem Statements for Earthquakes

*Table 22. 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.<br>• Elderly people may fall during an earthquake. |
| Structures (including facilities, lifelines, and critical infrastructure) | • Unreinforced masonry and utility lifelines impacted.<br>• Multi-story masonry residential buildings are present in the City.<br>• Utility systems impacted. |
| Systems (including networks and capabilities) | • Nonapparent or projected. |
| Natural, historic, and cultural resources | • Historical buildings constructed out of unreinforced masonry are susceptible and may be impacted. |

| Assets | Problems Associated with Earthquakes |
|---|---|
| Activities that have value to the community | • Nonapparent or projected. |

## Flooding from Precipitation

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

The City of Pittsfield Community Resilience Building Workshop Summary of Findings (2019) lists "flooding" as a 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.

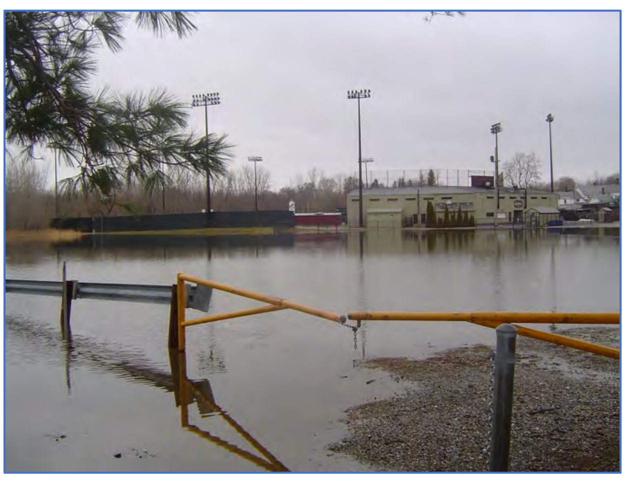


*Figure 12. Flooding in Pittsfield.*

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.

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 Pittsfield. Ice jams have occurred along the Housatonic River. Therefore, all flood-related hazards (riverine floods, stormwater flooding, and ice jams) are relevant to the City of Pittsfield.

- According to the CRB report (2019), more intense storms are placing increasing pressure on dams, culverts, and other drainage infrastructure designed to handle smaller storms. This problem manifests across the city at acute points where the local drainage systems concentrate and discharge, particularly near Wahconah Park.
    - Culverts and bridges are a concern City-wide, as Pittsfield's developed areas are in close proximity to the Housatonic River, its tributaries, and wetlands. Flooding at the causeway on Dan Casey Memorial Drive is an area of particular concern.
    - Utility gas lines (and other underground utility lines) are vulnerable at bridge crossings where pipes could be submerged during floods or disconnected in the event of bridge failure.
    - Detention basins and other stormwater infrastructure are of concern City-wide, and particularly in the areas around the former General Electric site and East Street.
    - Roads vulnerable to flooding lie in multiple locations. The top concerns include areas where flooding limits access to hospitals (Berkshire Medical Center on North Street), supermarkets (e.g. Big Y), schools (e.g. Berkshire Community College), gas stations, shelters, and social services.
    - Neighborhoods particularly prone to flooding include the Lakewood section of the City, neighborhoods along the East Branch of the Housatonic River, and the neighborhood around Goodrich Pond which floods even during light rain events. Some of these are repetitive flooding areas due to poor drainage, where residents do what they can to protect their properties but damages that occur are not often documented.
    - Kirvin Park experiences flooding during heavy precipitation events which affects both fields and access into the park. Wahconah Park also suffers from regular flooding, which is particularly problematic as the part serves as the main helicopter landing site for the Berkshire Medical Center.
- According to the previous HMP, the following additional flood-prone areas exist in Pittsfield:
    - The hydrology of Pittsfield contains several large lakes: Onota, Pontoosuc, and Richmond; several smaller waterbodies: Silver Lake, Morewood Lake, Goodrich Pond, Mud Pond and Pecks Pond; the Housatonic River (including the East Branch, West Branch and Southwest Branch) and several feeder streams, including Shaker Brook, Jacoby Brook, Smith Brook, Hawthorne Brook, Lulu Brook, Churchill Brook, Daniels Brook, South Brook, Maloy Brook, Onota Brook, Unkamet Brook, Brattle Brook, Sackett Brook, Sykes Brook and Wampenum Brook.
    - Upper North Street near New Road has an undersized culvert that tends to flood during the summer, resulting in sediment flowing onto the road.
    - The Pittsfield Plaza on West Housatonic Street floods as Maloy Brook crosses the property. The large parking lot, as well as part of West Housatonic Street, tends to be

underwater during heavy rains. The owners have recently added a retention area and cleaned/maintained the Army Corps structure. The changes appear to be working during heavy rain events. Maintenance of this storm water feature is important to help minimize the risk of flooding.

- Glen Drive has had flooding problems in the past due to the flashy nature of the Oak Hill Tributary. The City received a grant to make the brook less flashy and remove sediment but will need to do regular maintenance to preserve the capacity.
- The parking lot at Wahconah Park has stormwater problems. The existing system is collapsing on itself. A new stormwater system has been designed, but funding is not available to implement the new system.
- The intersection of Center Street and West Street has problems due to being a low point in the road network. During heavy rains, water collects in the road.
- There is an undersized, open ditch running parallel to Upper North Street from Reid Middle School to Garland Avenue that causes flooding to surrounding properties. The ditch has filled in over a period of time, worsening the problem.
- The area around North Street and Murphy Place has severe ponding of water.
- The stormwater system around the intersection of Elm Street and Newel Street is poorly designed and causes localized flooding. It is on private property, yet also takes City stormwater.
- The stormwater system capacity is inadequate around Plumb Road and Abby Road around Holmes Road. The stormwater system backs up, causing over-road flooding and compromising the road.
- Stanton Avenue has water being discharged from various properties running down the side of the road.
- There is a bermed area next to Elm Street which can periodically flood. Several residences are impacted by the flooding. Permitting for the project is of concern.
- The drainage around Marchisio Park has problems leading to flooding. A plan has been prepared by the City, and they are working with Massachusetts Department of Environmental Protection on this.
- A large pond forms during storms around Savoy Street and Sheffield Street.
- During heavy spring rains, the Dan Casey Causeway periodically floods. The road is low lying, and the culverts are presumed to be undersized. The long-term resolution is to redesign the culverts under the roadway to increase their capacity.

### Previous Occurrences

The previous edition of this plan and the CRB report (2019) includes narratives about previous flood events:

- According to the CRB report, the 1938 Hurricane resulted in widespread flood damage in Pittsfield. The flood stage during this event is memorialized with a sign on the Pomeroy Bridge. With the increasing frequency of severe storms, and the so-called “100-year storm” now occurring several times per year, recent storms have come close in severity to the historic flood level marked on the bridge.
- According to the CRB report, Hurricane Irene (late August 2011) and Tropical Storm Lee (September 2011) had substantial impacts in Pittsfield. Trees and ground vegetation had been removed northwest of the airport as part of an expansion project, leaving the landscape vulnerable to storm impacts. The heavy rains associated with these storms resulted in washouts of the streambank of the Housatonic River and catastrophic erosion and sedimentation in the river.

Ice jams are known to have occurred in and near Pittsfield. 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 50F, 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 through 2024). The NOAA Storm Events database (https://www.ncdc.noaa.gov/stormevents/) for Berkshire County lists 10 flood events impacting Pittsfield for the period 2014-2024.

*Table 23. NCEI Severe Storm Database Entries Covering Floods in Pittsfield.*

| Date | Description | Losses Reported |
|---|---|---|
| 6/25/14 | *Flash Flood.* A very moist and humid air mass was in place across the region on Wednesday, June 25th. As a slow moving cold front approached from the west, bands of heavy rain showers and thunderstorms developed ahead of the boundary. As these showers and thunderstorms repeatedly passed over the same locations, the heavy rainfall led to significant runoff, which caused flash flooding in some areas. Many roads were closed due to the flooding and some homes were affected by water as well. In addition, a few of the storms produced damaging lightning strikes as well. A brook was overflowing Shore Road in Pittsfield due to thunderstorm heavy rainfall. | --- |

| Date | Description | Losses Reported |
|---|---|---|
| 7/2/14 | *Flash Flood:* A warm southerly flow allowed for temperatures to reach well into the 80s to near 90 on Wednesday, July 2nd. In addition, it was rather humid with dewpoints nearing 70 degrees. With the warm and humid conditions in place, the atmosphere became quite unstable during the afternoon and evening hours. This caused thunderstorms to develop during the afternoon hours. A few of these storms became severe, producing wind damage to trees and power lines. In addition, the very humid air mass in place gave the storms the capability of producing very heavy rainfall in a short period of time. This allowed for one of the storms to produce flash flooding in the Pittsfield area, making travel difficult. Travel was impeded across the City due to high water on City roadways. | --- |
| 7/27/14 | *Flash Flood:* A strong area of low pressure was situated over the Great Lakes region on Sunday, July 27th. An upper level shortwave, combined with an approaching warm front, allowed for a cluster of strong to severe thunderstorms to break out during the afternoon hours on July 27th over eastern New York, which spread into western Massachusetts during the late afternoon hours. In addition to straight-line wind damage and large hail, the area of thunderstorms also produced an EF1 tornado in Dalton, causing damage to trees and homes. Heavy rainfall from thunderstorms led to flash flooding, especially in the urbanized areas around Pittsfield. Over 6 inches of water was flowing across King Street in Pittsfield due to heavy rainfall from thunderstorms. Several roads in Pittsfield were closed due to flash flooding from thunderstorm heavy rainfall, including Hubbard Avenue, East Street, Merrill Road, and Dalton Avenue. | --- |
| 7/28/23 | *Flash Flood.* As the strong area of low pressure moved across upstate New York on Monday, July 28th, some additional thunderstorms occurred during the afternoon hours. Trees were downed due to thunderstorm winds across parts of Berkshire County, as the storm's cold front moved through the area. With additional heavy rainfall occurring, flash flooding was renewed in some parts of the Berkshires once again, as two-day rainfall totals were more than three inches in the Pittsfield area. Heavy rainfall from thunderstorms heavily damaged a 1.5 mile stretch of the Berry Pond Circuit Road in the Pittsfield State Forest in Pittsfield. As a result of the flash flooding, 13 popular campsites at Berry Pond had to be closed for the remainder of the summer season due to the damaged access road. A local newspaper reported that when the flash flooding occurred, | $277,000 |

| Date | Description | Losses Reported |
|---|---|---|
| | campers had to be evacuated before water cascading down the mountain gouged out the paved road. The damage to the road and eleven stone culverts was estimated to be significant. | |
| 8/12/17 | *Flash Flood.* After widespread rain moved through overnight associated with a warm front, early clouds gave way to breaks of sun ahead of an approaching cold front and upper level disturbance on Saturday, August 12th. Dewpoints were in the mid to upper 60s throughout the region with strong wind shear in place aloft. The upper level disturbance and an approaching cold front served as main focus for severe weather. Isolated reports of downed trees and wires occurred as thunderstorms moved across Berkshire County. Heavy rainfall also resulted in isolated flash flooding. The eastbound side of East Housatonic Street in Pittsfield was closed to traffic. A sewer cover was popped off. | $1,000 to property and $1,000 to crops |
| 8/22/17 | *Flash Flood.* Strong to severe thunderstorms developed along and ahead of a cold frontal boundary as it moved through eastern New York and western New England. Prior to convective initiation, a Tornado Watch (#461) was issued for the western Adirondacks and Mohawk Valley and a Severe Thunderstorm Watch (#463) was issued for much of eastern New York and western New England. These storms resulted reports of flash flooding in western Massachusetts. In Pittsfield, North Street was flooded with cars stuck in the water, and Fourth Street near Silver Lake was flooded with a possible washout. In the Coltsville section of Pittsfield, the road was flooded with water over the hood of a truck. | $3,000 to property and $3,000 to crops |
| 8/17/18 | *Heavy Rain.* A series of disturbances ahead of a cold frontal boundary brought rounds of heavy rainfall and strong thunderstorms to the region during the evening hours of Friday, August 17th. As a result of these disturbances, flash flooding occurred in Berkshire County, MA. Rainfall from the event ranged from 2 to 3 inches. | --- |
| 7/18/21 | *Flash Flood.* Scattered showers and thunderstorms resulted in widespread flash flooding in the Berkshires on July 18. Numerous roadways were closed in Lenox, Richmond, Lee, Otis, Becket, and Pittsfield. North Street was closed between Burke Avenue and New Road in Pittsfield due to flooding. | --- |
| 7/29/21 | *Flood.* A couple of severe thunderstorms pushed across western Massachusetts during the evening hours of Thursday, July 29, 2021 along a | --- |

| Date | Description | Losses Reported |
| --- | --- | --- |
| | warm front and area of low pressure, downing trees and power lines as a result. These thunderstorms also produced a brief period of heavy rainfall, leading to some minor flooding across the region. Minor street flooding as well as some flooding in yards was reported in the City of Pittsfield. | |
| 7/13/23 | *Flash Flood.* A line of strong to severe thunderstorms ahead and along a cold frontal boundary resulted in widespread downed trees and wires across western Massachusetts during the afternoon and evening hours of July 13, 2023. Bradford Street, Center Street, and Union Street in Pittsfield were all closed due to flooding. | --- |

The HMPC noted 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

According to the previous HMP, Pittsfield averages approximately 47 inches of rain per year.

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% 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 Pittsfield, as they are used throughout Massachusetts on a routine basis and appropriately characterized previous floods in Pittsfield. 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; this is of concern to the HMPC. 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.

According to the previous HMP, there is concern that the aging infrastructure in Pittsfield, specifically antiquated pipes, storm drains, and culverts, increase the probability of future flooding.

### Vulnerability Assessment

#### *Exposure*

In Pittsfield, the 1% annual chance floodplain (100-year floodplain) covers about 4790 acres, or approximately 18% of the City. In addition to the 100- year floodplains, stormwater has the potential to cause localized flooding.

The water chlorinator on Mountain Drive is exposed to flooding. Additionally, the bus operations, county ambulance, and action ambulance are adjacent to the floodplain and may be impacted during a flood event. Approximately 1,960 buildings are in the floodplain including all building occupancies. Additionally, several roads experience flooding including Mill Street, Melbourne Road, Pontoosuc Road, Government Drive, Taconic Island Road, Hungerford Street, East New Lenox Road, Elm Street, Dan Casey Memorial Drive, and Baker Road. Several culverts are older and undersized which can contribute to flood impacts. There are 17 structures listed on the National Register of Historic Places in the floodplain. According to EPA's Toxic Release Inventory (TRI) database, 64 facilities that contain hazardous materials are in the 100-year floodplain. These facilities include but are not limited to automotive repair, natural gas distribution, electric power generation, and manufacturing. Table 24 shows the types of buildings exposed to the flood and their value. The number in parathesis is the total number of buildings and associated building values for the City.

Several roads experience flooding including Pine St., North Summer St., Fisk St., Forest Park Ave., Russell Field, Columbia St., Howland Ave., East Hoosac St., Friend St., Jordan St., Staple St. to Reed Field, and Lime St. The Quality St. Bridge and attached waterline are vulnerable to flooding as well as the DPW garage. As discussed in the HMPC #1 Meeting (October 29, 2024), the City is observing more flooding in areas where the infrastructure built to handle stormwater is not owned by the City.

*Table 24. Buildings in 100-Year Floodplain.*

| Building Type | Number of Buildings (Total in City) | Building Value (Total in City) |
|---|---|---|
| Single Family | 1,236 (16,264) | $170,622,434 ($2,767,968,691) |
| Mobile Home | 0 (195) | $0 ($12,406,818) |
| Multi-Family | 342 (396) | $101,343,974 ($2,109,797,827) |
| Mixed-Use | 239 (1,057) | $290,650,861 ($1,818,754,103) |
| Commercial | 29 (213) | $4,058,589 ($118,667,167) |
| Educational | 5 (59) | $10,073,805 ($1,049,453,443) |

| | | |
|---|---|---|
| Government | 25 (293) | $60,623,501 ($569,875,929) |
| Religious/Non-Profit | 8 (161) | $9,130,695 ($419,697,742) |
| Industrial | 64 (220) | $239,248,207 ($840,169,491) |
| Garage/Outbuilding | 12 (89) | $562,335 ($5,482,819) |
| Vacant | **1,960 (22,115)** | **$886,314,402 ($9,712,274,032)** |
| **Total** | **1,236 (16,264)** | **$170,622,434 ($2,767,968,691)** |

The population exposed to the 100-year floodplain is shown in Table 25. 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 City. The population exposed to the flood hazard is similar to that in the City as a whole, with a slightly higher percentage of individuals over 64 in the floodplain.

*Table 25. Population Exposed to 100-Year Floodplain (2020 U.S. Census).*

| Demographics | Population in and Adjacent to Floodplain | Total Population |
|---|---|---|
| Population | 11,655 | 43,927 |
| Households | 5,632 | 21,738 |
| White | 9,742 (83.6%) | 34,924 (79.5%) |
| Black | 646 (5.5%) | 3,002 (6.8 %) |
| American Indian | 14 (0.1%) | 103 (0.2%) |
| Asian | 140 (1.2%) | 630 (1.4%) |
| Pacific Islander | 3 (0.03%) | 7 (0.02%) |
| Other Race | 407 (3.5%) | 1,768 (4.0%) |
| Two or More Races | 703 (6.0%) | 3,493 (8.0%) |
| Hispanic or Latino: | 759 (6.5%) | 3,539 (8.1%) |
| Population under 18: | 1,797 (15.4%) | 7,581 (17.3%) |
| Population over 64: | 4,632 (39.7%) | 9,092 (20.7%) |
| Annual Income < $30K/year | 1,294 (14.5%) | 6,383 (14.5%) |
| Population in EJ Zone*: | 3,494 (30.0%) | 21,356 (48.6%) |

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

The 100-year Floodplain (FEMA) with the City of Pittsfield's critical facilities and roads with flood potential is shown in Figure 13.

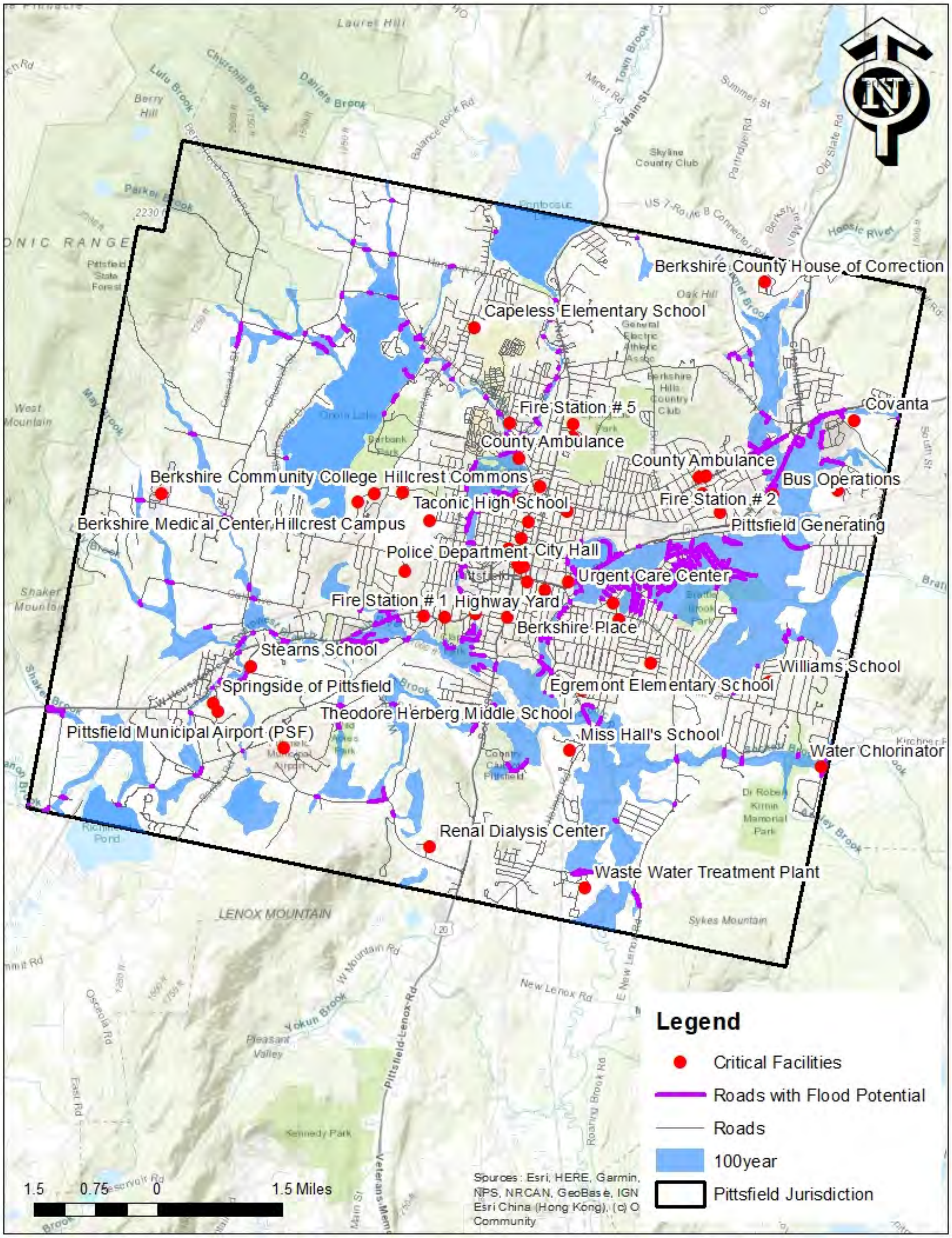



*Figure 13. Pittsfield Critical Facilities and 100-Year Floodplain.*

***Built Environment Impacts***

To identify built environment impacts to the City of Pittsfield, 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 flood event are shown in Table 24. The City's AAL is calculated to be $4,582,700.

*Table 26. Building Loss for the 100-Year Flood Scenario*

| Loss Type | Residential ($Million) | Commercial ($Million) | Other Occupancy ($Million) | Total ($Million) |
|---|---|---|---|---|
| Building Loss | 37.79 | 19.97 | 15.96 | **73.72** |
| Content Loss | 18.54 | 67.98 | 43.67 | **130.19** |
| Business Inventory Loss | 0.00 | 13.67 | 4.65 | **18.32** |
| Business Income Loss | 0.58 | 64.38 | 4.00 | **68.96** |
| Business Relocation Loss | 11.55 | 15.91 | 3.22 | **30.68** |
| Rental Income Loss | 7.56 | 11.44 | 0.85 | **19.86** |
| Wage Loss | 1.40 | 71.08 | 44.06 | **116.54** |
| **Total** | **77.42** | **264.43** | **116.41** | **458.27** |

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 also be considered.

***Population Impacts***

The City should be aware that senior and low-income segments of Pittsfield'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 City 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 modeled flood scenario results showed that there would be 939 households (or 2,818 people) displaced due to the flood and 522 people seeking temporary 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.

Participants in the Pittsfield HMPC #1 Meeting (October 29, 2024) noted that the City has encountered instances in the past 4-5 years with an increase in the costs from rain events and that work is needed to secure funding for stormwater improvements, including repairs to the system, to identify gaps, and to address areas subject to recurring flooding. During the meeting, the Road/Stream Crossing Inventory project with BRPC, funded through the MVP grant, was discussed, as it will provide a snapshot of the locations of the crossings, along with current and future precipitation, to identify the conditions (e.g., undersized elements, current and future susceptibility to flooding).

***Environment Impacts***

One of the major environmental impacts of a major flood would be the potential release of hazardous materials. According to EPA's TRI database, 64 facilities located in the City of Pittsfield that report under the EPA TRI are in the 100-year floodplain. These facilities include but are not limited to automotive repair, natural gas distribution, electric power generation, and manufacturing.

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 27. 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.<br>• With respect to NFIP Policy and Claims, the area of flood risk may be larger than some realize, and affordability of insurance is a concern. |
| Structures (including facilities, lifelines, and critical infrastructure) | • Approximately 1,960 buildings are in the floodplain, including residential, commercial, agricultural, educational, religious/non-profit, industrial, and government buildings. |
| Systems (including networks and capabilities) | • Road closures may interrupt community systems. The Dan Casey Drive causeway is a concern due to its low elevation. |

| Assets | Problems Associated with Flood |
|---|---|
| Natural, historic, and cultural resources | • The City of Pittsfield has numerous parks and conservation areas exposed to flooding, including: Brattlebrook Park (nature area, 138 acres), Coolidge Park (28 acres), Clapp Park (33 acres), Burbank Park (188 acres), Kirvin Park (227 acres), Springside Park (246 acres), and Wahconah Park (102 acres); historic sites and cultural resources, including: the South Congregational Church (1850), the Berkshire Life Insurance Company Building (1868), and the African-American Heritage Trail.<br>• There are 17 structures listed on the National Register of Historic Places in the floodplain. |
| Activities that have value to the community | • Several road closures may disrupt community events. |

## Flooding from Dam Failure or Overtopping

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

### Description

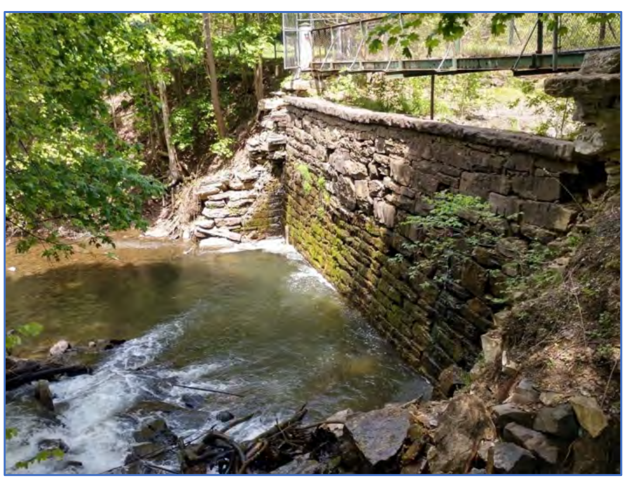


*Figure 14. Bel Air Dam.*

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 are an additional dam-related concern in many communities like Pittsfield. Beaver dams obstruct the flow of water and cause water levels to rise. Significant downstream flooding can occur if beaver dams break. Flooding can also occur upstream of beaver dams, though this type of flooding is addressed in the discussion about flooding earlier in the chapter.

### Location

Numerous dams are located in and upstream of Pittsfield, as presented on the mapping in the vulnerability section. According to the Massachusetts Office of Dam Safety, 13 dams are located in Pittsfield, of which four are high hazard and three are significant hazard. These high and significant hazard dams are presented on the following table:

*Table 28. Significant and High Hazard Dams in Pittsfield.*

| National ID | Dam Name | Owner | Hazard Potential | Notes |
|---|---|---|---|---|
| MA00016 | Onota Lake Dam | City of Pittsfield | High | Minor concrete repairs planned |
| MA00017 | Richmond Pond Dam | Private | Significant | |
| MA00309 | Pontoosuc Lake Dam | MassDCR | High | |
| MA00843 | Pecks Lower Pond Dam | Private | High | Also known as Gillette |
| MA00845 | Government Mill Dam | Private | Significant | |
| MA01061 | Bel Air Dam | City of Pittsfield | High | Removal scheduled for 2026-2026 |
| MA01969 | Parker Pond Dam | Private | Significant | |

The City owns six dams located outside of Pittsfield that impound the City's public water supply reservoirs. Five of these are considered high hazard dams, but only three are upstream of Pittsfield; they are listed below.

*Table 29. High Hazard Dams Owned by Pittsfield and Located In Upstream Communities.*

| National ID | Dam Name | Owner | Hazard Potential | Location |
|---|---|---|---|---|
| MA00313 | Ashley Lake Dam | City of Pittsfield | High | Washington |
| MA00225 | Cleveland Brook Reservoir Dam | City of Pittsfield | High | Hinsdale |

| National ID | Dam Name | Owner | Hazard Potential | Location |
|---|---|---|---|---|
| MA00227 | Upper Sackett Reservoir Dam | City of Pittsfield | High | Hinsdale |

Only two high hazard dams owned by the City, used for public water supply, and located outside the City have inundation areas that exclude any part of Pittsfield. These are listed below.

*Table 30. High Hazard Dams Owned by Pittsfield and Located In Communities that are not Upstream.*

| National ID | Dam Name | Owner | Hazard Potential | Location |
|---|---|---|---|---|
| MA00316 | Sandwash Reservoir Dam | City of Pittsfield | High | Washington |
| MA00314 | Farnham Reservoir Dam | City of Pittsfield | High | Washington |

According to the CRB report (2019), the City's water supply dams are not a major concern for the City as three of the six dams were renovated between 2009 and 2019 and inspections are up to date. The City reiterated that no major concerns were apparent during the meeting with dam owners that was convened in January 2025. Nevertheless, if these High Hazard City-owned dams failed the potential exists that Pittsfield would be impacted.

Finally, several additional high hazard dams are located upstream of Pittsfield, and they have associated inundation areas that extend into Pittsfield. These are listed below.

*Table 31. Other High Hazard Dams Located In Upstream Communities*

| National ID | Dam Name | Owner | Hazard Potential | Location |
|---|---|---|---|---|
| MA01063 | Egypt Reservoir Dam | Town of Dalton | High | Dalton |
| MA00841 | Windsor Reservoir Dam | Town of Dalton | High | Dalton |
| MA00226 | Plunkett Reservoir Dam | Town of Hinsdale | High | Hinsdale |
| MA00224 | Belmont Reservoir Dam | Town of Hinsdale | High | Hinsdale |

Overall, the City's CRB report (2019) noted the following regarding the potential for dam failure:

- The condition of the majority of dams in Pittsfield is generally known. As one City staff person remarked during the CRB process, "we have a pretty good handle on the terrible condition of our dams." However, for some of the private dams there is less oversight and sometimes less information available.
- Maintenance and monitoring of dams, in particular the Farnham Dam, is complicated by the fact that road access to the City's dams is limited by deteriorating road conditions as well as snow and ice in the winter months, and the City does not have the equipment for remote monitoring.

- The Bel Air Dam is a high hazard dam located upstream of several low-income neighborhoods as well as the Berkshire Medical Center. At the time of the CRB report, the dam was known to have water leaking through a broken spillway, but because the dam was privately owned and funds are not available for repairs, there was little the City can do to manage this hazard. Since that time, the State has issued a grant to the City for repairs; as part of the grant, the City acquired the dam by eminent domain.
- Other dams in the City, including the Cleveland Dam and the Ashley Dam, are also located upstream of major medical, commercial, and municipal sites for which flooding would be catastrophic.
- Water backups and flooding had been problematic at the Tel-Electric Dam, but this dam was removed in 2020.
- The City has pursued dam removal feasibility studies for the Upper Wild Acres Dam, but funding had not been available as of 2019.

As part of this plan update, HMPC members noted there is continued beaver dam activity in certain areas of City. The previous HMP identified the areas for beaver dam concerns as follows:

- Wild Acres Pond (damming the spillway of upper dam & stream channel below dam)
- Southwest Branch of Housatonic River below Richmond Pond
- Wampenum Brook along South Mountain Road
- Malloy Brook along West Housatonic Street near Pittsfield Plaza
- May Brook along West St. past Berkshire Community College
- Hawthorne Brook along Cascade St. and CYC summer camp
- Smith Brook along Fort Hill Avenue
- Daniels Brook near Hancock Road
- West Branch of Housatonic River Wahconah Park
- West Branch of Housatonic River near the confluence of West/East Branches of Housatonic River in vicinity of Fred Garner Park
- East Branch of Housatonic River near confluence of East/West Branches of Housatonic River in vicinity of Fred Garner Park & Pomeroy Avenue
- Unkamet Brook along Crane Avenue
- Upper reaches of Unkamet Brook
- Unkamet Brook around Dalton Avenue and Merrill Road
- Brattle Brook throughout Brattlebrook Park, East Branch of Housatonic River and Grand Avenue

- Branch of Brattle Brook near Marchesio Park, Imperial Ave and McIntosh Avenue
- Branch of Brattle Brook near WMECO Sub-station, Elaine Drive and Leona Drive
- Sackett Brook in Kirvin Park causing flooding on Mountain Drive
- Unnamed stream channel near Conte School and West Union St.

The City of Pittsfield maintains dam Emergency Action Plans (EAPs) for its dams. The general downstream inundation areas in Pittsfield that may be subject to flooding due to high hazard dam failure are noted below. Note that the EAPs do not include an estimate of the population size at risk in the event of a dam failure event but do include a list of the streets and parcels potentially affected for evacuation purposes.

- The inundation area for the Ashley Lake Dam (High Hazard) in Washington extends downstream along Ashley Brook to Sackett Brook and west to the Housatonic River in Pittsfield. The inundation area includes residential and commercial areas with the potential for loss of life, as well as damage to buildings, roadways, and utility infrastructure.
- The inundation area for Cleveland Brook Reservoir Dam (High Hazard) in Hinsdale extends downstream along Cleaveland Brook to the East Branch Housatonic River in Pittsfield. The inundation area includes residential and commercial areas with the potential for loss of life, as well as damage to buildings, roadways, and utility infrastructure.
- The inundation area for Onota Lake Dam (High Hazard) in Pittsfield extends downstream in Pittsfield to encompass approximately 954 properties including 666 residential properties. The inundation area includes residential and commercial areas with the potential for loss of life, as well as damage to buildings, roadways, and utility infrastructure including downstream dams.
- The inundation area for Upper Sackett Reservoir Dam (High Hazard) in Hinsdale extends downstream along Sackett Brook to the Housatonic River in Pittsfield. The inundation area includes residential and commercial areas with the potential for loss of life, as well as damage to buildings, roadways, and utility infrastructure.

The National Inventory of Dams[59] maintains information on dams across the United States, including information on dam conditions. This information is not always up to date but often provides a good indicator of a dam's condition within the last decade. Data for high and significant hazard dams in Pittsfield are presented in the following table.

[59] https://nid.sec.usace.army.mil/#/

*Table 32. Dam Conditions and Downstream Channels in Pittsfield*

| National ID | Dam Name | Downstream Channel | Dam Condition | Dam Condition Date |
|---|---|---|---|---|
| MA00016 | Onota Lake Dam | Onota Brook | Satisfactory | 6/7/2016 |
| MA00017 | Richmond Pond Dam | Southwest Branch Housatonic River | Fair | 12/12/2011 |
| MA00309 | Pontoosuc Lake Dam | West Branch Housatonic River | Satisfactory | 2/23/2017 |
| MA00843 | Pecks Lower Pond Dam | Onota Brook | Poor | N/A |
| MA00845 | Government Mill Dam | East Branch Housatonic River | Satisfactory | 10/13/2016 |
| MA01061 | Bel Air Dam | West Branch Housatonic River | Unsatisfactory | 4/29/2022 |
| MA01969 | Parker Pond Dam | Parker Brook | Fair | 11/10/2017 |

The sole dam listed as “poor” (Pecks Lower Pond dam) is locally called the Betty Gilette Dam. This is a private dam, and the owner has limited resources. The old rock-laid structure needs attention in the short term. The City believes that removal of the dam is likely the best outcome. Although the City will not consider acquiring this dam, it will support evaluations and any temporary repairs, with the ultimate goal of removal. The sole dam listed as “unsatisfactory” (Bel Air) is scheduled for removal in 2025-2026.

One privately-owned dam in Pittsfield is not listed on DCR and federal inventories. This dam, located at 321 Lebanon Avenue, is locally known as “Grist Mill Dam” (*although other dams with that name are located in the region*). The City helped the owner apply for a grant to conduct evaluations, and the City prefers to eventually remove this small private dam.

### Previous Occurrences

According to the previous edition of this plan, “there is little recorded information about dam failure in the City of Pittsfield.” Dams have been in the news frequently due to severe precipitation events occurring nationwide in the last few years. Events in New England from 2022-2024 include the following:

- The Crosby Pond Dam, a significant hazard dam on Mill Brook in Concord, MA, failed in May 2015. According to the Association of State Dam Safety Officials (ASDSO)[60], the uncontrolled release of the impoundment inundated a heavily traveled road. No one was injured, but the road was closed all day creating significant traffic delay issues.
- The Silica Pond Dam, a significant hazard dam in New Hampshire, was reported by ASDSO as having had a gate/valve failure in July 2022 that resulted in the release of the impoundment. This was not a catastrophic failure, but the release of storage was caused by the deterioration and/or poor condition of the outlet valve.

[60] https://www.damsafety.org/incidents

- The George Schnopp Road Pond Dam in Hinsdale breached in October 2022. According to the Hinsdale Hazard Mitigation Plan (2024), significant damage did not occur downstream, but the experience underscored the challenges associated with dams. During the breach, five to ten million gallons of water was released rapidly to the downstream watercourse, flowing into Ashmere Lake. The Town responded with clearing and repair of George Schnopp Road, which was covered in debris and eroded partially by the flooding.
- Five dam failures were reported by ASDSO as occurring in Vermont on July 10, 2023 following a severe flood event. These included the Clarks Sawmill Dam, a low hazard dam on the Winooski River which fully failed; the Hands Mill Dam, a significant hazard dam on the Jail Branch River which fully failed; the Lyons Pond Dam, a low hazard dam on Burndt Meadow Brook which fully failed; the Quinn Lower Dam, a low hazard dam on Homer Stone Brook which fully failed; and the South Woodbury Pond Dam, a significant hazard dam on a tributary to Sabin Pond which partially breached. Several of these dams were reportedly remote and failure only discovered several days following the failure.
- A dam overtopped at Barrett Park Pond Dam in September 2023 in Leominster, resulting in downstream evacuations and emergency repairs. Floodwaters downstream caused damage to roads and properties.
- A partial dam breach on the Yantic River occurred in January 2024 in Bozrah, Connecticut, resulting in evacuations downstream in the Town of Bozrah and the City of Norwich.

The most significant concern for Pittsfield at this time is the condition of the Bel Air Dam on Wahconah Street. This dam is scheduled for removal as noted above. The Pecks Lower Pond dam (locally called the Betty Gilette Dam) is the next-highest concern, and the private dam at 321 Lebanon Avenue is the third-highest concern among all dams in Pittsfield.

According to the CRB report (2019), beaver activity is not often reported and can result in unpredictable problems during heavy precipitation events when flooding occurs in unexpected locations. The City reportedly struggles with trying to keep beaver impoundments from impacting recreation areas with flooding. Beaver-driven flooding is common at Marchisio Park, and a beaver dam failure at the top of Oak Hill in northeastern Pittsfield around 2004 also caused damage to downstream recreation areas.

#### Extent

Many dams in Massachusetts were built in the 19th Century without the benefit of modern engineering design and construction oversight. Dams can fail because of structural problems due to age and/or lack of proper maintenance. Dam failure can also be the result of structural damage caused by an earthquake or flooding brought on by severe storm events. The Massachusetts Department of Conservation and Recreation (DCR) is the agency responsible for regulating dams in the state (M.G.L. Chapter 253, Section 44, and the implementing regulations 302 CMR 10.00). The DCR was also responsible for conducting dam inspections until 2002, when state law was changed to place the responsibility and cost of inspections on the owners of the dams. In accordance with the new regulations, which went into effect in 2005, dam owners must register, inspect, and maintain dams in good operating condition. Owners of High Hazard Potential dams and certain Significant Hazard Potential dams are also required to prepare, maintain, and update EAPs. The state has three hazard classifications for dams:

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

According to FEMA[61], hazard potential classification systems vary between certain states and federal agencies. However, the Massachusetts dam hazard classification system is consistent with the federal dam hazard classification system (Low, Significant, and High).

Owners of dams are required by DCR to hire a qualified engineer to inspect and report results using the following inspection schedule:

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

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

According to FEMA[61], the common dam failure modes include those in the following table. Any of these failure modes could result in an uncontrolled downstream release of water with potential downstream consequences.

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

*Table 33. Dam Failure Modes*

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

NOAA's Northeast River Forecast Center provides flood warnings for Massachusetts, relying on monitoring data from the USGS stream gauge network. Notice of potential flood conditions is generally available several days in advance, with the exception of flash flood warnings which can be issued only hours before a flood. State agency staff also monitor river, weather, and forecast conditions throughout the year. Notification of potential flooding is shared among state agency staff, including the MEMA and the Office of Dam Safety. The NWS provides briefings to state and local emergency managers and provides notifications to the public via traditional media and social networking platforms.

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

Due to the pattern of meteorological conditions needed to cause serious flooding, it is unusual for a flood to occur without warning. Flash flooding, which occurs when excessive water fills either normally dry creeks or riverbeds or dramatically increases the water surface elevation on currently flowing creeks and rivers, can be less predictable. However, potential hazard areas can be warned in advance of potential flash-flooding danger. Flooding is more likely to occur due to a rainstorm when the soil is already wet and/or streams are already running high from recent previous rains.

At the present time, the NWS utilizes the flood advisory, watch, and warning products for dam-related hazards. Specific warnings are used as needed to augment these messages when a dam failure could occur. In Massachusetts, EAPs must include a "procedure for warning downstream residents if failure of the dam is imminent." Therefore, the use of the word "imminent" is often incorporated into specific dam-related messages from local emergency managers. In Dudley, the City issues messages according to the approach outlined in its EAPs for the Merino and Lower Merino Pond dams:

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

- "Situation A" (failure is imminent or has occurred) denotes a rapidly deteriorating condition where mobilization of manpower and resources for repair efforts are deemed inappropriate. Notification procedures are to be enacted immediately with the highest warning – that is, for evacuation of potentially impacted downstream areas identified on the Inundation Maps. Therefore, priority notification of the Highway and Water Departments will be from the Dudley Police Department/Emergency Services Dispatch.
- "Situation B" (a potentially hazardous situation at either dam is developing) is typically perceived as a lower grade emergency that may be contained and corrected with resources at a local level. An identified problem at the dam, such as excessive seepage, boiling, whirlpool, slope failure, etc. will need to be observed constantly, checking for any significant changes which may indicate development of a Situation A emergency condition. Since the time to maximum failure for earthen embankments is typically of a very short duration, reaction time will be limited. Certainly, there is much "gray area" as to what constitutes a Situation B emergency. A condition

at the dam may initially be perceived as minor, but may be a precursor to a complete embankment failure.

Although other EAPs were not examined, the City believes that the above approach is representative of the response for other dams in the community.

The NWS[62] is reportedly in the process of developing alternative forecasting tools and processes that will enable River Forecast Center (RFC) and Weather Forecast Office (WFO) forecasters of different skill levels to evaluate the consequences of a potential dam failure in a relatively short period of time. This new project is designed to address the limitations of the current dam inventory data and dam break modeling approaches. Two goals should be achieved with this project: the first is to provide RFC and WFO forecasters access to quality-controlled, up-to-date dam inventory information; and the second goal is to develop a system that will integrate several dam break modeling approaches. Results from these approaches will assist forecasters in selecting the tool that could be most appropriate, given the length of time needed for execution, how quickly the results are needed, and the availability of data.

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

### Probability of Future Events

According to the previous Plan (2019), while Pittsfield has significant and high hazard dams in the City there have not been any reported dam failure events within the City. Furthermore, the Tel-Electric Dam was removed, and the Wild Acres Dam was scheduled for removal by the State. The probability for a future failure event in the City was presumed to be low although the risk was high due to the potential for significant downstream impacts.

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.

[62] https://www.weather.gov/owp/oh_hrl_hsmb_hydraulics_dam_break_analysis

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

### Vulnerability Assessment

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 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.

***Exposure***

Table 34 identifies dams in the vicinity of the City.

*Table 34. Dams in the Vicinity.*

| Name | Ownership | Hazard Type |
|---|---|---|
| Ashley Lake Reservoir Dam | Public (City of Pittsfield) | High Hazard |
| Bel Air Dam | Public (City of Pittsfield) | High Hazard |
| Belmont Reservoir Dam | Public (Town of Hinsdale) | High Hazard |
| Cleveland Brook Reservoir Dam | Public (City of Pittsfield) | High Hazard |
| Egypt Reservoir Dam | Public (Town of Dalton) | High Hazard |
| Farnham Reservoir Dam | Public (City of Pittsfield) | High Hazard |
| Onota Lake Dam | Public (City of Pittsfield) | High Hazard |
| Pecks Lower Pond Dam | Private | High Hazard |
| Plunkett Reservoir Dam | Public (Town of Hinsdale) | High Hazard |
| Pontoosuc Lake Dam | Public (State) | High Hazard |
| Sandwash Reservoir Dam | Public (City of Pittsfield) | High Hazard |
| Upper Sackett Reservoir Dam | Public (City of Pittsfield) | High Hazard |
| Windsor Reservoir Dam | Public (Town of Dalton) | High Hazard |
| Byron Weston #1 Dam | Private | Significant Hazard |
| Government Mill Dam | Private | Significant Hazard |
| Parker Pond Dam | Private | Significant Hazard |

| Name | Ownership | Hazard Type |
|---|---|---|
| Richmond Pond Dam | Private | Significant Hazard |
| Tel Electric Pond Dam | Private | Low Hazard |
| Wild Acres Pond #1 Dam | Public | Low Hazard |
| Wild Acres Pond #2 Dam | Public | Low Hazard |
| Camp St. Michael Dam | Private | N/A |
| Gravesleigh Pond Dam | Private | N/A |
| Lulu Brook Dam | Public | N/A |
| Pecks-Onota Brook Dam | Private | N/A |
| Tilden Swamp Dam | Private | N/A |

Participants in the Pittsfield HMPC #1 Meeting (October 29, 2024) identified the Massachusetts Department of Conservation and Recreation (DCR) as a stakeholder, noting that the October Mountain State Forest surrounds the City's drinking water reservoirs and that the DCR is responsible for the management of the dams. Participants in the Pittsfield HMPC #2 Meeting (December 18, 2024) noted that the City has the inundation maps for: Ashley Lake Dam (located in Washington, MA), Upper Sackett Reservoir Dam (located in Hinsdale, MA), Cleveland Brook Reservoir Dam (located in Hinsdale, MA), Farnham Reservoir Dam (located in Washington, MA), and the Sandwash Reservoir Dam (located in Washington, MA).

In 2019, the DCR engaged the infrastructure consulting firm AECOM to conduct a visual structural and geotechnical condition assessment of Bel Air Dam, which was originally constructed in 1832 and is located approximately 1.1 miles downstream of Pontoosuc Lake. The results of the 2019 study found that the dam was unsafe and structurally deficient. Information provided in the Massachusetts DCR Bel Air Dam Removal, Pittsfield, MA, October 2024 Summary indicates that after evaluation of alternatives to repair or remove the dam to address the structural deficiencies, the City of Pittsfield and DCR elected to proceed with dam removal (including sediment management) rather than dam repair. The owner of the dam was deceased, and in October 2024, the City of Pittsfield obtained ownership of the parcels including Bel Air Dam (400 Wahconah Street) as well as the parcel containing the impounded water upstream of the Dam through Eminent Domain. The currently proposed project, which will be funded by an allocation of $20 million of American Rescue Plan Act (ARPA) funding, includes removal of Bel Air Dam and excavation of accumulated sediments as needed to create a restored stream channel and stable adjacent riverbanks.

To determine the exposure of the high hazard dams, the inundation maps were collected from each dam's Emergency Action Plan (EAP). These maps were digitized and integrated into a GIS, where they were converted into an inundation depth using a high-resolution Digital Elevation Model (DEM). This inundation depth was used with the local inventory to determine exposure and loss shown in the next section. Figure 15 shows the dam locations and the dam breach area for the high hazard dams.

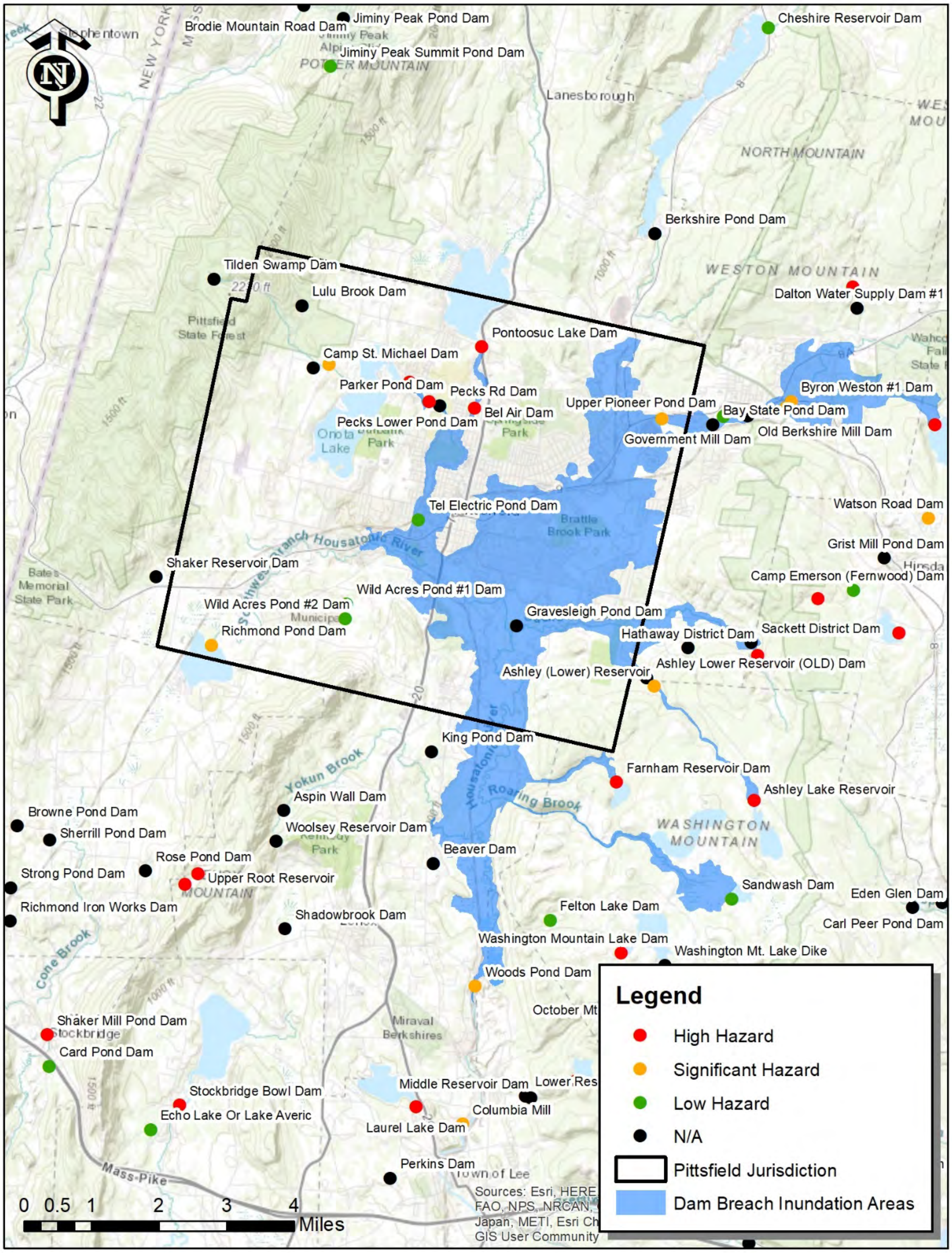



*Figure 15. Location and Hazard Potential of Dams in Pittsfield.*

Table 35 shows the high hazard dam name, the area of the inundation area resulting from a breach, and any critical facilities in the inundation areas. Several roads are also exposed to the dam inundation areas including Merrill Road, Dalton Avenue, Route 7, East Street, South Street, West Housatonic Street, Elm Street, Williams Street, and Holmes Road, among others. There are 48 historic properties in the dam inundation areas.

*Table 35. Critical Facilities Exposed to Dam Inundation Areas.*

| Dam | Area (Acres) | Critical Facilities Exposed |
|---|---|---|
| Ashley Lake Reservoir Dam | 1,793 | • Wastewater Treatment Plant<br>• Water Chlorinator<br>• Miss Hall's School<br>• Theodore Herberg Middle School |
| Bel Air Dam | 277 | • County Ambulance |
| Byron Weston Dam #1 | 149 | • None |
| Cleveland Brook Reservoir Dam | 7,851 | • Fire Station #1<br>• Fire Station #6<br>• Action Ambulance<br>• Urgent Care Center<br>• Wastewater Treatment Plant<br>• Highway Yard<br>• Miss Hall's School<br>• Williams School<br>• Sacred Heart Head Start Program<br>• Allendale Elementary School<br>• Egremont Elementary School<br>• Theodore Herberg Middle School<br>• Hibbard School Warehouse Facility<br>• BRTA Maintenance & Operations Facility<br>• Bus Operations |
| Farham Reservoir Dam | 990 | • None |
| Onota Lake Dam | 991 | • County Ambulance<br>• Action Ambulance |
| Pontoosuc Lake Dam | 2,127 | • County Ambulance<br>• Action Ambulance |
| Sandwash Reservoir Dam | 473 | • None |
| Upper Sackett Reservoir Dam | 1,509 | • Water Chlorinator<br>• Miss Hall's School |

The buildings, categorized by building occupancy, exposed to the dam inundation areas are shown in the tables below.

