TOWN OF NORTON, MA
HAZARD MITIGATION PLAN
APRIL 2024

Town of Norton
70 East Main Street
Norton, MA 02766

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https://www.nortonma.org

Prepared by:

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Acknowledgements

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- Bryan Carmichael, Planning Board Admin. Assistant, Town of Norton
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- Shawn Simmons, Fire Chief, Town of Norton
- John Thomas, Norton Conservation Director/Stormwater Agent, Town of Norton
- Michael Yunits, Town Manager, Town of Norton
- Chris Zahner, Health Agent, Town of Norton

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

Local Adoption Resolution

TOWN OF NORTON, MASSACHUSETTS
SELECTBOARD
A RESOLUTION ADOPTING THE
TOWN OF NORTON, MA HAZARD MITIGATION PLAN
RESOLUTION NO. _____

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

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

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

WHEREAS adoption by the Town of Norton Selectboard demonstrates its commitment to hazard mitigation and achieving the goals outlined in the TOWN OF NORTON, MA HAZARD MITIGATION PLAN.

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

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

ADOPTED by a vote of _____ in favor and _____ against, and _____ abstaining, this _____ day of _____, _____.

By: _____ Kevin Snyder, Chair

ATTEST: By: _____ Steven Hornsby, Vice Chair

ATTEST: By: _____ Megan Artz, Member

ATTEST: By: _____ Denise Luciano, Member

APPROVED AS TO FORM: By: _____ Alec E. Rich 111, Clerk

Record of Changes

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

Table 1. Summary of Changes.

Date of Change	Entered By	Summary of Changes

Chapter 1. Introduction

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

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

The Town of Norton, Massachusetts created this plan as part of an ongoing effort to reduce the negative impacts and costs from damages associated with natural hazards, such as nor'easters, floods, and hurricanes. This plan meets the requirements of the Disaster Mitigation Act 2000. More importantly, the plan was created to reduce loss of life, land, and property due to natural hazards that affect the Town of Norton. 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.

Figure 1. 1938 Hurricane Impacts on Mansfield Avenue, Norton.

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.

[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

Purpose of the Plan

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

This plan is a result of a collaborative effort between the Town of Norton 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 participated, included the Massachusetts Emergency Management Agency (MEMA), Wheaton College and the Norton Public Schools.

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 meets the requirements outlined 44 CFR § 201.6(d)(3). These requirements are included in the plan in the green call-out boxes, like the one below. This is the Town's first Hazard Mitigation Plan.

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

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

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

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

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

The HMPC identified the following list of hazards to profile. They are shown in alphabetical order.

- Average and Extreme Temperatures
- Droughts
- Earthquakes
- Flooding
- Hurricanes and Tropical Storms
- Invasive Species
- Other Severe Weather
- Severe Winter Storms
- Tornadoes
- Wildfires/Brushfires

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 Town's Municipal Vulnerability Preparedness Plan 2018 were considered when developing this list. Information about the goal development process is in the Mitigation Strategy (Chapter 6). The goals are considered "broad policy-type statements"[4] that represent the long-term vision for mitigating risk to natural hazards in the Town of Norton. This is the Town's first Hazard Mitigation Plan.

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

Save Lives and Property

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

Infrastructure

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

Capacity

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

Natural Resources

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

Education

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

Figure 2. Mitigation Plan Goal Statements.

Authority and Assurances

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

- Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended.
- National Flood Insurance Act of 1968, as amended.
- National Dam Safety Program Act (Pub. L. 92-367), as amended.
- 44 CFR Part 201 Mitigation Planning.
- 44 CFR, Part 60, Subpart A, including § 60.3 Flood plain management criteria for flood-prone areas.
- 44 CFR Part 77 Flood Mitigation Grants10.
- 44 CFR Part 206 Subpart N. Hazard Mitigation Grant Program.

Plan Adoption

The Town of Norton 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 10.

Document Overview

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

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

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

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

Chapter 5: Capability Assessment
The Capability Assessment looks at the Town's ability to mitigate risk prior to and following disaster. This chapter is structured around the following four categories: 1) planning and regulatory, 2) administrative and technical, 3) financial, and 4) education and outreach. The chapter concludes with information regarding the National Flood Insurance Program (NFIP) and the Community Rating System (CRS).

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

Chapter 7: Plan Implementation and Maintenance
The Plan Implementation and Maintenance chapter establishes a system and mechanism for periodically monitoring, evaluating, and updating the Town of Norton Hazard Mitigation Plan. It also includes a plan for continuing public outreach and monitoring the implementation of the identified mitigation actions.

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

Chapter 2: Planning Area Profile

The Town of Norton, with a population of 19,202[5], is in southeastern Massachusetts in Bristol County. The Town is located 30 miles south of Boston. Norton is bordered by Easton and Mansfield in the north, Rehoboth in the south, Taunton in the east, and Attleboro in the west.[6]

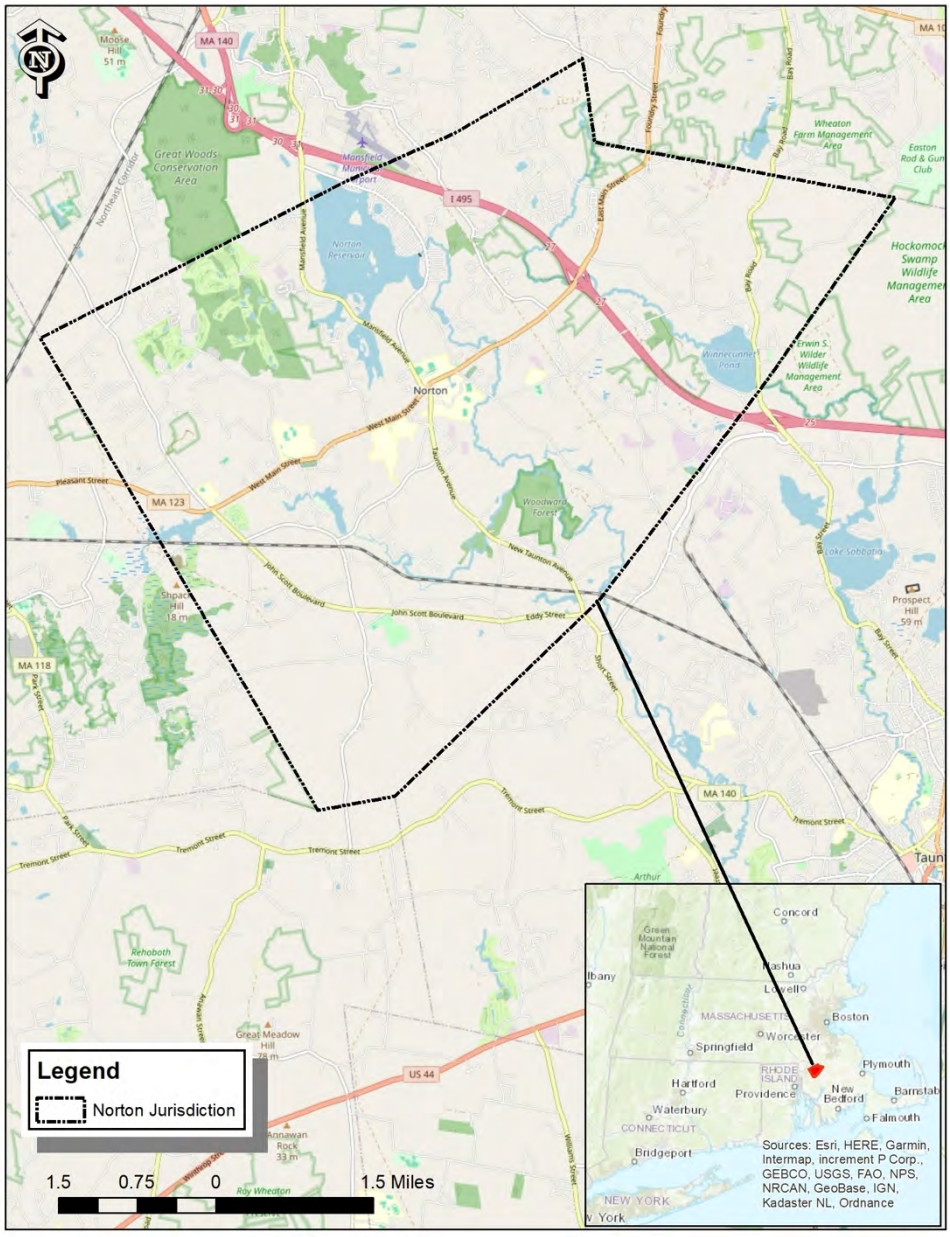


Figure 3. Norton Town Boundary.

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

[6] Town of Norton Open Space and Recreation Plan. (2017-2024). Town of Norton, Massachusetts.

Norton came from a tract of land purchased from Plymouth County in 1637 by the founders of nearby Taunton and was called the "Taunton North Purchase."[7] The first colonial settlement was in 1669 by William Wetherell and the Town was incorporated in 1711. Archaeological studies have shown that the land was widely used by Native Americans. A formation of boulders near the Town's Lake Winnecunnet was the site of a lodge used by the Indians, while hunting in the swamps and woods of what is now known to be Norton.[8]

At the end of the seventeenth century, the Leonard Family, a family of skilled ironworkers from Taunton, mined and forged bog iron in Norton. The Town's industries also included farming, gristmills, and lumbering. Textile mills, bleacheries, a wool-combing mill, and the manufacturing of various goods like jewelry and straw hats grew in the nineteenth century.[9]

The Town is said to have a "unique" composition due to it being developed as a set of villages which included Chartley, Norton Center, Barrowsville, Norton Furnace, Crane's, East Norton, and Winnecunnet.[10] Some of the villages had their own post offices, schools, fire stations, and railroad stations.[11]The two villages of Charley and Norton Center still exist today. The Town is home to Wheaton College, a private 4-year liberal arts college, that was founded in 1834.

Norton has a Town Manager-Selectboard form of government. The Selectboard is comprised of five members, each elected for three-year terms. The Selectboard serves the role of Chief Executive Officer and is responsible for policymaking for all Town agencies and officials.[12]

People

As of 2020, 87.5% of the Town identified as White, while 5.4% identified as Black or African American. Additionally, 2.2% of the population identified as Asian and 4.4% identified as Hispanic or Latino. The foreign-born population in Town is 5.8%. There are approximately 6,588 households in Norton and the median household income is $112,284, which is higher than the State's median household income of $96,505.[13] The number of people living in poverty is 5.9%. Almost 94% of the Town, aged 25 years or older, have a high school or higher diploma.[14]

[7] "About Norton." (n.d.). Town of Norton, Massachusetts.
[8] Town of Norton Open Space and Recreation Plan. (2017-2024). Town of Norton, Massachusetts.
[9] Town of Norton Open Space and Recreation Plan. (2017-2024). Town of Norton, Massachusetts.
[10] "About Norton." (n.d.). Town of Norton, Massachusetts.
[11] "About Norton." (n.d.). Town of Norton, Massachusetts.
[12] "Selectboard." (n.d.). Town of Norton, Massachusetts.
[13] QuickFacts Massachusetts. (2022). United States Census Bureau
[14] QuickFacts Norton Town, Bristol County, Massachusetts. (2022). United States Census Bureau

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

1. Annual median household income is 65% or less of the state's annual median household income.
2. Minorities make up 40% or more of the city or town's population.
3. Twenty-five percent or more of households speak English "less than very well."
4. Minorities make up 25% or more of the population *and* the annual median household income of the municipality where the neighborhood is located does not exceed 150% of the statewide annual median household income.[15]

These populations are more vulnerable due to being disproportionately affected by the negative impacts of natural hazards nationwide. The data for identifying Environmental Justice Populations comes from the Executive Office of Energy and Environmental Affairs (EEA) who uses American Community Survey data.[16]

Norton has no designated Environmental Justice Populations, but according to the Hazard Mitigation Planning Committee (HMPC), there are several vulnerable populations which include those living in senior housing complexes and special needs housing. This includes over a dozen group homes, one nursing home, communities for people over-55-years-old, and elderly housing, some of which were established by State Agencies.

Land Use and Development (Structures)

Norton is a mostly residential town with a significant amount of open space. There are only a few commercial areas in the Town, which include the Village Center and Chartley's Corner. Some larger commercial and industrial sites are spread throughout the Town but are located mainly in outlying areas and along major roadways. In the 1990s, the Town experienced a "population growth spurt," but has since continued to grow at a similar rate to the rest of Massachusetts.[17]

In 2020, the Town's Planning Department worked to update their Zoning By-Laws which were first adopted in 1974, in addition to planning a review of their land use rules and regulations.[18] The recent changes to the Town's zoning include a Village Center Core District (VCC) and updates related to the State's legalization of cannabis retail operations. Norton's zoning code promotes residential cluster

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

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

[17] Norton Master Plan. (2021). Town of Norton, Massachusetts.

[18] "Planning Initiatives Toward Norton's Future." (n.d.). Town of Norton, Massachusetts.

development to protect open space; however, much of the Town's zoning follows a "typical suburban-style zoning code" which calls for large lot sizes, setbacks, and parking requirements.[19]

Norton has aimed to balance growth with conservation and preservation, particularly in areas of historic, cultural, or natural resource value. These efforts are spearheaded by the Town's Conservation Commission and partners like the Land Preservation Society of Norton and the Nature Conservancy.[20]

Norton worked with the Southeastern Regional Planning and Economic Development District (SRPEDD) to complete a Complete Streets Prioritization Plan and is currently working on a Housing Production Plan.[21] The Town is also required to comply with the State's new "Multi-Family Zoning Requirement for MBTA Communities" due to being an "MBTA Adjacent Community." This requires Norton to create a zoning district that allows for a minimum of 15 units per acre, applied over at least 50 acres by 2024.[22]

Most of the community's recent development has been characterized as "larger-scale development" that was related to Norton's proximity to the Interstate Route 495 corridor and the Town's other major roads. [23] According to the 2014 Massachusetts Audubon Society's Losing Ground: Planning for Resilience Report, this development has impacted Norton's open land. Open land is defined as "agricultural areas, bare soil, or low vegetation." [24] Since the publication of the Losing Ground, there has been an increase in permanently protected areas which now include Crane Farm Preserve and the Erikson Conservation Land. In total, almost one quarter of the Town's land is permanently protected.[25]

A 2019 Zoning Map of Norton can be found in Figure 4.

[19] Norton Master Plan. (2021). Town of Norton, Massachusetts.
[20] "Planning Initiatives Toward Norton's Future." (n.d.). Town of Norton, Massachusetts.
[21] "Planning Initiatives Toward Norton's Future." (n.d.). Town of Norton, Massachusetts.
[22] "Planning Initiatives Toward Norton's Future." (n.d.). Town of Norton, Massachusetts.
[23] Town of Norton Open Space and Recreation Plan. (2017-2024). Town of Norton, Massachusetts.
[24] Town of Norton Open Space and Recreation Plan. (2017-2024). Town of Norton, Massachusetts.
[25] Town of Norton Open Space and Recreation Plan. (2017-2024). Town of Norton, Massachusetts.

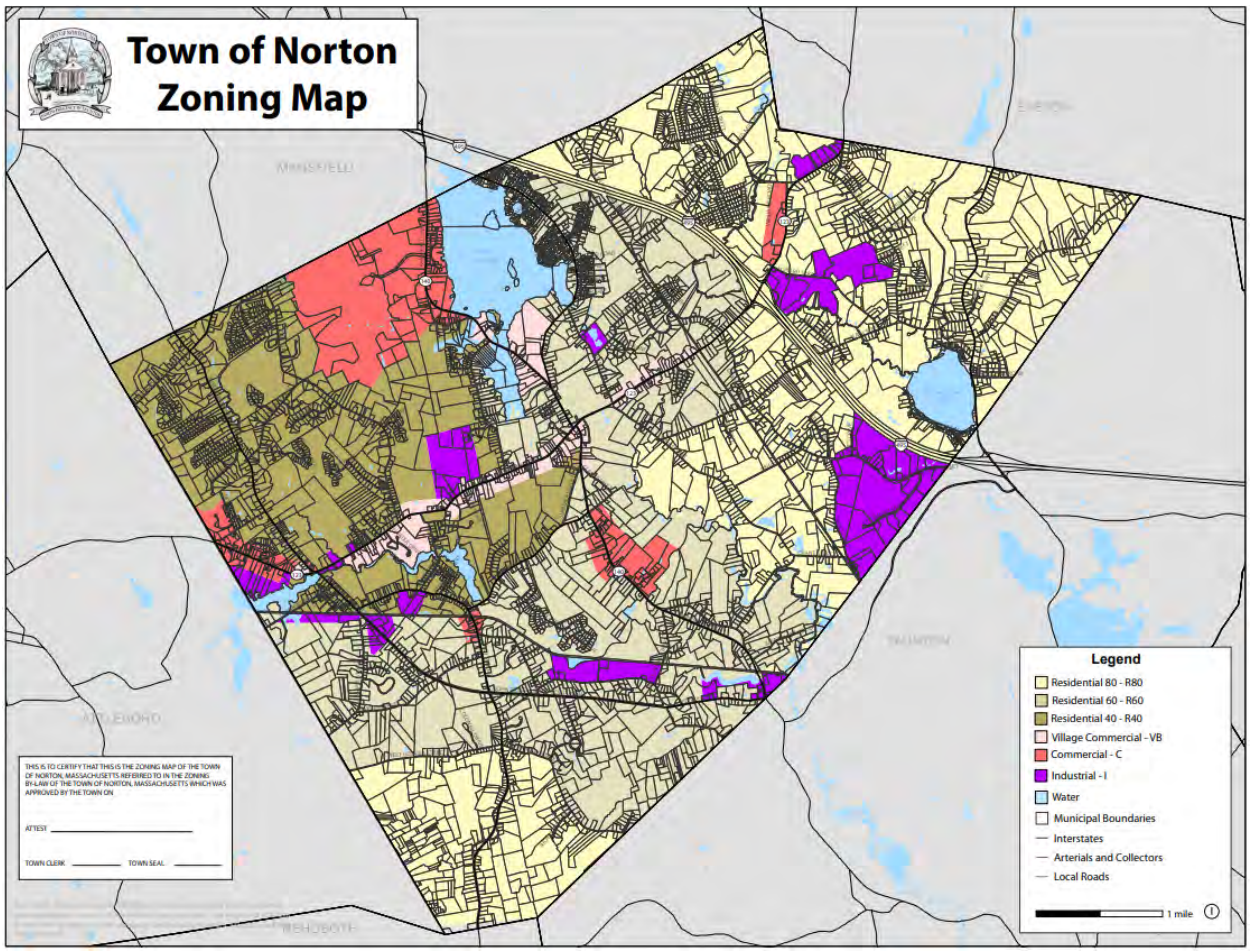


Figure 4. Town of Norton Zoning Map.[26]

Natural Resources

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

Rivers and Waterways

Norton has several major waterways within the Town, including four rivers and watershed areas which are listed below:

1. Canoe River

[26] Town of Norton Zoning Map. (2019). Town of Norton, Massachusetts.

2. Rumford River
3. Three-Mile River
4. Wading River.[27]

The Canoe River watershed consists of five towns and includes the northeastern portion of Norton, and the Rumford River watershed includes the central parts of Town. The Three-Mile River comprises the southern portion of Town while the Wading River watershed includes the northwestern portion.

There are also several brooks in Norton which include:

- Birch Brook
- Chartley Brook
- Crooked Meadow Brook
- Dora Brook
- Great Brook
- Mulberry Meadow Brook
- Tucker Brook.[28]

All the waterways in Norton have public access except for Birch Brook, Chartley Brook, and Crooked Meadow Brook.[29]

Surface Water

The Town has five major bodies of water that provide opportunities for fishing, boating, skating, and canoeing. They include:

1. Norton Reservoir and Its Islands
2. Barrowsville Pond
3. Chartley Pond
4. Meadowbrook Pond
5. Winnecunnet Pond.[30]

The Norton Reservoir is one of the largest dammed bodies of water in southeastern Massachusetts. Though it is a reservoir, it does not supply drinking water. In 2017, the reservoir was treated for invasive aquatic plants (water chestnut, variable-leaf milfoil, Eurasian water milfoil, and fanwort). Barrowsville Pond comprises of 44 acres and was originally created to provide power to mills in the surrounding area. It is used recreationally by Town residents and visitors. Chartley Pond is approximately 37 acres and

[27] Town of Norton Open Space and Recreation Plan. (2017-2024). Town of Norton, Massachusetts.
[28] Town of Norton Open Space and Recreation Plan. (2017-2024). Town of Norton, Massachusetts.
[29] Town of Norton Open Space and Recreation Plan. (2017-2024). Town of Norton, Massachusetts.
[30] Town of Norton Open Space and Recreation Plan. (2017-2024). Town of Norton, Massachusetts.

provides recreational opportunities and "aesthetic value."[31] Meadowbrook Pond is the smallest of the five water bodies at 15 acres. The pond is privately-owned and there is no public access to the site. Winnecunnet Pond is 148-acres and the Town's only Great Pond. A Great Pond is a lake or pond that contains more than ten acres in its natural state. Winnecunnet Pond deals with invasive aquatic plants and is managed by the Lake Winnecunnet Association.[32]

Open Space

In addition to the recreational opportunities found in the Town's lakes and ponds, Norton has several open space areas that can be used for passive recreation by residents and visitors. A list of these spaces according to the 2021 Norton Master Plan are listed in alphabetical order below:

- Everett Leonard Park – Town Pool
- Gertrude Cornish Town Forest
- Johnson Acres
- Leo G. Yelle Conservation Area
- Lion's Field
- Norton Wellhead Protection Area
- Rose Farm Conservation Area
- Tricentennial Park
- Woodward Woods
- YMCA-Camp Finberg-Edit Read. [33]

Critical Facilities and Infrastructure

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

Water & Sewer Service

Water System

The Town is serviced by the Norton Water Department which provides 1.3 million gallons per day to its customers. Norton's drinking water comes from the Canoe River Sole Source Aquifer located in the Taunton River Basin. Norton, alongside Mansfield, Sharon, Easton, and Foxborough all get a portion of

[31] Town of Norton Open Space and Recreation Plan. (2017-2024). Town of Norton, Massachusetts.
[32] Town of Norton Open Space and Recreation Plan. (2017-2024). Town of Norton, Massachusetts.
[33] Norton Master Plan. (2021). Town of Norton, Massachusetts.

their water supply from the Canoe River Aquifer and are part of the Canoe River Aquifer Advisory Committee. The Committee works to protect the water resource while promoting public awareness.

Norton's water distribution system includes five gravel-packed wells, four storage facilities that hold a total of 5.85 million gallons of water, and over 120 miles of water mains. All the wells in Town are in Norton's Water Resources Protection District.[34]

Sewer System

In 2014, the communities of Norton, Mansfield, and Foxborough created the Mansfield, Foxborough, Norton (MFN) Regional Wastewater District. The MFN Regional Wastewater Facility is in Norton near the Myles Standish Industrial Park. It is a 3.14 million gallon-per-day advanced wastewater treatment facility that discharges treated effluent into the Three-Mile River that flows into Narragansett Bay through the Taunton River. Due to new funding from the Massachusetts Department of Environmental Protection's State Revolving Loan Fund Program (SRF) for water pollution there have been improvements made to the wastewater facility. These improvements allowed Norton to expand sewer service to a senior housing complex called Woodland Meadows and to two schools. The new sewer line travels up Route 123 to a new pump station at Wheaton College, which ties into the MFN District system.[35]

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."*

[34] Town of Norton Open Space and Recreation Plan. (2017-2024). Town of Norton, Massachusetts.

[35] Town of Norton Open Space and Recreation Plan. (2017-2024). Town of Norton, Massachusetts.

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

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

Norton's HMPC identified fifty-four critical facilities, many of which are infrastructure for the water and sewer system such as pump stations. There are also some privately-owned businesses such as CVS Pharmacy, Walgreens, Home Depot, and Cumberland Farms. The Town-Owed facilities, such as the Town Hall, Fire Station, Police Station, Council on Aging, and some local schools have back-up power. A complete list of critical facilities can be found in the Appendix B, and the list of facilities with full or partial back-up power can be found in the table below.

Table 2. List of Critical Facilities in Norton with Back-Up Power.

Name	**Address**
Town Hall	70 East Main Street
Norton Fire Station #1	25 South Worcester Street
Fire Station - Headquarters	70 East Main Street
Norton Police Station	82 East Main Street
Wheaton College	26 East Main Street
Dept. of Public Works	70 East Main Street (Rear)
Council for Aging	55 West Main Street
Norton High School	66 West Main Street
Norton Middle School	215 West Main Street
Henri A. Yelle Elementary School	64 West Main Street
Mansfield Wastewater Treatment Plant	80 Hill Street
Water Facility	Reservoir Street

Name	Address
Pumping Station	157 Mansfield Avenue
Pumping Station	Holly Road
Sewer	12A Bay Road
Sewer	Filmore Drive
Water Well	200 Plain Street
Sewer Pumping Station	Kingsley Road
Pump House	Plain Street
Water	32 Newland Street
Sewer	Island Road
Water	167 Pine Street
Water	West Main Street
Sewer	Rumford Road
Cottage Street Station - Water	Cottage Street
Home Inc.	55 Newland Street
The Residence At Great Woods	190 Mansfield Avenue
North Cottage	69 East Main Street

Critical Transportation Infrastructure

There are several major roadways located within Norton. The Town is bisected by State Route 140 from north to south and State Route 123 from east to west. Interstate 495 (I-495) runs north to south and passes through the northern part of Town. The Town's Highway Department maintains approximately 109 miles of these roads.[36]

[36] Town of Norton Open Space and Recreation Plan. (2017-2024). Town of Norton, Massachusetts.

The Town's public transportation includes the Greater Attleboro Taunton Regional Authority (GATRA) that provides local transit services and a direct line to the Route 6 commercial center. GATRA also provides services to seniors and/or persons with a disability who cannot access public transportation. The Massachusetts Bay Transportation Authority (MBTA) Commuter Rail can serve the Norton but is in the neighboring communities of Mansfield and Attleboro and therefore requires a 15-minute commute for residents.[37]

Norton is currently in the planning and design phase on the "Norton Rail Trail" which will extend from the existing World War II Memorial Trail in Mansfield. Upon completion, the Norton portion of the trail will be four miles long and provide a connection between the Mansfield Commuter Rail Station and the Myles Standish Industrial Park. The trail will have a ten-foot-wide paved multi-use trail and a five-foot-wide equestrian trail. The project is led by the Massachusetts Department of Transportation and the Norton Alternative Transportation Committee.[38]

Dams

There are two high hazard dams (Chartley Pond Dam and Norton Reservoir Dam) and two significant hazard dams (Barrowsville Pond Dam and Rumford River Dam) in Norton. The following is a list of the eight dams located within the Town:

1. Barrowsville Pond Dam
2. Canoe River Dam
3. Chartley Pond Dam
4. Goose Branch Pond Dam
5. Norton Reservoir Dam
6. Norton Water Supply Dam #1
7. Meadowbrook Pond Dam
8. Rumford River Dam.

Economy

The Town is working on drawing in more visitors through "revitalization and meaningful placemaking" efforts in the Village Center.[39] This will include more shopping and dining locations and supporting new businesses, alongside existing ones.[40]

[37] Town of Norton Open Space and Recreation Plan. (2017-2024). Town of Norton, Massachusetts.
[38] Town of Norton Open Space and Recreation Plan. (2017-2024). Town of Norton, Massachusetts.
[39] Norton Master Plan. (2021). Town of Norton, Massachusetts.
[40] Norton Master Plan. (2021). Town of Norton, Massachusetts.

As of 2020, Norton's top three 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.[41]

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 Town is said to be "rich in historical and archaeological resources."[42] According to Brona Simon, State Archaeologist, Norton had 284 inventoried resources in the Massachusetts Historic Commission's Inventory of Historic and Archeological Assets of the Commonwealth in 2017. The resources in this list include buildings and structures, burial grounds, and historic areas.[43] As of 2021, the number of resources increased to 333. [44] The Norton Center Historic District, Old Bay Road Historic District, and the Reverend Pitt Clarke House are on the National Register of Historic Places.[45]

The following sites are listed on the State Register of Historic Places:

- Bay Street Prehistoric District
- Canoe River Prehistoric District
- Newcomb Street Site
- Norton Historic District
- White Crow Site.[46]

[41] "Industry By Occupation for the Civilian Employed Population 16 Years and Over ACS 5-Year Estimates." (2020). United States Census Bureau.
[42] Town of Norton Open Space and Recreation Plan. (2017-2024). Town of Norton, Massachusetts.
[43] Town of Norton Open Space and Recreation Plan. (2017-2024). Town of Norton, Massachusetts.
[44] Norton Master Plan. (2021). Town of Norton, Massachusetts.
[45] Town of Norton Open Space and Recreation Plan. (2017-2024). Town of Norton, Massachusetts.
[46] Town of Norton Open Space and Recreation Plan. (2017-2024). Town of Norton, Massachusetts.

In addition to these sites, there are 31 ancient Native American archaeological sites.[47] All of these historical and cultural resources must be considered in future hazard mitigation planning due to the risk of the Town's significant districts, sites, and structures being damaged or threatened by natural hazards and climate change.

[47] Town of Norton Open Space and Recreation Plan. (2017-2024). Town of Norton, Massachusetts.

Chapter 3: Planning Process

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

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

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

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

The planning process for this mitigation plan began in September 2023 and concluded in April 2024 (this does not include the months of plan review and adoption). The Town developed a Municipal Vulnerability Preparedness (MVP) Program summary of findings in 2018. This planning effort contributed to the development of the mitigation plan. Below is a graphical display of the plan development timeline.

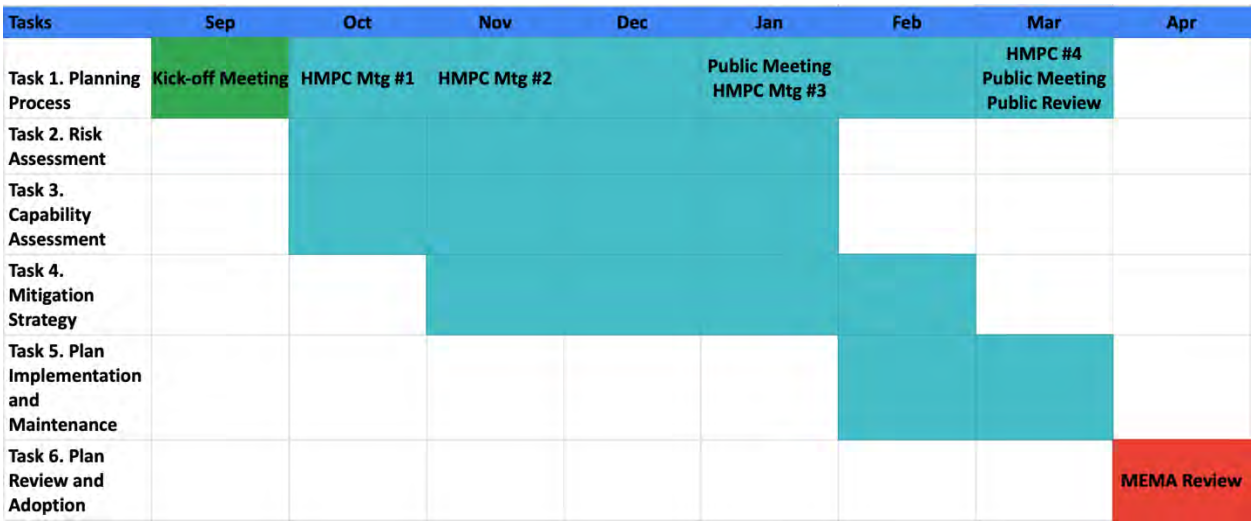


Figure 5. Planning Process Timeline.

The Town of Norton participates in the NFIP Community Rating System (CRS) program. Participating in this program awards NFIP policy holders a reduction in flood insurance. Part of the Planning Process for this Hazard Mitigation Plan included making sure to optimize the number points the Town can receive, more points translate into bigger insurance discounts for policy holders. The ten CRS Planning Steps and their adjacent Mitigation Planning Elements are shown in Table 3.

Table 3. Comparison of the Planning Processes.

Mitigation Planning Elements	CRS Planning Steps
Planning Process	1- Organize to prepare the plan 2 - Involve the public 3 -Coordinate 10 - Implement, Evaluate, Revise
Hazard Identification and Risk Assessment	4- Assess the hazard 5 - Assess the problem
Mitigation Strategy	6 -Set goals 7 - Review possible activities 8 - Draft an action plan
Plan Update	10 - Implement, evaluate, revise 5-year update
Plan Adoption	9 - Adopt the plan

Hazard Mitigation Planning Committee

The Norton Fire Department Chief, Shawn Simmons, developed the Hazard Mitigation Planning Committee (HMPC) and was the point of contact for the Consulting Team. The HMPC included Town employees, representatives from the Norton Public Schools, and the Director of Wheaton Campus

Safety. Together this group represented six sectors of the community shown in Table 4. A full list of HMPC members is shown in Table 5. The HMPC met four times, October 24, 2023, November 29, 2023, January 29, 2024, and March 5, 2024. All the meetings were conducted via Zoom, however sometimes Town employees gathered at their Town offices. A list of participants at each of these meetings is included in Appendix A.

Table 4. Sectors of the Community Represented on the HMPC.

Sectors of the Community	HMPC Members
• Emergency Management	• Deputy Director of Norton Emergency Management Agency (NEMA) • Fire Chief • Health Agent • Police Chief
• Economic Development	• Building Commissioner • Planning Board Administrative Assistant • Selectboard Member • Town Manager
• Land Use and Development	• Building Commissioner • Conservation Director/Stormwater Agent • Highway Superintendent • Planning Board Administrative Assistant • Town Manager • Selectboard Member • Water Department Director • Water Department Foreman
• Health and Social Services	• Deputy Director of Norton Emergency Management Agency (NEMA) • Director of Facilities (Public Schools) • Director of Human Services/Council on Aging • Director of Wheaton Campus Safety (Wheaton College) • Fire Chief • Health Agent • Police Chief

Sectors of the Community	HMPC Members
	• Superintendent of Schools
• Infrastructure	• Building Commissioner • Conservation Director/Stormwater Agent • Deputy Director of Norton Emergency Management Agency (NEMA) • Highway Superintendent • Planning Board Administrative Assistant • Selectboard Member • Town Manager • Water Department Director • Water Department Foreman
• School Systems	• Superintendent of Schools • Director of Facilities (Public Schools) • Director of Wheaton Campus Safety (Wheaton College)

Table 5. HMPC Members.