*Table 36. Buildings in Ashley Lake Dam Inundation Area.*

| **Building Type** | **Number of Buildings in Dam Breach Inundation Area (Total in City)** | **Building Value in Dam Breach Inundation Area (Total in City)** |
|---|---|---|
| Single Family | 893 (16,264) | $194,612,936 ($2,767,968,691) |
| Mobile Home | 0 (195) | $0 ($12,406,818) |
| Multi-Family | 7 (396) | $1,520,064 ($2,109,797,827) |
| Commercial | 2 (1,057) | $3,236,961 ($1,818,754,103) |
| Agricultural | 1 (213) | $23,314 ($118,667,167) |
| Educational | 15 (59) | $304,808,341 ($1,049,453,443) |
| Government | 18 (293) | $5,105,873 ($569,875,929) |
| Religious/Non-Profit | 6 (161) | $2,228,512 ($419,697,742) |
| Industrial | 0 (220) | $0 ($840,169,491) |
| Garage/Outbuilding | 2 (89) | $28,120 ($5,482,819) |
| **Total** | 944 (22,115) | $511,564,123 ($9,712,274,032) |

*Table 37. Buildings in Bel Air Dam Inundation Area.*

| **Building Type** | **Number of Buildings in Dam Breach Inundation Area (Total in City)** | **Building Value in Dam Breach Inundation Area (Total in City)** |
|---|---|---|
| Single Family | 229 (16,264) | $30,308,772 ($2,767,968,691) |
| Mobile Home | 0 (195) | $0 ($12,406,818) |
| Multi-Family | 155 (396) | $81,239,259 ($2,109,797,827) |
| Commercial | 43 (1,057) | $29,975,206 ($1,818,754,103) |
| Agricultural | 8 (213) | $1,005,165 ($118,667,167) |
| Educational | 0 (59) | $0 ($1,049,453,443) |
| Government | 24 (293) | $25,834,721 ($569,875,929) |
| Religious/Non-Profit | 10 (161) | $10,922,929 ($419,697,742) |
| Industrial | 6 (220) | $7,525,612 ($840,169,491) |
| Garage/Outbuilding | 3 (89) | $73,514 ($5,482,819) |
| **Total** | **478 (22,115)** | **$186,885,179 ($9,712,274,032)** |

*Table 38. Buildings in Byron Weston Dam Inundation Area.*

| Building Type | Number of Buildings in Dam Breach Inundation Area (Total in City) | Building Value in Dam Breach Inundation Area (Total in City) |
|---|---|---|
| Single Family | 0 (16,264) | $0 ($2,767,968,691) |
| Mobile Home | 0 (195) | $0 ($12,406,818) |
| Multi-Family | 0 (396) | $0 ($2,109,797,827) |
| Commercial | 0 (1,057) | $0 ($1,818,754,103) |
| Agricultural | 1 (213) | $28,904 ($118,667,167) |
| Educational | 0 (59) | $0 ($1,049,453,443) |
| Government | 0 (293) | $0 ($569,875,929) |
| Religious/Non-Profit | 0 (161) | $0 ($419,697,742) |
| Industrial | 0 (220) | $0 ($840,169,491) |
| Garage/Outbuilding | 0 (89) | $0 ($5,482,819) |
| **Total** | **1 (22,115)** | **$28,904 ($9,712,274,032)** |

*Table 39. Buildings in Cleveland Brook Dam Inundation Area.*

| Building Type | Number of Buildings in Dam Breach Inundation Area (Total in City) | Building Value in Dam Breach Inundation Area (Total in City) |
|---|---|---|
| Single Family | 6058 (16,264) | $994,134,313 ($2,767,968,691) |
| Mobile Home | 55 (195) | $3,713,159 ($12,406,818) |
| Multi-Family | 1222 (396) | $610,164,916 ($2,109,797,827) |
| Commercial | 457 (1,057) | $660,452,810 ($1,818,754,103) |
| Agricultural | 48 (213) | $23,332,086 ($118,667,167) |
| Educational | 20 (59) | $350,138,448 ($1,049,453,443) |
| Government | 75 (293) | $202,093,046 ($569,875,929) |
| Religious/Non-Profit | 30 (161) | $51,478,330 ($419,697,742) |
| Industrial | 120 (220) | $441,374,961 ($840,169,491) |
| Garage/Outbuilding | 21 (89) | $2,104,164 ($5,482,819) |
| **Total** | **8106 (22,115)** | **$3,338,986,233 ($9,712,274,032)** |

*Table 40. Buildings in Onota Lake Dam Inundation Area.*

| Building Type | Number of Buildings in Dam Breach Inundation Area (Total in City) | Building Value in Dam Breach Inundation Area (Total in City) |
|---|---|---|
| Single Family | 520 (16,264) | $71,770,333 ($2,767,968,691) |
| Mobile Home | 0 (195) | $0 ($12,406,818) |
| Multi-Family | 234 (396) | $114,285,661 ($2,109,797,827) |

| Building Type | Number of Buildings in Dam Breach Inundation Area (Total in City) | Building Value in Dam Breach Inundation Area (Total in City) |
|---|---|---|
| Commercial | 64 (1,057) | $54,545,435 ($1,818,754,103) |
| Agricultural | 7 (213) | $1,984,327 ($118,667,167) |
| Educational | 0 (59) | $0 ($1,049,453,443) |
| Government | 23 (293) | $18,435,426 ($569,875,929) |
| Religious/Non-Profit | 11 (161) | $11,322,009 ($419,697,742) |
| Industrial | 16 (220) | $39,517,878 ($840,169,491) |
| Garage/Outbuilding | 1 (89) | $36,926 ($5,482,819) |
| **Total** | **869 (22,115)** | **$309,913,667 ($9,712,274,032)** |

*Table 41. Buildings in Pontoosuc Lake Dam Inundation Area.*

| Building Type | Number of Buildings in Dam Breach Inundation Area (Total in City) | Building Value in Dam Breach Inundation Area (Total in City) |
|---|---|---|
| Single Family | 402 (16,264) | $53,515,862 ($2,767,968,691) |
| Mobile Home | 0 (195) | $0 ($12,406,818) |
| Multi-Family | 286 (396) | $159,168,966 ($2,109,797,827) |
| Commercial | 115 (1,057) | $119,029,986 ($1,818,754,103) |
| Agricultural | 13 (213) | $2519510($118,667,167) |
| Educational | 0 (59) | $0 ($1,049,453,443) |
| Government | 21 (293) | $18,531,827 ($569,875,929) |
| Religious/Non-Profit | 13 (161) | $15,551,162 ($419,697,742) |
| Industrial | 23 (220) | $38,550,351 ($840,169,491) |
| Garage/Outbuilding | 2 (89) | $56,001 ($5,482,819) |
| **Total** | **875 (22,115)** | **$406,923,665 ($9,712,274,032)** |

*Table 42. Buildings in Upper Sackett Reservoir Inundation Area.*

| Building Type | Number of Buildings in Dam Breach Inundation Area (Total in City) | Building Value in Dam Breach Inundation Area (Total in City) |
|---|---|---|
| Single Family | 537 (16,264) | $118,792,701 ($2,767,968,691) |
| Mobile Home | 0 (195) | $0 ($12,406,818) |
| Multi-Family | 0 (396) | $0 ($2,109,797,827) |
| Commercial | 4 (1,057) | $10,382,272 ($1,818,754,103) |
| Agricultural | 1 (213) | $25,332 ($118,667,167) |
| Educational | 14 (59) | $304,808,106 ($1,049,453,443) |
| Government | 8 (293) | $2,175,015 ($569,875,929) |

| | | |
|---|---|---|
| Religious/Non-Profit | 2 (161) | $519,723 ($419,697,742) |
| Industrial | 0 (220) | $0 ($840,169,491) |
| Garage/Outbuilding | 2 (89) | $28,120 ($5,482,819) |
| **Total** | **568 (22,115)** | **$436,731,269 ($9,712,274,032)** |

The population exposed to dam breach is shown in Table 43. The column on the left shows the population in and around the dam breach areas (wherever the Census Block overlapped with the inundation boundary) while the column on the right shows the total population numbers for the City. The population exposed has more households with a lower income and a high environmental justice population.

*Table 43. Population Exposed to Dam Breach (2020 U.S. Census).*

| Demographics | Population in and Adjacent to Inundation Areas | Total Population |
|---|---|---|
| Population | 25,392 | 43,927 |
| Households | 12,396 | 21,738 |
| White | 20,459 (80.6%) | 34,924 (79.5%) |
| Black | 1,691 (6.7%) | 3,002 (6.8 %) |
| American Indian | 42 (0.2%) | 103 (0.2%) |
| Asian | 310 (1.2%) | 630 (1.4%) |
| Pacific Islander | 3 (0.02%) | 7 (0.02%) |
| Other Race | 997 (3.9%) | 1,768 (4.0%) |
| Two or More Races | 1,890 (7.4%) | 3,493 (8.0%) |
| Hispanic or Latino: | 1,961 (7.7%) | 3,539 (8.1%) |
| Population under 18: | 4,505 (17.7%) | 7,581 (17.3%) |
| Population over 64: | 5,090 (20.0%) | 9,092 (20.7%) |
| Annual Income < $30K/year | 3,547 (28.6%) | 6,383 (14.5%) |
| Population in EJ Zone*: | 18,810 (74.1%) | 21,356 (48.6%) |

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

***Built Environment Impacts***

To identify built environment impacts to the City, FEMA’s risk assessment software, Hazus, was implemented. Building footprint data and parcel data was used to update the model while the dam inundation was also integrated into the software. The economic loss results for the dam breach events are shown in the tables below. Although there isn’t a return period assigned to the dam breach, the assumption is that it is a catastrophic event (1,000-year). The City’s AAL is calculated to be $3.32M.

*Table 44. Building Impacts in the Ashley Lake Dam Inundation Area.*

| Building Type | Number of Buildings Impacted | Building Losses | Content Losses | Inventory Losses |
|---|---|---|---|---|
| Single Family | 786 | $122,566,239 | $61,302,558 | $0 |
| Mobile Home | 0 | $0 | $0 | $0 |
| Multi-Family | 2 | $166,224 | $104,594 | $0 |
| Commercial | 1 | $183,705 | $37 | $0 |
| Agricultural | 1 | $20,139 | $78 | $18,218 |
| Educational | 1 | $14 | $31 | $0 |
| Government | 14 | $1,892,293 | $1,142 | $0 |
| Religious/Non-Profit | 6 | $433,959 | $524 | $0 |
| Industrial | 0 | $0 | $0 | $0 |
| Garage/Outbuilding | 0 | $0 | $0 | $0 |
| **Total** | **811** | **$125,262,572** | **$61,408,965** | **$18,218** |

*Table 45. Building Impacts in Bel Air Dam Inundation Area.*

| Building Type | Number of Buildings Impacted | Building Losses | Content Losses | Inventory Losses |
|---|---|---|---|---|
| Single Family | 214 | $16,104,092 | $8,453,759 | $0 |
| Mobile Home | 0 | $0 | $0 | $0 |
| Multi-Family | 143 | $25,757,466 | $15,687,062 | $0 |
| Commercial | 42 | $9,844,253 | $2,984 | $9,970,789 |
| Agricultural | 8 | $277,249 | $511 | $615,306 |
| Educational | 0 | $0 | $0 | $0 |
| Government | 13 | $954,291 | $1,209 | $0 |
| Religious/Non-Profit | 9 | $3,426,161 | $887 | $0 |
| Industrial | 6 | $1,760,030 | $428 | $443,476 |
| Garage/Outbuilding | 0 | $0 | $0 | $0 |
| **Total** | **435** | **$58,123,541** | **$24,146,841** | **$11,029,572** |

*Table 46. Building Impacts in Byron Weston Dam Inundation Area.*

| Building Type | Number of Buildings Impacted | Building Losses | Content Losses | Inventory Losses |
|---|---|---|---|---|
| Single Family | 0 | $0 | $0 | $0 |
| Mobile Home | 0 | $0 | $0 | $0 |
| Multi-Family | 0 | $0 | $0 | $0 |

| Building Type | Number of Buildings Impacted | Building Losses | Content Losses | Inventory Losses |
|---|---|---|---|---|
| Commercial | 0 | $0 | $0 | $0 |
| Agricultural | 1 | $1,366 | $17 | $4,447 |
| Educational | 0 | $0 | $0 | $0 |
| Government | 0 | $0 | $0 | $0 |
| Religious/Non-Profit | 0 | $0 | $0 | $0 |
| Industrial | 0 | $0 | $0 | $0 |
| Garage/Outbuilding | 0 | $0 | $0 | $0 |
| **Total** | **1** | **$1,366** | **$17** | **$4,447** |

*Table 47. Building Impacts in Cleveland Brook Dam Inundation Area.*

| Building Type | Number of Buildings Impacted | Building Losses | Content Losses | Inventory Losses |
|---|---|---|---|---|
| Single Family | 444 | $25,852,735 | $13,953,998 | $0 |
| Mobile Home | 0 | $0 | $0 | $0 |
| Multi-Family | 205 | $31,844,125 | $20,024,594 | $0 |
| Commercial | 56 | $12,152,984 | $3,741 | $14,796,972 |
| Agricultural | 7 | $279,722 | $384 | $709,354 |
| Educational | 0 | $0 | $0 | $0 |
| Government | 22 | $2,283,566 | $1,764 | $0 |
| Religious/Non-Profit | 9 | $3,112,333 | $779 | $0 |
| Industrial | 13 | $11,782,839 | $881 | $3,480,759 |
| Garage/Outbuilding | 0 | $0 | $0 | $0 |
| **Total** | **756** | **$87,308,302** | **$33,986,140** | **$18,987,085** |

*Table 48. Building Impacts in the Onota Lake Dam Inundation Area.*

| Building Type | Number of Buildings Impacted | Building Losses | Content Losses | Inventory Losses |
|---|---|---|---|---|
| Single Family | 444 | $25,852,735 | $13,953,998 | $0 |
| Mobile Home | 0 | $0 | $0 | $0 |
| Multi-Family | 205 | $31,844,125 | $20,024,594 | $0 |
| Commercial | 56 | $12,152,984 | $3,741 | $14,796,972 |
| Agricultural | 7 | $279,722 | $384 | $709,354 |

| Building Type | Number of Buildings Impacted | Building Losses | Content Losses | Inventory Losses |
|---|---|---|---|---|
| Educational | 0 | $0 | $0 | $0 |
| Government | 22 | $2,283,566 | $1,764 | $0 |
| Religious/Non-Profit | 9 | $3,112,333 | $779 | $0 |
| Industrial | 13 | $11,782,839 | $881 | $3,480,759 |
| Garage/Outbuilding | 0 | $0 | $0 | $0 |
| **Total** | **756** | **$87,308,302** | **$33,986,140** | **$18,987,085** |

*Table 49. Building Impacts in the Pontoosuc Lake Dam Inundation Area.*

| Building Type | Number of Buildings Impacted | Building Losses | Content Losses | Inventory Losses |
|---|---|---|---|---|
| Single Family | 388 | $26,056,333 | $14,052,882 | $0 |
| Mobile Home | 0 | $0 | $0 | $0 |
| Multi-Family | 274 | $51,133,203 | $33,102,215 | $0 |
| Commercial | 114 | $24,353,691 | $7,060 | $22,533,600 |
| Agricultural | 13 | $680,372 | $798 | $1,760,402 |
| Educational | 0 | $0 | $0 | $0 |
| Government | 21 | $2,507,964 | $1,868 | $0 |
| Religious/Non-Profit | 13 | $2,615,360 | $1,243 | $0 |
| Industrial | 23 | $8,930,537 | $1,607 | $2,804,153 |
| Garage/Outbuilding | 0 | $0 | $0 | $0 |
| **Total** | **846** | **$116,277,461** | **$47,167,672** | **$27,098,155** |

*Table 50. Building Impacts in Upper Sackett Reservoir Inundation Area.*

| Building Type | Number of Buildings Impacted | Building Losses | Content Losses | Inventory Losses |
|---|---|---|---|---|
| Single Family | 457 | $64,538,435 | $32,779,364 | $0 |
| Mobile Home | 0 | $0 | $0 | $0 |
| Multi-Family | 0 | $0 | $0 | $0 |
| Commercial | 1 | $548,136 | $83 | $0 |
| Agricultural | 0 | $0 | $0 | $0 |
| Educational | 2 | $3,969,830 | $110 | $0 |
| Government | 7 | $1,247,061 | $633 | $0 |

| Building Type | Number of Buildings Impacted | Building Losses | Content Losses | Inventory Losses |
|---|---|---|---|---|
| Religious/Non-Profit | 1 | $60,972 | $90 | $0 |
| Industrial | 0 | $0 | $0 | $0 |
| Garage/Outbuilding | 0 | $0 | $0 | $0 |
| **Total** | **468** | **$70,364,434** | **$32,780,280** | **$0** |

Climate change will increase the probability and magnitude of dam breach impacts to the built environment. New development in the City should consider these projected conditions.

***Population Impacts***

The City should be aware that senior and low-income segments of Pittsfield'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. The dam inundation areas have high percentages of these vulnerable populations including those in Environmental Justice areas. Access to information about the hazard event may be lacking, 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 City should be aware of the potential needs of residents within these population segments in the event of a hazard occurrence.

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

***Environment Impacts***

One of the major environmental impacts of a major flood would be the potential release of hazardous materials. According to EPA's TRI database, 261 facilities that contain hazardous materials are in the dam breach area including five Brownfields sites and a Superfund site.

Climate change will increase the probability and magnitude of dam breach 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 Dam Failure and Overtopping

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

*Table 51. Problem Statements Related to Dam Failure and Overtopping.*

| Assets | Problems Associated with Dam Failure and Overtopping |
|---|---|
| People (including underserved communities and socially vulnerable populations) | • Older populations in the potential downstream inundation area may have difficulty evacuating, particularly in a short time frame. |
| Structures (including facilities, lifelines, and critical infrastructure) | • These three dams are of most concern in Pittsfield:<br>  ○ The most significant concern for Pittsfield is the condition of the Bel Air Dam on Wahconah Street. This dam is scheduled for removal.<br>  ○ The Pecks Lower Pond dam (locally called the Betty Gilette Dam) is the next-highest concern.<br>  ○ The private dam at 321 Lebanon Avenue (sometimes known as Grist Mill Dam) is the third-highest concern among all dams in Pittsfield.<br>• Local officials sometimes do not routinely receive copies and updates of EAPs for privately owned dams. Without these documents, it is harder for emergency personnel to characterize the potential downstream risks and prepare for a potential breach event.<br>• When engineered, dam spillways were often designed to pass a discharge for a particular historic storm recurrence interval. As the frequency and magnitude of precipitation events changes, these spillways are becoming undersized relative to their design standard which places downstream areas at increased risk of experiencing inundation from a dam failure.<br>• High hazard dams could impact multiple towns which could benefit from more communication and cooperation.<br>• Some of the dams are undocumented by the State and USACE. |

| Assets | Problems Associated with Dam Failure and Overtopping |
|---|---|
| Systems (including networks and capabilities) | • Roads may be impacted by a dam breach, potentially impacting City capabilities to respond to events. |
| Natural, historic, and cultural resources | • 48 historic sites may be impacted during a dam breach. |
| 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.

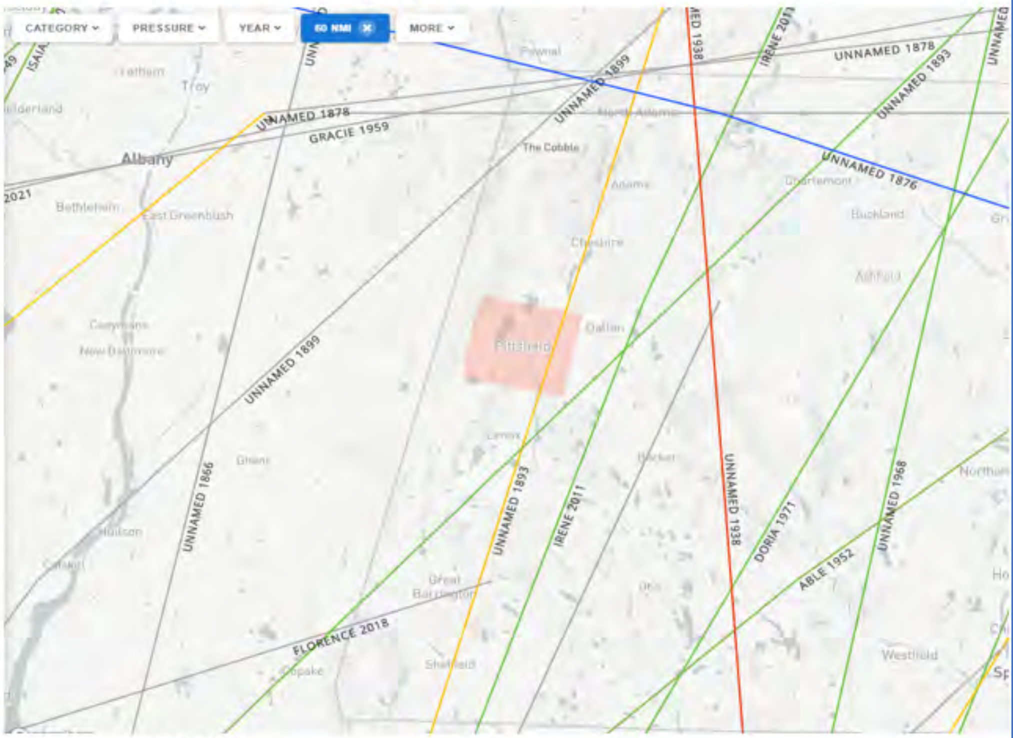
### Location

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

### 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 City of Pittsfield




*Graphic courtesy of NOAA*

A number of tropical storms and hurricanes have passed near or through Pittsfield since recordkeeping began. Unnamed storms crossed through the city in 1878, 1893, and 1968; the two earlier storms were hurricanes and believed likely to have caused widespread damage in the area. 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 was the most recent damaging storm, causing widespread wind damage in the region.

*Figure 16. Historical Tropical Storm Tracks In Pittsfield.*

As noted elsewhere, this Plan update relies primarily on a ten-year lookback (2014 through 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:

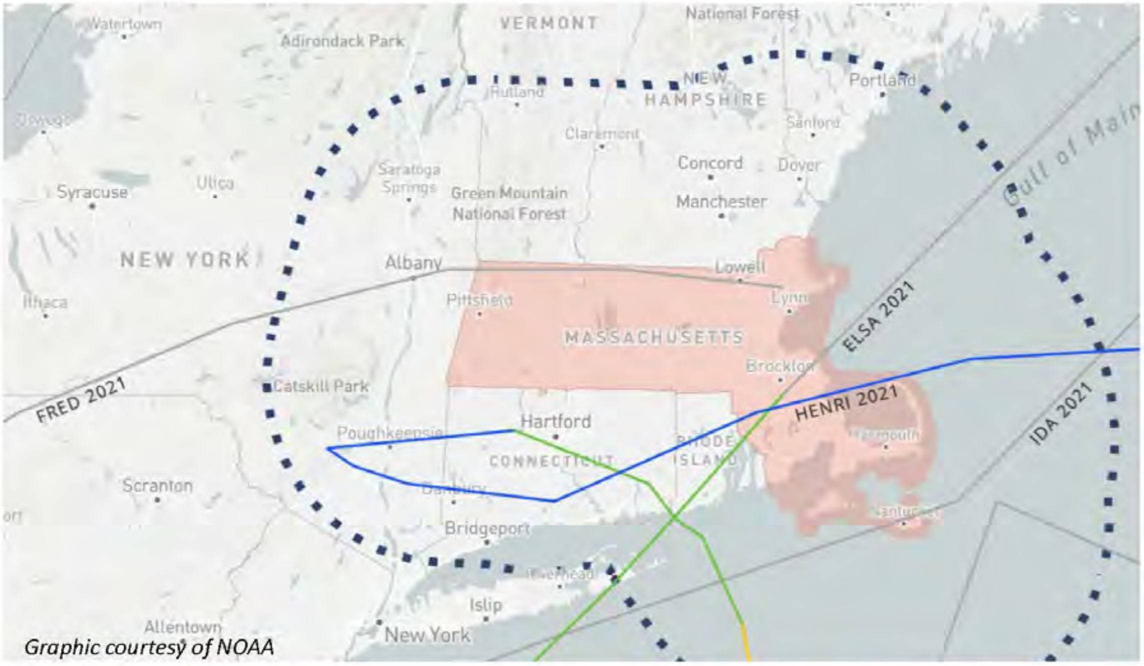
- August 4, 2020: Tropical Storm Isaias tracked northeast from the eastern Carolinas across the mid-Hudson Valley and into New England. The center of the storm passed close to Albany, NY on August 4th. This storm brought tropical storm force winds and moderate rainfall to western Massachusetts through 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 City of Pittsfield, Peru, Hinsdale and northwest of Dalton. Large tree limbs were also downed in the Town of Richmond.

Pittsfield 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. Henri - August 22-23, 2021
- T.D. Ida - September 1, 2021

Although Pittsfield experienced precipitation impacts from these events, the HMPC noted that flooding did not result from any of the four named storms in 2021. The HMPC did not identify any specific areas prone to tropical storm and hurricane wind damage in Pittsfield but noted that it was a significant concern apart from the flooding caused by these storms.

## Impacts of the 2021 Hurricane Season on Massachusetts




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

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

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

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

*Figure 17. Tracks for Tropical Storms that Impacted Massachusetts 2021.*

Even without the presence of a catastrophic hurricane striking Pittsfield 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 52. Saffir-Simpson Scale.*

**Saffir-Simpson Hurricane Wind Scale**

| | Sustained Winds | Types of Damage Due to Hurricane Winds |
|---|---|---|
| **1** | 74-95 mph<br>64-82 kt<br>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<br>83-95 kt<br>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<br>96-112 kt<br>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<br>113-136 kt<br>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<br>137 kt or higher<br>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 Pittsfield, as they are used throughout Massachusetts on a routine basis and appropriately characterized the previous storms that posed risks to Pittsfield.

### 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. In Berkshire County, hurricanes and tropical storms are generally limited to the months of August, September, and October, with a few storms arriving in May, June, July, or November.

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 Pittsfield 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 Pittsfield should be considered exposed to high winds while specific areas are exposed to hurricane surge. Figure 18 shows the 100-year wind speeds identified in the American Society of Civil Engineers (ASCE) 7-98 publication.

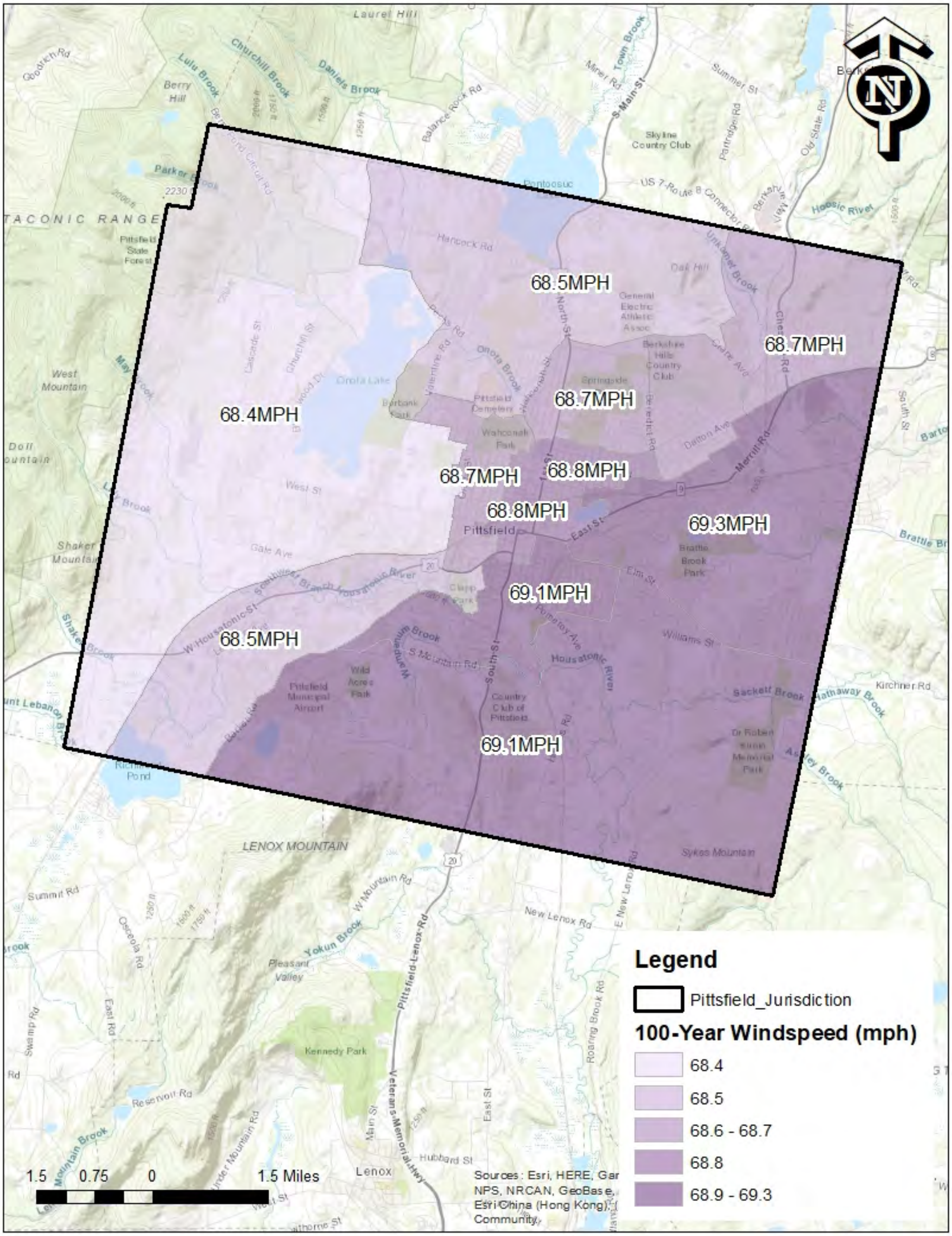



*Figure 18. 100-Year Windspeeds (ASCE 7-98).*

***Built Environment Impacts***

To identify built environment impacts to the City 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 53, while the results for the 1000-year event are shown in **Error! Reference source not found.** The City of Pittsfield's AAL is calculated to be $646,429.

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

| Loss Type | Residential ($Million) | Commercial ($Million) | Other Occupancy ($Million) | Total ($Million) |
|---|---|---|---|---|
| Building Loss | 34.33 | 4.58 | 3.47 | **42.38** |
| Content Loss | 10.83 | 0.82 | 1.05 | **12.70** |
| Business Inventory Loss | 0.00 | 0.11 | 0.01 | **0.12** |
| Business Income Loss | 0.00 | 0.36 | 0.18 | **0.54** |
| Business Relocation Loss | 1.01 | 0.46 | 0.38 | **1.85** |
| Rental Income Loss | 0.70 | 0.19 | 0.03 | **0.92** |
| Wage Loss | 0.00 | 0.39 | 0.68 | **1.07** |
| **Total** | **46.87** | **6.91** | **5.80** | **59.58** |

*Table 54. Building Losses Due to Wind for a 1000-Year Scenario.*

| Loss Type | Residential ($Million) | Commercial ($Million) | Other Occupancy ($Million) | Total ($Million) |
|---|---|---|---|---|
| Building Loss | 54.75 | 8.19 | 6.13 | **69.07** |
| Content Loss | 17.47 | 1.67 | 2.04 | **21.18** |
| Business Inventory Loss | 0.00 | 0.20 | 0.19 | **0.39** |
| Business Income Loss | 0.00 | 0.72 | 0.33 | **1.05** |
| Business Relocation Loss | 2.24 | 0.96 | 0.80 | **4.00** |

| Loss Type | Residential ($Million) | Commercial ($Million) | Other Occupancy ($Million) | Total ($Million) |
|---|---|---|---|---|
| Rental Income Loss | 1.44 | 0.40 | 0.09 | **1.93** |
| Wage Loss | 0.00 | 0.98 | 2.02 | **3.00** |
| **Total** | **75.90** | **13.12** | **11.60** | **100.62** |

***Population Impacts***

Populations considered most vulnerable to hurricane and tropical storm impacts in Pittsfield 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 is important to maintain the building envelope during the event. If a window or door fails, damage to the structure will be much greater. The senior and low-income populations in Pittsfield are particularly susceptible to extreme winds and it should be noted that there may be overlap within the two categories. The City 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 13 displaced households and 7 people seeking temporary public shelter from the high windspeeds. For the 1000-year event, Hazus predicts that there will be 35 displaced households and 21 people seeking temporary public shelter from the high windspeeds. Participants in the Pittsfield HMPC #1 Meeting (October 29, 2024) listed the following facilities operating as emergency shelters: Taconic High School; the Church ("The Pearl") located at 55 Fenn Street; and the family shelter (through Service Net) located at 320 Onota Street. During the Pittsfield HMPC #2 Meeting (December 18, 2024), the Reed Middle School was identified as a shelter, with a back-up facility identified as the field house at Berkshire Community College, and it was noted that the Sheriff's Department now has a mobile generator.

***Environment Impacts***

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

Participants in the Pittsfield HMPC #1 Meeting (October 29, 2024) noted that the Eversource Power Company implements a program to mitigate risk from tree limbs cutting down power lines and that the City wants to implement a similar program but currently lacks the resources (time, personnel, funds) to do so.

### Problem Statements for Hurricanes/Tropical Storms

*Table 55. 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.<br>• Wind damage to wind-susceptible buildings such as carports, greenhouses, pavilions, gazebos, and open-walled buildings. Additional damage to commercial buildings with HVAC located on roofs.<br>• The electric grid may go down during a high wind event. |
| Systems (including networks and capabilities) | • First responders may have difficulty reaching people if roads are closed due to tree debris. |
| Natural, historic, and cultural resources | • Historic buildings may experience damage during high wind events, especially the roofing and windows. Water entering these buildings could impact important historic and cultural artifacts. |
| Activities that have value to the community | • A severe hurricane wind and rain event could negatively impact outdoor activities in the City. |

## 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 Pittsfield is believed at risk for invasive species propagation.

The City of Pittsfield Open Space & Recreation Plan 2019-2026 (OSRP) notes that “the geologic and soil conditions that provide the marble valley ecoregion with its vast array of unique plant communities also provides advantageous conditions for the establishment and proliferation of invasive plants.”

### 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 56. Statewide Budgets for Addressing Invasive Species.*

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

The 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.

According to the CRB report (2019), oak, hemlock, maple, ash, and pine trees are all in decline either due to pests (e.g., Emerald Ash Borer, Hemlock Wooly Adelgid, and Asian Longhorned Beetle) or changing climate. Invasive plants such as oriental bittersweet, multiflora rose, two types of swallowwort, and several non-native honeysuckles threaten upland areas, while riparian and aquatic habitats are severely threatened by common reed, Japanese knotweed, invasive water chestnut, hydrilla, purple loosestrife, and Eurasian milfoil. Invasive fauna such as zebra mussels also threaten aquatic habitats and also threaten submerged infrastructure such as drain pipes.

The OSRP notes that removal of invasive species and reestablishment of cattail habitat has been conducted as part of the General Electric cleanup of ploy-chlorinated biphenyls (PCBs) in the Housatonic River system. Significant infestations of purple loosestrife are present along the Housatonic River and its tributaries, and Eurasian milfoil, curly-leaf pondweed, and water chestnut require extensive management efforts in both Onota and Pontoosuc Lakes. There is also concern about zebra mussel which is present in the Housatonic River downstream of these lakes. Furthermore, MassAudubon identifies the Pontoosuc and Onota Lakes, Mud Pond, and Richmond Pond as Important Bird Area habitat and breeding habitat for the Marsh Wren. According to the OSRP, MassAudubon cites invasive plants as one of the greatest threats for long-term protection of these habitats. Finally, hardy kiwi vine is impacting Burbank Park at Onota Lake, requiring hand pulling efforts to prevent it from becoming the dominant vegetation.

Over the course of the meetings held during the development of this plan, the HMPC confirmed that the Emerald Ash Borer (first found nearby in Dalton) has caused significant damage and killed many trees in Pittsfield. The OSRP notes that the Wild Acres conservation land is particularly infested, with the City cutting several acres of trees in the active recreational areas to protect public safety. Approximately 50 to 70 ash trees are cut each year at a cost of thousands of dollars per year. Gypsy moth damage comes and goes, but is likely worse during droughts and they remain concerned.

### 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 57. 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 Pittsfield. If invasive terrestrial and aquatic vegetation become problematic in Pittsfield, 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 City has the potential to be exposed to invasive pests. Climate change will make the area more attractive to pests that have not been found there traditionally.

During the Pittsfield HMPC #1 Meeting (October 29, 2024), it was noted that Zebra Mussels have been found in both Onota and Pontoosuc Lakes.

***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 City 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 58. Problem Statements for Invasive Species.*

| Assets | Problems Associated with Invasive Species |
|---|---|
| People (including underserved communities and socially vulnerable populations) | • Nonapparent or projected. |
| Structures (including facilities, lifelines, and critical infrastructure) | • Nonapparent or projected. |

| | |
|---|---|
| Systems (including networks and capabilities) | • Additional City resources may be required in terrestrial and aquatic areas to control the species of concern. |
| Natural, historic, and cultural resources | • Vegetation favored by Spotted lanternfly will likely become a larger concern over the next few years. |
| 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 lacustrine or marine clays are found, 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.

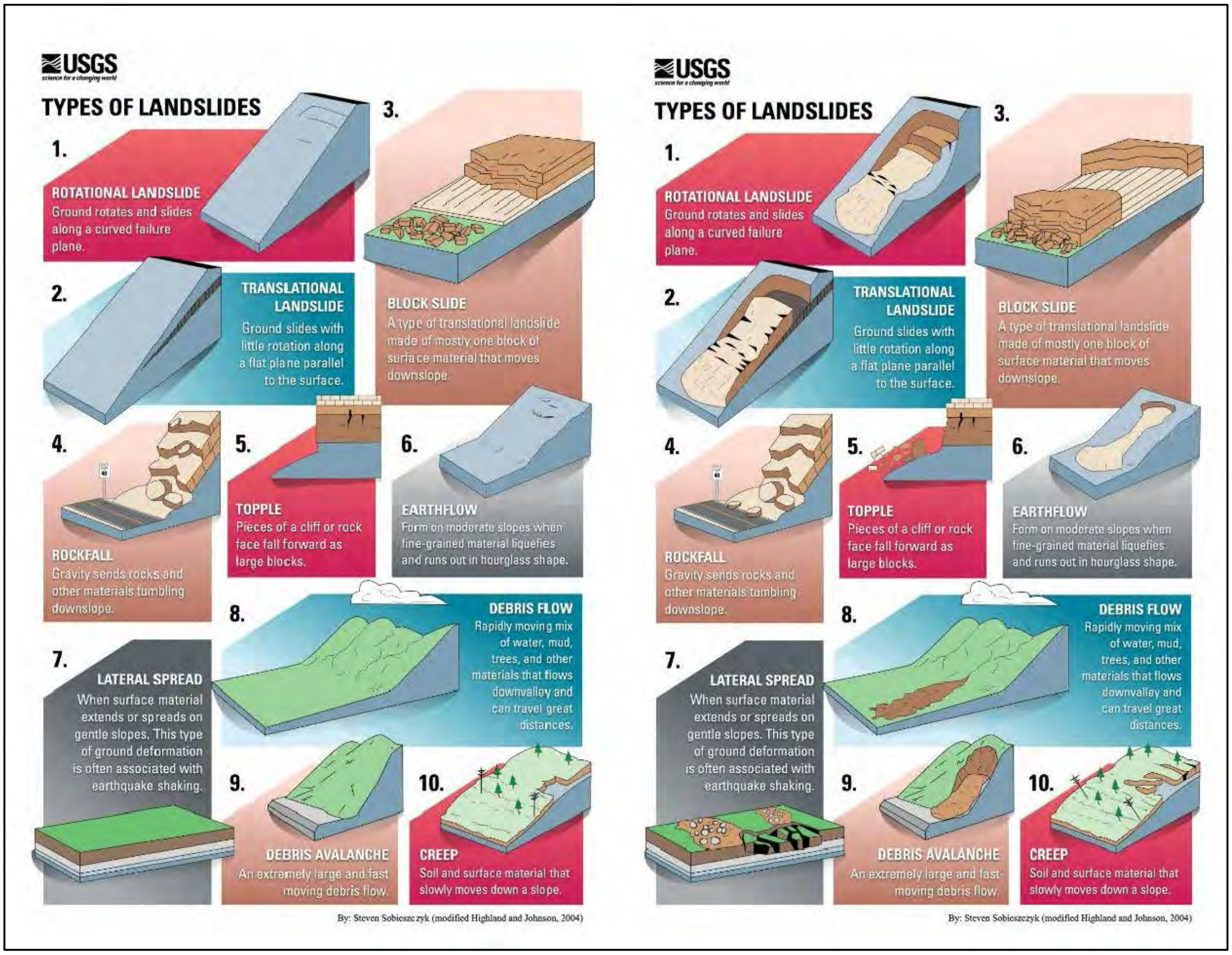



*Figure 19. Types of Landslides.*

## Location

In 2013, the Massachusetts Geological Survey and University of Massachusetts Amherst published a Slope Stability Map of Massachusetts (Figure 20). 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 Pittsfield, although the previous HMP notes that "there is not an area in Pittsfield designated as susceptible to landslides". The previous HMP noted that the dams in the region posed a risk of landslide.

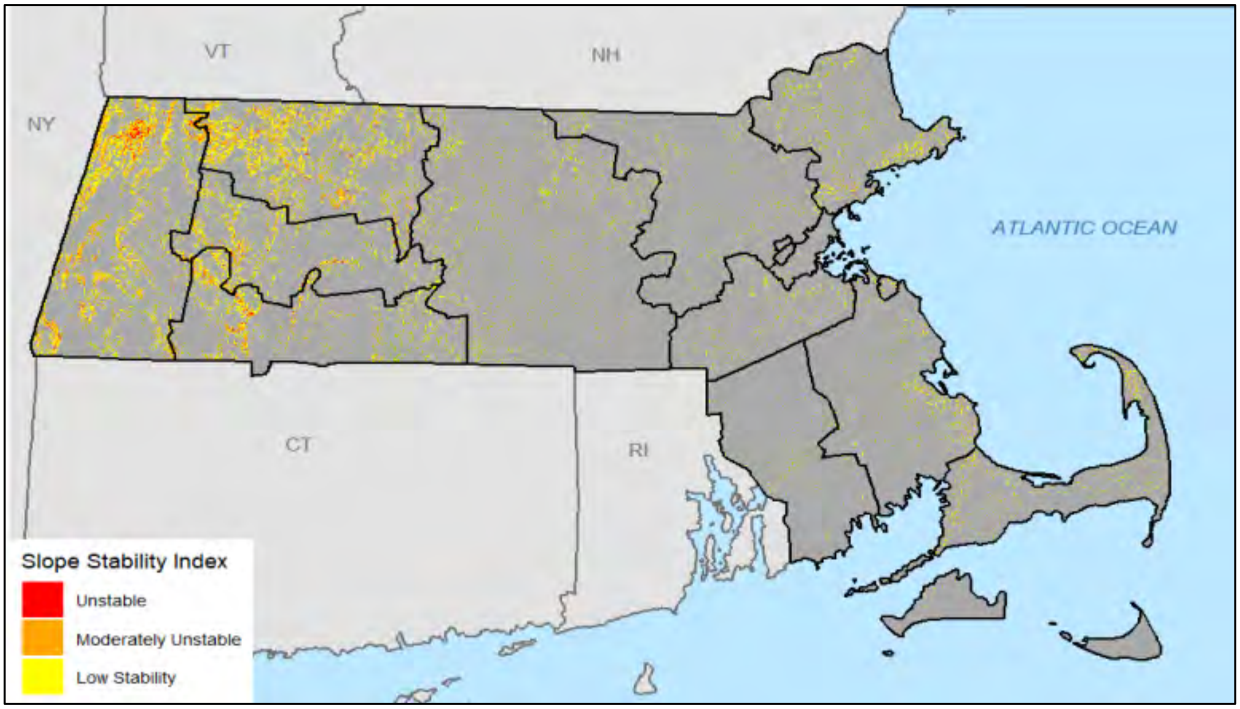



*Figure 20. Slope Stability Map of Massachusetts (Created by ERG using data from Mabee & Duncan (2013)).*

### 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."

According to the previous HMP, previous instances of landslides in Pittsfield were unknown and it was considered unlikely that a landslide would be experienced in the future. During this update, the HMPC did not have any concerns about landslides affecting critical facilities.

### 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 20), 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 Pittsfield and have only occasionally been used in Massachusetts. However, if a significant or damaging landslide occurred in Pittsfield, 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. As noted above, the previous HMP considered it unlikely that a damaging landslide would be experienced in Pittsfield in the future. For these reasons, the probability of future occurrence is believed low.

### 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.

Participants in the Pittsfield HMPC #1 Meeting reported increased awareness of the issue following the landslide that happened as a result of the flash flood in Leominster, MA, in September 2023.

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

The other building data was overlaid with the unstable and moderately unstable areas. There were 42 buildings found in the moderately unstable area and no buildings found in the unstable areas. Table 59 shows the result of this analysis.

*Table 59. Buildings in Moderately Unstable Area.*

| Building Type | Number of Buildings (Total in City) | Building Value (Total in City) |
|---|---|---|
| Single Family | 31 (16,264) | $5,553,483 ($2,767,968,691) |
| Mobile Home | 0 (195) | $0 ($12,406,818) |
| Multi-Family | 6 (396) | $815,771 ($2,109,797,827) |
| Commercial | 2 (1,057) | $1,601,043 ($1,818,754,103) |
| Agricultural | 0 (213) | $0 ($118,667,167) |
| Educational | 0 (59) | $0 ($1,049,453,443) |
| Government | 0 (293) | $0 ($569,875,929) |
| Religious/Non-Profit | 1 (161) | $1,576,532 ($419,697,742) |
| Industrial | 2 (220) | $374,597 ($840,169,491) |
| Garage/Outbuilding | 12 (89) | $0 ($5,482,819) |
| **Total** | **42 (22,115)** | **$9,921,427 ($9,712,274,032)** |

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

Figure 21 shows the landslide susceptibility map for the City. The red and pink areas are more susceptible to landslides.

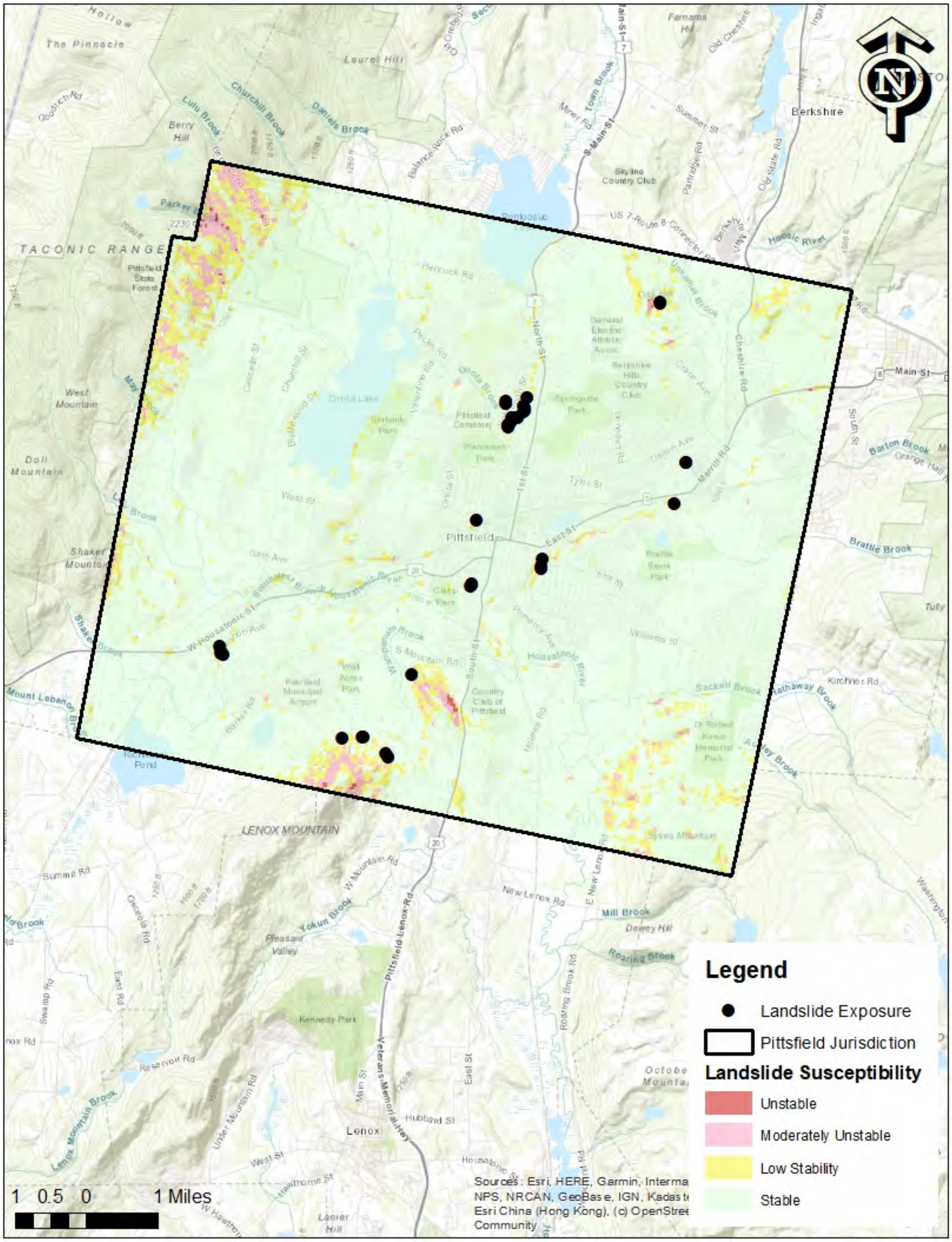



*Figure 21. Landslide Susceptibility Map.*

***Built Environment Impacts***

Historic data for landslide events indicate that between 1993 and 2022, no landslide events were recorded in Pittsfield. 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 $236,224, this would result in an AAL of $2,362.

***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 City should be aware of the potential needs of residents within the elderly and low income population segments in the event of a hazard occurrence.

***Environment Impacts***

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

### Problem Statements for Landslides

*Table 60. Problem Statements for Landslides.*

| Assets | Problems Associated with Landslides |
|---|---|
| People (including underserved communities and socially vulnerable populations) | • Vulnerable populations in isolated areas may be cut off if a landslide impacts specific roads. |
| Structures (including facilities, lifelines, and critical infrastructure) | • Some residential and other structures reside within and adjacent to moderately unstable areas and could be impacted. |
| Systems (including networks and capabilities) | • Roads and rail may be impacted and could cause a hazardous material spill. |
| Natural, historic, and cultural resources | • Parks and other natural areas reside in or adjacent to the unstable or moderately unstable areas. |

| Assets | Problems Associated with Landslides |
|---|---|
| | • Participants in the Pittsfield HMPC #1 Meeting mentioned that the U.S. Fish & Wildlife Service Land and the State Recreation Land are vulnerable to landslides due to the high slope areas.<br>• Increased precipitation intensity and invasive species' impacts to forests may influence future landslide risks. |
| Activities that have value to the community | • None apparent or projected |

## Other Severe Weather

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

The City of Pittsfield Community Resilience Building Workshop Summary of Findings (2019) lists "intense wind and rain" (severe storms) as one of the top hazards of concern.

### Description

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

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

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

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

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

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

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

### Location

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

### Previous Occurrences

The NOAA Storm Events database (https://www.ncdc.noaa.gov/stormevents/) for Berkshire County lists numerous severe storms affecting the area of Pittsfield from 2014 through 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 61. NCEI Severe Storm Database Entries Covering Other Severe Storms in Pittsfield.*

| Date | Description | Losses Reported |
|---|---|---|
| 7/2/14 | *Thunderstorm Wind:* A warm southerly flow allowed for temperatures to reach well into the 80s to near 90 on Wednesday, July 2nd. In addition, it was rather humid with dewpoints nearing 70 degrees. With the warm and humid conditions in place, the atmosphere became quite unstable during the afternoon and evening hours. This caused thunderstorms to develop during the afternoon hours. A few of these storms became severe, producing wind damage to trees and power lines. In addition, the very humid air mass in place gave the storms the capability of producing very heavy rainfall in a short period of time. This allowed for one of the storms to produce flash flooding in the Pittsfield area, making travel difficult. | --- |
| 7/7/14 | *Thunderstorm Wind:* A warm and humid air mass was in place over western Massachusetts during the afternoon and evening hours on Monday, July 7th, which allowed the atmosphere to become quite unstable. As an upper level shortwave trough moved towards the area, clusters of thunderstorms developed over eastern New York and moved into western Massachusetts by the evening hours. These thunderstorms, although not overly tall, were able to bring very strong winds aloft down to the surface, producing damaging wind gusts to trees and power lines. Trees and wires were reported down in Pittsfield due to wind damage, including some that landed on cars. | --- |
| 7/27/14 | *Thunderstorm Wind:* A strong area of low pressure was situated over the Great Lakes region on Sunday, July 27th. An upper level shortwave, combined with an approaching warm front, allowed for a cluster of strong to severe thunderstorms to break out during the afternoon hours on July 27th over eastern New York, which spread into western Massachusetts during the late afternoon hours. In addition to straight-line wind damage and large hail, the area of thunderstorms also produced an EF1 tornado in Dalton, causing damage to trees and homes. Heavy rainfall from thunderstorms led to flash flooding, especially in the urbanized areas around Pittsfield. Trees were downed on Holmes Road in Pittsfield due to thunderstorm winds. | --- |

| Date | Description | Losses Reported |
|---|---|---|
| 5/27/15 | *Thunderstorm Wind:* With high pressure situated just off the eastern seaboard, a southerly flow allowed for a very warm and humid air mass to move into western Massachusetts. Temperatures reached well into the 80s F with dewpoint temperatures into the 60s F as well. An approaching upper level disturbance, aided by a surface pre-frontal trough, allowed thunderstorms to develop in the late afternoon hours. Although instability was limited due to areas of cloud cover in place, thunderstorms were able to organize into lines. As a result, some of these thunderstorms became severe, producing damaging winds. Trees were reported down in Pittsfield due to thunderstorm winds. | --- |
| 8/4/15 | *Hail.* A warm air mass was situated over the region on Tuesday, August 4th. An upper level disturbance was located north of the region over eastern Canada, while a surface cold front was slowly moving towards western Massachusetts from the west. Ahead of this cold front, clusters of thunderstorms developed over eastern New York and spread into the Berkshires during the afternoon hours. With cooler temperatures moving in aloft, the thunderstorms were prone to developing hail, with some hailstones as large as one inch in diameter. Quarter size hail was reported at the intersection of Dalton Avenue and Westminster Avenue in Pittsfield, and penny-sized hail was reported in other areas of the City. | --- |
| 3/2/16 | *Strong Wind.* In the wake of a strong cold front, westerly winds became gusty across the Berkshires. Winds frequently gusted over 40 MPH throughout the day, resulting in some downed trees and power lines, mainly in the Richmond area. A few gusts reached around 45 MPH, including Pittsfield Airport, which reached 45 MPH at 2:30 PM EST. | $5,000 |
| 5/30/16 | *Thunderstorm Wind.* A warm and humid air mass was in place over western Massachusetts on Memorial Day (May 30th). With a cold front approaching from the west, lines of thunderstorms developed during the late afternoon and early evening hours and moved eastward across the region. One of these thunderstorms strengthened enough to become severe, producing damaging winds as it crossed across Berkshire County. Some trees and wires were downed due to these gusty winds. A large tree was reported down and on wires at the intersection of West Street and Westbrook | --- |

| Date | Description | Losses Reported |
|---|---|---|
| | Terrace in Pittsfield due to thunderstorm winds, and trees were reported down on Elm Street and Dorchester Avenue also. | |
| 8/12/16 | *Thunderstorm Wind.* With a warm and humid air mass in place, scattered thunderstorms developed during the late afternoon hours on Friday, August 12th. Although these thunderstorms had little upper level support, one of the thunderstorms produced damaging wind gusts to trees and power lines. Wires were reported down on Pecks Road in Pittsfield due to thunderstorm winds. | --- |
| 8/13/16 | *Thunderstorm Wind.* On the morning of Saturday, August 13th, a warm front lifted northward across the region. This allowed a very warm and excessively humid air mass to be in place over the area. Late in the day, a surface cold front was approaching the area from the west. An organized line of thunderstorms moved from west to east across all of eastern Upstate New York and crossed western Massachusetts during the evening hours. These storms produced gusty winds, which caused damage to some trees and power lines. In addition to the gusty winds, the thunderstorms also produced a significant amount of cloud-to-ground lightning. Numerous power outages were reported across the region as a result of the thunderstorms. Trees were reported down in Pittsfield due to thunderstorm winds. | --- |
| 2/25/17 | *Thunderstorm Wind.* A record warm airmass was in place prior to a sharp cold frontal passage Saturday, February 25, 2017. As the front tracked through the region in the evening, a line of severe thunderstorms developed, producing high winds and several damage reports. An observer measured a 69 mph gust, and around 100 trees were snapped or uprooted in a 100 yard-diameter swath at separate locations in Berkshire County. A tree was blown over at Cheshire Road near the Allendale Shopping Center in the Coltsville section of Pittsfield. | --- |
| 6/30/17 | *Thunderstorm Wind.* A fast moving upper level shortwave passed through the area during the afternoon hours on Friday, June 30th, 2017. With a warm and muggy air mass in place, this shortwave sparked off numerous strong to severe thunderstorms, which resulted in some downed trees across the Berkshires. A tree was down blocking the road at the intersection of Cherry Street and Willow Street in Pittsfield due to thunderstorm winds. | --- |

| Date | Description | Losses Reported |
|---|---|---|
| 8/12/17 | *Thunderstorm Wind.* After widespread rain moved through overnight associated with a warm front, early clouds gave way to breaks of sun ahead of an approaching cold front and upper level disturbance on Saturday, August 12th. Dewpoints were in the mid to upper 60s throughout the region with strong wind shear in place aloft. The upper level disturbance and an approaching cold front served as main focus for severe weather. Isolated reports of downed trees and wires occurred as thunderstorms moved across Berkshire County. Heavy rainfall also resulted in isolated flash flooding. A large tree and wires were down on a residence in Pittsfield. | --- |
| 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. The Pittsfield ASOS measured a wind gust of 41 mph. | $1,000 |
| 11/19/17 | *Strong Wind.* A strengthening low pressure system dragged a strong cold front through western New England after sunrise on November 19. Strong westerly winds occurred along the front and continued during the day behind the front. Winds gusted as high as 51 mph at Pittsfield Municipal Airport. | $1,000 to property and $1,000 to crops |
| 5/4/18 | *Thunderstorm Wind.* A powerful low pressure system formed on May 4th, pushing a strong cold front across New York and New England. A line of thunderstorms developed along this front and tracked into Western Massachusetts in the evening, resulting in several reports of downed trees in the Pittsfield area. A 58 mph gust was recorded at Pittsfield Municipal Airport (KPSF). Several trees were downed along Route 20 at Hancock Shaker Village. Trees were also downed on Melbourne Road, and MacArthur Street. | --- |
| 8/8/19 | *Thunderstorm Wind.* An upper level disturbance moved through the region ahead of a surface cold front, which sparked off strong to severe thunderstorms during the afternoon and evening hours of Thursday, August 8th, 2019. As a result, multiple trees and wires were downed across the region. | --- |

| Date | Description | Losses Reported |
|---|---|---|
| 5/15/20 | *Thunderstorm Wind.* On Friday, May 15, 2020, an intense line of thunderstorms quickly developed near Lake Ontario and raced eastward across eastern New York, reaching western Massachusetts by around 7:00 pm. The storms produced several reports of wind damage which were most concentrated in the Pittsfield and Great Barrington areas. A wind gust of 54 miles per hour was recorded at Pittsfield Municipal Airport. In Pittsfield, a tree was downed onto a house on Pecks Road, wires were down on Holmes Road, and a tree was downed across Route 8. | $2,000 |
| 10/7/20 | *Thunderstorm Wind.* A high-end severe weather event unfolded across the Northeast on Wednesday October 7, 2020. A line of thunderstorms originated across New York state and moved eastward into New England during the afternoon hours, producing widespread damage. Over a dozen reports occurred across Berkshire County. The Pittsfield Municipal airport measured a wind gust of 60 mph as the line moved through. One man was killed when a tree fell onto him on a golf cart at the Wyantenuck Country Club in Great Barrington. This event was classified as a serial derecho based on the 320-mile-long damage swath and distribution of significant wind gusts (75 mph and above). The fact that trees across the region were fully leafed exacerbated the resulting wind damage and produced widespread power outages. There were over 2,500 power outages across western Massachusetts. | $5,250 |
| 3/1/21 | *High Wind.* A strong cold front moved across the region on Monday, March 1 advecting in a much colder air mass along with a prolonged period of strong to locally damaging winds which continued into the early part of Tuesday, March 2. Wind gusts between 40 and 60 mph were common across the region, which led to some downed trees and power lines and isolated power outages. Key impacts: tree damage, power outages. A peak wind gust of 60 mph was recorded at the Pittsfield Municipal airport. | --- |
| 3/28/21 | *High Wind.* A strong cold front pushed across the region during the evening hours which resulted in a period of high winds into the afternoon hours on Monday, March 29. Wind gusts were generally in the 35 to 50 mph range, but a peak wind gust of 58 mph was recorded at the Pittsfield Municipal Airport. Trees were reported down across the region. One of these trees fell onto a vehicle, but the | $1,000 |

| Date | Description | Losses Reported |
|---|---|---|
| | individual in the vehicle was not injured. More than 3,000 people were without power as a result of the wind event. Key Impacts: tree damage, power outages. | |
| 7/20/21 | *Thunderstorm Wind.* A line of strong to severe thunderstorms pushed across western Massachusetts during the evening hours of Tuesday, July 20, 2021. These storms led to some downed trees near Pittsfield, including five trees being downed across Mountain Drive. | --- |
| 7/27/21 | *Thunderstorm Wind.* A couple of thunderstorms progressed from west to east across western Massachusetts ahead of an approaching cold front from the north during the afternoon hours on Tuesday, July 27, 2021. Damaging winds associated with these storms led to downed trees and power lines with the Town of Lenox being the area hardest hit. Two microbursts were confirmed in the Town of Lenox. A tree was downed on Balance Rock Road north of the City of Pittsfield, and one was downed on Circular Avenue in the City. | --- |
| 9/8/21 | *Thunderstorm Wind.* A line of strong to severe thunderstorms resulted in damage over western Massachusetts on Wednesday September 8, 2021. Wires were reported down on Wahconah Street in Pittsfield. | --- |
| 12/11/21 | *Strong Wind.* A strong cold front pushed across western Massachusetts during the evening hours on December 11, 2021. Seasonably mild air ahead of this front resulted in the development of a line of showers and embedded thunderstorms which pushed eastward bringing locally damaging winds across the region. Damage was concentrated across the Town of Cheshire. Widespread wind gusts in the wake of these showers and thunderstorms were between 40 and 57 mph. The Pittsfield Municipal Airport gusted to 51 mph. | --- |
| 3/7/22 | *Thunderstorm Wind.* A line of severe thunderstorms with damaging winds pushed through western Massachusetts during the evening hours of March 7, 2022 resulting in numerous reports of downed trees and powerlines. A wind gust of 65 mph was reported at Pittsfield Municipal Airport, and a tree was reported down on Richard Drive in Pittsfield. Around 1,900 customers lost power. | --- |

| Date | Description | Losses Reported |
|---|---|---|
| 8/4/22 | *Thunderstorm Wind.* Amid a hot and humid air mass, scattered thunderstorms developed during the afternoon hours across western Massachusetts on August 4, 2022. One storm became severe, downing some trees near Pittsfield. An additional tree was downed from an outflow boundary that moved through. Multiple trees were snapped or uprooted along Churchill Street in the City of Pittsfield. One of the trees fell onto a house. | --- |
| 4/1/23 | *Strong Wind.* A low pressure system moved across the region on April 1, 2023. A band of rain and embedded thunderstorms accompanied the system's cold front as it tracked from west to east. This brought widespread wind gusts between 40 and 55 mph along with a downed tree in the Town of Lee. A 56 mph wind gust was reported at the Pittsfield Municipal Airport. | --- |
| 7/13/23 | *Thunderstorm Wind.* A line of strong to severe thunderstorms ahead and along a cold frontal boundary resulted in widespread downed trees and wires across western Massachusetts during the afternoon and evening hours of July 13, 2023. | --- |
| 9/7/23 | *Thunderstorm Wind.* A frontal boundary and low pressure system located to the west and east of western Massachusetts was the focus for rounds of showers and thunderstorms each day September 7-8. Strong to severe thunderstorms were more widespread on September 7. These storms resulted in numerous reports of tree and powerline damage. In Pittsfield, trees and large branches were down at a property on Church Hill Street. Large branches were on multiple houses and multiple trees were uprooted. A tree was down on Pecks Road. A tree and wires were down on Alcove Street, Berkshire Avenue, and Stoddard Avenue. A tree was down on a house on Benedict Road. | --- |
| 2/28/24 | *High Wind.* Strong winds developed in the wake of a strong cold frontal passage on the afternoon of Wednesday, February 28th through the morning of Thursday, February 29th, 2024. Wind gusts throughout Berkshire County, Massachusetts ranged from about 35-65 mph. Reports came in of trees down on houses and roadways such that traffic was blocked or brief periods of time in the City of Pittsfield. | --- |

The HMPC reported that the City spends $120,000 per year cutting trees along roads and utility lines.