First Name	Last Name	Title	Affiliation	Phone	Email
Bryan	Carmichael	Planning Board Admin. Assistant	Town of Norton	508-285-0278	bcarmichael@nortonmaus.com
Brian	Clark	Chief of Police	Town of Norton	508-285-0301	clark@nortonpolice.com
Ray	Cord	Deputy Director of Norton Emergency Management Agency (NEMA)	Town of Norton	508-726-1054	rcord@nortonmaus.com
Christopher	DeMartino	Water Department Foreman	Town of Norton	508-285-0280	cdemartino@nortonmaus.com
Jared	Ferrara	Highway Superintendent	Town of Norton	508-285-0237	FerraraJ@nortonmaus.com
Frank	Fournier	Director Water Department	Town of Norton	508-285-0282	FFournier@nortonmaus.com
Nick	Lafrate	Building Commissioner	Town of Norton	508-285-0291	NIafrate@nortonmaus.com
Wade	Lizotte	Director of Facilities	Norton Public Schools	508-285-0100	wlizotte@norton.k12.ma.us
Roy	Mulcahy	Director of Wheaton Campus Safety	Wheaton College	508-286-5808	mulcahy_roy@wheatoncollege.edu
Jen	O'Neill	Superintendent of Schools	Norton Public Schools	508-285-0100	joneill@norton.k12.ma.us
Alec	Rich III	Selectboard Member	Town of Norton	508-285-0211	arich@nortonmaus.com
Beth	Rossi	Director Human Services / Council on Aging	Town of Norton	508-285-0235	etaylorrossi@nortonmaus.com

First Name	Last Name	Title	Affiliation	Phone	Email
Shawn	Simmons	Fire Chief	Town of Norton	508-285-0249	simmonss@nortonfire.com
John	Thomas	Norton Conservation Director/Stormwater Agent	Town of Norton	508-285-0275	jthomas@nortonmaus.com
Michael	Yunits	Town Manager	Town of Norton	508-285-0210	myunits@nortonmaus.com
Chris	Zahner	Health Agent	Town of Norton	508-285-0262	healthagent@nortonmaus.com

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

The first HMPC Meeting was held on October 24, 2023, and provided an opportunity for the consulting team and the Fire Department Chief to introduce the HMPC to the mitigation planning process. After an introduction to the plan, the HMPC identified natural hazards and critical facilities. Norton Middle School is the primary emergency shelter, though there is also a regional shelter in the City of Attleboro. The Town's Senior Center was also discussed as being used for a warming or cooling center, but it was never opened or required in the past. Norton is in the process of developing a new Senior Center for the community.

Regarding natural hazards, flooding has been an ongoing issue due to a dam that washes out on major roadways like Route 140. Droughts have led to water bans and restrictions for portions of the year. The HMPC discussed the presence of invasive species such as Japanese Knotweed and Waterborne Invasive Species which impact the Town's water bodies. The Town has an Aquatic Vegetative Management Program to aid in their efforts to manage invasive species.

The HMPC then discussed an increase in development with new warehouses, a six-building industrial park with four buildings currently occupied, a large residential complex with approximately 250 residents, a 200-unit apartment building being developed on Mansfield Avenue, an 80,000 square foot warehouse, alongside an update and expansion of the Nylon Pharmaceutical Company site. Wheaton College is also present in Norton, and they will work alongside the Town to mitigate risk.

The second HMPC meeting, held on November 29, 2023, began with planned outreach for the first public meeting. The HMPC had the Hazard Mitigation Plan meeting linked with the Council on Aging Senior Lunch in a "Lunch and Learn" format. Outreach included advertising in the Senior Newsletter, social media, cable, via the Town's website, reaching out to watershed groups, and providing information to students at local schools.

The meeting then turned to Norton's capabilities and the HMPC noted that they have a good amount of information regarding Town issues, projects, and plans. Norton has over seventy National Flood Insurance Program Policies and fifty-five insured losses. The Town is also in the process of updating their Open Space and Recreation Plan. The HMPC then moved onto discussing each natural hazard and reviewed impacts over the last five to ten years. The main hazards that were discussed focused on flooding which places sewer infrastructure and pump stations at risk due to their location in the floodplain. Additional at-risk sites due to flooding included the existing Senior Center, culverts, major roadways, and the land surrounding Winnecunnet Pond and Norton Reservoir. The HMPC highlighted that the dams were built for a certain water level and the Town has now gone above that level which leads to flooding concerns; however, several dams are not Town-owned and are difficult to manage.

Wind damage was also discussed as it leads to fallen trees, power line issues, and poles snapping which disrupts service and poses a hazard.

The focus for the third HMPC meeting, held on January 29, 2024, was a discussion on the takeaways from the first public meeting which included positive comments that the meeting went well and now aiming to reach out to a different audience by linking with a Selectboard meeting for the second public meeting. Then, there was further discussion of hazards, hazard rankings, and the creation of mitigation actions. The HMPC noted that the Water Department currently has permanent water restrictions in place so that no irrigation systems are allowed to connect to the Town's water which aids in drought concerns. The Town's critical facilities have generators which improve their resiliency in major weather events. Some mitigation actions that were discussed include going after grant sources for the Community Preservation Act, prioritizing larger regional projects, and expanding their Norton GIS MapGeo system.

The HMPC stated that for the future implementation of the Hazard Mitigation Plan, the Fire Department Chief will schedule a meeting twice a year and meet post-disaster as needed.

The fourth HMPC meeting was held on March 5, 2024. The meeting began with a discussion about the Public Meeting scheduled for March 20th and the outreach for that meeting. The HMPC agreed to advertise the meeting on the Town and Fire District websites, to reach out directly to all Town departments, boards, and committees as well as the school district. They also agreed to reach out to Southeastern Regional Planning & Economic Development District (SRPEDD), the Resilient Taunton Watershed Network (RTWN), Wheaton College, and adjacent communities. The Fire Chief mentioned the Selectboard has a meeting on March 14, 2024, so he planned to announce the Public Meeting there. The HMPC reviewed the final hazard ranking list and the final list of mitigation actions.

The HMPC also participated in two public meetings, one on January 11, 2024, and one on March 20, 2024. Finally, the HMPC reviewed the draft Town of Norton, MA Hazard Mitigation Plan prior to sending it to the Massachusetts Emergency Management Agency (MEMA) for their review in April 2024.

Public Outreach

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

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

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

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

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

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

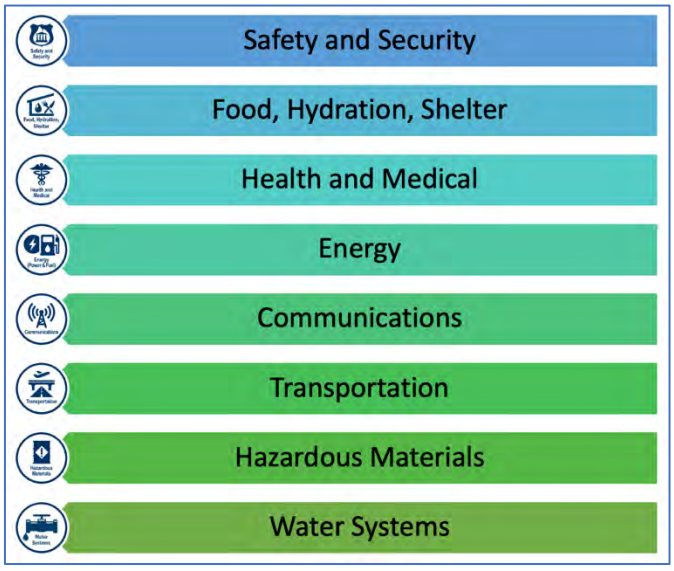


Figure 7. Community Lifelines.

Outreach for the public meetings and for plan review was sent via press release, email blasts, connecting with vulnerable populations such as the elderly community, sending information home with students, and reaching out to adjacent communities. The Town website (https://www.nortonma.org/) included announcements for meetings, the press releases were sent to local organizations, via social media, and posted around the Town at frequented buildings. The Town thought it best to have the Hazard Mitigation Plan Public Meetings align with the other Town-wide meetings like the Senior Lunch to increase participation.

Information gathered during the public meetings contributed to the plan's development. The first public meeting was held in a hybrid environment at the Senior Center on January 11, 2024. Five people attended on Zoom and a list of in-person attendees is in Appendix A. A flyer for this meeting is shown in Figure 8.

Figure 8. Public Meeting Flyer.

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

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

When asked "What do you like most about Norton?" answers included:

- People
- Supportive Community
- Rural Community.

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

- Flooding
- Windstorms
- Power Outages
- Extreme Temperatures
- Walking Up and Down
- Tornadoes
- Hurricanes

The meeting participants discussed critical facilities in Town which aligned with many of the facilities the HMPC highlighted in the plan, such as the Senior Center, Police and Fire Departments, Schools, the Care Center, Medical Facilities and Urgent Care, and Long-Term Care Facilities. These results are reflective of the population present at the meeting, which were those who were part of the elderly population and who prioritized the need for access to care and related services. Some mitigation actions that were noted by the meeting participants included addressing the railroad line and the trains that travel through wet areas while moving potentially hazardous materials. Additional actions included restricting building in flood zones, keeping green space, and removing trees from powerlines.

The second public meeting was held on March 20, 2024, on Zoom. Four people attended this meeting. The consulting team reviewed the contents of the plan with a focus on the list of natural hazards, a sample of mitigation actions, and descriptions of each chapter in the plan and how to review the draft plan. An issue in Town regarding dam ownership and roads was named. Apparently, the Town has questioned its legal responsibility for dams if they if they are part of Town-owned roads. The Town is working with lawyers and private dam owners to determine levels of responsibility.

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

Table 5. Where Public Engagement Informed the Plan.

Area of the Plan Impacted	**Contributions**
Planning Area Profile	• The HMPC developed 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. • Offered first-hand insight and experiences of Town residents. • Added the qualitative review to the risk analysis for determination of the hazard risk ranking.
Capability Assessment	• Contributed plans, bylaws, and reports for review. • Completed three Capability Assessment questionnaires including the National Flood Insurance survey and the Safe Growth survey.

Area of the Plan Impacted	Contributions
Mitigation Strategy	• Identified and prioritized mitigation actions based on their concerns. • Focused on the concerns raised by community members.
Implementation Plan	• Committed to integrating this plan more thoroughly throughout Town government and to posting the plan on the Town's website.

List of Key Stakeholders Invited to Public Meetings and to Review the Draft Plan

- Members of all Norton Boards
- Members of all Norton Committees
- All Town of Norton Employees
- Town of Easton
- Town of Mansfield
- Town of Rehoboth
- Town of Taunton
- Town of Attleboro
- Southeastern Regional Planning & Economic Development District
- Resilient Taunton Watershed Network
- Greater Attleboro Regional Emergency Planning Committee
- Wheaton College

Review of Draft Plan

The Town made the plan available for public review in April 2024. A press release announcing the availability to review the plan was sent and the announcement was posted to the Town and Fire Department websites. Announcements were also sent to all Town departments, committees, and Boards. The HMPC sent specific invitations to the Norton School District and the Norton Housing Authority, each was encouraged to share widely. Hard copies of the plan were kept in the Town Hall, at the Fire Department, at the Council on Aging and in the Conservation Department. Comments from the public were collected by the Fire Department Chief via a Google Form.

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 evaluate the hazards identified for study and inclusion in the Town's Municipal Vulnerability Preparedness 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 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 hazard identification process, the HMPC considered the results of the Town's Municipal Vulnerability Preparedness (MVP) planning effort (completed in 2018), as well as the "ResilientMass Plan" (2023[48]) which is the formal update to the 2018 State Hazard Mitigation and Adaptation Plan (SHMCAP). For this 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, changing seasonality and storms, high wind events, and extreme temperatures. Invasive species as a hazard was added to reflect the concern for this becoming a more prevalent challenge with projected climate change; and to ensure that the risk assessment is aligned with the ResilientMass Plan. The profiled hazards are as follows:

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

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

- Tornadoes
- Wildfires/Brushfires

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

Massachusetts Emergency Declarations

The Town of Norton has been subject to numerous federal disaster declarations along with the entirety of Bristol 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 Norton have involved natural hazards addressed in this plan except for the shelter capacity crisis, which is not a natural hazard and not profiled in this plan. Hazards that do not appear in this table (i.e., earthquakes) have not been subject to Massachusetts emergency declarations.

Table 6. Massachusetts Emergency Declarations.

Massachusetts Emergency	**Start**	**Termination**	**Corresponding Federal Disaster Declaration**	**FEMA Public Assistance Available**	**Applicable to Norton?**
Storm Lee	9/15/2023	9/16/2023	Not applicable	Not applicable	Yes
Severe Weather and Flooding	9/12/2023	9/16/2023	Not applicable	Not applicable	Yes
Shelter Capacity Crisis	8/8/2023	Pending	Not applicable	Not applicable	Yes, but not a natural hazard and not a FEMA declaration for Massachusetts
COVID-19	3/10/2020	5/11/2023	DR-4496-MA	All counties	Yes
Merrimack Valley Gas Explosion	9/14/2018	10/4/2018	Not applicable	Not applicable	No
Coastal Storm	3/3/2018	3/6/2018	DR-4372-MA	Essex, Norfolk, Plymouth, Bristol,	Yes

Massachusetts Emergency	Start	Termination	Corresponding Federal Disaster Declaration	FEMA Public Assistance Available	Applicable to Norton?
				Barnstable, and Nantucket Counties	
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	Yes
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	Yes
Nor'easter	10/29/2011	11/7/2011	DR-4051-MA	Berkshire, Franklin, Hampshire, Hampden, Worcester, and Middlesex Counties	No
Hurricane Irene	8/26/2011	9/6/2011	DR-4028-MA	Berkshire, Franklin, Hampshire, Hampden, Norfolk, Bristol, Plymouth, Barnstable, and Dukes Counties	Yes
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. Norton is in the "Eastern Inland" region shown in brown in the figure below.

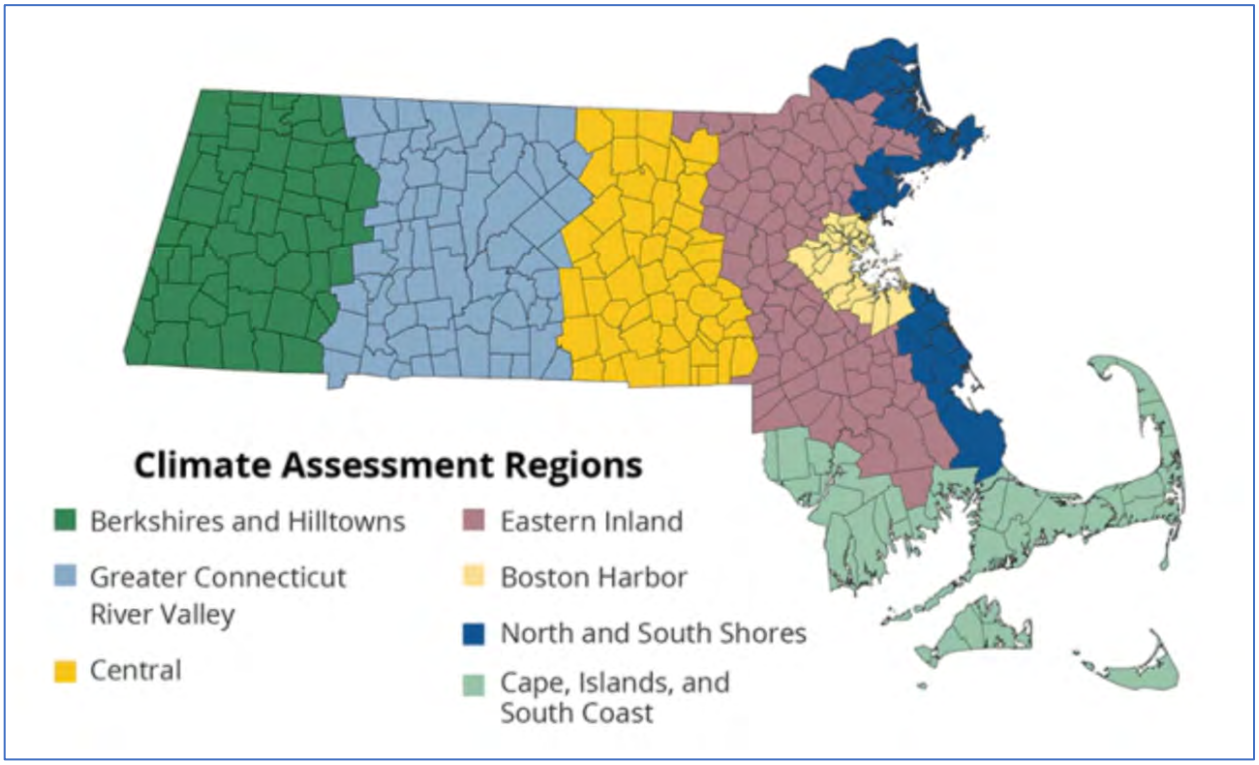


Figure 9. Climate Assessment Regions. Norton is in the Eastern Inland Region.

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

Table 7. Top Impacts of Climate Change per Sector in Eastern Inland Region.

Sector	Top Impacts per Sector	Comments
Human	Increase in vector-borne disease incidence and bacterial infections	Including West Nile Virus and Lyme due to favorable conditions for mosquitos and ticks
	Reduction in food safety and security	Causes are production and supply chain issues as well as spoilage during outages

Sector	Top Impacts per Sector	Comments
Infrastructure	Damage to electric transmission and distribution	From heat stress and extreme storms
	Damage to buildings	Causes are heavy rainfall and overwhelmed drainage
	Damage to rails and loss of rail/transit service	Causes are flooding and track buckling from heat
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	Includes emergency response, food assistance, and health care
Economy	Reduced ability to work	For outdoor workers during extreme heat events, as well as delays in commute times
	Reduction in availability of affordably priced housing	Causes are direct damage (floods) and scarcity caused by demand

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

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

Sector	Top Impacts per Sector	Approach to Incorporating Impacts
Human	Increase in vector-borne disease incidence and bacterial infections	Vector-borne and infectious diseases are a hazard profiled in this plan.
	Reduction in food safety and security	Local droughts that impact food security will be addressed. Food safety and security nationwide will not be directly addressed, but the capability

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

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

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

Table 9. Hazard Characterization.

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

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

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

Average and Extreme Temperatures

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

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

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.[49]

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

Previous Occurrences

Extreme Cold: The ResilientMass Plan notes that since 1995, there have been 120 cold weather events within the Commonwealth, ranging from Cold/Wind Chill to Extreme Cold/Wind Chill events. The NOAA Storm Events database (https://www.ncdc.noaa.gov/stormevents/) for Bristol County lists one extreme cold and/or wind chill events for the area of Norton during the 2014-2023 timeframe.

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 2023. 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.

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

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 Bristol County lists two extreme heat events for the area of Norton in the timeframe 2010-2023. These are listed below, with notations for temperatures and dates differing from entry to entry as reported by the various contributors.

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

Date	Description
7/6/10	A strong ridge built into Southern New England resulting in temperatures nearing 100 with high humidity. Heat index values ranged from 100 to 106 for most of Southern New England on the 6th and again on the 7th in a more limited area, generally the Connecticut River Valley.
7/22/11	A strong upper level ridge brought very hot temperatures to Southern New England. A moist southwest low level flow increased humidity levels such that heat index values rose above 105 degrees for a period of a few hours.

Evidence demonstrates that several extreme heat events occurred in Norton in July-August 2022 and July-August 2023.

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

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

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

Year	Event	Event "Begin Dates"
2022	Severe Winter Storm and Snowstorm	1/28/2022

Year	Event	Event "Begin Dates"
2022	Frost/Freeze	1/28/2022
2018	Severe Winter Storm and Flooding	3/2/2018
2018	Severe Winter Storm and Snowstorm	3/13/2018
2014	Below average temperatures and excessive ice	1/21/2014

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 10) designed to more accurately calculate how cold air feels on human skin.

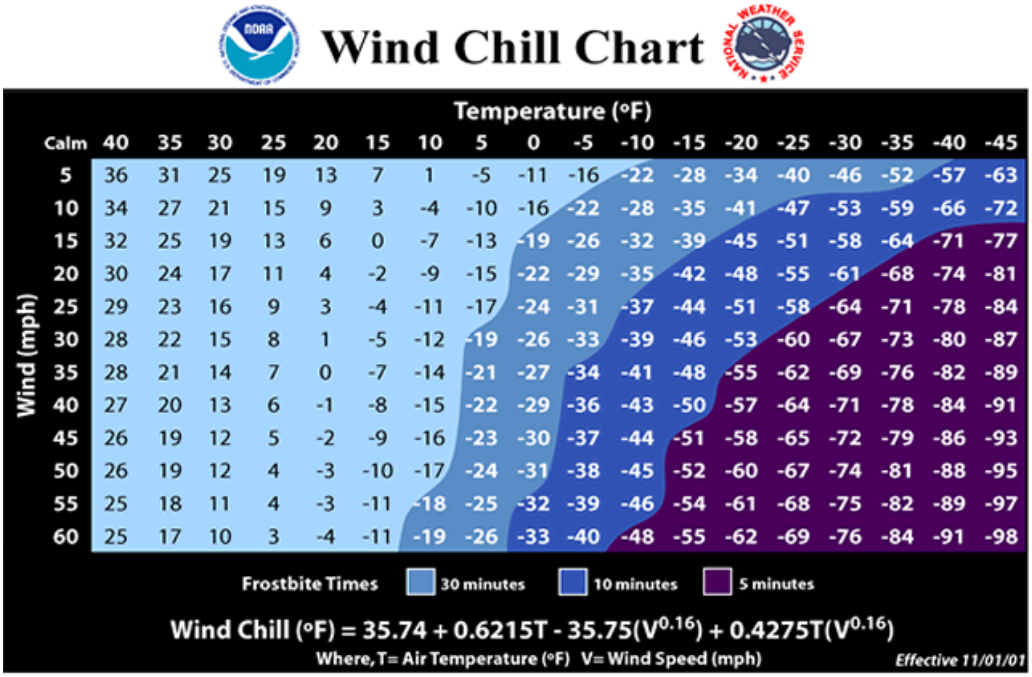


Figure 10. NWS Wind Chill Temperature Index and Frostbite Risk.

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.

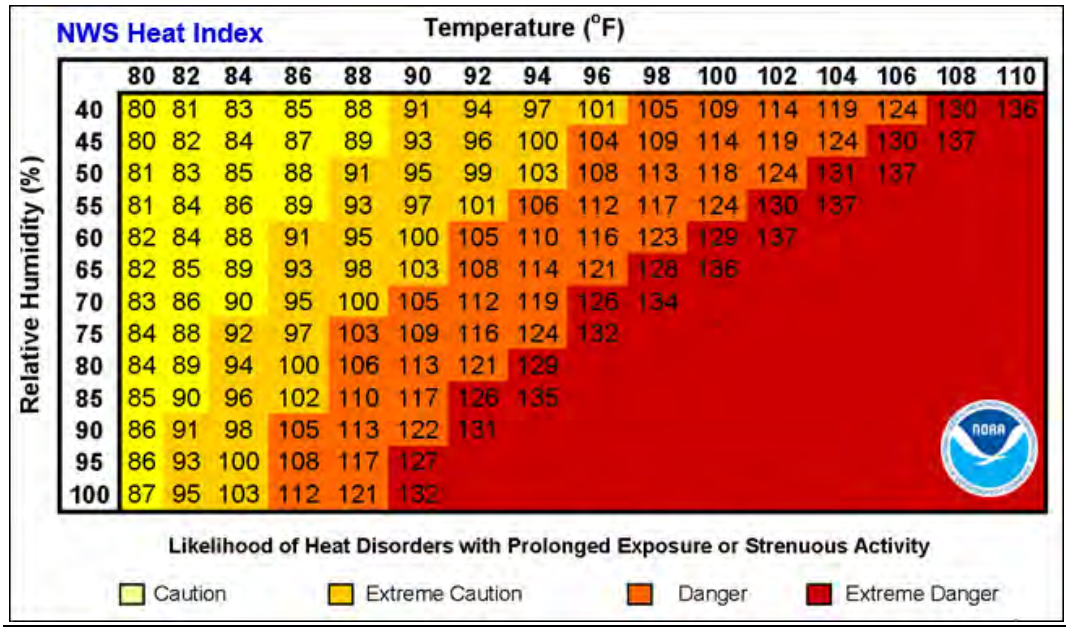


Figure 11. NWS Heat Index Chart.

Probability of Future Events

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

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

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

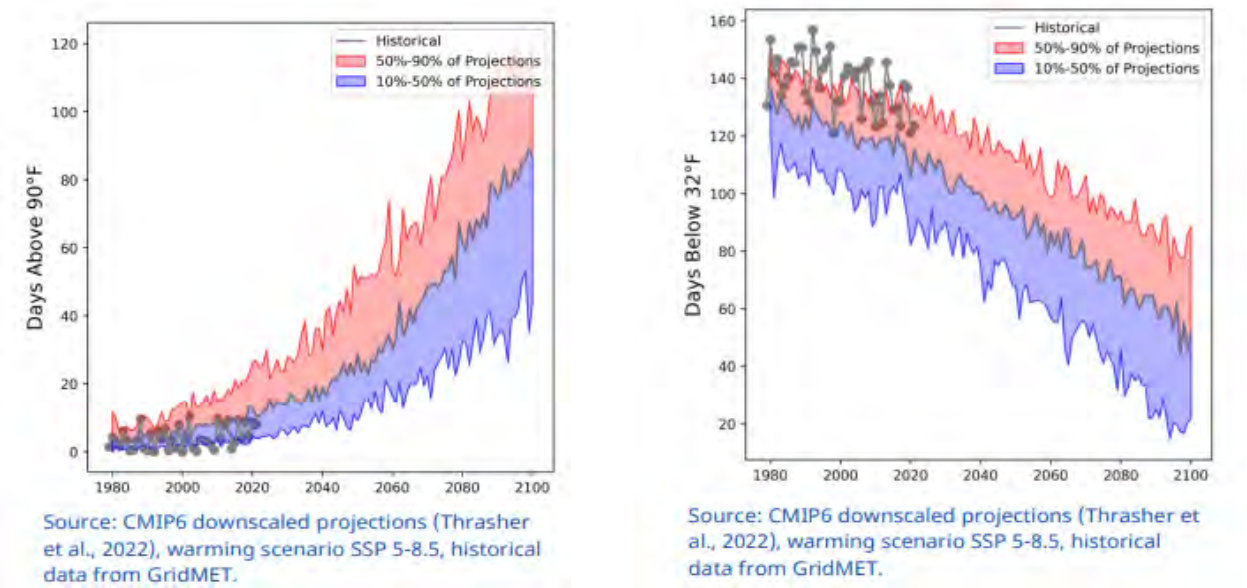


Figure 12. Projected Annual Days with Temperatures above 90 Degrees (left) and below 32 degrees (right).

Vulnerability Assessment

Exposure

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

Built Environment Impacts

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

and railroad locomotives which lead to an increase in mechanical failures. Steel rails are at risk of overheating and warping which can lead to train derailments.

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

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

Population Impacts

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

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

Older adults are often at elevated risk due to a high prevalence of pre-existing and chronic conditions. In Norton, 15.0% of the population is over age 64. People who live in older housing stock and in housing without air conditioning have increased vulnerability to heat-related illnesses. Power failures are more likely to occur during heat waves, affecting the ability of residents to remain cool during extreme heat.

Individuals with pre-existing conditions and those who require electric medical equipment may be at increased risk during a power outage. Heat impacts are more likely to be felt by residents without air conditioning, by those who work outdoors, and those with underlying health conditions.

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

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

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

Environment Impacts

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

Problem Statements for Extreme Temperatures.

Table 12. Problem Statements for Extreme Temperatures.

Assets	Problems Associated with Extreme Temperatures
People (including underserved communities and socially vulnerable populations)	• Extreme heat will be a significant public health threat to all residents, but especially for vulnerable populations living in older homes or homes without air conditioning.

Assets	Problems Associated with Extreme Temperatures
	• The elderly and those with mobility issues may not be able to leave their homes and travel safely. • People working in businesses without air conditioning may be at risk of heat illness. • First responders may also be impacted by extreme temperatures. • Pets may be adversely impacted by extreme heat. • The Town currently uses the middle school as an emergency shelter but would like to add the new council on aging center as an additional shelter when it's complete.
Structures (including facilities, lifelines, and critical infrastructure)	• Older homes without insulation and single-pane glass are difficult to heat and cool and may not provide safe living conditions. • Businesses that require refrigerated trucks or refrigeration units may see business losses and increased utility costs. • The electric grid may become stressed and fail during extreme heat events.
Systems (including networks and capabilities)	• Extreme heat mitigation and adaptation has not been fully integrated into existing local plans and regulations for new development, though progress is being made.
Natural, historic, and cultural resources	• Extreme heat may lead to, or exacerbate, impacts to natural systems related to wildfires and invasive species (refer to those sections). • Extreme heat may lead to water quality concerns.
Activities that have value to the community	• Recreational activities may be adversely impacted by extreme heat.

Droughts

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

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

Description

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

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

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

The Norton Water Department is a public community water system under the City Department of Public Works and provides water for about 19,031 residents. There are also private wells in Norton. 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 Town of Norton's drinking water supply is groundwater from the Canoe River Aquifer, located within the Taunton River Basin. The aquifer provides drinking water for five municipalities of Sharon, Foxborough, Mansfield, Easton, and Norton. The Canoe River Aquifer is a Federally-designated Sole

Source Aquifer due to its capacity to supply more than 50% of the drinking water consumed in the area, or approximately 50,000 residents. In total, the aquifer is 16 miles long and recharges the network of smaller aquifers that comprise the Canoe River sub watershed.

The Norton Water Department provided approximately 1.2 million gallons of water during 2022. The distribution system consists of five gravel-packed wells, four storage facilities that store a combined amount of 5.85 million gallons of water (state regulations require a one-day minimum of water storage supply), and approximately 150 miles of water main.

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

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

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

Location

Massachusetts Drought Management Plan (DMP, 2019) assesses drought conditions in seven regions: Western, Connecticut River Valley, Central, Northeast, Southeast, 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 Norton, which is located in the Southeast 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.

Norton has successfully implemented water bans and restrictions for previous drought events. The Town follows the recommendations of the State.

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 Bristol County are listed below, corresponding to 2015-2016 and 2020.

Table 13. USDA Disasters Events That Refer to Drought.

Year	Event	Event "Begin Dates"
2020	Drought	8/18/2020, 9/15/2020, 9/29/2020
2016	Drought, high winds, wildfire, excessive heat, insects	8/24/2016, 9/21/2016
2015	Drought	2/1/2015

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

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

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

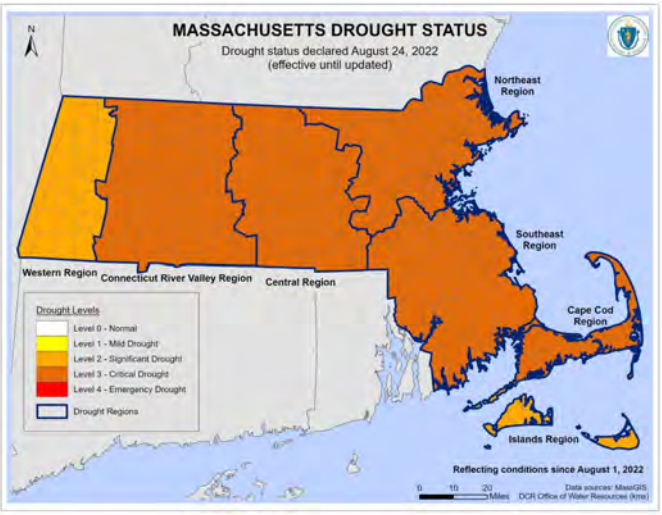
Extent

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

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

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

The drought of 2022 is typical of a flashy drought. The NCEI Severe Storm Database reported on 8/16/22 that "The United States Drought Monitor indicated severe drought conditions across much of Bristol 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 Bristol County starting on August 24. Residents and businesses were urged to be extremely mindful of their overall water use. The drought of 2022 was most severe in August but was alleviated by rainfall in September 2022.



to the Secretary of the EEA, who then declares the drought level for each region of the state.

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

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

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

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

Probability of Future Events

Climate change will increase the probability of droughts. The Massachusetts Climate Change Assessment notes that the region will experience slight increases in the number of consecutive dry days and the number of days without rain from 2050 onward. By 2090 the number of consecutive dry days per year will increase to 33, compared to the annual statewide baseline of 31 days from 1986 to 2005. Table 14 summarizes this data and indicates the projected number of consecutive dry days according to the "high" and "low" limits of the Northeast Climate Adaptation Science Center (NE CASC) data. The Town of Norton is represented by the Eastern Island region.

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

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

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

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

Vulnerability Assessment

Exposure

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

Built Environment Impacts

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

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

Population Impacts

Populations considered most vulnerable to drought impacts are identified based on a number of factors including their physical and financial ability to react or respond during a hazard. Senior and low-income

populations are particularly susceptible. The Town should be aware of the potential needs of residents within these population segments in the event of a hazard occurrence.

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

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

Environment Impacts

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

Problem Statements for Drought

Table 15. Problem Statements for Drought.

Assets	Problems Associated with Drought
People (including underserved communities and socially vulnerable populations)	• Vulnerable communities may have difficulty accessing potable water 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.
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.

Assets	Problems Associated with Drought
Activities that have value to the community	• None applicable.

Earthquakes

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

Description

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

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

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

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

In some places in New England, including locations in Massachusetts, small earthquakes seem to occur with some regularity. For example, since 1985 there has been a small earthquake approximately every 2.5 years within a few miles of Littleton. 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 Norton or to occur elsewhere and be felt in Norton.

Previous Occurrences

The largest earthquake since 1900 to strike Massachusetts was a magnitude 3.9 located east of the Quabbin Reservoir in 1994. There was a magnitude 2.6 earthquake 3 km outside of North Westport in 1996, a magnitude 3.1 earthquake 2 km outside of Bristol in 1996, and a 3.0 earthquake 2 km outside of North Lakeville in 1982.

To determine whether earthquakes have occurred more recently near or in Norton, 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:

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

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

Extent

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

The Richter scale was developed in 1935 and was used exclusively until the 1970s. The scale set the magnitude of an earthquake based on the logarithm of the amplitude of recorded waves. Being logarithmic, each whole number increase in magnitude represents a tenfold increase in measured

strength. Earthquakes with a magnitude of about 2.0 or less are usually called "microearthquakes" and are generally only recorded locally. Earthquakes with magnitudes of 4.5 or greater are strong enough to be recorded by seismographs all over the world.

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

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

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

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

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

Table 16. Modified Mercalli Intensity.

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

Source: USGS

A comparison of Moment Magnitude to typical Modified Mercalli intensity is presented below.

Table 17. Modified Mercalli Intensity and Moment Magnitude.

Moment Magnitude	Typical Maximum Modified Mercalli Intensity
1.0 to 3.0	I
3.0 to 3.9	II to III
4.0 to 4.9	IV to V
5.0 to 5.9	VI to VII

Moment Magnitude	Typical Maximum Modified Mercalli Intensity
6.0 to 6.9	VII to IX
7.0 and above	VIII or higher

Source: USGS

Probability of Future Events

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

Vulnerability Assessment

Exposure

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

Built Environment Impacts

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

To identify built environment impacts to the Town, FEMA's risk assessment software, Hazus, was implemented. The economic loss results of the 1500-year event are shown in Table 18 while the results for the 2500-year event are shown in Table 19. The Town's Average Annual Loss (AAL) is modeled to be $15,197.

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

Loss Type	Residential ($Million)	Commercial ($Million)	Other Occupancy ($Million)	Total ($Million)
Building Loss	7.16	4.27	3.64	**15.07**
Content Loss	1.69	1.51	1.58	**4.79**
Business Inventory Loss	0.00	0.35	0.08	**0.44**
Business Income Loss	0.09	0.69	0.07	**0.86**
Business Relocation Loss	0.47	0.79	0.87	**2.13**
Rental Income Loss	0.35	0.55	0.14	**1.05**
Wage Loss	0.21	0.75	0.29	**1.24**
Total	**9.97**	**8.92**	**6.67**	**25.56**

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

Loss Type	Residential ($Million)	Commercial ($Million)	Other Occupancy ($Million)	Total ($Million)
Building Loss	13.70	8.08	6.90	**28.67**
Content Loss	3.66	3.03	3.15	**9.84**
Business Inventory Loss	0.00	0.70	0.17	**0.87**
Business Income Loss	0.16	1.28	0.13	**1.58**
Business Relocation Loss	0.86	1.45	1.62	**3.93**
Rental Income Loss	0.62	0.98	0.26	**1.86**
Wage Loss	0.39	1.37	0.52	**2.28**
Total	**19.40**	**16.89**	**12.75**	**49.04**

Population Impacts

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

Hazus was used to model injuries and fatalities for the 1500- and 2500-year events. For the 1500-year event, there are fewer than 5 injuries requiring medical attention and one injury requiring medical attention. For the 2500-year event there are up to 10 minor injuries not requiring medical attention with up to 5 injuries requiring medical attention.

Environment Impacts

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

Problem Statements for Earthquakes

Table 20. Problem Statements for Earthquakes.

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

Flooding from Precipitation and Dam Overtopping

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

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

increased inland flooding. Common types of flooding are described below.

Description

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

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

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

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

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

Figure 13. Flooding in Norton.

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 Norton. A

few dams are located in and upstream of Norton. Ice jams have reportedly occurred along the Wading River. Therefore, all flood-related hazards (riverine floods, stormwater flooding, dam overtopping, and ice jams) are relevant to the Town of Norton.

The Community Resilience Building Workshop Summary of Findings (2018) included the following flood concerns:

- The Walker Street, North Worcester Street, Plain Street, East Hodges Street culverts are inadequate and lead to stormwater flooding.
- Dams were identified as concerns for the downstream flooding and potential loss of life or property damage if they fail. They were not built to accommodate current water levels, and cannot be upgraded or removed without evaluating downstream impacts of different scenarios.
- Existing solar farm sites experience flooding from runoff and consequential erosion, especially where trees have been cleared. The existing Large-Scale Ground-Mounted Solar bylaw requires a storm water pollution prevention plan and specifies clearing 'limited to what is necessary for construction'.

Other areas exposed to the flood hazard which have been identified during this HMP process, include:

- Richardson Ave. and Route 123
- Plain St. Water Well and Pump Station
- Rumford Rd. and 12A Bay Rd. Sewer Pump Station

Previous Occurrences

Floods

The Wading River Near Norton USGS stream gauge #011090000 is located at the intersection of New Taunton Ave. and Wading River and reflects the flood events experienced in the Town of Norton. There are four events listed on the USGS Waterwatch website that exceeded the 100-year flood stage for this stream gauge including:

- 8/20/1955 when the discharge was 1,170 cubic feet per second (cfs)
- 6/14/1998 when the discharge was 1,330 cfs
- 3/19/1968 when the discharge was 1,460 cfs
- 3/30/2010 when the discharge was 1,570 cfs

The most recent high maximum discharge was 783 cfs on 1/11/2024.

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

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

Date	Description
10/30/17	*Flood.* The remnants of Tropical Storm Phillipe merged with a mid-latitude system approaching the U.S. East Coast. This created an area of low pressure that moved north from the Carolinas through New York State on the 29th. The low swung a cold front through Southern New England during the early morning of the 30th. The combined system generated strong to damaging winds, especially in Eastern Massachusetts. Tropical moisture flowing north ahead of the cold front contributed to heavy downpours with one to five inches of rain reported.

Ice Jams

Ice jams are known to have occurred in and near Norton. According to the U.S. Army Corps of Engineers Cold Regions Research and Engineering Laboratory (CRREL) Ice Jam Database, an ice jam occurred on February 14, 1971, at Wading River. No damage from this event was recorded. Five other ice jams have occurred on this river from 1960 through 2023.

Dam Overtopping

Dams upstream of Norton and in Norton have not overtopped. However, according to Town staff, they are not built to accommodate current water levels, and cannot be upgraded or removed without evaluating downstream impacts of different scenarios.

Extent

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

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

boundaries of the 1% annual chance (100-year) and the 0.2% annual chance (500-year) floodplains are shown on Flood Insurance Rate Maps (FIRMs), which are the principal tools for identifying the extent and location of the flood hazard.

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

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

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

Probability of Future Events

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

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

Vulnerability Assessment

Exposure

In Norton, the 1% annual chance floodplain (100-year floodplain) covers about 2,957 acres, or approximately 15.8 percent of the Town. In addition to the 100- year floodplains, stormwater has the potential to cause localized flooding.

There are utilities exposed to the existing floodplain including the Plain St. water well and pump station, and sewer pump stations on Rumford Rd. and 12A Bay Rd. There are some issues with undersized culvert on Walker St., North Worcester St., Plain St., and East Hodges St. There are approximately 183 buildings in the floodplain including single family homes, multi-family homes, commercial, government, and industrial buildings. Additionally, there are some roads that experience flooding including Richardson Ave. and Route 123. There are no structures listed on the National Register of Historic Places in the floodplain. According to EPA's Toxic Release Inventory (TRI) database, there are four facilities which contain hazardous materials (Blue Star Business Park, Defiance Azon Corp, Reliable Electroplating, and Wheaton College at 26 East Main St.) in the 100-year floodplain. There are no buildings in the floodplain that are part of an environmental justice community. Table 22 shows the types of buildings exposed to the flood and their value. The number in parathesis shows the total number of buildings and building values for the Town.

Table 22. Buildings in 100-Year Floodplain.

Building Type	Number of Buildings (Total in City)	Building Value (Total in City)
Single Family	150 (6,161)	$23,839,600 ($1,408,802,000)
Multi-Family	3 (659)	$1,018,100 ($739,322,800)
Mixed-Use	0 (114)	$0 ($26,284,800)
Commercial	12 (301)	$19,248,700 ($183,608,300)
Educational	0 (90)	$0 ($110,222,900)
Government	7 (96)	$44,900 ($536,045,000)
Religious/Non-Profit	0 (58)	$0 ($62,320,700)
Industrial	3 (65)	$1,591,800 ($394,970,760)
Garage/Outbuilding	6 (25)	$138,000 ($594,700)
Vacant	2 (54)	$93,600 ($590,800)
Total	**183 (7,623)**	**$45,974,700 ($3,462,762,760)**

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

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

Demographics	Population in and Adjacent to Floodplain	Total Population
Population	11,055	19,202
Households	4,487	6,971
White	10,034 (90.8%)	17,018 (88.6%)
Black	231 (2.1%)	486 (2.5%)
American Indian	11 (0.1%)	19 (0.1%)
Asian	196 (1.7%)	469 (2.4%)
Pacific Islander	1 (0.0%)	3 (0.0%)
Other Race	122 (1.1%)	274 (1.4%)
Two or More Races	460 (4.2%)	933 (4.9%)
Hispanic or Latino:	258 (2.3%)	596 (3.1%)
Population under 18:	1,996 (18.1%)	3,203 (16.7%)
Population over 64:	1,706 (15.4%)	2,873 (15.0%)
Annual Income < $30K/year	578 (12.9%)	884 (12.7%)
Population in EJ Zone*:	0 (0.0%)	0 (0.0%)

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

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

There are two high dams and two significant hazard dams in Norton with six additional dams in Norton and two directly outside Norton in the Town of Easton. Table 24 identifies the dams within and adjacent to the Town. The two high hazard dams were built to hold a certain amount of water which are now exceeded during normal operations.

Table 24. Dams in Vicinity.

Name	Ownership	Hazard Type
Chartley Pond Dam	Public	High
Norton Reservoir Dam	Public	High
Barrowsville Pond Dam	Private	Significant
Rumford River Dam	Private	Significant
Meadowbrook Pond Dam	Private	Low
Canoe River Dam	Private	N/A
Cranberry Reservoir Dam (Town of Easton)	Private	N/A
Goose Branch Pond Dam	Public	N/A
Norton Water Supply Dam #1	Public	N/A
Ward Pond Dam (Town of Easton)	Public	N/A

The 100-year Floodplain (FEMA) with the Town's critical facilities is shown in Figure 14. There are utilities around Winnecunnet Pond which are exposed to the flood hazard.

There are also beaver dams around Meadowbrook Pond which may cause property damage.

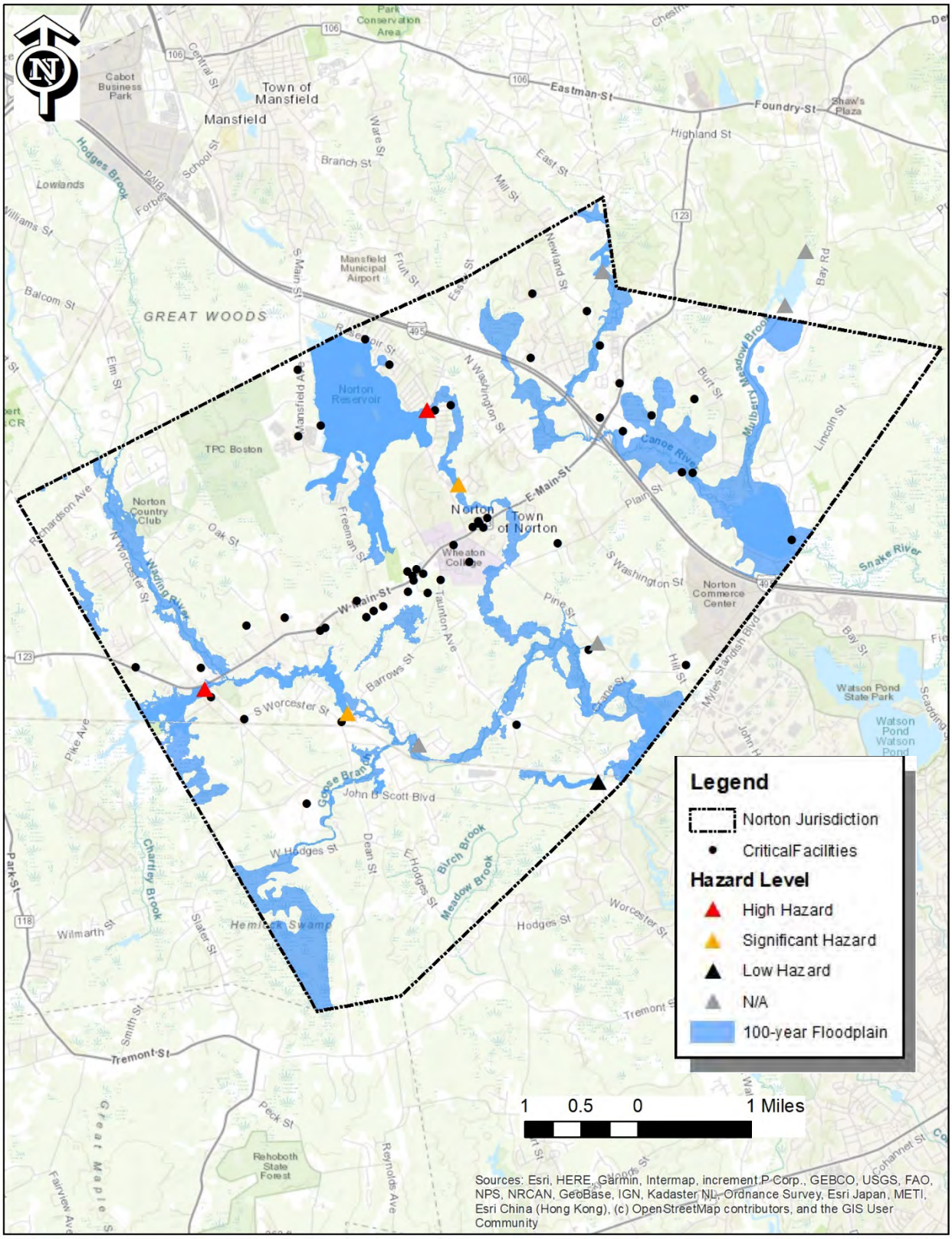


Figure 14. Norton Critical Facilities and 100-Year Floodplain.

Built Environment Impacts

To identify built environment impacts to the Town, FEMA's risk assessment software, Hazus, was implemented. Building footprint data and parcel data was used to update the model while the latest floodplain was also integrated into the software. The economic loss results of the 100-year event are shown in Table 25. The Town's Average Annual Loss (AAL) is calculated to be $186,000.

Table 25. Building Loss for the 100-Year Flood Scenario.

Loss Type	Residential ($Million)	Commercial ($Million)	Other Occupancy ($Million)	Total ($Million)
Building Loss	2.14	0.30	0.64	**3.08**
Content Loss	0.98	1.14	2.05	**4.17**
Business Inventory Loss	0.00	0.44	0.19	**0.63**
Business Income Loss	0.09	0.87	0.38	**1.34**
Business Relocation Loss	0.68	0.21	0.32	**1.21**
Rental Income Loss	0.23	0.15	0.09	**0.47**
Wage Loss	0.21	1.02	7.51	**8.74**
Total	**4.33**	**4.13**	**11.18**	**19.64**

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

Population Impacts

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

Using the Hazus software, the 100-year flood scenario results showed that there would be approximately 302 displaced households and 100 people seeking public shelter.

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

Environment Impacts

One of the major environmental impacts of a major flood would be the potential release of hazardous materials. According to EPA's Toxic Release Inventory (TRI) database, there are four facilities which contain hazardous materials (Blue Star Business Park, Defiance Azon Corp, Reliable Electroplating, and Wheaton College at 26 East Main St.) in the 100-year floodplain.

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

Problem Statements for Flood

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 26. Problem Statements Related to Flooding.

Assets	Problems Associated with Flood
People (including underserved communities and socially vulnerable populations)	• Older populations in the floodplain may have difficulty evacuating. • Although the J.C. Solmonese Elementary School is not in the floodplain, part of the property and two of the roads to the school could be flooded.

Structures (including facilities, lifelines, and critical infrastructure)	• Potential exposed structures include:
	  ○ Water and sewer utilities.
	  ○ Undersized culverts on Walker St., North Worcester St., Plain St., and East Hodges St.
	• Wayfair and Home Depot Distribution Centers are near the floodplain.

Systems (including networks and capabilities)	• Road closures may interrupt community systems including Richardson Ave. and Route 123.

Assets	Problems Associated with Flood
	• The Town is currently precluded from adopting higher regulatory standards to protect against flooding (must comply with State Building Code).
Natural, historic, and cultural resources	• According to EPA's Toxic Release Inventory (TRI) database, there are four facilities which contain hazardous materials (Blue Star Business Park, Defiance Azon Corp, Reliable Electroplating, and Wheaton College at 26 East Main St.) in the 100-year floodplain.
Activities that have value to the community	• Several road closures may disrupt community events.

Hurricanes and Tropical Storms

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

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

Description

Tropical cyclones (tropical depressions, tropical storms, and hurricanes) that affect New England form over the warm, moist waters of the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico. Tropical systems customarily come from a southerly direction and when they accelerate up the East Coast of the U.S., most take on a distinct appearance that is different from a typical hurricane. Although rain is often limited to 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

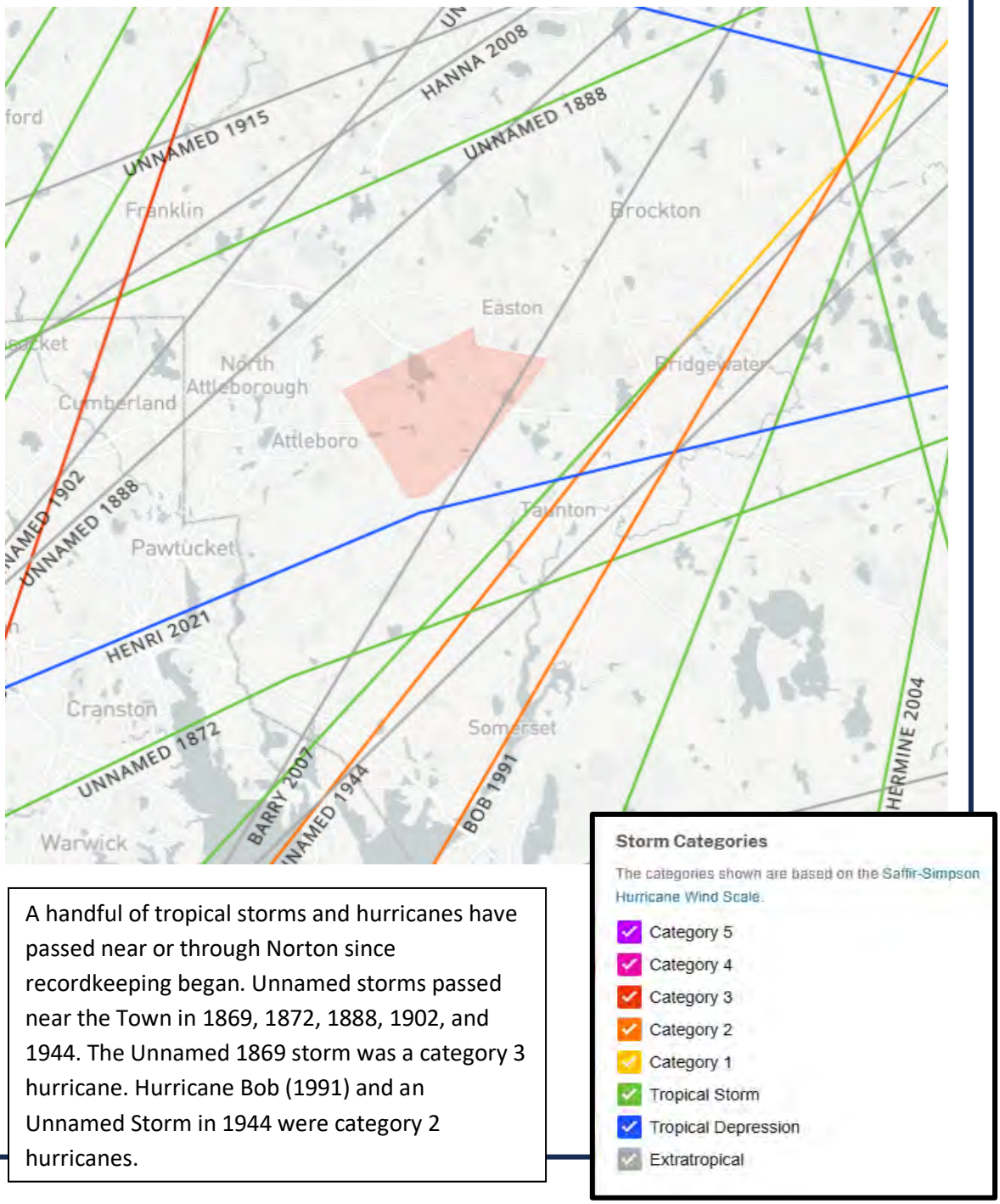
Tropical storms and hurricanes can affect the entirety of Massachusetts, including the geographic extent of Norton.

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.

Figure 15. Damage from Hurricane Carol on East Main Street.

Historical Tropical Storm Tracks in the Town of Norton



A handful of tropical storms and hurricanes have passed near or through Norton since recordkeeping began. Unnamed storms passed near the Town in 1869, 1872, 1888, 1902, and 1944. The Unnamed 1869 storm was a category 3 hurricane. Hurricane Bob (1991) and an Unnamed Storm in 1944 were category 2 hurricanes.

Figure 16. Historical Tropical Storm Tracks in Norton.

As noted elsewhere, this Plan relies primarily on a ten-year lookback (2014 through 2023) ending with the date of plan development. During that ten-year period, only one Massachusetts emergency declaration (Storm Lee of September 2023) was associated with a tropical system, but it is not yet in the NCEI database of severe storms for Bristol County. Over the last ten years, the following tropical storms impacted in and around Norton:

- September 20, 2017: Named storm Jose formed over the Tropical Atlantic, moving west and growing to become a Major Hurricane. Jose passed north of the Leeward Islands, then turned on a northward path north of the Dominican Republic. As he moved north, Jose diminished to a Tropical Storm during Tuesday the 19th and then stalled about 150 miles southeast of Nantucket. The storm then slowly drifted south by Friday the 22nd and started to dissipate. Jose brought strong wind gusts and heavy downpours, primarily to the islands and south coasts of Massachusetts. Rainfall reached about 6 inches on Nantucket, wind gusts reached 62 mph at Nantucket and Aquinnah, and storm surge brought minor coastal flooding to parts of Nantucket.
- August 4, 2020: Tropical Storm Isaias moved from coastal Virginia eastern New York state, near the Connecticut/Massachusetts border on Tuesday, August 4. As the storm reached the New York City area, southerly winds were maximizing across southern New England, causing widespread wind damage.
- July 9, 2021: Tropical Storm Elsa made landfall in Rhode Island on Friday morning before moving into the Gulf of Maine. It interacted with a stalled frontal boundary and brought widespread heavy rainfall of 2 to 3.5 inches and gusty winds along the south coast, which caused scattered tree damage.
- August 22, 2021: Tropical Storm Henri made landfall in southwest Rhode Island around noon on August 22nd, then moved slowly northwestward and westward across northern Connecticut and weakened. Henri brought strong wind gusts and flash flooding. The strongest gusts -- to 70 mph -- occurred along the Rhode Island coast. The worst flash flooding occurred in northeast Connecticut. As the remnants of Henri moved eastward across southern New England on August 23rd, it spawned three tornadoes and a waterspout in MA and caused some renewed flooding. The highest rainfall totals over the two-day period ranged from 5 to 6 inches in Hartford and Tolland Counties in northern Connecticut and in Franklin, Hampshire, and Hampden Counties in western Massachusetts.

Impacts of the 2021 Hurricane Season on Massachusetts

Graphic courtesy of NOAA

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

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

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

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

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

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

Extent

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

Table 27. Saffir-Simpson Scale.

Saffir-Simpson Hurricane Wind Scale

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

Source: National Hurricane Center, NOAA

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

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

Probability of Future Events

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

Some researchers have suggested that the intensity of tropical cyclones has increased over the last 40 years, with some believing that there is a connection between this increase in intensity and climate change. While most climate simulations agree that greenhouse warming enhances the frequency and intensity of tropical storms, models of the climate system are still limited by resolution and computational ability. Given the history of major storms and the possibility of increased frequency and intensity of tropical storms due to climate change, it is prudent to expect that there will be hurricanes impacting Norton 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 Norton should be considered exposed to high winds while specific areas are exposed to hurricane surge. Figure 18 shows the 100-year windspeeds identified in the ASCE 7-98 publication.

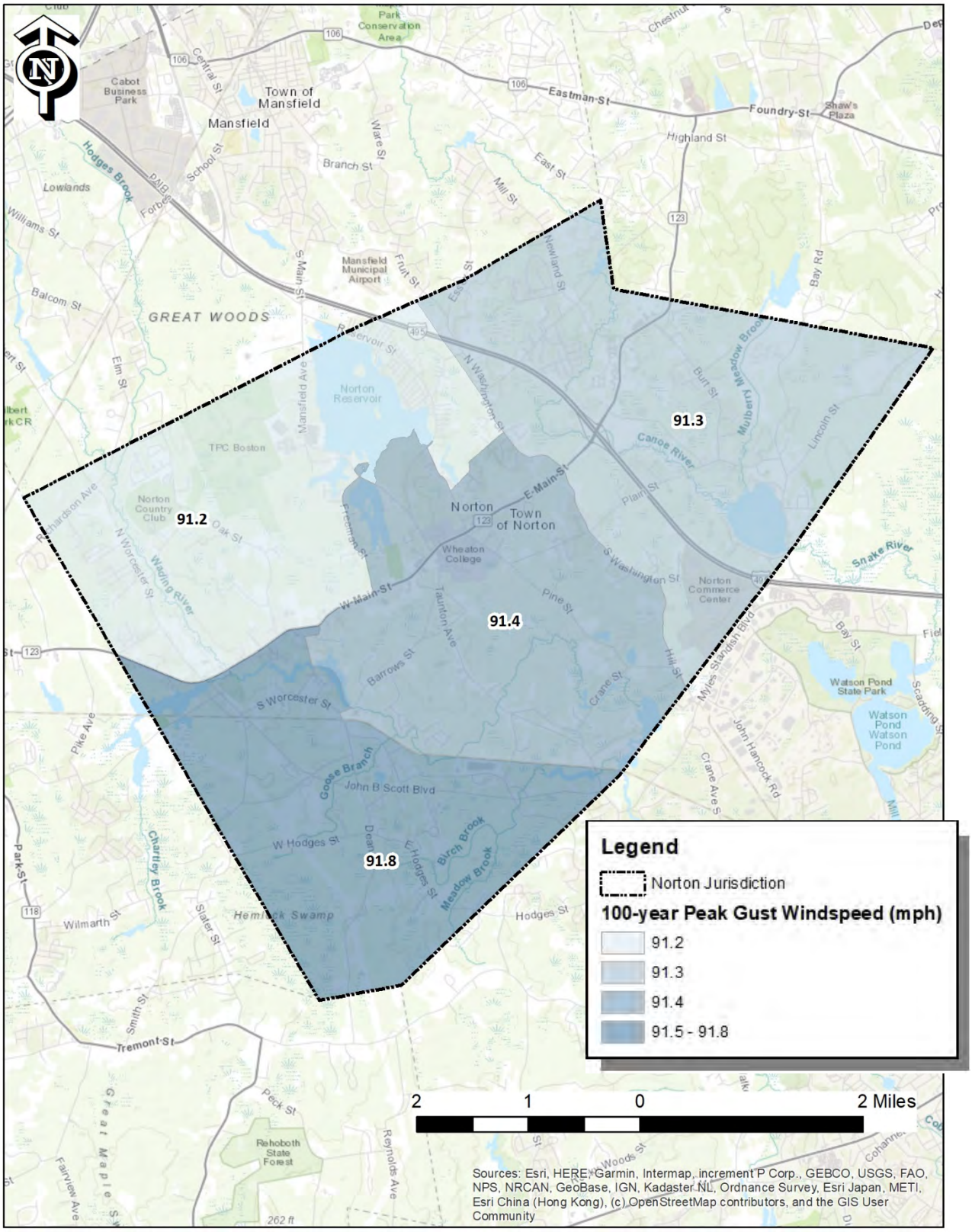


Figure 18. 100-Year Windspeeds (ASCE 7-98).

Built Environment Impacts

To identify built environment impacts to the Town resulting from wind damage, FEMA's risk assessment software, Hazus, was implemented. The economic loss results of the 500-year event are shown in Table 28 while the results for the 1000-year event are shown in Table 29. The Town's Average Annual Loss (AAL) is calculated to be $1,789,972. Buildings that are permanently open with bays or open sides are susceptible to wind damage since the building envelope can't be maintained.

Table 28. Building Losses Due to Wind for a 500-Year Scenario.

Loss Type	Residential ($Million)	Commercial ($Million)	Other Occupancy ($Million)	Total ($Million)
Building Loss	68.34	7.94	5.85	**82.13**
Content Loss	29.45	2.66	2.50	**34.61**
Business Inventory Loss	0.00	0.58	0.18	**0.76**
Business Income Loss	0.00	0.67	0.49	**1.16**
Business Relocation Loss	3.15	1.28	0.99	**5.42**
Rental Income Loss	1.72	0.64	0.13	**2.49**
Wage Loss	0.00	0.62	2.34	**2.96**
Total	**102.66**	**14.39**	**12.48**	**129.53**

Table 29. Building Losses Due to Wind for a 1000-Year Scenario.

Loss Type	Residential ($Million)	Commercial ($Million)	Other Occupancy ($Million)	Total ($Million)
Building Loss	94.34	12.42	9.87	**116.63**
Content Loss	40.32	4.71	4.88	**49.91**
Business Inventory Loss	0.00	1.05	0.31	**1.36**
Business Income Loss	0.00	0.67	0.58	**1.25**
Business Relocation Loss	5.67	2.04	1.64	**9.35**
Rental Income Loss	2.72	1.05	0.23	**4.00**
Wage Loss	0.00	0.64	2.47	**3.11**
Total	**143.05**	**22.58**	**19.98**	**185.61**

Population Impacts

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

For the 500-year event, Hazus predicts that there will be approximately 32 displaced households and 6 people seeking public shelter from high windspeeds. For the 1000-year event, Hazus predicts that there will be up to 72 displaced households and 16 people seeking public shelter from high windspeeds.

Environment Impacts

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

Problem Statements for Hurricanes/Tropical Storms

Table 30. Problem Statements for Hurricanes/Tropical Storms.

Assets	Problems Associated with Hurricanes and Tropical Storms
People (including underserved communities and socially vulnerable populations)	• Vulnerable populations may need to be evacuated and could be displaced from their homes.
Structures (including facilities, lifelines, and critical infrastructure)	• Wind may cause trees to fall into structures and infrastructure, and roadways. • Wind damage to wind-susceptible buildings such as carports, greenhouses, pavilions, gazebos, and open-walled buildings. Additional damage to commercial buildings with HVAC located on roofs. • The electric grid may go down during high wind event.
Systems (including networks and capabilities)	• First responders may have difficulty reaching people if roads are closed due to tree debris.

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

Invasive Species

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

Description

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

Some examples of invasive insect species include:

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

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

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

Location

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

Previous Occurrences

Invasive species do not represent a singular event but rather an ongoing or emerging problem, so it is difficult to measure the frequency of occurrences. A comprehensive list of invasives can be found at https://www.massnrc.org/mipag/invasive.htm. Invasives of current concern to forest health (https://www.mass.gov/service-details/current-forest-health-threats) in Bristol 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 31. 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

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 32. 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

Species	Common Name	Current County of Distribution (November 2010)	Notes
Heracleum mantegazzianum	Giant hogweed	Berkshire, Franklin, Hampden, Hampshire, Middlesex, Norfolk, Suffolk, Worcester	Giant hogweed is a federal noxious weed that is currently being eradicated under the U.S. Department of Agriculture's authority. This is a perennial herb that can cause painful burns and permanent scarring to humans if they touch the plant.
Hydrilla verticillata	Hydrilla; water-thyme; Florida elodea	Barnstable, Plymouth, Worcester	Hydrilla is an invasive non-native submerged plant. This plant grows and reproduces rapidly, displacing native species, hampering recreational uses, and slowing water flow. Hydrilla, once 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.

Species	Common Name	Current County of Distribution (November 2010)	Notes
Persicaria perfoliata syn.: Polygonum perfoliatum	Mile-a-minute vine or weed; Asiatic tearthumb	Barnstable, Essex, Franklin, Norfolk, Plymouth, Suffolk	Mile-a-minute vine is a barbed vine that can grow up to 6 inches a day. This vine smothers other herbaceous plants, shrubs, and even trees by growing over them and blocking their access to sunlight.
Peuraria montana ssp. lobata	Kudzu; Japanese arrowroot	Barnstable, Bristol, Essex, Middlesex, Plymouth, County	Kudzu is native to Japan and southeast China and was introduced to the U.S. during the Philadelphia Centennial Exposition in 1876. Once established, kudzu can grow at a rate of a foot per day, with mature vines as long as 100 feet.
Senecio jacobaea	Tansy ragwort; stinking Willie; stinking Billy	Essex County Suffolk County Worcester County	This biennial herb is a weedy plant that infests woodlands, pastures, and hayfields. This plant is toxic to all classes of livestock but most toxic to cattle and horses. The plant can cause chronic liver disease, and affected animals usually die within a few weeks after ingesting it
Trapa natans	Water chestnut	Berkshire, Bristol, Essex, Franklin, Hamden, Hampshire, Middlesex, Suffolk, Worcester	Water chestnut is an annual aquatic species with both floating and submerged leaves.

Probability of Future Events

Once established, invasive species often escape notice for years or decades. Introduced species that initially escaped many decades ago are only now being recognized as invasives. Because these species

can occur anywhere (on public or private property), new invasive species often escape notice until they are widespread, and eradication is impractical. As a result, early and coordinated action between public and private landholders is critical to preventing widespread damage from an invasive species.