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 62. USDA Disasters Events That Refer to Severe Storms.*

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

### Extent

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

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 Pittsfield, 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 the City of Pittsfield is vulnerable to the high winds and/or flooding from a severe weather event.

***Built Environment Impacts***

Severe weather events, including high wind/strong wind, thunderstorms, and their associated wind, hail, and lightning events, brought about only minor property damage in Pittsfield in previous years. Based on review of the NCEI Storm Events Database, for Berkshire County, MA, from January 2011 to December 2024, a total of 491 events recorded in the County. Of the 491 events, 48 were hail and thunderstorm wind events recorded for Pittsfield and Pittsfield Municipal Airport. The 48 events had total recorded property damages of only $1,000; this equates to an AAL of $77 for the City.

***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. Based on review of the NCEI Storm Events Database, for Berkshire County from January 2011 to December 2024, the 491 events reported in all of Berkshire County recorded two deaths and one injury (no deaths or injuries were recorded in Pittsfield).

Populations considered most vulnerable to hail, microburst, and thunderstorm impacts in Pittsfield 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 Pittsfield are particularly susceptible to storms. The City 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 City may be out of service until trees are removed.

### Problem Statements for Other Severe Weather

*Table 63. Problem Statements for Other Severe Weather.*

| Assets | Problems Associated with Other Severe Weather |
|---|---|
| People (including underserved communities and socially vulnerable populations) | • People in Pittsfield have been disrupted by severe weather events (rain, snow, sleet, ice) and other more frequent wind and thunderstorm events. Vulnerable populations may be isolated if roads are closed. |
| Structures (including facilities, lifelines, and critical infrastructure) | • Given the frequency of events in and around Pittsfield, the impacts occur often and can occur anywhere in the City. |
| Systems (including networks and capabilities) | • First responders may have difficulty reaching people if roads are not plowed/treated or are closed due to tree debris. |
| Natural, historic, and cultural resources | • These can be adversely impacted depending on the specific locations of damage. |
| Activities that have value to the community | • These can be adversely impacted depending on the specific locations of damage. |

## Severe Winter Storms

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

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

### Description

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

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

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

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 Pittsfield.

According to the CRB report, roads throughout Pittsfield are vulnerable to snow and ice impacts. In general, the shifting weather patterns due to climate change are increasing the difficulty of maintaining roadways, with potholes and sinkholes becoming more problematic due to new patterns of freezing and thawing that are occurring. The deteriorating road conditions compromise emergency response times. The volumes of sand and salt required to keep the roads clear each winter is increasing, resulting in financial impacts and water quality impacts to downstream wetlands. The impacts of heavy snow loads on the City's aging, flat-roofed municipal buildings were also a concern.

During this plan update, the HMPC concurred with the CRB assessment and described the shifting snow and ice conditions during storms as resulting in "chaos" in the City. In addition, quicker accumulation of snow has been observed. Although winters are believed to be wetter (more rain) overall, ice on roadways has remained a challenge, with liquid treatment for ice more common now than in years past.

### 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 included the City of Pittsfield:

- 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***
  Pittsfield Impact: Snow plowing costs of $154,402.70

DR-4110 was likewise subject to a concurrent emergency declaration in Massachusetts. The PA assistance reimbursements associated with DR-4110 for the City totaled approximately $116,000. This indicates that severe winter storms comprise a notable expenditure for Pittsfield.

Since 2012, the City of Pittsfield has had two major winter storms that triggered the City to submit a request for reimbursement. These include the February 2013 blizzard above as well as:

- Severe winter storm: Snow plowing costs of $139,611.41
  Incident Period: March 7-8, 2018

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 2014-2024. A selection of events is provided below.

*Table 64. NCEI Severe Storm Database Entries Covering Winter Storms in Pittsfield.*

| Date | Description |
|---|---|
| 11/20/16 | A strong frontal boundary crossed the region during the early morning hours on Sunday, November 20th. Precipitation initially began as rain or a mix of rain and snow, but quickly transitioned over to just snow as colder air quickly worked its way into the region. The snowfall continued through the entire day on Sunday November 20th and into the day on Monday November 21st, especially across the highest terrain, as the persistent westerly flow caused upslope flow into the Berkshires. Snowfall tapered off the early evening hours on Monday and storm total amounts ranged from around 9 inches in Pittsfield to nearly 20 inches in Peru. |
| 2/7/18 | A winter storm brought mixed wintry precipitation to the region. Precipitation began as snow during the morning hours but changed to a mix of sleet, freezing rain and snow during the afternoon hours. Precipitation transitioned back to snow during the evening hours before exiting the region to the east. Snowfall and sleet totals ranged from 2 inches to 8 inches, with the higher totals north of Pittsfield. |
| 1/19/19 | A winter storm impacted western Massachusetts on January 19th and 20th. Snowfall broke out during the afternoon of the 19th, continuing heavy at times into the evening and overnight hours before ending during the morning of the 20th. The strong southerly flow brought above-freezing air aloft into the region, causing the snow to turn to sleet and freezing rain for a time around during the wee hours to the early morning of the 20th before turning back to snow. Snow and sleet totals ranged from around 6 inches around Pittsfield and Great Barrington to around 20 inches over the high terrain of the Berkshires. Ice accretion of up to 0.15 inches was recorded due to freezing rain. Frigid temperatures followed the snow for Monday and Tuesday, January 21st-22nd, with wind |

| Date | Description |
|---|---|
| | chills falling to -20 to -40F. The cold weather prompted the closing of schools and the opening of warming shelters across the region. |
| 12/16/20 | An area of low pressure tracked northward off the East Coast toward New York City on Wednesday, December 16, then eastward to just off Cape Cod on Thursday, December 17. As a result, cold enough air north of this low led to moderate to heavy snowfall across all of eastern New York and western New England. Snow started across the mid-Hudson Valley and northwestern Connecticut during the late afternoon hours on Wednesday, December 16 and then pushed farther north into western Massachusetts during the evening and overnight hours. Snow reached its peak intensity during the overnight hours before gradually winding down during the morning hours on Thursday, December 17. Bands of heavy snow occurred with snowfall rates of 1 to 2 inches per hour reported at times. Total snowfall across western Massachusetts generally ranged between 12 to 24 inches with the higher amounts across the northern Berkshires. Most area school districts across Berkshire County along with businesses and services were closed on Thursday, December 17. More than 11,000 power outages occurred in Pittsfield, Lee, Dalton and Lanesborough, most of which were short-lived. Key impacts: transportation delays, traffic accidents, power outages, school closures. |
| 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. Key impacts: Travel delays. Whiteout conditions observed for a period of ten minutes within one snow squall along with 0.8 inches of accumulation. |
| 3/11/24 | A moisture rich, strong low pressure system brought rain, wet snow and gusty winds to western Massachusetts from Saturday, March 9 through Monday, March 11, 2024. Berkshire county received snowfall accumulations ranging from 1-4 inches. Pittsfield declared a snow emergency in effect from March 10-11. Additionally, strong winds ranging from 40-60 mph were also reported across Berkshire County. Numerous road closures and power outages were reported as a result of downed trees and power lines. Key Impacts: power outages, travel delays, road closures. |
| 3/20/24 | A clipper system passing to the north of the region on March 20, 2024 lead to some upslope snow showers in western Massachusetts. Stronger forcing developed along the associated cold front as the system moved overhead, resulting in a couple of localized snow squalls. Significantly low visibilities were reported as a result of these squalls with gusty winds and thunder. Key Impacts: Travel delays. |

According to the CRB report (2019), the major snowstorm in late October 2011 caused widespread damage. Due to the unusual timing of the wet, heavy snow when leaves were still on the trees, the storm caused extensive tree damage and subsequent damage to electrical infrastructure resulting in extended power outages. This was following the substantial impacts of Hurricane Irene (late August 2011) and Tropical Storm Lee (September 2011) which also had substantial flooding impacts in Pittsfield.

According to the previous HMP, Pittsfield receives an average of 71 inches of snow per year. The most likely month for a winter storm to occur is January, while all of the severe winter storms that have affected Berkshire County have primarily occurred in December through March, with occasional storms occurring in October, November, and April.

The secondary impacts of snowfall are important considerations. When severe weather shuts down the entire City, the negative economic impacts to businesses is significant. Furthermore, there is increased vulnerability to prolonged power outages and particularly among the medically vulnerable populations of any age.

The City of Pittsfield has a Winter Storm Plan it follows to respond to winter storm events. This plan deals with snow, but not downed trees. Downed trees and wires are dealt with by emergency responders with the Police Department and Eversource coordinating on response.

### 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 65. RSI Scale.*

| Category | RSI Value | Event Description |
| --- | --- | --- |
| 1 | 1 to 3 | Notable |

| Category | RSI Value | Event Description |
|---|---|---|
| 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 Pittsfield, 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 Pittsfield.

### 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 City of Pittsfield 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 City should be considered exposed to the severe winter storm hazard.

***Built Environment Impacts***

The entire built environment of the City of Pittsfield 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 for extensive damage to occur about once every 10 years.

As Hazus doesn't support severe winter storms, and in the absence of other readily available severe winter storm models, historical data was used to determine potential losses and probabilities. Review of the data for severe winter storms (including blizzard, freezing fog, frost/freeze, heavy snow, ice storm, winter storm, and winter weather) recorded in the NCEI Storm Events Database reveals that between January 2014 and December 2024 (ten-year lookback), Berkshire County experienced 189 winter storm events, with no recorded deaths and two recorded injuries (no injuries in Pittsfield). The total property damage recorded was $1,000 for the winter storm events that occurred in Berkshire County from 2014 through 2024. This region's AAL is modeled to be $100.

***Population Impacts***

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

Some traffic accidents associated with storm events 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 Pittsfield are particularly susceptible and the City 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 City may be out of service until roads are cleared and trees are removed.

### Problem Statements for Severe Winter Storms

*Table 66. 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.<br>• The electrical grid and roadways are susceptible to failure and loss of use during storms. |
| Systems (including networks and capabilities) | • First responders may have difficulty reaching people if roads are closed due to road closures. |
| Natural, historic, and cultural resources | • Severe storms may damage trees in natural areas, and historical and cultural sites. |

| Assets | Problems Associated with Severe Winter Storms |
|---|---|
| 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. Pittsfield 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 16 tornadoes have occurred in Berkshire County between 1950 and 2016. Tornadoes in Berkshire County have only struck between the months March and October, and typically occur in the summer months. An EF-1 tornado struck nearby Dalton in July 2014, resulting in damage to trees and homes. The NOAA Storm Events database (https://www.ncdc.noaa.gov/stormevents/) for Berkshire County lists one tornado for the period 2014-2023.

Notwithstanding the many previous occurrences in Massachusetts, only one has touched down in Pittsfield (an F0 in 2004). This tornado touched down[63] near First Street and proceeded southeast across Second Street, Fourth Street, East Street, Newell Street, and Ontario Street before ending near Rueter Avenue. According to NOAA, the tornado caused no fatalities or injuries, but caused approximately $25,000 in property damage.

### 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.

[63] https://highwaysandhailstones.com/tornado/pittsfield-ma-f0-tornado-of-august-20-2004/

*Table 67. 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 Pittsfield, as they are used throughout Massachusetts on a routine basis and appropriately characterized the tornado (retroactively) that passed through Pittsfield. Recent 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***

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

***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 1951 until 2024, nineteen tornado events were recorded in Berkshire County, and they resulted in seven deaths, sixty injuries, and a total of $28.454 million in property damage. One of the tornado events was recorded in Pittsfield on August 20, 2004, with no deaths or injuries and $25,000 in property damage. The City’s average annual loss would be $342.45, while the County’s average annual loss would be estimated at $389,781.

***Population Impacts***

Populations considered most vulnerable to tornado impacts in the City of Pittsfield 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 Pittsfield are vulnerable. The City 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 City may be out of service until trees are removed.

### Problem Statements for Tornadoes

*Table 68. 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.<br>• People without basements are susceptible to tornado impacts. |
| Structures (including facilities, lifelines, and critical infrastructure) | • Structures and critical infrastructure can all be impacted by tornadoes.<br>• Roadways may be blocked due to downed trees and other debris. |
| Systems (including networks and capabilities) | • The electric and landline telephone grids may be impacted by winds and downed trees. |
| Natural, historic, and cultural resources | • Historic and cultural resources may be impacted by tornado winds.<br>• 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

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

### Description

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

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

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

### Location

The ResilientMass Plan identified areas in Barnstable, Essex, and Plymouth counties with the highest wildfire potential in the state. The ecosystems that are most susceptible to the wildfire hazard Include pine barrens in the Connecticut River Valley, marshes inundated with *Phragmites*, pine barrens and maritime grasslands in Martha's Vineyard, Nantucket, and Cuttyhunk, and the Myles Standish State Forest. Other portions of the Commonwealth are also susceptible to wildfire, particularly at the urban-wildland interface. Notwithstanding the location of Pittsfield in western Massachusetts, the presence of wildland interface and large open spaces at Springside Park, South Mountain, Oak Hill, and the Pittsfield State Forest makes Pittsfield a location with wildfire risk. According to the previous HMP:

- Springside Park has a high frequency of wildfires but low severity. The area has a buffer separating fuel from the residences, making the area relatively safe.
- South Mountain has a low frequency of wildfires but high severity. The steep terrain severely limits the ability of fire forces to operate safely. Steep gradients allow convected heat to dry out fuel load above the fire, causing flame to spread up the side of the mountain rapidly. The few buildings on the property – one house and the concert hall – could easily be endangered by a wind-driven fire. This is a difficult area in which to fight wildland fires, and the potential loss of these two buildings could easily exceed $1 million.
- Oak Hill has a high frequency for wildfire and moderate severity. This is an area of heavy, dense fuel load, and very tough to move through. Fires of recent past have been deep into the woods, not endangering any structures.

### 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 69. 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 Pittsfield:

*Table 70. Outdoor and Total Fire Event Figures for Pittsfield.*

| Year | Total Outdoor Fires | Total Fire Events | Reported Losses for Outdoor Fires |
|---|---|---|---|
| 2012 | 125 | 281 | $1,519,800 |
| 2013 | 78 | 213 | $2,439,864 |
| 2014 | 62 | 180 | $981,500 |
| 2015 | 96 | 239 | $697,410 |
| 2016 | 107 | 263 | $1,232,942 |
| 2017 | 70 | 193 | $2,239,355 |
| 2018 | 66 | 186 | $2,138,630 |
| 2019 | 75 | 157 | $2,274,402 |
| 2020 | 64 | 186 | Not available |
| 2021 | 42 | 145 | 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 Pittsfield is presented below. The previous HMP did not present estimated loss estimates for wildfires.

*Table 71. Estimated Brush Fire Event Figures for Pittsfield.*

| Year | Estimated Brush Fires | Estimated Brush Fire Losses |
|---|---|---|
| 2012 | 65 | $2,888 |
| 2013 | 41 | $4,636 |
| 2014 | 32 | $1,865 |
| 2015 | 50 | $1,325 |
| 2016 | 56 | $2,343 |
| 2017 | 36 | $4,255 |

| Year | Estimated Brush Fires | Estimated Brush Fire Losses |
|---|---|---|
| 2018 | 34 | $4,063 |
| 2019 | 39 | $4,321 |
| 2020 | 33 | $123* |
| 2021 | 22 | $85* |

*Estimated from Countywide figures

According to the Massachusetts DCR Bureau of Forest Fire Control and Forestry[64], October 2024 saw 588 acres burned across Massachusetts through 185 separate fires as of October 29th. The majority of the fires occurred during the last week of the month[65].

The previous plan did not quantify wildfire risk other than to say that at that time wildfires were of generally minor concern. Overall, Pittsfield experiences a small number of brush fires and wildfires each year. The previous edition of this plan did not provide an estimate of the average acreage burned per year.

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 72. USDA Disasters Events That Refer to Wildfires.*

| Year | Event | Event “Begin Dates” |
|---|---|---|
| 2016 | Drought, Wind/High Winds, Fire/Wildfire, Heat, Excessive Heat, High Temperatures, Insects | 7/5/2016 |

The fall 2024 wildfire season eclipsed the occurrences of the last few years in terms of the number of wildfires; a description is provided in the text box below.

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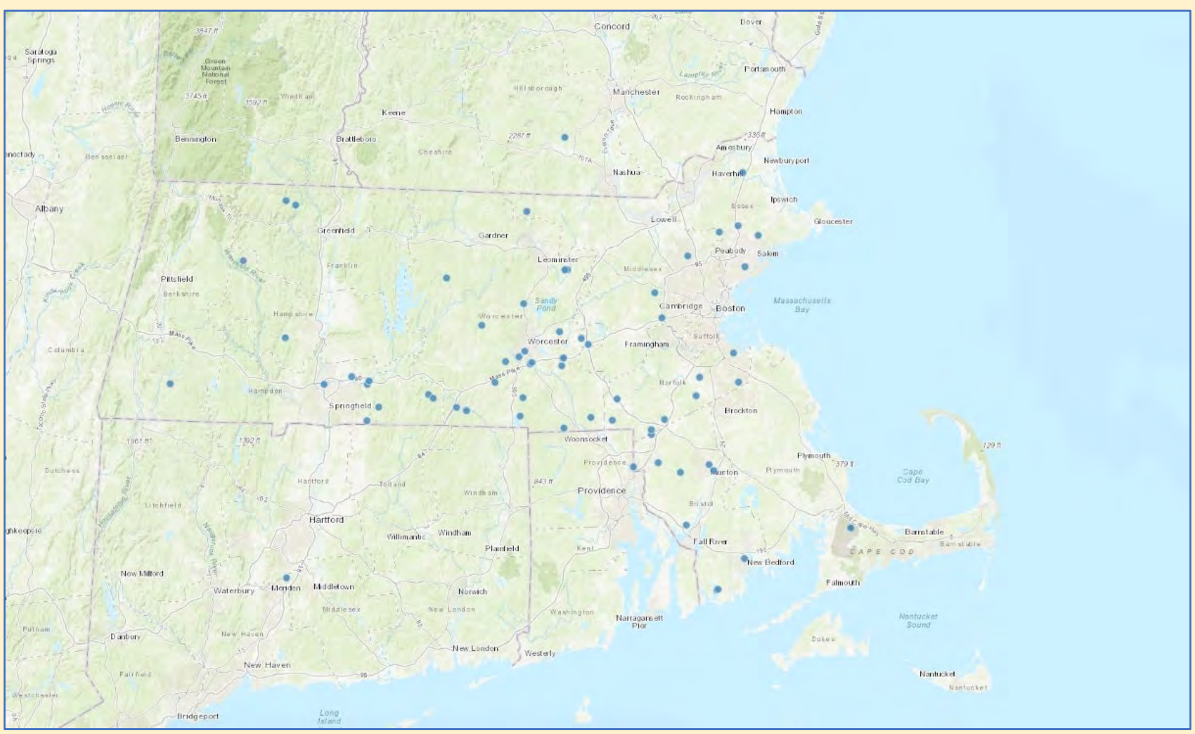
[64] “Massachusetts Wildfire Activity Briefing, October 29, 2024, as of 17:00”, https://www.wwlp.com/wp-content/uploads/sites/26/2024/10/Massachusetts-Wildfire-Activity-Briefing-10-29-24.pdf

[65] https://www.masslive.com/news/2024/10/wildfires-spread-across-massachusetts-amid-dry-windy-weather.html

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

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

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




*Wildfires in Massachusetts as of October 28, 2024. (National Interagency Fire Center)*

During the meetings that were convened for this plan update, the HMPC noted that some brush fires have occurred in Springside Park. 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 Pittsfield despite the fact that extensive wildfires have not 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. Consistent with the previous HMP and the ResilientMass plan, the probability of future wildfire events in Pittsfield remains low in the next five years. The following discussion helps characterize the risk further for Pittsfield.

### Vulnerability Assessment

#### *Exposure*

To help identify potential wildfire areas for the City of Pittsfield, 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. No critical facilities were identified in the 0.02% burn probability areas. Table 73 shows the results of this analysis.

*Table 73. Buildings in 0.02% Annual Chance Area.*

| Building Type | Number of Buildings (Total in City) | Building Value (Total in City) |
|---|---|---|
| Single Family | 2 (16,264) | $752,552 ($2,767,968,691) |
| Mobile Home | 0 (195) | $0 ($12,406,818) |
| Multi-Family | 0 (396) | $0 ($2,109,797,827) |
| Commercial | 0 (1,057) | $0 ($1,818,754,103) |
| Agricultural | 0 (213) | $0 ($118,667,167) |
| Educational | 0 (59) | $0 ($1,049,453,443) |
| Government | 0 (293) | $0 ($569,875,929) |
| Religious/Non-Profit | 0 (161) | $0 ($419,697,742) |
| Industrial | 0 (220) | $0 ($840,169,491) |
| Garage/Outbuilding | 12 (89) | $0 ($5,482,819) |
| **Total** | **2 (22,115)** | **$752,552 ($9,712,274,032)** |

The residential properties (i.e., the 2 single family buildings included in the table above or approximately 0.0118% of all homes in the City) located within the higher burn probability area represent the population exposed to the wildfire hazard. The population exposed to the 0.02% or greater annual chance wildfire is further broken down into demographic segments in Table 74. There is an older population exposed to the wildfire hazard compared to the City's overall demographics.

*Table 74. Population Exposed to 0.02% Annual Chance Wildfire (2020 U.S. Census).*

| Demographics | Population in and Adjacent to 0.02% Wildfire Area | Total Population |
|---|---|---|
| Population | 93 | 43,927 |
| Households | 50 | 21,738 |
| White | 91 (97.8%) | 34,924 (79.5%) |
| Black | 0 | 3,002 (6.8 %) |
| American Indian | 0 | 103 (0.2%) |
| Asian | 0 | 630 (1.4%) |
| Pacific Islander | 0 | 7 (0.02%) |
| Other Race | 0 | 1,768 (4.0%) |
| Two or More Races | 2 (2.2%) | 3,493 (8.0%) |
| Hispanic or Latino: | 0 | 3,539 (8.1%) |
| Population under 18: | 15 (16.1%) | 7,581 (17.3%) |
| Population over 64: | 25 (26.9%) | 9,092 (20.7%) |
| Annual Income < $30K/year | 4 (8.0%) | 6,383 (14.5%) |
| Population in EJ Zone*: | 0 | 21,356 (48.6%) |

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

The NOAA National Centers for Environmental Information (NCEI) Storm Events Database recorded one wildfire event in northern Berkshire County, Massachusetts, during the ten-year lookback period (January 2014 through December 2024). A wildfire started on East Mountain in the Clarksburg State Forest during the evening of Friday, May 14th. The fire burned 947 acres before it was contained on Tuesday, May 18th, making it the largest wildfire in Massachusetts since 1999. Around 120 professional and volunteer firefighters responded to the incident. One firefighter was hospitalized with undisclosed injuries. The fire resulted in the closure of several hiking trails in the area, including the Appalachian Trail. No structures were impacted as the fire remained in the unpopulated state forest.

During the Pittsfield HMPC #1 Meeting (October 29, 2024), it was noted that the wildfires in North Adams were in proximity to the City, and that some wildfires had occurred in Springside Park. Participants in the meeting mentioned that the wildfires in Canada had affected the community and limited the outdoor recreation and activities due to the air quality impacts.

During the Pittsfield HMPC #2 Meeting (December 18, 2024), it was noted that the Great Barrington fire (November 2024) posed a potential risk to the City of Pittsfield.

Figure 22 shows the burn probability map from the USFS overlaid on the City.

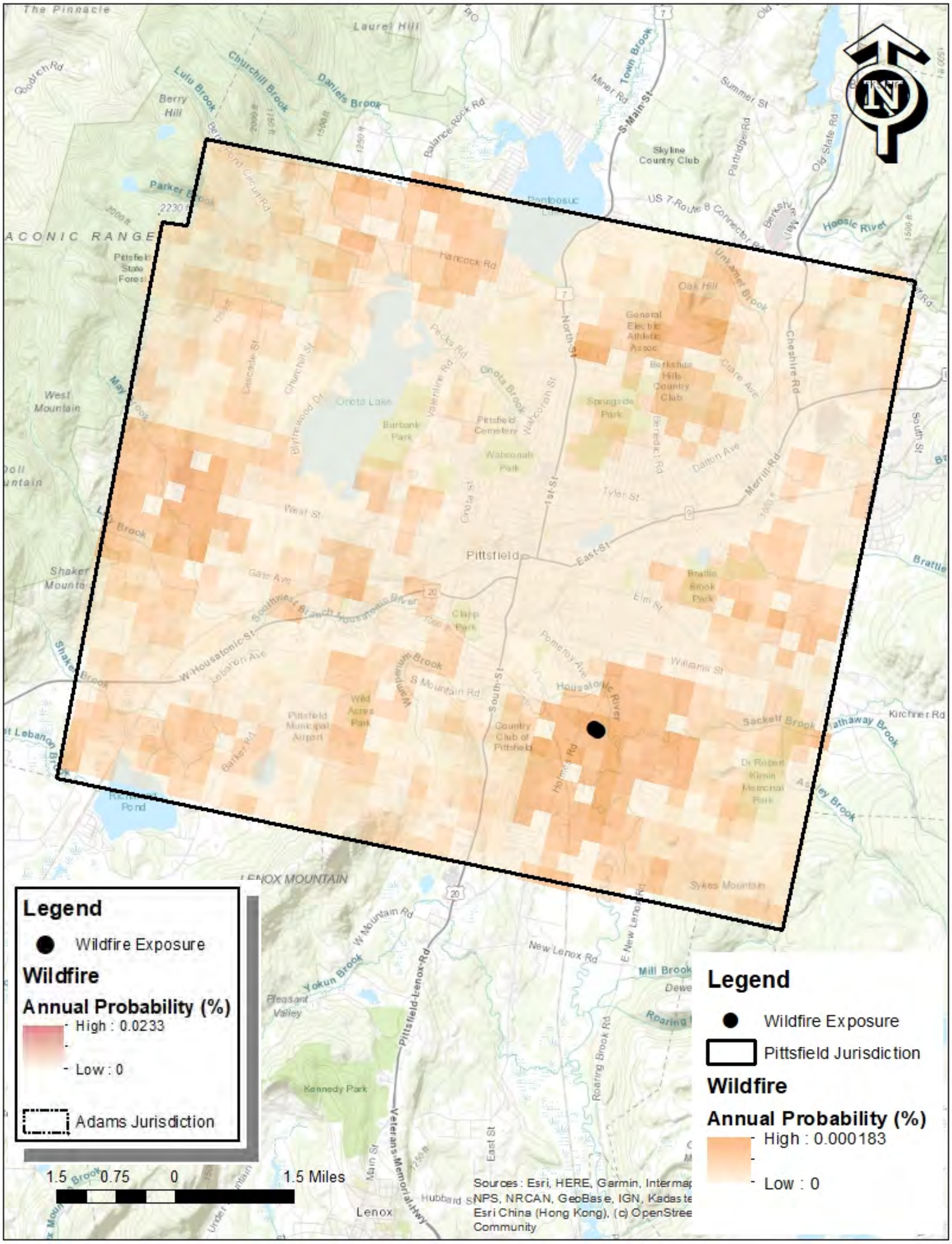



*Figure 22. Wildfire Burn Probability Map.*

***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.

Review of the NCEI Storm Events Database indicates that no wildfire events were recorded in Pittsfield from January 2014 through December 2024. Accordingly, no property damage, injuries, or deaths have been reported associated with wildfires in Pittsfield during the same period, 2014-2024. Using the wildfire probabilities and building values, based on the single event recorded for Berkshire County, a loss estimate was produced for the .02% scenario. The losses are $752,552 for the .02% event and the AAL for the County will be $151.

***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 Pittsfield are particularly susceptible to wildfires. The City should be aware of the potential needs of residents within these population segments in the event of a hazard occurrence.

Air quality can also be impacted due to major wildfires. The Canadian wildfires in 2022 impacted the air quality of communities throughout Massachusetts, and the Canadian wildfires in 2024 impacted the air quality in counties in western and central Massachusetts. Individuals with asthma and smoke-sensitivity could be severely impacted by poor air quality leading to life and business disruption. Animals kept outside could also be impacted by poor air quality.

With the increased probability of brushfires outside of the City 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 City are susceptible to wildfire, including trees and forested areas, parks, and recreation areas. According to the ResilientMass Plan, the ecosystems most at risk from wildfires in the Commonwealth are pitch pine, scrub oak, and oak forests.

The ResilientMass Plan projects summer rainfall to decrease as much as 15% in the next decades. In combination with higher temperatures and winds, this drop in precipitation would contribute to additional fire risk. Forest response to increased atmospheric carbon dioxide – the so-called “fertilization effect” – could also contribute to more tree growth and thus provide more fuel for wildfires. Climate change may increase winds that spread fires. Faster moving fires are harder to contain and thus are more likely to expand into residential neighborhoods. Reduced stream flows and pond depths may also impact the number and quality of access points for rural firefighting. Overall, the risk of wildfires to people and property can be expected to increase as a result of climate change.

### Problem Statements for Wildfires

*Table 75. Problem Statements for Wildfires.*

| Assets | Problems Associated with Wildfires |
|---|---|
| People (including underserved communities and socially vulnerable populations) | • Adverse air quality impacts can affect all people, but populations with severe asthma may be severely impacted by wildfires in the vicinity or upwind.<br>• Fire poses direct risks to structures, emergency workers, and people living in or near exposed areas, as well as indirect risks to public health due to smoke. |
| Structures (including facilities, lifelines, and critical infrastructure) | • Some structures are found in the higher probability burn areas. Structures without defensible zones are more susceptible to wildfires and brush fires. |
| Systems (including networks and capabilities) | • Wildfires often cause roads to be closed requiring detours impacting emergency services. |
| Natural, historic, and cultural resources | • Wildfires may adversely impact forested and other vegetated areas of the City.<br>• The economic consequences of wildfires can be substantial, due to the initial loss of structures, and to the loss of revenue from business and tourism, and natural heritage. |
| Activities that have value to the community | • Recreational activities may be adversely impacted by wildfires, depending on location. |

## 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))

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 claim payments with the cumulative amount exceeding the market value of the building. According to data provided by MEMA:

- Eleven repetitive loss properties have experienced thirty loss events, with $376635.97 total building payments and $47464.15 total content payments. The properties consist of nine single family homes, one other residential property, and one non-residential property.
- No severe repetitive loss properties.

***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.*

***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 City'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 City 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 76 provides the hazard characteristic, level description, level criteria, level index value, and weighting value.

*Table 76. 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 | |

| Hazard Characteristic | Degree of Risk | | | Assigned Weighting Factor |
|---|---|---|---|---|
| | Level | Criteria | Index Value | |
| | 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 77 provides the final hazard ranking for Pittsfield. 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 2.0 and less than or equal to 2.7, it was assigned as a moderate risk. If the value was less than or equal to 2.0, it was assigned as a low risk hazard. The flooding from precipitation, severe winter storms, wildfires/brushfires, and average and extreme temperatures were ranked highest. The flooding from dam failure and overtopping, invasive species, other severe weather, droughts, tornadoes, and hurricanes/tropical storms hazards were all ranked as moderate. The earthquake and landslide hazards are ranked as low. This ranking is the average for the year with an understanding that some of the hazards become a greater concern with specific environments and seasons.

*Table 77. Final Hazard Ranking of Hazards for Pittsfield.*

| Hazards | Probability | Impact | Spatial Extent | Warning Time | Duration | Value | Rank |
|---|---|---|---|---|---|---|---|
| Flooding from Precipitation | 4 | 3 | 2 | 3 | 2 | 3 | High |
| Severe Winter Storms | 4 | 2 | 4 | 1 | 3 | 3 | High |
| Wildfires/Brushfires | 3 | 3 | 3 | 3 | 3 | 3 | High |
| Average and Extreme Temperatures | 4 | 2 | 4 | 1 | 2 | 2.9 | High |
| Flooding from Dam Failure or Overtopping | 2 | 4 | 2 | 3 | 2 | 2.7 | Mod. |
| Invasive Species | 3 | 2 | 2 | 3 | 4 | 2.6 | Mod. |
| Other Severe Weather | 3 | 2 | 4 | 2 | 1 | 2.6 | Mod. |
| Droughts | 2 | 2 | 4 | 1 | 4 | 2.5 | Mod. |
| Tornadoes | 2 | 4 | 1 | 3 | 1 | 2.4 | Mod. |

| Hazards | Probability | Impact | Spatial Extent | Warning Time | Duration | Value | Rank |
|---|---|---|---|---|---|---|---|
| Hurricanes and Tropical Storms | 2 | 2 | 4 | 1 | 2 | 2.3 | Mod. |
| Earthquakes | 1 | 1 | 4 | 4 | 1 | 1.9 | Low |
| Landslides | 2 | 2 | 1 | 4 | 1 | 1.9 | Low |

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

*Table 78. Impacts from Population and Land Use.*

| Hazards | Changes in Population Patterns | Changes in Land Use and Development |
|---|---|---|
| Flooding Including Dam Failures and Ice Jams | There is a growing elderly population exposed to the floodplain:<br>• North of Dalton Avenue and Crane Avenue.<br>• Between Barker Road and Route 20.<br>• West of Pecks Road and East of Churchill Street. | Existing codes and regulations in the SFHA will help to keep flood impacts low.<br>New development areas may produce additional flooding due to the addition of impervious surfaces. |
| Droughts | The City's elderly population has increased from 18.4% in 2010 to 20.7% in 2020. The number of people living below the poverty line has remained the same from 13.6% in 2010 to 13.6% in 2020. | All new developments will create more demand for limited water resources. |
| Landslides | There is a growing elderly population around Lenox Mountain exposed to a moderate landslide susceptibility area. | Existing land use regulations will help to keep development out of landslide-prone areas. |
| Extreme Temperatures | The City's elderly population has increased from 18.4% in 2010 to 20.7% in 2020. The number of people living | All new developments will exacerbate heat island effect if the development |

| Hazards | Changes in Population Patterns | Changes in Land Use and Development |
|---|---|---|
| | below the poverty line has remained the same from 13.6% in 2010 to 13.6% in 2020. | includes tree removal and adding black surfaces such as asphalt and roofs. |
| Wildfires | There is a growing elderly population east of the Country Club of Pittsfield with a moderate wildfire susceptibility. | Development in or adjacent to a forested or brushland area can lead to a higher risk of wildfire. |
| Invasive Species | Shouldn't be impacted by population changes. | Should not be impacted by changes in land use and development. |
| Hurricanes and Tropical Storms | The City's elderly population has increased from 18.4% in 2010 to 20.7% in 2020. The number of people living below the poverty line has remained the same from 13.6% in 2010 to 13.6% in 2020. | Should not be impacted by changes in land use and development. |
| Severe Winter Storms | The City's elderly population has increased from 18.4% in 2010 to 20.7% in 2020. The number of people living below the poverty line has remained the same from 13.6% in 2010 to 13.6% in 2020. | Should not be impacted by changes in land use and development. |
| Tornadoes | The City's elderly population has increased from 18.4% in 2010 to 20.7% in 2020. The number of people living below the poverty line has remained the same from 13.6% in 2010 to 13.6% in 2020. | Should not be impacted by changes in land use and development. |
| Other Severe Weather | The City's elderly population has increased from 18.4% in 2010 to 20.7% in 2020. The number of people living below the poverty line has remained | Should not be impacted by changes in land use and development. |

| Hazards | Changes in Population Patterns | Changes in Land Use and Development |
|---|---|---|
| | the same from 13.6% in 2010 to 13.6% in 2020. | |
| 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 79. Problem Statements Summary.*

| Hazard | Problem Summary |
|---|---|
| Flood from Precipitation | • Approximately 1,960 buildings are in the floodplain, including residential, commercial, agricultural, educational, religious/non-profit, industrial, and government buildings.<br>• Stormwater projects are underway, but a detailed analysis should be undertaken.<br>• Two ambulance locations and a bus facility are adjacent to the floodplain.<br>• Older populations and lower income households in the floodplain may have difficulty evacuating.<br>• With respect to NFIP Policy and Claims, the area of flood risk may be larger than some realize, and affordability of insurance is a concern.<br>• The City of Pittsfield has numerous parks and conservation areas exposed to flooding, including: Brattlebrook Park (nature area, 138 acres), Coolidge Park (28 acres), Clapp Park (33 acres), Burbank Park (188 acres), Kirvin Park (227 acres), Springside Park (246 acres), and Wahconah Park (102 acres); historic sites and cultural resources, including: the South Congregational Church (1850), the Berkshire Life |

| Hazard | Problem Summary |
|---|---|
| | Insurance Company Building (1868), and the African-American Heritage Trail.<br>• There are 17 structures listed on the National Register of Historic Places in the floodplain.<br>• Road closures may interrupt community systems. The Dan Casey Drive causeway is a concern due to its low elevation. |
| Severe Winter Storms | • Vulnerable populations may be stranded during a winter storm event and may not be able to travel to emergency services.<br>• The electrical grid and roadways are susceptible to failure and loss of use during storms.<br>• First responders may have difficulty reaching people if roads are closed due to road closures. |
| Wildfires/Brushfires | • Adverse air quality impacts can affect all people, but populations with severe asthma may be severely impacted by wildfires in the vicinity or upwind.<br>• Several residential structures are found in the higher probability burn areas. Structures without defensible zones are more susceptible to wildfires and brush fires.<br>• Wildfires often cause roads to be closed requiring detours impacting emergency services. |
| Average and Extreme Temperatures | • Extreme heat will be a significant public health threat to all residents, but especially for vulnerable populations living in older homes or homes without air conditioning.<br>• The elderly and those with mobility issues may not be able to leave their homes and travel safely.<br>• The unhoused population in Pittsfield lacks options for avoiding extreme heat exposure.<br>• People working in businesses without air conditioning may be at risk of heat illness.<br>• First responders may also be impacted by extreme temperatures. |

| Hazard | Problem Summary |
|---|---|
| | • Pets may be adversely impacted by extreme heat.<br>• Older homes without insulation and single-pane glass are difficult to heat and cool and may not provide safe living conditions.<br>• Businesses that require refrigerated trucks or refrigeration units may see business losses and increased utility costs.<br>• The electric grid may become stressed and fail during extreme heat events.<br>• Extreme heat mitigation and adaptation have not been fully integrated into existing local plans and regulations for new development, though progress is being made.<br>• Extreme heat may lead to, or exacerbate, impacts to natural systems related to wildfires and invasive species (refer to those sections).<br>• Extreme heat may lead to water quality concerns such as harmful algal blooms and disinfection byproducts in treated water.<br>• Recreational activities may be adversely impacted by extreme heat. |
| Flood from Dam Failure or Overtopping | • These three dams are of most concern in Pittsfield:<br>▪ The most significant concern for Pittsfield is the condition of the Bel Air Dam on Wahconah Street. This dam is scheduled for removal.<br>▪ The Pecks Lower Pond dam (locally called the Betty Gilette Dam) is the next-highest concern.<br>▪ The private dam at 321 Lebanon Avenue (sometimes known as Grist Mill Dam) is the third-highest concern among all dams in Pittsfield.<br>• Older populations in the potential downstream inundation area may have difficulty evacuating, particularly in a short time frame.<br>• Local officials sometimes do not routinely receive copies and updates of EAPs for privately owned dams. Without these documents, it is harder for emergency personnel to characterize the potential downstream risks and prepare for a potential breach event. |

| Hazard | Problem Summary |
|---|---|
| | • When engineered, dam spillways were often designed to pass a discharge for a particular historic storm recurrence interval. As the frequency and magnitude of precipitation events changes, these spillways are becoming undersized relative to their design standard which places downstream areas at increased risk of experiencing inundation from a dam failure.<br>• High hazard dams could impact multiple towns which could benefit from more communication and cooperation.<br>• Some of the dams are undocumented by the State and USACE.<br>• Roads may be impacted by a dam breach, potentially impacting City capabilities to respond to events.<br>• 48 historic sites may be impacted during a dam breach.<br>• Road closures may disrupt community events. |
| Invasive Species | • Additional City resources may be required in terrestrial and aquatic areas to control the species of concern.<br>• Vegetation favored by Spotted lanternfly will likely become a larger concern over the next few years.<br>• Recreational activities may be adversely impacted, depending on location, and especially in parks and natural areas. |
| Other Severe Weather | • First responders may have difficulty reaching people if roads are closed due to tree debris.<br>• Storm damage to wind-susceptible buildings such as carports, greenhouses, and open-walled buildings. Additional damage to commercial buildings with HVAC located on roofs.<br>• The electric and telephone grids may go down during a high wind event. |
| Droughts | • According to the CRB Workshop Summary of Findings (January 2019), the City of Pittsfield population has declined in recent decades, so concerns regarding the public water supply during drought conditions relate to water quality more than quantity. |

| Hazard | Problem Summary |
| --- | --- |
| | • Vulnerable communities may have difficulty accessing potable water during an emergency drought event. If the water sources are at emergency levels, having a plan to get vulnerable people water should be considered. If rates are increased to lower water demand, this may also adversely impact underserved and vulnerable communities.<br>• Water supply infrastructure may need to be shut down and water quality may become substandard. Businesses requiring water for daily operations may have their operations limited due to water restrictions.<br>• Some of the City's water pump stations are not equipped with backup power.<br>• Upgrades to the drinking water supply infrastructure are necessary and ongoing.<br>• 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.<br>• Water quality may be adversely impacted by major droughts. Extreme heat and drought together may lead to water quality concerns such as harmful algal blooms and disinfection byproducts in treated water.<br>• Agricultural users may have difficulty obtaining water for products and livestock forage.<br>• Use of parks and recreational areas may be adversely impacted by droughts due to the effects on plants, trees, and surface water bodies. |
| Tornadoes | • Vulnerable populations may need support seeking protected shelter. Those without cell phones may not get weather alerts.<br>• Structures and critical infrastructure can all be impacted by tornadoes.<br>• Roadways may be blocked due to downed trees and other debris.<br>• The electric and telephone grids may be impacted by winds and downed trees. |

| Hazard | Problem Summary |
| --- | --- |
| Hurricanes/Tropical Storms | • Wind may cause trees to fall into structures and infrastructure, and roadways.<br>• Wind damage to wind-susceptible buildings such as carports, greenhouses, and open-walled buildings. Additional damage to commercial buildings with HVAC located on roofs.<br>• The electric and telephone grids may go down during a high wind event. |
| InEarthquakes | • Elderly people can fall during event.<br>• Unreinforced masonry and utility lifelines impacted. |
| Landslides | • Vulnerable populations in isolated areas may be cut off if a landslide impacts specific roads.<br>• Some residential and other structures reside within and adjacent to moderately unstable areas and could be impacted.<br>• Roads and rail may be impacted and could cause a hazardous material spill.<br>• Parks and other natural areas reside in or adjacent to the unstable or moderately unstable areas.<br>• Participants in the Pittsfield HMPC #1 Meeting mentioned that the U.S. Fish & Wildlife Service Land and the State Recreation Land are vulnerable to landslides due to the high slope areas.<br>• Increased precipitation intensity and invasive species’ impacts to forests may influence future landslide risks. |

# Chapter 5: Capability Assessment

## Overview

The capability assessment is an evaluation of the existing tools and resources available to the City of Pittsfield 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 Pittsfield'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 City of Pittsfield'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."* [66]

The capability assessment for the City of Pittsfield includes a comprehensive examination of several components as summarized in Table 80. It was prepared using the latest guidance and worksheets provided in FEMA's 2023 Local Mitigation Planning Handbook.[67]

*Table 80. 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. |

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

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

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

## Review and Incorporation of Existing Plans, Studies, and Reports

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

The first step in completing the updated capability assessment was to gather and review any relevant local plans, studies, or reports completed or updated since the previous hazard mitigation plan was adopted in 2019. This information was used to help gain a current understanding of the City's current ability to mitigate risk, and how local capabilities may have changed over the past six years. The 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan (the "ResilientMass" Plan), as well as other plans adopted by the City of Pittsfield 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 81 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 81. 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. |

| Plan / Study / Report | Summary Description / Incorporation |
|---|---|
| | Through the ResilientMass Plan, the Commonwealth is advancing its mission to increase its capacity for addressing natural and other hazards and climate impacts through preparation, mitigation, adaptation, and risk reduction. The ResilientMass Plan includes six (6) overarching goals which were developed through a collaborative process involving the interagency ResilientMass Action Team (RMAT) and local, regional, and community partners. It also integrates the findings of the 2022 Climate Assessment with additional analysis on all current hazards that may impact the Commonwealth, as well as future risks that will increase the likelihood, frequency, and duration of hazards. Of perhaps most relevance to local communities, the ResilientMass Plan identifies the most urgent priority impacts of these risks to various regions across the Commonwealth.<br><br>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 Pittsfield's Hazard Mitigation Plan to help ensure the City'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 Pittsfield's updated plan address the key themes identified in the ResilientMass Plan. |
| City of Pittsfield Municipal Vulnerability Preparedness (MVP) / Community Resilience Building (CRB) Summary of Findings Report (2019) | The Commonwealth's Municipal Vulnerability Preparedness (MVP) program provides support for cities and towns in Massachusetts to plan for resiliency and implement key climate change adaptation actions for resiliency. In 2018, Pittsfield 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.<br><br>In completing the MVP planning process, the City of Pittsfield followed the Community Resilience Building (CRB) framework with technical assistance provided by a state-certified MVP Provider, Fuss & O'Neill. The CRB methodology is an "anywhere at any scale" format that draws on |

| Plan / Study / Report | Summary Description / Incorporation |
|---|---|
| | stakeholders' wealth of information and experience to foster dialogue about a community's strengths and vulnerabilities. A day long CRB Workshop was held on December 6, 2018, with the following central objectives:<br>1. Define top local natural and climate-related hazards of concern.<br>2. Identify existing and future strengths and vulnerabilities.<br>3. Develop prioritized actions for Pittsfield.<br>4. Identify immediate opportunities to collaboratively advance actions to increase resilience.<br><br>The resulting Summary of Findings Report and supporting materials served as a primary source of information and community-based input for incorporation into the update of this plan. These inputs include the identification of top climate-influenced hazards (flooding, extreme temperatures, severe storms, and ice and snow) 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 Pittsfield. |
| Open Space & Recreation Plan (2019) | The City's Open Space and Recreation Plan serves as a guide for the residents of Pittsfield to balance growth pressures with demands for open space preservation and recreation opportunities. It identifies and analyzes factors such as physical and cultural assets, land use, and socio-economic trends that are relevant to the protection of important resources. It created an inventory of present supply and establishes future conservation and recreation needs, outlining a series of recommendations for safeguarding and expanding these resources which are prioritized in a Five-Year Action Plan. The 2019 plan represents an update of the City's 2009 Open Space and Recreation Plan. The City launched its next plan update process in 2024 which is expected to result in a fully updated OSRP by the end of 2025.<br><br>The OSRP is an effective tool for supporting Pittsfield's open space preservation and recreation goals while also addressing some specific natural hazards identified in the plan. It served as a key source of information related to the community'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 stormwater management, floodplain development, invasive plants, and climate change impacts which were incorporated into the risk assessment. It also includes information relevant to existing goals, |

| Plan / Study / Report | Summary Description / Incorporation |
|---|---|
| | objectives, and actions that can help the community to mitigate hazards or adapt to climate change for the mitigation strategy. |
| Master Plan (2009) | The Master Plan serves as the City's comprehensive development guide. Created with the extensive involvement of citizens, business leaders, public officials and planners, it describes a vision and strategic roadmap for Pittsfield's growing and revitalized future. The plan addresses five main subject areas through five elements including: Land Use and Development Patterns; Housing Quality and Affordability / Neighborhood Development; Economic and Cultural Development / Historic and Cultural Resources; Transportation and Circulation / Public Facilities and Services; and Open Space and Recreation / Natural Resource Protection. Adopted in 2009, the plan generally speaks to smart growth and techniques to preserve open space, but very little attention is paid to natural hazards. The plan is considered quite outdated and in need of an update to more directly address natural hazards and climate change. Although some information on development patterns and environmental features was reviewed and incorporated into the plan update process, the City's OSRP (described above) was considered a more current and reliable source for this information. |
| Emergency Action Plans (various dates) | The City of Pittsfield maintains Emergency Action Plans (EAPs) for all dams that are owned by the City and required to maintain EAPs. The purpose of 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.<br><br>All the latest available EAPs for dams classified as High Hazard Potential with impacts to Pittsfield were reviewed and used to inform the plan update. This includes EAPS for the following dams: Ashley Lake, Cleveland Brook Reservoir, Farnham Reservoir, Onota Lake, Sandwash Reservoir, and Upper Sackett Reservoir. Inundation mapping data was available for all of these dams through the EAPs, in addition to the Bel Air dam (provided separately). Relevant data and information were incorporated into the risk assessment as deemed appropriate, especially as it relates to dam failure inundation maps that show the stream(s) which would be flooded, as well as the impacted downstream environment during potential dam failure events. These maps |

| Plan / Study / Report | Summary Description / Incorporation |
|---|---|
| | were digitized and integrated into the risk assessment to conduct a GIS-based vulnerability assessment to determine the exposure of critical facilities, buildings, and populations in the planning area to dam failure. They were also integrated into Hazus, FEMA's loss estimation software, to determine economic losses from dam failure inundation. |
| FEMA Flood Insurance Study for Berkshire County (1981) | Last published by FEMA on January 16, 1987, this report constitutes the currently effective Flood Insurance Study (FIS) report for Berkshire County. The FIS provides information on the existence and severity of flood hazards for the study area, which includes the City of Pittsfield. The studies described in this report provide flood hazard data that are used to establish actuarial flood insurance rates and to assist communities in efforts to implement sound floodplain management.<br><br>Although considered very outdated, the FIS and accompanying Flood Insurance Rate Maps (FIRMs) include relevant data and information on flood hazards for Pittsfield, 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 82 in the next section.

- ***Comprehensive Emergency Management Plan (2024)*** – The City's Comprehensive Emergency Management Plan (CEMP) provides a framework for a community-wide emergency management system to ensure a coordinated response to emergencies and coordinated support of certain pre-planned events. The CEMP addresses the roles and responsibilities of all community departments, agencies, government organizations, volunteers, and other community partners that may be involved in response operations, and identifies regional, state, federal, private sector, and other resources that may be activated to address disasters and emergencies in the community. Although the plan is focused on actions and activities in response to an emergency or disaster event, it does provide general guidance on the roles and responsibilities of City departments and partners for the prevention and mitigation of anticipated incidents. The CEMP also includes a summary of a threat, hazard, and vulnerability analysis completed by the City that briefly summarizes potential impacts to the community.