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

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

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

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

Vulnerability Assessment

Exposure

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

Built Environment Impacts

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

Population Impacts

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

Environment Impacts

Most of the natural features in the Town have some susceptible pests including the parks and other forested areas. Trees that have been damaged by other events such as fire, wind, flooding, and animal browsing are more susceptible to diseases and pests. Certain species of trees are more susceptible based on the need of the damaging organism.

Climate change will increase the probability of invasive pests which will pose increased environmental impacts in the future.

Problem Statements for Invasive Species

Table 33. Problem Statements for Invasive Species.

Assets	Problems Associated with Invasive Species
People (including underserved communities and socially vulnerable populations)	• None apparent or projected.
Structures (including facilities, lifelines, and critical infrastructure)	• None apparent or projected.

Assets	Problems Associated with Invasive Species
Systems (including networks and capabilities)	• Additional DPW resources may be required in critical areas.
Natural, historic, and cultural resources	• Invasive species are problematic throughout the Town and have been verified in Wheaton College, along Three Mile River, along Route 123, and along the railroads.
Activities that have value to the community	• Recreational activities may be adversely impacted, depending on location, and especially in parks and natural areas.

Other Severe Weather

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

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

Description

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

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

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

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

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

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

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

Location

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

Previous Occurrences

The NOAA Storm Events database (https://www.ncdc.noaa.gov/stormevents/) for Bristol County lists two severe storms affecting the area of Norton from 2014 through 2023. Overall, Bristol County had 111 hail, strong wind, or thunderstorm wind events during that time period.

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

Date	Description	Losses Reported
2/25/16	*Thunderstorm Wind.* Low pressure tracked north through New York bringing a warm front through southern New England. Unseasonably deep moisture accompanied this front. This was a very complicated weather situation as a strong low level inversion was in place over the area with a very strong low level jet just above the inversion. As showers and thunderstorms developed, the storms and heavy rain allowed the stronger winds to mix down to the surface. In other areas, temperatures warmed enough at the surface to break the inversion and allow the stronger winds to mix down. This resulted in a complicated combination of severe thunderstorm winds and high winds. To add to the historical nature of this event, it occurred in February all during the overnight hours. A large tree was downed onto wires in Norton. A tree on Dean and Hodges Streets was downed onto wires by thunderstorm winds. A large branch on Oak Street in Norton was downed by thunderstorm winds.	$11K
7/23/16	*Thunderstorm Wind.* A cold pool aloft coupled with a large area of instability and a mid-level disturbance moving through the area resulted in showers and thunderstorms across much of southern New England. The stronger of these storms produced hail and wind damage. Wires in Norton and a dozen fifteen foot pine branches were downed by thunderstorm winds.	$10K

Extent

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

Probability of Future Events

According to the NWS, an average of 100,000 thunderstorms per year occur in the United States. The ResilientMass Plan notes that over the 15-year period between January 1, 2008, and December 31, 2022, a total of 911 high wind events occurred in Massachusetts on 198 days, and an annual average of 61 events occurred per year. Southern New England typically experienced 10 to 15 days a year with

severe thunderstorms, with Massachusetts experiencing between nine and 27 thunderstorm days per year. Climate models show projections that the frequency and intensity of severe thunderstorms (which include tornadoes, hail, and winds) will increase (USGCRP, 2017). Furthermore, the ResilientMass Plan reports that, according to the Localized Constructed Analog's climate change models, thunderstorm event frequency is expected to slightly increase as a result of climate change.

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

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

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

Vulnerability Assessment

Exposure

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

Built Environment Impacts

Severe thunderstorms, and their associated hail and lightning events, brought about property damage in Norton and adjacent towns in previous years. From 2014 until 2023, there were 53 events causing $695,200 in property damage to Norton and adjacent towns. This equates to an AAL of $69,520.

Population Impacts

Some traffic accidents associated with storm events include injuries and deaths. However, the number of injuries and deaths reported for accidents is generally low. Populations considered most vulnerable to tornado, microburst and thunderstorm impacts in Norton 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 Norton are particularly susceptible to storms. The Town should be aware of the potential needs of residents within these population segments in the event of a hazard occurrence.

Environment Impacts

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

Problem Statements for Other Severe Weather

Table 35. Problem Statements for Other Severe Weather.

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

Severe Winter Storms

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.

Figure 19. Blizzard in 1978.

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 Norton.

Previous Occurrences

Winter storms occur somewhat regularly in Massachusetts. Four of the disasters declared in Massachusetts from 2012 through 2022 were associated with winter storms, and three covered Bristol County and therefore the Town of Norton:

- 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

- Massachusetts Severe Winter Storm, Snowstorm, and Flooding (DR-4214-MA)
  Incident Period: January 26, 2015 – January 28, 2015
  PA reimbursements eligible for Worcester County and eastward

- Massachusetts Severe Winter Storm and Flooding (DR-4372-MA)
  Incident Period: March 2, 2018 – March 3, 2018
  PA reimbursements eligible for Norfolk, Essex, Bristol, Plymouth, Cape and Islands

The PA assistance reimbursements associated with the winter storms of 2013, 2015, and 2018 for the County totaled $19.23M.

The NOAA Storm Events database (https://www.ncdc.noaa.gov/stormevents/) for Bristol County lists numerous severe winter storm events impacting Norton for the period 2014-2023. A selection of events is provided below.

Table 36. NCEI Severe Storm Database Entries Covering Winter Storms in Norton.

Date	Description	Losses Reported
2/8/13	*Blizzard:* An historic winter storm deposited tremendous amounts of snow over all of southern New England, mainly from the mid-afternoon on Friday, February 8 and lasting into the daylight hours of Saturday, February 9. What made this an amazing storm was the widespread coverage of heavy snowfall. Most locations received 2 to 2.5 feet of snow. A stationary band of even heavier snowfall persisted from southwest NH through central MA and on to the southwest across central and western CT. In those areas, reports averaged closer to 2.5 to 3 feet. Along the southeast MA coast, average amounts ranged from 1 to 2 feet.	$245,000
1/7/17	*Winter Storm:* Eleven to seventeen inches of snow fell on Bristol county during the day and evening.	Not Reported
2/9/17	*Winter Storm:* Nine to fourteen inches of snow fell on Bristol County.	Not Reported
3/10/17	*Winter Storm:* Amateur radio operators reported between five and seven inches of snow in Bristol County.	Not Reported
1/4/18	*Winter Storm:* Eight to sixteen inches of snow fell across Bristol County, except near the coast where three to eight inches fell.	$3,000
1/30/18	*Winter Storm:* From five to nine inches of snow fell on Bristol County.	Not Reported
3/13/18	*Winter Storm:* Eight to sixteen inches of snow fell on Bristol County.	$65,000
1/28/22	*Winter Storm:* Snowfall was generally from 17 to 22 inches. Winds generally gusted 40 to 50 mph.	Not Reported

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 37. RSI Scale.

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

Source: NOAA

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

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

Probability of Future Events

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

Vulnerability Assessment

Exposure

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

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

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

Built Environment Impacts

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

Since Hazus doesn't support severe winter storms and there aren't other readily available severe winter storm models, historical data was used to determine potential losses and probabilities. From 2014 until 2023, there was $315,900 in storm damage in and around Norton. This equates to an AAL of $31,590.

Population Impacts

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

Environment Impacts

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

Problem Statements for Severe Winter Storms

Table 38. Problem Statements for Severe Winter Storms.

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

Tornadoes

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

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

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. Norton 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 injuries. Damage estimates were

placed at more than $52 million. The National Storm Prediction Center has ranked this as one of the deadliest tornadoes in the nation's history.

The most recent severe tornado 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 NOAA Storm Events database (https://www.ncdc.noaa.gov/stormevents/) for Bristol County lists three tornadoes for the period 2014-2023 with one EF1 tornado impacting Norton. Since 1950, there have been ten tornadoes in Bristol County. The three tornadoes which have impacted Bristol County since 2014 are described below.

Table 39. NCEI Severe Storm Database Entries Covering Tornadoes in Bristol County.

Date	Description	Losses Reported
10/23/18	Low pressure over upstate New York moved east-southeastward across northern Rhode Island and southeast Massachusetts during the afternoon and early evening. A warm frontal boundary extending eastward from the low, combined with strong mid-level wind shear, provided the focus for tornado development, both in MA and RI. The same storm cell that produced the North Providence and Lincoln, Rhode Island tornado spawned another tornado, which touched down in Norton, MA at approximately 413 PM EDT. The tornado began on Freeman Street, just north of West Main Street (Route 123). It traveled to the northeast, cutting across the extreme southern portion of Norton Reservoir and Mansfield Avenue (Route 140), and lifted at the southernmost portion of Reservoir Street around 415 PM EDT. On Freeman Street, an oak tree was downed with large branches leaning on a house. Between the reservoir and Mansfield Avenue, numerous oak and pine trees were snapped near their bases. A tree fell onto a garage causing significant structural damage. There was some damage to a home, but it was spared any significant damage. There was very pronounced convergence in the downed trees with some downed from southwest to northeast and others from southeast to northwest.	$20K
8/18/23	A high amplitude, negatively tilted trough moving across the Great Lakes and into New England along with cold and warm front provided strong forcing which resulted in flooding, wind damage, and 5 tornadoes. In the warm sector dewpoints surged into the mid 70s with	$30K

Date	Description	Losses Reported
	PWATs near 2 inches which led to torrential downpours. Tornadoes occurred in Scotland, Ct, Scituate, RI, North Attleboro, MA, Stoughton, MA, and Weymouth, MA. The tornadoes ranged in intensity from EF-0 to EF-2. The storm that produced the Rhode Island tornado produced a second tornado as it crossed into Massachusetts, just over the Cumberland line in North Attleborough. Many trees were snapped or uprooted on Mendon Road near the intersection of Monticello Drive. An eyewitness saw swirling debris before taking shelter in her home. From there, damage was more sporadic. A home on Mary Ann Way had its third floor window blown in. Additionally, there were a number of downed or snapped trees on Lisa Drive. The tornado then lifted briefly before touching back down in Mansfield along Gilbert Street, where it sheared several large trees near their tops, one of which fell on a car. An air conditioning unit, estimated to have weighed 1000 pounds, was knocked over on the roof of a one-story commercial building.	
9/13/23	A frontal system brought a period of heavy rain, flash flooding, and embedded thunderstorms to southern New England from the morning to mid evening. In addition to much tree damage from straight line winds, there was one tornado in Connecticut, 2 in Rhode Island, and 1 in Massachusetts. These all occurred in the afternoon. An EF-0 with maximum winds of 75 mph briefly touched down in a rural area of North Attleborough on Ellis Road which caused tree damage south of High Street. The tree damage was limited to the tops of three trees having been twisted off and lofted into nearby pasture. After speaking with the homeowners, they described seeing the sheets of rain change direction before seeking shelter in their basement. The tree damage along the path was consistent with wind speeds between 65 and 75 mph, resulting an EF-0 rating on the Enhanced Fujita Scale.	$5K

Extent

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

Table 40. Enhanced Fujita Scale.

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

Source: National Weather Service

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

Probability of Future Events

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

2017). Overall, it is unclear if tornado frequency will increase with climate change given the difficulty to draw conclusions based on thunderstorm statistics and the difficulty in identifying long-term trends.

Vulnerability Assessment

Exposure

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

Built Environment Impacts

Since Hazus doesn't support tornadoes and there aren't other readily available tornado models, historical data will be used to determine potential losses and probabilities. From 1953 until 2023, there was $20K in property damage to Norton due to tornadoes. Additionally, there were ten events in Bristol County which produced $2.650M in property damage, no deaths, and five injuries. The county's average annual loss would be $37,324K.

Population Impacts

Populations considered most vulnerable to tornado impacts in Norton 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 Norton. It should be noted that there may be overlap within the two categories, so that the total number of persons exposed may be lower than what is shown in the table. However, the Town should be aware of the potential needs of residents within these population segments in the event of a hazard occurrence.

Environment Impacts

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

Problem Statements for Tornadoes

Table 41. Problem Statements for Tornadoes.

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

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

Wildfires/Brushfires

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.

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

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.

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 42. 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 Norton:

Table 43. Outdoor and Total Fire Event Figures for Norton.

Year	Total Outdoor Fires	Total Fire Events	Reported Losses for Outdoor Fires
2012	38	64	$17,223
2013	19	34	$18,170
2014	33	49	$24,505
2015	18	37	$5,464
2016	27	48	$4,507
2017	15	25	$13,182
2018	17	34	$9,407
2019	15	29	$12,601
2020	31	44	$10,417
2021	21	36	$50,460

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 Norton is presented below.

Table 44. Estimated Brush Fire Event Figures for Norton.

Year	Estimated Brush Fires	Estimated Brush Fire Losses
2012	20	$34
2013	10	$36
2014	17	$49
2015	9	$11
2016	14	$9
2017	8	$26
2018	9	$19
2019	8	$25
2020	16	$21
2021	11	$101

*Estimated from Countywide figures

The above estimates compare reasonably well to the figures reported in the previous edition of this plan. Overall, Norton experiences a small number of brush fires and wildfires each year.

During the meetings that were convened for this plan, Town staff noted that Norton sees more fires in areas adjacent to train tracks and power lines (e.g. West Hodges St.).

Extent

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

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

mortality and survival of plant and animal life aboveground and belowground and by the loss of organic matter (NPS, n.d.).

The National Wildfire Coordinating Group defines seven classes of wildfires:

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

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

Probability of Future Events

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

Vulnerability Assessment

Exposure

To help identify potential wildfire areas for Norton, the U.S. Forest Service's Wildfire Risk to Communities spatial data was downloaded. This data was developed in 2020 using the vegetation and wildland fuels from the LANDFIRE 2014 model with the burn probability coming from the Forest Service Fire Simulation System (FSim). To create a product with a finer resolution, the data was upsampled to the native 30m resolution of the LANDFIRE fuel and vegetation data spreading the values of the modeled burn probability into developed areas represented in LANDFIRE fuels as non-burnable. The

areas with a 0.02% annual probability of burning were identified and overlaid with the critical facilities and other buildings. There were no critical facilities found in the 0.02% burn probability areas and thirty-seven buildings including single family home and industrial buildings found there. Table 45 shows the result of this analysis.

Table 45. Buildings in 0.02% Annual Chance Area.

Building Type	Number of Buildings (Total in Town)	Building Value (Total in Town)
Single Family	32 (6,161)	$11,313,100 ($1,408,802,000)
Multi-Family	0 (659)	$0 ($739,322,800)
Mixed-Use	6 (114)	$1,881,000 ($26,284,800)
Commercial	0 (301)	$0 ($183,608,300)
Educational	0 (90)	$0 ($110,222,900)
Government	0 (96)	$0 ($536,045,000)
Religious/Non-Profit	0 (58)	$0 ($62,320,700)
Industrial	0 (65)	$0 ($394,970,760)
Garage/Outbuilding	0 (25)	$0 ($594,700)
Vacant	2 (54)	$72,500 ($590,800)
Total	**40 (7,623)**	**$13,266,600 ($3,462,762,760)**

The population exposed to the 0.02% probability area is shown in Table 46. The column on the left shows the population in and around the 0.02% probability wildfire area (wherever the Census Block overlapped with the wildfire area) while the column on the right shows the total population numbers for the Town. There is a lower income population, elder population, and a large number of children exposed to the wildfire hazard.

Table 46. 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	1,474	19,202
Households	540	6,971
White	1,289 (87.4%)	17,018 (88.6%)
Black	51 (3.5%)	486 (2.5%)
American Indian	1 (0.1%)	19 (0.1%)
Asian	27 (1.8%)	469 (2.4%)
Pacific Islander	0 (0.0%)	3 (0.0%)
Other Race	23 (1.6%)	274 (1.4%)
Two or More Races	83 (5.6%)	933 (4.9%)
Hispanic or Latino:	67 (4.5%)	596 (3.1%)

Demographics	Population in and Adjacent to 0.02% Wildfire Area	Total Population
Population under 18:	331 (22.5%)	3,203 (16.7%)
Population over 64:	240 (16.3%)	2,873 (15.0%)
Annual Income < $30K/year	90 (16.7%)	884 (12.7%)
Population in EJ Zone*:	0 (0.0%)	0 (0.0%)

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

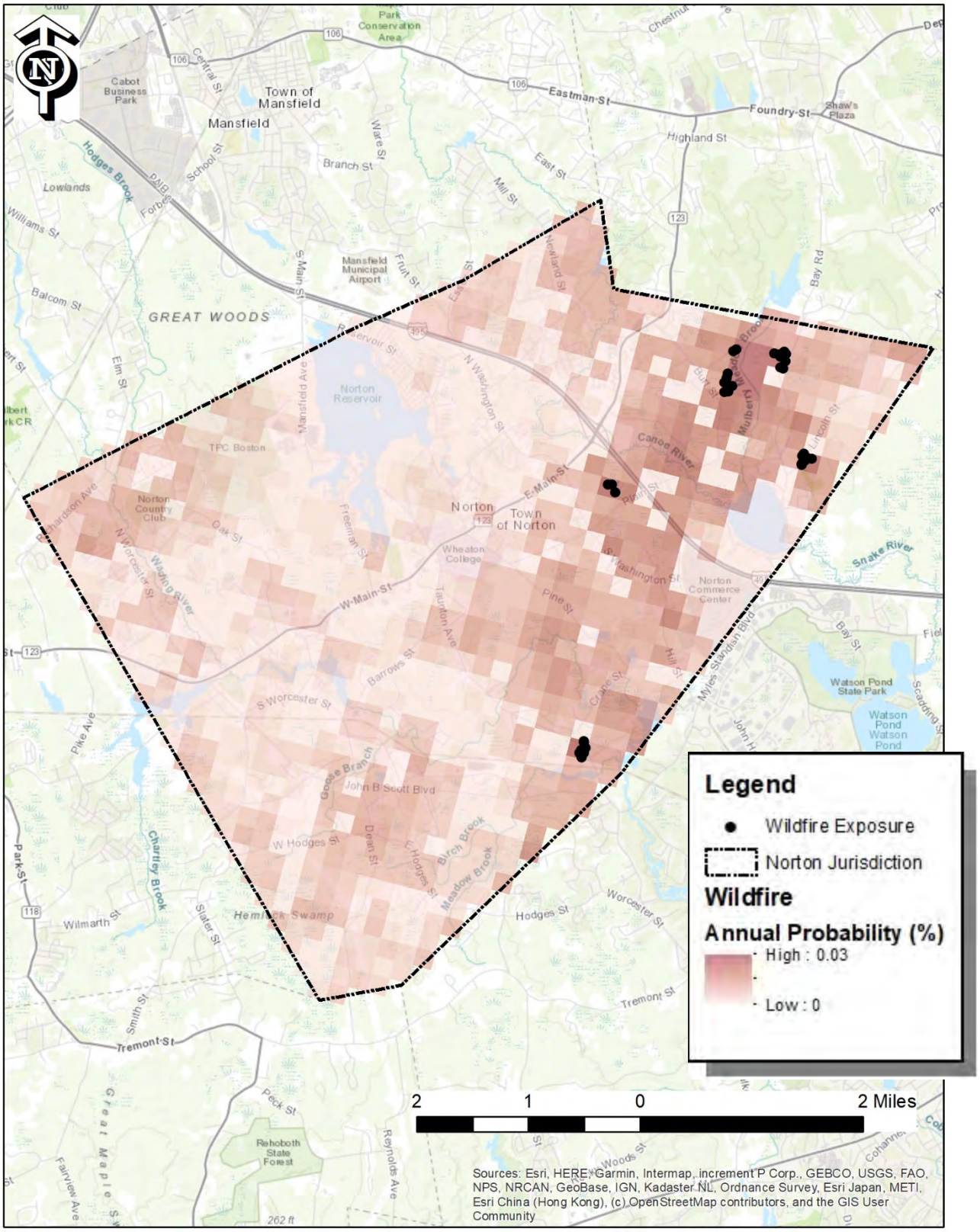


Figure 20. Wildfire Burn Probability Map.

Built Environment Impacts

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

No property damage, injuries or deaths have been recorded for the reported for major wildfires in Norton between 2004 and 2022. Using the wildfire probabilities and building values, a loss estimate was produced for the 0.02% scenario. The losses are $13,266,600 for the .02% event and the AAL will be $6,633.

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

Population Impacts

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

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

Environment Impacts

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

Problem Statements for Wildfires

Table 47. Problem Statements for Wildfires.

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

Assets	Problems Associated with Wildfires
Structures (including facilities, lifelines, and critical infrastructure)	• Several residential 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 Norton.
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 claims payments with the cumulative amount exceeding the market value of the building.

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

- According to data provided by MEMA, there are two repetitive loss properties and one severe repetitive loss properties. These properties are all single-family residences.

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

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.*

Hazard Ranking

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

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

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

Table 48 provides the hazard characteristic, level description, level criteria, level index value, and weighting value.

Table 48. 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	

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

Table 49 provides the final hazard ranking for Norton. Each hazard characteristic is assigned a value between 1 (lowest value) and 4 (highest value). When the risk values were calculated, if the value was greater than 2.7, it was assigned as a high risk hazard. If the value was greater than 2 and less than or equal to 2.7, it was assigned as a moderate risk. If the value was less than or equal to 2, it was assigned as a low risk hazard. The flood, severe winter storms, average and extreme temperatures, and drought

hazards were ranked highest. The wildfires/brushfires, hurricanes/tropical storms, other severe weather, invasive species, and tornadoes were all ranked as moderate. The earthquake hazard is ranked as low.

Table 49. Final Hazard Ranking of Hazards for Norton.

Hazards	Probability	Impact	Spatial Extent	Warning Time	Duration	Value	Rank
Flooding from Precipitation and Dam Overtopping	4	3	2	3	2	3	High
Severe Winter Storms	4	2	4	1	3	3	High
Average and Extreme Temperatures	4	2	4	1	2	2.9	High
Droughts	2	3	4	1	4	2.8	High
Wildfires/Brushfires	2	3	3	3	3	2.7	Mod.
Hurricanes/Tropical Storms	2	3	4	1	2	2.6	Mod.
Other Severe Weather	3	2	4	2	1	2.6	Mod.
Tornadoes	2	4	1	3	1	2.4	Mod.
Invasive Species	3	1	2	3	4	2.3	Mod.
Earthquakes	1	1	4	4	1	1.9	Low

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

Table 50. 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: • West of Mulberry Meadow Brook • East of Wading River • West of Norton Reservoir	Existing codes and regulations in the SFHA will help to keep flood impacts low. New development areas may produce additional flooding due to the addition of impervious surfaces.

Hazards	Changes in Population Patterns	Changes in Land Use and Development
	There is a growing low-income population exposed to the floodplain: • South of W. Main St. and North of Barrows St. • West of Mulberry Meadow Brook • Along Canoe River	
Droughts	The Town's elderly population has increased from 10.7% in 2010 to 14.8% in 2020. The number of people living below the poverty line has increased from 3.8% in 2010 to 5.1% in 2020.	All new developments will create more demand for limited water resources.
Extreme Temperatures	The Town's elderly population has increased from 10.7% in 2010 to 14.8% in 2020. The number of people living below the poverty line has increased from 3.8% in 2010 to 5.1% in 2020.	All new developments will exacerbate heat island effect if the development includes tree removal and adding black surfaces such as asphalt and roofs.
Wildfires	There is a growing elderly and low-income population exposed to the moderate wildfire susceptibility in the area west of Mulberry Meadow Brook.	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.	Shouldn't be impacted by changes in land use and development.
Hurricanes and Tropical Storms	The Town's elderly population has increased from 10.7% in 2010 to 14.8% in 2020. The number of people living below the poverty line has increased from 3.8% in 2010 to 5.1% in 2020.	Shouldn't be impacted by changes in land use and development.

Hazards	Changes in Population Patterns	Changes in Land Use and Development
Severe Winter Storms	The Town's elderly population has increased from 10.7% in 2010 to 14.8% in 2020. The number of people living below the poverty line has increased from 3.8% in 2010 to 5.1% in 2020.	Shouldn't be impacted by changes in land use and development.
Tornadoes	The Town's elderly population has increased from 10.7% in 2010 to 14.8% in 2020. The number of people living below the poverty line has increased from 3.8% in 2010 to 5.1% in 2020.	Shouldn't be impacted by changes in land use and development.
Other Severe Weather	The Town's elderly population has increased from 10.7% in 2010 to 14.8% in 2020. The number of people living below the poverty line has increased from 3.8% in 2010 to 5.1% in 2020.	Shouldn't be impacted by changes in land use and development.
Earthquakes	Not considered.	Not considered.

Problem Statements Summary

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

Table 51. Problem Statements Summary.

Hazard	Problem Summary
Flood	• Older populations in the floodplain may have difficulty evacuating.

Hazard	Problem Summary

	• Although the J.C. Solmonese Elementary School is not in the floodplain, part of the property and two of the roads to the school could be flooded.
	• Potential exposed structures include:
	  • Water and sewer utilities.
	  • Undersized culverts on Walker St., North Worcester St., Plain St., and East Hodges St.
	  • Wayfair and Home Depot Distribution Centers are near the floodplain.
	• Road closures may interrupt community systems including Richardson Ave. and Route 123.
	• According to EPA's Toxic Release Inventory (TRI) database, there are four facilities which contain hazardous materials (Blue Star Business Park, Defiance Azon Corp, Reliable Electroplating, and Wheaton College at 26 East Main St.) in the 100-year floodplain.

Severe Winter Storms	• Vulnerable populations may be stranded during a winter storm event and may not be able to travel to emergency services. • The electrical grid and roadways are susceptible to failure and loss of use during storms. • First responders may have difficulty reaching people if roads are closed due to road closures.
Average and Extreme Temperatures	• Extreme heat will be a significant public health threat to all residents, but especially for vulnerable populations living in older homes or homes without air conditioning. • The electric grid may become stressed and fail during extreme heat events. • The elderly and those with mobility issues may not be able to leave their homes and travel safely. • People working in businesses without air conditioning may be at risk of heat illness.

Hazard	Problem Summary
Droughts	• Vulnerable communities may have difficulty accessing potable water during an emergency drought event. • Water supply infrastructure may need to be shut down and water quality may become substandard. Businesses requiring water for daily operations may have their operations limited due to water restrictions. • 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. • At least one private well has been affected by droughts.
Wildfires/Brushfires	• Populations with severe asthma may be adversely impacted by wildfires in the vicinity. • Several residential structures are found in the higher probability burn areas. Structures without defensible zones are more susceptible to wildfires and brush fires. • Wildfires often cause roads to be closed requiring detours impacting emergency services.
Hurricanes/Tropical Storms	• Wind may cause trees to fall into structures and infrastructure, and roadways. • Wind damage to wind-susceptible buildings such as carports, greenhouses, and open-walled buildings. Additional damage to commercial buildings with HVAC located on roofs. • The electric grid may go down during high wind event.
Other Severe Weather	• First responders may have difficulty reaching people if roads are closed due to tree debris. • Storm damage to wind-susceptible buildings such as carports, greenhouses, and open-walled buildings. Additional damage to commercial buildings with HVAC located on roofs. • The electric grid may go down during high wind event.

Hazard	Problem Summary
Tornadoes	• Vulnerable populations may need support seeking protected shelter. Those without cell phones may not get weather alerts. • Structures and critical infrastructure can all be impacted by tornadoes. • Roadways may be blocked due to downed trees and other debris. • The electric grid may be impacted by winds and downed trees.
Invasive Species	• Invasive species are problematic throughout the Town and have been verified in Wheaton College, along Three Mile River, along Route 123, and along the railroads. • Additional DPW resources may be required in critical areas. • Vector borne disease incidence may increase with climate change, adversely impacting vulnerable people.
Earthquakes	• Elderly population may fall during an event. • Unreinforced masonry and utility lifelines impacted.

Chapter 5: Capability Assessment

Overview

The capability assessment is an evaluation of the existing tools and resources available to the Town of Norton 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 Norton's existing authorities, policies, programs, and resources available to support them. It also helps identify any critical capability gaps or limitations to address through corrective actions, as well the key strengths or positive measures in place that should continue to be supported or expanded upon to improve local mitigation capabilities.

This capability assessment was completed to not only help establish the goals and actions for the Town of Norton'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."* [50]

The capability assessment for the Town of Norton includes a comprehensive examination of several components as summarized in Table 52. It was prepared using the latest guidance and worksheets provided in FEMA's 2023 Local Mitigation Planning Handbook.[51]

Table 52. Capability Assessment Components.

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

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

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

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

Review and Incorporation of Existing Plans, Studies, and Reports

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 capability assessment was to gather and review any relevant local plans, studies, or reports completed in recent years to help gain a current understanding of the Town's current ability to mitigate risk. The 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan (the "ResilientMass" Plan), as well as other plans adopted by the Town of Norton in the recent past, were reviewed for consistency as well as opportunities for plan integration. The goal of this review was to help ensure this new hazard mitigation plan aligns with and possibly incorporate key aspects of other relevant plans at the state and local level.

Table 53 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.

Table 53. Relevant Plans, Studies, and Reports for Incorporation.

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

Plan / Study / Report	Summary Description / Incorporation
	Action Team (RMAT) and local, regional, and community partners. It also integrates the findings of the 2022 Climate Assessment with additional analysis on all current hazards that may impact the Commonwealth, as well as future risks that will increase the likelihood, frequency, and duration of hazards. Of perhaps most relevance to local communities, the ResilientMass Plan identifies the most urgent priority impacts of these risks to various regions across the Commonwealth. The ResilientMass Plan was incorporated as a key source of information for this plan. 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 Eastern Inland 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 plan development process to help ensure the Town's own goals and objectives are in alignment with and can be mutually supportive of the Commonwealth's overall strategy. As can be seen in Chapter 6 of this plan, several of the goals and actions identified for Norton's mitigation strategy address key themes identified in the ResilientMass Plan.
Town of Norton Municipal Vulnerability Preparedness (MVP) / Community Resilience Building (CRB) Summary of Findings Report (2018)	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, Norton was awarded an MVP Planning Grant to assess its vulnerability to and prepare for climate change impacts, build community resilience, and receive designation from the Executive Office of Energy and Environmental Affairs (EEA) as an MVP Community. Communities with this designation become eligible for MVP Action Grant funding and other opportunities to support the implementation of priority climate adaptation actions. In completing the MVP planning process, the Town of Norton followed the Community Resilience Building (CRB) framework with technical assistance provided by the Southeast Regional Planning and Economic Development Division (SRPEDD), a state-certified MVP Provider. Staff from The Nature Conservancy, Manomet, and Mass Audubon also supported the CRB process. The CRB methodology is an "anywhere at any scale" format that draws on stakeholders' wealth of information and experience to foster dialogue about a community's strengths and vulnerabilities. As part of the process two CRB Workshops were held in November 2018 with the following key objectives: 1. Define top local natural and climate-related hazards of concern. 2. Identify existing and future strengths and vulnerabilities.

Plan / Study / Report	Summary Description / Incorporation
	3. Develop prioritized actions for Norton. 4. Identify immediate opportunities to collaboratively advance actions to increase resilience. The resulting Summary of Findings Report and supporting materials served as a primary source of information and community-based input for incorporation into this plan. These inputs include the identification of top climate-influenced hazard categories (flooding; high wind; drought, fire, extreme temperatures; and changing seasonality) 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 Norton.
Master Plan (2021)	Norton designed its 2021 Master Plan to be a concise, easy-to-understand document. It is not an exhaustive list of actions or ideas; rather, it presents the main missions for the Town to achieve over the life of the plan – approximately 5 to 10 years. The Master Plan consists of the following "elements," or chapters: Norton's Vision, Land Use, Housing, Economic Development, Open Space & Recreation, Natural & Cultural Resources, Services & Facilities, Transportation & Circulation, and Implementation. Each chapter contains the main information needed to explore and address its subject matter, including explanatory context and the identification of relevant issues and opportunities, as well as key goals and strategies to accomplish those goals. All these details are summarized again in the "Implementation" chapter, which explores and organizes each Strategy in a user-friendly table. The Town's Master Plan served as a primary source for current information and data that were reviewed and integrated into this hazard mitigation plan. This included content relating to the physical, environmental, cultural, and demographic characteristics of Norton, as well as the community's collective vision for the future and the key goals and strategies to achieve that vision. This also included several relevant or complementary strategies in support hazard mitigation, such as those focused on preserving community characteristics, protecting natural resources, enhancing resiliency and sustainability, and building local capacity. For example, a goal for the Natural & Cultural Resources chapter is to "Apply for Municipal Vulnerability Preparedness (MVP) Funding to implement stormwater management strategies identified by the 2018 Norton MVP plan," and a strategy in the Services and Facilities chapter is to "Prepare Norton buildings to respond to

Plan / Study / Report	Summary Description / Incorporation
	immediate and long-term climate challenges." Any relevant goals and strategies included in the plan were incorporated into the mitigation strategy for this plan as deemed appropriate by the HMPC.
Open Space and Recreation Plan (2017)	The purpose of the Town's 2017 Open Space and Recreation Plan (OSRP) is to provide members of local boards and commissions, staff, and residents with the opportunity to work toward common goals in the areas of conservation and recreation on both local and regional levels. The plan is a tool that can be used during permit reviews, long-term land use planning, grant writing and open space project planning. It includes information on the history, growth, and development of the community as well as a detailed environmental inventory and analysis. It also includes a community vision along with the identification of resource protection and management needs, followed by specific goals, objectives, and actions to be pursued through plan implementation. The OSRP served as a key source of information related to Norton's natural and built environment, with specific content regarding natural hazards and mitigation activities being incorporated into this plan. This includes details on environmental challenges such as chronic flooding, stormwater management, erosion, new development/development impact, invasive plants, and climate change for the risk assessment, and information on existing goals and recommended or planned activities that will help the community to mitigate hazards or adapt to climate change for the mitigation strategy. The OSRP is currently being updated but no major changes are anticipated according to the HMPC.
FEMA Flood Insurance Study for Bristol County (2023)	Last revised by FEMA on February 3, 2023, this report constitutes the revised preliminary Flood Insurance Study (FIS) report for Bristol County. This latest FIS revises and updates information from the currently effective (2021) FIS report on the existence and severity of flood hazards for the study area, which includes the Town of Norton. The studies described in this report provide flood hazard data that will, once formally adopted as final/effective, be used to establish actuarial flood insurance rates and to assist communities in efforts to implement sound floodplain management. The FIS and accompanying Flood Insurance Rate Maps (FIRMs) include relevant data and information on flood hazards for Norton, 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 development process by informing the risk assessment,

Plan / Study / Report	Summary Description / Incorporation
	especially as it relates to the hazard profile and GIS-based vulnerability assessment that was prepared for the flood hazard.

In addition to the above plans which were determined to be most relevant for incorporation into the hazard mitigation plan, 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 54 in the next section.

- ***Comprehensive Emergency Management Plan (2023)*** – The Town's Comprehensive Emergency Management Plan (CEMP) provides a framework for a community-wide emergency management system to ensure a coordinated response to emergencies and coordinated support of certain pre-planned events. The CEMP includes a summary of a threat, hazard, and vulnerability analysis for the Town that includes brief descriptions of the natural and technological hazards faced by the community. The plan also addresses the roles and responsibilities of all community departments, agencies, government organizations, volunteers, and other community partners that may be involved in response operations, and identifies how regional, state, federal, private sector, and other resources may be activated to address disasters and emergencies in the community. Although the plan is focused on actions and activities in response to an emergency or disaster event, it does provide general guidance on the roles and responsibilities of Town departments and partners for the prevention and mitigation of anticipated incidents.
- ***Wheaton College Emergency Response Guide (2023)*** – This guide includes the plans, practices, and resources available to Wheaton College for responding to various emergencies and critical incidents. It includes but is not limited to plans for critical incident management, weather emergencies, international crisis response, and an information technology continuity plan. The information summarizes plans and policies developed on an institutional and departmental level to be used as guidelines for a response and are not intended to provide a step-by-step plan for handling all emergencies. The guide also includes information on available town, state, and consortia resources.
- ***Annual Town Report (2022)*** **–** The Annual Town Report contains updated facts about Norton and a series of reports and information from Town's various departments, boards, commissions, and other officials.
- ***2022 Annual Lakes and Ponds Monitoring and Management Report (2022)*** **–** This report summarizes the results of annual monitoring and reporting activities as required by the Town's Conservation Commission for the management of nuisance vegetation at Winnecunnet Pond, Norton Reservoir, and Chartley Pond. It includes a description of conditions during and after the management treatments taken at each water body as well as recommendations for future vegetative management activities.

- ***Local Rapid Recovery Plan (2021)*** – The Rapid Recovery Plan (LRRP) was prepared for Norton's West Main Street Business District as part of the Massachusetts Rapid Recovery Plan (RRP) Program. The RRP was intended to provide every municipality in Massachusetts the opportunity to develop actionable, project-based recovery plans tailored to the unique economic challenges and COVID-19 related impacts to downtowns, town centers, and commercial areas across the Commonwealth. Norton's LRRP examines market and physical conditions, as well as feedback from the business community, to identify strategic projects that support a sustainable and equitable recovery from the COVID-19 pandemic.
- ***Energy Reduction Plan (2020)*** – As part of the Town's Green Communities Application for Designation, Norton adopted this Energy Reduction Plan as prepared by the by the Southeastern Regional Planning and Economic Development District (SRPEDD). The plan includes an energy use baseline survey and commits the Town of Norton to reduce energy use in municipal facilities by at least 20% by the end of Fiscal Year 2024. The path to achieving this goal is recommended through a variety of energy conservation measures identified in the plan.
- ***Norton Village Center Vision Plan (2019)*** – This plan includes an assessment of different planning issues related to Norton Village Center such as existing land use patterns, circulation, and assets and opportunities and a series of recommendations to achieve the goals for the area as identified by the community. These goals included encouraging a mix of uses and development patterns that bolster the historic character of the Village and provide a walkable environment.

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

Table 54. Planning and Regulatory Findings.

Planning/Regulatory Tool	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
Plans		
Master/Comprehensive Plan	Yes	The Town's latest Master Plan was updated in 2021 (see Table 53 for complete description). Very effective tool as several of the plan's goals and strategies are very supportive of long-term risk reduction.
Open Space & Recreation Plan	Yes	The Town's latest OSRP was updated in 2017 (see Table 53 for complete description). Very effective tool as this latest plan includes a detailed section on climate change and many of the recommended goals, strategies, and actions are mutually supportive of hazard mitigation and long-term climate adaptation.
Climate Adaptation Plan	No	Although technically not a full climate adaptation plan, the Town's 2018 MVP Summary of Findings Report includes a basic assessment of key strengths and vulnerabilities and identifies a series of recommended actions to reduce the impacts of Norton's top climate-influenced hazards ((flooding; high wind; drought, fire, extreme temperatures; and changing seasonality). See Table 53 for more details on the MVP report. Effective in terms of identifying and prioritizing actions to build community resilience for specific hazards through continued coordination and integration with this hazard mitigation plan.
Floodplain Management Plan	No	No stand-alone plan but floodplain management is addressed within this Hazard Mitigation Plan and through local development regulations as noted later in this table.
Stormwater Management Plan	No	No stand-alone plan but stormwater management is addressed through local development regulations as noted later in this table.
Capital Improvements Plan	Yes	No stand-alone plan but Town departments prepare and maintain their own department-specific CIPs for consideration by the Town's Capital Improvements Committee as part of the annual budgeting process.
Housing Production Plan	No	In progress – the Town has recently partnered with the Southeast Regional Planning and Economic

Planning/Regulatory Tool	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
		Development Division (SRPEDD) to prepare its first Housing Production Plan.
Transportation Plan	No	No stand-alone plan but the Town does address transportation as an element (Transportation and Circulation) within its Master Plan. See Table 53 for more information.
Economic Development Plan	Yes	No stand-alone plan but the Town does address economic development as an element within its Master Plan. See Table 53 for more information. The Plan's main economic development goals are to encourage appropriate projects at key locations and support existing businesses and attract new firms.
Historic Preservation Plan	No	No stand-alone plan but the Town does have an active Historical Commission.
Emergency Operations Plan	Yes	The Comprehensive Emergency Management Plan (CEMP) primarily addresses the Town's preparedness and response to hazards. More details on the CEMP are provided in the previous section following Table 53.
Continuity of Operations Plan	No	In progress
Community Wildfire Protection Plan	No	N/A
Other special plans?	Yes	Energy Reduction Plan, Rapid Recovery Plan, North Village Center Vision Plan (see previous section following Table 53 for more information).
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		BCEGS Commercial Class: BCEGS Residential Class:
ISO Public Protection Classification (PPC©)	Yes	PPC Grade (Community Classification): 3
Special Permit / Site Plan Review Requirements	Yes	Special permits are required for various construction projects per numerous articles in the Town's Zoning Bylaw and to be approved by the Town's Planning Board, acting as the Special Permit Granting Authority (SPGA). Article XV of the Zoning Bylaw requires site plan approval for specific projects to ensure the impacts of

Planning/Regulatory Tool	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
		proposed development, whether allowed as a matter of right or by special permit, are in accord with the purposes of the Zoning Bylaw; that proposed development preserves and protects the natural environment; that proposed development adequately provides in its design and layout for the transportation, water supply, drainage, sewerage, open space, recreation and amenity needs of the occupants; that proposed development minimizes, to the maximum extent feasible, any adverse off-site impacts to public facilities and services; and that proposed development is in harmony with the existing neighborhood character and protects against adverse impacts to adjoining landowners. Very effective in terms of supporting hazard risk reduction through existing procedures.
Zoning, Land Use, and Development Regulations		
Zoning Bylaw	Yes	Last updated in 2023, the Town's Zoning Bylaw (Chapter 175) was initially adopted in 1974 and has been amended from time to time for the purpose of promoting health, safety, convenience, morals or welfare of the inhabitants of the Town of Norton, for lessening the dangers of congestion and fire, to conserve the value of the land and buildings, to encourage the most appropriate use of land, and for other purposes stated in Chapter 40A of the General Laws of Massachusetts. Very effective at supporting hazard risk reduction through multiple articles and sections and in combination with other rules or regulations as further described in this table.
Subdivision Regulations	Yes	Last updated in 2017, the Town's Subdivision Rules and Regulations are exercised for the purpose of promoting the general welfare and convenience, protecting the health and safety of the residents of Norton and of adjoining communities which may be impacted by the construction of a subdivision in Norton. The regulations include design standards, stormwater drainage and erosion control requirements, environmental protection requirements, and other specifications that

Planning/Regulatory Tool	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
		all help reduce the risk of creating hazards during the subdivision process.
Floodplain Regulations		Article XIII of the Town's Zoning Bylaw establishes and regulates activities within the Floodplain District with purposes to ensure public safety through reducing the threats to life and personal injury; eliminate new hazards for emergency response officials; prevent the occurrence of public emergencies resulting from water quality, contamination, and pollution due to flooding; avoid the loss of utility services which, if damaged by flooding, would disrupt or shut down the utility network and impact regions of the community beyond the site of flooding; eliminate costs associated with the response and cleanup of flooding conditions; and reduce damage to public and private property resulting from flooding waters. These regulations have routinely been updated to include the latest FEMA map products and recommended best practices, including those shared by the State's (DCR) Flood Hazard Management Program. Very effective in reducing the long-term risk of flood hazards throughout the Town's identified special flood hazard areas as depicted on the latest Flood Insurance Rate Map for Bristol County (2021).
Wetlands Protection Regulations	Yes	Article V of the Town's Zoning Bylaw establishes and regulates activities within the Wetland Protection District with purposes to protect the health and safety of the residents by maintaining and protecting against depletion or pollution of water supplies and water recharges areas within the Town; to provide that lands in the Town of Norton subject to periodic or seasonal flooding shall not be used for residence or other purposes in such a manner as to endanger the health or safety of the occupants thereof; to protect persons and property against the hazards of flood inundation by providing for the unimpeded natural flow of watercourses and for adequate and safe flood storage capacity. Very effective.
Stormwater Management Regulations	Yes	Chapter 133 of the Town's General Bylaws establishes the Town's Stormwater Regulations with purposes to

Planning/Regulatory Tool	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
		adopt a local construction-term stormwater runoff control program to minimize or eliminate erosion and maintain sediment on site so that it is not transported to a water of the commonwealth; reduce the discharge of pollutants found in stormwater through the retention and treatment of stormwater during and after construction; ensure long-term operation and maintenance of stormwater drainage systems; and meet the Massachusetts MS4 General Permit mandates for the Town of Norton. The regulations address prohibited activities and specific requirements for all stormwater discharges, permit procedures, and post-development stormwater management criteria that include low impact design and green infrastructure. Very effective in terms of reducing the adverse effects of increased post-development stormwater runoff and supporting the safe operation of the Town's existing stormwater management facilities.

Massachusetts State Building Code

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

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

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

- International Residential Code (IRC)
- International Existing Building Code (IEBC)
- International Mechanical Code (IMC)

- International Energy Conservation Code (IECC)
- International Swimming Pool and Spa Code (ISPSC)
- Portions of the International Fire Code (IFC)

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

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

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

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

Safe Growth Survey

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

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

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

The results of the Safe Growth Survey are summarized in Table 55. This includes describing how strongly the Town's planning staff agrees or disagrees with 25 statements as they relate to Norton'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 55. Safe Growth Survey Results.

MASTER/COMPREHENSIVE PLAN						
Land Use						
1.	The master/comprehensive plan includes a future land use map that clearly identifies natural hazard areas.	[1]	2	3	4	5
2.	Current land use policies discourage development and/or redevelopment within natural hazard areas.	1	2	3	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]	4	5

MASTER/COMPREHENSIVE PLAN						
Transportation						
4.	The transportation element limits access to natural hazard areas.	1	2	[3]	4	5
5.	Transportation policy is used to guide future growth and development to safe locations.	1	2	3	4	[5]
6.	Transportation systems are designed to function under disaster conditions (e.g., evacuation, mobility for fire/rescue apparatus, etc.).	1	2	3	[4]	5
Environmental Management						
7.	Environmental features that serve to protect development from hazards (e.g., wetlands, riparian buffers, etc.) are identified and mapped.	1	2	3	4	[5]
8.	Environmental policies encourage the preservation and restoration of protective ecosystems.	1	2	3	4	[5]
9.	Environmental policies provide incentives to development that is located outside of protective ecosystems.	1	2	3	4	[5]
Public Safety						
10.	The goals and policies of the master/comprehensive plan are related to and consistent with those in the hazard mitigation plan.	1	2	3	[4]	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]	4	5
14.	The bylaws contain natural hazard overlay zones that set conditions for land use within such zones.	1	2	[3]	4	5

MASTER/COMPREHENSIVE PLAN						
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	4	5
16.	The bylaws prohibit development within, or filling of, wetlands, floodways, and floodplains.	1	2	3	4	5
SUBDIVISION REGULATIONS						
17.	The subdivision regulations restrict the subdivision of land within or adjacent to natural hazard areas.	1	2	3	4	5
18.	The regulations provide for conservation subdivisions or cluster subdivisions to conserve environmental resources.	1	2	3	4	5
19.	The regulations allow density transfers where natural hazard areas exist.	1	2	3	4	5
CAPITAL IMPROVEMENT PROGRAM AND INFRASTRUCTURE POLICIES						
20.	The capital improvement program limits expenditures on projects that would encourage development and/or redevelopment in areas vulnerable to natural hazards.	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	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	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	4	5

Administrative and Technical Capabilities

Table 56 is based off Worksheet 4 from FEMA's Local Mitigation Planning Handbook. It was used by the HMPC to document and review the current administrative and technical capabilities of the Town. These include staff and their skills and tools that can be used for mitigation planning and to implement specific mitigation actions.

Table 56. 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 a seven-member elected Board responsible for review and approval of Site Plans, Special Permits, and Subdivisions. In addition, the Planning Board develops Zoning Bylaw Articles, Subdivision Regulations, and Zoning changes and provides a recommendation of proposed changes to Town Meeting for adoption. The Planning Board is also charged with the task of updating Norton's Master Plan and adopting local policies to meet State mandates. Very effective in terms of updating and enforcing numerous bylaws, regulations, and procedures that promote public safety, natural resource protection, sustainable development, and other measures that align with hazard risk reduction.
Conservation Commission	Yes	The Norton Conservation Commission is a seven-member board of volunteers to administer and enforce the Wetlands Protection Act (M.G.L. Chapter 131, Section 40) and its Regulations (310 CMR 10.00). The Conservation Commission also manages over 1,100 acres of land and water bodies for open space and preservation purposes. The Conservation Director is the Conservation Agent, Stormwater Agent, Community Rating System Coordinator, and an active member of the Stormwater Authority and Open Space Committee. Very effective, especially in terms of flood hazard risk reduction and protection of the natural and beneficial functions of floodplains, wetlands, and other protective natural resources.
Capital Planning Committee	Yes	The Town's five-member Capital Improvements Committee is established annually to undertake review

Administrative/Technical Resource	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
		and recommendation with respect to departmental requests for capital items and capital improvements to be undertaken during the next ensuing five years. Funds must be approved by a majority vote of any Town Meeting, which could be an issue if needed to replace major equipment between town meetings but not a common occurrence. Effective committee and process for appropriating monies to the Town's Capital Improvement Fund which can be accessed for approved hazard risk reduction projects.
Climate Action Committee	No	N/A
Other relevant boards/committees?	Yes	Council on Aging, Board of Health, Zoning Board of Appeals, Open Space Committee
Staff		
Community Planner	Yes	The Town's Planning Board is supported by the Director of Planning & Economic Development and the Planning/Zoning Secretary. Effective coordination on the administration of the Town's Zoning Bylaw and other relevant development regulations and community plans that are supportive of long-term hazard risk reduction.
Chief Building Official	Yes	The Building Commissioner is supported by a part-time assistant and other staff inspectors. The Building / Inspections Department is responsible for ensuring that buildings are constructed safely and used properly in compliance with the provisions of the State Building Code, the Town Zoning Bylaw, and other applicable ordinances. It issues permits for new construction, reconstruction, alteration, repair, and demolition of buildings as well as the installation of equipment & the location, use & occupancy of all buildings, structures, and land. Also responsible for annual inspections of restaurants, multi-family buildings, schools, and day care centers. Department staffing is adequate to administer programs and enforce regulations that are effective in supporting hazard risk reduction.
Civil Engineer	No	N/A
Emergency Manager	Yes	The Town's Fire Chief serves as the Emergency Management Director (EMD) and oversees the Norton

Administrative/Technical Resource	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
		Emergency Management Agency (NEMA). NEMA's mission is to further the education of the citizens of Norton in the ability to avert or combat the effects of a disaster either natural or manmade; to coordinate the resources of those State, Federal and Volunteer agencies that respond to our need when local resources are overwhelmed; and to ensure that the citizens affected by disaster are cared for, receive the financial assistance and emotional support to insure a full recovery.
Floodplain Administrator	Yes	The duties of floodplain management are effectively administered by the Town's Building Commissioner. This includes implementation of all commitments and requirements of the NFIP as addressed through the Town's Zoning Bylaw (Article XIII: Floodplain District) and the State Building Code.
Sustainability/Climate Coordinator	No	N/A
GIS Coordinator	Yes	Although not a formally designated position, GIS mapping and related duties are performed as an auxiliary function provided by the Town Assessor.
Public Information Officer/Specialist	No	N/A
Technical		
Grant writing	Yes	Not a formal position, but this is a shared staff responsibility that is specific to each department.
GIS mapping and analysis	Yes	As noted above, GIS mapping and related duties are performed as an auxiliary function provided by the Town Assessor. This includes the maintenance of Norton GIS, the Town's online mapping system, in addition to other mapping or analysis tasks in support of Town departments, boards, and committees.
Hazard data and information	Yes	Norton GIS, supplemented by state and other hazard data products and online data portals.
Maintenance programs to reduce risk *(e.g., tree trimming, drainage clearance)*	Yes	Highway Department

Administrative/Technical Resource	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
Acquisition of land for open space, recreation, and other public use	Yes	Open space preservation is one of the Town's current priorities, which can really help with environmental buffers that supportive hazard risk reduction.
Warning systems/services *(e.g., Reverse 911, outdoor warning signs)*	Yes	Norton Alerts (provided by Smart911). The Norton Alerts notification system allows community residents to determine how and about what they wish to be notified. The Town recommends that every resident sign up for Emergency Alerts and General Alerts. In addition, residents may opt-in to receive notifications from Town Departments, Commissions, and Committees. They can be notified in various ways and on different devices based on selected options (e.g., text, voice, emails, and social media). The Town also suggests that it would be advantageous for those who are medically dependent on electricity or have special needs to fill out the medical questions appropriate for their needs. While not guaranteeing a special response it certainly helps for awareness and planning purposes.
Mutual Aid Agreements	Yes	The Town has opted in with MEMA under statewide mutual aid agreements and has similar arrangements with neighboring communities (Public Safety and Public Works).

Financial Capabilities

Table 57 is based off Worksheet 4 from FEMA's Local Mitigation Planning Handbook. It was used by the HMPC to identify and review the Town's eligibility and access to funding sources that can be used to support the implementation of hazard mitigation projects.

Table 57. Financial Findings.

Financial Tool/Source	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
General funds	Yes	Limited budget for Town operations and not historically used in support of hazard mitigation projects. Annual budgets are presented by the Town Manager and recommended by the Finance Committee, and typically proves to be a challenging process in terms of balancing revenues with expenditures.

Financial Tool/Source	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
Capital Improvement Program (CIP) funding	Yes	The Town's Capital Improvements Fund has been established as a separate account in the treasury, with monies that may be appropriated when approved by a majority vote of any Town Meeting for any purpose for which the Town would be authorized to borrow money. Can be an effective tool for supporting hazard risk reduction projects.
Special purpose taxes	No	N/A
Fees for water, sewer, gas, or electric services	Yes	Water fees collected by Norton Water Department but generally not available to fund risk reduction projects.
Stormwater utility fee	No	N/A
Development impact fees	No	N/A
General obligation bonds and/or special purpose bonds	Yes	Not used in the past but a possible source of funding for larger capital projects that can support hazard mitigation efforts.
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	No	N/A
Other federal funding programs	Yes	EPA, USACE, and other federal agencies do make grant funding available for a variety of resilience-themed projects and initiatives that the Town may be eligible to pursue in the future.
Massachusetts Municipal Vulnerability Preparedness (MVP) Action Grant funds	Yes	The MVP Action Grant offers financial resources to communities that are seeking to advance priority climate adaptation actions to address climate change impacts resulting from extreme weather, sea level rise, inland and coastal flooding, severe heat, and other climate impacts. As a designated "MVP Community" the Town is eligible to apply for grants on its own, or as part of a regional partnership of multiple municipalities provided that the lead applicant is MVP-designated.
Massachusetts Community Preservation Act (CPA) funds	No	Not adopted by the Town, but this could be a potential source of funding to support open space preservation and similar mitigation measures if Norton becomes a CPA community in the future. CPA adoption was

Financial Tool/Source	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
		recently proposed at Annual Town Meeting but did not pass the required majority vote. The Selectboard had appointed a study committee several years ago to gather more information on how to approach CPA adoption for the Town and this remains a recommended activity in the Town's Master Plan, OSRP, and MVP Plan.
Other state funding programs	Yes	The Commonwealth makes a variety of funding programs available on a routine basis to support local risk reduction projects. Some of the most applicable opportunities for the Town include MVP Action Grants and other annual grant programs through EEA, such as the Culvert Replacement Municipal Assistance Grant Program. Others may include Community Compact grants, Green Communities grants, etc. depending on the scope and scale of specific projects.
Private or non-profit grants, loans, or funding	Yes	Possibly with land trusts and other organizations to help the Town acquire/preserve land and open space.

Education and Outreach Capabilities

Table 58 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 58. Education and Outreach Findings.

Education & Outreach Program/Method	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
Community newsletter(s)	No	Town website is sometimes used to share newsletters that are shared by Town departments (i.e., Council on Aging, Veteran's Services, etc.). Residents can also sign up for various Email notifications from the Town.
Web-based / social media	Yes	Town website is well-maintained and provides links to many resources for the community. This includes a page dedicated to the Town's Floodplain Management Program. Town departments also use social media including Facebook, X, etc. Very effective methods for communicating with community residents.
Public Access TV, radio, etc.	Yes	Norton Media Center / Cable Access TV

Education & Outreach Program/Method	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
Community gatherings, festivals, celebrations, or other events	Yes	The Town routinely hosts annual and seasonal events for the community which provide opportunities for effective outreach and communication with residents.
Hazard awareness campaigns *(e.g., Severe Weather Awareness Week)*	Yes	The Town often sends out PSA's that are relevant to the season or situation.
Organizations that represent, advocate for, or interact with underserved or vulnerable populations	Yes	Cupboard of Kindness (food pantry), Council On Aging, local charitable organizations
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, etc.	Yes	Norton's Community Emergency Response Team (CERT) program educates people about disaster preparedness for hazards that may impact their area and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations. Using the training learned in the classroom and during exercises, CERT members can assist others in their neighborhood or workplace following an event when professional responders are not immediately available to help. CERT members also are encouraged to support emergency response agencies by taking a more active role in emergency preparedness projects in their community. Very effective. Norton EMA has sponsored a CERT Team since the spring of 2002. Training sessions have been run usually twice a year spring and fall, and to date over 400 area residents have received their FEMA CERT certifications.
Ongoing public education or information program *(e.g., responsible water use, fire safety, household preparedness)*	Yes	The Norton Fire Department and Norton Emergency Management Agency are actively engaged in a variety of education and training activities, including those promoting fire safety, severe weather preparedness, flood mitigation, etc. in addition to the CERT program described above.
Natural disaster or safety-related school programs	Yes	Norton Fire participates in the S.A.F.E. grant programs, which are educational fire programs teaches children and seniors about fire safety. S.A.F.E is one of two fire and life safety grant programs available to

Education & Outreach Program/Method	In Place? *(Yes/No)*	General Description / Effectiveness for Hazard Risk Reduction
		Massachusetts Fire Departments. The second program is Senior SAFE, which aims to reduce older adult fire deaths through fire safety and education. These programs help residents understand the importance of fire safety and what to do in an emergency.
StormReady® certification	No	Not familiar with this program
Firewise USA® certification	No	Not familiar with this program
Public-private partnership initiatives addressing disaster-related issues	No	N/A

National Flood Insurance Program (NFIP) Participation and Compliance

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

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

The Town of Norton has participated in the NFIP since 1979. As summarized in Table 59, the HMPC used Worksheet 5 from FEMA's *Local Mitigation Planning Handbook* to collect information regarding the Town's participation in and compliance with the NFIP. This worksheet, in addition to a separate *NFIP Survey* for the Conservation Director, helped the HMPC to identify areas for improvement and other ideas that could be potential mitigation actions.

Table 59. NFIP Participation and Compliance Findings.

NFIP Topic	Source of Information	Comments
Insurance Summary		
How many NFIP policies are in the community? What is the total premium and coverage?	FEMA NFIP Services, Flood Insurance Data and Analytics; State NFIP Coordinator	As of December 31, 2023, a total of 73 NFIP policies are in force. The total premium is $54,417 for a total of $18,828,000 in coverage. The average premium paid per policy is $745.
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 55 claims paid since 1979, totaling $312,728 in losses. The average claim amount paid is $5,686. There have been two (2) claims paid for substantial damage.
How many structures are exposed to flood risk within the community?	GIS analysis (FEMA FIRMs + building footprint data)	It is estimated that 183 structures are at risk to the 1-percent annual chance flood, and 260 are at risk to the 0.2 percent annual chance flood for a combined total of 443 structures exposed to flood risk.
Are there any repetitive or severe repetitive loss structures in the community?	MEMA / FEMA	Yes, there are 6 repetitive loss properties in Norton that have experienced a total of 13 insured losses. There is also 1 severe repetitive loss property that has experienced 2 insured losses. See Chapter 4 for more details.
Describe any areas of flood risk with limited NFIP policy coverage	HMPC	No address-specific data has been made available by FEMA, but it is generally assumed that owners of property located in special flood hazard areas are underinsured when it comes to flood insurance coverage (based on only 73 current policies under the NFIP in comparison to 443 structures estimated to be exposed to moderate to high flood risk).
Staff Resources		
Who is responsible for floodplain management in the community? Do they serve any roles other than	Conservation Director	The duties of floodplain management and implementation of the commitments and requirements of the NFIP are performed as an auxiliary function by the Town's Building

NFIP Topic	Source of Information	Comments
Community Floodplain Administrator (FPA)?		Commissioner, with support from the Conservation Director.
Is the Community FPA or NFIP Coordinator a Certified Floodplain Manager?	Conservation Director	No
Is floodplain management an auxiliary function?	Conservation Director	Yes, for the Building Commissioner.
Explain NFIP administration services (e.g., permit review, GIS, inspections, engineering capability).	Conservation Director	All development within the Town's Floodplain District, including structural and non-structural activities, are reviewed for compliance with the Town's Zoning Bylaws and other applicable rules or regulations. The Town complies with the NFIP by enforcing floodplain regulations, maintaining up-to-date floodplain maps, and providing information to property owners and builders regarding floodplains and building requirements. The Conservation Commission provides general information on flood insurance, floodplains, floodplain permits and the Town's permit review process, and frequently asked questions (FEMA FAQs). Norton also participates in FEMA's Community Rating System (CRS) and conducts regular outreach on flood risk topics in addition to other CRS credited activities.
What are the barriers to running an effective NFIP program in the community, if any?	Conservation Director	Staffing can be a problem, especially with many of the Town's personnel being stretched thin with fulfilling other staff positions and roles.
Compliance History		
Is the community in good standing with the NFIP?	Conservation Director, State NFIP Coordinator, FEMA	Yes
Are there any outstanding compliance issues (i.e., current violations)?	Conservation Director	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 10/29/2018 Last CAV was 12/15/2022
Is a CAV or CAC scheduled or needed?	Conservation Director	No
Regulation		
When did the community enter the NFIP?	State NFIP Coordinator, FEMA (CIS)	6/1/1979 (Regular Entry) 3/20/1974 (Emergency Entry)
Are the FIRMs digital or paper?	Community FPA	Digital
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	Floodplain regulations are administered through the enforcement of the Town's Zoning Bylaws which exceed current FEMA/NFIP minimum requirements. In May 2023 the Town updated their regulations to align with the State's latest (2020) model floodplain bylaw. As described earlier in this chapter, higher regulatory standards are also met through the Town's enforcement of the Massachusetts State Building Code (780 CMR). Other floodplain development requirements are included in the Town's administration of the Commonwealth's Wetlands Protection Act Regulations (310 CMR 10).
How does the community enforce local floodplain regulations and monitor compliance. Explain the permitting process.	Community FPA, community records	The Planning Board, Building Department, and Conservation Commission are involved with land use development in special flood hazard areas. The Towns' Zoning Bylaw works in tandem with the State Building Code and Wetland Protection Act assist with floodplain management determinations. The Town of Norton's permit review process includes the use of a checklist of all local, state, and federal permits that will be necessary to carry out the proposed development in the Floodplain District. The proponent must acquire all necessary permits and must submit the completed checklist demonstrating that all

NFIP Topic	Source of Information	Comments
		necessary permits have been acquired. A Floodplain Development Permit Application is required for any proposed development in an SFHA. The term "development" includes new or improved structures, placement of fill, excavation, storage of materials, and other activities.
Community Rating System (CRS)		
Does the community participate in CRS? If so, what is the community's CRS Class?	Conservation Director	Yes – Class 9
What categories and activities provide CRS points and how can the class be improved?	Verisk/ISO	The Town receives credit points across a range of CRS activities including public information, mapping and regulations, flood damage reduction, and warning and response. It received 160 points for the previous Hazard Mitigation Plan (Activity 510: Floodplain Management Planning). Improving beyond Class 9 will require the Town to take on more activities that may go beyond existing staff capabilities and resources to implement, but this will continue to be routinely explored in the future.
Does the plan include CRS planning requirements	Yes	Yes, many of the planning requirements under CRS Activity 510 are included in the plan.

Table 60 provides some additional information in response to the updated requirements included in FEMA's 2022 Local Mitigation Planning Policy Guide (Element C2-a):[52]

Table 60. Additional NFIP Participation and Compliance Information.

Required Information	Response
Adoption of NFIP minimum floodplain management criteria via local regulation.	Zoning Bylaws, Article 13 (Floodplain District). Last updated and adopted in May 2023 in conformance with the State's model floodplain bylaw in May 2023.
Adoption of the latest effective Flood Insurance Rate Map (FIRM), if applicable.	The Town's Zoning Bylaw, Article 13 at §175-13.3 (Location) establishes the Floodplain

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

Required Information	Response
	District to include all special flood hazard areas as designated within the Town of Norton, Bristol County Flood Insurance Rate Map (FIRM) dated July 6, 2021.
Implementation and enforcement of local floodplain management regulations to regulate and permit development in SFHAs.	See explanation of the Town's permitting process provided in Table 59.
Appointment of a designee or agency to implement the addressed commitments and requirements of the NFIP.	The Town's Building Commissioner is tasked with implementing the commitments and requirements of the NFIP, making sure Norton remains in compliance with all relevant codes and standards for floodplain management.
Description of how participants implement the substantial improvement/substantial damage provisions of their floodplain management regulations after an event.	The Town implements the SI/SD provisions of its floodplain management regulations as required per the NFIP (CFR Title 44, Parts 59 through 65) and Massachusetts State Building Code (780 CMR). The Town provides a "Substantial Improvement or Substantial Damage Application Packet Checklist" to the checklist for applicants that must submitted as part of the community permit application process for substantial improvement or substantial damage of a structure located in a special flood hazard area. Applicants are responsible for submitting a Floodplain Management Permit Application which includes itemized SI/SD claims, and ultimately the Building Commissioner provides determinations on the permit. The Town will also coordinate with State Flood Hazard Management Program staff to assure that proper practices are followed and that a post-disaster plan will be in place to implement all SI/SD provisions.

Summary and Conclusions

The Town of Norton is a suburban, largely residential community with relatively strong capabilities and resources to support the implementation of hazard mitigation actions. This chapter provides documentation on the existing local authorities, policies, programs, and resources to support hazard mitigation.

Some of the strongest hazard mitigation capabilities for the Town of Norton are found through the adoption and maintenance of local plans, such as its recently updated Master Plan, and the routine administration and enforcement of strong codes and regulations. The Town's 2021 Master Plan has already begun to incorporate hazard and climate resilience strategies and actions into the local planning framework, including an explicit strategy to "prepare Norton buildings to respond to immediate and long-term climate challenges." Open space preservation remains one of the Town's highest priorities, and the Town's Open Space and Recreation Plan supports this by aiming to protect and preserve lands which may be within floodplains or known areas which may be prone to flooding. In 2018, Norton was among the first municipalities in the Commonwealth to be designated as an "MVP Community" under the State's Municipal Vulnerability Preparedness (MVP) program. The Town has also been an active participant in FEMA's Community Rating System (CRS) since 1991 in recognition for local floodplain management activities that go above the minimum federal standards of the National Flood Insurance Program (NFIP).

The Town of Norton has also adopted and routinely updates regulations and procedures that can help reduce natural hazard risks, including the Town's zoning bylaws which continue to be reviewed and improved along with other local rules and regulations, such as those related to stormwater management, wetlands protection, and the subdivision of land. Most recently this includes revising and updating its local floodplain management regulations in 2023 to comply with the State's latest model floodplain bylaw. The Town's special permit and site plan approval process is triggered and enforced under many circumstances and are considered very effective in terms of supporting the Town's goals and purposes as adopted through these local regulations. This includes but goes beyond only those developments or improvements proposed in flood hazard areas.

The Town employs skilled and committed staff across numerous departments to administer existing local programs, regulations, and other activities, who are supported by an active citizenry and volunteers that serve on numerous local boards and committees. The Town benefits from effective collaboration and interdepartmental coordination across these various entities. Although the Town's administrative and technical capabilities are generally considered strong, existing staff resources do get stretched thin with department staff often working on multiple projects or other priorities that can take time and/or possible focus away from hazard mitigation and other longer-term resilience initiatives. As one member of the HMPC explained, most of these types of tasks are handled as an "add on" to a primary job function, and they do not always get a high degree of attention when consumed with primary role tasks. That said, staffing for most departments is generally considered adequate, and while some services are handled on a part-time basis, contracted out, or done in cooperation with the support of the Southeast Regional Planning and Economic Development Division (SRPEDD), these human resources are skilled and very supportive in meeting the Town's day-to-day administrative and technical needs. Those positions considered most critical to supporting hazard and climate resilience are maintained by the town at full-time status (e.g., Town Planner, Building Commissioner, Emergency Management Director, and Conservation Director/Stormwater Agent) with many also supported by additional staff and local board or committee members.