- ***Stormwater Management Plan (2022)*** – The City's Stormwater Management Plan (SWMP) is maintained in compliance with MS4 permit requirements as administered by the U.S. Environmental Protection Agency and Massachusetts Department of Environmental Protection (MassDEP). The SWMP describes and details the activities and measures that will be implemented to meet the terms and conditions of the MS4 permit. It is focused on reducing pollutants in stormwater runoff versus mitigating flood hazards. The main elements of the City's stormwater management program are (1) a public education program in order to affect public behavior causing stormwater pollution, (2) an opportunity for the public to participate and provide comments on the stormwater program, (3) a program to effectively find and eliminate illicit discharges within the MS4 (4) a program to effectively control construction site stormwater discharges to the MS4, (5) a program to ensure that stormwater from development projects entering the MS4 is adequately controlled by the construction of stormwater controls, and (6) a good housekeeping program to ensure that stormwater pollution sources on municipal properties and from municipal operations are minimized.
- ***Community Preservation Plan (2018) –*** This plan describes the process for administering the Community Preservation Act (CPA) in the City of Pittsfield. It presents a description of the CPA as it applies to the City, a definition of CPA goals, and a methodology and procedure by which the CPA is administered. It represents an informational document for residents, business owners, and other interested parties, a guideline and instructional document for applicants seeking project funding through the CPA, and a guidance document for this and future CPA Committees in making recommendations to the City Council for project funding.
- ***A Vision for Pittsfield's Conservation Areas: Linking Landscape with Community (2016)*** – This plan was developed by the Conway School to serve as management plan to guide the maintenance practices and decision making processes for the City's conservation areas. It drew from multiple sources at the time of its development including the Conservation Commission, the 2009 Master Plan, and the 2008 Open Space and Recreation Plan. The plan addressed existing trends and identified strategies for implementing recommended objectives for land management and community engagement applicable to all conservation areas in Pittsfield.
- ***Drought Management Plan (2009)*** – The City's Drought Management Plan was prepared as an operational guide for the City to more purposely monitor and react to local conditions that relate to drought conditions. It includes information on the existing conditions of the City's water supply and distribution system along with an assessment of consumer supply and demand (at the time of the plan's development). The plan incorporated recommendations from the American Water Works Association's drought management planning documents and the Massachusetts Drought Management Plan, including implementation of mitigation measures to be taken by the City in response to the various stages (severity) of ongoing drought events.

## 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 82 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 City 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 82. Planning and Regulatory Findings.*

| Planning/Regulatory Tool | In Place? *(Yes/No)* | General Description / Effectiveness for Hazard Risk Reduction |
|---|---|---|
| ***Plans*** | | |
| Master/Comprehensive Plan | Yes | The City's Master Plan was last updated and adopted in 2009 (see Table 81 for a more complete description). The existing plan does not address natural hazards or climate change, and the only relevant strategy found in the plan was "to update FEMA flood maps." Not currently considered and effective tool for supporting hazard risk reduction though future updates present a tremendous opportunity to more fully incorporate hazard mitigation and resilience principles and practices, in addition to cross-references with this hazard mitigation plan. |
| Open Space & Recreation Plan | Yes | The City's Open Space and Recreation Plan (OSRP) was last updated in 2019, though an update to the existing plan is currently underway (see Table 81 for a more complete description). The existing plan includes information related to stormwater management, floodplain development, invasive plants, and climate change impacts, and it is expected that the updated OSRP will address these challenges more directly through the recommended five-year action plan. |

| Planning/Regulatory Tool | In Place? *(Yes/No)* | General Description / Effectiveness for Hazard Risk Reduction |
|---|---|---|
| Climate Adaptation Plan | No | Not a plan per se, however climate adaptation is addressed in the City's MVP Summary of Findings Report. It identifies Pittsfield's top climate hazards (flooding, extreme temperatures, severe storms, and ice and snow) 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 City's resilience. The report's findings and recommendations can be used to support the implementation of mitigation actions. Report was published in 2020. |
| Floodplain Management Plan | No | No standalone plan, however, floodplain management is addressed in the Open Space and Recreation Plan and through regulations as described in this chapter. |
| Stormwater Management Plan | Yes | Last updated in 2024 (see brief description provided in the previous section following Table 81). The plan is updated annually to report on progress made by implementing the City's MS4 General Permit. The last report was submitted in June 2024 and reported on Year 6 of the permit. Hazards that were addressed in year 6 included a system vulnerability factor analysis to identify areas with elevated risk for containing illicit sewer connections, and contracted services for wet weather sampling of stormwater outfalls to identify catchments that may contain illicit connections. The City also completed a gap analysis to identify areas that lack sufficient runoff collection, which are expected to be fixed through services contracted in year 7. Very effective tool for supporting stormwater management improvements to reduce existing flood hazards. |
| Capital Improvements Plan | Yes | Developed by the Mayor's Office and runs from Fiscal Year 2025 through Fiscal Year 2029. The plan allocates funding to a wide range of requests from department heads, and directly and indirectly addresses hazards. Examples include the allocation of funds to replace |

| Planning/Regulatory Tool | In Place? *(Yes/No)* | General Description / Effectiveness for Hazard Risk Reduction |
|---|---|---|
| | | frontline emergency response vehicles and funds to maintain water, sewer, and drainage infrastructure. |
| Housing Production Plan | No | N/A |
| Transportation Plan | No | No standalone plan, however, Transportation and Circulation is included as an element in the City's Master Plan. More recently a Bicycle Facilities Master Plan was completed in July 2021 and the City is working on a Safe Action Plan with funds from a Safe Streets and Roads for All grant from the US Department of Transportation. The City also has projects included in the state transportation improvement plan. |
| Economic Development Plan | No | No standalone plan, however, Economic and Cultural Development is included as an element in the City's Master Plan. Developing a City-wide Business Improvement and Economic Development Plan to support local businesses and make the business community more resilient was identified as a high priority recommendation in the City's 2020 MVP Plan. |
| Historic Preservation Plan | No | No standalone plan, however, Historic and Cultural Resources is included as an element in the City's Master Plan. The City also has an active Historical Commission, largely driven by the review of projects related to various state or federal resources. |
| Emergency Operations Plan | Yes | The City's Comprehensive Emergency Management Plan (CEMP) focuses on emergency preparedness and response to hazards (see narrative following Table 81 for a complete description). Last updated in 2024. |
| Continuity of Operations Plan | No | N/A |
| Community Wildfire Protection Plan | No | N/A |
| Other special plans? | Yes | Wastewater Management Plan, Water (potable) Master Plan |

| Planning/Regulatory Tool | In Place? *(Yes/No)* | General Description / Effectiveness for Hazard Risk Reduction |
|---|---|---|
| ***Building Code, Permitting, and Inspections*** | | |
| Building Code | Yes | Version/Year: MA State Building Code (780 CMR), Ninth Edition, 2017 |
| ISO Building Code Effectiveness Grading Schedule (BCEGS®) Classification | Yes | BCEGS Commercial Class: 4<br>BCEGS Residential Class: 4<br>* *Per Evaluation Report dated 10/4/2019* |
| ISO Public Protection Classification (PPC©) | Yes | PPC Grade (Community Classification): 3 |
| Special Permit / Site Plan Review Requirements | Yes | The purpose of Special Permits and Site Plan Review is to ensure that new development meets the requirements of the Zoning Ordinance and is designed in a way that reasonably protects the physical, environmental, and aesthetic qualities of the neighborhood and the City. These requirements help to ensure that development is conducted in a safe, responsible way that helps to mitigate existing hazards (floodplain, wetlands, sensitive areas) and prevent future hazards from being created by irresponsible development. |
| ***Zoning, Land Use, and Development Regulations*** | | |
| Zoning Bylaw | Yes | Adopted as Chapter 23 of the City Code for the purpose of promoting the health, safety, convenience, and welfare of community members. Among the stated purposes is to secure safety from fire, panic, and other dangers; to conserve the value of land and buildings; and to encourage the most appropriate use of land throughout the City. Very effective in supporting hazard risk reduction, especially through provisions that specifically address site plan reviews, floodplain and stormwater management regulations, and other mitigation techniques as described elsewhere in this table. The Zoning Ordinance provides regulations and guidelines to help ensure development is safe and does not negatively impact the community, infrastructure, |

| Planning/Regulatory Tool | In Place? *(Yes/No)* | General Description / Effectiveness for Hazard Risk Reduction |
|---|---|---|
| | | environmental areas or create or exacerbate hazards present in the community. The Ordinance is enforced adequately by the Zoning Enforcement Officer and administered by several staff members in the City's Department of Community Development and by the Zoning Board of Appeals as well as the Community Development Board. |
| Subdivision Regulations | Yes | The Pittsfield Subdivision Regulations are very thorough and ensure that all proposed subdivisions properly consider means of access, natural conditions on the site, stormwater management and proper installation of utilities. Upon receipt of a subdivision plan application, the plan is disseminated to other City Departments such as Engineering, Building, Conservation, and Health. An internal meeting between these departments is also held. Comments from these discussions ensure plans are evaluated thoroughly before approval, mitigating many possible hazards from development. The regulations are administered by the Community Development Board and by the City Planner. Last updated in 2013. |
| Floodplain Regulations | Yes | Adopted per Section 6 of the Zoning Ordinance (Floodplain District). The City's floodplain regulations have long helped to ensure that any development in the floodplain is controlled and that any floodplain storage disturbed by development is compensated for by the developer. In December 2024, the City Council approved a petition from the Community Development Board to amend these regulations with revised text that is consistent with the latest version of the State's Model Floodplain Bylaw. Very effective in supporting flood risk reduction in all FEMA-mapped special flood hazard areas, however, more updated and accurate floodplain mapping remains a priority need for the City. |
| Wetlands Protection Regulations | Yes | Adopted per Chapter 27 of the City Code (Wetlands Protection) for the purpose of protecting wetland resource areas, related water resources and adjoining |

| Planning/Regulatory Tool | In Place? *(Yes/No)* | General Description / Effectiveness for Hazard Risk Reduction |
|---|---|---|
| | | land areas in the City by controlling activities deemed by the Conservation Commission likely to have a significant or cumulative effect upon wetland values. The Conservation Commission along with MassDEP administers and enforces any violations within protected resource areas administered by these local regulations and the state's Wetlands Protection Act. |
| Stormwater Management Regulations | Yes | Adopted per Chapter 26 of the City Code (Land Disturbance and Stormwater Management). Among the state objectives of this chapter is to require enhanced and low impact development practices that control the flow of stormwater from new and redeveloped sites into the City's storm drainage system in order to prevent flooding and erosion. The regulations are suitable for new and certain redevelopment projects, requiring them to meet peak flow requirements and water quality treatment standards which effectively mitigate risk from flood hazards and maintain a healthy ecosystem. There have been thoughts about reviewing the enforcement aspect of the regulation, which is mentioned in the City's annual MS4 report. |

### 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 City of Pittsfield administers the MSBC for all applicable projects and according to Insurance Services Office, Inc. (ISO) maintains a demonstrated commitment to code adoption and enforcement services. ISO helps distinguish communities with effective building codes through a comprehensive evaluation program called the Building Code Effectiveness Grading Schedule (BCEGS). Under BCEGS, ISO collects information on a community's building code adoption and enforcement services, analyzes the data, and then assigns a classification from 1 to 10. BCEGS Class 1 represents an exemplary commitment to building code enforcement through code administration, plan review, and field inspection. According to the latest evaluation study performed by Insurance Services Office (ISO) in 2019, the City of Pittsfield had a BCEGS class of 4 for 1 and 2 family dwellings and a class 4 for all other construction. It is anticipated that these classifications will only improve following ISO's next BCEGS survey based on its enforcement of the tenth edition of the MSBC as described above.

### Safe Growth Survey

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

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

While somewhat of a subjective exercise, the Safe Growth Survey was used to provide some measure of how adequately existing planning mechanisms and tools for the City of Pittsfield 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 83. This includes describing how strongly the City's planning staff agrees or disagrees with 25 statements as they relate to Pittsfield'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 83. 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 $\boxed{3}$ 4 5 |
| 2. Current land use policies discourage development and/or redevelopment within natural hazard areas. | 1 2 3 $\boxed{4}$ 5 |
| 3. The master/comprehensive plan provides adequate space for expected future growth in areas located outside of natural hazard areas. | 1 2 3 $\boxed{4}$ 5 |
| ***Transportation*** | |
| 4. The transportation element limits access to natural hazard areas. | 1 2 3 $\boxed{4}$ 5 |
| 5. Transportation policy is used to guide future growth and development to safe locations. | 1 2 3 $\boxed{4}$ 5 |
| 6. Transportation systems are designed to function under disaster conditions (e.g., evacuation, mobility for fire/rescue apparatus, etc.). | 1 2 3 $\boxed{4}$ 5 |
| ***Environmental Management*** | |
| 7. Environmental features that serve to protect development from hazards (e.g., wetlands, riparian buffers, etc.) are identified and mapped. | 1 2 3 4 $\boxed{5}$ |
| 8. Environmental policies encourage the preservation and restoration of protective ecosystems. | 1 2 3 $\boxed{4}$ 5 |

| | |
|---|---|
| 9. Environmental policies provide incentives to development that is located outside of protective ecosystems. | 1 2 $\boxed{3}$ 4 5 |
| ***Public Safety*** | |
| 10. The goals and policies of the master/comprehensive plan are related to and consistent with those in the hazard mitigation plan. | 1 2 3 $\boxed{4}$ 5 |
| 11. Public safety is explicitly included in the master/comprehensive plan’s growth and development policies. | 1 2 3 4 5 |
| 12. The monitoring and implementation section of the master/comprehensive plan covers safe growth objectives. | 1 2 3 4 5 |
| **ZONING BYLAWS** | |
| 13. The zoning bylaws conform to the master/comprehensive plan in terms of discouraging development and/or redevelopment within natural hazard areas. | 1 2 3 $\boxed{4}$ 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 3 $\boxed{4}$ 5 |
| 16. The bylaws prohibit development within, or filling of, wetlands, floodways, and floodplains. | 1 2 3 $\boxed{4}$ 5 |
| **SUBDIVISION REGULATIONS** | |
| 17. The subdivision regulations restrict the subdivision of land within or adjacent to natural hazard areas. | 1 2 $\boxed{3}$ 4 5 |

| | |
|---|---|
| 18. The regulations provide for conservation subdivisions or cluster subdivisions to conserve environmental resources. | 1 2 3 4 $\boxed{5}$ |
| 19. The regulations allow density transfers where natural hazard areas exist. | 1 2 $\boxed{3}$ 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. | 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. | 1 2 3 4 5 |
| 22. The capital improvements program provides funding for hazard mitigation projects identified in the hazard mitigation plan. | 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 3 $\boxed{4}$ 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 3 $\boxed{4}$ 5 |
| 25. The community considers and addresses potential impacts of its plans, policies, or regulations on Environmental Justice (EJ) neighborhoods or other socially vulnerable populations. | 1 2 3 $\boxed{4}$ 5 |

## Administrative and Technical Capabilities

Table 84 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 City. These include staff and their skills and tools that can be used for mitigation planning and to implement specific mitigation actions.

*Table 84. 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 referred to as the Community Development Board (CDB) in Pittsfield. Responsibilities include but are not limited to the oversight of the City's Master Plan, studies and reports, public land and buildings, public ways, capital improvement programs, zoning and subdivisions. The CDB is very effective at coordinating with applicants, City staff and the public. It provides effective analysis on Subdivisions, Special Permits, Zoning Amendments and Site Plan Reviews. |
| Conservation Commission | Yes | The Conservation Commission consists of a seven-member group of volunteers charged with adhering to the law set forth in the Massachusetts Wetlands Protection Act and its accompanying regulations. The Commission holds regular meetings to discuss proposed activities within jurisdictional wetland resource areas, and their applicable buffer zones, and makes sound decisions pertaining to each project in a separate and distinct manner. The Conservation Commission is very capable and ensures that any work in protected resource areas is compliant with existing regulations. Very effective in supporting flood hazard risk reduction and adverse impacts to the natural and beneficial functions of floodplains, wetlands, and other environmental features. |
| Capital Planning Committee | Yes | After working with department heads to obtain as much detail as possible about each proposed project, the City finance team reviews and prioritizes projects based on an established series of criteria. After setting a target investment level, City leadership, guided by project prioritization and other data provided by department heads, generated a list of top-priority projects for the Capital Improvements Plan which is reassessed on an annual basis. Effective in terms of generating a comprehensive, multi-year capital |

| Administrative/Technical Resource | In Place? *(Yes/No)* | General Description / Effectiveness for Hazard Risk Reduction |
|---|---|---|
| | | investments strategy that may include projects that support risk reduction both directly and indirectly. |
| Climate Action Committee | No | Not specific to climate action per se, however the City's Green Commission is charged with investigating means to increase the overall use efficiency in the City and decreasing the use of nonrenewable energy sources. |
| Other relevant boards/committees? | Yes | Board of Health, Community Preservation Committee, Council on Aging, Historical Commission. |
| ***Staff*** | | |
| Community Planner | Yes | The City Planner and Permitting Coordinator provide assistance and technical analysis in relation to planning, land use and zoning issues in the City. The primary responsibility of both staff is to implement and manage the statutory provisions of State law pertaining to zoning and subdivisions within the City. The City Planner has competed thorough training via FEMA and MEMA on hazard mitigation and emergency management. Relevant administrative duties that support hazard mitigation include enforcement of floodplain management regulations and other measures implemented through zoning and subdivision control. Staffing is sufficient to administer these areas. |
| Chief Building Official | Yes | The Office of the Building Commissioner is dedicated to the enforcement of the State Building Code and Zoning Ordinance and is responsible for ensuring public safety in the built environment. Enforcement of community standards for safety, health, sanitation, energy efficiency, structural stability, resilience and accessibility is accomplished through the review of applications and construction documents, onsite inspections by certified personnel, and annual certification of buildings and structures. Very effective in reducing risks to new or improved construction from multiple natural hazards. |

| Administrative/Technical Resource | In Place? *(Yes/No)* | General Description / Effectiveness for Hazard Risk Reduction |
|---|---|---|
| Civil Engineer | Yes | The Engineering Division consists of three employees including the City Engineer and Environmental Engineer. Duties include managing contracts for road construction, reconstruction and maintenance projects; processing permit applications for construction or demolition work; documenting regulatory compliance for stormwater runoff; maintaining material and construction method standards and details; and responding to citizen inquiries and concerns. Staff have been trained in some hazard response and mitigation through programs such as bay state roads or MassDOT workshops. Staffing is not adequate to perform all assigned duties, and coordination is not always effective. |
| Emergency Manager | Yes | The City's Fire Chief serves as the Emergency Management Director (EMD), and head of the Pittsfield Emergency Management Agency. He works collaboratively with MEMA and the Central Berkshire Regional Emergency Planning Committee (CBREPC) in preparing for potential disasters. Effective in terms of supporting efforts to save lives and protect property through coordination of an integrated emergency management system with all emergency response organizations, support services and volunteers, and in advocating for greater community efforts to mitigate and prepare for potential emergencies. |
| Floodplain Administrator | Yes | Per the latest updates to Section 6 of the Zoning Ordinance (Floodplain District), the Director of Community Development or their designee shall act as the official Floodplain Administrator for the City. |
| Sustainability/Climate Coordinator | No | N/A |
| GIS Coordinator | Yes | The City's GIS Coordinator is positioned with the Engineering Department. Staffing is adequate to meet current responsibilities. Not trained in hazard mitigation or response but generally provides support |

| Administrative/Technical Resource | In Place? *(Yes/No)* | General Description / Effectiveness for Hazard Risk Reduction |
|---|---|---|
| | | for staff that are. Coordination is generally effective, however additional GIS staff would provide for redundancies and allow for expanded services to various departments. |
| Public Information Officer/Specialist | Yes | One person from the Mayor's Office. Coordination is often through multiple layers of personnel, which can make communication slow. |
| ***Technical*** | | |
| Grant writing | No | No dedicated person. City staff are proficient in technical writing, and there are further resources available through the Berkshire Regional Planning Commission or on-call consultants. |
| GIS mapping and analysis | Yes | The City has the GIS Coordinator who is responsible for managing the City's GIS data and creating maps for informational purposes. For most analysis work the City contracts with engineering firms who can do more advanced analysis work. The City has used GIS mapping and analysis to create a model for prioritization of sewer replacement work based on the likelihood of failure and consequence of failures. GIS mapping and analysis tools are also used for planning repairs to sidewalks and road. |
| Hazards data and information | Yes | The City has geospatial data on areas that flood outside the FEMA-mapped flood hazard areas and other information that is helpful for conducting risk and vulnerability assessments. |
| Maintenance programs to reduce risk *(e.g., tree trimming, drainage clearance)* | Yes | The City's Department of Public Services and Utilities perform a variety of maintenance activities to reduce risk such as keeping catch basins clear from debris to mitigate potential flooding during storm events and responding to any emergencies involving hazardous tree removal. Staff are trained in routine limb cutting and clearing of woody debris from the roadway. Additionally, the City has 2 vacuum trucks and a water |

| Administrative/Technical Resource | In Place? *(Yes/No)* | General Description / Effectiveness for Hazard Risk Reduction |
|---|---|---|
| | | jet truck for maintaining and clearing drainage and sewer mains. |
| Acquisition of land for open space, recreation, and other public use | Yes | The City does use some grant funding (for example, Community Preservation Act funds) to acquire and preserve open space in Pittsfield, as well as to use open space for recreation opportunities. The Conservation Commission and the Parks Department are very active in this. |
| Warning systems/services *(e.g., Reverse 911, outdoor warning signs)* | Yes | The City has a reverse 911 system (CodeRED) that can provide high-speed notifications to registered residents during emergency events. The system has effectively been used to notify residents of road closures, untreated releases from the wastewater treatment plant, and winter snow emergencies. City-wide alerts are only activated in the event of severe weather or other hazard events. Very effective though limited to residents who are registered with the system. A recent enhancement made by the City now allows residents to enroll using their login credentials from Google, Facebook or Twitter accounts, streamlining the registration process and making updates easier. |
| Mutual Aid Agreements | Yes | Mutual aid agreements are held by both Fire and Police, and in general the first responder communities in the Berkshires coordinate and work well together during emergency situations. The City has also opted in with MEMA under both statewide mutual aid agreements (Public Safety and Public Works). |

## Financial Capabilities

Table 85 is based off Worksheet 4 from FEMA's Local Mitigation Planning Handbook. It was used by the HMPC to identify and review the City's eligibility and access to funding sources that can be used to support the implementation of hazard mitigation projects.

*Table 85. 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 to support staffing and for grant matches in support of hazard mitigation activities through recommendations from the City's finance team. |
| Capital Improvement Program (CIP) funding | Yes | The proposed FY2025–FY2029 CIP for the City invests more than $308 million in important capital projects, prioritizing roadway quality, parks and recreational opportunities, City and School facility improvements, safe and functional vehicles and equipment for staff, and modern information technology. The CIP has traditionally been an effective financing mechanism for improving transportation infrastructure (i.e., roadway repairs, bridge/culvert replacements, etc.) and can be used to fund other activities to bolster hazard mitigation and climate resilience (i.e., stormwater BMPs and green infrastructure improvements). |
| Special purpose taxes | No | N/A |
| Fees for water, sewer, gas, or electric services | Yes | The City charges water and sewer fees, but revenues are generally limited to cover operational costs, maintenance expenses, and infrastructure improvements associated with the water, sewer, and stormwater systems. Gas and Electric utilities are private. |
| Stormwater utility fee | No | Not in place, however, the City has identified the creation of a stormwater utility/enterprise fund as an option to explore as part of its upcoming development of an Integrated Water Management Plan. |
| Development impact fees | No | N/A |
| General obligation bonds and/or special purpose bonds | Yes | The City can use bonds and other means of debt financing. Per its CIP the most common method of financing large capital projects is general obligation bonds, though other options are available. |

| Financial Tool/Source | In Place? *(Yes/No)* | General Description / Effectiveness for Hazard Risk Reduction |
|---|---|---|
| FEMA Hazard Mitigation Assistance (HMA) funds | Yes | 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. |
| HUD Community Development Block Grant (CDBG) funds | Yes | The City is eligible for HUD CDBG and CDBG-DR funding that could be used to support the implementation of hazard mitigation actions. CDBG funding has been used in the past for sidewalk improvements. |
| Other federal funding programs | Yes | The City has received federal funding through a variety of programs, including most recently through a "Safe Streets and Roads for All" grant from the US Department of Transportation. NOAA, EPA, USACE, and other federal agencies do make grant funding available for a variety of resilience-themed projects and initiatives that the City 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.[68] |
| Massachusetts Municipal Vulnerability Preparedness (MVP) Action Grant funds | Yes | The MVP Action Grant offers financial resources to communities that are aiming 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 City 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. In Fiscal Year 2025 the City received MVP Action Grant funds to address inland flooding in the Unkamet Brook Watershed. It is expected to take multiple funding cycles to complete. |

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

| Financial Tool/Source | In Place? *(Yes/No)* | General Description / Effectiveness for Hazard Risk Reduction |
|---|---|---|
| Massachusetts Community Preservation Act (CPA) funds | Yes | The City adopted the Community Preservation Act in 2016 and has used CPA funding since FY18. Funds are used for housing, open space/recreation, and historic preservation. Projects have led to the acquisition of land that was put under permanent Conservation Restriction, reducing hazard risk. Preservation of historic properties can reduce hazard by rehabilitating rapidly deteriorating structures that if left could deteriorate and cause health/safety risks to the community. Recreation spending helps to preserve, maintain and expand open space opportunities, ensuring that development in these critical areas follow safe guidelines that reduce hazard risk and prevent creation of hazards. |
| Other state funding programs | Yes | The City routinely benefits from state funding programs with recent examples including Chapter 90 and Fair Share funding are distributed for road projects. 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 City 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 86 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 86. Education and Outreach Findings.*

| Education & Outreach Program/Method | In Place? *(Yes/No)* | General Description / Effectiveness for Hazard Risk Reduction |
|---|---|---|
| Community newsletter(s) | Yes | The City's Department of Public Services and Utilities launched its publication of a monthly newsletter (The Works) in 2023 though more staff capacity is needed to maintain over the long run. |
| Web-based / social media | Yes | The City maintains a well-organized website and uses social media platforms (Facebook, X) to conduct outreach and communicate with community members. |
| Public Access TV, radio, etc. | Yes | Pittsfield Community Television (PCTV) and WTBR Pittsfield Community Radio. PCTV simulcasts City Council meetings and those of local boards and commissions where hazard-related topics may be discussed. |
| Community gatherings, festivals, celebrations, or other events | Yes | The City hosts many festivals and special events that take place each season of the year. This includes a year-round monthly visual arts event, First Fridays Artswalk, for participating businesses to unveil new exhibits of paintings, photographs and other works from local and regional artists. From May through October the streets come alive with musicians, artists, activities, sidewalk dining, and much more with the City's popular 3rd Thursdays downtown street festivals. Pittsfield is also the home of the famous Pittsfield Fourth of July Parade—one of the biggest in all of New England. |
| Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, etc. | Yes | Berkshire Environmental Action Team (BEAT), Berkshire Natural Resource Council (BNRC), Housatonic Valley Association (HVA). The City's Health Department also runs public outreach and education activities as does the Fire Department (see below). |
| Ongoing public education or information program *(e.g., responsible water use, fire safety, household preparedness)* | Yes | The Fire Department directs fire prevention activities and provides public safety education and awareness programs on the identification and protection of common risks from fire and other potential hazards. Education on storm water pollution prevention is included as part of the SWMP. |

| Education & Outreach Program/Method | In Place? *(Yes/No)* | General Description / Effectiveness for Hazard Risk Reduction |
|---|---|---|
| Natural disaster or safety-related school programs | Yes | The Fire Department participates in the Student Awareness of Fire Education (SAFE) program which provides resources to help teach fire safety in schools. |
| *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 City of Pittsfield has participated in the NFIP since 1973. As summarized in Table 87, the HMPC used Worksheet 5 from FEMA's *Local Mitigation Planning Handbook* to collect information regarding the City's participation in and compliance with the NFIP. This worksheet, in addition to a separate *NFIP Survey* for the City Planner, helped the HMPC to identify areas for improvement and other ideas that could be potential mitigation actions.

*Table 87. NFIP Participation and Compliance Findings.*

| NFIP Topic | Source of Information | Comments |
|---|---|---|
| ***Insurance Summary*** | | |
| How many NFIP policies are in the community? What is the total premium and coverage? | FEMA NFIP Services, Flood Insurance Data and Analytics; State NFIP Coordinator | As of December 31, 2024, a total of 165 NFIP policies are in force. The total premium is $397,012 for a total of $33,678,000 in coverage. |
| How many claims have been paid in the community? What is the total amount of paid claims? How many of the claims were for substantial damage? | FEMA NFIP Services, Flood Insurance Data and Analytics (HUDEX report) | There has been a total of 125 claims paid since 1973, totaling $724,938 in losses. There have been no claims paid for substantial damage. |
| How many structures are exposed to flood risk within the community? | GIS analysis (FEMA FIRMs + building footprint data) | It has been estimated that 1,960 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 | Yes – 11 repetitive loss properties which have experienced 30 insured losses that total $424,100 in NFIP claims payments. See Chapter 4 for more details. |
| Describe any areas of flood risk with limited NFIP policy coverage | HMPC | No address-specific data has been made available by FEMA, but it is generally assumed that most owners of property located in special flood hazard areas are underinsured when it comes to flood insurance coverage (based on only 165 current policies under the NFIP in comparison to 1,960 structures estimated to be exposed to high flood risk). |
| ***Staff Resources*** | | |
| Who is responsible for floodplain management in the community? Do they serve | Zoning Ordinance, Section 6 | The City has designated the Director of Community Development as the official Floodplain Administrator for the City. |

| NFIP Topic | Source of Information | Comments |
|---|---|---|
| any roles other than Community Floodplain Administrator (FPA)? | (Floodplain District) | |
| 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 Director of Community Development. |
| Explain NFIP administration services (e.g., permit review, GIS, inspections, engineering capability). | Community FPA | All development in the Floodplain District, including structural and non-structural activities, are reviewed for compliance with the City's Zoning Ordinance and other applicable rules and regulations described in this chapter. The City 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 City offers FIRMs and other relevant information for those considering the purchase of flood insurance. FIRMs are file with the Department of Community Development and Conservation Commission. |
| 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 |

| NFIP Topic | Source of Information | Comments |
|---|---|---|
| When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)? | State NFIP Coordinator, FEMA (CIS) | Last CAC was 12/13/2023<br>Last CAV was 11/2/2016 |
| 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) | 3/1/1978 (Regular Entry)<br>10/29/1973 (Emergency Entry) |
| Are the FIRMs digital or paper? | Community FPA | Digital (updated as of January 16, 1987) |
| 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 City's Zoning Ordinance which complies with the state's Model Floodplain Bylaw and exceeds current FEMA/NFIP minimum requirements. These regulations will be routinely updated as necessary to maintain compliance with existing NFIP and State minimum standards for floodplain management. As described earlier in this chapter, higher regulatory standards are also met through the City's enforcement of the Massachusetts State Building Code. Other NFIP development requirements are included in the City's administration of the Commonwealth's Wetlands Protection Act Regulations (CMR 10) and Title V (310 CMR 15) requirements for sewage treatment and disposal. |
| How does the community enforce local floodplain regulations and monitor compliance? Explain the permitting process. | Community FPA, community records | If work proposed in the floodplain, the first entity that would evaluate the proposal is the Conservation Commission. Depending on the work proposed this would either be through the Request for Determination of Applicability (RDA) or Notice of Intent (NOI) process. Once the applicant either receives a determination or |

| NFIP Topic | Source of Information | Comments |
|---|---|---|
| | | an Order of Conditions, the next step will be to receive Floodplain Site Plan Approval from the Community Development Board. This formerly was a Special Permit but the new local regulations only require a Site Plan Review. This site plan covers any work done in the floodplain including small accessory uses such as fences, to ensure that the flood storage present on the property remains constant. |
| ***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? | Insurance Services Office, Inc. | N/A |
| Does the plan include CRS planning requirements | Yes | Yes, many of the planning requirements under CRS Activity 510 are included in the plan update. |

Table 88 provides some additional information in response to the updated requirements included in FEMA's 2022 Local Mitigation Planning Policy Guide (Element C2-a):[69]

*Table 88. Additional NFIP Participation and Compliance Information.*

| Required Information | Response |
|---|---|
| Adoption of NFIP minimum floodplain management criteria via local regulation. | The City's Zoning Ordinance (Chapter 23) at Article 23-6 (Floodplain District) includes the local regulations regarding floodplain management and development in the floodplain. Last amended in December 2024 with revised text to be consistent with the latest version of the State's Model Floodplain Bylaw |

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

| | |
|---|---|
| Adoption of the latest effective Flood Insurance Rate Map (FIRM), if applicable. | The City's Zoning Ordinance at Article 23-6, Section 6.3 (Floodplain District Boundaries) establishes the Floodplain District as shown on the official Flood Insurance Rate Map (FIRM) for the City of Pittsfield, dated January 16, 1987. |
| Implementation and enforcement of local floodplain management regulations to regulate and permit development in SFHAs. | See explanation of the City's permitting process provided in Table 87. |
| Appointment of a designee or agency to implement the addressed commitments and requirements of the NFIP. | Per the City's Zoning Ordinance at Article 23-6, Section 6.104 (Designation of Community Floodplain Administrator), the Director of Community Development or their designee shall act as the official Floodplain Administrator for the City. |
| Description of how participants implement the substantial improvement/substantial damage provisions of their floodplain management regulations after an event. | The City implements the SI/SD provisions of its floodplain management regulations as required per the NFIP (CFR Title 44, Parts 59 through 65) and Massachusetts State Building Code (780 CMR). The City will also coordinate with State Flood Hazard Management Program staff to assure that proper practices are followed and that a post-disaster plan will be in place to implement all SI/SD provisions. |

## Summary and Conclusions

Pittsfield is a bustling urban center 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 mitigation actions and build community resilience to natural hazards.

As demonstrated throughout this chapter and in previous planning efforts, including the City's MVP Summary of Findings Report, Pittsfield's community strengths span across social, environmental, and infrastructural sectors. Some of the strongest hazard mitigation capabilities are found through the routine administration and enforcement of strong codes and regulations. This includes the administration of zoning and subdivision regulations, building codes, and special permit or site plan reviews that ensure new or improved development projects address risk reduction through various provisions such as stormwater drainage, floodplain management, wetlands protection, and more. These codes and standards are effectively enforced through multiple City departments, boards, and commissions and they are periodically reviewed and updated to incorporate recommended best practices. For example, in December 2024 the City Council adopted new provisions within its Zoning Ordinance to ensure its local floodplain management regulations were aligned with the state's latest Model Floodplain Bylaw.

The City employs skilled and committed staff across numerous departments to administer existing local regulations, maintenance programs, and other activities, who are supported by an active citizenry and volunteers that serve on numerous local boards and committees. As noted in the previous plan, the City's staffing infrastructure is a tremendous strength. For example, the Community Development Board is very effective at coordinating with City staff, permit applicants, and the public while the Conservation Commission holds regular meetings to discuss proposed activities within jurisdictional wetland resource areas and help ensure that any work is compliant with existing regulations. The City's Department of Public Services and Utilities perform a variety of maintenance activities to reduce risk throughout the year and in advance or response hazard events, though existing staff resources can get overwhelmed with larger events. Staffing within the Engineering Division can also have difficulty performing all its assigned duties, and coordination between City departments can use some improvement. The City's GIS Coordinator is positioned with the Engineering Division and effectively meets all current responsibilities, though additional GIS staff would provide for redundancies and allow for expanded services to various departments.

The City maintains strong financial capabilities in terms of its ability to leverage local and external funding sources to support hazard mitigation activities. It has successfully utilized its annual budget and capital planning process to fund hazard risk reduction projects, such as culvert replacements and other stormwater drainage improvements, and for the past seven years it has effectively used its Community Preservation Fund to acquire and preserve open space lands subject to hazards. The City has also had success with leveraging available grant funding from FEMA and other federal agencies for mitigation projects, in addition to state assistance through MEMA, EEA, and others. This includes a mix of federal and state funding to support the removal of the Mill Street Dam in 2019 (leading to the revitalization of the West Branch Housatonic River), and more recently, the City was awarded an MVP Action Grant by EEA to address inland flooding in the Unkamet Brook Watershed.

The City is also fortunate to have a variety of 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 radio, and a series of regular community gathering events. Several City departments, including Fire, Emergency Management, Public Services and Utilities, and the Health Department conduct regular public outreach and educational programming for community members that support increased awareness and preparedness for a variety of hazards.

Although the City of Pittsfield has strong capabilities and resources 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 Capabilities to Reduce Risk

**Planning and Regulatory Capabilities**

- Integrate hazard mitigation and climate resilience goals and strategies/actions into the City's Open Space and Recreation Plan and future updates to the Master Plan.
- Conduct reviews and updates to the following City 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).
    - Subdivision Regulations – last amended in 2013, 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.
    - Land Disturbance and Stormwater Management (Chapter 26) – Review enforcement procedures and explore the incorporation of design standards that better account for future climate conditions, such as the latest updates to NOAA's precipitation frequency data presented in Atlas 14.
    - Wetlands Protection – consider adopting City-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.
- Coordinate with the State's Flood Hazard Management Program (within DCR) and FEMA on updating the Flood Insurance Study (FIS) and Flood Insurance Rate Map (FIRM) for Pittsfield.
- Identify opportunities to address extreme heat through further study and tree management, planning, and policy development.

**Administrative and Technical Capabilities**

- Designate a position within the Department of Public Works and Utilities to focus on resilience-themed projects and activities.
- Designate or hire additional staff dedicated to the oversight of regulatory compliance and the enforcement of local permitting procedures.
- Provide additional staffing to the Engineering Division to improve coordination and adequately perform all assigned duties.
- Increase GIS staff capacity to provide for redundancies and allow for expanded services to various departments.

- Consider the designation or hiring of a Grants Administrator to provide support across multiple departments that pursue and administer their own external grant funding awards.
- Encourage and support the local Floodplain Administrator to gain Certified Floodplain Manager (CFM®) certification.
- Develop information/knowledge management systems to (1) help maintain coordination between departments on resilience-themed projects or maintenance activities, and (2) better cope with staff turnover or other disruptions to routine government functions.

**Financial Capabilities**

- Incorporate hazard/climate resilience into the prioritization criteria established for the City's annual capital improvement planning process. Support investments to reduce risk while limiting expenses on projects that could increase hazard vulnerabilities.
- Prioritize available grant funding opportunities to pursue including FEMA Hazard Mitigation Assistance, EEA's MVP Action Grants, DER's Culvert Replacement Municipal Assistance Grant Program, etc.).
- Continue to coordinate with BRPC and neighboring communities on positioning the City to pursue and capture future grant funding for regional resilience/risk reduction projects.
- Leverage the City's Community Preservation Fund to support open space acquisition and/or restorations, green infrastructure installations, and other projects that can advance flood mitigation.
- Explore feasibility of a stormwater utility/enterprise fund as a dedicated, stable revenue source to support stormwater management, flood mitigation, and green infrastructure projects in addition to meeting its MS4 permit requirements.

**Education and Outreach Capabilities**

- Increase use of the City's website and social media platforms, and other readily available outreach mechanisms to promote low-cost public education initiatives on emergency preparedness and hazard mitigation actions for homeowners, business owners, etc.
- 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.).
- Participate annually in National Flood Safety Awareness Week and other emergency preparedness campaigns by using MEMA's social media toolkits and other readily available communication materials to promote risk awareness and mitigation.
- Promote the availability of flood insurance to all property owners and renters, especially those with structures located in areas of high to moderate flood risk.
- Partner with Pittsfield Public Schools to incorporate hazard and climate resilience into existing curriculum and educational programming for K-12 students.

- Improve coordination and streamline the City's external communication procedures, especially for hazard and emergency-related messaging to the public.
- Continue to promote energy assessment programs that can lead to weatherization improvements to older residential structures, especially to low-to-moderate income populations who are more vulnerable to extreme temperatures due to lack of sufficient heating/cooling.

**Possible New Actions Related to NFIP Participation and Compliance**

- Coordinate with the State's Flood Hazard Management Program (within DCR) and FEMA on updating the Flood Insurance Study (FIS) and Flood Insurance Rate Map (FIRM) for Pittsfield.
- Review the State's Local Floodplain Action Guide for possible additional regulatory or administrative improvements. This includes amending the City's Zoning Ordinance to include additional, more accurate flood hazards maps to delineate the regulatory Floodplain District (exceeding the existing FEMA FIS and FIRM).
- Participate in regional efforts that consider advantages to managing flood hazards at a watershed scale, especially where the City is experiencing challenges in finding local solutions.
- Develop a post-disaster substantial damage plan based on the latest guidance from FEMA and the State's Flood Hazard Management Program.
- Explore the potential of joining FEMA's Community Rating System (CRS) in the future based on City staff capabilities, NFIP policy counts, and updated program requirements.

# 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))

HHPD3. Did the plan include mitigation goals to reduce long-term vulnerabilities from HHPDs?

***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 City of Pittsfield, MA Hazard Mitigation Plan Update the HMPC reviewed the City of Pittsfield Hazard Mitigation Plan 2019, the City of Pittsfield Municipal Vulnerability Preparedness Plan 2019 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 23 to represent their vision and priorities for the City of Pittsfield 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 City will mitigate risk posed by all identified hazards.

| | |
|---|---|
| **Save Lives and Property** | Protect lives, property, and infrastructure by proactively reducing risks from natural hazards and adapting to climate change. |
| **High Hazard Potential Dams** | Assess the vulnerabilities of high-hazard dams and implement strategies to reduce risks, while protecting and preserving the natural ecosystems they support. |
| **Local Plans & Regulations** | Develop and implement sustainable policies and regulations to mitigate risks from natural hazards and climate change, promoting resilience at the local and regional levels. |
| **Buildings & Infrastructure Projects** | Plan, design, and execute infrastructure projects that enhance resilience to flooding and other natural hazards, reducing long-term risk to the community. |
| **Natural & Cultural Resources** | Preserve and protect natural and cultural resources by implementing strategies that mitigate the impacts of natural hazards and climate change on ecosystems, water resources, and open spaces. |
| **Education** | Enhance community resilience by expanding educational initiatives for City employees and residents, promoting awareness and engagement in hazard mitigation and climate adaptation efforts. |

*Figure 23. Goal Statements.*

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

The City of Pittsfield Hazard Mitigation Plan 2019 included 37 mitigation actions. For the purposes of this plan, all the actions were reviewed for their status and relevance. Table 89 shows the previous plan's 37 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 89. 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** | Provide emergency back-up power to all critical facilities. | Partially Completed / In Progress | The City received Hazard Mitigation Grant Program (HMGP) funding to install one (1) new 1250 Kilowatt natural gas generator at Berkshire Medical Center. | YES - updated/revised description provided at right, if applicable | Provide emergency back-up power to all critical facilities. |
| **2** | Develop and implement a comprehensive plan to mitigate flood risk at Wahconah Park. | Partially Completed / In Progress | New stadium plans address parking lot flooding. Engineered site plans have been developed, will move into local and Department of Environmental Protection permitting in late winter/early spring 2025. | YES - updated/revised description provided at right, if applicable | Build the new stormwater control system for Wahconah Park and develop and implement a comprehensive plan to mitigate flood risk at Wahconah Park. |
| **3** | Update City regulations to reduce vulnerability to flooding, severe weather, and extreme temperatures. | Completed | The Floodplain Ordinance, located in the Pittsfield Zoning Ordinance Article 23-6 Section 6 was updated in the fall of 2024 to conform with State and Federal requirements. | NO - explanation provided at left | |
| **4** | Develop a City-wide Business Improvement and Economic Development Plan to increase resilience. | Delayed | The Community Development Office will update its Master Plan in 2025 and 2026. This comprehensive plan will include an updated Economic Development plan. | YES - updated/revised description provided at right, if applicable | Develop a City-wide Business Improvement and Economic Development Plan to increase resilience. |
| **5** | Implement the recommendations of the microgrid feasibility study. | Canceled | Eversource is taking the lead to develop a downtown Pittsfield micro-grid as part of upgrades to their 333 West Street facility. Grant application to Federal Government was not awarded in last round of funding opportunity. | NO - explanation provided at left | |
| **6** | Dan Casey Culvert Replacement | Partially Completed / In Progress | Redesign to address MassDOT concerns with foundation support. | YES - updated/revised description | Implement priority projects from City's field inventory of culverts and |

| Action # | Action Title | Current Status | Current Status Description/Explanation | Keep for Updated Plan? | Updated Action Title/Description (if applicable) |
|---|---|---|---|---|---|
| | | | | provided at right, if applicable | bridges. Prioritize replacement of the culvert at Dan Casey Memorial Drive. |
| **7** | Floodplain Education and Awareness | Partially Completed / In Progress | Have not launched a formal campaign. Have addressed individual questions brought to our attention by residents. A new website is being developed and could be used as an opportunity to share information in the future. | YES - updated/revised description provided at right, if applicable | Increase floodplain education and awareness. |
| **8** | Local Transportation Plan | Canceled | Change in emphasis from traffic congestion to safety of all road users. | NO - explanation provided at left | |
| **9** | Implement priority projects from City's field inventory of culverts and bridges. | Completed + To Be Continued | Culverts on Hancock Road and Churchill Street have been replaced. Pecks Road Bridge is being replaced. | YES - updated/revised description provided at right, if applicable | Implement priority projects from City's field inventory of culverts and bridges. Prioritize replacement of the culvert at Dan Casey Memorial Drive. |
| **10** | Illicit Discharge Detection and Elimination Program | Completed + To Be Continued | Dry weather sampling from stormwater outfalls has been completed and led to the elimination of two illicit connections. Additional sampling is on-going and a program is in place to attempt to narrow search area of illicit connections. | NO - explanation provided at left | |
| **11** | Develop a prioritized list of projects to reduce stormwater runoff and mitigate flood risk. | Completed + To Be Continued | Grant obtained to construct stormwater treatment facility at the Highway yard. | NO - explanation provided at left | |
| **12** | Conduct dam assessment and dam removal feasibility for the Wild Acres Dam and Mill Street Dam. | Partially Completed / In Progress | Mill Street Dam has been removed. Wild Acres Dam remains, and is the subject of a feasibility study to determine best course of action. | YES - updated/revised description provided at right, if applicable | Conduct dam assessment and dam removal feasibility for the Wild Acres Dam and Mill Street Dam. |

| Action # | Action Title | Current Status | Current Status Description/Explanation | Keep for Updated Plan? | Updated Action Title/Description (if applicable) |
|---|---|---|---|---|---|
| **13** | Upgrades to water and wastewater systems. | Completed + To Be Continued | Tertiary treatment added to meet nitrogen removal requirements. Other support buildings have received updates. 2025 - 2026 project to replace bubble diffusion to enhance nutrient removal efficacy. 2027-2028 replacement of the Laboratory building. | NO - explanation provided at left | |
| **14** | Prevention of vector-borne illnesses. | Partially Completed / In Progress | Board of Health and the County Mosquito Control Project provides services on reducing the potential for mosquito borne disease. | YES - updated/revised description provided at right, if applicable | Prevention of vector-borne illnesses. |
| **15** | Design and implement an education and outreach program for the public. | Partially Completed / In Progress | Fire Department Staff conducts outreach at school programs, radio shows, public hearings and social media. | YES - updated/revised description provided at right, if applicable | Design and implement a natural hazard education and outreach program for the public. |
| **16** | Determine a strategy for utilizing multiple communication systems to inform the general population. | Completed | The City uses Code Red, Reverse 911, Social Media and the ability to have MEMA send out wireless emergency alerts (WEA). We can also send a message to our Media List that will go out on all media platforms. | NO - explanation provided at left | |
| **17** | Generator Installation Study for Patterson Field House and Field Administration Building for use as an Emergency Shelter. | Delayed | The college is having trouble finding funding. | YES - updated/revised description provided at right, if applicable | Generator Installation Study and installation for Patterson Field House and Field Administration Building for use as an Emergency Shelter. |
| **18** | Plan for Wildlife Management with an emphasis on Beaver control. | Delayed | Mentioned as potential MVP project for FY 2025 but opted for different project. Beaver management continues a case by case basis. | YES - updated/revised description provided at right, if applicable | Plan for Wildlife Management with an emphasis on Beaver control. |

| Action # | Action Title | Current Status | Current Status Description/Explanation | Keep for Updated Plan? | Updated Action Title/Description (if applicable) |
|---|---|---|---|---|---|
| **19** | Maintenance of Urban Waterways. | Completed + To Be Continued | Obstructions that leave potential for flooding are addressed with the abutting property owner. | YES - updated/revised description provided at right, if applicable | Maintenance of Urban Waterways. |
| **20** | Implement Design Plans for West Side Riverway as well as other opportunities highlighted in the Urban River Visions Plan. | Completed | Park was constructed. | NO - explanation provided at left | |
| **21** | Short- and long-term lake management. | Completed + To Be Continued | Lake management actions related to reducing impacts from climate change are ongoing, such as working to address / inform community about issues related to cyanobacteria blooms. | YES - updated/revised description provided at right, if applicable | Short- and long-term lake management. |
| **22** | Build the new stormwater control system for Wahconah Park. | Delayed | Replacement of culvert from Wahconah Street through the Wahconah Park parking lot will be done during the renovation of the Wahconah park. Also, additional flood storage will be a part of the park project, which is still in need of additional funding. | YES - updated/revised description provided at right, if applicable | Build the new stormwater control system for Wahconah Park and develop and implement a comprehensive plan to mitigate flood risk at Wahconah Park. |
| **23** | Flood Mapping Management. | Completed + To Be Continued | The City continues to reiterate the need for updated FEMA Flood maps. The current map is from 1983 and does not likely capture the accurate picture of the Floodplain in the city any longer. The City has received some notice from FEMA that these maps will be worked on in the near future, but it is unclear when exactly this process will begin or when the maps will be complete. | YES - updated/revised description provided at right, if applicable | Build the new stormwater control system for Wahconah Park and develop and implement a comprehensive plan to mitigate flood risk at Wahconah Park. |

| Action # | Action Title | Current Status | Current Status Description/Explanation | Keep for Updated Plan? | Updated Action Title/Description (if applicable) |
|---|---|---|---|---|---|
| **24** | Reservoir Dam Access Improvement. | Completed + To Be Continued | Repairs have been made to access roads for the dams and to the dams themselves. Additional repairs have been identified from semiannual inspection of the dams. | YES - updated/revised description provided at right, if applicable | Reservoir Dam Access Improvement. |
| **25** | Remote Monitoring of High Hazard Dams. | Delayed | Funding not in place. | YES - updated/revised description provided at right, if applicable | Remote Monitoring of High Hazard Dams. |
| **26** | Develop a city-wide practice for addressing stormwater and flood events. | Delayed | City ordinance to be revised to lower the review thresholds. | YES - updated/revised description provided at right, if applicable | Develop a city-wide practice for addressing stormwater and flood events. |
| **27** | Natural Gas Infrastructure Improvements. | Completed + To Be Continued | Private Utility. They have been upgrading major distribution lines and has plans for 3+ years of additional replacement. | NO - explanation provided at left | |
| **28** | Develop a plan to respond to the transportation needs of vulnerable populations. | Partially Completed / In Progress | Document ready for review. | NO - explanation provided at left | |
| **29** | Develop a plan for sheltering citizens. | Partially Completed / In Progress | Pittsfield has two facilities that can be used to shelter evacuees or displaced persons in emergency situations. Shelters will be managed by Emergency Management and provide mass care services to evacuees and displaced persons. Shelter facilities will be activated at the direction of the Emergency Management Director or Emergency Operations Manager; shelter facilities are not automatically activated during times of emergency; therefore, residents should obtain guidance and information from local officials on which shelters may be open. The shelters are | NO - explanation provided at left | |

| Action # | Action Title | Current Status | Current Status Description/Explanation | Keep for Updated Plan? | Updated Action Title/Description (if applicable) |
|---|---|---|---|---|---|
| | | | either Reid Middle School or Patterson Field House at Berkshire Community College. The City is trying to have a generator hook up installed. | | |
| **30** | Water quality preservation. | Delayed | No known progress has been made towards this. The reservoirs that feed Ashley water treatment plant are in state forest. All drinking water reservoirs are not in the City, so control is limited. | YES - updated/revised description provided at right, if applicable | Water quality preservation. |
| **31** | Promote/Support Sustainable Land Use Patterns. | Partially Completed / In Progress | The City is continuing to create land use regulations that create protections for development in Open Space areas as well as in sensitive areas such as wetlands and riverfront areas. The City has also created several ordinances such as the Flexible Development Ordinance that incentivizes more dense development in exchange for the setting aside and preservation of Open Space. The City in its Zoning is focused on developing Form-Based Code which will consolidate development in the downtown. Creating protections against deforestation have been explored and may be implemented in large scale developments such as in large scale ground mounted solar arrays. | YES - updated/revised description provided at right, if applicable | Incorporate hazard/climate resilience into the prioritization criteria established for the City’s annual capital improvement planning process. |
| **32** | GE Storm Water Purification. | Canceled | Not within the purview of the City. | NO - explanation provided at left | |
| **33** | Roadway Winterization Public Education. | Canceled | No progress made towards this. City has invested in equipment for liquid deicing chemicals use as direct applications or as a treatment to the regular salt applied to the roadway. | NO - explanation provided at left | |
| **34** | Pervious Paving Assessment. | Completed | Required maintenance for pervious asphalt pavement completed. | NO - explanation provided at left | |
| **35** | Debris Management Plan. | Partially Completed / In Progress | Debris is stockpiled at the wastewater treatment plant and periodically disposed of or sold as clean fill. | NO - explanation provided at left | |

| Action # | Action Title | Current Status | Current Status Description/Explanation | Keep for Updated Plan? | Updated Action Title/Description (if applicable) |
|---|---|---|---|---|---|
| **36** | Litter Reduction Education and Outreach Program. | Delayed | This project has yet to begin but remains necessary. | YES - updated/revised description provided at right, if applicable | Litter Reduction Education and Outreach Program. |
| **37** | Tree and Forest Management Program. | Completed + To Be Continued | City continues to address urban street tree issues and has secured several state grants for street tree plantings. | YES - updated/revised description provided at right, if applicable | Tree and Forest Management Program. |

## Municipal Vulnerability Preparedness Plan

The City of Pittsfield Municipal Vulnerability Preparedness Plan (MVP) 2019 includes 37 overall 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 Pittsfield's MVP were reviewed and considered when developing mitigation actions for this plan update.

## 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 City of Pittsfield. 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 24. Process of Identifying a Range of Mitigation Actions.*

The HMPC and the public considered four mitigation action categories defined in Figure 25 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 25. Types of Mitigation Actions.*

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

*Table 90. Examples of Mitigation Actions in Each Category.*

| Mitigation Action Category | Examples of Mitigation Actions |
|---|---|
| Local Plans and Regulations | • Comprehensive plans<br>• Land use ordinances<br>• Subdivision regulations<br>• Development review<br>• Building codes and enforcement<br>• NFIP Community Rating System<br>• Capital improvement programs<br>• Open space preservation<br>• Stormwater management regulations and master plans |
| Structure and Infrastructure Projects | • Acquisitions and elevations of structures in flood-prone areas<br>• Utility undergrounding<br>• Structural retrofits<br>• Floodwalls and retaining walls<br>• Detention and retention structures<br>• Culverts |
| Natural Systems Protection | • Sediment and erosion control<br>• Stream corridor restoration<br>• Forest management<br>• Conservation easements<br>• Wetland restoration and preservation |
| Education and Awareness Programs | • Radio or television spots<br>• Websites with maps and information<br>• Real estate disclosure<br>• Presentations to school groups or neighborhood organizations<br>• Mailings to residents in hazard-prone areas |

The HMPC also included specific dam risk mitigation activities such as those shown in Table 91 below taken from FEMA's Hurricane and Flood Mitigation Handbook for Public Facilities (https://www.fema.gov/sites/default/files/documents/fema_p-2181-fact-sheet-2-3-dams-and-reservoirs_0.pdf).