The Town's financial capabilities are more limited in terms of its ability to leverage local and external funding sources to support hazard mitigation projects. Although the Town could conceivably appropriate local funds (or borrow money through debt financing) to support investments in hazard mitigation projects, these expenses would have to be approved through Town Meeting and can come from the Town's operating budget or Capital Improvements Fund. The Town has been successful in leveraging these funds in the past for stormwater management and other infrastructure improvements, but they have not historically been used for more traditional hazard mitigation projects. However, the Town remains committed to pursuing additional funding from external sources of grant funding that it is eligible to receive, including those identified as priority funding sources for hazard mitigation and climate adaptation. This includes applying for federal (e.g., FEMA, NOAA, USACE, etc.) and state (e.g., EEA, DCR, etc.) and other grants on its own in addition to partnering with neighboring communities and other partners, such as the Resilient Taunton Watershed Network (RTWN), for funding in support of regional hazard risk reduction projects.

The Town is fortunate to have many methods and tools to support public education and outreach initiatives that can support hazard mitigation, such as a regularly maintained website (including a dedicated Floodplain Management Program page), social media, cable access TV and community gathering events, in addition to several organizations that routinely engage with and advocate for underserved or socially vulnerable populations. These resources can be used to help with increasing risk awareness and promoting emergency preparedness and hazard mitigation activities that can be accomplished on community, neighborhood, and site-specific scales. It is part of the Norton Emergency Management Agency's mission to raise the level of awareness of residents to better prepare and better be able to be self-sufficient during an emergency. NEMA has also been successful in gaining support from community members through its Community Emergency Response Team (CERT). During recent storms that resulted in power outages or trees down, CERT Team enforced road closures and wires down safely to free up the Police and Fire Department staff to concentrate on the true emergencies.

Although the Town of Norton has relatively high capabilities and is well-positioned to mitigate the natural hazard risks faced by the community, it can expand and improve on the capabilities described in this chapter. Some general and specific opportunities to address existing gaps or limitations in local capabilities to reduce risk have been identified for each capability type and are further described below. Each of these opportunities were then considered by the HMPC during the plan development process as potential new mitigation actions to be included in the Mitigation Strategy.

Opportunities to Expand and Improve on Capabilities to Reduce Risk

Planning and Regulatory Capabilities

- Integrate hazard mitigation/resilience into future updates of key plans (Master Plan, OSRP, MVP, HPP) in alignment with the HMP.

- Continue coordinating with SRPEDD and the Resilient Taunton Watershed Network (RTWN) on plans/studies that promote resiliency.
- Conduct bylaw reviews and updates for climate resilience/adaptation (incorporating LID, GI, and other nature-based solutions to mitigate the effects of extreme heat, heavy precipitation, and flooding). Leverage existing methods such as Mass Audubon's Bylaw Review Tool.
- Consider adoption of a Drought Management Bylaw to spell out a uniform set of water use restrictions to be enacted under state-declared water shortage conditions.

Administrative and Technical Capabilities

- Build staff expertise and capacity for mitigation activities through incentivizing training and professional development opportunities.
- Expand opportunities for volunteer or part-time support of hazard mitigation activities (drawing from local boards, CERT, interns, etc.).
- Enhance in-house GIS capabilities to support CRS, hazard mitigation and other resilience planning/project initiatives.
- Develop system/process for maintaining hazard impact/loss data.

Financial Capabilities

- Integrate long-term risk reduction/resilience as a key principle for the annual Town Budget and Capital Improvements Fund appropriations.
- Develop a more comprehensive/integrated Capital Improvement Program (long-term plan versus annual departmental requests).
- Revisit adoption of the MA Community Preservation Act (CPA).
- Prioritize and dedicate resources (grant writer) for pursuing recurring grant opportunities to mitigate hazards (FEMA, EEA, etc.).
- Continue to coordinate with SRPEDD, neighboring communities, non-profits organizations, and others on regional risk reduction projects.

Education and Outreach Capabilities

- Leverage the Town's website, newsletters, social media / PSAs, and community events to promote risk awareness and low-cost or DIY mitigation activities.
- Identify and seek to address any unmet needs related to targeted outreach/education for the community's more vulnerable populations.
- Expand NEMA's and Fire Department's ongoing public outreach programs to address hazard mitigation and climate adaptation topics.

Possible New Actions Related to NFIP Participation and Compliance

- Evaluate permit application forms to determine possible modifications focused on flood hazard prevention.
- Maintain a map of areas that flood frequently (including repetitive loss areas) and prioritize them for inspection immediately after flood events. If outside FEMA special flood hazard areas, consider requiring existing regulatory standards (compliance with Floodplain District) through extended overlay zoning, etc.
- Send information about the flood hazard and promote the availability of flood insurance through regular mailings (annual property tax notices, utility bills, etc.).
- Maintain supplies of FEMA/NFIP materials to help property owners evaluate measures to reduce potential hazard damage. Make available in public buildings, local library, website, etc. and inform people who they can call to learn more information.
- Develop handouts for permit applications on specific issues such as installation of manufactured homes in flood hazard areas according to HUD's installation standards (examples available), or guidance on improving/repairing existing buildings to better withstand potential hazards.
- Develop a local Post-Disaster Substantial Damage Plan to assist with implementing substantial damage provisions of the NFIP, the State Building Code, and local floodplain regulations (guidance available).
- Review the State's *Local Floodplain Action Guide* (forthcoming in 2024) for possible zoning or administrative improvements.

Chapter 6. Mitigation Strategy

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

Mitigation Goals

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

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

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

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

Save Lives and Property

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

Infrastructure

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

Capacity

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

Natural Resources

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

Education

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

Figure 21. Mitigation Plan Goal Statements.

The Municipal Vulnerability Preparedness (MVP) plan, called the Town's Municipal Vulnerability Preparedness Plan 2018, included 15 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 Norton's MVP were reviewed and considered when developing mitigation actions for this plan. Below is the list of MVP Recommendations with notes regarding their status and relevance in the Hazard Mitigation Plan.

Table 61. Status comments on MVP recommendations.

MVP Recommendation (Organized by Theme)	Notes / Comments
Multi-Hazard Mitigation Planning	
Add generators to the Norton Senior Center, St Mary's, 120 West Main Apartment units, and homes around Winnecunnet Pond (or install adaptors on each Winnecunnet Pond home, so that a mobile generator can be used to service all the homes).	Generator added to existing Senior Center, and one will be installed at the new Senior/Community Center with funding from a FEMA EMPG Grant. 120 W. Main St has added a Generator to power the Complex Community Center and surrounding lighting.

MVP Recommendation (Organized by Theme)	Notes / Comments
Designate additional emergency shelters, likely the Senior Center.	Existing Senior Center has been designated as a Warming/Cooling Center. New Senior/Community Center will be designated a Mass Care Shelter
Culvert replacement/upgrade at Walker, Plain, and East Hodges Streets.	Plain Street Bridge Upgrade Complete. Walker & E Hodges denied CR Grant in 2022.
Assess all dams for, removal, maintenance costs/benefits.	In Progress.
Stormwater Management retrofits and mitigation plans for Routes 123 and 140.	Ongoing retrofit in progress study with MS4 | 123/140 intersection study for re-configuration was approved for funding at May 2023 Town Meeting.
Prioritize resiliency of Canoe River and Wading River, through improving infiltration, appropriate culvert replacement, and dam removal.	In Progress.
Assess resilience of existing power infrastructure to treefall; coordinate with National Grid on their Vegetation Management Plan.	Ongoing activity.
Communications	
Create and distribute public education materials on local environmental resources and vulnerabilities.	Ongoing activity with websites, pamphlets, and notices.
Create an Information Technology department Collectively decide to on/create a central social media account that will manage all communications to town – expand on school alerts and police notifications.	Delayed due to capacity.
Increase interdepartmental communication by collecting and sharing information.	Ongoing activity.
Stormwater Management	
Incorporate LID in senior center parking lot.	Standard.

MVP Recommendation (Organized by Theme)	Notes / Comments
Keep local water local by improving infiltration and managing stormwater on-site.	Standard.
Bylaw Review	
Revisit zoning, open space, subdivision bylaws to ensure nature-based solutions are being encouraged to their full capacity.	In Progress.
Revisit Large-Scale Ground-Mounted Solar bylaw to encourage use of renewables while maintaining land conservation priorities.	Town has Drafted 2023 Solar Bylaw for approval at Town Meeting 2024.

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))

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

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

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 MVP recommendations to develop a list of mitigation actions for this plan. The HMPC sought to solve problems identified with the mitigation actions.

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

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

In addition to this quantitative approach to identifying mitigation actions, the HMPC took a qualitative approach through the public outreach and engagement process to identify mitigation actions. Mitigation actions supporting underserved communities and environmental justice communities were specifically considered by the HMPC. They also focused on actions to the built environment both buildings and infrastructure as well as future development or redevelopment. The resulting list of mitigation actions includes at a minimum one action for hazard identified. In several instances multiple actions address an identified hazard and problem. For instance, flooding is addressed through multiple actions. The HMPC and the public considered four mitigation action categories defined in Figure 23 below when considering solutions to identified problems.

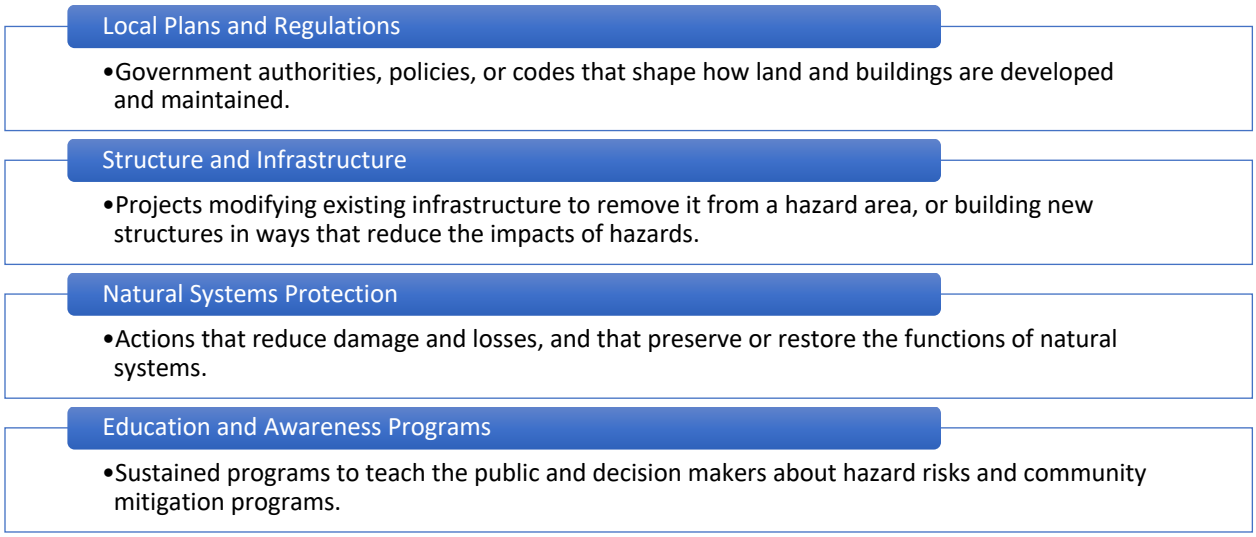


Figure 23. Four Types of Mitigation Actions.

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

Table 62. Examples of Mitigation Actions.

Mitigation Action Category	Examples of Mitigation Actions
Local Plans and Regulations	• Comprehensive plans • Land use ordinances • Subdivision regulations • Development review • Building codes and enforcement • NFIP Community Rating System • Capital improvement programs • Open space preservation • Stormwater management regulations and master plans
Structure and Infrastructure Projects	• Acquisitions and elevations of structures in flood-prone areas • Utility undergrounding • Structural retrofits • Floodwalls and retaining walls • Detention and retention structures • Culverts
Natural Systems Protection	• Sediment and erosion control • Stream corridor restoration

Mitigation Action Category	Examples of Mitigation Actions
	• Forest management • Conservation easements • Wetland restoration and preservation
Education and Awareness Programs	• Radio or television spots • Websites with maps and information • Real estate disclosure • Presentations to school groups or neighborhood organizations • Mailings to residents in hazard-prone areas

Potential mitigation actions for each identified hazard and problem identified in the Risk Assessment are shown Table 63 below. Hazards are listed in order of risk. Some of these mitigation actions are included in the Action Plan; some were not included because of cost-benefit-analysis outcomes or inconsistency with Town priorities. The HMPC considered the pros and cons of all possible mitigation actions. They considered each of the hazard risks and problems identified in terms of the following CRS categories:

a. Preventive Activities
b. Floodplain Management Regulatory/current & future conditions
c. Property Protection Activities
d. Natural Resource Protection Activities
e. Emergency Services Activities
f. Structural Projects
g. Public Information Activities

The HMPC reviewed a comprehensive range of specific mitigation actions to reduce the effects of hazards as described in the risk assessment, with emphasis on addressing the vulnerability of new and existing buildings and infrastructure. This systematic review also included the consideration of numerous opportunities to expand and improve the Town's capabilities to reduce risk as identified in the capability assessment. The actions and opportunities explored by the HMPC covered a variety of mitigation measures including preventive activities, property protection, natural resource protection, structural projects, public information activities, and emergency services.

The HMPC considered long-term preventive activities a top priority, such as limiting risk to new development and redevelopment, along with natural resource protection. These priorities directly support the Town's other established goals and current efforts to preserve open space, wetlands, floodplains, and other environmentally sensitive areas. They also align with the Town's key strengths in terms of existing planning and regulatory capabilities to guide future growth and community development. As mentioned in Chapter 5 the Town continues to review and update its local rules and

regulations, such as those related to stormwater management, floodplain management, wetlands protection, and the subdivision of land. Additional actions to build upon and enhance these efforts were incorporated into the mitigation strategy following committee discussion and the general consideration of the pros and cons of each activity.

The HMPC also reviewed a range of structural projects and public information activities designed to help reduce the vulnerability of existing buildings and populations to potential hazard impacts. These actions included new hazard identification and mapping activities, site-specific building and infrastructure improvements, community education initiatives, and more targeted outreach campaigns to vulnerable populations. Although not the focus of the Town's mitigation strategy, actions related to integrating mitigation into existing emergency management activities were also considered and incorporated into the plan as new actions for the Town to pursue.

Table 63. Possible Mitigation Actions.

Hazard	Possible Mitigation Actions
Flooding from Precipitation and Dam Overtopping	• Review the State's Local Floodplain Action Guide (forthcoming in 2024) for possible zoning or administrative improvements that may be taken to further enhance the Town's existing flood risk reduction efforts. • Maintain or repair Chartley Dam and the Norton Reservoir Dam as necessary. • Restrict building in high hazard areas.
Severe Winter Storms	• Develop system/process for maintaining hazard impact/loss data. • Be able to open a warming center. • Mitigate risk to buildings with flat roofs that may accumulate snow.
Average and Extreme Temperatures	• Develop and maintain a library of publications and other resources on hazard mitigation and climate adaptation for property owners to learn more about how to prepare and protect their property from the adverse effects of natural hazards.
Droughts	• Revisit the adoption of a Drought Management Bylaw as described in the Open Space and Recreation Plan.

Hazard	Possible Mitigation Actions
Wildfires/Brushfires	• Educate neighborhoods with an increased wildfire risk due to dead trees how to mitigate their risk. • Collaborate with CSX to mitigate wildfire risk along railroad tracks.
Hurricanes and Tropical Storms	• Review the CEMP for opportunities to incorporate mitigation measures into the Town's emergency preparedness and response activities.
Other Severe Weather Events	• Pursue culvert and drainage improvements through MA Division of Ecological Restoration Grant opportunities.
Tornadoes	• Leverage the Town's website, newsletters, social media / PSAs, cable television, and community events to promote risk awareness and low-cost or do-it-yourself mitigation activities.
Invasive Species	• Develop an invasive species and water pollution management plan, that includes education for privately owned facilities.
Earthquakes	• Conduct a seismic safety study for critical facilities and work with Wheaton College to study their older buildings.

Mitigation Action Plan

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

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

Table 64. Essential Details for Mitigation Actions.

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

The HMPC also considered six CRS categories and the following actions chosen for the Plan to meet those six categories (some actions may meet more than one category).

Table 65. CRS Categories and Mitigation Actions.

CRS Category	Mitigation Action and Action #
Preventive	
• Integrate hazard mitigation/resilience into future updates of key plans (Master Plan, OSRP, MVP, HPP) in alignment with the HMP. (1) • Build staff expertise and capacity for mitigation activities through incentivizing training and professional development opportunities. (2) • Review the State's Local Floodplain Action Guide (forthcoming in 2024) for possible zoning or administrative improvements that may be taken to further enhance the Town's existing flood risk reduction efforts. (5) • Continue coordinating with SRPEDD and the Resilient Taunton Watershed Network (RTWN) on plans/studies that promote resilience. (7)	

CRS Category	Mitigation Action and Action #
	• Maintain a map of areas that flood frequently (including repetitive loss areas) and prioritize them for inspection immediately after flood events. If outside FEMA special flood hazard areas, consider requiring existing regulatory standards (compliance with Floodplain District) through extended overlay zoning, etc. (8) • Develop a local Post-Disaster Substantial Damage Plan to assist with implementing substantial damage provisions of the NFIP, the State Building Code, and local floodplain regulations. (14) • Evaluate permit application forms to determine possible modifications focused on flood hazard prevention. (17) • Revisit zoning, open space, subdivision bylaws to ensure nature-based solutions are being encouraged to their full capacity. (24) • Perform stormwater management duties required by MS4 and administer the Local Stormwater Bylaw. (26) • Develop system/process for maintaining hazard impact/loss data. (28)
Property Protection	
	• Conduct annual outreach to owners of repetitive loss properties to promote awareness of mitigation grant funding that is available to mitigate future flood losses. Promote the availability of flood insurance. (19) • Develop and maintain a library of publications and other resources on hazard mitigation and climate adaptation for property owners to learn more about how to prepare and protect their property from the adverse effects of natural hazards. (20) • Conduct outreach to the NFIP policyholders and develop a plan to address repetitive loss properties. (29)
Natural Resource Protection	
	• Develop an invasive species and water pollution management plan, that includes education for privately owned facilities. (6) • Develop and adopt stream dumping regulations that prohibit dumping debris into the drainage network throughout Town. (11)

CRS Category	Mitigation Action and Action #
	• Provide information about areas that should be protected because of their natural protective functions, including floodplains, wetlands, forested lands, and other areas that can help reduce the impacts of natural hazards. (22) • Revisit adoption of the MA Community Preservation Act (CPA). (27) • Identify and prioritize specific strategies to preserve areas important to the retention of the Town's natural green infrastructure (including forest, wetlands, native vegetation), and as delineated on the Resilient Taunton Watershed Network's Green Infrastructure Map for Norton. The Town will also Acquire/protect/preserve areas identified as ecologically important for local and regional resilience in various studies/assessments/reports (such as Audubon MAPPR, RTWN Green Infrastructure Maps, Bio Map II, and others). (30) • Seek out partnerships between private landowners, land conservation groups, and state and local governments to enable future open space acquisitions. (34) • Update the Open Space and Recreation Plan goals and actions to help prioritize nature-based solutions and other hazard mitigation priorities. (37)
Emergency Services	
	• Review the CEMP for opportunities to incorporate mitigation measures into the Town's emergency preparedness and response activities. (15) • Explore the development of post-disaster mitigation policies and procedures. (39)
Structural Projects	
	• Expand the Town's capacity to identify and prioritize the mitigation grant opportunities to pursue, including but not limited to FEMA's HMA programs and the Commonwealth's MVP Action Grants and others focused on climate resilience. (3) • Work with neighboring communities to develop larger, regional MVP Action Grants. (9) • Implement the Norton Complete Streets Plan. (10) • Complete Low Impact Development (LID) stormwater facility at Crane Street along the Three Mile River. (16) • Pursue culvert and drainage improvements through MA Division of Ecological Restoration Grant opportunities. (23)

CRS Category	Mitigation Action and Action #
	• Maintain or repair Chartley Dam and the Norton Reservoir Dam and others as necessary. (32) • Explore mitigation and flood relief improvements to the Barrows Court subdivision. (33)
Public Information	
	• Educate neighborhoods with an increased wildfire risk due to dead trees how to mitigate their risk. (4) • Document and provide information on areas of flooding concern that are not located in the Town's Floodplain District (outside of FEMA's mapped special flood hazard areas). (12) • Identify and seek to address any unmet needs related to targeted outreach/education for the community's more vulnerable populations. (13) • Leverage the Town's website, newsletters, social media / PSAs, cable television, and community events to promote risk awareness and low-cost or do-it-yourself mitigation activities. (18) • Conduct annual outreach to owners of repetitive loss properties to promote awareness of mitigation grant funding that is available to mitigate future flood losses. Promote the availability of flood insurance. (19) • Develop and maintain a library of publications and other resources on hazard mitigation and climate adaptation for property owners to learn more about how to prepare and protect their property from the adverse effects of natural hazards. (20) • Conduct outreach to the NFIP policyholders and develop a plan to address repetitive loss properties. (29)

The priority order was chosen based on weighing costs versus benefits. It was imperative for the Town to determine if the costs associated with an action were reasonable compared to the corresponding benefits. To do this, the HMPC developed a prioritization table that included seven categories of criteria; these are detailed in the able below. Each category was assigned points with priority criteria given the highest points. The most points an action could earn was 22. Actions that scored 15-18 points were ranked as High priority. Actions that scored between 12-14 points were considered Medium, and actions that scored 9-11 points were considered low priority.

Table 66. 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 Flooding from Precipitation and Dam Overtopping, Severe Winter Storms, Average and Extreme Temperatures, Droughts) = 3 Medium (Wildfires/Brushfires, Hurricanes and Tropical Storms, Other Severe Weather, Tornadoes, Invasive Species) = 2 Low (Earthquakes) = 1
2	Approximate Cost	How much will the measure cost to implement?	Low (Under $10k) = 3 Medium ($10k - $100k) = 2 High over $100k) = 1
3	Implementation Timeline	How long will it take to implement the action?	1-2 Years = 3 3-4 Years = 2 5 or more Years = 1
4	Equity Focus	Does the measure provide support to Environmental Justice (EJ) and other Vulnerable Populations?	Direct Support = 3 Indirect Support = 2 No Support = 0
5	Protection of Lives	How effective is the measure in protecting lives and mitigating injuries resulting from the targeted hazard(s)?	Major Support = 3 Moderate Support = 2 Minor Support = 1 None = 0
6	Protection of Critical Facilities or Infrastructure	Does the measure provide protection of critical facilities and infrastructure?	Yes = 3 No = 0
7	Natural Resource Protection	Does the measure provide protection of natural resources?	Yes = 2 No = 0

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

All the actions are listed in Table 67 in order of priority with the action's essential details. Additional tables are included in Appendix C. The breakdown of priority ranking points for each action is included in Appendix C. 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 67. Norton Hazard Mitigation Actions.

1	**Integrate hazard mitigation/resilience into future updates of key plans (Master Plan, OSRP, MVP, HPP) in alignment with the HMP.**	
High	**Action Description**	The Planning Board will require support from an outside consultant to assist with the integration of hazard mitigation/resilience actions to existing Town Management Plans
	Lead Position	Planning Board
	Supporting Agencies	Planning Department, Fire Department
	Cost	Low
	Potential Funding Sources	Capital Request from Town Meeting to secure transfer of funds and hiring of a consultant.
	Hazards	All Hazards
	Implementation Schedule	2024-2029
2	**Build staff expertise and capacity for mitigation activities through incentivizing training and professional development opportunities.**	
High	**Action Description**	Educating Town staff on best practices and current state and federal requirements for hazard mitigation and climate adaptation is an effective way to mitigate natural hazard risks.
	Lead Position	Town Administrator
	Supporting Agencies	Town Departments
	Cost	Low
	Potential Funding Sources	Department Specific Training Budgets - each Town department has these funds.
	Hazards	All Hazards
	Implementation Schedule	2024-2029

3	**Expand the Town's capacity to identify and prioritize the mitigation grant opportunities to pursue, including but not limited to FEMA's HMA programs and the Commonwealth's MVP Action Grants and others focused on climate resilience.**	
High	**Action Description**	To identify mitigation grant opportunities and integrate the hazard mitigation plan throughout planning mechanisms the HMPC will meet twice a year.
	Lead Position	Norton Conservation Director/Stormwater Agent
	Supporting Agencies	Planning Department, Fire Department
	Cost	Low
	Potential Funding Sources	FEMA BRIC
	Hazards	All Hazards
	Implementation Schedule	2024-2029
4	**Educate neighborhoods with an increased wildfire risk due to dead trees how to mitigate their risk.**	
High	**Action Description**	Based on high wildfire risk mapping, prepare mailings and offer neighborhood education on ways to reduce wildfire risk and safe fire practices.
	Lead Position	Fire Chief
	Supporting Agencies	$0
	Cost	Low
	Potential Funding Sources	USDA - Wildfire Community Defense Program
	Hazards	Wildfires/Brushfires
	Implementation Schedule	2026-2027
5	**Review the State's Local Floodplain Action Guide (forthcoming in 2024) for possible zoning or administrative improvements that may be taken to further enhance the Town's existing flood risk reduction efforts.**	
High	**Action Description**	The Floodplain Administrator may require support from an outside consultant on guidance for adhering to the guide, and assist with determining if any existing efforts may require administrative improvement or regulatory changes.
	Lead Position	Building Commissioner
	Supporting Agencies	Conservation Department
	Cost	Low
	Potential Funding Sources	Building Commissioner's Budget
	Hazards	Flooding from Precipitation and Dam Overtopping

	Implementation Schedule	2024-2026
6	**Develop an invasive species and water pollution management plan, that includes education for privately owned facilities.**	
High	**Action Description**	The Conservation Director will require support from an outside consultant to assist with the compilation of an Invasive Species Management Plan & Water Pollution Management Plan which serves as guidance for the Town and local community.
	Lead Position	Norton Conservation Director/Stormwater Agent
	Supporting Agencies	Southeastern Regional Planning & Economic Development District (SRPEDD), Resilient Townton Watershed Network (RTWN)
	Cost	Medium
	Potential Funding Sources	MA Executive Office of Energy and Environmental Affairs (EEA) MVP Action Grant
	Hazards	Invasive Species
	Implementation Schedule	2025-2027
7	**Continue coordinating with SRPEDD and the Resilient Taunton Watershed Network (RTWN) on plans/studies that promote resilience.**	
High	**Action Description**	Host meetings on a regular schedule to workshop best practices and grant sources to mitigate risks to the watershed from natural hazards.
	Lead Position	Planning Board
	Supporting Agencies	Southeastern Regional Planning & Economic Development District (SRPEDD), Resilient Townton Watershed Network (RTWN)
	Cost	Low
	Potential Funding Sources	MA Department of Environmental Protection - Water Quality Management Planning Grant Program
	Hazards	Average/Extreme Temperatures, Drought, Flooding from Precipitation, Hurricanes and Tropical Storms, Invasive Species, Other Severe Weather, Severe Winter Storms, Tornadoes, Wildfires/Brushfires
	Implementation Schedule	2024-2029
8	**Maintain a map of areas that flood frequently (including repetitive loss areas) and prioritize them for inspection immediately after flood events. If outside FEMA special flood hazard areas, consider requiring existing regulatory standards (compliance with Floodplain District) through extended overlay zoning, etc.**	
High	**Action Description**	The Floodplain Administrator will require support from an outside consultant to assist with the compilation of GIS Mapping on an annual basis to assist with CRS reporting purposes. In the future, the Town may develop a detailed mitigation plan that is specific to the Town's repetitive loss areas as identified in the risk assessment.
	Lead Position	Building Commissioner
	Supporting Agencies	Conservation Department

	Cost	Low
	Potential Funding Sources	FEMA BRIC
	Hazards	Flooding from Precipitation and Dam Overtopping
	Implementation Schedule	2024-2029
9	**Work with neighboring communities to develop larger, regional MVP Action Grants.**	
High	**Action Description**	The Conservation Department will continue to collaborate with the local communities and agencies, and meet with local officials and experts within the local community network program to discuss wide-scale action items and goals affecting the entire local community.
	Lead Position	Norton Conservation Director/Stormwater Agent
	Supporting Agencies	Southeastern Regional Planning & Economic Development District (SRPEDD), Resilient Townton Watershed Network (RTWN), Adjacent Communities: Easton, Mansfield, Rehoboth, Taunton, and Attleboro
	Cost	Low
	Potential Funding Sources	Conservation Department Budget
	Hazards	All Hazards
	Implementation Schedule	2024-2029
10	**Implement the Norton Complete Streets Plan.**	
High	**Action Description**	The Complete Streets Plan has the purpose of designing safe roads and streets that accomodate all users. This is achieved through ADA compliance, bus shelters, landscaping, lighting and other items. The Complete Streets Plan includes sustainability for land adjacent to streets.
	Lead Position	Highway Superintendent
	Supporting Agencies	Planning & Economic Development Department, Complete Streets Working Group, MassDOT, Southeastern Regional Planning & Economic Development District (SRPEDD)
	Cost	High
	Potential Funding Sources	MassDOT Complete Streets Funding Program
	Hazards	Average/Extreme Temperatures, Flooding from Precipitation
	Implementation Schedule	2025-2028
11	**Develop and adopt stream dumping regulations that prohibit dumping debris into the drainage network throughout Town.**	
High	**Action Description**	Develop, adopt, and publicize regulations prohibiting any dumping in local streams or ditches to mitigate flooding and other stormwater management concerns. This is also a creditable activity under FEMA's CRS program (up to 30 points).

	Lead Position	Norton Conservation Director/Stormwater Agent
	Supporting Agencies	Building Commissioner, Highway Department
	Cost	High
	Potential Funding Sources	MA Executive Office of Energy and Environmental Affairs (EEA) MVP Action Grant
	Hazards	Flooding from Precipitation
	Implementation Schedule	2028-2029
12	**Document and provide information on areas of flooding concern that are not located in the Town's Floodplain District (outside of FEMA's mapped special flood hazard areas).**	
High	**Action Description**	Examples of other flood problems include but are not limited to areas expected to be flooded in the future due to climate change, local drainage problems, or the failure of a dam or other protective structure. This is also a creditable activity under FEMA's CRS program (up to 20 points).
	Lead Position	Norton Conservation Director/Stormwater Agent
	Supporting Agencies	Fire Department, Building Commissioner, Highway Department
	Cost	High
	Potential Funding Sources	MA Executive Office of Energy and Environmental Affairs (EEA) MVP Action Grant
	Hazards	Flooding from Precipitation
	Implementation Schedule	2028-2029
13	**Identify and seek to address any unmet needs related to targeted outreach/education for the community's more vulnerable populations.**	
Medium	**Action Description**	The Town's most vulnerable residents may not be aware of the support the Town can provide such as transportation, heating and cooling centers, sheltering, Smart911, and natural hazard risk education.
	Lead Position	Health Agent
	Supporting Agencies	Fire Chief, Norton Emergency Management Agency, Greater Attleboro Regional Emergency Planning Committee
	Cost	Low
	Potential Funding Sources	Health Department Budget
	Hazards	Average/Extreme Temperatures, Hurricanes and Tropical Storms, Other Severe Weather, Severe Winter Storms, Tornadoes
	Implementation Schedule	2025-2029
14	**Develop a local Post-Disaster Substantial Damage Plan to assist with implementing substantial damage provisions of the NFIP, the State Building Code, and local floodplain regulations.**	

Medium	**Action Description**	Local substantial damage plans may be required by FEMA for every community participating in the NFIP at some point in the future. State guidance is available through the Massachusetts Flood Hazard Management Program (Local Guidance for NFIP Substantial Damage Planning).
	Lead Position	Building Commissioner
	Supporting Agencies	Planning Board
	Cost	Medium
	Potential Funding Sources	FEMA FMA
	Hazards	Flooding from Precipitation and Dam Overtopping
	Implementation Schedule	2026-2029
15	**Review the CEMP for opportunities to incorporate mitigation measures into the Town's emergency preparedness and response activities.**	
Medium	**Action Description**	The Town will review its CEMP on an annual basis to review and update measures to be taken during an emergency to minimize hazard impacts. These measures may include but are not limited to utilizing Norton Alerts (Reverse 911) to warn and communicate with impacted residents on recommended preparedness and loss prevention activities (e.g., evacuation, sheltering, property protection, etc.), as well as prioritizing and coordinating with the owners or operators of critical facilities and infrastructure on necessary protective measures (e.g,, shuttering, floodproofing, clearing storm drains, testing backup generators, etc.).
	Lead Position	Fire Chief
	Supporting Agencies	Health Agent, Norton Emergency Management Agency, Greater Attleboro Regional Emergency Planning Committee
	Cost	Low
	Potential Funding Sources	Fire Department Budget
	Hazards	Flooding from Precipitation, Hurricanes and Tropical Storms, Invasive Species, Other Severe Weather, Severe Winter Storms, Tornadoes
	Implementation Schedule	2024-2029
16	**Complete Low Impact Development (LID) stormwater facility at Crane Street along the Three Mile River.**	
Medium	**Action Description**	The Town is interested in securing an engineered solution to assist with past reported flooding concerns and safety hazards along Crane Street. The work will include civil engineer studies and investigations, planning, permitting, and construction of either nature based solutions or stormwater management systems to alleviate the concerns.
	Lead Position	Norton Conservation Director/Stormwater Agent

	Supporting Agencies	Conservation Commission
	Cost	High
	Potential Funding Sources	MA Executive Office of Energy and Environmental Affairs (EEA) MVP Action Grant, FEMA BRIC
	Hazards	Flooding from Precipitation, Hurricanes and Tropical Storms, Invasive Species, Other Severe Weather, Severe Winter Storms, Tornadoes
	Implementation Schedule	2026-2029
17	**Evaluate permit application forms to determine possible modifications focused on flood hazard prevention.**	
Medium	**Action Description**	Review the Town's Floodplain Development Permit Application, SI/SD Application, and other forms for possible improvements that could support the reduction of current and future flood hazard risks, including those related to projected increased severity in heavy rainfall events. This should also include those forms and checklists to help applicants meet the Town's stormwater management rules and regulations.
	Lead Position	Building Commissioner
	Supporting Agencies	Conservation Department
	Cost	Low
	Potential Funding Sources	MA Executive Office of Energy and Environmental Affairs (EEA) MVP Action Grant
	Hazards	Flooding from Precipitation and Dam Overtopping
	Implementation Schedule	2024-2029
18	**Leverage the Town's website, newsletters, social media / PSAs, cable television, and community events to promote risk awareness and low-cost or do-it-yourself mitigation activities.**	
Medium	**Action Description**	The Town of Noton intends to expand the hazard mitigation and climate adaptation educational materials available to residents through multiple modes including the Town's website, social media, newsletters, television, and public events.
	Lead Position	Fire Chief
	Supporting Agencies	Health Agent, Norton Emergency Management Agency, Greater Attleboro Regional Emergency Planning Committee
	Cost	Low
	Potential Funding Sources	Fire Department Budget
	Hazards	All Hazards
	Implementation Schedule	2025-2029

19	**Conduct annual outreach to owners of repetitive loss properties to promote awareness of mitigation grant funding that is available to mitigate future flood losses. Promote the availability of flood insurance.**	
Medium	**Action Description**	Conduct targeted outreach to owners of repetitive loss properties (as reported by FEMA) to make them aware of mitigation grant funding opportunities that are available to help them avoid future flood damages and losses. This could be done through an annual mailing that includes information provided by MEMA on FEMA's notifications of funding availability for those programs that prioritize mitigation projects for known repetitive loss properties. Promote the availability of flood insurance to all property owners and renters in the community, but especially those in FEMA-mapped special flood hazard areas). It is generally assumed that owners of property located in special flood hazard areas are underinsured when it comes to flood insurance coverage (based on only 73 current policies under the NFIP in comparison to 443 structures estimated to be exposed to moderate to high flood risk). CRS credits are provided for conducting a flood insurance coverage assessment, preparing and implementing a coverage improvement plan, and providing advice about flood insurance.
	Lead Position	Norton Conservation Director/Stormwater Agent
	Supporting Agencies	Building Commissioner
	Cost	Low
	Potential Funding Sources	Conservation Department Budget
	Hazards	Flooding from Precipitation and Dam Overtopping, Hurricanes and Tropical Storms, Other Severe Weather, Severe Winter Storms, Tornadoes
	Implementation Schedule	2024-2029
20	**Develop and maintain a library of publications and other resources on hazard mitigation and climate adaptation for property owners to learn more about how to prepare and protect their property from the adverse effects of natural hazards.**	
Medium	**Action Description**	This may include FEMA materials to help property owners evaluate measures to reduce potential hazard damage. Make available in public buildings, local library, website, etc. and inform people who they can call to learn more information. This can also be a credible activity under FEMA's CRS program (up to 20 points).
	Lead Position	Norton Conservation Director/Stormwater Agent
	Supporting Agencies	Library, Building Commissioner
	Cost	Low
	Potential Funding Sources	Conservation Department Budget

	Hazards	All Hazards
	Implementation Schedule	2024-2029
21	**Explore the option of requiring the undergrounding of powerlines in new subdivisions or other large-scale developments to reduce the damage and disruption caused by extreme wind and severe winter storms.**	
Medium	**Action Description**	The Planning Board will require support from an outside consultant to assist with updating their Subdivision and Solar Bylaws to conform with hazard mitigation.
	Lead Position	Planning Board
	Supporting Agencies	Highway Department, Fire Department
	Cost	High
	Potential Funding Sources	FEMA BRIC
	Hazards	Hurricanes and Tropical Storms, Other Severe Weather, Severe Winter Storms, Tornadoes
	Implementation Schedule	2027-2029
22	**Provide information about areas that should be protected because of their natural protective functions, including floodplains, wetlands, forested lands, and other areas that can help reduce the impacts of natural hazards.**	
Medium	**Action Description**	This includes the natural features within the Town's Floodplain District but also as otherwise described in local plans, such as the Open Space and Recreation Plan, Master Plan, or MVP Plan. This is also a creditable activity under FEMA's CRS program (up to 20 points).
	Lead Position	Norton Conservation Director/Stormwater Agent
	Supporting Agencies	Building Commissioner
	Cost	Low
	Potential Funding Sources	Conservation Department Budget
	Hazards	Average/Extreme Temperatures, Drought, Flooding from Precipitation, Hurricanes and Tropical Storms, Invasive Species, Other Severe Weather, Severe Winter Storms, Tornadoes, Wildfires/Brushfires
	Implementation Schedule	2026-2029
23	**Pursue culvert and drainage improvements through MA Division of Ecological Restoration Grant opportunities.**	
Medium	**Action Description**	Link identifies culverts and dams of significance - https://snepnetwork.org/taunton-river-watershed-final-projects. The Town submitted requests in 2020 (E Hodges) and 2022 (Walker Street) to the DER CRMA for potenital funding, but was not granted the opportunites.

	Lead Position	Norton Conservation Director/Stormwater Agent
	Supporting Agencies	Conservation Commission
	Cost	High
	Potential Funding Sources	MA Division of Ecological Restoration (DER) Culvert Replacement Municipal Assistance Grant Program (CRMA)
	Hazards	Flooding from Precipitation, Hurricanes and Tropical Storms, Other Severe Weather, Severe Winter Storms, Tornadoes
	Implementation Schedule	2024-2029
24	**Revisit zoning, open space, subdivision bylaws to ensure nature-based solutions are being encouraged to their full capacity.**	
Medium	**Action Description**	Conduct bylaw reviews and updates for climate resilience/adaptation (incorporating LID, GI, and other nature-based solutions to mitigate the effects of extreme heat, heavy precipitation, and flooding). Leverage existing methods such as Mass Audubon's Bylaw Review Tool.
	Lead Position	Norton Conservation Director/Stormwater Agent
	Supporting Agencies	Southeastern Regional Planning & Economic Development District (SRPEDD), SNEEP-
	Cost	Medium
	Potential Funding Sources	MA Executive Office of Energy and Environmental Affairs (EEA) MVP Action Grant
	Hazards	Average/Extreme Temperatures, Flooding from Precipitation, Hurricanes and Tropical Storms, Other Severe Weather, Tornadoes
	Implementation Schedule	2024-2029
25	**Conduct a seismic safety study for critical facilities and work with Wheaton College to study their older buildings.**	
Medium	**Action Description**	The oldest buildings in Town are on the Wheaton College campus. The Town will seek to collaborate with Wheaton College on a study to determine the seismic capacity of the oldest critical facilities and buildings on the Wheaton College campus.
	Lead Position	Building Commissioner
	Supporting Agencies	Wheaton College
	Cost	Medium
	Potential Funding Sources	FEMA BRIC
	Hazards	Earthquakes
	Implementation Schedule	2027-2029
26	**Perform stormwater management duties required by MS4 and administer the Local Stormwater Bylaw.**	

Medium	**Action Description**	The Town of Norton administers a Local Stormwater Bylaw for which they request any new development provide LID stormwater practices (depending on the development, these may include nature based solutions: rain gardens, porous pavers, vegetated filters, etc.) The Town holds an MS4 Permit (Year 5) and will continue to perform said duties and responsibilities for reporting and management. The Town of Norton has a local stormwater permit process to ensure all land disturbance (greater than 20K sf) is in compliance with the local and state rules.
	Lead Position	Norton Conservation Director/Stormwater Agent
	Supporting Agencies	Highway Department
	Cost	High
	Potential Funding Sources	MA Department of Environmental Protection - MS4 Municipal Assistance Grant Program
	Hazards	Flooding from Precipitation
	Implementation Schedule	2024-2029
27	**Revisit adoption of the MA Community Preservation Act (CPA).**	
Medium	**Action Description**	Adopt the Community Preservation Act (CPA) to help fund the acquisition of open space and community development projects.
	Lead Position	Community Preservation Review Committee Chair
	Supporting Agencies	Selectboard
	Cost	Low
	Potential Funding Sources	Community Preservation Act, Community Preservation Coalition
	Hazards	Average/Extreme Temperatures, Drought, Flooding from Precipitation, Hurricanes and Tropical Storms, Invasive Species, Other Severe Weather, Severe Winter Storms, Tornadoes, Wildfires/Brushfires
	Implementation Schedule	2026-2029
28	**Develop system/process for maintaining hazard impact/loss data.**	
Medium	**Action Description**	Collecting data facilitates the Town's ability to conduct benefit-cost-analysis for FEMA grants.
	Lead Position	Floodplain Administrator/Building Commissioner
	Supporting Agencies	Planning Board, Conservation Commission, Highway Department
	Cost	Low
	Potential Funding Sources	FEMA BRIC

	Hazards	All Hazards
	Implementation Schedule	2025-2029
29	**Conduct outreach to the NFIP policyholders and develop a plan to address repetitive loss properties.**	
Low	**Action Description**	Add language regarding floodplain mitigation to the annual notices (annual property tax notices, utility bills, etc.) and other outreach materials sent to homeowners whose properties are located in the floodplain. These notices are part of the Community Rating System (CRS) Program.
	Lead Position	Norton Conservation Director/Stormwater Agent
	Supporting Agencies	Building Commissioner/Floodplain Administrator
	Cost	Low
	Potential Funding Sources	Conservation Department Budget
	Hazards	Flooding from Precipitation and Dam Overtopping
	Implementation Schedule	2024-2029
30	**Identify and prioritize specific strategies to preserve areas important to the retention of the Town's natural green infrastructure (including forest, wetlands, native vegetation), and as delineated on the Resilient Taunton Watershed Network's Green Infrastructure Map for Norton. The Town will also Acquire/protect/preserve areas identified as ecologically important for local and regional resilience in various studies/assessments/reports (such as Audubon MAPPR, RTWN Green Infrastructure Maps, Bio Map II, and others).**	
Low	**Action Description**	The Open Space Committee will require support from an outside consultant to assist with the compilation of an Open Space Management Plan, and various other Land Management Plans which aim to retain/preserve/protect the Town's natural setting, environment, and green infrastructure.
	Lead Position	Norton Conservation Director/Stormwater Agent
	Supporting Agencies	Conservation Commission
	Cost	High
	Potential Funding Sources	MA Executive Office of Energy and Environmental Affairs (EEA) MVP Action Grant
	Hazards	Average/Extreme Temperatures, Drought, Flooding from Precipitation, Hurricanes and Tropical Storms, Invasive Species, Other Severe Weather, Severe Winter Storms, Tornadoes, Wildfires/Brushfires
	Implementation Schedule	2025-2028
31	**Encourage property owners to maintain trees on their properties, through pruning and clearing dead vegetation near buildings, to reduce structural damage from falling**	

	trees/branches during severe weather and possible brush fires during drought conditions.	
Low	**Action Description**	The Tree Warden may require support from an outside consultant to assist with signage, notices, and policies to encourage local residents to maintain and manage their properties to prevent hazards.
	Lead Position	Tree Warden
	Supporting Agencies	Highway Department, Conservation Department
	Cost	Low
	Potential Funding Sources	Highway Department Budget
	Hazards	Hurricanes and Tropical Storms, Other Severe Weather, Severe Winter Storms, Tornadoes, Wildfires/Brushfires
	Implementation Schedule	2026-2029
32	**Maintain or repair Chartley Dam and the Norton Reservoir Dam and others as necessary.**	
Low	**Action Description**	All Dams managed by the Town (Chartley & Norton Reservoir) are subject to DER required Phase I Inspections and Emergency Action Plans. The Town has no vision at this time to modify the dams, unless they are for repairs and maintenance improvements. The Town is not interested in acquiring privately owned dams, Barrowsville and Rumford River/Cross Street. However, the Town is concerned that the privately owned dams don't have Emergency Action Plans.
	Lead Position	Norton Conservation Director/Stormwater Agent
	Supporting Agencies	Conservation Commission
	Cost	High
	Potential Funding Sources	MA Department of Conservation and Recreation (DCR) Dam and Seawall Repair or Removal Program
	Hazards	Flooding from Precipitation and Dam Overtopping
	Implementation Schedule	2024-2029
33	**Explore mitigation and flood relief improvements to the Barrows Court subdivision.**	
Low	**Action Description**	The Town will assess and evaluate improvements under the guidance of a professional civil engineer. The subdivision stormwater improvements may require a comprehesive re-design in accordance with current MA Stormwater Regulations and Requirements. The Town will work with abutting residents to establish potential easments and access rights for drainage improvements and long-term maintenance.
	Lead Position	Norton Conservation Director/Stormwater Agent
	Supporting Agencies	Norton Highway Dept, Fire Dept., Conservation Commission
	Cost	High

	Potential Funding Sources	MA Executive Office of Energy and Environmental Affairs (EEA) MVP Action Grant
	Hazards	Flooding from Precipitation, Hurricanes and Tropical Storms, Invasive Species, Other Severe Weather, Severe Winter Storms, Tornadoes
	Implementation Schedule	2025-2029
34	**Seek out partnerships between private landowners, land conservation groups, and state and local governments to enable future open space acquisitions.**	
Low	**Action Description**	The Conservation Department will continue to collaborate with the local residents, land trust/conservation organizations, state agencies, and meet to discuss the importance of securing/protecting/preserving open space lands for the Town and local community.
	Lead Position	Norton Conservation Director/Stormwater Agent
	Supporting Agencies	MA Department of Fish & Game, Wildlands Trust, Mass Audubon
	Cost	Low
	Potential Funding Sources	Conservation Department Budget
	Hazards	Average/Extreme Temperatures, Drought, Flooding from Precipitation, Hurricanes and Tropical Storms, Invasive Species, Other Severe Weather, Severe Winter Storms, Tornadoes, Wildfires/Brushfires
	Implementation Schedule	2024-2029
35	**Coordinate with the State and CSX Railway to mitigate risk of train going through wet areas and transporting hazardous materials.**	
Low	**Action Description**	The railroad poses a significant threat to the Town. A train derailment could cause a major wildfire as well as impacts to air quality and natural resources. In an effort to better understand what materials travel through Town and to protect the area around the tracks the Town would like to coordinate with CSX Railway.
	Lead Position	Fire Chief
	Supporting Agencies	Fire Department, Health Department, Greater Attleboro Regional Emergency Planning Committee
	Cost	Low
	Potential Funding Sources	Norton Emergency Management Agency Budget
	Hazards	Wildfires/Brushfires
	Implementation Schedule	2024-2029
36	**Revisit the adoption of a Drought Management Bylaw as described in the Open Space and Recreation Plan.**	
Low	**Action Description**	Develop and adopt a Drought Management Bylaw that spells out a uniform set of water use restrictions to be enacted under state-

		declared water shortage conditions or other emergency situations. While the Water Department may issue restrictions or bans on outside watering during summer droughts, the Town has not adopted a drought management bylaw that prioritizes water use under specific conditions/situations.
	Lead Position	Selectboard Chair
	Supporting Agencies	Fire Department, Open Space Committee
	Cost	High
	Potential Funding Sources	MA Executive Office of Energy and Environmental Affairs (EEA) MVP Action Grant
	Hazards	Drought
	Implementation Schedule	2026-2029
37	**Update the Open Space and Recreation Plan goals and actions to help prioritize nature-based solutions and other hazard mitigation priorities.**	
Low	**Action Description**	For the purposes of reducing flooding, improving water quality, restoring and protecting wetlands, and adding recreational space, the Town will prioritize nature based solutions. Link Directs to a GIS resilience mapping areas - https://maps.coastalresilience.org/massachusetts/
	Lead Position	Norton Conservation Director/Stormwater Agent
	Supporting Agencies	Conservation Commission
	Cost	High
	Potential Funding Sources	MA Executive Office of Energy and Environmental Affairs (EEA) MVP Action Grant
	Hazards	Flooding from Precipitation, Hurricanes and Tropical Storms, Invasive Species, Other Severe Weather, Severe Winter Storms, Tornadoes
	Implementation Schedule	2025-2029
38	**Drought education for business owners.**	
Low	**Action Description**	Educate business owners on how to limit water usage during times of drought.
	Lead Position	Water Superintendent
	Supporting Agencies	Selectboard, Health Department
	Cost	Low
	Potential Funding Sources	MA Executive Office of Energy and Environmental Affairs (EEA) MVP Action Grant
	Hazards	Drought
	Implementation Schedule	2024-2029

39	Explore the development of post-disaster mitigation policies and procedures.	
Low	**Action Description**	The Town will consider the feasibility of adding an annex to the CEMP or the HMP that details expected damages from a major flood or other disaster along with alternative policy options for guiding post-disaster redevelopment. This annex will identify potentially hardest hit areas and potential policies regarding if/how they should be rebuilt if substantially damaged, coupled with how to incorporate mitigation or adaptation into any redevelopment plans or procedures (including the assignment of responsibilities for public information, code enforcement, planning, and other efforts that encourage, mandate, and/or fund loss reduction activities).
	Lead Position	Fire Chief
	Supporting Agencies	Norton Conservation Director/Stormwater Agent
	Cost	Low
	Potential Funding Sources	MA Executive Office of Energy and Environmental Affairs (EEA) MVP Action Grant, MA Emergency Management Agency (MEMA): Emergency Management Grant Programs
	Hazards	Flooding from Precipitation, Hurricanes and Tropical Storms, Invasive Species, Other Severe Weather, Severe Winter Storms, Tornadoes
	Implementation Schedule	2026-2029

Table 68 shows the mitigation actions that specifically target vulnerable populations and Table 69 shows the mitigation actions that specifically target buildings and infrastructure. Each table lists the actions in order of priority.

Table 68. Actions that Target Vulnerable Populations.

Action #	Action Title
10	Implement the Norton Complete Streets Plan.
13	Identify and seek to address any unmet needs related to targeted outreach/education for the community's more vulnerable populations.

Table 69. Actions that Target Buildings and Infrastructure.

Action #	Action Title
10	Implement the Norton Complete Streets Plan.
16	Complete Low Impact Development (LID) stormwater facility at Crane Street along the Three Mile River.
23	Pursue culvert and drainage improvements through MA Division of Ecological Restoration Grant opportunities.
25	Conduct a seismic safety study for critical facilities and work with Wheaton College to study their older buildings.

Action #	Action Title
32	Maintain or repair Chartley Dam and the Norton Reservoir Dam and others as necessary.
33	Explore mitigation and flood relief improvements to the Barrows Court subdivision.

Possible Funding Sources

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

Federal Emergency Management Agency (FEMA) Mitigation Grants

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

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

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

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

Municipal Vulnerability Preparedness Action Grants[53]

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.

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

- ***Public Education and Communication*** – Projects that increase public understanding of climate change impacts within and beyond the community and foster effective partnerships to develop support.

- ***Local Bylaws, Ordinances, Plans, and other Management Measures*** – Projects to develop, amend, and implement local ordinances, bylaws, standards, plans, and other management measures to reduce risk and damages from extreme weather, heat, flooding, and other climate change impacts.

- ***Redesigns and Retrofits*** – Engineering and construction projects to redesign, plan, or retrofit vulnerable community facilities and infrastructure (e.g., wastewater treatment plants, culverts, and critical municipal roadways/evacuation routes) to function over the life of the infrastructure given projected climate change impacts.

- ***Energy Resilience Strategies*** — Projects that incorporate clean energy generation, such as micro grids, and that are paired with resilience enabling technology to maintain electrical and/or heating and cooling services at critical facilities.

- ***Chemical Safety and Climate Vulnerabilities*** — Projects that seek to engage the business and manufacturing community through assistance or training on identifying vulnerabilities to chemical releases due to severe weather events, reducing use of toxic or hazardous chemicals, outreach to improve operations and maintenance procedures to prevent chemical releases and accidents, outreach to improve emergency and contingency planning, and/or identifying existing contaminated sites that pose chemical dispersion risks during flood events.

- ***Nature-Based Storm-Damage Protection, Drought Mitigation, Water Quality, and Water Infiltration Techniques*** – Projects that utilize natural resources and pervious surfaces to manage coastal and inland flooding, erosion, and other storm damage, such as stormwater wetlands and bio-retention systems, and other Smart Growth and Low Impact Development techniques.

- ***Nature-Based, Infrastructure and Technology Solutions to Reduce Vulnerability to Extreme Heat and Poor Air Quality*** – Projects that utilize natural resources, vegetation, and increasing pervious surface to reduce ambient temperatures, provide shade, increase evapotranspiration, improve local air quality, and otherwise provide cooling services within the municipality.

- ***Nature-Based Solutions to Reduce Vulnerability to other Climate Change Impacts*** – Nature-based projects that address other impacts of climate change such as extreme weather, damaging wind and power outages, and increased incidence of pests and vector-borne illnesses and other public health issues.

- ***Acquisition of Land to Achieve a Resiliency Objective*** — Land purchases are eligible for grant funding if the parcel has been identified through a climate vulnerability assessment as an appropriate location for a specific eligible adaptation activity to occur, such as accommodating

an infrastructure or facility redesign or retrofit project, providing natural flood storage to reduce downstream flooding, or removal of pavement and planting of trees to reduce flooding and heat island effects.

- ***Ecological Restoration and Habitat Management to Increase Resiliency*** — Projects that repair or improve natural systems for community and ecosystem adaptation, such as right-sizing culverts, dam removal, restoration of coastal wetlands, etc.

- ***Subsidized Low Income Housing Resilience Strategies*** — Investments in resiliency measures for affordable housing to protect vulnerable populations that may not have the resources to recover from an extreme climate event.

- ***Mosquito Control Districts*** — Projects to reduce the risk to public health from mosquito-borne illness and to increase mosquito surveillance and control capacity by incentivizing municipalities not in an organized mosquito control project or district to form a new mosquito control district or join an existing mosquito control district. Also funding for municipalities currently in a mosquito control district for new or proactive mosquito control measures.

Chapter 7. Plan Integration and Maintenance

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

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 level of public interest in the mitigation planning process and other recent local planning initiatives, such as Municipal Vulnerability Preparedness (MVP) and the 2021 Master Plan, Town residents and stakeholders remain interested in building community resilience to hazards. The HMPC included several education and outreach mitigation actions designed to engage the public. The Town intends to involve the public throughout the five-year implementation of this plan, as well as in the reviewing and updating processes. The Fire Chief will take the lead in soliciting participation from the public with support from other Town departments. This participation will take multiple forms, including all of those outlined in the Chapter 3 (Planning Process) of this plan. Efforts to involve the public include:

- Community advertising and press releases through standard public meeting laws.
- Targeted outreach and/or specific invitations to community groups, including underserved communities or other vulnerable populations, as needed. For example, this includes continued coordination with the Council on Aging on outreach to seniors.
- Public presentations offered in-person and through remote participation (i.e., live broadcasts, Zoom recordings, etc.).
- Invitations to neighboring communities and regional organizations including the Southeastern Regional Planning and Economic Development District (SRPEDD).

- A digital copy of this plan will remain on the Town's website; and hard copies will be kept in Town Hall, at the Fire Department, with the Conservation Department, and in the Council on Aging for public review. Updates to the plan will also be posted on the Town's website.
- The Town of Norton will continue to work with private industry, non-profit organizations, regional agencies, and adjacent communities as this plan is implemented.
- Continue to work with vulnerable populations, local organizations, private industry, regional agencies, and adjacent communities as this plan is implemented.

Method and Schedule for Keeping the Plan Current

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

The HMPC and the Town of Norton recognize the importance of keeping the mitigation plan up to date. The HMPC will meet twice a year for the purposes of implementing and maintaining the Hazard Mitigation Plan. This work includes monitoring, evaluating, and updating the plan over a five-year period. Overall, the responsibility for monitoring the Plan rests with the 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 Town committees. They may also distribute the Mitigation Action Progress Worksheet (shown in Appendix D) for Department Heads who prefer a form over a digital spreadsheet.

If the Town 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 2024), the HMPC will review the effectiveness of the planning process, public and stakeholder engagement, risk analysis, and the mitigation strategy, including its implementation. It is recommended that the HMPC use the worksheet provided in Appendix D. Beyond considering the

planning process, the HMPC will seek to answer the following questions to determine if the plan is effective at mitigating risk to Town residents, the built environment, and the natural environment.

- Can the HMPC identify success stories of losses avoided because of hazard mitigation measures implemented? Can the HMPC identify political, social, and economic successes?
- Have the mitigation actions implemented achieved benefits beyond the cost of mitigation?
- Have the implemented mitigation actions saved lives or protected property?
- Does the list of mitigation actions coincide with the Town's priorities? Do additional actions need to be added?

Process to Update the Plan

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

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

They will brief the Selectboard as requested and post any significant updates to the Plan to the Town's website. The HMPC recognizes the value in keeping the public and key stakeholders informed about the implementation and status of the mitigation plan.

HMPC members will continue to participate in regional and state-based meetings to stay current with best risk-mitigation practices. Such meetings may include the Massachusetts Emergency Management Agency (MEMA), Southeastern Regional Planning & Economic Development District (SRPEDD), Norton Emergency Management Agency, Greater Attleboro Regional Emergency Planning Committee, and Massachusetts Department of Conservation and Recreation (DCR). The HMPC will also participate in land use planning and mitigation planning meetings with their neighbors, Mansfield, Easton, Taunton, and Attleboro.

The Town of Norton agrees to update and adopt this mitigation plan on a five-year basis. The update will include a comprehensive review and planning process like the one used to develop this mitigation plan update. It will update the mitigation action list, current land use practices, collect and review best available data, review the capability assessment, and engage the public and stakeholders. This process will occur according to FEMA guidelines. The HMPC will seek funding for the development of the plan update **two years** before the plan expires. The plan update process gives the Town the chance to add and/or re-prioritize mitigation actions based on current risk, capabilities, and public/stakeholder suggestions. The Fire Chief will serve as the Project Manager for the update process. The figure below illustrates the update timeline.

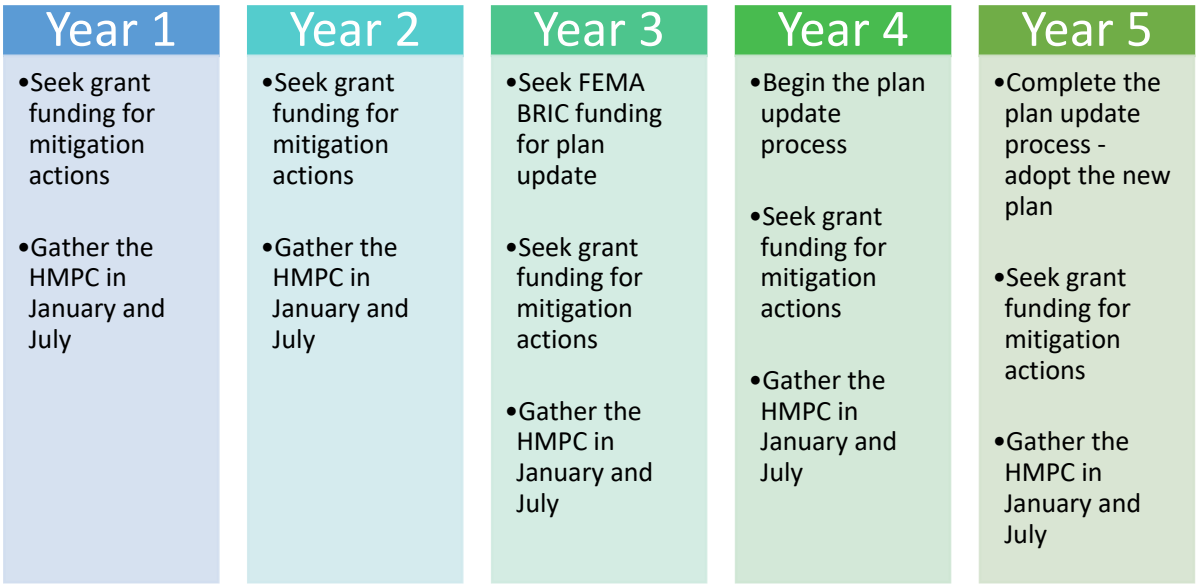


Figure 20. Plan Update and Implementation Schedule.

Responsible Parties for Plan Implementation and Maintenance

Norton, MA

Fire Chief, Shawn Simmons

Norton Fire Department

70 East Main Street, Norton, MA 02766

Phone: 508-285-0249

Email: simmons@nortonfire.com

For State resources:

Massachusetts Emergency Management Agency:

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

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

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

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

For Federal resources:

Federal Emergency Management Agency:

Address: 220 Binney Street, Cambridge, MA 02142

Phone: 877-336-2734

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

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

System to Integrate this Plan with Existing Planning Mechanisms (Darrin)

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

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

For the Town of Norton 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 incorporation of specific hazard mitigation and climate adaptation goals and strategies into the recent update of the Town's 2021 Master Plan demonstrate this type of integration by stressing the importance of resilience strategies across various elements of the municipal planning framework.

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 Norton. 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):

- Master Plan (2021)
- Open Space and Recreation Plan (update underway)
- Municipal Vulnerability Preparedness / Community Resilience Building Summary of Findings Report (2018)
- Comprehensive Emergency Management Plan (2023)

Additional opportunities to integrate the requirements of this plan into other local planning mechanisms shall continue to be identified through future meetings of the HMPC and through the five-year review process described in this chapter. Other planning mechanisms include local regulations and existing code enforcement procedures (i.e., zoning bylaws, site plan review, etc.), internal municipal policies,

special projects or initiatives, and other routine government or community decision-making activities such as capital improvement planning and the Town's annual budget process. Emphasis for identifying these integration opportunities will be placed on those governance structures used to manage local land use and community development in both the pre-disaster and post-disaster environment. Also, as it relates to implementing specific mitigation actions identified in this plan, it will be the responsibility of each assigned lead department to determine additional measures that can support action completion or enhancement. This includes integrating mitigation actions from this plan into other local planning documents, processes, or mechanisms as deemed appropriate and most effective.

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

While it is recognized that there are many possible benefits to integrating components of this plan into other local planning mechanisms, the routine maintenance of this stand-alone plan is considered by the Town to be the most effective and appropriate method to identify, prioritize, and implement local hazard mitigation actions. In moving forward, however, the Town will consider the incorporation of some other plan documents into the hazard mitigation plan, such as any future iterations of the Town's MVP Plan or related climate adaptation planning efforts.