*Table 91. Dam Risk Mitigation Activities.*

| Type of Dam Risk Mitigation Activity | Description |
|---|---|
| Emergency Action Plans | • Develop and practice an Emergency Action Plan (EAP). EAPs include actions dam owners take to mitigate risk, coordinate with emergency management, issue early warnings, create inundation maps, and delineate responsibilities for those who manage an incident. |
| Improve Dam Stability | • Reduce the Slope<br>• Use Buttressing<br>• Use Anchoring |
| Increase Spillway Capacity | • Expand Existing Spillway<br>• Add a New Spillway |
| Increase Temporary Storage Capacity | • Raise the Dam Height |
| Control Surface Erosion | • Use Armoring<br>• Build a Parapet Wall<br>• Build a Cutoff Wall to Address Headcutting |
| Reduce Seepage and Internal Erosion | • Install a Blanket Drain<br>• Install a Filter Diaphragm<br>• Install a Reverse Filter<br>• Install a Seepage Cutoff Wall |
| Address Foundation Issues | • Install a Grout Curtain<br>• Install a Foundation Cutoff Wall |

The Association of State Dam Safety Officials (https://damsafety.org/Roadmap) includes the following recommendations for mitigating risk. The HMPC considered each of these.

Dam Owners Should:

- Maintain and operate dams to assure that they do not fail. Work with state and local officials to mitigate the consequences of failures and incidents.

- Inform local officials of risks associated with dams.
- Develop emergency action plans (EAP) for every high-hazard potential dam. Use a nationally accepted model/guide. Integrate exercising into the planning process.
- Have a dam failure inundation map created as part of the EAP development process. Share plans and maps with local planners and first responders.
- Work with the state or federal regulator to comply with safety standards.
- Hire experienced professional engineers to oversee dam safety engineering issues.
- Attend educational programs when offered by organizations and agencies.

Emergency and Floodplain Managers Should:

- Open lines of communication with State and Federal dam safety agencies to improve planning and preparedness for dam failures or incidents.
- Participate in educational programs to become more aware of dams and how they intersect with emergency and floodplain management.
- Encourage improved land use planning at the local level so that communication about how dams affect local areas is more accurately known and considered in future planning.

Additional mitigation actions considered by the HMPC for dams included:

- Rehabilitation or removal
- Adopting or enforcing land use ordinances in inundation zones
- Elevating structures in inundation zones
- Adding flood protection measures such as berms, floodwalls, and floodproofing in inundation zones
- Managing the watershed to reduce erosion and sediment inflow.
- Public education.

In addition to this quantitative approach to identifying mitigation actions, the HMPC took a qualitative approach through the public outreach and engagement process to identify mitigation actions. Mitigation actions supporting underserved communities and environmental justice communities were specifically considered by the HMPC. They also focused on actions to the built environment both buildings and infrastructure as well as future development or redevelopment. The resulting list of mitigation actions includes at a minimum one action for each hazard identified. In several instances multiple actions address an identified hazard and problem.

Potential mitigation actions for each identified hazard and problem identified in the Risk Assessment are shown **Error! Reference source not found.** 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 City priorities.

## 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))

HHPD4: Did the plan include actions that address HHPDs and prioritize mitigation actions to reduce vulnerabilities from HHPDs?

The HMPC then had the job to create a cost-effective mitigation action plan that included projects to address the identified hazards, areas of risk and vulnerable assets. An online Mitigation Action Tracker was developed for the City 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 City'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 City government responsible for implementing the action. |
| Supporting Organizations | A possible list of supporting partners, these may be City departments, regional organizations, state agencies or adjacent communities. |
| Potential Funding Source(s) | A list of possible grant sources or the location in the City'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 City hopes to implement the action. |
| Estimated Cost | An estimated cost designated as high, medium, or low. The City 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 City to determine if the costs associated with an action were reasonable compared to the corresponding benefits. To do this, the HMPC developed a prioritization table that included eight categories of criteria; these are detailed in the table below. Each category was assigned points with priority criteria given the highest points. The most points an action could earn was 22. Actions that scored 15 points or higher were ranked as High priority. Actions that scored between 12-14 points were considered Medium, and actions that scored under 11 points were considered low priority. High Hazard Dams were given their own prioritization ranking due to their significance as a critical asset.

*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 (Flood from Precipitation, Severe Winter Storms, Wildfires/Brushfires, Extreme Temperatures) = 3<br>Medium (Flooding from Dam Failure or Overtopping, Invasive Species, Other Severe Weather, Droughts, Tornadoes, Hurricanes/Tropical Storms) = 2<br>Low (Earthquakes, Landslides) = 1 |
| 2 | High Hazard Dams | How much does the measure mitigate dam risk? | Specific Risk Mitigation = 3<br>Some Risk Mitigation = 2<br>No Risk Mitigation = 0 |
| 3 | Approximate Cost | How much will the measure cost to implement? | Low (Under $10k) = 3<br>Medium ($10k - $100k) = 2<br>High ($100k - $500k) = 1<br>Very High (over $500k) = 0 |
| 4 | Equity Focus | Does the measure provide support to Environmental Justice (EJ) and other Vulnerable Populations? | Direct Support = 3<br>Indirect Support = 2<br>No Support = 0 |
| 5 | Protection of Lives | How effective is the measure in protecting lives and mitigating injuries resulting from the targeted hazard(s)? | Direct Support = 3<br>Moderate Indirect Support = 2<br>Minor Indirect Support = 1<br>None = 0 |
| 6 | Protection of Critical Facilities or Infrastructure | Does the measure provide protection of critical facilities and infrastructure? | Yes = 3<br>No = 0 |
| 7 | Natural Resource Protection | Does the measure provide protection of natural resources? | Yes = 2<br>No = 0 |

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

All the actions are listed in Table 92 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 92. Hazard Mitigation Actions.*

| 1 | Flood Mapping Management. | |
|---|---|---|
| High | **Action Description** | Continue to advocate that FEMA update city-wide flood maps. |
| | **Lead Position** | Floodplain Coordinator |
| | **Supporting Agencies** | Massachusetts Department of Conservation and Recreation (DCR); Federal Emergency Management Agency (FEMA) |
| | **Cost** | Low |
| | **Potential Funding Sources** | City of Pittsfield Floodplain Coordinator's Budget |
| | **Hazards** | Flooding from Precipitation, Flooding from Dam Failure or Overtopping |
| | **Implementation Schedule** | 2025-2030 |

| 2 | Formalize a system of collaboration with adjacent towns that have High Hazard Dams or may be impacted by City owned dams. | |
|---|---|---|
| High | **Action Description** | Collaborate with the members of the Pittsfield Economic Revitalization Corporation (PERC), and adjacent communities regarding the risk posed by High Hazard Dams in the region. |
| | **Lead Position** | Fire Chief/Emergency Management Director |
| | **Supporting Agencies** | Massachusetts Emergency Management Agency (MEMA), Berkshire Regional Planning Commission (BRPC), Adjacent Towns |
| | **Cost** | Low |
| | **Potential Funding Sources** | Fire Department Budget |
| | **Hazards** | Flooding from Dam Failure or Overtopping |
| | **Implementation Schedule** | 2025-2030 |

| 3 | Reservoir Dam Access Improvement. | |
|---|---|---|
| High | **Action Description** | Improve access roads at dams and other critical facilities. Purchase appropriate vehicles or equipment to ensure access under a wide range of hazard conditions. |
| | **Lead Position** | Commissioner of Public Works |
| | **Supporting Agencies** | Deputy Commissioner of Public Works |
| | **Cost** | Medium |
| | **Potential Funding Sources** | Massachusetts Executive Office of Energy and Environmental Affairs (EEA): MA Dam and Seawall Repair or Removal Fund, Massachusetts Department of Environmental Protection (MassDEP): Massachusetts Clean Water Trust (CWT) – State Revolving Fund (SRF) Loans, Massachusetts Emergency Management Agency (MEMA): Hazard Mitigation Grants, Massachusetts Department of Conservation and Recreation (DCR): FEMA High Hazard Potential Dam (HHPD) Grant Program, U.S. Army Corps of Engineers (USACE): Dam Rehabilitation Assistance |
| | **Hazards** | Flooding from Dam Failure or Overtopping |
| | **Implementation Schedule** | 2025-2030 |

| 4 | Develop a city-wide practice for addressing stormwater and flood events. | |
|---|---|---|
| High | **Action Description** | Assess the viability of nature-based solutions such as restoration of wetlands and river channels, or implementation of green infrastructure, to develop a list of specific priority projects in which reduction of stormwater runoff and increased flood storage capacity could mitigate flooding risk. |
| | **Lead Position** | Conservation Agent |
| | **Supporting Agencies** | Department of Public Services |
| | **Cost** | Medium |
| | **Potential Funding Sources** | Conservation Commission Budget |
| | **Hazards** | Flooding from Precipitation, Severe Winter Storms, Flooding from Dam Failure or Overtopping, Other Severe Weather, Tornadoes, Hurricanes and Tropical Storms |
| | **Implementation Schedule** | 2025-2030 |

| 5 | Increase outreach and facilitate access to warming and cooling centers for the unhoused and elderly. | |
|---|---|---|
| High | Action Description | Pittsfield's unhoused population, and those living in homes without air conditioning or sufficient heat are at risk to extreme temperatures. |
| | Lead Position | Director of Public Health |
| | Supporting Agencies | Council on Aging, Fire Department |
| | Cost | Low |
| | Potential Funding Sources | Public Health Department Budget |
| | Hazards | Extreme Temperatures |
| | Implementation Schedule | 2025-2030 |

| 6 | Upgrades to water and wastewater systems. | |
|---|---|---|
| High | Action Description | Continue assessing and upgrading water and wastewater systems and implementing upgrades, particularly at pump stations, collection points, and treatment plants. Upgrade Wastewater Treatment Plant to meet current regulations. |
| | Lead Position | Commissioner of Public Works |
| | Supporting Agencies | Deputy Commissioner of Public Works |
| | Cost | Very High |
| | Potential Funding Sources | City Budget, Capital Projects, and state and federal grants |
| | Hazards | Flooding from Precipitation, Severe Winter Storms, Other Severe Weather, Tornadoes, Hurricanes and Tropical Storms |
| | Implementation Schedule | 2025-2030 |

| 7 | Generator Installation Study and installation for Patterson Field House and Field Administration Building for use as an Emergency Shelter. | |
|---|---|---|
| High | Action Description | Provide a study at Berkshire Community College for two buildings to be used as an emergency shelter. The two buildings under consideration are Stanley/Peterson Building and Field Administration Center. The new generators would need to comply with FEMA requirements in order to support operation as an emergency shelter. |
| | Lead Position | Fire Chief/Emergency Management Director |
| | Supporting Agencies | Berkshire Community College Administration |

| | | |
|---|---|---|
| | **Cost** | High |
| | **Potential Funding Sources** | Massachusetts Division of Capital Asset Management and Maintenance (DCAMM) |
| | **Hazards** | Flooding from Precipitation, Severe Winter Storms, Wildfires/Brushfires, Extreme Temperatures, Flooding from Dam Failure or Overtopping, Other Severe Weather, Tornadoes, Hurricanes and Tropical Storms, Earthquakes, Landslides |
| | **Implementation Schedule** | 2025-2030 |

| **8** | **Incorporate hazard/climate resilience into the prioritization criteria established for the City's annual capital improvement planning process.** | |
|---|---|---|
| **High** | **Action Description** | Adding resilience into the City's prioritization criteria for investments to reduce risk while limiting expenses on projects that could increase hazard vulnerabilities benefits the City. |
| | **Lead Position** | Director of Community Development |
| | **Supporting Agencies** | City Departments |
| | **Cost** | Low |
| | **Potential Funding Sources** | Community Development Department Budget |
| | **Hazards** | Flooding from Precipitation, Severe Winter Storms, Wildfires/Brushfires, Extreme Temperatures, Flooding from Dam Failure or Overtopping, Invasive Species, Other Severe Weather, Droughts, Tornadoes, Hurricanes and Tropical Storms, Earthquakes, Landslides |
| | **Implementation Schedule** | 2025-2030 |

| **9** | **Maintenance of Urban Waterways.** | |
|---|---|---|
| **High** | **Action Description** | Develop a plan and identify funding for addressing urban waterway impediments to reduce flooding and improve navigability. |
| | **Lead Position** | Conservation Agent |
| | **Supporting Agencies** | |
| | **Cost** | Medium |
| | **Potential Funding Sources** | City Budget, and state and federal grants |
| | **Hazards** | Flooding from Precipitation, Severe Winter Storms, Other Severe Weather, Tornadoes, Hurricanes and Tropical Storms |

| | | |
|---|---|---|
| | Implementation Schedule | 2025-2030 |

| 10 | Remote Monitoring of High Hazard Dams. | |
|---|---|---|
| High | Action Description | Acquire remote monitoring equipment to enable continuous monitoring of critical structures such as high-hazard dams. |
| | Lead Position | Natural Resource Program Manager |
| | Supporting Agencies | |
| | Cost | Medium |
| | Potential Funding Sources | Massachusetts Executive Office of Energy and Environmental Affairs (EEA): MA Dam and Seawall Repair or Removal Fund, Massachusetts Department of Environmental Protection (MassDEP): Massachusetts Clean Water Trust (CWT) – State Revolving Fund (SRF) Loans, Massachusetts Emergency Management Agency (MEMA): Hazard Mitigation Grants, Massachusetts Department of Conservation and Recreation (DCR): FEMA High Hazard Potential Dam (HHPD) Grant Program, U.S. Army Corps of Engineers (USACE): Dam Rehabilitation Assistance |
| | Hazards | Flooding from Dam Failure or Overtopping |
| | Implementation Schedule | 2025-2030 |

| 11 | Implement priority projects from City's field inventory of culverts and bridges. Prioritize replacement of the culvert at Dan Casey Memorial Drive. | |
|---|---|---|
| High | Action Description | Implement priority projects from the City's existing field inventory of culverts and bridges for increased flooding resiliency and storm-hardening, including re-sizing or replacement projects. Green infrastructure, low-Impact design, and other nature-based solutions should be integrated with hard-infrastructure improvements to establish robust approaches in the face of natural hazards and climate-change scenarios, and that meet Massachusetts stream-crossing standards. |
| | Lead Position | Commissioner of Public Works |
| | Supporting Agencies | Deputy Commissioner of Public Works |
| | Cost | Very High |
| | Potential Funding Sources | Massachusetts Division of Ecological Restoration (DER): Culvert Replacement Municipal Assistance (CRMA) Grant Program, Executive Office of Energy and Environmental Affairs (EEA): Municipal Vulnerability Preparedness (MVP) Program, Statewide Transportation and Climate Resilience Funding |

| | | |
|---|---|---|
| | **Hazards** | Flooding from Precipitation, Severe Winter Storms, Other Severe Weather, Tornadoes, Hurricanes and Tropical Storms |
| | **Implementation Schedule** | 2025-2030 |

| **12** | **Design and implement a natural hazard education and outreach program for the public.** | |
|---|---|---|
| **High** | **Action Description** | Design an education and outreach program to build awareness of hazard risk, mitigation actions for homeowners, and City resources. This program should include sources of emergency information such as social media, local TV, and radio and City websites. Include messaging to prompt citizens to register for City's CODE RED system. The program should also educate residents how to shelter in place and what items they need (such as battery-powered radios and emergency supplies). The program will be designed within one year and implemented over the lifetime of the mitigation plan. |
| | **Lead Position** | Fire Chief and Mayor's Office |
| | **Supporting Agencies** | Community navigators through Habitat for Humanity |
| | **Cost** | Low |
| | **Potential Funding Sources** | Mayor's Office Budget |
| | **Hazards** | Flooding from Precipitation, Severe Winter Storms, Wildfires/Brushfires, Extreme Temperatures, Flooding from Dam Failure or Overtopping, Invasive Species, Other Severe Weather, Droughts, Tornadoes, Hurricanes and Tropical Storms, Earthquakes, Landslides |
| | **Implementation Schedule** | 2025-2026 |

| **13** | **Water quality preservation.** | |
|---|---|---|
| **High** | **Action Description** | Evaluate opportunities for improved watershed protection to preserve or improve water quality in the City's reservoirs and waterways. |
| | **Lead Position** | Water Superintendent |
| | **Supporting Agencies** | |
| | **Cost** | Medium |
| | **Potential Funding Sources** | State Revolving Funds (SRF), Drinking Water State Revolving Fund (DWSRF), Section 319 Nonpoint Source Grants, Section 604 Water Quality Management Planning Grants |

| | | |
|---|---|---|
| | Hazards | Flooding from Precipitation, Severe Winter Storms, Flooding from Dam Failure or Overtopping, Invasive Species, Other Severe Weather, Tornadoes, Hurricanes and Tropical Storms |
| | Implementation Schedule | 2025-2030 |

| 14 | Remove the Bel Air Dam. | |
|---|---|---|
| High | Action Description | The Bel Air Dam impounds Pontoosuc Brook, which is a tributary to the West Branch of the Housatonic River. The Bel Air Dam is located approximately 1.1 miles downstream of Pontoosuc Lake. The Bel Air Dam is classified as a HIGH (Class I) Hazard Potential dam. Removing the dam is necessary to protect the City. |
| | Lead Position | Natural Resource Program Manager |
| | Supporting Agencies | MA Department of Conservation and Recreation, Office of Dam Safety |
| | Cost | Very High |
| | Potential Funding Sources | Massachusetts Office of Dam Safety |
| | Hazards | Flooding from Dam Failure or Overtopping |
| | Implementation Schedule | 2025-2026 |

| 15 | Develop a plan to evacuate the elderly living in downstream inundation areas. | |
|---|---|---|
| High | Action Description | Identifying shelter needs, transportation resources, and people living in dam inundation areas is a way to prepare and mitigate the risk created by these dams. |
| | Lead Position | Fire Chief/Emergency Management Director |
| | Supporting Agencies | Council on Aging, Fire Department |
| | Cost | Medium |
| | Potential Funding Sources | Massachusetts Department of Transportation (MassDOT): Community Transit Grant Program, Fire Department Budget |
| | Hazards | Flooding from Dam Failure or Overtopping |
| | Implementation Schedule | 2025-2030 |

| 16 | Provide emergency back-up power to all critical facilities. |
|---|---|

| | | |
|---|---|---|
| High | Action Description | Evaluate opportunities to provide improvements at critical facilities, especially emergency backup power, including feasibility of green power and battery storage. There are a number of buildings and facilities in the city (including pump stations, schools, senior housing properties, medical facilities, etc.) in need of backup power systems to protect public buildings and infrastructure from freezing and improve services for residents who may lose power during emergencies or hazard events. Consider supplying backup power to the BCC fieldhouse to enable it to serve as a shelter during hazard events. |
| | Lead Position | Building Superintendent |
| | Supporting Agencies | Deputy Commissioner of Public Works |
| | Cost | High |
| | Potential Funding Sources | FEMA Hazard Mitigation Grant Program (HMGP), Massachusetts Department of Energy Resources: Massachusetts Green Communities Grant Program |
| | Hazards | Flooding from Precipitation, Severe Winter Storms, Wildfires/Brushfires, Extreme Temperatures, Flooding from Dam Failure or Overtopping, Other Severe Weather, Tornadoes, Hurricanes and Tropical Storms, Earthquakes, Landslides |
| | Implementation Schedule | 2025-2030 |

| **17** | **Build the new stormwater control system for Wahconah Park and develop and implement a comprehensive plan to mitigate flood risk at Wahconah Park.** | |
|---|---|---|
| High | Action Description | Reduce flooding within Wahconah Park parking lot through improved stormwater management conveyance to the Housatonic River. Develop and implement a comprehensive plan to address flooding at Wahconah Park and surrounding neighborhoods. |
| | Lead Position | Commissioner of Public Works |
| | Supporting Agencies | Massachusetts Emergency Management Agency (MEMA) |
| | Cost | Medium |
| | Potential Funding Sources | MassDEP: Section 319 Nonpoint Source Competitive Grants, Massachusetts Clean Water Trust: Clean Water State Revolving Fund (CWSRF), Executive Office of Energy and Environmental Affairs (EEA): Municipal Vulnerability Preparedness (MVP) Action Grants |
| | Hazards | Flooding from Precipitation |
| | Implementation Schedule | 2025-2030 |

| **18** | **Increase floodplain education and awareness.** |
|---|---|

| | | |
|---|---|---|
| High | **Action Description** | Analysis of the number of flood insurance policies and the number of structures in areas of flood risk indicate a possible issue of underinsurance.<br><br>Develop education and outreach to residents living in flood-prone areas to ensure that all individuals and families residing there are aware of potential risks, as well as mechanisms to reduce their risk exposure (such as flood insurance). Target renters as well as property owners. |
| | **Lead Position** | Conservation Agent |
| | **Supporting Agencies** | Parks/Open Spaces Resource Manager |
| | **Cost** | Low |
| | **Potential Funding Sources** | Conservation Commission Budget |
| | **Hazards** | Flooding from Precipitation, Severe Winter Storms, Other Severe Weather, Tornadoes, Hurricanes and Tropical Storms |
| | **Implementation Schedule** | 2025-2030 |

| 19 | **Conduct dam assessment and dam removal feasibility for the Wild Acres Dam and Mill Street Dam.** | |
|---|---|---|
| High | **Action Description** | Conduct dam assessments and study feasibility of dam removals, specifically at Wild Acres Dam and Mill Street Dam. |
| | **Lead Position** | Conservation Commission Chair |
| | **Supporting Agencies** | Community Development |
| | **Cost** | High |
| | **Potential Funding Sources** | Massachusetts Executive Office of Energy and Environmental Affairs (EEA): MA Dam and Seawall Repair or Removal Fund, Massachusetts Department of Environmental Protection (MassDEP): Massachusetts Clean Water Trust (CWT) – State Revolving Fund (SRF) Loans, Massachusetts Emergency Management Agency (MEMA): Hazard Mitigation Grants, Massachusetts Department of Conservation and Recreation (DCR): FEMA High Hazard Potential Dam (HHPD) Grant Program, U.S. Army Corps of Engineers (USACE): Dam Rehabilitation Assistance |
| | **Hazards** | Flooding from Dam Failure or Overtopping |
| | **Implementation Schedule** | 2027 |

| 20 | **Upgrade the City drinking water supply infrastructure to protect water quality and availability.** |
|---|---|

| | | |
|---|---|---|
| High | Action Description | Extreme heat may increase the risk of algal blooms and other harmful species that may impact water quality. |
| | Lead Position | Commissioner of Public Works |
| | Supporting Agencies | |
| | Cost | Very High |
| | Potential Funding Sources | Massachusetts Clean Water Trust: Clean Water State Revolving Fund (CWSRF), Massachusetts Executive Office of Energy and Environmental Affairs (EEA): Municipal Vulnerability Preparedness (MVP) Action Grants |
| | Hazards | Extreme Temperatures, Drought, Invasive Species |
| | Implementation Schedule | 2025-2030 |

| **21** | **Alert homeowners to the potential wildfire risk in high probability burn areas and educate them about how to create defensible space.** | |
|---|---|---|
| High | Action Description | Many homes are in urban interface areas. Through community outreach including social media and workshops the City can educate residents how to reduce their risk to wildfire. |
| | Lead Position | Fire Chief/EMD |
| | Supporting Agencies | MA Department of Conservation and Recreation, Fire Warden |
| | Cost | Low |
| | Potential Funding Sources | Fire Department Budget |
| | Hazards | Wildfires/Brushfires, Extreme Temperatures, Other Severe Weather, Tornadoes, Hurricanes and Tropical Storms |
| | Implementation Schedule | 2025-2026 |

| **22** | **Conduct reviews and updates to City regulations to require or promote hazard resistant, climate-adaptive standards for new development.** | |
|---|---|---|
| High | Action Description | 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). |
| | Lead Position | City Planner |
| | Supporting Agencies | Community Development Board, Conservation Commission, Community Preservation Committee |
| | Cost | Medium |

| | | |
|---|---|---|
| | Potential Funding Sources | Community Development Department Budget |
| | Hazards | Flooding from Precipitation, Severe Winter Storms, Wildfires/Brushfires, Extreme Temperatures, Flooding from Dam Failure or Overtopping, Invasive Species, Other Severe Weather, Droughts, Tornadoes, Hurricanes and Tropical Storms, Earthquakes, Landslides |
| | Implementation Schedule | 2025-2030 |

| 23 | Litter Reduction Education and Outreach Program. | |
|---|---|---|
| Medium | Action Description | Develop a community litter-reduction education and outreach program aimed at limiting debris in stormwater infrastructure and natural water bodies. Increase everyday access to trash and recycling disposal and promote the use of these amenities by residents. |
| | Lead Position | Commissioner of Public Works |
| | Supporting Agencies | Community navigators through Habitat |
| | Cost | Low |
| | Potential Funding Sources | Mayor's Office Budget |
| | Hazards | Flooding from Precipitation, Severe Winter Storms, Wildfires/Brushfires, Extreme Temperatures, Flooding from Dam Failure or Overtopping, Invasive Species, Other Severe Weather, Droughts, Tornadoes, Hurricanes and Tropical Storms, Earthquakes, Landslides |
| | Implementation Schedule | 2025-2030 |

| 24 | Increase use of the City's website and social media platforms, and other readily available outreach mechanisms to promote low-cost public education initiatives on emergency preparedness and hazard mitigation actions for homeowners, business owners, etc. | |
|---|---|---|
| Medium | Action Description | Participate annually in National Flood Safety Awareness Week and other emergency preparedness campaigns by using MEMA's social media toolkits and other readily available communication materials to promote risk awareness and mitigation.<br><br>Partner with Pittsfield Public Schools to incorporate hazard and climate resilience into existing curriculum and educational programming for K-12 students. |
| | Lead Position | Director of Administrative Services and Public Information Officer |

| | | |
|---|---|---|
| | **Supporting Agencies** | Fire Department, Berkshire Regional Planning Commission (BRPC) |
| | **Cost** | Low |
| | **Potential Funding Sources** | City funds and/or grants |
| | **Hazards** | Flooding from Precipitation, Severe Winter Storms, Wildfires/Brushfires, Extreme Temperatures, Flooding from Dam Failure or Overtopping, Invasive Species, Other Severe Weather, Droughts, Tornadoes, Hurricanes and Tropical Storms, Earthquakes, Landslides |
| | **Implementation Schedule** | 2025-2030 |

| **25** | **Prevention of vector-borne illnesses.** | |
|---|---|---|
| **Medium** | **Action Description** | Pittsfield Health Department and Board of Health work with Berkshire County Mosquito Control Project who provides services on reducing the potential for mosquito borne diseases by larval control, surveillance, ditch maintenance. The Pittsfield board of health approves an integrated pest management plan every year. While spraying has been voted down, the board of health still reserves the right to make the decision if we reach an elevated point of disease outbreak. The health department staff and the Berkshire county mosquito control project also do community outreach during the summer months on ticks and mosquitos. Participate in community events such as first Fridays to provide education, awareness, and resource material. |
| | **Lead Position** | Health Department/Board of Health |
| | **Supporting Agencies** | Berkshire County Mosquito Control Project |
| | **Cost** | Medium |
| | **Potential Funding Sources** | City of Pittsfield, Berkshire County Mosquito Control Project |
| | **Hazards** | Mosquito and Tick borne illness prevention |
| | **Implementation Schedule** | 2025-2030 |

| **26** | **Tree and Forest Management Program.** |
|---|---|

| | | |
|---|---|---|
| Medium | **Action Description** | Develop a comprehensive tree and forest management program that builds on the Greening the Gateway Program to identify, remove, and replace problem trees, preserve intact forests and street tree cover, and provide guidance and resources for moving toward more climate-resilient trees and forest communities (e.g. species that tolerate warmer temperatures). Keep the sides of roads clear from overhanging trees that may topple during high wind events such as tornadoes, hurricanes, and tropical storms. |
| | **Lead Position** | Natural Resource Program Manager |
| | **Supporting Agencies** | |
| | **Cost** | Medium |
| | **Potential Funding Sources** | Massachusetts Department of Conservation and Recreation (DCR): Urban & Community Forestry Challenge Grants, Greening the Gateway Cities Program (GGCP) |
| | **Hazards** | Extreme Temperatures, Other Severe Weather, Droughts, Tornadoes, Hurricanes/Tropical Storms |
| | **Implementation Schedule** | 2025-2030 |

| **27** | **Keep the sides of roads clear from overhanging trees that may topple during high wind events such as tornadoes, hurricanes, and tropical storms.** | |
|---|---|---|
| **Medium** | **Action Description** | Downed trees are a huge risk to roadways. The City intends to monitor the health of trees, protect them from invasive species, and remove trees that are diseased are at risk of coming down in high winds or storms. |
| | **Lead Position** | Deputy Commissioner of Public Works |
| | **Supporting Agencies** | |
| | **Cost** | High |
| | **Potential Funding Sources** | Massachusetts Department of Conservation and Recreation (DCR): Urban & Community Forestry Challenge Grants, Greening the Gateway Cities Program (GGCP) |
| | **Hazards** | Other Severe Weather, Tornadoes, Hurricanes/Tropical Storms |
| | **Implementation Schedule** | 2025-2030 |

| **28** | **Integrate extreme temperatures into existing City plans and regulations for new development.** | |
|---|---|---|
| **Medium** | **Action Description** | The Zoning Ordinance and Subdivision Regulations already feature some landscaping protections to mitigate extreme temperatures, but further changes may reduce risk to extreme temperatures. |
| | **Lead Position** | Director of Community Development |

| | | |
|---|---|---|
| | Supporting Agencies | Community Development Board, Conservation Commission, Community Preservation Committee |
| | Cost | Low |
| | Potential Funding Sources | Community Development Department Budget |
| | Hazards | Extreme Temperatures |
| | Implementation Schedule | 2025-2030 |

| 29 | Integrate hazard mitigation and climate resilience goals and strategies/actions into the City's Open Space and Recreation Plan and future updates to the Master Plan. | |
|---|---|---|
| Medium | Action Description | The HMPC recognizes the value of including hazard mitigation strategies into all City plans to increase resilience. |
| | Lead Position | Director of Community Development |
| | Supporting Agencies | Community Development Department, Community Development Board, Conservation Commission, Community Preservation Committee |
| | Cost | Low |
| | Potential Funding Sources | Community Development Department Budget |
| | Hazards | Flooding from Precipitation, Severe Winter Storms, Wildfires/Brushfires, Extreme Temperatures, Flooding from Dam Failure or Overtopping, Invasive Species, Other Severe Weather, Droughts, Tornadoes, Hurricanes and Tropical Storms, Earthquakes, Landslides |
| | Implementation Schedule | 2026-2028 |

| 30 | Continue to coordinate with Berkshire Regional Planning Commission (BRPC) and neighboring communities on positioning the City to pursue and capture future grant funding for regional resilience/risk reduction projects. | |
|---|---|---|
| Medium | Action Description | The City of Pittsfield recognizes the value of mitigating risk beyond the City's borders as an effective way to reduce risk in the region. |
| | Lead Position | Director of Community Development |
| | Supporting Agencies | City Departments |
| | Cost | Low |
| | Potential Funding Sources | Community Development Department Budget |

| | | |
|---|---|---|
| | Hazards | Flooding from Precipitation, Severe Winter Storms, Wildfires/Brushfires, Extreme Temperatures, Flooding from Dam Failure or Overtopping, Invasive Species, Other Severe Weather, Droughts, Tornadoes, Hurricanes and Tropical Storms, Earthquakes, Landslides |
| | Implementation Schedule | 2025-2030 |

| **31** | **Explore the potential of joining FEMA's Community Rating System (CRS) in the future based on City staff capabilities, National Flood Insurance Program (NFIP) policy counts, and updated program requirements.** | |
|---|---|---|
| **Medium** | **Action Description** | Floodplain Coordinator will evaluate and determine benefits of joining Community Rating System program. |
| | **Lead Position** | Floodplain Coordinator |
| | **Supporting Agencies** | MA Department of Conservation and Recreation (DCR), FEMA |
| | **Cost** | Low |
| | **Potential Funding Sources** | Community Development Department Budget |
| | **Hazards** | Flooding from Precipitation, Severe Winter Storms, Other Severe Weather, Tornadoes, Hurricanes and Tropical Storms |
| | **Implementation Schedule** | 2025-2030 |

| **32** | **Short- and long-term lake management.** | |
|---|---|---|
| **Low** | **Action Description** | Continue to identify opportunities to address climate-change challenges as it relates to lake management for ecosystem/recreational needs. |
| | **Lead Position** | Conservation Agent |
| | **Supporting Agencies** | Resource Manager |
| | **Cost** | Medium |
| | **Potential Funding Sources** | Massachusetts Clean Water Trust: Clean Water State Revolving Fund (CWSRF), Massachusetts Executive Office of Energy and Environmental Affairs (EEA): Municipal Vulnerability Preparedness (MVP) Action Grants, Land and Water Conservation Fund (LWCF) Grants, Massachusetts Department of Environmental Protection (MassDEP): Section 319 Nonpoint Source Pollution Grants |
| | **Hazards** | Extreme Temperatures, invasive Species, Droughts |
| | **Implementation Schedule** | 2025-2030 |

| 33 | Encourage and support the local Floodplain Administrator to gain Certified Floodplain Manager (CFM®) certification. | |
|---|---|---|
| Low | Action Description | Floodplain Coordinator will receive support to pursue and attain Certified Floodplain Manager certification and other related ongoing education |
| | Lead Position | Floodplain Coordinator |
| | Supporting Agencies | MA Department of Conservation and Recreation (DCR), FEMA |
| | Cost | Low |
| | Potential Funding Sources | Community Development Department Budget |
| | Hazards | Flooding from Precipitation, Severe Winter Storms, Other Severe Weather, Tornadoes, Hurricanes and Tropical Storms |
| | Implementation Schedule | 2025-2030 |

| 34 | Add water meters to residences without them. | |
|---|---|---|
| Low | Action Description | The City has a Drought Management Plan but many homes do not have water meters. Adding water meters will facilitate regulating water usage. |
| | Lead Position | Water Superintendent |
| | Supporting Agencies | Deputy Commissioner |
| | Cost | Medium |
| | Potential Funding Sources | Water Department Budget |
| | Hazards | Drought |
| | Implementation Schedule | 2025-2030 |

| 35 | Identify which City owned buildings are built from unreinforced masonry and may be at risk during an earthquake. | |
|---|---|---|
| Low | Action Description | Knowing which critical facilities may be at risk to earthquake gives the City the information it needs to move toward mitigating the earthquake risk. |
| | Lead Position | Building Commissioner |
| | Supporting Agencies | Building Inspector |
| | Cost | Medium |

| | | |
|---|---|---|
| | **Potential Funding Sources** | National Earthquake Hazards Reduction Program State Assistance Program (NEHRP) |
| | **Hazards** | Earthquakes |
| | **Implementation Schedule** | 2028-2030 |

| | | |
|---|---|---|
| **36** | **Develop a City-wide Business Improvement and Economic Development Plan to increase resilience.** | |
| **Low** | **Action Description** | Develop a city-wide Business Improvement and Economic Development Plan to support local businesses and make the business community more resilient. Identify business development areas where impacts from climate hazards can be easily avoided or mitigated (e.g., by avoiding floodplains or areas of known drainage-related flooding) and targeted improvements, such as a microgrid, could be employed to provide extra resilience to community businesses. Encourage reuse of brownfields and existing buildings where appropriate. Simultaneously identify areas from which businesses could be encouraged to divest in order to avoid hazards and minimize the potential for economic loss or additional stress on emergency services. The plan's goals should include a focused plan for attracting climate-friendly businesses to the City that will invigorate the City's economy, improve the tax base, and reduce the tax burden on all residents, business owners, and land owners, while simultaneously generating funds that will enable the City to continue building toward a resilient future. |
| | **Lead Position** | Director of Community Development |
| | **Supporting Agencies** | $0 |
| | **Cost** | Low |
| | **Potential Funding Sources** | Executive Office of Housing and Livable Communities Community Planning Grant |
| | **Hazards** | Flooding from Precipitation, Severe Winter Storms, Wildfires/Brushfires, Extreme Temperatures, Flooding from Dam Failure or Overtopping, Invasive Species, Other Severe Weather, Droughts, Tornadoes, Hurricanes and Tropical Storms, Earthquakes, Landslides |
| | **Implementation Schedule** | 2025-2030 |

| | |
|---|---|
| **37** | **Identify a system to monitor the risk of landslides due to precipitation and invasive species and develop a plan to mitigate the risk.** |

| | | |
|---|---|---|
| Low | Action Description | There are areas in the City at risk to landslide. Further study is needed to determine the best ways to mitigate the risk from invasive species and precipitation. |
| | Lead Position | Deputy Commissioner of Public Works |
| | Supporting Agencies | |
| | Cost | Low |
| | Potential Funding Sources | U.S. Geological Survey (USGS) Landslide Hazard Grants, FEMA Hazard Mitigation Assistance (HMA) Programs |
| | Hazards | Landslides |
| | Implementation Schedule | 2027-2030 |

| 38 | Plan for Wildlife Management with an emphasis on Beaver control. | |
|---|---|---|
| Low | Action Description | Develop a comprehensive plan for beaver management to mitigate the impacts of unpredictable flooding and impoundment breaches. Establish creative engineering solutions and consider the support and promotion of state-wide trapping legislation amendments that would help control problematic beaver. Develop a City-wide plan to maintain open-space corridors and appropriate habitat for wildlife passage. |
| | Lead Position | Conservation Agent |
| | Supporting Agencies | Resource Manager |
| | Cost | Medium |
| | Potential Funding Sources | Massachusetts Society for the Prevention of Cruelty to Animals (MSPCA): Beaver Flow Device Funding, Massachusetts Division of Fisheries and Wildlife (Mass Wildlife): Habitat Management Grant Program |
| | Hazards | Flood control |
| | Implementation Schedule | 2025-2030 |

| 39 | Develop a system to mitigate the increasing concern of Spotted Lanternfly. | |
|---|---|---|
| Low | Action Description | Spotted Lanternfly damage plants, reduce crop yields, and negatively impact ecosystems. They also excrete a sugary substance called honeydew, which attracts other insects and promotes the growth of sooty mold. |
| | Lead Position | Natural Resource Program Manager |
| | Supporting Agencies | Conservation Commission |
| | Cost | Medium |

| | | |
|---|---|---|
| | **Potential Funding Sources** | Massachusetts Department of Conservation and Recreation (DCR): Invasive Plant Grants, Massachusetts Division of Fisheries and Wildlife (Mass Wildlife): Habitat Management Grants, Massachusetts Environmental Trust (MET) Grants, Massachusetts Municipal Vulnerability Preparedness (MVP) Program, U.S. Fish and Wildlife Service (USFWS): Aquatic Invasive Species Grant Program, National Fish and Wildlife Foundation (NFWF): Pulling Together Initiative (PTI) Grant |
| | **Hazards** | Invasive Species |
| | **Implementation Schedule** | 2026-2028 |

| **40** | **Develop a plan to mitigate the risk that dam breach and flooding pose to the identified 40 historic sites.** | |
|---|---|---|
| **Low** | **Action Description** | Some of Pittsfield's 40 historic properties are in dam inundation zones. Identifying these properties and devising a system to mitigate the flood risk is necessary to protect them. |
| | **Lead Position** | Director of Community Development |
| | **Supporting Agencies** | Historical Commission |
| | **Cost** | Very High |
| | **Potential Funding Sources** | FEMA Hazard Mitigation Grant Program (HMGP), FEMA Flood Mitigation Assistance (FMA), Massachusetts Historical Commission (MHC): Massachusetts Preservation Projects Fund (MPPF), Community Development Block Grants (CDBG) |
| | **Hazards** | Flooding from Precipitation, Severe Winter Storms, Other Severe Weather, Tornadoes, Hurricanes and Tropical Storms |
| | **Implementation Schedule** | 2027-2030 |

The two tables below are sorted to indicate actions that specifically target buildings and infrastructure and a table for actions that target dam safety.

*Table 93. Mitigation Actions that Target Buildings and Infrastructure.*

| Action # | Actions that Target Buildings and Infrastructure |
|---|---|
| **3** | Reservoir Dam Access Improvement. |
| **6** | Upgrades to water and wastewater systems. |
| **7** | Generator Installation Study and installation for Patterson Field House and Field Administration Building for use as an Emergency Shelter. |
| **10** | Remote Monitoring of High Hazard Dams. |

| Action # | Actions that Target Buildings and Infrastructure |
|---|---|
| **11** | Implement priority projects from City's field inventory of culverts and bridges. Prioritize replacement of the culvert at Dan Casey Memorial Drive. |
| **14** | Remove the Bel Air Dam. |
| **16** | Provide emergency back-up power to all critical facilities. |
| **17** | Build the new stormwater control system for Wahconah Park and develop and implement a comprehensive plan to mitigate flood risk at Wahconah Park. |
| **19** | Conduct dam assessment and dam removal feasibility for the Wild Acres Dam and Mill Street Dam. |
| **27** | Keep the sides of roads clear from overhanging trees that may topple during high wind events such as tornadoes, hurricanes, and tropical storms. |
| **35** | Identify which City owned buildings are built from unreinforced masonry and may be at risk during an earthquake. |
| **40** | Develop a plan to mitigate the risk that dam breach and flooding pose to the identified 40 historic sites. |

*Table 94. Mitigation Actions that Target High Hazard Dams.*

| Action # | Action Title |
|---|---|
| **2** | Formalize a system of collaboration with adjacent towns that have High Hazard Dams or may be impacted by City owned dams. |
| **3** | Reservoir Dam Access Improvement. |
| **7** | Generator Installation Study and installation for Patterson Field House and Field Administration Building for use as an Emergency Shelter. |
| **10** | Remote Monitoring of High Hazard Dams. |
| **14** | Remove the Bel Air Dam. |
| **15** | Develop a plan to evacuate the elderly living in downstream inundation areas. |
| **19** | Conduct dam assessment and dam removal feasibility for the Wild Acres Dam and Mill Street Dam. |
| **40** | Develop a plan to mitigate the risk that dam breach and flooding pose to the identified 40 historic sites. |

## 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.

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

- **Flood Mitigation Assistance (FMA) Program**
  The FMA program was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the NFIP. FEMA provides FMA funds to assist states and communities with implementing measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the NFIP. The long-term goal of FMA is to reduce or eliminate claims under the NFIP through mitigation activities. One limitation of the FMA program is that it is generally used to provide mitigation for structures that are insured or located in Special Flood Hazard Areas (SFHAs) as mapped by FEMA. Federal funding for this nationally competitive grant program is generally an annual allocation (subject to Congressional appropriation) and eligibility is linked to a community's good standing in the NFIP.

- **Rehabilitation of High Hazard Potential Dams**

  The President signed the Water Infrastructure Improvements for the Nation Act or the "WIIN Act," on Dec. 16, 2016, which adds a new grant program under FEMA's National Dam Safety Program (33 U.S.C. 467f). Section 5006 of the Act, Rehabilitation of High Hazard Potential Dams, provides technical, planning, design, and construction assistance in the form of grants for rehabilitation of eligible high hazard potential dams. This is an annual funding opportunity. City governments as well as private dam owners are eligible for the program which is managed by the state.

**Additional funding opportunities to support Dam Removal**

- NOAA - Community Based Restoration Grant Program

- U.S. Fish and Wildlife Service – National Fish Passage Program

- U.S. Army Corps of Engineers – Section 206 Aquatic Ecosystem Restoration Program

- U.S. Forest Service – Support for Dam Removal

**Municipal Vulnerability Preparedness Action Grants**[70]
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 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.

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

- ***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 City's Fire Chief 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 City, 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 City 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, City 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 City intends to involve the public throughout the five-year implementation of this plan, as well as in the reviewing and updating processes. The City's Director of Administrative Services and Public Information Officer will take the lead in soliciting participation from the public with support from other City 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 City's website and through standard meeting laws.
- Posting news and announcements on the City'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 City's website and keep hard copies at the Fire Department and in City Hall for public review.
- Continue to work with vulnerable populations, local organizations, private industry, regional agencies, and adjacent communities as this plan is implemented.

## Method and Schedule for Keeping the Plan Current

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 City of Pittsfield 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 Fire Chief.

### Process to Track Actions

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

The Fire Chief 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 City 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 City experiences a large-scale disaster, the Fire Chief 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 City 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 City'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 City priorities. In addition, the HMPC will discuss methods for continuing to integrate the mitigation plan with other plans, processes, and projects in the City.

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

*Figure 20. Plan Update and Implementation Schedule.*

The National Dam Safety Program Act has authorized FEMA to provide High Hazard Potential Dams (HHPD) Rehabilitation Grant Program assistance for the rehabilitation of dams that do not meet minimum safety standards and pose substantial risk to life and property.[71] The City of Pittsfield is interested in accessing the HHPD grant funds and have designed this plan to meet criteria outlined in Element G: High Hazard Potential Dams. To continue meeting the requirements of Element G the HMPC will answer the following questions during plan update meetings:

- Do we have new or updated plans, studies, reports or technical information regarding the HHPDs?
- How does the risk assessment need to be updated to accurately reflect dam risk?

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

- Have the mitigation goals related to the HHPDs been implemented and do they need to be amended to reflect current conditions and priorities in the City?
- Have the mitigation actions that addressed HHPDs been implemented and do new actions aimed at reducing vulnerabilities from HHPDs need to be added?

## Responsible Parties for Plan Implementation and Maintenance

City of Pittsfield, MA

Thomas Sammons

Fire Chief/Emergency Management Director

City of Pittsfield

74 Columbus Avenue, Pittsfield, MA 01201

Phone: 413-448-9764

Email: tsammons@cityofpittsfield.org

For State resources:

Massachusetts Emergency Management Agency

Address: 400 Williamstown Road, Framingham, MA 01702-5399

Phone: 508-820-2000 (MEMA Headquarters and Communications Center)

or 978-328-1500 (MEMA Region 1 Office)

Website: https://www.mass.gov/orgs/massachusetts-emergency-management-agency

For Federal resources:

Federal Emergency Management Agency

Address: 220 Binney Street, Cambridge, MA 02142

Phone: 877-336-2734

Email: fema-r1-info@fema.dhs.gov

Website: https://www.fema.gov/region-i-ct-me-ma-nh-ri-vt

## Plan Integration

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))

For the City of Pittsfield 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 City's ongoing update to its Open Space and Recreation Plan will reflect its commitment to this type of integration though more directly addressing natural hazards and climate-driven challenges including floodplain and stormwater management, invasive plants, and other impacts resulting from extreme weather events and climate change.

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 Pittsfield. 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):

- Open Space and Recreation Plan (2019)
- Master Plan (2009)
- Municipal Vulnerability Preparedness / Community Resilience Building Summary of Findings Report (2019)
- Community Preservation Plan (2018)
- Comprehensive Emergency Management Plan (2024)
- Stormwater Management Plan (2022)

Additional opportunities to integrate the requirements of this plan into other local planning mechanisms shall continue to be identified through future meetings of the HMPC and through the five-year review process described in this chapter. Other planning mechanisms include local regulations and existing code enforcement procedures (i.e., zoning bylaws, site plan review, etc.), internal municipal policies, special projects or initiatives, and other routine government or community decision-making activities such as capital improvement planning and the City'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 City to be the most effective and appropriate method to identify, prioritize, and implement local hazard mitigation actions. In moving forward, however, the City will consider the incorporation of some other plan documents into the hazard mitigation plan, such as any future iterations of the City's MVP Plan or related climate adaptation planning efforts.

## Acronyms

| | |
|---|---|
| AAL | Average Annual Loss |
| APA | American Planning Association |
| APHIS | Animal and Plant Health Inspection Service |
| ARP | American Rescue Plan |
| ASCE | American Society of Civil Engineers |
| ASDSO | Association of State Dam Safety Officials |
| BBRS | Board of Building Regulations and Standards |
| BCEGS | Building Code Effectiveness Grading Schedule |
| BEAT | Berkshire Environmental Action Team |
| BMP | Best Management Practices |
| BNRC | Berkshire Natural Resource Council |
| BRIC | Building Resilient Infrastructure and Communities |
| BRTA | Berkshire Regional Transit Authority |
| BTU | British Thermal Unit |
| C2ES | Center for Climate and Energy Solutions |
| CAC | Community Assistance Contact |
| CAV | Community Assistance Visit |
| CBREPC | Central Berkshire Regional Emergency Planning Committee |
| CDBG | Community Development Block Grant |
| CDC | Centers for Disease Control and Prevention |
| CDD | Consecutive Dry Days |
| CEMP | Comprehensive Emergency Management Plan |
| CFM | Certified Floodplain Manager |
| CFR | Code of Federal Regulations |
| CIP | Capital Improvement Plan |
| CIS | Community Information System |
| CMR | Code of Massachusetts Regulations |
| COA | Council on Aging |
| CPA | Community Preservation Act |
| CRB | Community Resilience Building |
| CRS | Community Rating System |
| CZM | Coastal Zone Management |
| DBA | Doing Business As (d/b/a) |
| DCR | Department of Conservation and Recreation |
| DEP | Department of Environmental Protection |
| DEM | Digital Elevation Model |
| DER | Division of Ecological Restoration |
| DMA | Disaster Mitigation Act |

| | |
|---|---|
| DMP | Drought Management Plan |
| DMTF | Drought Management Task Force |
| DOT | Department of Transportation |
| DPW | Department of Public Works |
| DWR | Days Without Rain |
| EAP | Emergency Action Plan |
| EEA | Energy and Environmental Affairs |
| EDT | Eastern Daylight Time |
| EF | Enhanced Fujita |
| EJ | Environmental Justice |
| EM | Emergency Management |
| 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 |
| EST | Eastern Standard Time |
| FERC | Federal Energy Regulatory Commission |
| FEMA | Federal Emergency Management Agency |
| FIRM | Flood Insurance Rate Map |
| FIS | Flood Insurance Study |
| FMA | Flood Mitigation Assistance |
| FPA | Floodplain Administrator |
| FSim | Forest Service Fire Simulation System |
| FY | Fiscal Year |
| GE | General Electric |
| GHG | Greenhouse Gas Emissions |
| GIS | Geographic Information Systems |
| HHPD | High Hazard Potential Dams |
| HMA | Hazard Mitigation Assistance |
| HMGP | Hazard Mitigation Grant Program |
| HMP | Hazard Mitigation Plan |
| HMPC | Hazard Mitigation Planning Committee |
| HUD | United States Department of Housing and Urban Development |
| HVA | Housatonic Valley Association |
| HVAC | Heating, Ventilation, and Air Conditioning |
| IBC | International Building Code |
| IBHS | Insurance Institute for Business and Home Safety |
| ICC | International Code Council |
| IEBC | International Existing Building Code |
| IECC | International Energy Conservation Code |

| | |
|---|---|
| IFC | International Fire Code |
| IMC | International Mechanical Code |
| IRC | International Residential Code |
| ISO | Insurance Services Office, Inc. |
| ISPSC | International Swimming Pool and Spa Code |
| LID | Low Impact Development |
| MACRIS | Massachusetts Cultural Resource Information System |
| MCDA | Multi-Criteria Decision Analysis |
| MEMA | Massachusetts Emergency Management Agency |
| MG | Million Gallons |
| MGD | Million Gallons Per Day |
| MGL | Massachusetts General Law |
| MIPAG | Massachusetts Invasive Plant Advisory Group |
| 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 Flooding Insurance Program |
| NFIRA | National Flood Insurance Reform Act |
| NOAA | National Oceanic and Atmospheric Administration |
| NPS | National Park Service |
| NWS | National Weather Service |
| OSRP | Open Space and Recreation Plan |
| PA | Public Assistance |
| PCTV | Pittsfield City Television |
| PHD | Doctor of Philosophy |
| PPC | Public Protection Classification |
| PPQ | Plant Protection and Quarantine |
| PWS | Public Water Systems |
| RMAT | ResilientMass Action Team |
| RFC | River Forecast Center |
| RSI | Regional Snowfall Index |
| SAFE | Student Awareness of Fire Education |
| SFHA | Special Flood Hazard Areas |
| SHMCAP | State Hazard Mitigation and Adaptation Plan |
| SI/SD | Substantial Improvement/Substantial Damage |
| SPIA | Sperry-Piltz Accumulation Index |
| SWMP | Stormwater Management Plan |

| | |
|---|---|
| TD | Tropical Depression |
| TRI | Toxic Release Inventory |
| TS | Tropical Storm |
| TV | Television |
| US | United States |
| USACE | United States Army Corps of Engineers |
| USC | U.S. Code |
| USDA | United States Department of Agriculture |
| USFS | United States Forest Service |
| USFWS | United States Fish and Wildlife Service |
| USGS | United States Geological Survey |
| USGCRP | U.S. Global Change Research Program |
| WEA | Wireless Emergency Alerts |
| WFO | Weather Forecast Office |
| WIIN | Water Infrastructure Improvements for the Nation 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 9/20/2024 | HMPC #1 10/29/2024 | HMPC #2 12/18/2024 | HMPC #3 2/12/2025 | HMPC #4 4/1/2025 |
|---|---|---|---|---|---|---|---|---|---|---|
| Andy | Cambi | Health Department Director | City of Pittsfield | 413-499-9411 | acambi@cityofpittsfield.org | ☐ | ☐ | ☐ | ☐ | ☐ |
| Jeffrey | Clemons | Building Commissioner | City of Pittsfield | 413-499-9440 | jclemons@cityofpittsfield.org | ☐ | ☑ | ☐ | ☑ | ☐ |
| Joseph | Curtis | Superintendent of Schools | Pittsfield Schools | 413-499-9500 | jcurtis@pittsfield.net | ☐ | ☐ | ☐ | ☐ | ☐ |
| Tina | Danzy | Executive Director - Pittsfield Housing Authority | Pittsfield Housing Authority | 413-443-5936 | tinadanzy@pittsfieldhousing.org | ☐ | ☐ | ☐ | ☐ | ☐ |
| Justine | Dodds | Community Development Director | City of Pittsfield | 413-499-9368 | jdodds@cityofpittsfield.org | ☐ | ☐ | ☐ | ☐ | ☐ |
| Anne | Ferin | Senior Financial Manager (Fire Department) | City of Pittsfield | 413-448-9764 | aferin@cityofpittsfield.org | ☑ | ☐ | ☐ | ☐ | ☐ |
| Ryan | Grennan | GIS Coordinator | City of Pittsfield | 413-448-9853 | rgrennan@cityofpittsfield.org | ☐ | ☐ | ☑ | ☑ | ☑ |
| Matthew | Hill | Police Captain | City of Pittsfield | 413-448-9700 x563 | mhill@cityofpittsfield.org | ☐ | ☐ | ☐ | ☐ | ☑ |
| Nate | Joyner | Housing Program Manager | City of Pittsfield | 413-499-9358 | njoyner@cityofpittsfield.org | ☐ | ☑ | ☑ | ☑ | ☑ |
| Eric | Lamoureaux | School Safety Coordinator | Pittsfield Schools | 413-770-1315 | elamoureaux@pittsfield.net | ☐ | ☐ | ☑ | ☑ | ☑ |
| Albert | Leu | Building Inspector | City of Pittsfield | 413-499-9440 | aleu@cityofpittsfield.org | ☐ | ☑ | ☐ | ☐ | ☐ |
| Peter | Machetti | Mayor | City of Pittsfield | 413-499-9321 | pmarchetti@cityofpittsfield.org | ☐ | ☐ | ☐ | ☐ | ☐ |
| Peter | Marino | Safety Officer - Pittsfield Housing Authority | Pittsfield Housing Authority | 413-443-5936 | petemarino@pittsfieldhousing.org | ☐ | ☐ | ☐ | ☐ | ☐ |
| Christopher | Marsden | Local Coordinator - Operations | MEMA | 413-750-1410 | christopher.marsden2@mass.gov | ☐ | ☐ | ☐ | ☐ | ☐ |
| James | McGrath | Natural Resource Program Manager | City of Pittsfield | 413-499-93445 | jmcgrath@cityofpittsfield.org | ☐ | ☐ | ☐ | ☑ | ☑ |
| Daniel | Moore | Head of Custodial Services | Pittsfield Schools | 413-499-9528 | dtmoore@pittsfield.net | ☐ | ☐ | ☐ | ☐ | ☐ |
| Ricardo | Morales | Commissioner of Public Works | City of Pittsfield | 413-448-9768 | rmorales@cityofpittsfield.org | ☐ | ☑ | ☑ | ☐ | ☐ |
| Valerie | Pease | Advocate | AdLib Indepedent Living | 413-442-7047 ext. 14 | vpease@adlibcil.org | ☐ | ☐ | ☐ | ☐ | ☐ |
| Kevin | Rayner | City Planner | City of Pittsfield | 413-499-9366 | krayner@cityofpittsfield.org | ☑ | ☑ | ☑ | ☑ | ☑ |
| Jennifer | Reynolds | Council on Aging | City of Pittsfield | 413-499-9346 | jreynolds@cityofpittsfield.org | ☐ | ☐ | ☐ | ☐ | ☐ |
| Thomas | Sammons | Fire Chief/Emergency Management Director | City of Pittsfield | 413-448-9764 | tsammons@cityofpittsfield.org | ☑ | ☐ | ☑ | ☑ | ☑ |
| Tyler | Shedd | City Engineer | City of Pittsfield | 413-499-9417 | tshedd@cityofpittsfield.org | ☐ | ☑ | ☐ | ☑ | ☑ |
| Amber | Spring | Permitting Coordinator | City of Pittsfield | 413-448-9673 | aspring@cityofpittsfield.org | ☐ | ☑ | ☑ | ☑ | ☑ |
| Catherine | Van Bramer | Director of Administrative Services- Mayor's Office | City of Pittsfield | 413-499-9322 | cvanbramer@cityofpittsfield.org | ☐ | ☐ | ☑ | ☑ | ☑ |
| Robert | Van Der Kar | Conservation Agent | City of Pittsfield | 413-499-9359 | rvanderkar@cityofpittsfield.org | ☐ | ☐ | ☑ | ☑ | ☑ |
| James | Ziter | Deputy Chief Fire Department | City of Pittsfield | 413-448-9764 | jziter@cityofpittsfield.org | ☑ | ☐ | ☐ | ☐ | ☐ |

HMPC Meeting Agendas

# HMPC MEETING #1 AGENDA

CITY OF PITTSFIELD, MA HAZARD MITIGATION PLAN UPDATE

**DATE:** TUESDAY, 10/29/2024

**TIME:** 10:00-11:30AM

**ZOOM:** https://us02web.zoom.us/j/88629121692?pwd=7HTa8ujBrLV0tNMjqP0gQGcbKGZFnY.1
MEETING ID: 886 2912 1692
PASSCODE: 154206

## 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. Share GIS Data and Maps
III. Mitigation Action Tracker
    i. Finalize Status of Old Actions
IV. Pictures

# KICK OFF MEETING AGENDA

CITY OF PITTSFIELD, MA HAZARD MITIGATION PLAN UPDATE

**DATE:** FRIDAY, 09/20/2024

**TIME:** 10:00-11:00AM

**ZOOM:** https://us02web.zoom.us/j/89166728020?pwd=UybeoJQVaC40Wzrk6aRDlh9fLucrsu.1
Meeting ID: 891 6672 8020
Passcode: 508742

## AGENDA ITEMS

I. **Project Introduction**

II. **Timeline and Tasks**

III. **Developing a Hazard Mitigation Planning Committee (HMPC)**

IV. **Sharing GIS Data**

V. **Updating Mitigation Actions**

VI. **Scheduling a HMPC Meeting for October**

## ACTION ITEMS

I. Develop the HMPC

II. Sharing GIS Data & Relevant Resources

III. Updating Mitigation Action Tracker with Action Status

IV. Scheduling a HMPC Meeting for October

# HMPC MEETING #2 AGENDA

CITY OF PITTSFIELD, MA HAZARD MITIGATION PLAN UPDATE

**DATE:** WEDNESDAY, 12/18/2024

**TIME:** 11:00-12:30PM

**ZOOM:** https://us02web.zoom.us/j/85757689934?pwd=1t0QplObYvWnaq7qpyiJ4jgwx7vWmG.1
MEETING ID: 857 5768 9934
PASSCODE: 239520

## AGENDA ITEMS

I. **Project Update**

II. **Public Meeting Outreach**
   i. Outreach Efforts

III. **Capability Assessment Update**
   i. Key Plans Reviewed
   ii. Survey Status
   iii. Where are Strengths and Challenges Discussion

IV. **Risk Assessment**
   i. Hazards and Critical Facilities Identified
   ii. Hazus Impacts
   iii. Problems Identified Including High Hazard Areas

V. **Mitigation Strategy**
   i. Goal Statements
   ii. Developing Mitigation Actions

VI. **City Priorities and Changes in Development**

## ACTION ITEMS

I. **HMPC Meeting #3**
II. **HHPDs Meeting**
III. **Outreach for Public Meeting**
IV. **Mitigation Actions**
V. **Pictures**
VI.

# HMPC MEETING #3 AGENDA

CITY OF PITTSFIELD, MA HAZARD MITIGATION PLAN UPDATE

**DATE:** WEDNESDAY, 02/12/2025

**TIME:** 10:30-12:00PM

**ZOOM:** https://us02web.zoom.us/j/88019115448?pwd=KEQlclvgnOqbqbc5FqSDG6ltYPZ1SN.1
Meeting ID: 880 1911 5448
Passcode: 869561

## AGENDA ITEMS

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

## ACTION ITEMS

I. HMPC #4 Date
II. New Mitigation Actions

# HMPC MEETING #4 AGENDA

CITY OF PITTSFIELD, MA HAZARD MITIGATION PLAN UPDATE

**DATE:** TUESDAY, 04/01/2025
**TIME:** 9:00-10:30AM
**ZOOM:** https://us02web.zoom.us/j/83742756110?pwd=hznlsafaox23hca8egywhrwynhlnwp.1
MEETING ID: 837 4275 6110
PASSCODE: 682534

## AGENDA ITEMS

I. **Project Update and Loose Ends**
II. **Public Engagement**
    i. Outreach for Public Meeting and Plan Review
III. **Final Hazard List Ranking**
IV. **Mitigation Actions**
    i. List Review Including Prioritization
V. **Plan Review**
    i. Essential Details for New Actions
    ii. Action Prioritization
VI. **Timeline for Completion**

## ACTION ITEMS

I. Public Meeting Outreach
II. Plan Review

# HIGH HAZARD DAMS MEETING AGENDA

CITY OF PITTSFIELD, MA HAZARD MITIGATION PLAN UPDATE

**DATE:** WEDNESDAY, 01/22/2025

**TIME:** 1:00-2:00PM

**ZOOM:** https://us02web.zoom.us/j/84722382631?pwd=9OuYujPJy9TUCI1HRWsWA7kMF1osm9.1

MEETING ID: 847 2238 2631

PASSCODE: 813003

## AGENDA ITEMS

I. **Mitigation Planning Introduction**
   i. Overview and Background to Mitigation Planning
   ii. Addressing High Hazard Potential Dams in the HMP Update

II. **Emergency Action Plans and Other Resources**
   i. Any additional resources to share?

III. **Dam Risk Summaries**
   i. Downstream Risks

IV. **Mitigation Strategy**
   i. Discuss Potential Mitigation Actions

V. **Next Steps**

## Public Outreach

### Public Meetings

# PUBLIC MEETING #1 AGENDA

CITY OF PITTSFIELD, MA HAZARD MITIGATION PLAN UPDATE

**DATE: MONDAY, JANUARY 27, 2025**

**TIME: 10:00AM – 11:00AM**

**IN-PERSON:** Senior Center, 330 North Street, Pittsfield, MA 01201

**ZOOM:** https://us02web.zoom.us/j/87658932053?pwd=AIZakUtJYba2E4cRHJ5JyQSJoBEpC1.1
Meeting ID: 876 5893 2053
Passcode: 869598

## AGENDA ITEMS

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

## CITY OF PITTSFIELD, MA

# PUBLIC MEETING

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

Do you wonder if Pittsfield 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 Pittsfield more resilient to natural hazards and climate change.

Pittsfield has formed a Hazard Mitigation Planning Committee to identify risks and projects to mitigate those risks. The City 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 City. This plan allows Pittsfield to apply for pre- and post-disaster mitigation funds.

## 01/27/2025

**Time: 10:00am**

**via Zoom & at Senior Center**

HTTPS://WWW.CITYOFPITTSFIELD.ORG/ FOR MEETING DETAILS OR CONTACT CHIEF THOMAS SAMMONS, FIRE CHIEF & EMERGENCY MANAGEMENT DIRECTOR AT 413-448-9764 OR TSAMMONS@CITYOFPITTSFIELD.ORG.

# PUBLIC MEETING #2 AGENDA

CITY OF PITTSFIELD, MA HAZARD MITIGATION PLAN UPDATE

**DATE:** **MONDAY, APRIL 7, 2025**

**TIME:** **10:00AM – 11:00AM**

**IN-PERSON:** Ralf Froio Senior Center (330 North Street, Pittsfield, MA)

**ZOOM:**

Meeting ID:
Passcode:

## 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**

DISASTER PREPAREDNESS

# PUBLIC MEETING

## CITY OF PITTSFIELD

**APRIL 7, 2025**

10:00 AM – 11:00 AM

**In Person:**

Ralf Froio Senior Center

330 North Street

**On Zoom:**

Meeting ID:

Passcode:

**PARKING IN REAR OF BUILDING!**

Do you know where to go if you lose power or how to shelter-in-place safely? Would you like a list of supplies to have on hand in a disaster?

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

Pittsfield has formed a Hazard Mitigation Planning Committee to identify risks and projects to mitigate those risks. The City 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 City. This plan allows Pittsfield to apply for pre- and post-disaster mitigation funds.

**Learn how to prepare for winter storms, and other natural disasters.**

**Hear about the City's plan to mitigate natural hazard risks.**

**For more information visit:**
**https://www.cityofpittsfield.org/**

**Or Contact:**
**Chief Thomas Sammons, Fire Department Chief & Emergency Management Director**
**Phone:** 413-448-9764
**Email:** tsammons@cityofpittsfield.org

**Join the Meeting to learn about this plan and to contribute your ideas for making Pittsfield safer!**

iBerkshires.com


The public session at the Senior Center was attended by Fire Chief Thomas Sammons and Commissioner of Public Works Ricardo Morales, seen above helping attendees with phone questionaire.

## Pittsfield Talks Hazard Mitigation

**By Brittany Polito**
*iBerkshires Staff*
05:17AM / Thursday, April 10, 2025

PITTSFIELD, Mass. — The city's updated Hazard Mitigation Plan is headed towards final review.

On Monday, community members and public officials mulled disaster preparedness at the Ralph J. Froio Senior Center. Pittsfield's 2019 plan is due for an update so the city stays eligible for grant funding and, of course, prepared.

"Mitigation planning is the foundation for establishing where the city would like to direct its risk reduction efforts, how it would like to build community resilience through the whole breadth of natural hazard events that it is at risk to. It brings people together and organizations to develop strategies, to build ideas for projects, to do things through, say, plans or regulations, outreach activities, and so on," said Darrin Punchard of Jamie Caplan Consulting.

"These hazard mitigation plans, 25 years ago, became a requirement for cities and towns across the United States in order to be eligible for certain grant programs."

Pittsfield recently partnered with Berkshire Medical Center for a nearly $2 million Hazard Mitigation Grant toward backup generators at the hospital.

"These are key grant funding programs that have come through the federal government, but in order to access and be eligible for that type of funding, you have to prepare these plans and update them every five years," Punchard explained.

"So that's the purpose of this plan document is really to build community resilience, but also, very importantly, maintain grant funding eligibility for the city."

The Hazard Mitigation Plan, last updated in 2019, focuses the city's limited resources on areas of greatest risk, helps build partnerships with organizations outside of the city, and increases public awareness. Punchard added that the plan can also align with other city objectives, but "saving lives and money, that's the main focus, of course, of hazard mitigation."

Also in 2019, the city went through a Municipal Vulnerability Preparedness, or MVP, process that heavily focused on risks posed by climate change.

Pittsfield began working with the firm (which facilitated the existing plan) last fall, and Monday's public hearing was the second. In a few weeks, a draft plan will be posted for public input before a final plan goes to the state and Federal Emergency Management Agency for approval.

The plan's six goals relate to saving lives and property, high hazard potential dams, local plans and regulations, building and infrastructure projects, natural and cultural resources, and education.  The risk assessment process and the hazard mitigation strategy are the meat and bones of the document.

Flooding from precipitation, severe winter storms, wildfires, and temperatures were identified as the city's highest risk hazards, while earthquakes and landslides are the lowest risk. This was mirrored in responses from attendees, who expressed concern about winter storms, flooding, and power outages.

"There's nothing we can really do to stop them from occurring or limit their intensity as a natural event but what we can do is limit the risk, its impacts on our community assets, on people, on our built in environment, our infrastructure and critical facilities, our natural environment, and the economy," Punchard said.

Risk is the potential for damage, losses, or other impacts created by the interaction of natural hazards such as hurricanes, earthquakes, and wildfires with community assets. The plan looks at 11 natural hazard categories and identifies critical facilities such as fire and police stations, utility lifelines, and schools that serve as emergency shelters.

"There's a whole chapter dedicated to risk assessment, so you'll find a profile for each of those 11 natural hazards identified in the plan, what potential impacts are, and again, how they were all prioritized against one another," Punchard explained.

"There's a capability assessment. This is an aspect of the plan I was heavily involved in, which was really looking at the city's existing plans and regulations, and looking across departments of all those great things that the city is already doing to help mitigate risk, and where there are opportunities to do perhaps more and build those capabilities and resources at the city level."

The presentation included information about individual preparedness and emergency planning "because it's not all up to the chief and emergency management and first responders, of course, to help us must be more reliant," he added.

"There's a lot we can do at the individual, home level, neighborhood level, as well as citywide."

iBerkshires • 102 Main Street
North Adams, MA 01247 • tel: 413.663.3384 • fax: 413.664.4251 • info@iberkshires.com

# Appendix B. Mitigation Actions

## Priority Ranking Points

*Table 95. Mitigation Actions Prioritization.*

| Action # | Action Title | Hazards Addressed | High Hazard Dams | Approximate Cost | Equity Focus | Protection of Lives | Protection of Critical Facilities or Infrastructure | Protection of Natural Resources | Alignment with Objectives | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| **1** | Flood Mapping Management. | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 2 | 20 |
| **2** | Formalize a system of collaboration with adjacent towns that have High Hazard Dams or may be impacted by City owned dams. | 3 | 3 | 3 | 3 | 3 | 3 | 0 | 2 | 20 |
| **3** | Reservoir Dam Access Improvement. | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 2 | 19 |
| **4** | Develop a city-wide practice for addressing stormwater and flood events. | 3 | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 19 |
| **5** | Increase outreach and facilitate access to warming and cooling centers for the unhoused and elderly. | 3 | 2 | 3 | 3 | 3 | 3 | 0 | 2 | 19 |
| **6** | Upgrades to water and wastewater systems. | 3 | 2 | 0 | 3 | 3 | 3 | 2 | 2 | 18 |
| **7** | Generator Installation Study and installation for Patterson Field House and | 3 | 3 | 1 | 3 | 3 | 3 | 0 | 2 | 18 |

| Action # | Action Title | Hazards Addressed | High Hazard Dams | Approximate Cost | Equity Focus | Protection of Lives | Protection of Critical Facilities or Infrastructure | Protection of Natural Resources | Alignment with Objectives | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | Field Administration Building for use as an Emergency Shelter. | | | | | | | | | |
| **8** | Incorporate hazard/climate resilience into the prioritization criteria established for the City's annual capital improvement planning process. | 3 | 2 | 3 | 2 | 1 | 3 | 2 | 2 | 18 |
| **9** | Maintenance of Urban Waterways. | 3 | 2 | 2 | 2 | 1 | 3 | 2 | 2 | 17 |
| **10** | Remote Monitoring of High Hazard Dams. | 2 | 3 | 2 | 2 | 3 | 3 | 0 | 2 | 17 |
| **11** | Implement priority projects from City's field inventory of culverts and bridges. Prioritize replacement of the culvert at Dan Casey Memorial Drive. | 3 | 2 | 0 | 2 | 2 | 3 | 2 | 2 | 16 |
| **12** | Design and implement a natural hazard education and outreach program for the public. | 3 | 2 | 3 | 3 | 3 | 0 | 0 | 2 | 16 |
| **13** | Water quality preservation. | 2 | 0 | 2 | 2 | 3 | 3 | 2 | 2 | 16 |
| **14** | Remove the Bel Air Dam. | 2 | 3 | 0 | 3 | 3 | 3 | 0 | 2 | 16 |
| **15** | Develop a plan to evacuate the elderly living in | 3 | 3 | 2 | 3 | 3 | 0 | 0 | 2 | 16 |

| Action # | Action Title | Hazards Addressed | High Hazard Dams | Approximate Cost | Equity Focus | Protection of Lives | Protection of Critical Facilities or Infrastructure | Protection of Natural Resources | Alignment with Objectives | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | downstream inundation areas. | | | | | | | | | |
| **16** | Provide emergency back-up power to all critical facilities. | 3 | 0 | 1 | 3 | 3 | 3 | 0 | 2 | 15 |
| **17** | Build the new stormwater control system for Wahconah Park and develop and implement a comprehensive plan to mitigate flood risk at Wahconah Park. | 3 | 0 | 2 | 2 | 1 | 3 | 2 | 2 | 15 |
| **18** | Increase floodplain education and awareness. | 3 | 2 | 3 | 2 | 1 | 0 | 2 | 2 | 15 |
| **19** | Conduct dam assessment and dam removal feasibility for the Wild Acres Dam and Mill Street Dam. | 2 | 3 | 1 | 2 | 2 | 3 | 0 | 2 | 15 |
| **20** | Upgrade the City drinking water supply infrastructure to protect water quality and availability. | 2 | 0 | 0 | 3 | 3 | 3 | 2 | 2 | 15 |
| **21** | Alert homeowners to the potential wildfire risk in high probability burn areas and educate them about how to create defensible space. | 3 | 0 | 3 | 3 | 2 | 0 | 2 | 2 | 15 |
| **22** | Conduct reviews and updates to City regulations | 3 | 0 | 2 | 2 | 1 | 3 | 2 | 2 | 15 |

| Action # | Action Title | Hazards Addressed | High Hazard Dams | Approximate Cost | Equity Focus | Protection of Lives | Protection of Critical Facilities or Infrastructure | Protection of Natural Resources | Alignment with Objectives | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | to require or promote hazard resistant, climate-adaptive standards for new development. | | | | | | | | | |
| **23** | Litter Reduction Education and Outreach Program. | 3 | 0 | 3 | 0 | 1 | 3 | 2 | 2 | 14 |
| **24** | Increase use of the City's website and social media platforms, and other readily available outreach mechanisms to promote low-cost public education initiatives on emergency preparedness and hazard mitigation actions for homeowners, business owners, etc. | 3 | 2 | 3 | 3 | 1 | 0 | 0 | 2 | 14 |
| **25** | Prevention of vector-borne illnesses. | 2 | 0 | 2 | 3 | 2 | 0 | 2 | 2 | 13 |
| **26** | Tree and Forest Management Program. | 3 | 0 | 2 | 0 | 1 | 3 | 2 | 2 | 13 |
| **27** | Keep the sides of roads clear from overhanging trees that may topple during high wind events such as tornadoes, hurricanes, and tropical storms. | 3 | 0 | 1 | 0 | 2 | 3 | 2 | 2 | 13 |

| Action # | Action Title | Hazards Addressed | High Hazard Dams | Approximate Cost | Equity Focus | Protection of Lives | Protection of Critical Facilities or Infrastructure | Protection of Natural Resources | Alignment with Objectives | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| **28** | Integrate extreme temperatures into existing City plans and regulations for new development. | 2 | 0 | 3 | 2 | 2 | 0 | 2 | 2 | 13 |
| **29** | Integrate hazard mitigation and climate resilience goals and strategies/actions into the City's Open Space and Recreation Plan and future updates to the Master Plan. | 3 | 0 | 3 | 2 | 1 | 0 | 2 | 2 | 13 |
| **30** | Continue to coordinate with Berkshire Regional Planning Commission (BRPC) and neighboring communities on positioning the City to pursue and capture future grant funding for regional resilience/risk reduction projects. | 3 | 2 | 3 | 2 | 1 | 0 | 0 | 2 | 13 |
| **31** | Explore the potential of joining FEMA's Community Rating System (CRS) in the future based on City staff capabilities, National Flood Insurance Program (NFIP) policy counts, and updated program requirements. | 3 | 2 | 3 | 2 | 0 | 0 | 0 | 2 | 12 |

| Action # | Action Title | Hazards Addressed | High Hazard Dams | Approximate Cost | Equity Focus | Protection of Lives | Protection of Critical Facilities or Infrastructure | Protection of Natural Resources | Alignment with Objectives | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| **32** | Short- and long-term lake management. | 2 | 0 | 2 | 2 | 1 | 0 | 2 | 2 | 11 |
| **33** | Encourage and support the local Floodplain Administrator to gain Certified Floodplain Manager (CFM®) certification. | 3 | 2 | 3 | 0 | 1 | 0 | 0 | 2 | 11 |
| **34** | Add water meters to residences without them. | 3 | 0 | 2 | 0 | 1 | 0 | 2 | 2 | 10 |
| **35** | Identify which City owned buildings are built from unreinforced masonry and may be at risk during an earthquake. | 1 | 0 | 2 | 0 | 2 | 3 | 0 | 2 | 10 |
| **36** | Develop a City-wide Business Improvement and Economic Development Plan to increase resilience. | 3 | 0 | 3 | 0 | 1 | 0 | 0 | 2 | 9 |
| **37** | Identify a system to monitor the risk of landslides due to precipitation and invasive species and develop a plan to mitigate the risk. | 1 | 0 | 3 | 0 | 1 | 0 | 2 | 2 | 9 |
| **38** | Plan for Wildlife Management with an emphasis on Beaver control. | 2 | 0 | 2 | 0 | 0 | 0 | 2 | 2 | 8 |

| Action # | Action Title | Hazards Addressed | High Hazard Dams | Approximate Cost | Equity Focus | Protection of Lives | Protection of Critical Facilities or Infrastructure | Protection of Natural Resources | Alignment with Objectives | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| **39** | Develop a system to mitigate the increasing concern of Spotted Lanternfly. | 2 | 0 | 2 | 0 | 0 | 0 | 2 | 2 | 8 |
| **40** | Develop a plan to mitigate the risk that dam breach and flooding pose to the identified 48 historic sites. | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 2 | 8 |

## Types of Mitigation Actions

*Table 96. Actions Sorted by Type.*

| Mitigation Category | Action # | Action Title |
|---|---|---|
| **Local Plans and Regulations** | 1 | Flood Mapping Management. |
| | 2 | Formalize a system of collaboration with adjacent towns that have High Hazard Dams or may be impacted by City owned dams. |
| | 8 | Incorporate hazard/climate resilience into the prioritization criteria established for the City's annual capital improvement planning process. |
| | 9 | Maintenance of Urban Waterways. |
| | 15 | Develop a plan to evacuate the elderly living in downstream inundation areas. |
| | 22 | Conduct reviews and updates to City regulations to require or promote hazard resistant, climate-adaptive standards for new development. |
| | 28 | Integrate extreme temperatures into existing City plans and regulations for new development. |
| | 29 | Integrate hazard mitigation and climate resilience goals and strategies/actions into the City's Open Space and Recreation Plan and future updates to the Master Plan. |
| | 30 | Continue to coordinate with Berkshire Regional Planning Commission (BRPC) and neighboring communities on positioning the City to pursue and capture future grant funding for regional resilience/risk reduction projects. |
| | 31 | Explore the potential of joining FEMA's Community Rating System (CRS) in the future based on City staff capabilities, National Flood Insurance Program (NFIP) policy counts, and updated program requirements. |
| | 37 | Identify a system to monitor the risk of landslides due to precipitation and invasive species and develop a plan to mitigate the risk. |
| **Structure and Infrastructure Projects** | 3 | Reservoir Dam Access Improvement. |
| | 6 | Upgrades to water and wastewater systems. |
| | 7 | Generator Installation Study and installation for Patterson Field House and Field Administration Building for use as an Emergency Shelter. |
| | 10 | Remote Monitoring of High Hazard Dams. |
| | 11 | Implement priority projects from City's field inventory of culverts and bridges. Prioritize replacement of the culvert at Dan Casey Memorial Drive. |
| | 14 | Remove the Bel Air Dam. |
| | 16 | Provide emergency back-up power to all critical facilities. |

| Mitigation Category | Action # | Action Title |
|---|---|---|
| | 17 | Build the new stormwater control system for Wahconah Park and develop and implement a comprehensive plan to mitigate flood risk at Wahconah Park. |
| | 19 | Conduct dam assessment and dam removal feasibility for the Wild Acres Dam and Mill Street Dam. |
| | 27 | Keep the sides of roads clear from overhanging trees that may topple during high wind events such as tornadoes, hurricanes, and tropical storms. |
| | 35 | Identify which City owned buildings are built from unreinforced masonry and may be at risk during an earthquake. |
| | 40 | Develop a plan to mitigate the risk that dam breach and flooding pose to the identified 40 historic sites. |
| **Natural Systems Protection** | 4 | Develop a city-wide practice for addressing stormwater and flood events. |
| | 13 | Water quality preservation. |
| | 20 | Upgrade the City drinking water supply infrastructure to protect water quality and availability. |
| | 26 | Tree and Forest Management Program. |
| | 32 | Short- and long-term lake management. |
| | 34 | Add water meters to residences without them. |
| | 38 | Plan for Wildlife Management with an emphasis on Beaver control. |
| | 39 | Develop a system to mitigate the increasing concern of Spotted Lanternfly. |
| **Education and Awareness Programs** | 5 | Increase outreach and facilitate access to warming and cooling centers for the unhoused and elderly. |
| | 12 | Design and implement a natural hazard education and outreach program for the public. |
| | 18 | Increase floodplain education and awareness. |
| | 21 | Alert homeowners to the potential wildfire risk in high probability burn areas and educate them about how to create defensible space. |
| | 23 | Litter Reduction Education and Outreach Program. |
| | 24 | Increase use of the City's website and social media platforms, and other readily available outreach mechanisms to promote low-cost public education initiatives on emergency preparedness and hazard mitigation actions for homeowners, business owners, etc. |
| | 25 | Prevention of vector-borne illnesses. |
| | 33 | Encourage and support the local Floodplain Administrator to gain Certified Floodplain Manager (CFM®) certification. |
| | 36 | Develop a City-wide Business Improvement and Economic Development Plan to increase resilience. |

## Actions Sorted by Goal Statement

*Table 97. Actions Sorted by Goal Statement.*

| Goal | Action # | Action Title |
|---|---|---|
| **Save Lives and Property** | 1 | Flood Mapping Management. |
| | 7 | Generator Installation Study and installation for Patterson Field House and Field Administration Building for use as an Emergency Shelter. |
| | 15 | Develop a plan to evacuate the elderly living in downstream inundation areas. |
| | 16 | Provide emergency back-up power to all critical facilities. |
| **Local Plans and Regulations** | 2 | Formalize a system of collaboration with adjacent towns that have High Hazard Dams or may be impacted by City owned dams. |
| | 8 | Incorporate hazard/climate resilience into the prioritization criteria established for the City’s annual capital improvement planning process. |
| | 9 | Maintenance of Urban Waterways. |
| | 22 | Conduct reviews and updates to City regulations to require or promote hazard resistant, climate-adaptive standards for new development. |
| | 28 | Integrate extreme temperatures into existing City plans and regulations for new development. |
| | 29 | Integrate hazard mitigation and climate resilience goals and strategies/actions into the City’s Open Space and Recreation Plan and future updates to the Master Plan. |
| | 30 | Continue to coordinate with Berkshire Regional Planning Commission (BRPC) and neighboring communities on positioning the City to pursue and capture future grant funding for regional resilience/risk reduction projects. |
| | 31 | Explore the potential of joining FEMA’s Community Rating System (CRS) in the future based on City staff capabilities, National Flood Insurance Program (NFIP) policy counts, and updated program requirements. |
| | 37 | Identify a system to monitor the risk of landslides due to precipitation and invasive species and develop a plan to mitigate the risk. |
| **Building and Infrastructure** | 6 | Upgrades to water and wastewater systems. |
| | 11 | Implement priority projects from City's field inventory of culverts and bridges. Prioritize replacement of the culvert at Dan Casey Memorial Drive. |
| | 17 | Build the new stormwater control system for Wahconah Park and develop and implement a comprehensive plan to mitigate flood risk at Wahconah Park. |
| | 27 | Keep the sides of roads clear from overhanging trees that may topple during high wind events such as tornadoes, hurricanes, and tropical storms. |
| | 35 | Identify which City owned buildings are built from unreinforced masonry and may be at risk during an earthquake. |

| Goal | Action # | Action Title |
|---|---|---|
| **Natural Resources** | 4 | Develop a city-wide practice for addressing stormwater and flood events. |
| | 13 | Water quality preservation. |
| | 20 | Upgrade the City drinking water supply infrastructure to protect water quality and availability. |
| | 26 | Tree and Forest Management Program. |
| | 32 | Short- and long-term lake management. |
| | 34 | Add water meters to residences without them. |
| | 38 | Plan for Wildlife Management with an emphasis on Beaver control. |
| | 39 | Develop a system to mitigate the increasing concern of Spotted Lanternfly. |
| **Education** | 5 | Increase outreach and facilitate access to warming and cooling centers for the unhoused and elderly. |
| | 12 | Design and implement a natural hazard education and outreach program for the public. |
| | 18 | Increase floodplain education and awareness. |
| | 21 | Alert homeowners to the potential wildfire risk in high probability burn areas and educate them about how to create defensible space. |
| | 23 | Litter Reduction Education and Outreach Program. |
| | 24 | Increase use of the City's website and social media platforms, and other readily available outreach mechanisms to promote low-cost public education initiatives on emergency preparedness and hazard mitigation actions for homeowners, business owners, etc. |
| | 25 | Prevention of vector-borne illnesses. |
| | 33 | Encourage and support the local Floodplain Administrator to gain Certified Floodplain Manager (CFM®) certification. |
| | 36 | Develop a City-wide Business Improvement and Economic Development Plan to increase resilience. |
| **High Hazard Dams** | 3 | Reservoir Dam Access Improvement. |
| | 10 | Remote Monitoring of High Hazard Dams. |
| | 14 | Remove the Bel Air Dam. |
| | 19 | Conduct dam assessment and dam removal feasibility for the Wild Acres Dam and Mill Street Dam. |
| | 40 | Develop a plan to mitigate the risk that dam breach and flooding pose to the identified 40 historic sites. |

## Actions Sorted by Hazard

*Table 98. Actions Sorted by Hazards Addressed.*

| Specific Hazards Addressed | Action # | Action Title |
|---|---|---|
| **Earthquakes** | 35 | Identify which City owned buildings are built from unreinforced masonry and may be at risk during an earthquake. |
| **Invasive Species** | 39 | Develop a system to mitigate the increasing concern of Spotted Lanternfly. |
| **Flooding from Precipitation, Flooding from Dam Failure or Overtopping** | 1 | Flood Mapping Management. |
| **Flooding from Precipitation** | 17 | Build the new stormwater control system for Wahconah Park and develop and implement a comprehensive plan to mitigate flood risk at Wahconah Park. |
| **Flooding from Dam Failure or Overtopping** | 2 | Formalize a system of collaboration with adjacent towns that have High Hazard Dams or may be impacted by City owned dams. |
| | 3 | Reservoir Dam Access Improvement. |
| | 10 | Remote Monitoring of High Hazard Dams. |
| | 14 | Remove the Bel Air Dam. |
| | 15 | Develop a plan to evacuate the elderly living in downstream inundation areas. |
| | 19 | Conduct dam assessment and dam removal feasibility for the Wild Acres Dam and Mill Street Dam. |
| **Flooding from Precipitation, Severe Winter Storms, Flooding from Dam Failure or Overtopping, Other Severe Weather, Tornadoes, Hurricanes and Tropical Storms** | 4 | Develop a city-wide practice for addressing stormwater and flood events. |
| **Extreme Temperatures** | 5 | Increase outreach and facilitate access to warming and cooling centers for the unhoused and elderly. |
| | 28 | Integrate extreme temperatures into existing City plans and regulations for new development. |
| **Flooding from Precipitation, Severe Winter Storms, Other Severe Weather, Tornadoes, Hurricanes and Tropical Storms** | 6 | Upgrades to water and wastewater systems. |
| | 9 | Maintenance of Urban Waterways. |
| | 11 | Implement priority projects from City's field inventory of culverts and bridges. Prioritize replacement of the culvert at Dan Casey Memorial Drive. |
| | 18 | Increase floodplain education and awareness. |
| | 31 | Explore the potential of joining FEMA's Community Rating System (CRS) in the future based on City staff capabilities, National Flood Insurance Program (NFIP) policy counts, and updated program requirements. |

| Specific Hazards Addressed | Action # | Action Title |
|---|---|---|
| | 33 | Encourage and support the local Floodplain Administrator to gain Certified Floodplain Manager (CFM®) certification. |
| | 40 | Develop a plan to mitigate the risk that dam breach and flooding pose to the identified 40 historic sites. |
| **Flooding from Precipitation, Severe Winter Storms, Wildfires/Brushfires, Extreme Temperatures, Flooding from Dam Failure or Overtopping, Other Severe Weather, Tornadoes, Hurricanes and Tropical Storms, Earthquakes, Landslides** | 7 | Generator Installation Study and installation for Patterson Field House and Field Administration Building for use as an Emergency Shelter. |
| | 16 | Provide emergency back-up power to all critical facilities. |
| **Flooding from Precipitation, Severe Winter Storms, Wildfires/Brushfires, Extreme Temperatures, Flooding from Dam Failure or Overtopping, Invasive Species, Other Severe Weather, Droughts, Tornadoes, Hurricanes and Tropical Storms, Earthquakes, Landslides** | 8 | Incorporate hazard/climate resilience into the prioritization criteria established for the City's annual capital improvement planning process. |
| | 22 | Conduct reviews and updates to City regulations to require or promote hazard resistant, climate-adaptive standards for new development. |
| | 24 | Increase use of the City's website and social media platforms, and other readily available outreach mechanisms to promote low-cost public education initiatives on emergency preparedness and hazard mitigation actions for homeowners, business owners, etc. |
| | 29 | Integrate hazard mitigation and climate resilience goals and strategies/actions into the City's Open Space and Recreation Plan and future updates to the Master Plan. |
| | 30 | Continue to coordinate with Berkshire Regional Planning Commission (BRPC) and neighboring communities on positioning the City to pursue and capture future grant funding for regional resilience/risk reduction projects. |
| | 36 | Develop a City-wide Business Improvement and Economic Development Plan to increase resilience. |
| **Flooding from Precipitation, Severe Winter Storms, Wildfires/Brushfires, Extreme Temperatures, Flooding from Dam Failure or Overtopping, Invasive Species, Other Severe Weather, Droughts, Tornadoes, Hurricanes and Tropical Storms, Earthquakes, Landslides** | 12 | Design and implement a natural hazard education and outreach program for the public. |

| Specific Hazards Addressed | Action # | Action Title |
|---|---|---|
| | 23 | Litter Reduction Education and Outreach Program. |
| **Flooding from Precipitation, Severe Winter Storms, Flooding from Dam Failure or Overtopping, Invasive Species, Other Severe Weather, Tornadoes, Hurricanes and Tropical Storms** | 13 | Water quality preservation. |
| **Extreme Temperatures, Drought, Invasive Species** | 20 | Upgrade the City drinking water supply infrastructure to protect water quality and availability. |
| **Wildfires/Brushfires, Extreme Temperatures, Other Severe Weather, Tornadoes, Hurricanes and Tropical Storms** | 21 | Alert homeowners to the potential wildfire risk in high probability burn areas and educate them about how to create defensible space. |
| **Mosquito and Tick borne illness prevention** | 25 | Prevention of vector-borne illnesses. |
| **Extreme Temperatures, Other Severe Weather, Droughts, Tornadoes, Hurricanes/Tropical Storms** | 26 | Tree and Forest Management Program. |
| **Other Severe Weather, Tornadoes, Hurricanes/Tropical Storms** | 27 | Keep the sides of roads clear from overhanging trees that may topple during high wind events such as tornadoes, hurricanes, and tropical storms. |
| **Extreme Temperatures, invasive Species, Droughts** | 32 | Short- and long-term lake management. |
| **Drought** | 34 | Add water meters to residences without them. |
| **Landslides** | 37 | Identify a system to monitor the risk of landslides due to precipitation and invasive species and develop a plan to mitigate the risk. |
| **Flood control** | 38 | Plan for Wildlife Management with an emphasis on Beaver control. |

## Actions Sorted by Lead Position

*Table 99. Actions Sorted by Lead Position.*

| Action Lead | Action # | Action Title |
|---|---|---|
| **Floodplain Coordinator** | **1** | Flood Mapping Management. |
| | **31** | Explore the potential of joining FEMA's Community Rating System (CRS) in the future based on City staff capabilities, National Flood Insurance Program (NFIP) policy counts, and updated program requirements. |
| | **33** | Encourage and support the local Floodplain Administrator to gain Certified Floodplain Manager (CFM®) certification. |
| **Fire Chief/Emergency Management Director** | **2** | Formalize a system of collaboration with adjacent towns that have High Hazard Dams or may be impacted by City owned dams. |
| | **7** | Generator Installation Study and installation for Patterson Field House and Field Administration Building for use as an Emergency Shelter. |
| | **15** | Develop a plan to evacuate the elderly living in downstream inundation areas. |
| **Commissioner of Public Works** | **3** | Reservoir Dam Access Improvement. |
| | **6** | Upgrades to water and wastewater systems. |
| | **11** | Implement priority projects from City's field inventory of culverts and bridges. Prioritize replacement of the culvert at Dan Casey Memorial Drive. |
| | **17** | Build the new stormwater control system for Wahconah Park and develop and implement a comprehensive plan to mitigate flood risk at Wahconah Park. |
| | **20** | Upgrade the City drinking water supply infrastructure to protect water quality and availability. |
| | **23** | Litter Reduction Education and Outreach Program. |
| **Conservation Agent** | **4** | Develop a city-wide practice for addressing stormwater and flood events. |
| | **9** | Maintenance of Urban Waterways. |
| | **18** | Increase floodplain education and awareness. |
| | **32** | Short- and long-term lake management. |
| | **38** | Plan for Wildlife Management with an emphasis on Beaver control. |
| **Director of Public Health** | **5** | Increase outreach and facilitate access to warming and cooling centers for the unhoused and elderly. |
| **Director of Community Development** | **8** | Incorporate hazard/climate resilience into the prioritization criteria established for the City's annual capital improvement planning process. |
| | **28** | Integrate extreme temperatures into existing City plans and regulations for new development. |

| Action Lead | Action # | Action Title |
|---|---|---|
| | 29 | Integrate hazard mitigation and climate resilience goals and strategies/actions into the City's Open Space and Recreation Plan and future updates to the Master Plan. |
| | 30 | Continue to coordinate with Berkshire Regional Planning Commission (BRPC) and neighboring communities on positioning the City to pursue and capture future grant funding for regional resilience/risk reduction projects. |
| | 36 | Develop a City-wide Business Improvement and Economic Development Plan to increase resilience. |
| | 40 | Develop a plan to mitigate the risk that dam breach and flooding pose to the identified 40 historic sites. |
| **Natural Resource Program Manager** | 10 | Remote Monitoring of High Hazard Dams. |
| | 14 | Remove the Bel Air Dam. |
| | 26 | Tree and Forest Management Program. |
| | 39 | Develop a system to mitigate the increasing concern of Spotted Lanternfly. |
| **Fire Chief and Mayor's Office** | 12 | Design and implement a natural hazard education and outreach program for the public. |
| **Water Superintendent** | 13 | Water quality preservation. |
| | 34 | Add water meters to residences without them. |
| **Building Superintendent** | 16 | Provide emergency back-up power to all critical facilities. |
| **Conservation Commission Chair** | 19 | Conduct dam assessment and dam removal feasibility for the Wild Acres Dam and Mill Street Dam. |
| **Fire Chief/EMD** | 21 | Alert homeowners to the potential wildfire risk in high probability burn areas and educate them about how to create defensible space. |
| **City Planner** | 22 | Conduct reviews and updates to City regulations to require or promote hazard resistant, climate-adaptive standards for new development. |
| **Director of Administrative Services and Public Information Officer** | 24 | Increase use of the City's website and social media platforms, and other readily available outreach mechanisms to promote low-cost public education initiatives on emergency preparedness and hazard mitigation actions for homeowners, business owners, etc. |
| **Health Department/Board of Health** | 25 | Prevention of vector-borne illnesses. |
| **Deputy Commissioner of Public Works** | 27 | Keep the sides of roads clear from overhanging trees that may topple during high wind events such as tornadoes, hurricanes, and tropical storms. |
| | 37 | Identify a system to monitor the risk of landslides due to precipitation and invasive species and develop a plan to mitigate the risk. |

| Action Lead | Action # | Action Title |
|---|---|---|
| **Building Commissioner** | **35** | Identify which City owned buildings are built from unreinforced masonry and may be at risk during an earthquake. |

## Actions Sorted by Implementation Schedule

*Table 100. Actions Sorted by Implementation Schedule.*

| Implementation Schedule | Action # | Action Title |
|---|---|---|
| **2027** | 19 | Conduct dam assessment and dam removal feasibility for the Wild Acres Dam and Mill Street Dam. |
| **2025-2026** | 12 | Design and implement a natural hazard education and outreach program for the public. |
| | 14 | Remove the Bel Air Dam. |
| | 21 | Alert homeowners to the potential wildfire risk in high probability burn areas and educate them about how to create defensible space. |
| **2025-2030** | 1 | Flood Mapping Management. |
| | 2 | Formalize a system of collaboration with adjacent towns that have High Hazard Dams or may be impacted by City owned dams. |
| | 3 | Reservoir Dam Access Improvement. |
| | 4 | Develop a city-wide practice for addressing stormwater and flood events. |
| | 5 | Increase outreach and facilitate access to warming and cooling centers for the unhoused and elderly. |
| | 6 | Upgrades to water and wastewater systems. |
| | 7 | Generator Installation Study and installation for Patterson Field House and Field Administration Building for use as an Emergency Shelter. |
| | 8 | Incorporate hazard/climate resilience into the prioritization criteria established for the City’s annual capital improvement planning process. |
| | 9 | Maintenance of Urban Waterways. |
| | 10 | Remote Monitoring of High Hazard Dams. |
| | 11 | Implement priority projects from City's field inventory of culverts and bridges. Prioritize replacement of the culvert at Dan Casey Memorial Drive. |
| | 13 | Water quality preservation. |
| | 15 | Develop a plan to evacuate the elderly living in downstream inundation areas. |
| | 16 | Provide emergency back-up power to all critical facilities. |
| | 17 | Build the new stormwater control system for Wahconah Park and develop and implement a comprehensive plan to mitigate flood risk at Wahconah Park. |
| | 18 | Increase floodplain education and awareness. |
| | 20 | Upgrade the City drinking water supply infrastructure to protect water quality and availability. |
| | 22 | Conduct reviews and updates to City regulations to require or promote hazard resistant, climate-adaptive standards for new development. |
| | 23 | Litter Reduction Education and Outreach Program. |
| | 24 | Increase use of the City’s website and social media platforms, and other readily available outreach mechanisms to promote low-cost public |

| Implementation Schedule | Action # | Action Title |
|---|---|---|
| | | education initiatives on emergency preparedness and hazard mitigation actions for homeowners, business owners, etc. |
| | 25 | Prevention of vector-borne illnesses. |
| | 26 | Tree and Forest Management Program. |
| | 27 | Keep the sides of roads clear from overhanging trees that may topple during high wind events such as tornadoes, hurricanes, and tropical storms. |
| | 28 | Integrate extreme temperatures into existing City plans and regulations for new development. |
| | 30 | Continue to coordinate with Berkshire Regional Planning Commission (BRPC) and neighboring communities on positioning the City to pursue and capture future grant funding for regional resilience/risk reduction projects. |
| | 31 | Explore the potential of joining FEMA's Community Rating System (CRS) in the future based on City staff capabilities, National Flood Insurance Program (NFIP) policy counts, and updated program requirements. |
| | 32 | Short- and long-term lake management. |
| | 33 | Encourage and support the local Floodplain Administrator to gain Certified Floodplain Manager (CFM®) certification. |
| | 34 | Add water meters to residences without them. |
| | 36 | Develop a City-wide Business Improvement and Economic Development Plan to increase resilience. |
| | 38 | Plan for Wildlife Management with an emphasis on Beaver control. |
| **2026-2028** | 29 | Integrate hazard mitigation and climate resilience goals and strategies/actions into the City's Open Space and Recreation Plan and future updates to the Master Plan. |
| | 39 | Develop a system to mitigate the increasing concern of Spotted Lanternfly. |
| **2027-2030** | 37 | Identify a system to monitor the risk of landslides due to precipitation and invasive species and develop a plan to mitigate the risk. |
| | 40 | Develop a plan to mitigate the risk that dam breach and flooding pose to the identified 40 historic sites. |
| **2028-2030** | 35 | Identify which City owned buildings are built from unreinforced masonry and may be at risk during an earthquake. |

# Appendix C. Plan Implementation and Review Supporting Materials

## Plan Update Evaluation Worksheet

*Table 101. Plan Update Evaluation Worksheet.*

| Plan Section | Considerations | Explanation |
|---|---|---|
| Planning Process | Should the City invite any additional stakeholders to participate in the planning process?<br>What public outreach activities have occurred?<br>How can public involvement be improved? | |
| Risk Assessment | What disasters has the City, or the region experienced?<br>Should the list of hazards be modified?<br>Are new data sources, maps or studies available? If so, what have they revealed, and should the information be incorporated into the plan update?<br>Has development in the region occurred and could it create or reduce risk? | |
| Capability Assessment | Has the City adopted new policies, plans, regulations, or reports that could be incorporated into this plan?<br>Are there different or additional administrative, human, technical, and financial resources available for mitigation planning?<br>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?<br>Were the cost and timeline estimate accurate?<br>Should new mitigation actions be added to the Action Plan?<br>Should existing mitigation actions be revised or removed from the plan?<br>Are there new obstacles that were not anticipated in the plan that will need to be considered in the next plan update?<br>Are there new funding sources to consider?<br>Have elements of the plan been incorporated into other planning mechanisms? | |
| Implementation Plan | Was the plan monitored and evaluated as anticipated?<br>What are needed improvements to the plan implementation procedures? | |

## Mitigation Action Progress Worksheet

*Table 102. 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:** PittsfieldFlood

**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.*

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| Building Inventory | |
| General Building Stock | 4 |
| Essential Facility Inventory | 5 |
| Flood Scenario Parameters | 6 |
| Building Damage | |
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| Economic Loss | 12 |
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| Appendix A: County Listing for the Region | 15 |
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## General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is approximately 10 square miles and contains 751 census blocks. The region contains over 20 thousand households and has a total population of 43,901 people. The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 15,959 buildings in the region with a total building replacement value (excluding contents) of 8,416 million dollars. Approximately 86.97% of the buildings (and 57.32% of the building value) are associated with residential housing.

# HAZUS™

## Building Inventory

### General Building Stock

Hazus estimates that there are 15,959 buildings in the region which have an aggregate total replacement value of 8,416 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 | 4,824,309 | 57.3% |
| Commercial | 2,227,352 | 26.5% |
| Industrial | 559,657 | 6.6% |
| Agricultural | 16,541 | 0.2% |
| Religion | 90,488 | 1.1% |
| Government | 341,202 | 4.1% |
| Education | 356,548 | 4.2% |
| **Total** | **8,416,097** | **100%** |

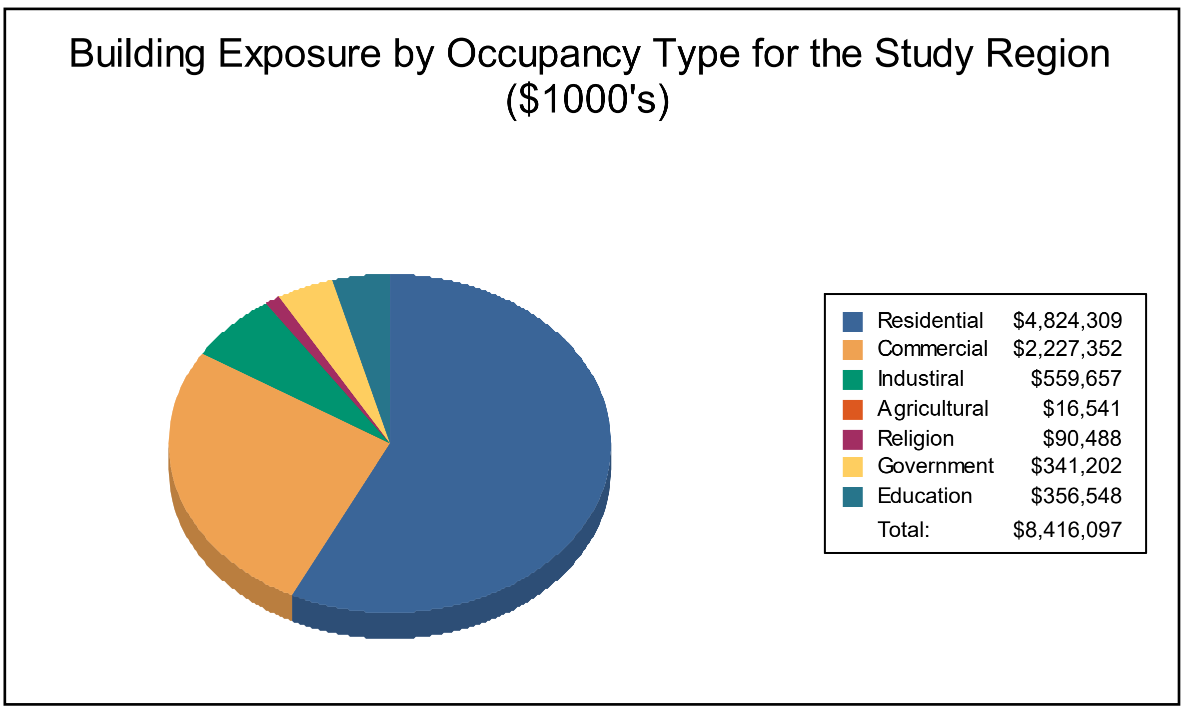
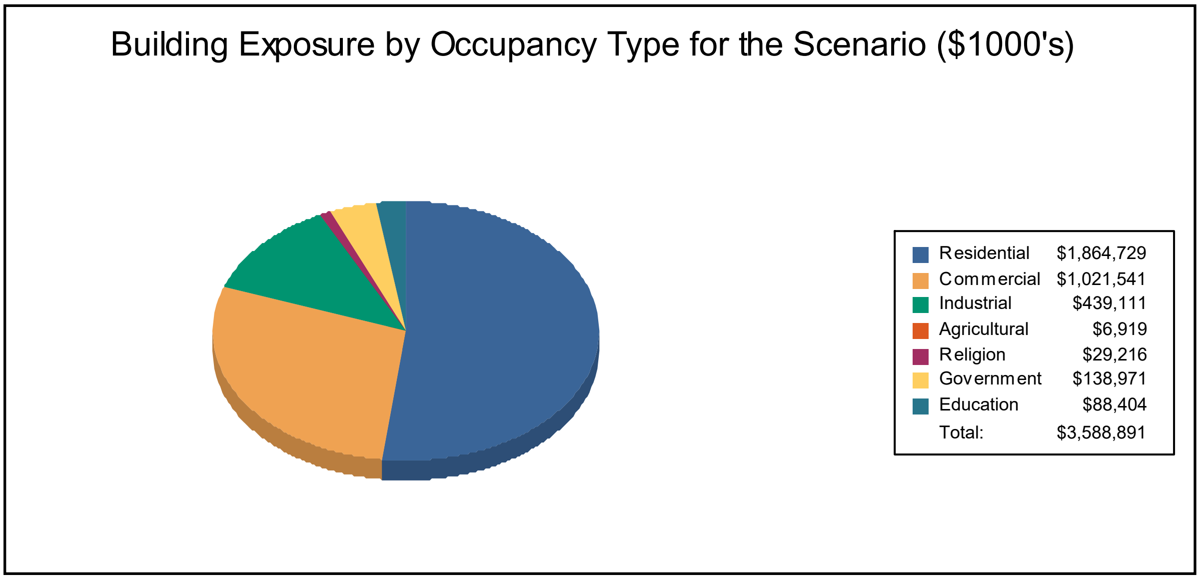


Table 2
**Building Exposure by Occupancy Type for the Scenario**

| Occupancy | Exposure ($1000) | Percent of Total |
|---|---|---|
| Residential | 1,864,729 | 52.0% |
| Commercial | 1,021,541 | 28.5% |
| Industrial | 439,111 | 12.2% |
| Agricultural | 6,919 | 0.2% |
| Religion | 29,216 | 0.8% |
| Government | 138,971 | 3.9% |
| Education | 88,404 | 2.5% |
| **Total** | **3,588,891** | **100%** |




## Essential Facility Inventory

For essential facilities, there are 3 hospitals in the region with a total bed capacity of 298 beds. There are 16 schools, 5 fire stations, 2 police stations and 1 emergency operation center.

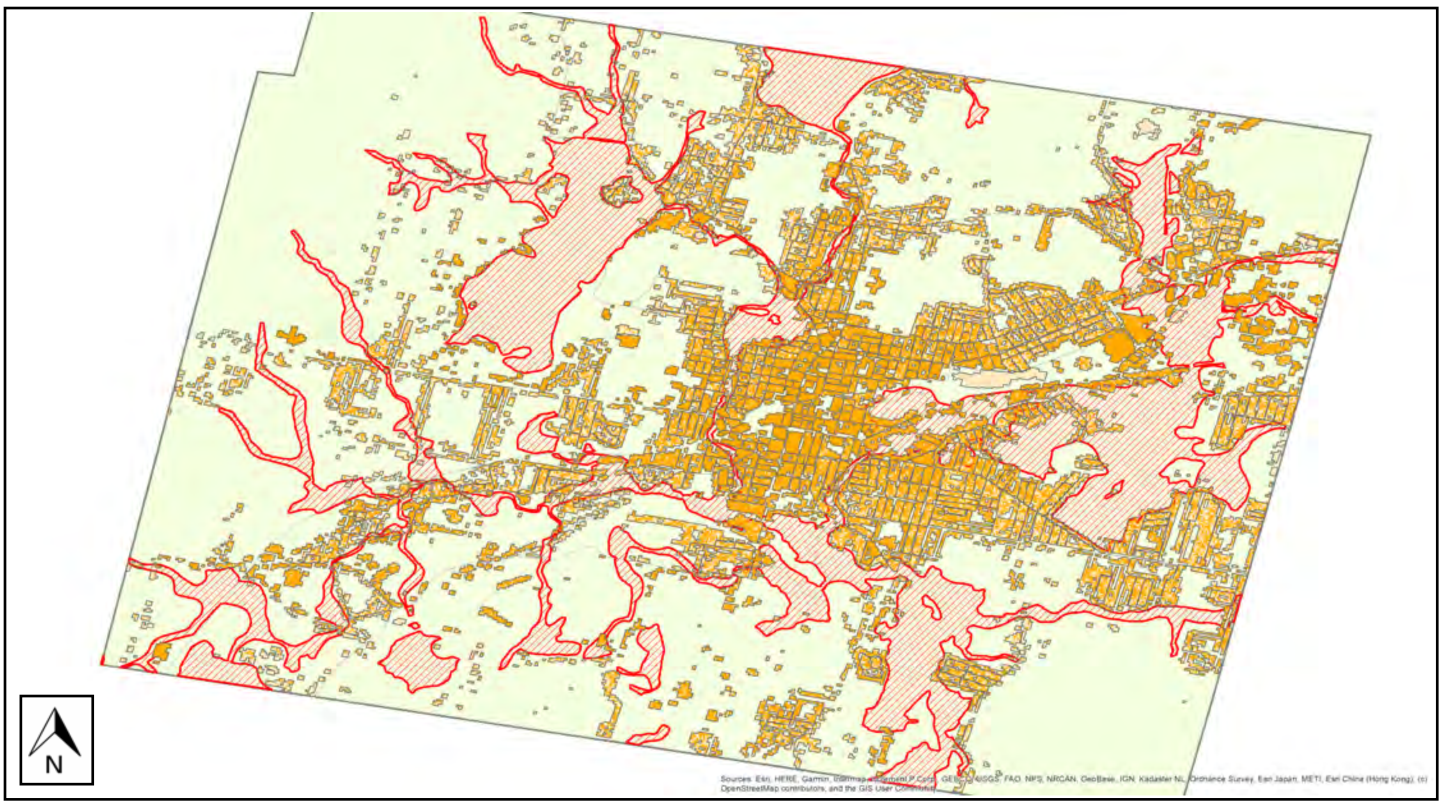
## Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

| | |
|---|---|
| **Study Region Name:** | PittsfieldFlood |
| **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**



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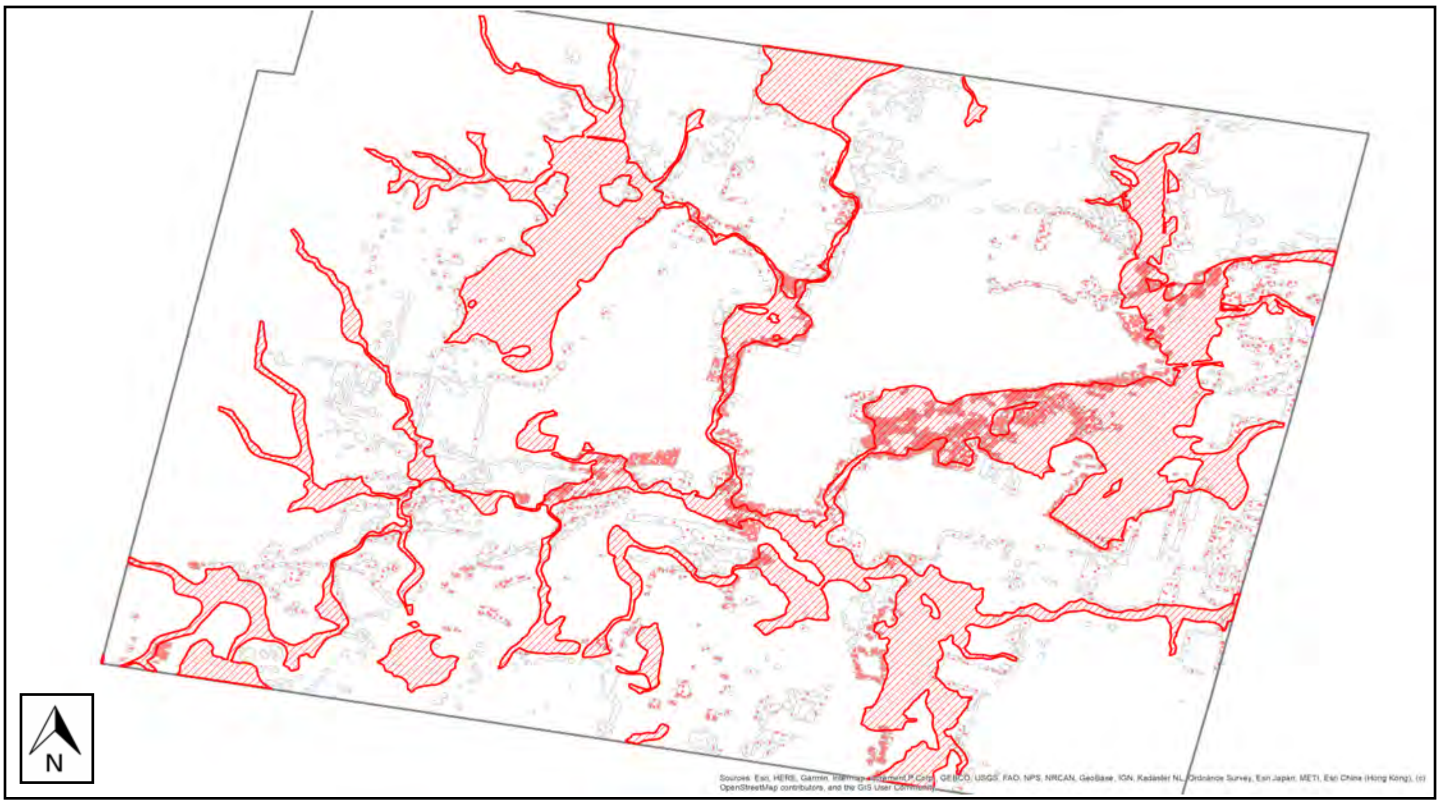
## Building Damage

### General Building Stock Damage

Hazus estimates that about 203 buildings will be at least moderately damaged. This is over 75% of the total number of buildings in the scenario. There are an estimated 17 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**




FEMA

RiskMAP
Increasing Resilience Together

**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 | 13 | 42 | 17 | 55 | 1 | 3 | 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 | 1 | 25 | 1 | 25 | 1 | 25 | 1 | 25 | 0 | 0 |
| Religion | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Residential | 148 | 45 | 95 | 29 | 41 | 12 | 16 | 5 | 12 | 4 | 17 | 5 |
| **Total** | **161** | | **113** | | **43** | | **17** | | **13** | | **17** | |

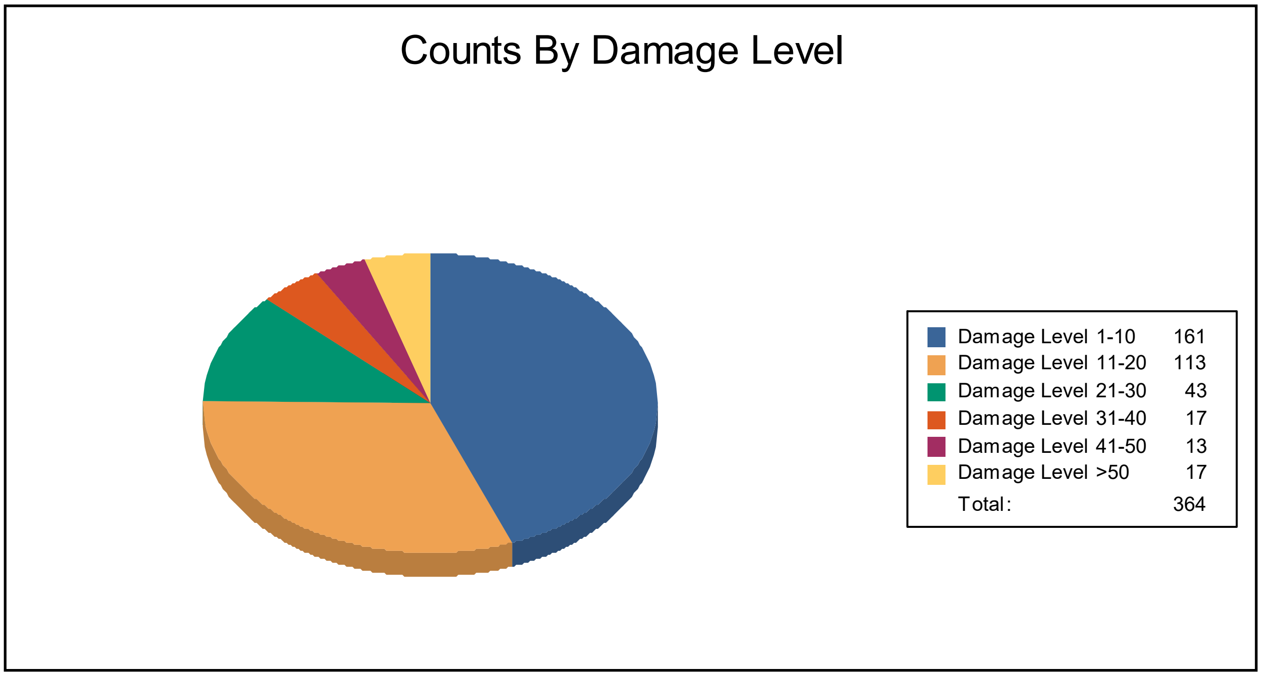


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**Table 4: Expected Building Damage by Building Type**

| 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 | 7 | 37 | 11 | 58 | 1 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| Steel | 5 | 56 | 4 | 44 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wood | 147 | 44 | 99 | 30 | 41 | 12 | 16 | 5 | 12 | 4 | 17 | 5 |

## Essential Facility Damage

Before the flood analyzed in this scenario, the region had 298 hospital beds available for use. On the day of the scenario flood event, the model estimates that 298 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 | 5 | 0 | 0 | 0 |
| Hospitals | 3 | 0 | 0 | 0 |
| Police Stations | 2 | 0 | 0 | 0 |
| Schools | 16 | 0 | 0 | 0 |

If this report displays all zeros or is blank, two possibilities can explain this.

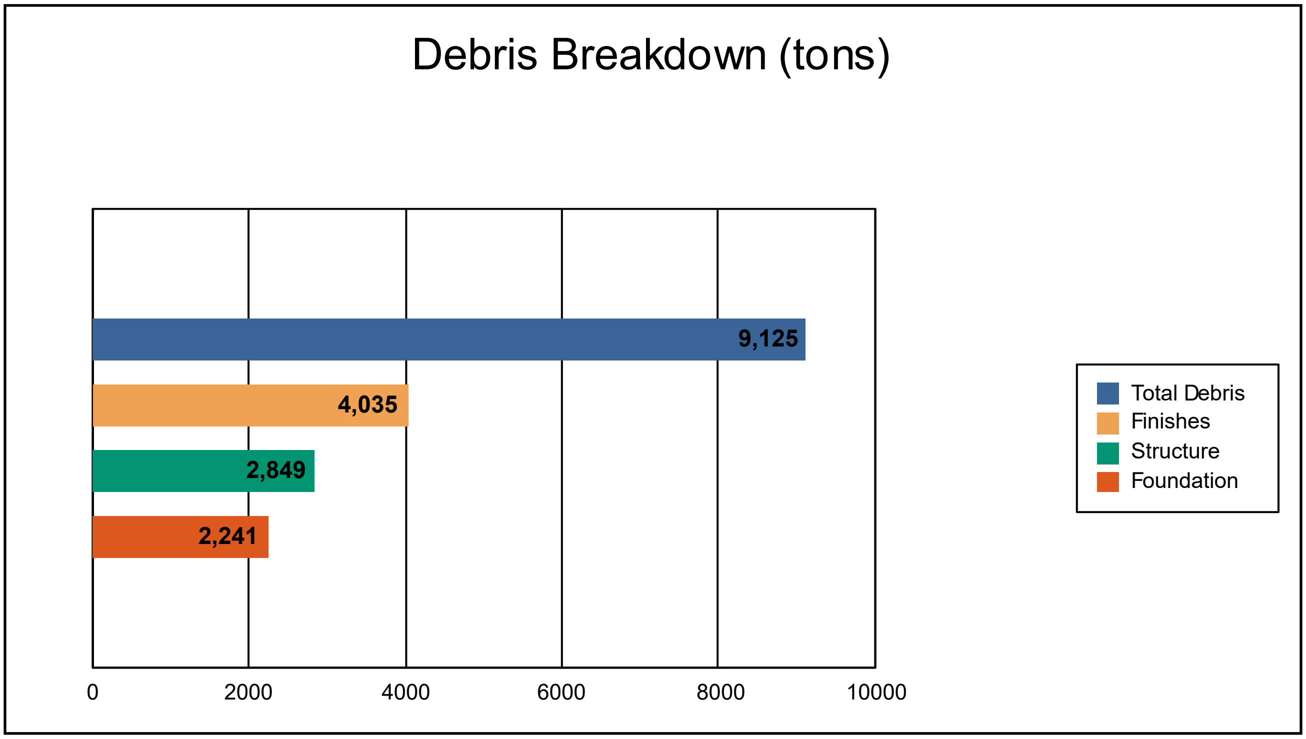
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(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.

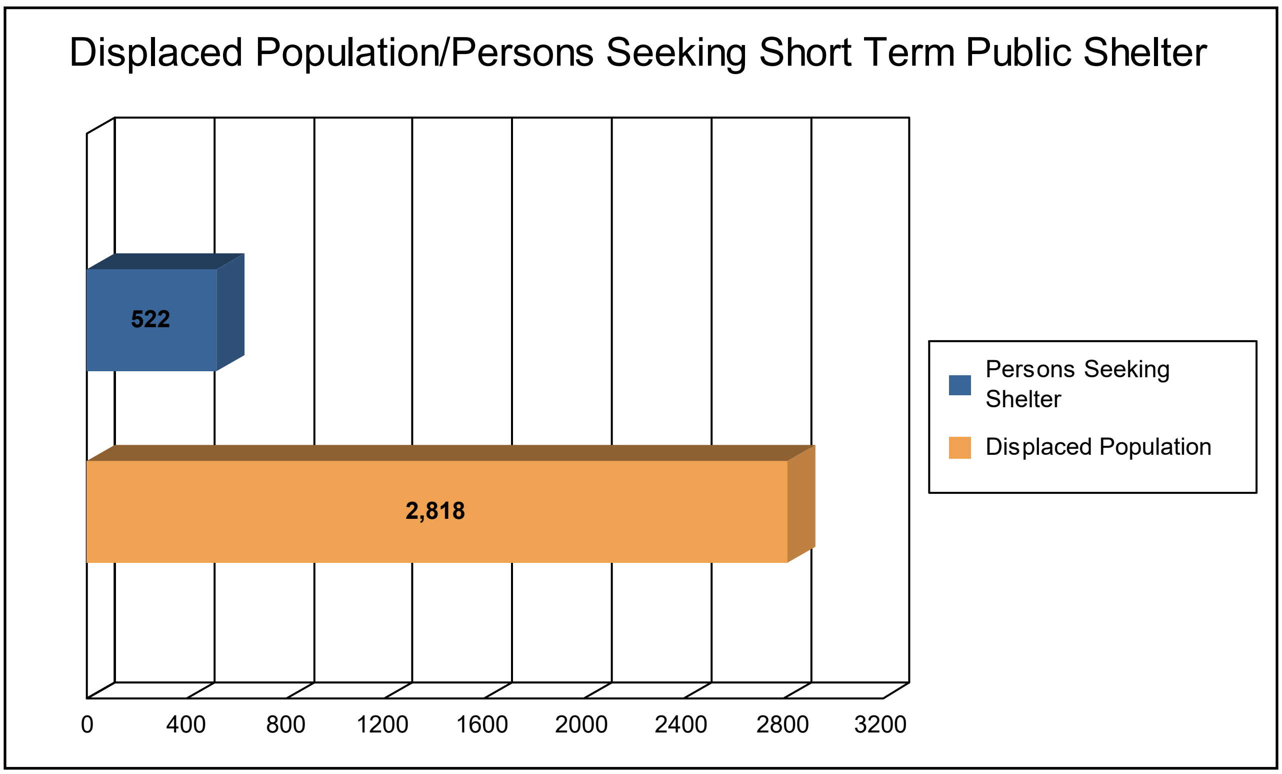



The model estimates that a total of 9,125 tons of debris will be generated. Of the total amount, Finishes comprises 44% of the total, Structure comprises 31% of the total, and Foundation comprises 25%. If the debris tonnage is converted into an estimated number of truckloads, it will require 365 truckloads (@25 tons/truck) to remove the debris generated by the flood.

## Social Impact

### Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 939 households (or 2,818 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 522 people (out of a total population of 43,901) will seek temporary shelter in public shelters.



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## Economic Loss

The total economic loss estimated for the flood is 458.26 million dollars, which represents 12.77 % of the total replacement value of the scenario buildings.

### Building-Related Losses

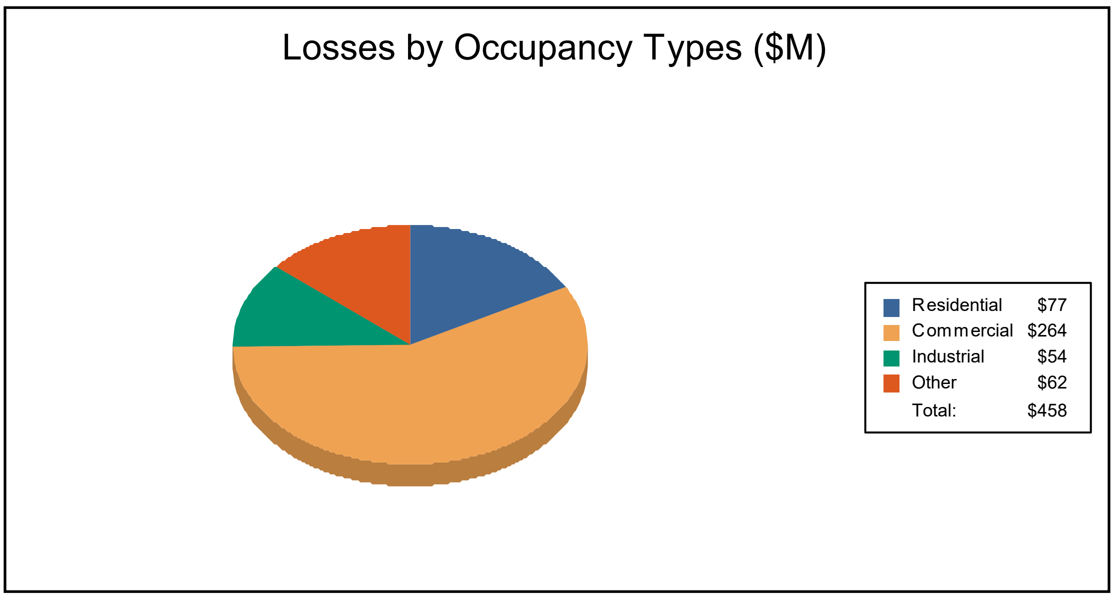
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability 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 222.23 million dollars. 52% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 16.90% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

### Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

| Category | Area | Residential | Commercial | Industrial | Others | Total |
|---|---|---|---|---|---|---|
| Building Loss | | | | | | |
| | Building | 37.79 | 19.97 | 13.92 | 2.04 | 73.72 |
| | Content | 18.54 | 67.98 | 33.48 | 10.19 | 130.19 |
| | Inventory | 0.00 | 13.67 | 4.22 | 0.43 | 18.32 |
| | **Subtotal** | **56.33** | **101.62** | **51.61** | **12.66** | **222.23** |
| Business Interruption | | | | | | |
| | Income | 0.58 | 64.38 | 0.51 | 3.49 | 68.96 |
| | Relocation | 11.55 | 15.91 | 0.87 | 2.35 | 30.68 |
| | Rental Income | 7.56 | 11.44 | 0.14 | 0.71 | 19.86 |
| | Wage | 1.40 | 71.08 | 0.89 | 43.17 | 116.54 |
| | **Subtotal** | **21.10** | **162.81** | **2.41** | **49.73** | **236.04** |
| ALL | **Total** | **77.43** | **264.43** | **54.03** | **62.38** | **458.26** |



## 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 | 43,901 | 4,824,309 | 3,591,788 | 8,416,097 |
| **Total** | **43,901** | **4,824,309** | **3,591,788** | **8,416,097** |
| **Total Study Region** | **43,901** | **4,824,309** | **3,591,788** | **8,416,097** |

# Hazus: Hurricane Global Risk Report

**Region Name:** PittsfieldWind

**Hurricane Scenario:** Probabilistic  500-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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## 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 40.54 square miles and contains 11 census tracts. There are over 19 thousand households in the region and a total population of 43,927 people. The distribution of population by State and County is provided in Appendix B.

There are an estimated 15 thousand buildings in the region with a total building replacement value (excluding contents) of 8,417 million dollars. Approximately 87% of the buildings (and 57% of the building value) are associated with residential housing.

## Building Inventory

### General Building Stock

Hazus estimates that there are 15,959 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.

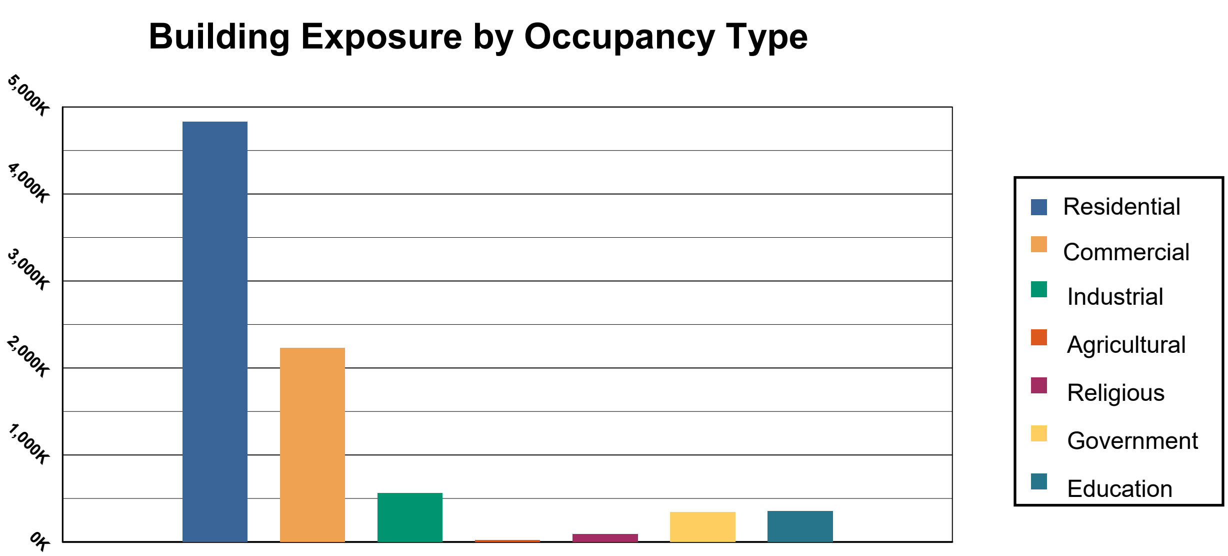



**Table 1: Building Exposure by Occupancy Type**

| Occupancy | Exposure ($1000) | Percent of Tot |
|---|---|---|
| Residential | 4,824,961 | 57.32% |
| Commercial | 2,227,760 | 26.47% |
| Industrial | 559,746 | 6.65% |
| Agricultural | 16,552 | 0.20% |
| Religious | 90,516 | 1.08% |
| Government | 341,238 | 4.05% |
| Education | 356,554 | 4.24% |
| **Total** | **8,417,327** | **100.00%** |

### Essential Facility Inventory

For essential facilities, there are 3 hospitals in the region with a total bed capacity of 298 beds. There are 16 schools, 5 fire stations, 2 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 145 buildings will be at least moderately damaged. This is over 1% of the total number of buildings in the region. There are an estimated 2 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

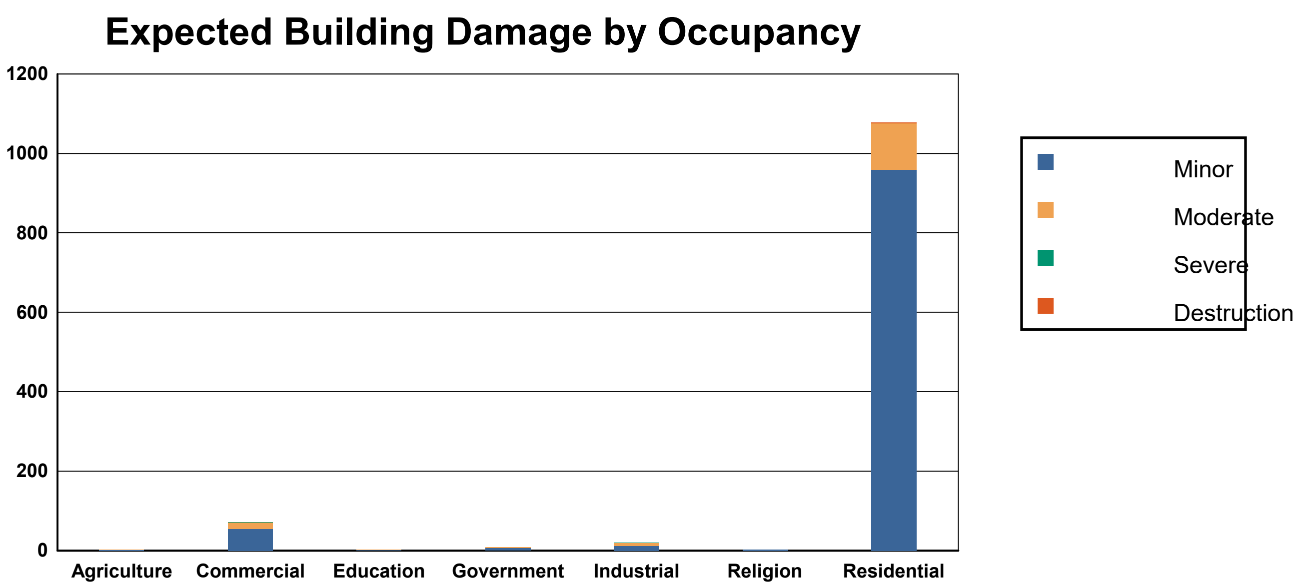



**Table 2: Expected Building Damage by Occupancy : 500 - year Event**

| | None | | Minor | | Moderate | | Severe | | Destruction | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Occupancy** | **Count** | **(%)** | **Count** | **(%)** | **Count** | **(%)** | **Count** | **(%)** | **Count** | **(%)** |
| Agriculture | 36 | 95.04 | 1 | 3.32 | 0 | 1.20 | 0 | 0.43 | 0 | 0.02 |
| Commercial | 1,359 | 95.02 | 55 | 3.85 | 15 | 1.07 | 1 | 0.06 | 0 | 0.00 |
| Education | 27 | 91.42 | 2 | 6.01 | 1 | 2.56 | 0 | 0.01 | 0 | 0.00 |
| Government | 174 | 95.28 | 7 | 3.95 | 1 | 0.75 | 0 | 0.01 | 0 | 0.00 |
| Industrial | 290 | 93.61 | 13 | 4.08 | 6 | 2.00 | 1 | 0.30 | 0 | 0.00 |
| Religion | 85 | 96.44 | 3 | 3.06 | 0 | 0.46 | 0 | 0.03 | 0 | 0.00 |
| Residential | 12,802 | 92.23 | 959 | 6.91 | 116 | 0.83 | 1 | 0.01 | 2 | 0.01 |
| **Total** | **14,774** | | **1,040** | | **140** | | **3** | | **2** | |

## Table 3: Expected Building Damage by Building Type : 500 - year Event

| Building Type | None | | Minor | | Moderate | | Severe | | Destruction | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Count | (%) | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| Concrete | 49 | 95.68 | 2 | 4.04 | 0 | 0.28 | 0 | 0.00 | 0 | 0.00 |
| Masonry | 1,233 | 94.98 | 57 | 4.42 | 7 | 0.54 | 1 | 0.06 | 0 | 0.00 |
| MH | 54 | 98.56 | 1 | 1.04 | 0 | 0.29 | 0 | 0.01 | 0 | 0.10 |
| Steel | 739 | 85.65 | 76 | 8.81 | 46 | 5.35 | 2 | 0.19 | 0 | 0.00 |
| Wood | 12,851 | 93.91 | 781 | 5.71 | 49 | 0.36 | 2 | 0.01 | 1 | 0.01 |

## Essential Facility Damage

Before the hurricane, the region had 298 hospital beds available for use. On the day of the hurricane, the model estimates that 298 hospital beds (100%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, 100% of the beds will be in service. By 30 days, 100% will be operational.

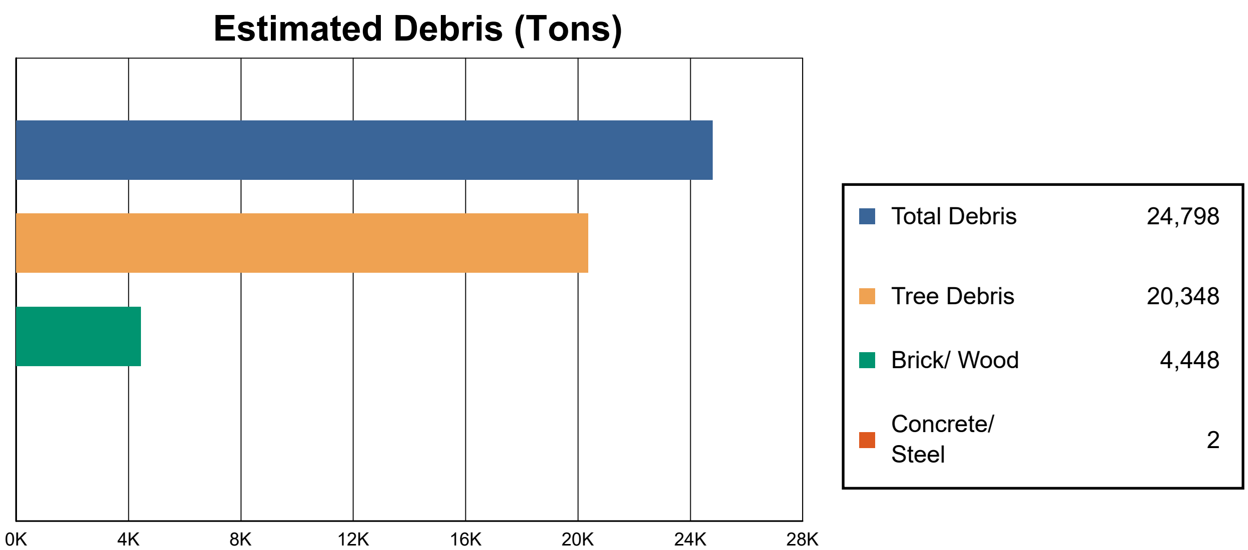
## Thematic Map of Essential Facilities

**Table 4: Expected Damage to Essential Facilities**

| Classification | Total | # Facilities<br>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 | 5 | 0 | 0 | 5 |
| Hospitals | 3 | 0 | 0 | 3 |
| Police Stations | 2 | 0 | 0 | 2 |
| Schools | 16 | 0 | 0 | 16 |

## Induced Hurricane Damage

### Debris Generation

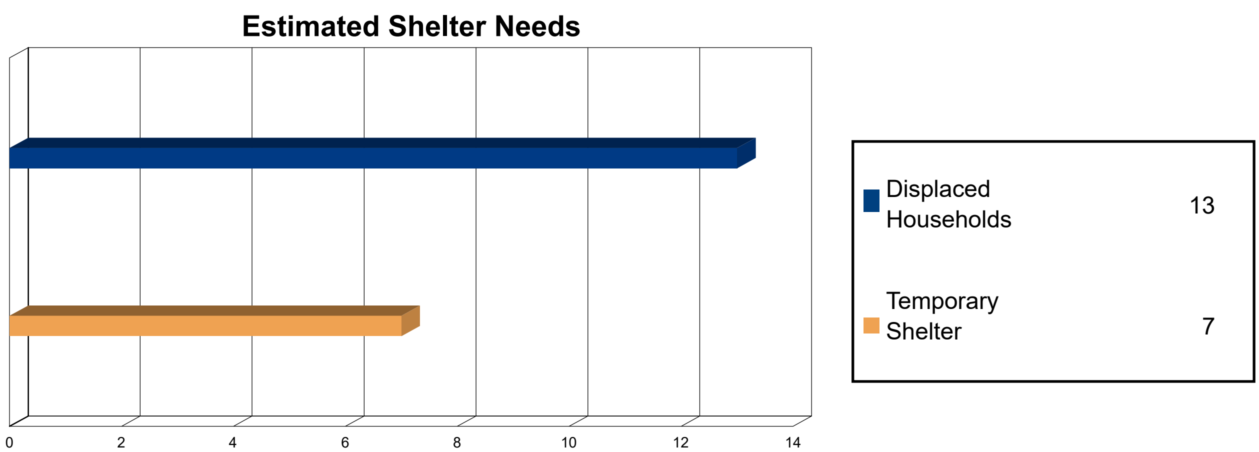



Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 24,798 tons of debris will be generated. Of the total amount, 12,891 tons (52%) is Other Tree Debris. Of the remaining 11,907 tons, Brick/Wood comprises 37% 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 178 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 7,457 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 13 households to be displaced due to the hurricane. Of these, 7 people (out of a total population of 43,927) will seek temporary shelter in public shelters.

# Economic Loss

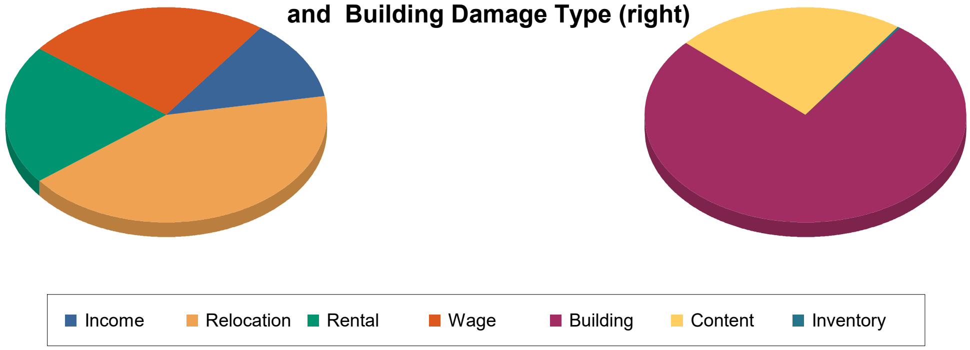
The total economic loss estimated for the hurricane is 59.7 million dollars, which represents 0.71 % of the total replacement value of the region's buildings.

## 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 60 million dollars. 7% 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 79% 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**

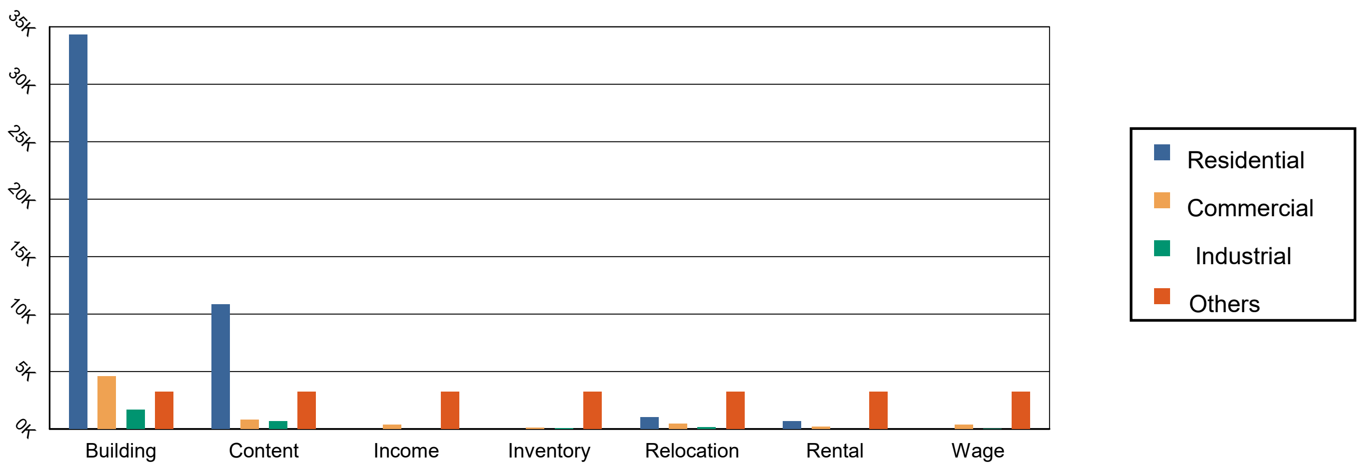



**Table 5: Building-Related Economic Loss Estimates**

(Thousands of dollars)

| Category | Area | Residential | Commercial | Industrial | Others | Total |
|---|---|---|---|---|---|---|
| Property Damage | | | | | | |
| | Building | 34,326.97 | 4,583.03 | 1,666.44 | 1,801.56 | 42,378.00 |
| | Content | 10,826.38 | 822.16 | 668.77 | 378.36 | 12,695.67 |
| | Inventory | 0.00 | 107.70 | 84.13 | 13.92 | 205.75 |
| | **Subtotal** | **45,153.34** | **5,512.89** | **2,419.34** | **2,193.84** | **55,279.42** |
| Business Interruption Loss | | | | | | |
| | Income | 0.00 | 355.76 | 17.60 | 159.32 | 532.68 |
| | Relocation | 1,009.68 | 463.08 | 139.97 | 242.51 | 1,855.24 |
| | Rental | 701.15 | 187.10 | 15.14 | 13.56 | 916.95 |
| | Wage | 0.00 | 393.02 | 28.86 | 654.82 | 1,076.70 |
| | **Subtotal** | **1,710.83** | **1,398.96** | **201.57** | **1,070.20** | **4,381.57** |

<u>Total</u>

| | | | | | |
|---|---|---|---|---|---|
| **Total** | **46,864.17** | **6,911.85** | **2,620.91** | **3,264.04** | **59,660.98** |

## 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 | 43,927 | 4,824,961 | 3,592,366 | 8,417,327 |
| **Total** | **43,927** | **4,824,961** | **3,592,366** | **8,417,327** |
| **Study Region Total** | **43,927** | **4,824,961** | **3,592,366** | **8,417,327** |

# Hazus: Hurricane Global Risk Report

**Region Name:** PittsfieldWind

**Hurricane Scenario:** Probabilistic  1000-year Return Period

**Print Date:** Tuesday, September 17, 2024

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*Totals only reflect data for those census tracts/blocks included in the user's study region.*

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HAZUS™ FEMA

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## General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 40.54 square miles and contains 11 census tracts. There are over 19 thousand households in the region and a total population of 43,927 people. The distribution of population by State and County is provided in Appendix B.

There are an estimated 15 thousand buildings in the region with a total building replacement value (excluding contents) of 8,417 million dollars. Approximately 87% of the buildings (and 57% of the building value) are associated with residential housing.

# Building Inventory

## General Building Stock

Hazus estimates that there are 15,959 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.

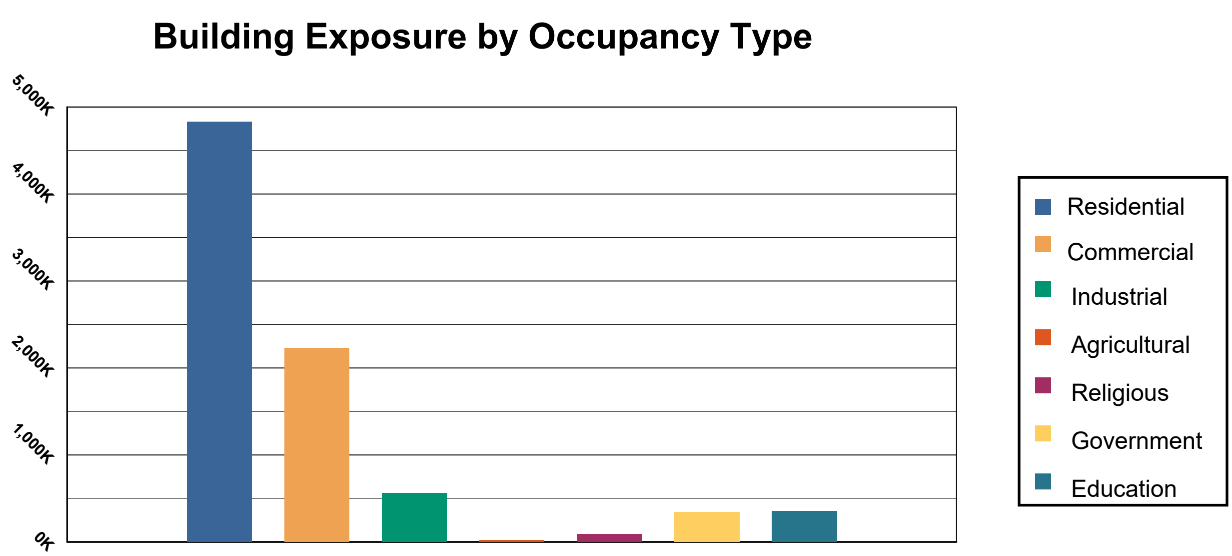



**Table 1: Building Exposure by Occupancy Type**

| Occupancy | Exposure ($1000) | Percent of Tot |
|---|---|---|
| Residential | 4,824,961 | 57.32% |
| Commercial | 2,227,760 | 26.47% |
| Industrial | 559,746 | 6.65% |
| Agricultural | 16,552 | 0.20% |
| Religious | 90,516 | 1.08% |
| Government | 341,238 | 4.05% |
| Education | 356,554 | 4.24% |
| **Total** | **8,417,327** | **100.00%** |

## Essential Facility Inventory

For essential facilities, there are 3 hospitals in the region with a total bed capacity of 298 beds. There are 16 schools, 5 fire stations, 2 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 312 buildings will be at least moderately damaged. This is over 2% of the total number of buildings in the region. There are an estimated 8 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

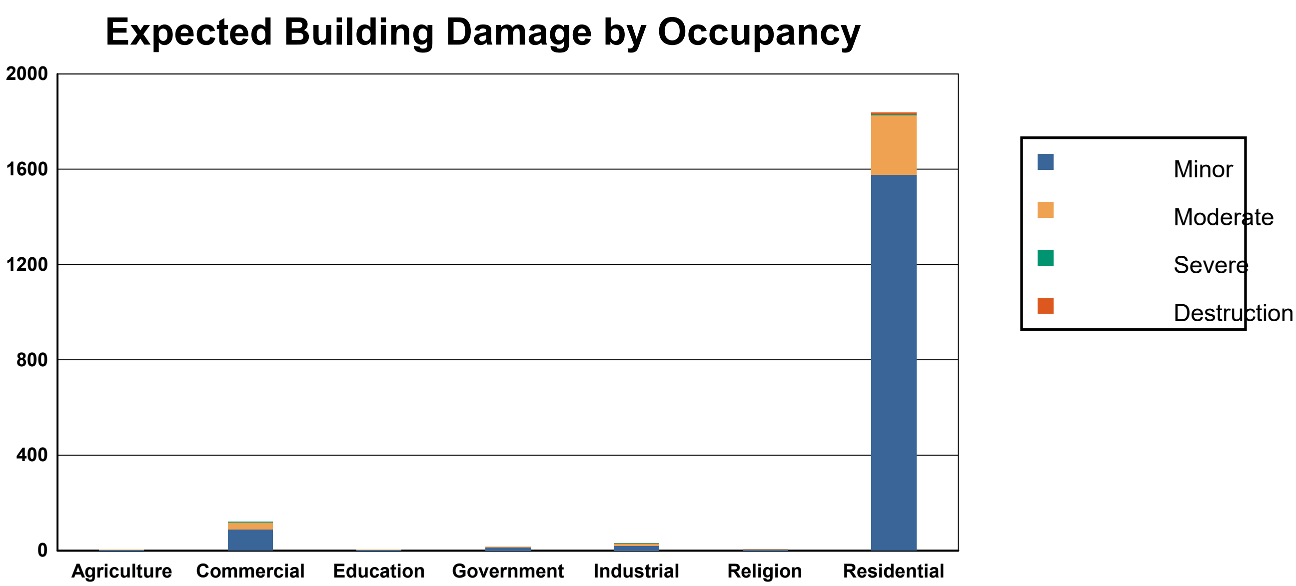



**Table 2: Expected Building Damage by Occupancy : 1000 - year Event**

| | None | | Minor | | Moderate | | Severe | | Destruction | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Occupancy** | **Count** | **(%)** | **Count** | **(%)** | **Count** | **(%)** | **Count** | **(%)** | **Count** | **(%)** |
| Agriculture | 35 | 91.40 | 2 | 5.35 | 1 | 2.20 | 0 | 0.99 | 0 | 0.06 |
| Commercial | 1,309 | 91.53 | 90 | 6.27 | 29 | 2.05 | 2 | 0.15 | 0 | 0.00 |
| Education | 26 | 86.62 | 3 | 8.72 | 1 | 4.64 | 0 | 0.03 | 0 | 0.00 |
| Government | 168 | 91.54 | 12 | 6.72 | 3 | 1.69 | 0 | 0.04 | 0 | 0.00 |
| Industrial | 278 | 89.66 | 19 | 6.28 | 10 | 3.36 | 2 | 0.69 | 0 | 0.01 |
| Religion | 82 | 93.39 | 5 | 5.51 | 1 | 1.03 | 0 | 0.07 | 0 | 0.00 |
| Residential | 12,041 | 86.75 | 1,578 | 11.37 | 249 | 1.79 | 4 | 0.03 | 8 | 0.06 |
| **Total** | **13,938** | | **1,709** | | **295** | | **8** | | **8** | |

### Table 3: Expected Building Damage by Building Type : 1000 - year Event

| Building Type | None | | Minor | | Moderate | | Severe | | Destruction | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Count | (%) | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| Concrete | 47 | 92.13 | 4 | 6.89 | 0 | 0.95 | 0 | 0.02 | 0 | 0.00 |
| Masonry | 1,184 | 91.20 | 95 | 7.31 | 17 | 1.34 | 2 | 0.14 | 0 | 0.02 |
| MH | 53 | 97.10 | 1 | 1.97 | 0 | 0.67 | 0 | 0.01 | 0 | 0.26 |
| Steel | 672 | 77.84 | 105 | 12.18 | 82 | 9.52 | 4 | 0.46 | 0 | 0.00 |
| Wood | 12,216 | 89.27 | 1,335 | 9.75 | 122 | 0.89 | 5 | 0.04 | 7 | 0.05 |

## Essential Facility Damage

Before the hurricane, the region had 298 hospital beds available for use. On the day of the hurricane, the model estimates that 298 hospital beds (100%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, 100% of the beds will be in service. By 30 days, 100% will be operational.

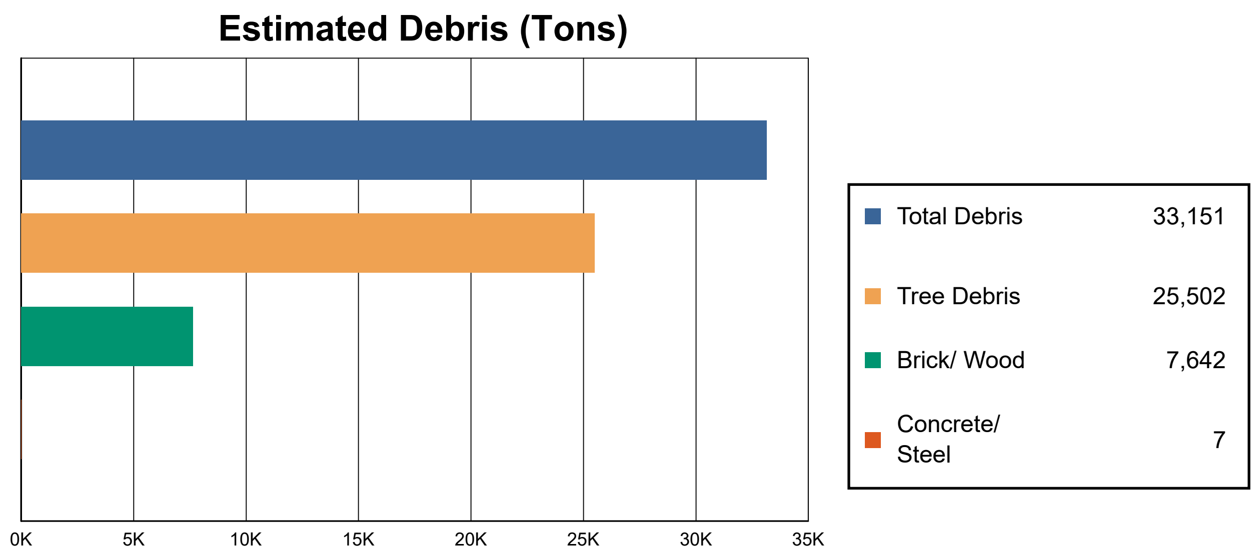
**Thematic Map of Essential Facilities**

**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 | 5 | 0 | 0 | 5 |
| Hospitals | 3 | 0 | 0 | 3 |
| Police Stations | 2 | 0 | 0 | 2 |
| Schools | 16 | 0 | 0 | 16 |

## Induced Hurricane Damage

### Debris Generation

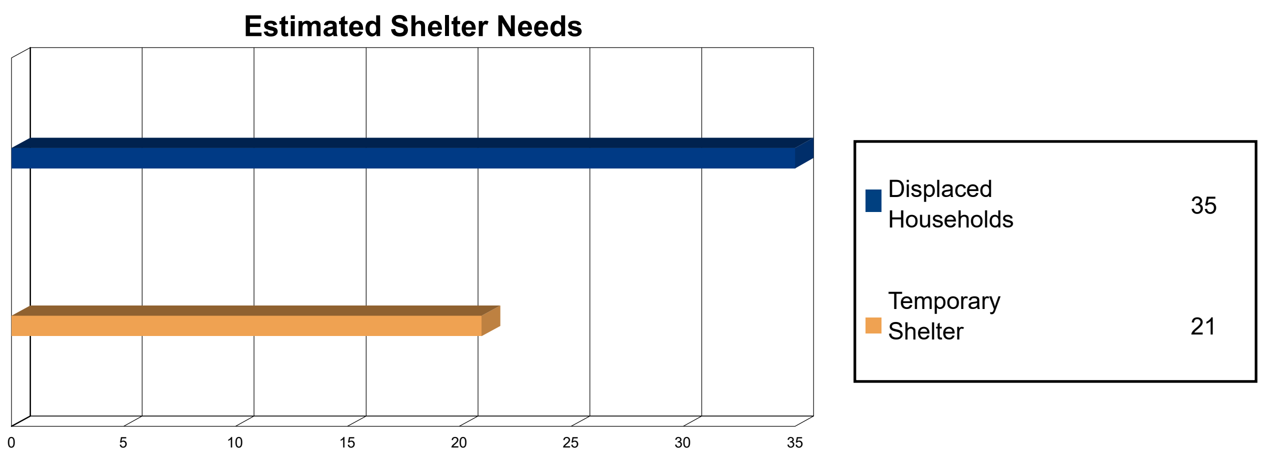



Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 33,151 tons of debris will be generated. Of the total amount, 16,102 tons (49%) is Other Tree Debris. Of the remaining 17,049 tons, Brick/Wood comprises 45% 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 306 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 9,400 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 35 households to be displaced due to the hurricane. Of these, 21 people (out of a total population of 43,927) will seek temporary shelter in public shelters.

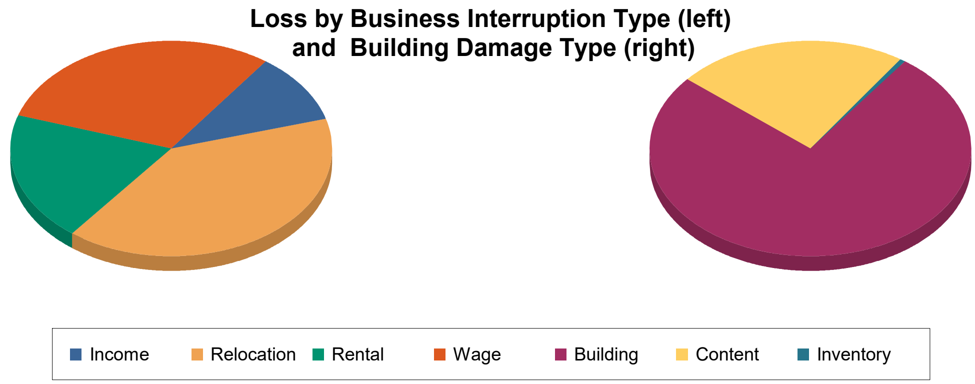
## Economic Loss

The total economic loss estimated for the hurricane is 100.6 million dollars, which represents 1.20 % 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 101 million dollars. 10% 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.



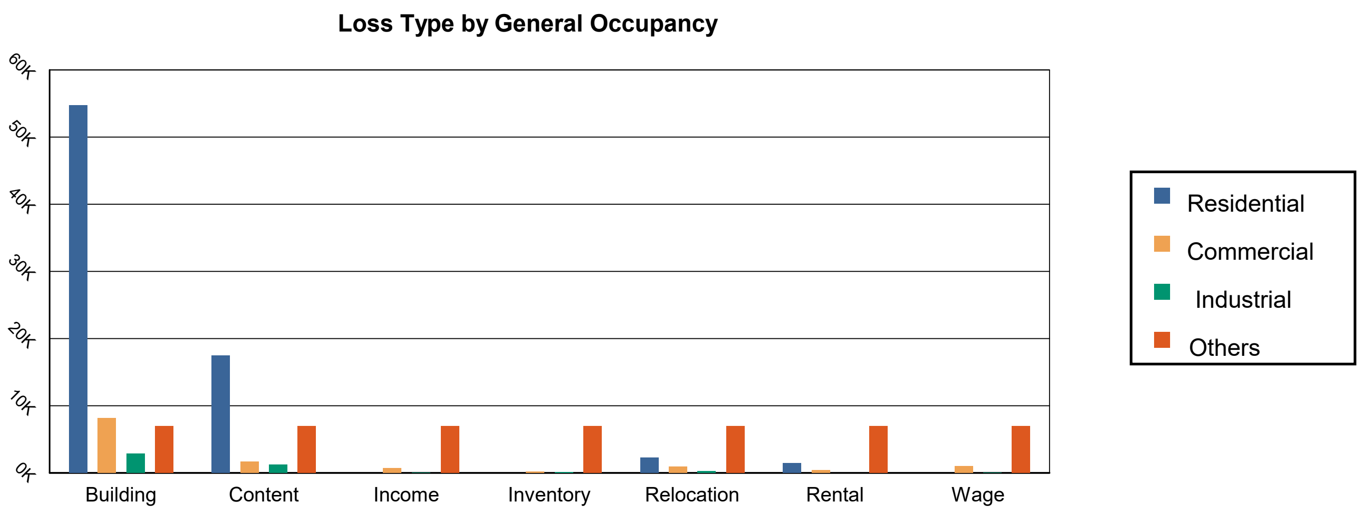




**Table 5: Building-Related Economic Loss Estimates**

(Thousands of dollars)

| Category | Area | Residential | Commercial | Industrial | Others | Total |
|---|---|---|---|---|---|---|
| Property Damage | | | | | | |
| | Building | 54,749.74 | 8,187.05 | 2,853.89 | 3,275.46 | 69,066.14 |
| | Content | 17,469.08 | 1,665.64 | 1,263.04 | 780.37 | 21,178.13 |
| | Inventory | 0.00 | 197.39 | 160.46 | 34.06 | 391.91 |
| | **Subtotal** | **72,218.82** | **10,050.08** | **4,277.40** | **4,089.89** | **90,636.18** |
| Business Interruption Loss | | | | | | |
| | Income | 0.00 | 721.24 | 34.69 | 294.75 | 1,050.67 |
| | Relocation | 2,239.05 | 956.41 | 248.96 | 552.44 | 3,996.87 |
| | Rental | 1,443.71 | 403.54 | 30.09 | 57.01 | 1,934.35 |
| | Wage | 0.00 | 983.07 | 57.16 | 1,965.95 | 3,006.17 |
| | **Subtotal** | **3,682.76** | **3,064.26** | **370.90** | **2,870.14** | **9,988.07** |

Total

| | | | | | |
|---|---|---|---|---|---|
| Total | 75,901.58 | 13,114.34 | 4,648.29 | 6,960.03 | 100,624.25 |

## 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 | 43,927 | 4,824,961 | 3,592,366 | 8,417,327 |
| **Total** | **43,927** | **4,824,961** | **3,592,366** | **8,417,327** |
| **Study Region Total** | **43,927** | **4,824,961** | **3,592,366** | **8,417,327** |

# Hazus: Earthquake Global Risk Report

**Region Name:** PittsfieldEarthqua

**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.*

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Appendix A: County Listing for the Region

Appendix B: Regional Population and Building Value Data

## General Description of the Region

Hazus-MH is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 42.55 square miles and contains 11 census tracts. There are over 19 thousand households in the region which has a total population of 43,927 peopleF. The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 15 thousand buildings in the region with a total building replacement value (excluding contents) of 8,417 (millions of dollars). Approximately 87.00 % of the buildings (and 57.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 1,893 and 851 (millions of dollars) , respectively.

# Building and Lifeline Inventory

## Building Inventory

Hazus estimates that there are 15 thousand buildings in the region which have an aggregate total replacement value of 8,417 (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 86% 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 3 hospitals in the region with a total bed capacity of 298 beds. There are 16 schools, 5 fire stations, 2 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 2,744.00 (millions of dollars). This inventory includes over 61.52 miles of highways, 48 bridges, 525.06 miles of pipes.

Table 1: Transportation System Lifeline Inventory

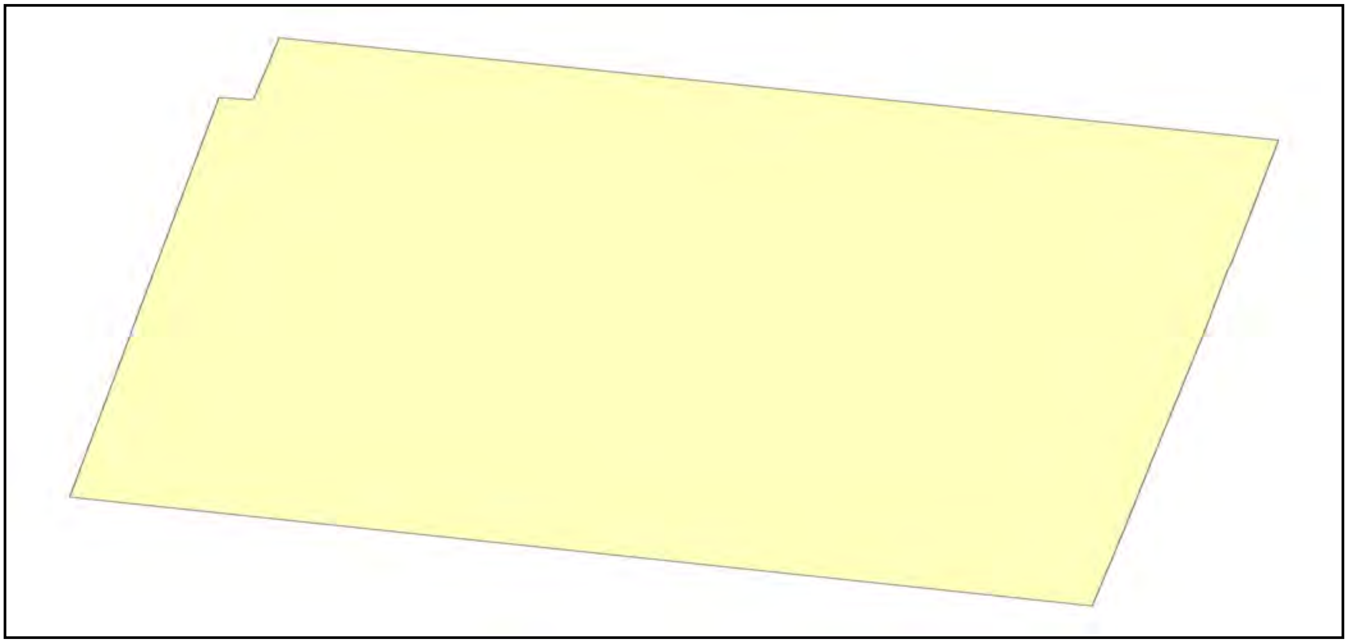
| System | Component | # Locations/ # Segments | Replacement value (millions of dollars) |
|---|---|---|---|
| **Highway** | Bridges | 48 | 65.4675 |
| | Segments | 34 | 437.2478 |
| | Tunnels | 0 | 0.0000 |
| | | Subtotal | **502.7153** |
| **Railways** | Bridges | 9 | 46.7100 |
| | Facilities | 1 | 2.6630 |
| | Segments | 13 | 1323.2391 |
| | Tunnels | 0 | 0.0000 |
| | | Subtotal | **1372.6121** |
| **Light Rail** | Bridges | 0 | 0.0000 |
| | Facilities | 0 | 0.0000 |
| | Segments | 0 | 0.0000 |
| | Tunnels | 0 | 0.0000 |
| | | Subtotal | **0.0000** |
| **Bus** | Facilities | 0 | 0.0000 |
| | | Subtotal | **0.0000** |
| **Ferry** | Facilities | 0 | 0.0000 |
| | | Subtotal | **0.0000** |
| **Port** | Facilities | 0 | 0.0000 |
| | | Subtotal | **0.0000** |
| **Airport** | Facilities | 1 | 5.3000 |
| | Runways | 2 | 12.7109 |
| | | Subtotal | **18.0109** |
| | | Total | **1,893.30** |

Table 2: Utility System Lifeline Inventory

| System | Component | # Locations / Segments | Replacement value (millions of dollars) |
|---|---|---|---|
| **Potable Water** | Distribution Lines | NA | 9.8340 |
| | Facilities | 0 | 0.0000 |
| | Pipelines | 0 | 0.0000 |
| | | Subtotal | **9.8340** |
| **Waste Water** | Distribution Lines | NA | 5.9004 |
| | Facilities | 1 | 156.8418 |
| | Pipelines | 0 | 0.0000 |
| | | Subtotal | **162.7422** |
| **Natural Gas** | Distribution Lines | NA | 3.9336 |
| | Facilities | 0 | 0.0000 |
| | Pipelines | 3 | 370.0320 |
| | | Subtotal | **373.9656** |
| **Oil Systems** | Facilities | 0 | 0.0000 |
| | Pipelines | 0 | 0.0000 |
| | | Subtotal | **0.0000** |
| **Electrical Power** | Facilities | 3 | 303.7871 |
| | | Subtotal | **303.7871** |
| **Communication** | Facilities | 7 | 0.8120 |
| | | Subtotal | **0.8120** |
| | | Total | **851.10** |

## 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 174 buildings will be at least moderately damaged. This is over 1.00 % of the buildings in the region. There are an estimated 1 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

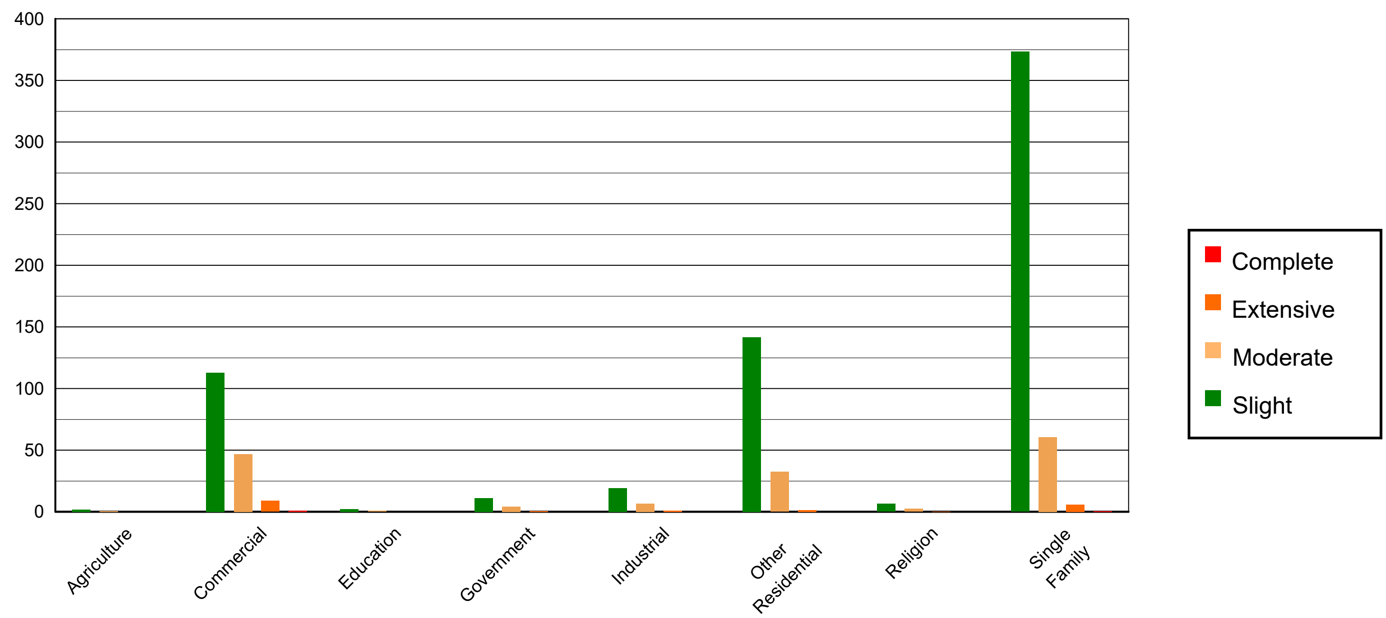



**Table 3: Expected Building Damage by Occupancy**

| | None | | Slight | | Moderate | | Extensive | | Complete | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Count | (%) | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| **Agriculture** | 35.72 | 0.24 | 1.73 | 0.26 | 0.48 | 0.31 | 0.06 | 0.34 | 0.01 | 0.37 |
| **Commercial** | 1260.79 | 8.34 | 112.70 | 16.86 | 46.75 | 30.24 | 8.76 | 48.46 | 1.01 | 53.72 |
| **Education** | 26.88 | 0.18 | 2.08 | 0.31 | 0.88 | 0.57 | 0.14 | 0.78 | 0.01 | 0.78 |
| **Government** | 167.05 | 1.11 | 11.06 | 1.65 | 4.22 | 2.73 | 0.62 | 3.45 | 0.06 | 2.96 |
| **Industrial** | 282.79 | 1.87 | 19.17 | 2.87 | 6.84 | 4.42 | 1.10 | 6.06 | 0.10 | 5.47 |
| **Other Residential** | 2769.50 | 18.32 | 141.79 | 21.21 | 32.36 | 20.94 | 1.28 | 7.07 | 0.07 | 3.91 |
| **Religion** | 78.66 | 0.52 | 6.55 | 0.98 | 2.32 | 1.50 | 0.42 | 2.33 | 0.05 | 2.72 |
| **Single Family** | 10494.74 | 69.43 | 373.27 | 55.85 | 60.73 | 39.29 | 5.70 | 31.50 | 0.56 | 30.08 |
| **Total** | **15,116** | | **668** | | **155** | | **18** | | **2** | |

Table 4: Expected Building Damage by Building Type (All Design Levels)

| | None | | Slight | | Moderate | | Extensive | | Complete | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Count | (%) | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| **Wood** | 13166.19 | 87.10 | 464.00 | 69.43 | 53.83 | 34.82 | 1.46 | 8.09 | 0.00 | 0.00 |
| **Steel** | 787.01 | 5.21 | 54.79 | 8.20 | 24.88 | 16.09 | 1.59 | 8.78 | 0.06 | 3.01 |
| **Concrete** | 31.25 | 0.21 | 2.10 | 0.31 | 0.83 | 0.54 | 0.05 | 0.30 | 0.00 | 0.03 |
| **Precast** | 14.54 | 0.10 | 1.09 | 0.16 | 0.80 | 0.52 | 0.18 | 0.97 | 0.00 | 0.07 |
| **RM** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **URM** | 1071.20 | 7.09 | 140.11 | 20.96 | 71.49 | 46.25 | 14.74 | 81.52 | 1.81 | 96.90 |
| **MH** | 45.95 | 0.30 | 6.25 | 0.93 | 2.74 | 1.78 | 0.06 | 0.33 | 0.00 | 0.00 |
| **Total** | **15,116** | | **668** | | **155** | | **18** | | **2** | |

*Note:
RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

## Essential Facility Damage

Before the earthquake, the region had 298 hospital beds available for use. On the day of the earthquake, the model estimates that only 233 hospital beds (78.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 91.00% of the beds will be back in service. By 30 days, 98.00% will be operational.

**Table 5: Expected Damage to Essential Facilities**

| Classification | Total | # Facilities | | |
|---|---|---|---|---|
| | | At Least Moderate Damage > 50% | Complete Damage > 50% | With Functionality > 50% on day 1 |
| Hospitals | 3 | 0 | 0 | 3 |
| Schools | 16 | 0 | 0 | 16 |
| EOCs | 1 | 0 | 0 | 1 |
| PoliceStations | 2 | 0 | 0 | 2 |
| FireStations | 5 | 0 | 0 | 5 |

## Transportation Lifeline Damage

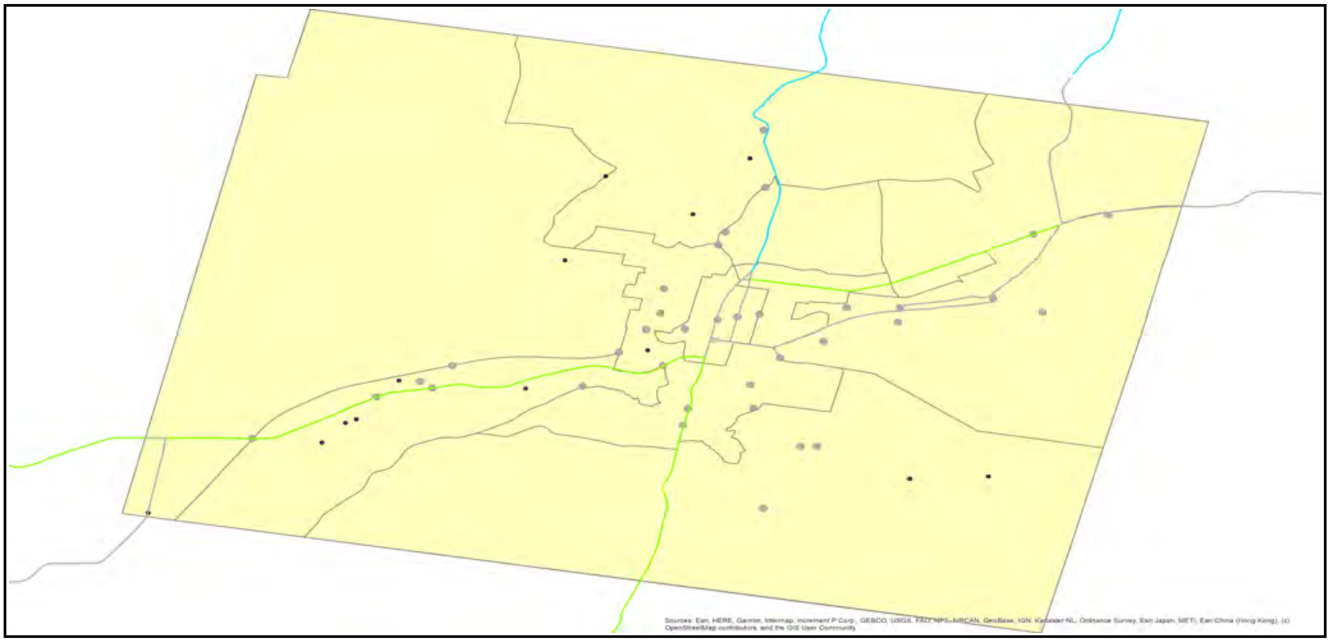


**Table 6: Expected Damage to the Transportation Systems**

| 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 | 34 | 0 | 0 | 34 | 34 |
| | Bridges | 48 | 0 | 0 | 48 | 48 |
| | Tunnels | 0 | 0 | 0 | 0 | 0 |
| **Railways** | Segments | 13 | 0 | 0 | 12 | 12 |
| | Bridges | 9 | 0 | 0 | 9 | 9 |
| | Tunnels | 0 | 0 | 0 | 0 | 0 |
| | Facilities | 1 | 0 | 0 | 1 | 1 |
| **Light Rail** | Segments | 0 | 0 | 0 | 0 | 0 |
| | Bridges | 0 | 0 | 0 | 0 | 0 |
| | Tunnels | 0 | 0 | 0 | 0 | 0 |
| | Facilities | 0 | 0 | 0 | 0 | 0 |
| **Bus** | Facilities | 0 | 0 | 0 | 0 | 0 |
| **Ferry** | Facilities | 0 | 0 | 0 | 0 | 0 |
| **Port** | Facilities | 0 | 0 | 0 | 0 | 0 |
| **Airport** | Facilities | 1 | 0 | 0 | 1 | 1 |
| | Runways | 2 | 0 | 0 | 2 | 2 |

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 | 3 | 0 | 0 | 3 | 3 |
| Communication | 7 | 0 | 0 | 7 | 7 |

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

| System | Total Pipelines Length (miles) | Number of Leaks | Number of Breaks |
|---|---|---|---|
| Potable Water | 306 | 2 | 0 |
| Waste Water | 183 | 1 | 0 |
| Natural Gas | 37 | 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 | 19,716 | 0 | 0 | 0 | 0 | 0 |
| Electric Power | | 0 | 0 | 0 | 0 | 0 |

## Induced Earthquake Damage

### Fire Following Earthquake

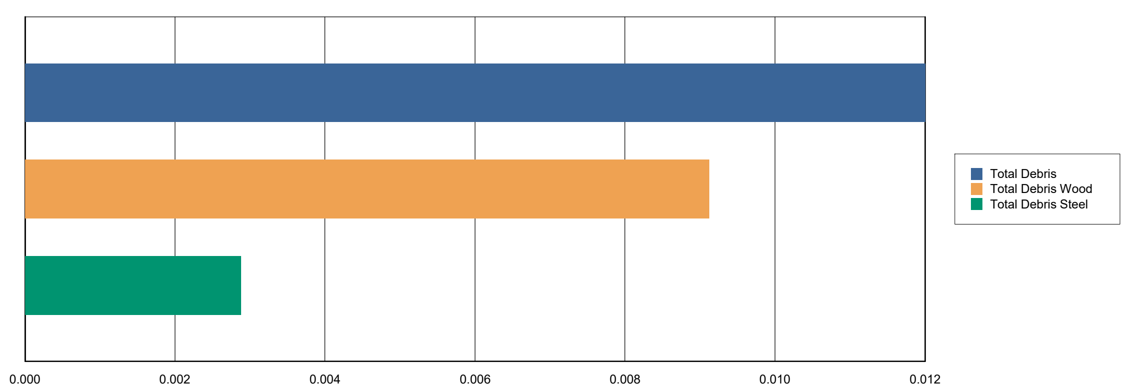
Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there 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 12,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 76.00% 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 480 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

**Earthquake Debris (millions of tons)**



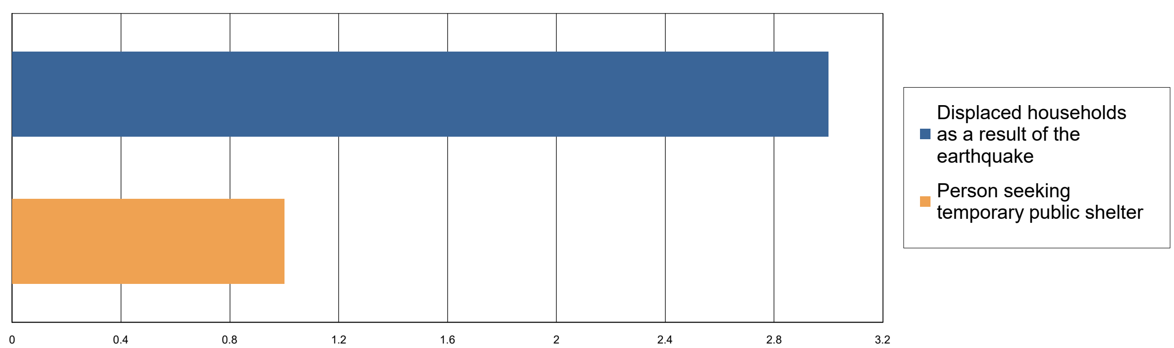

| Brick/ Wood | Reinforced Concrete/Steel | Total Debris | Truck Load |
|---|---|---|---|
| 0.01 | 0.00 | 0.01 | 480 (@25 tons/truck) |

## 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 3 households to be displaced due to the earthquake. Of these, 1 people (out of a total population of 43,927) 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 |
|---|---|
| 3 | 1 |

### Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

**Table 10: Casualty Estimates**

| | | Level 1 | Level 2 | Level 3 | Level 4 |
|---|---|---|---|---|---|
| **2 AM** | Commercial | 0.16 | 0.02 | 0.00 | 0.00 |
| | Commuting | 0.00 | 0.00 | 0.00 | 0.00 |
| | Educational | 0.00 | 0.00 | 0.00 | 0.00 |
| | Hotels | 0.01 | 0.00 | 0.00 | 0.00 |
| | Industrial | 0.09 | 0.01 | 0.00 | 0.00 |
| | Other-Residential | 1.02 | 0.08 | 0.00 | 0.01 |
| | Single Family | 1.21 | 0.12 | 0.01 | 0.02 |
| | **Total** | **2** | **0** | **0** | **0** |
| **2 PM** | Commercial | 9.42 | 1.45 | 0.15 | 0.28 |
| | Commuting | 0.00 | 0.00 | 0.00 | 0.00 |
| | Educational | 1.29 | 0.18 | 0.02 | 0.03 |
| | Hotels | 0.00 | 0.00 | 0.00 | 0.00 |
| | Industrial | 0.67 | 0.09 | 0.01 | 0.02 |
| | Other-Residential | 0.32 | 0.03 | 0.00 | 0.00 |
| | Single Family | 0.37 | 0.04 | 0.00 | 0.01 |
| | **Total** | **12** | **2** | **0** | **0** |
| **5 PM** | Commercial | 5.91 | 0.92 | 0.09 | 0.17 |
| | Commuting | 0.00 | 0.00 | 0.00 | 0.00 |
| | Educational | 0.15 | 0.02 | 0.00 | 0.00 |
| | Hotels | 0.00 | 0.00 | 0.00 | 0.00 |
| | Industrial | 0.42 | 0.06 | 0.01 | 0.01 |
| | Other-Residential | 0.38 | 0.03 | 0.00 | 0.00 |
| | Single Family | 0.46 | 0.05 | 0.00 | 0.01 |
| | **Total** | **7** | **1** | **0** | **0** |

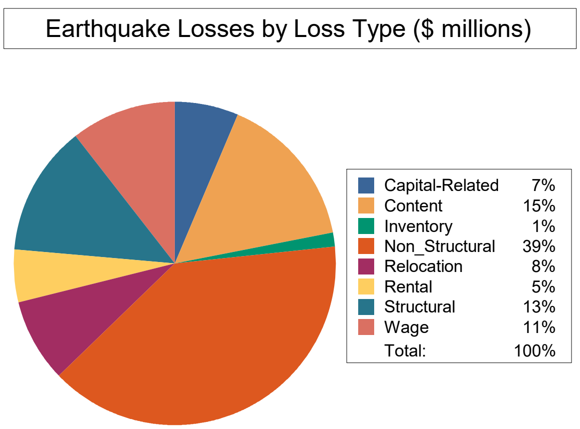
## Economic Loss

The total economic loss estimated for the earthquake is 61.78 (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 51.67 (millions of dollars); 31 % 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 30 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.



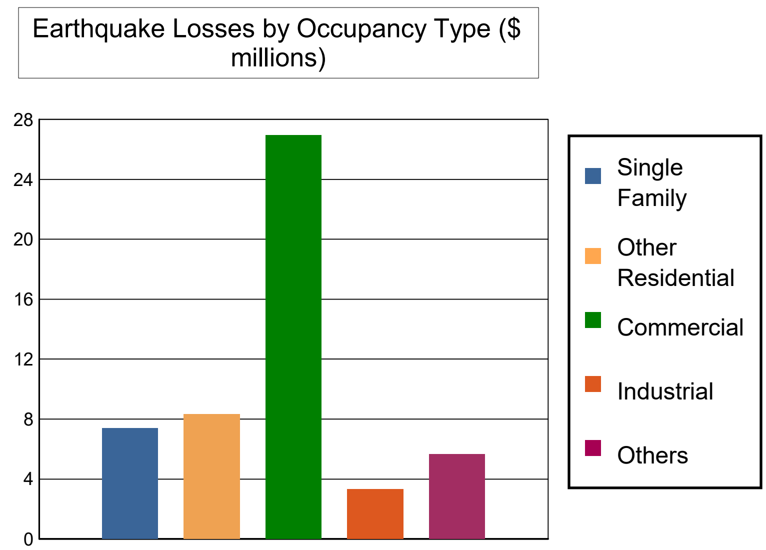




**Table 11: Building-Related Economic Loss Estimates**

(Millions of dollars)

| Category | Area | Single Family | Other Residential | Commercial | Industrial | Others | Total |
|---|---|---|---|---|---|---|---|
| **Income Losses** | | | | | | | |
| | Wage | 0.0000 | 0.3572 | 4.5811 | 0.0596 | 0.4565 | 5.4544 |
| | Capital-Related | 0.0000 | 0.1518 | 3.1289 | 0.0353 | 0.0442 | 3.3602 |
| | Rental | 0.1397 | 0.6401 | 1.7032 | 0.0363 | 0.1414 | 2.6607 |
| | Relocation | 0.4705 | 0.3055 | 2.6082 | 0.1974 | 0.7845 | 4.3661 |
| | **Subtotal** | **0.6102** | **1.4546** | **12.0214** | **0.3286** | **1.4266** | **15.8414** |
| **Capital Stock Losses** | | | | | | | |
| | Structural | 1.1000 | 0.7552 | 3.5256 | 0.5101 | 0.8936 | 6.7845 |
| | Non_Structural | 4.4116 | 4.8900 | 7.3558 | 1.4207 | 2.2680 | 20.3461 |
| | Content | 1.2863 | 1.2387 | 3.4979 | 0.9300 | 1.0480 | 8.0009 |
| | Inventory | 0.0000 | 0.0000 | 0.5321 | 0.1457 | 0.0197 | 0.6975 |
| | **Subtotal** | **6.7979** | **6.8839** | **14.9114** | **3.0065** | **4.2293** | **35.8290** |
| | **Total** | **7.41** | **8.34** | **26.93** | **3.34** | **5.66** | **51.67** |

## 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 | 437.2478 | 0.0000 | 0.00 |
| | Bridges | 65.4675 | 0.0000 | 0.00 |
| | Tunnels | 0.0000 | 0.0000 | 0.00 |
| | Subtotal | **502.7153** | **0.0000** | |
| **Railways** | Segments | 1323.2391 | 0.0000 | 0.00 |
| | Bridges | 46.7100 | 0.0000 | 0.00 |
| | Tunnels | 0.0000 | 0.0000 | 0.00 |
| | Facilities | 2.6630 | 0.1017 | 3.82 |
| | Subtotal | **1372.6121** | **0.1017** | |
| **Light Rail** | Segments | 0.0000 | 0.0000 | 0.00 |
| | Bridges | 0.0000 | 0.0000 | 0.00 |
| | Tunnels | 0.0000 | 0.0000 | 0.00 |
| | Facilities | 0.0000 | 0.0000 | 0.00 |
| | Subtotal | **0.0000** | **0.0000** | |
| **Bus** | Facilities | 0.0000 | 0.0000 | 0.00 |
| | Subtotal | **0.0000** | **0.0000** | |
| **Ferry** | Facilities | 0.0000 | 0.0000 | 0.00 |
| | Subtotal | **0.0000** | **0.0000** | |
| **Port** | Facilities | 0.0000 | 0.0000 | 0.00 |
| | Subtotal | **0.0000** | **0.0000** | |
| **Airport** | Facilities | 5.3000 | 0.1863 | 3.52 |
| | Runways | 12.7109 | 0.0000 | 0.00 |
| | Subtotal | **18.0109** | **0.1863** | |
| | **Total** | **1,893.34** | **0.29** | |

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 | 9.8340 | 0.0072 | 0.07 |
| | **Subtotal** | **9.8340** | **0.0072** | |
| **Waste Water** | Pipelines | 0.0000 | 0.0000 | 0.00 |
| | Facilities | 156.8418 | 0.8234 | 0.52 |
| | Distribution Lines | 5.9004 | 0.0036 | 0.06 |
| | **Subtotal** | **162.7422** | **0.8270** | |
| **Natural Gas** | Pipelines | 370.0320 | 0.0000 | 0.00 |
| | Facilities | 0.0000 | 0.0000 | 0.00 |
| | Distribution Lines | 3.9336 | 0.0012 | 0.03 |
| | **Subtotal** | **373.9656** | **0.0012** | |
| **Oil Systems** | Pipelines | 0.0000 | 0.0000 | 0.00 |
| | Facilities | 0.0000 | 0.0000 | 0.00 |
| | **Subtotal** | **0.0000** | **0.0000** | |
| **Electrical Power** | Facilities | 303.7871 | 8.9685 | 2.95 |
| | **Subtotal** | **303.7871** | **8.9685** | |
| **Communication** | Facilities | 0.8120 | 0.0118 | 1.45 |
| | **Subtotal** | **0.8120** | **0.0118** | |
| | **Total** | **851.14** | **9.82** | |

## 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 | 43,927 | 4,824 | 3,592 | 8,417 |
| **Total Region** | | **43,927** | **4,824** | **3,592** | **8,417** |

# Hazus: Earthquake Global Risk Report

**Region Name:** PittsfieldEarthqua

**Earthquake Scenario:** 2500year

**Print Date:** September 18, 2024

HAZUS™ FEMA

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Appendix A: County Listing for the Region

Appendix B: Regional Population and Building Value Data

## General Description of the Region

Hazus-MH is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 42.55 square miles and contains 11 census tracts. There are over 19 thousand households in the region which has a total population of 43,927 peopleF. The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 15 thousand buildings in the region with a total building replacement value (excluding contents) of 8,417 (millions of dollars). Approximately 87.00 % of the buildings (and 57.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 1,893 and 851 (millions of dollars) , respectively.

# Building and Lifeline Inventory

## Building Inventory

Hazus estimates that there are 15 thousand buildings in the region which have an aggregate total replacement value of 8,417 (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 86% 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 3 hospitals in the region with a total bed capacity of 298 beds. There are 16 schools, 5 fire stations, 2 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 2,744.00 (millions of dollars). This inventory includes over 61.52 miles of highways, 48 bridges, 525.06 miles of pipes.

Table 1: Transportation System Lifeline Inventory

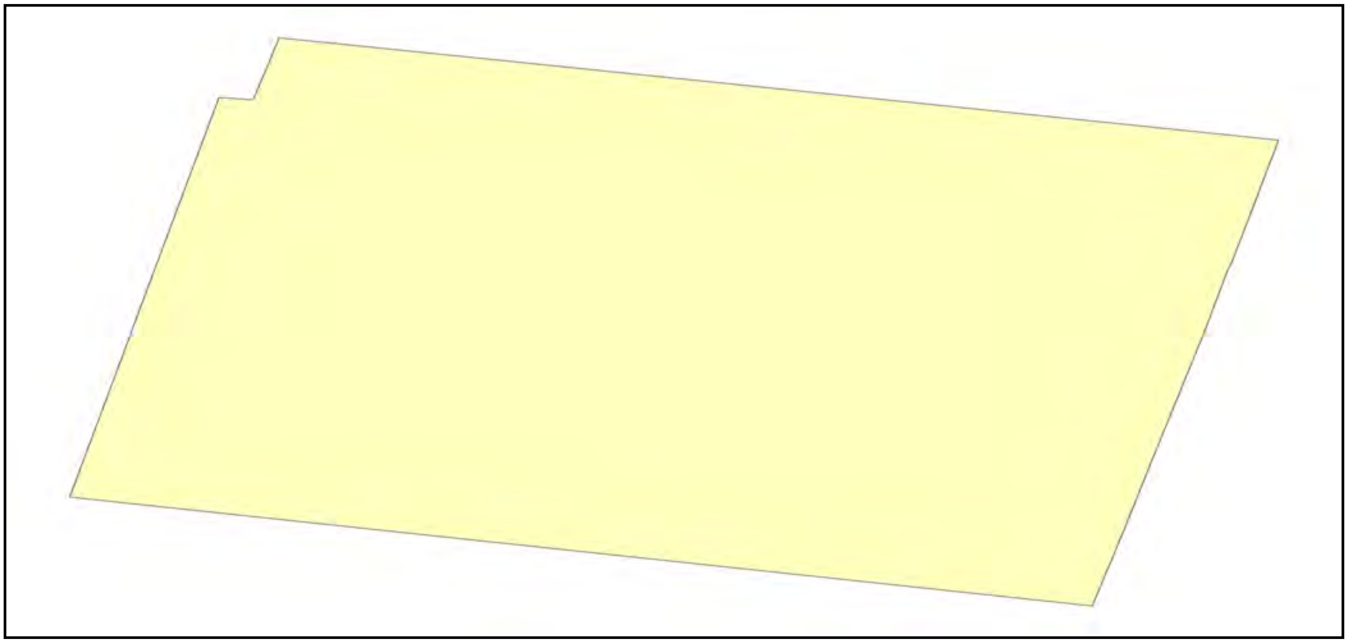
| System | Component | # Locations/ # Segments | Replacement value (millions of dollars) |
|---|---|---|---|
| **Highway** | Bridges | 48 | 65.4675 |
| | Segments | 34 | 437.2478 |
| | Tunnels | 0 | 0.0000 |
| | | Subtotal | **502.7153** |
| **Railways** | Bridges | 9 | 46.7100 |
| | Facilities | 1 | 2.6630 |
| | Segments | 13 | 1323.2391 |
| | Tunnels | 0 | 0.0000 |
| | | Subtotal | **1372.6121** |
| **Light Rail** | Bridges | 0 | 0.0000 |
| | Facilities | 0 | 0.0000 |
| | Segments | 0 | 0.0000 |
| | Tunnels | 0 | 0.0000 |
| | | Subtotal | **0.0000** |
| **Bus** | Facilities | 0 | 0.0000 |
| | | Subtotal | **0.0000** |
| **Ferry** | Facilities | 0 | 0.0000 |
| | | Subtotal | **0.0000** |
| **Port** | Facilities | 0 | 0.0000 |
| | | Subtotal | **0.0000** |
| **Airport** | Facilities | 1 | 5.3000 |
| | Runways | 2 | 12.7109 |
| | | Subtotal | **18.0109** |
| | | Total | **1,893.30** |

**Table 2: Utility System Lifeline Inventory**

| System | Component | # Locations / Segments | Replacement value (millions of dollars) |
|---|---|---|---|
| **Potable Water** | Distribution Lines | NA | 9.8340 |
| | Facilities | 0 | 0.0000 |
| | Pipelines | 0 | 0.0000 |
| | | Subtotal | **9.8340** |
| **Waste Water** | Distribution Lines | NA | 5.9004 |
| | Facilities | 1 | 156.8418 |
| | Pipelines | 0 | 0.0000 |
| | | Subtotal | **162.7422** |
| **Natural Gas** | Distribution Lines | NA | 3.9336 |
| | Facilities | 0 | 0.0000 |
| | Pipelines | 3 | 370.0320 |
| | | Subtotal | **373.9656** |
| **Oil Systems** | Facilities | 0 | 0.0000 |
| | Pipelines | 0 | 0.0000 |
| | | Subtotal | **0.0000** |
| **Electrical Power** | Facilities | 3 | 303.7871 |
| | | Subtotal | **303.7871** |
| **Communication** | Facilities | 7 | 0.8120 |
| | | Subtotal | **0.8120** |
| | | Total | **851.10** |

## 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 310 buildings will be at least moderately damaged. This is over 2.00 % of the buildings in the region. There are an estimated 3 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

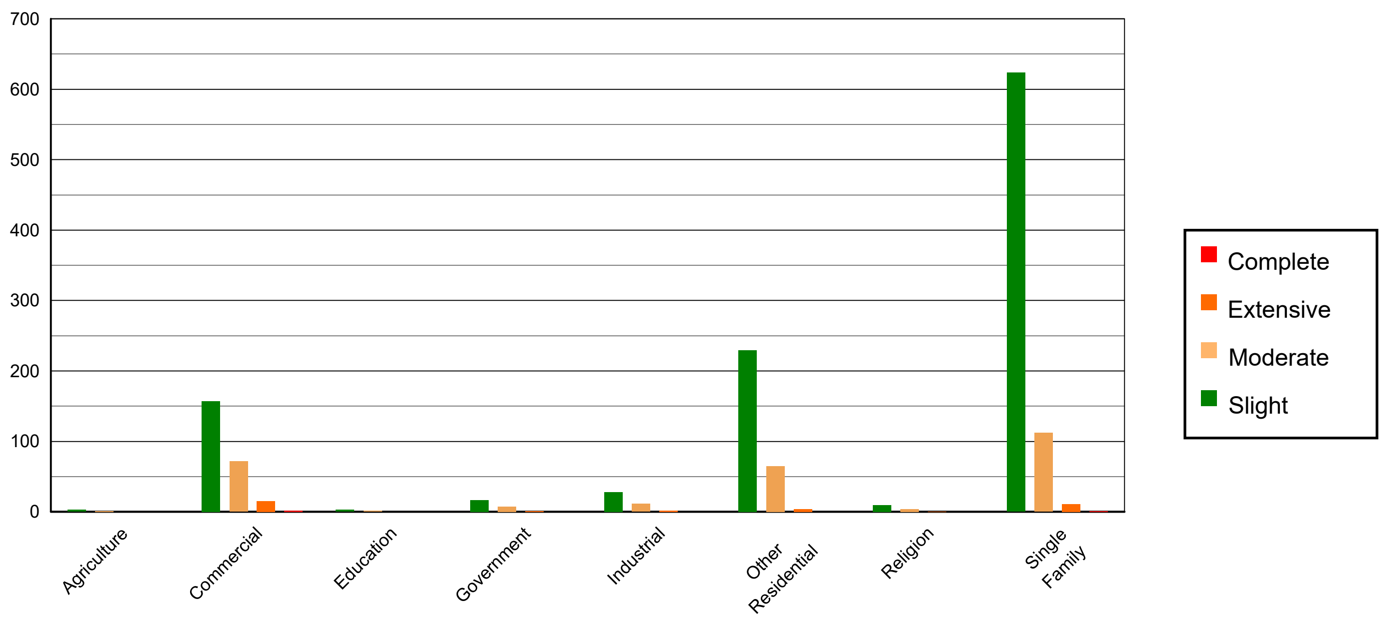



**Table 3: Expected Building Damage by Occupancy**

| | None | | Slight | | Moderate | | Extensive | | Complete | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Count | (%) | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| **Agriculture** | 34.34 | 0.24 | 2.70 | 0.25 | 0.83 | 0.30 | 0.11 | 0.34 | 0.01 | 0.38 |
| **Commercial** | 1184.28 | 8.12 | 157.05 | 14.68 | 71.57 | 26.27 | 15.06 | 44.15 | 2.03 | 51.67 |
| **Education** | 25.34 | 0.17 | 2.96 | 0.28 | 1.43 | 0.52 | 0.25 | 0.72 | 0.03 | 0.79 |
| **Government** | 158.32 | 1.09 | 16.23 | 1.52 | 7.14 | 2.62 | 1.18 | 3.47 | 0.12 | 3.13 |
| **Industrial** | 268.40 | 1.84 | 28.17 | 2.63 | 11.21 | 4.11 | 2.00 | 5.86 | 0.22 | 5.56 |
| **Other Residential** | 2646.74 | 18.15 | 229.60 | 21.47 | 64.70 | 23.75 | 3.68 | 10.79 | 0.28 | 6.99 |
| **Religion** | 74.27 | 0.51 | 9.36 | 0.87 | 3.56 | 1.31 | 0.71 | 2.08 | 0.10 | 2.57 |
| **Single Family** | 10187.15 | 69.88 | 623.59 | 58.30 | 112.00 | 41.11 | 11.12 | 32.60 | 1.14 | 28.91 |
| **Total** | **14,579** | | **1,070** | | **272** | | **34** | | **4** | |

**Table 4: Expected Building Damage by Building Type (All Design Levels)**

| | None | | Slight | | Moderate | | Extensive | | Complete | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Count | (%) | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| **Wood** | 12776.21 | 87.64 | 792.20 | 74.06 | 112.30 | 41.22 | 4.78 | 14.00 | 0.00 | 0.00 |
| **Steel** | 729.16 | 5.00 | 84.46 | 7.90 | 50.04 | 18.37 | 4.36 | 12.78 | 0.30 | 7.69 |
| **Concrete** | 29.26 | 0.20 | 3.20 | 0.30 | 1.61 | 0.59 | 0.15 | 0.43 | 0.00 | 0.12 |
| **Precast** | 13.61 | 0.09 | 1.46 | 0.14 | 1.22 | 0.45 | 0.31 | 0.92 | 0.00 | 0.11 |
| **RM** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **URM** | 988.95 | 6.78 | 179.84 | 16.81 | 102.60 | 37.66 | 24.35 | 71.36 | 3.63 | 92.08 |
| **MH** | 41.66 | 0.29 | 8.50 | 0.79 | 4.66 | 1.71 | 0.18 | 0.52 | 0.00 | 0.00 |
| **Total** | **14,579** | | **1,070** | | **272** | | **34** | | **4** | |

*Note:

RM Reinforced Masonry

URM Unreinforced Masonry

MH Manufactured Housing

## Essential Facility Damage

Before the earthquake, the region had 298 hospital beds available for use. On the day of the earthquake, the model estimates that only 212 hospital beds (71.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 87.00% of the beds will be back in service. By 30 days, 97.00% 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** | 3 | 0 | 0 | 3 |
| **Schools** | 16 | 0 | 0 | 16 |
| **EOCs** | 1 | 0 | 0 | 1 |
| **PoliceStations** | 2 | 0 | 0 | 2 |
| **FireStations** | 5 | 0 | 0 | 5 |

## Transportation Lifeline Damage

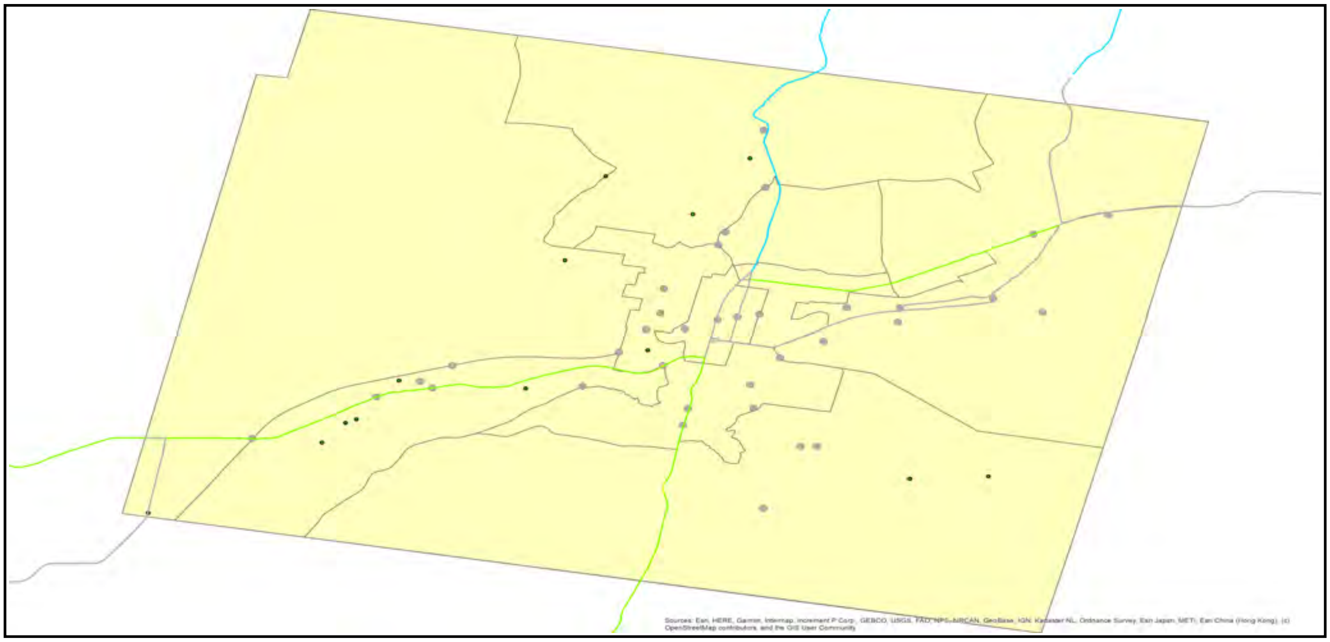


**Table 6: Expected Damage to the Transportation Systems**

| 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 | 34 | 0 | 0 | 34 | 34 |
| | Bridges | 48 | 0 | 0 | 48 | 48 |
| | Tunnels | 0 | 0 | 0 | 0 | 0 |
| **Railways** | Segments | 13 | 0 | 0 | 12 | 12 |
| | Bridges | 9 | 0 | 0 | 9 | 9 |
| | Tunnels | 0 | 0 | 0 | 0 | 0 |
| | Facilities | 1 | 0 | 0 | 1 | 1 |
| **Light Rail** | Segments | 0 | 0 | 0 | 0 | 0 |
| | Bridges | 0 | 0 | 0 | 0 | 0 |
| | Tunnels | 0 | 0 | 0 | 0 | 0 |
| | Facilities | 0 | 0 | 0 | 0 | 0 |
| **Bus** | Facilities | 0 | 0 | 0 | 0 | 0 |
| **Ferry** | Facilities | 0 | 0 | 0 | 0 | 0 |
| **Port** | Facilities | 0 | 0 | 0 | 0 | 0 |
| **Airport** | Facilities | 1 | 0 | 0 | 1 | 1 |
| | Runways | 2 | 0 | 0 | 2 | 2 |

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 | 3 | 0 | 0 | 3 | 3 |
| Communication | 7 | 0 | 0 | 7 | 7 |

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

| System | Total Pipelines Length (miles) | Number of Leaks | Number of Breaks |
|---|---|---|---|
| Potable Water | 306 | 3 | 1 |
| Waste Water | 183 | 2 | 0 |
| Natural Gas | 37 | 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 | 19,716 | 0 | 0 | 0 | 0 | 0 |
| Electric Power | | 0 | 0 | 0 | 0 | 0 |

# Induced Earthquake Damage

## Fire Following Earthquake

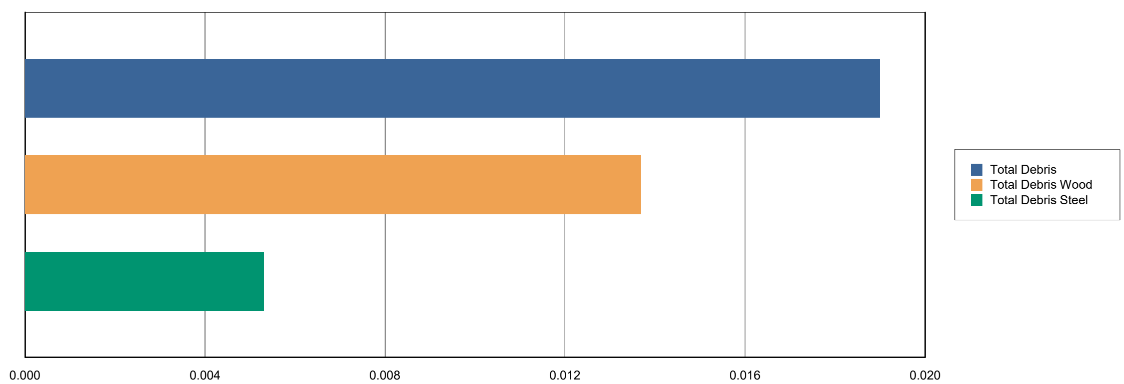
Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there 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 19,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 72.00% 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 760 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

**Earthquake Debris (millions of tons)**



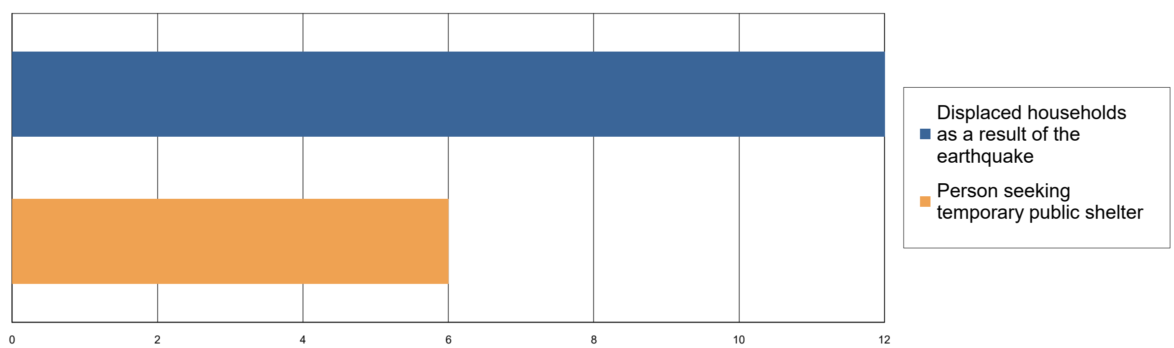

| Brick/ Wood | Reinforced Concrete/Steel | Total Debris | Truck Load |
|---|---|---|---|
| 0.01 | 0.01 | 0.02 | 760 (@25 tons/truck) |

## 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 12 households to be displaced due to the earthquake. Of these, 6 people (out of a total population of 43,927) 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 |
|---|---|
| 12 | 6 |

## 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 | 0.27 | 0.05 | 0.00 | 0.01 |
| | Commuting | 0.00 | 0.00 | 0.00 | 0.00 |
| | Educational | 0.00 | 0.00 | 0.00 | 0.00 |
| | Hotels | 0.01 | 0.00 | 0.00 | 0.00 |
| | Industrial | 0.16 | 0.02 | 0.00 | 0.00 |
| | Other-Residential | 2.03 | 0.19 | 0.01 | 0.02 |
| | Single Family | 2.17 | 0.23 | 0.02 | 0.04 |
| | **Total** | **5** | **0** | **0** | **0** |
| 2 PM | Commercial | 16.01 | 2.67 | 0.29 | 0.55 |
| | Commuting | 0.00 | 0.00 | 0.00 | 0.00 |
| | Educational | 2.30 | 0.36 | 0.04 | 0.07 |
| | Hotels | 0.00 | 0.00 | 0.00 | 0.00 |
| | Industrial | 1.16 | 0.18 | 0.02 | 0.03 |
| | Other-Residential | 0.63 | 0.06 | 0.00 | 0.01 |
| | Single Family | 0.67 | 0.08 | 0.01 | 0.01 |
| | **Total** | **21** | **3** | **0** | **1** |
| 5 PM | Commercial | 10.06 | 1.69 | 0.18 | 0.35 |
| | Commuting | 0.00 | 0.00 | 0.00 | 0.00 |
| | Educational | 0.26 | 0.04 | 0.00 | 0.01 |
| | Hotels | 0.00 | 0.00 | 0.00 | 0.00 |
| | Industrial | 0.73 | 0.11 | 0.01 | 0.02 |
| | Other-Residential | 0.76 | 0.07 | 0.00 | 0.01 |
| | Single Family | 0.83 | 0.09 | 0.01 | 0.02 |
| | **Total** | **13** | **2** | **0** | **0** |

## Economic Loss

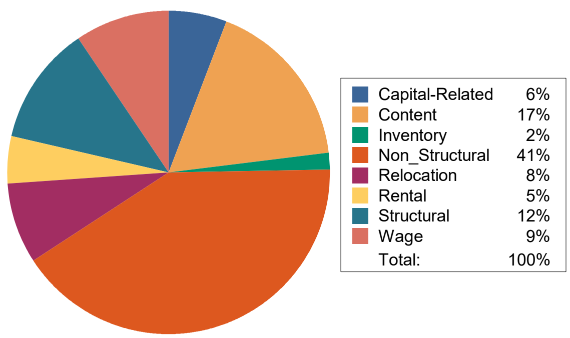
The total economic loss estimated for the earthquake is 115.05 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

## 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 94.94 (millions of dollars); 28 % 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 32 % 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)

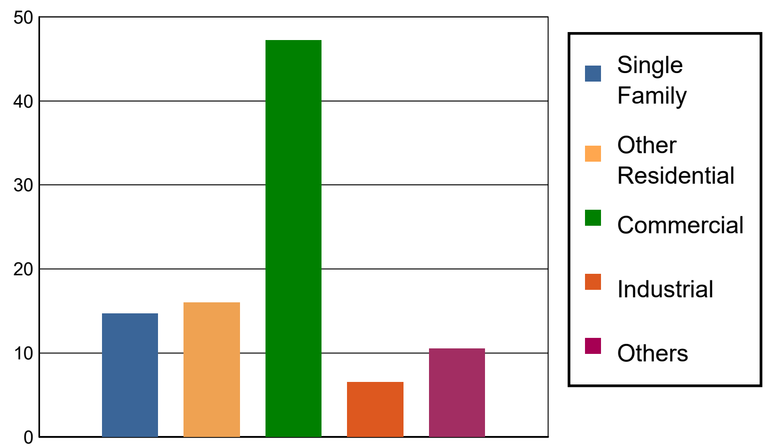



**Table 11: Building-Related Economic Loss Estimates**

(Millions of dollars)

| Category | Area | Single Family | Other Residential | Commercial | Industrial | Others | Total |
|---|---|---|---|---|---|---|---|
| **Income Losses** | | | | | | | |
| | Wage | 0.0000 | 0.6050 | 7.3769 | 0.1035 | 0.7653 | 8.8507 |
| | Capital-Related | 0.0000 | 0.2571 | 5.0503 | 0.0615 | 0.0743 | 5.4432 |
| | Rental | 0.2568 | 1.2065 | 2.6915 | 0.0625 | 0.2508 | 4.4681 |
| | Relocation | 0.8777 | 0.6510 | 4.2067 | 0.3407 | 1.3842 | 7.4603 |
| | **Subtotal** | **1.1345** | **2.7196** | **19.3254** | **0.5682** | **2.4746** | **26.2223** |
| **Capital Stock Losses** | | | | | | | |
| | Structural | 1.9656 | 1.4555 | 5.7163 | 0.8717 | 1.5249 | 11.5340 |
| | Non_Structural | 8.7227 | 9.3943 | 13.8923 | 2.8560 | 4.3187 | 39.1840 |
| | Content | 2.8315 | 2.4375 | 7.2085 | 1.9275 | 2.1450 | 16.5500 |
| | Inventory | 0.0000 | 0.0000 | 1.1022 | 0.3027 | 0.0412 | 1.4461 |
| | **Subtotal** | **13.5198** | **13.2873** | **27.9193** | **5.9579** | **8.0298** | **68.7141** |
| | **Total** | **14.65** | **16.01** | **47.24** | **6.53** | **10.50** | **94.94** |

## Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

**Table 12: Transportation System Economic Losses**
(Millions of dollars)

| System | Component | Inventory Value | Economic Loss | Loss Ratio (%) |
|---|---|---|---|---|
| Highway | Segments | 437.2478 | 0.0000 | 0.00 |
| | Bridges | 65.4675 | 0.0002 | 0.00 |
| | Tunnels | 0.0000 | 0.0000 | 0.00 |
| | Subtotal | **502.7153** | **0.0002** | |
| Railways | Segments | 1323.2391 | 0.0000 | 0.00 |
| | Bridges | 46.7100 | 0.0000 | 0.00 |
| | Tunnels | 0.0000 | 0.0000 | 0.00 |
| | Facilities | 2.6630 | 0.1580 | 5.93 |
| | Subtotal | **1372.6121** | **0.1580** | |
| Light Rail | Segments | 0.0000 | 0.0000 | 0.00 |
| | Bridges | 0.0000 | 0.0000 | 0.00 |
| | Tunnels | 0.0000 | 0.0000 | 0.00 |
| | Facilities | 0.0000 | 0.0000 | 0.00 |
| | Subtotal | **0.0000** | **0.0000** | |
| Bus | Facilities | 0.0000 | 0.0000 | 0.00 |
| | Subtotal | **0.0000** | **0.0000** | |
| Ferry | Facilities | 0.0000 | 0.0000 | 0.00 |
| | Subtotal | **0.0000** | **0.0000** | |
| Port | Facilities | 0.0000 | 0.0000 | 0.00 |
| | Subtotal | **0.0000** | **0.0000** | |
| Airport | Facilities | 5.3000 | 0.2961 | 5.59 |
| | Runways | 12.7109 | 0.0000 | 0.00 |
| | Subtotal | **18.0109** | **0.2961** | |
| | **Total** | **1,893.34** | **0.45** | |

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 | 9.8340 | 0.0142 | 0.14 |
| | **Subtotal** | **9.8340** | **0.0142** | |
| Waste Water | Pipelines | 0.0000 | 0.0000 | 0.00 |
| | Facilities | 156.8418 | 1.9864 | 1.27 |
| | Distribution Lines | 5.9004 | 0.0071 | 0.12 |
| | **Subtotal** | **162.7422** | **1.9935** | |
| Natural Gas | Pipelines | 370.0320 | 0.0000 | 0.00 |
| | Facilities | 0.0000 | 0.0000 | 0.00 |
| | Distribution Lines | 3.9336 | 0.0024 | 0.06 |
| | **Subtotal** | **373.9656** | **0.0024** | |
| Oil Systems | Pipelines | 0.0000 | 0.0000 | 0.00 |
| | Facilities | 0.0000 | 0.0000 | 0.00 |
| | **Subtotal** | **0.0000** | **0.0000** | |
| Electrical Power | Facilities | 303.7871 | 17.6158 | 5.80 |
| | **Subtotal** | **303.7871** | **17.6158** | |
| Communication | Facilities | 0.8120 | 0.0278 | 3.42 |
| | **Subtotal** | **0.8120** | **0.0278** | |
| | **Total** | **851.14** | **19.65** | |

## 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 | 43,927 | 4,824 | 3,592 | 8,417 |
| **Total Region** | | **43,927** | **4,824** | **3,592** | **8,417** |