Acronyms

AAL	Average Annual Loss
APA	American Planning Association
APHIS	Animal and Plant Health Inspection Service
ASCE	American Society of Civil Engineers
BBRS	Board of Building Regulations and Standards
BCEGS	Building Code Effectiveness Grading Schedule
BRIC	Building Resilient Infrastructure and Communities
BTU	British Thermal Unit
C2ES	Center for Climate and Energy Solutions
CAV	Community Assistance Visit
CAC	Community Assistance Contact
CDBG	Community Development Block Grant
CDC	Centers for Disease Control and Prevention
CDD	Consecutive Dry Days
CEMP	Comprehensive Emergency Management Plan
CERT	Community Emergency Response Team
CFR	Code of Federal Regulations
CFS	Cubic Feet Per Second
CIP	Capital Improvement Program
CIS	Community Information System
CMR	Code of Massachusetts Regulations
CPA	Community Preservation Act
CRB	Community Resilience Building
CRS	Community Rating System
CZM	Coastal Zone Management
DAR	Department of Agricultural Resources
DCR	Department of Conservation and Recreation
DEP	Department of Environmental Protection
DMA	Disaster Mitigation Act
DMP	Drought Management Plan
DMTF	Drought Management Task Force
DOT	Department of Transportation
DPED	Department of Planning and Economic Development
DRRA	Disaster Recovery Reform Act
DWR	Days Without Rain
EAP	Emergency Action Plans
EDT	Eastern Daylight Time
EEA	Executive Office of Energy and Environmental Affairs
EF	Enhanced Fujita

EJ	Environmental Justice
EMD	Emergency Management Director
EMPG	Emergency Management Performance Grant
EOC	Emergency Operations Center
EOEEA	Executive Office of Energy and Environmental Affairs
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flooding Insurance Study
FMA	Flooding Mitigation Assistance
FPA	Floodplain Administrator
FSim	Forest Service Fire Simulation System
GATRA	Greater Attleboro Taunton Regional Authority
GHG	Greenhouse Gas
GIS	Geographic Information Systems
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMPC	Hazard Mitigation Planning Committee
HVAC	Heating, Ventilation, and Air Conditioning
IBC	International Building Code
IBHS	Insurance Institute for Business and Home Safety
ICC	International Code Council
IEBC	International Existing Building Code
IECC	International Energy Conservation Code
IFC	International Fire Code
IMC	International Mechanical Code
IRC	International Residential Code
ISO	International Organization for Standardization
ISPSC	International Swimming Pool and Spa Code
LID	Low Impact Development
LRRP	Local Rapid Recovery Plan
MBTA	Massachusetts Bay Transportation Authority
MCDA	Multi-Criteria Decision Analysis
MEMA	Massachusetts Emergency Management Agency
MFN	Mansfield, Foxborough, Norton
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
NEMA	Norton Emergency Management Agency
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
PDM	Pre-Disaster Mitigation
PPC	Public Protection Classification
PPQ	Plant Protection and Quarantine
PSA	Public Service Announcement
PWS	Public Water Systems
RMAT	ResilientMass Action Team
RRP	Rapid Recovery Plan
RSI	Regional Snowfall Index
RTWN	Resilient Taunton Watershed Network
SAFE	Student Awareness of Fire Education
SFHA	Special Flood Hazard Areas
SHMCAP	State Hazard Mitigation and Adaptation Plan
SI/SD	Substantial Improvement/Substantial Damage
SPGA	Special Permit Granting Authority
SRF	State Revolving Loan Fund
SRPEDD	Southeastern Regional Planning and Economic Development District
TRI	Toxic Release Inventory
US	United States
USC	U.S. Code
USDA	United States Department of Agriculture
USGS	United States Geological Survey
USGCRP	U.S. Global Change Research Program
YMCA	Young Men’s Christian Association

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 9/19/2023	HMPC #1 10/24/2023	HMPC #2 11/29/2023	HMPC #3 1/29/2024	HMPC #4 3/5/2024
Bryan	Carmichael	Planning Board Admin. Assistant	Town of Norton	508-285-0278	bcarmichael@nortonmaus.com	☑	☑	☑	☑	☑
Brian	Clark	Chief of Police	Town of Norton	508-285-0301	clark@nortonpolice.com	☐	☐	☐	☐	☐
Ray	Cord	Deputy Director of Norton Emergency Management Agency (NEMA)	Town of Norton	508-726-1054	rcord@nortonmaus.com	☑	☑	☑	☑	☐
Christopher	DeMartino	Water Department Foreman	Town of Norton	508-285-0280	cdemartino@nortonmaus.com	☐	☐	☑	☐	☐
Jared	Ferrara	Highway Superintendent	Town of Norton	508-285-0237	FerraraJ@nortonmaus.com	☐	☐	☐	☐	☐
Frank	Fournier	Director Water Department	Town of Norton	508-285-0282	FFournier@nortonmaus.com	☐	☐	☑	☑	☐
Nick	Lafrate	Building Commissioner	Town of Norton	508-285-0291	Nlafrate@nortonmaus.com	☐	☐	☐	☑	☐
Wade	Lizotte	Director of Facilities	Norton Public Schools	508-285-0100	wlizotte@norton.k12.ma.us	☐	☑	☑	☑	☐
Roy	Mulcahy	Director of Wheaton Campus Safety	Wheaton College	508-286-5808	mulcahy_roy @wheatoncollege.edu	☐	☑	☑	☑	☐
Jen	O'Neill	Superintendent of Schools	Norton Public Schools	508-285-0100	joneill@norton.k12.ma.us	☐	☑	☐	☐	☐
Alec	Rich III	Selectboard Member	Town of Norton	508-285-0211	arich@nortonmaus.com	☐	☐	☐	☐	☑
Beth	Rossi	Director Human Services / Council on Aging	Town of Norton	508-285-0235	etaylorrossi@nortonmaus.com	☐	☑	☑	☐	☐
Shawn	Simmons	Fire Chief	Town of Norton	508-285-0249	simmonss@nortonfire.com	☑	☑	☑	☑	☑
John	Thomas	Norton Conservation Director/Stormwater Agent	Town of Norton	508-285-0275	jthomas@nortonmaus.com	☑	☑	☑	☑	☑
Michael	Yunits	Town Manager	Town of Norton	508-285-0210	myunits@nortonmaus.com	☑	☐	☐	☑	☐
Chris	Zahner	Health Agent	Town of Norton	508-285-0262	healthagent@nortonmaus.com	☐	☑	☐	☑	☐

HMPC Meeting Agendas

JAMIE CAPLAN CONSULTING LLC
Emergency Management Services

KICK-OFF MEETING

TOWN OF NORTON, MA HAZARD MITIGATION PLAN

DATE: 9/19/2023

TIME: 9:00-10:00AM

ZOOM: https://us02web.zoom.us/j/86476716140?pwd=aVJNbERvNE83Mm9qcUJPaXlZKzFGUT09
Meeting ID: 864 7671 6140
Passcode: 448552

AGENDA ITEMS

I. Project Introduction

II. Planning Process
   a) Timeline and Tasks
   b) Developing a Hazard Mitigation Planning Committee (HMPC)

III. Risk Assessment
   a) Sharing GIS Data

IV. Capability Assessment

V. Mitigation Action Tracker

VI. Scheduling a HMPC Meeting for October

ACTION ITEMS

I. Develop the HMPC

II. Share GIS Data & Relevant Resources

III. Add to Mitigation Action Tracker with Action Status

IV. Schedule a HMPC Meeting for October

JAMIE CAPLAN CONSULTING LLC
Emergency Management Services

HMPC MEETING #1

TOWN OF NORTON, MA HAZARD MITIGATION PLAN

DATE: 10/24/2023

TIME: 12:00-1:30PM

ZOOM: https://us02web.zoom.us/j/87096407895?pwd=QnFHM0tWTExwd21YaEZ2TVorS2FmUT09
Meeting ID: 870 9640 7895
Passcode: 020755

AGENDA ITEMS

I. Introductions
   i. HMPC Members and Consulting Team
II. Introduction to Hazard Mitigation Planning
   i. What's in a Hazard Mitigation Plan?
   ii. Planning Timeline
   iii. HMPC Responsibilities
III. Plan Development
   i. Plans and Policies
   ii. Public and Stakeholder Engagement
   iii. Hazard Identification
   iv. Critical Facilities
   v. Capability Assessment
   vi. Mitigation Strategy

ACTION ITEMS

I. HMPC Meeting #2 Week of November 27th
II. Capability Assessment Surveys
III. Mitigation Action Tracker
IV. Stakeholder Engagement
V. GIS and Critical Facilities

JAMIE CAPLAN CONSULTING LLC
Emergency Management Services

HMPC MEETING #2

TOWN OF NORTON, MA HAZARD MITIGATION PLAN

DATE: 11/29/2023

TIME: 1:00-2:30PM

ZOOM: https://us02web.zoom.us/j/82675364602?pwd=a3Bzd211cWpqcnZ4U2lXb09ZWERyUT09
Meeting ID: 826 7536 4602
Passcode: 882412

AGENDA ITEMS

I. Project Update and Loose Ends
II. Public Meeting Outreach
    i. Outreach Efforts
    ii. Website and Social Media
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
    iv. Mitigation Actions Discussion
V. Mitigation Strategy
    i. Goal Statements
    ii. Developing Mitigation Actions
VI. Town Priorities and Changes in Development

ACTION ITEMS

I. HMPC Meeting #3
II. Tie Up Loose Ends
III. Pictures
IV. Outreach for Public Meeting
V. Mitigation Actions

HMPC MEETING #3 AGENDA

TOWN OF NORTON, MA HAZARD MITIGATION PLAN

DATE:	1/29/2024
TIME:	10:00-11:30AM
ZOOM:	https://us02web.zoom.us/j/86712331701?pwd=cnNCaTdKTWdMdWw2cWQ1UGJycFFJZz09 Meeting ID: 867 1233 1701 Passcode: 192056

AGENDA ITEMS

I. **Project Update and Loose Ends**

II. **Risk Assessment**

   i. Risk Ranking

   ii. Problem Statements

III. **Capability Assessment Update**

   i. Opportunities Identified

IV. **Public Meeting**

   i. Date and Outreach Efforts

V. **Mitigation Strategy**

   i. Essential Details for New Actions

   ii. Action Prioritization

VI. **Plan Implementation**

ACTION ITEMS

I. Public Meeting Date and Outreach

II. HMPC #4 Date

III. Pictures

IV. New Mitigation Actions

HMPC MEETING #4 AGENDA

TOWN OF NORTON, MA HAZARD MITIGATION PLAN

DATE: TUESDAY, 03/05/2024
TIME: 10:00-11:30AM
ZOOM: https://us02web.zoom.us/j/84764844821?pwd=QVZnOVY4QVVPK0JMaGx4cXN4WHA3Zz09
MEETING ID: 847 6484 4821
PASSCODE: 153899

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. **CRS Points**
V. **Mitigation Actions**
    i. List Review Including Prioritization
VI. **Plan Review**
    i. Essential Details for New Actions
    ii. Action Prioritization
VII. **Timeline for Completion**

ACTION ITEMS

I. Public Meeting Outreach
II. Plan Review

Public Outreach

JAMIE CAPLAN CONSULTING LLC
Emergency Management Services

PUBLIC MEETING

TOWN OF NORTON, MA HAZARD MITIGATION PLAN

DATE: 1/11/2024
TIME: 2:00-3:00PM
ZOOM: https://us02web.zoom.us/j/88454474266?pwd=Q0RyRXJ0K3Btc0poU0VicIRrOEhSQT09
Meeting ID: 884 5447 4266
Passcode: 933412

AGENDA ITEMS

I. Introductions

II. What is Hazard Mitigation? What is a Hazard Mitigation Plan?

III. Identify Natural Hazards

IV. Identify Critical Facilities

V. Brainstorm Possible Mitigation Actions

VI. Next Steps

TOWN OF NORTON, MA

PUBLIC MEETING

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

Do you wonder if Norton 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 Norton more resilient to natural hazards and climate change.

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

1/11/2024

2:00 pm – 3:00 pm
Following Council on Aging Lunch & Learn in-person or Join on Zoom

HTTPS://WWW.NORTONMA.ORG FOR MEETING DETAILS OR CONTACT CHIEF SHAWN SIMMONS, NORTON FIRE DEPT 508-285-0249 OR SIMMONSS@NORTONFIRE.COM

PRESS RELEASE
For Immediate Release
December 4, 2023

Contact: Chief Shawn Simmons
Fire Chief, Norton Fire Department
Town of Norton
508-285-0249

Public Meeting Invitation
Identify Natural Hazard Risks and Recommend Mitigation Actions

Do you wonder if Norton can flood, experience a tornado, or have an earthquake? What is the worst that can happen in Norton? What can prevent those natural hazards and others from wreaking havoc?

Fortunately, the Town of Norton is developing a Hazard Mitigation Plan. This plan details all the natural hazard risks that may impact the Town and includes a list of potential actions to mitigate those risks.

The Town of Norton encourages all residents and business owners to come to a public meeting to share your ideas and gather your feedback regarding which hazards present the greatest risks, which areas of Town are most susceptible to damage, and what you would like to see done to mitigate these risks?

We cannot stop winter storms, heavy rains, high winds, or earthquakes but we do not have to suffer severe consequences. The Town of Norton hopes you will join our first of two Public Meetings on **January 11, 2024 at 2:00 pm – 3:00pm**. Meeting will be held at the Council on Aging following the Lunch & Learn.

Town leaders have formed a Hazard Mitigation Planning Committee (HMPC) comprised of community leaders. A Hazard Mitigation Plan, approved by the Federal Emergency Management Agency (FEMA), and adopted by the Town, allows the Town to apply for pre- and post-disaster hazard mitigation grant funds. Development of this plan includes **public** participation.

Public participation is essential to the development of a Hazard Mitigation Plan that represents the interests of all residents and mitigates risk to all natural hazards and the impacts of climate change.

Meeting will be held in-person and via Zoom

- Day: Thursday, January 11, 2024
- Time: 2:00-3:00 pm
- Meet in Person following the Council on Aging Lunch & Learn or Join via Zoom
- Zoom Link: https://us02web.zoom.us/j/88454474266?pwd=Q0RyRXJ0K3Btc0poU0ViclRrOEhSQT09
- Meeting ID: 884 5447 4266
- Passcode: 933412

For questions regarding this plan, please contact Chief Shawn Simmons, Fire Chief (Norton Fire Department), at 508-285-0249 or simmonss@nortonfire.com.

Hazard Mitigation Plan – Public Meeting

1/11/2024 @ 14:00 Location: Norton Senior Center
55 West Main St.
Norton, MA 02766

NEIL LINEHAN
Pat Tarantino
Nicole Mello (PHN)
PJ Merrey
Carolyn Berry
Carol Betty
Joyce Marone
Jim Lawlor
Roberta Berthelette
Elaine Desmarchel
Josephine Phillips
Janice Norton
Virginia Barrett
CAROL RUBERGE
FINNIAN DEPAT
Jared Ferraro
John Thomas
Kathy Eno
Carol McLaughlin
Ray Cord

PUBLIC MEETING #2 AGENDA

TOWN OF NORTON, MA HAZARD MITIGATION PLAN

DATE: **WEDNESDAY, MARCH 20, 2024**

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

ZOOM: https://us02web.zoom.us/j/88461728708?pwd=L1g3WUxLSjZ0RnArWFRWVjRRQjFlZz09

Meeting ID: 884 6172 8708

Passcode: 179012

AGENDA ITEMS

I. **Introductions**

II. **What is Hazard Mitigation?**

   i. What is in a Hazard Mitigation Plan?

III. **Who Developed the Hazard Mitigation Plan?**

IV. **Natural Hazards and Critical Facilities**

V. **Mitigation Goals and Mitigation Actions**

   i. Types of Mitigation Actions

   ii. Review of actions

VI. **Plan Review**

   i. What to expect and how to review

VII. **Questions**

TOWN OF NORTON, MA

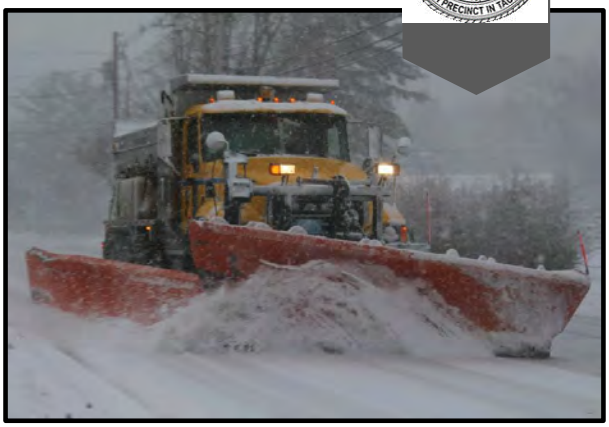
PUBLIC MEETING

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

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

Join our **second public meeting** to learn about this important project and to **share your ideas** for making Norton **more resilient** to natural hazards and climate change.

03/20/2024
11:00 am – 12:00 pm
Join via Zoom!



Norton has formed a Hazard Mitigation Planning Committee to identify projects to mitigate the risks caused by natural hazards and climate change.

The Town is working with a consultant hired by the Massachusetts Emergency Management Agency to develop a Hazard Mitigation Plan that will be approved by the Federal Emergency Management Agency and adopted by the Town. This plan allows Norton to apply for pre- and post-disaster mitigation funds.

HTTPS://WWW.NORTONMA.ORG FOR MEETING DETAILS OR CONTACT CHIEF SHAWN SIMMONS, NORTON FIRE DEPT. 508-285-0249 **SIMMONSS@NORTONFIRE.COM**

FOR IMMEDIATE RELEASE

The Town of Norton Welcomes Community Input on Hazard Mitigation Plan

Norton, Massachusetts – February 27, 2024

Do you wonder if Norton can flood, experience a tornado, or have an earthquake? What is the worst that can happen in Norton? What can prevent those natural hazards and others from wreaking havoc?

The Town is extending an invitation to the community to participate in a public meeting as it develops their Hazard Mitigation Plan. This plan details all the natural hazard risks that may impact the Town and includes potential actions to mitigate those risks.

Meeting Information:

- Wednesday, March 20, 2024
- 11:00 am – 12:00 pm
- https://us02web.zoom.us/j/88461728708?pwd=L1g3WUxLSjZ0RnArWFRWVjRRQjFlZz09
- Meeting ID: 884 6172 8708
- Passcode: 179012

The Town encourages all residents and business owners to attend this public meeting to share ideas and offer feedback on which hazards present the greatest risks, which areas of Town are most susceptible to damage, and what you would like to see done to mitigate these risks.

The Hazard Mitigation Planning Committee, in partnership with Jamie Caplan Consulting LLC, a Northampton, MA-based firm, is developing the plan with a grant from the Massachusetts Emergency Management Agency (MEMA). FEMA approval, coupled with Town adoption, will enable Norton to access pre- and post-disaster hazard mitigation grant funds.

For Further Inquiries:

- *Shawn Simmons, Chief of Norton Fire Department*
- *Phone: 508-285-0249*
- *Email: simmonss@nortonfire.com*

Public participation is essential to a Hazard Mitigation Plan. This Plan needs to represent the interests of all community members while working to mitigate risk to natural hazards and the impacts of climate change.

The Town looks forward to a collaborative effort in building a resilient and secure future!

THE TOWN OF NORTON WELCOMES COMMUNITY INPUT ON HAZARD MITIGATION PLAN

Join Us in Building a Resilient Future for Norton, MA!

WHAT?

Review and provide feedback on the Hazard Mitigation Plan drafted by Norton's Hazard Mitigation Planning Committee.

HOW?

- For Online Access: https://www.nortonma.org/ to read the draft plan.
- In-Person Viewing: Hard copies available at the Town Hall, Fire Department, and Council on Aging.
- Complete the Google Form on the Town's website or at designated locations to provide feedback.

WHEN?

- Commentary Period: **April 15, 2024–April 15, 2024**

WHY?

- Strengthen our community's resilience to natural hazards and climate change impacts, such as flooding, snowstorms, high winds, and extreme temperatures.

CONTACT FOR INQUIRIES

- Shawn Simmons, Chief of Norton Fire Department
- Phone: 508-285-0249
- Email: simmonss@nortonfire.com

FOR IMMEDIATE RELEASE

The Town of Norton Invites Community Input on Hazard Mitigation Plan

Norton, Massachusetts – April 12, 2024

The Hazard Mitigation Planning Committee of Norton has developed a comprehensive Hazard Mitigation Plan that identifies and prioritizes strategies to mitigate the impacts of natural hazards and climate change on our community.

Engage with the Draft Plan:

- Online Access: Visit the Town's website at https://www.nortonma.org/ to review the draft plan.
- In-Person Review: Hard copies are available for review at the Town Hall located at 70 East Main Street, Norton, MA 02766, the Fire Department, and the Council on Aging.

Commentary Period: April 15, 2024 – April 29, 2024

How to Provide Feedback:

- Complete the Google Form provided on the Town's website and available in hard copy at the designated viewing locations.

Norton's Hazard Mitigation Planning Committee has developed this plan as a strategy for our Town against existing and future natural hazard threats and the evolving challenges posed by climate change. Implementation of this plan will significantly enhance our resilience to hazards such as flooding, snowstorms, high winds, and extreme temperatures.

Town officials and local stakeholders developed this plan with funding support from the Massachusetts Emergency Management Agency. Federal Emergency Management Agency (FEMA) approval, and Town adoption, of the Hazard Mitigation Plan allows the Town to pursue pre- and post-disaster hazard mitigation grant opportunities.

For Further Inquiries:

- **Shawn Simmons, Chief of Norton Fire Department**
- **Phone:** 508-285-0249
- **Email:** simmonss@nortonfire.com

Public engagement lies at the core of our Hazard Mitigation Plan. It is imperative that this plan reflects the diverse perspectives and priorities of our community members as we move to mitigate risks posed by natural hazards and climate change.

The Town looks forward to a collaborative effort in building a resilient and secure future!
###

Appendix B. Critical Facilities

Table 70. Critical Facility List.

Name	Address	Does this facility have back-up power?
Town Hall	70 E. Main St.	Yes
Norton Fire Station #1	25 South Worcester St.	Yes
Norton Fire Station - Alarm Div.	188 South Worcester St.	
Fire Station - Headquarters	70 East Main St.	Yes
Norton Police Station	82 East Main St.	Yes
Wheaton College Public Safety	30 Taunton Ave.	
Wheaton College	26 E. Main St.	Yes
Dept. of Public Works	70 E. Main St. (Rear)	Yes
Council for Aging	55 W. Main St.	Yes (Heating/Cooling Center)
Norton High School	66 W. Main St.	Yes, 2/3 of bldg.
Norton Middle School	215 W. Main St.	Yes, 1/3 of bldg. (Shelter)
LG Nourse Elementary School	38 Plain St.	No
Henri A. Yelloe	64 W. Main St.	Sewer Pump Only
JC Solmonese	315 W. Main St.	No
Legacy Christian Academy	1 New Taunton Ave.	No
Tristan Medical Norton Care Center	184 W. Main St.	No
Housing Authority	120 W. Main St.	No
Housing Authority	Jacobs Way	No
Library	68 E. Main St.	
Chartley Post Office	391 Old Colony Rd.	No
Mansfield Wastewater Treatment Plant	80 Hill St.	Yes
Water Facility	Reservoir St.	Yes
Pumping Station	157 Mansfield Ave.	Yes
Pumping Station	Holly Rd.	Yes
Sewer	12A Bay Rd.	Yes
Sewer	Filmore Dr.	Yes
Water Well	200 Plain St.	Yes
Sewer Pumping Station	Kingsley Rd.	Yes
Pump House	Plain St.	Yes
Water	32 Newland St.	Yes
Sewer	Island Rd.	Yes
Water	167 Pine St.	Yes
Water	West Main St.	Yes
Sewer	Rumford Rd.	Yes
Cottage Street Station - Water	Cottage St.	Yes

Name	Address	Does this facility have back-up power?
Water Dept.	166 John-Scott Blvd.	No
Home Inc.	55 Newland St.	Yes
Cumberland Farms	246 Mansfield Ave	No
CSX	John-Scott Blvd.	No
Mass Highway Department	0 N Washington St	No
Bell Atlantic - N E M S	0 Taunton Ave	No
Comcast Corporation	184 W MAIN ST	No
Speedway Gas Station	125 W. Main St.	No
Walgreens Drug Store	38 W. Main St	No
CVS Pharmacy	35 W. Main St	No
Cumberland Farms Gas Station	60 W. Main St	No
Town of Norton Sewer	120 W. Main St.	No
The Residence At Great Woods	190 Mansfield Ave	Yes
North Cottage	69 East Main St	Yes
East Main St Apartments	274 E. Main St	No
Wayfair	19 Leonard St	No
Home Depot Dist. Center	40 Leonard St	No
Yale Appliance Dist. Center	42-50 Leonard St	No

Appendix C. Mitigation Actions.

Priority Ranking Points

Table 71. Priority Ranking Points for Each Action.

Action #	Action Title	Hazards Addressed	Approximate Cost	Implementation Timeline	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
1	Integrate hazard mitigation/resilience into future updates of key plans (Master Plan, OSRP, MVP, HPP) in alignment with the HMP.	3	3	1	2	2	3	2	2	18
2	Build staff expertise and capacity for mitigation activities through incentivizing training and professional development opportunities.	3	3	1	2	2	3	2	2	18
3	Expand the Town's capacity to identify and prioritize the mitigation grant opportunities to pursue, including but not limited to FEMA's HMA programs and the Commonwealth's MVP Action Grants and others focused on climate resilience.	3	3	1	2	1	3	2	2	17
4	Educate neighborhoods with an increased wildfire risk due to dead trees how to mitigate their risk.	2	3	3	2	2	0	2	2	16
5	Review the State's Local Floodplain Action Guide (forthcoming in 2024) for possible zoning or administrative improvements that may be taken	3	3	2	0	1	3	2	2	16

Action #	Action Title	Hazards Addressed	Approximate Cost	Implementation Timeline	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
	to further enhance the Town's existing flood risk reduction efforts.									
6	Develop an invasive species and water pollution management plan, that includes education for privately owned facilities.	2	2	2	0	2	3	2	2	15
7	Continue coordinating with SRPEDD and the Resilient Taunton Watershed Network (RTWN) on plans/studies that promote resilience .	3	3	1	0	1	3	2	2	15
8	Maintain a map of areas that flood frequently (including repetitive loss areas) and prioritize them for inspection immediately after flood events. If outside FEMA special flood hazard areas, consider requiring existing regulatory standards (compliance with Floodplain District) through extended overlay zoning, etc.	3	3	1	0	1	3	2	2	15
9	Work with neighboring communities to develop larger, regional MVP Action Grants.	3	3	1	0	1	3	2	2	15
10	Implement the Norton Complete Streets Plan.	3	1	2	3	1	3	0	2	15
11	Develop and adopt stream dumping regulations that prohibit dumping debris into the drainage network throughout Town.	3	1	3	0	1	3	2	2	15
12	Document and provide information on areas of flooding concern that are not located in the	3	1	3	0	1	3	2	2	15

Action #	Action Title	Hazards Addressed	Approximate Cost	Implementation Timeline	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
	Town's Floodplain District (outside of FEMA's mapped special flood hazard areas).									
13	Identify and seek to address any unmet needs related to targeted outreach/education for the community's more vulnerable populations .	3	3	1	3	2	0	0	2	14
14	Develop a local Post-Disaster Substantial Damage Plan to assist with implementing substantial damage provisions of the NFIP, the State Building Code, and local floodplain regulations.	3	2	2	0	2	3	0	2	14
15	Review the CEMP for opportunities to incorporate mitigation measures into the Town's emergency preparedness and response activities.	3	3	1	0	2	3	0	2	14
16	Complete Low Impact Development (LID) stormwater facility at Crane Street along the Three Mile River.	3	1	2	0	1	3	2	2	14
17	Evaluate permit application forms to determine possible modifications focused on flood hazard prevention.	3	3	1	0	0	3	2	2	14
18	Leverage the Town's website, newsletters, social media / PSAs, cable television, and community events to promote risk awareness and low-cost or do-it-yourself mitigation activities.	3	3	1	2	2	0	0	2	13
19	Conduct annual outreach to owners of repetitive loss properties to promote awareness of	3	3	1	2	2	0	0	2	13

Action #	Action Title	Hazards Addressed	Approximate Cost	Implementation Timeline	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
	mitigation grant funding that is available to mitigate future flood losses. Promote the availability of flood insurance.									
20	Develop and maintain a library of publications and other resources on hazard mitigation and climate adaptation for property owners to learn more about how to prepare and protect their property from the adverse effects of natural hazards.	3	3	1	2	2	0	0	2	13
21	Explore the option of requiring the undergrounding of powerlines in new subdivisions or other large-scale developments to reduce the damage and disruption caused by extreme wind and severe winter storms.	3	1	2	0	2	3	0	2	13
22	Provide information about areas that should be protected because of their natural protective functions, including floodplains, wetlands, forested lands, and other areas that can help reduce the impacts of natural hazards.	3	3	2	0	1	0	2	2	13
23	Pursue culvert and drainage improvements through MA Division of Ecological Restoration Grant opportunities.	3	1	1	0	1	3	2	2	13
24	Revisit zoning, open space, subdivision bylaws to ensure nature-based solutions are being encouraged to their full capacity.	3	2	1	0	0	3	2	2	13

Action #	Action Title	Hazards Addressed	Approximate Cost	Implementation Timeline	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
25	Conduct a seismic safety study for critical facilities and work with Wheaton College to study their older buildings.	1	2	2	0	2	3	0	2	12
26	Perform stormwater management duties required by MS4 and administer the Local Stormwater Bylaw.	3	1	1	0	2	3	0	2	12
27	Revisit adoption of the MA Community Preservation Act (CPA).	3	3	2	0	0	0	2	2	12
28	Develop system/process for maintaining hazard impact/loss data.	3	3	1	0	0	3	0	2	12
29	Conduct outreach to the NFIP policyholders and develop a plan to address repetitive loss properties.	3	3	1	0	2	0	0	2	11
30	Identify and prioritize specific strategies to preserve areas important to the retention of the Town's natural green infrastructure (including forest, wetlands, native vegetation), and as delineated on the Resilient Taunton Watershed Network's Green Infrastructure Map for Norton. The Town will also Acquire/protect/preserve areas identified as ecologically important for local and regional resilience in various studies/assessments/reports (such as Audubon	3	1	2	0	1	0	2	2	11

Action #	Action Title	Hazards Addressed	Approximate Cost	Implementation Timeline	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
	MAPPR, RTWN Green Infrastructure Maps, Bio Map II, and others).									
31	Encourage property owners to maintain trees on their properties, through pruning and clearing dead vegetation near buildings, to reduce structural damage from falling trees/branches during severe weather and possible brush fires during drought conditions.	3	3	2	0	1	0	0	2	11
32	Maintain or repair Chartley Dam and the Norton Reservoir Dam and others as necessary.	3	1	1	0	1	3	0	2	11
33	Explore mitigation and flood relief improvements to the Barrows Court subdivision.	3	1	1	0	1	3	0	2	11
34	Seek out partnerships between private landowners, land conservation groups, and state and local governments to enable future open space acquisitions.	3	3	1	0	0	0	2	2	11
35	Coordinate with the State and CSX Railway to mitigate risk of train going through wet areas and transporting hazardous materials.	2	3	1	0	0	0	2	2	10
36	Revisit the adoption of a Drought Management Bylaw as described in the Open Space and Recreation Plan.	3	1	2	0	0	0	2	2	10

Action #	Action Title	Hazards Addressed	Approximate Cost	Implementation Timeline	Equity Focus	Protection of Lives	Protection of Critical Facilities or Infrastructure	Protection of Natural Resources	Alignment with Objectives	Total
37	Update the Open Space and Recreation Plan goals and actions to help prioritize nature-based solutions and other hazard mitigation priorities.	3	1	1	0	0	0	2	2	9
38	Drought education for business owners.	3	3	1	0	0	0	0	2	9
39	Explore the development of post-disaster mitigation policies and procedures.	3	3	1	0	0	0	0	2	9

Types of Mitigation Actions

Table 72. Mitigation Actions Sorted by Type.

Action #	Action Title
Local Plans and Regulations	
1	Integrate hazard mitigation/resilience into future updates of key plans (Master Plan, OSRP, MVP, HPP) in alignment with the HMP.
5	Review the State's Local Floodplain Action Guide (forthcoming in 2024) for possible zoning or administrative improvements that may be taken to further enhance the Town's existing flood risk reduction efforts.
11	Develop and adopt stream dumping regulations that prohibit dumping debris into the drainage network throughout Town.
14	Develop a local Post-Disaster Substantial Damage Plan to assist with implementing substantial damage provisions of the NFIP, the State Building Code, and local floodplain regulations.
15	Review the CEMP for opportunities to incorporate mitigation measures into the Town's emergency preparedness and response activities.
17	Evaluate permit application forms to determine possible modifications focused on flood hazard prevention.
21	Explore the option of requiring the undergrounding of powerlines in new subdivisions or other large-scale developments to reduce the damage and disruption caused by extreme wind and severe winter storms.
24	Revisit zoning, open space, subdivision bylaws to ensure nature-based solutions are being encouraged to their full capacity.
28	Develop system/process for maintaining hazard impact/loss data.
36	Revisit the adoption of a Drought Management Bylaw as described in the Open Space and Recreation Plan.
37	Update the Open Space and Recreation Plan goals and actions to help prioritize nature-based solutions and other hazard mitigation priorities.
39	Explore the development of post-disaster mitigation policies and procedures.
Structure and Infrastructure	
10	Implement the Norton Complete Streets Plan.
16	Complete Low Impact Development (LID) stormwater facility at Crane Street along the Three Mile River.
23	Pursue culvert and drainage improvements through MA Division of Ecological Restoration Grant opportunities.
25	Conduct a seismic safety study for critical facilities and work with Wheaton College to study their older buildings.
32	Maintain or repair Chartley Dam and the Norton Reservoir Dam and others as necessary.
33	Explore mitigation and flood relief improvements to the Barrows Court subdivision.

Action #	Action Title
Natural Systems Protection	
6	Develop an invasive species and water pollution management plan, that includes education for privately owned facilities.
7	Continue coordinating with SRPEDD and the Resilient Taunton Watershed Network (RTWN) on plans/studies that promote resilience.
8	Maintain a map of areas that flood frequently (including repetitive loss areas) and prioritize them for inspection immediately after flood events. If outside FEMA special flood hazard areas, consider requiring existing regulatory standards (compliance wit
9	Work with neighboring communities to develop larger, regional MVP Action Grants.
26	Perform stormwater management duties required by MS4 and administer the Local Stormwater Bylaw.
27	Revisit adoption of the MA Community Preservation Act (CPA).
30	Identify and prioritize specific strategies to preserve areas important to the retention of the Town's natural green infrastructure (including forest, wetlands, native vegetation), and as delineated on the Resilient Taunton Watershed Network's Green Infra
31	Encourage property owners to maintain trees on their properties, through pruning and clearing dead vegetation near buildings, to reduce structural damage from falling trees/branches during severe weather and possible brush fires during drought conditions.
34	Seek out partnerships between private landowners, land conservation groups, and state and local governments to enable future open space acquisitions.
35	Coordinate with the State and CSX Railway to mitigate risk of train going through wet areas and transporting hazardous materials.
Education and Awareness Programs	
2	Build staff expertise and capacity for mitigation activities through incentivizing training and professional development opportunities.
3	Expand the Town's capacity to identify and prioritize the mitigation grant opportunities to pursue, including but not limited to FEMA's HMA programs and the Commonwealth's MVP Action Grants and others focused on climate resilience.
4	Educate neighborhoods with an increased wildfire risk due to dead trees how to mitigate their risk.
12	Document and provide information on areas of flooding concern that are not located in the Town's Floodplain District (outside of FEMA's mapped special flood hazard areas).
13	Identify and seek to address any unmet needs related to targeted outreach/education for the community's more vulnerable populations.
18	Leverage the Town's website, newsletters, social media / PSAs, cable television, and community events to promote risk awareness and low-cost or do-it-yourself mitigation activities.

Action #	Action Title
19	Conduct annual outreach to owners of repetitive loss properties to promote awareness of mitigation grant funding that is available to mitigate future flood losses. Promote the availability of flood insurance.
20	Develop and maintain a library of publications and other resources on hazard mitigation and climate adaptation for property owners to learn more about how to prepare and protect their property from the adverse effects of natural hazards.
22	Provide information about areas that should be protected because of their natural protective functions, including floodplains, wetlands, forested lands, and other areas that can help reduce the impacts of natural hazards.
29	Conduct outreach to the NFIP policyholders and develop a plan to address repetitive loss properties.
38	Drought education for business owners.

Actions Sorted by Goal Statement

Table 73. Mitigation Actions Sorted by Goal Statement and Priority.

Action #	Mitigation Action
Save Lives and Property	
5	Review the State's Local Floodplain Action Guide (forthcoming in 2024) for possible zoning or administrative improvements that may be taken to further enhance the Town's existing flood risk reduction efforts.
31	Encourage property owners to maintain trees on their properties, through pruning and clearing dead vegetation near buildings, to reduce structural damage from falling trees/branches during severe weather and possible brush fires during drought conditions.
32	Maintain or repair Chartley Dam and the Norton Reservoir Dam and others as necessary.
Infrastructure	
10	Implement the Norton Complete Streets Plan.
16	Complete Low Impact Development (LID) stormwater facility at Crane Street along the Three Mile River.
23	Pursue culvert and drainage improvements through MA Division of Ecological Restoration Grant opportunities.
25	Conduct a seismic safety study for critical facilities and work with Wheaton College to study their older buildings.
27	Revisit adoption of the MA Community Preservation Act (CPA).
33	Explore mitigation and flood relief improvements to the Barrows Court subdivision.
Capacity	
1	Integrate hazard mitigation/resilience into future updates of key plans (Master Plan, OSRP, MVP, HPP) in alignment with the HMP.
2	Build staff expertise and capacity for mitigation activities through incentivizing training and professional development opportunities.
3	Expand the Town's capacity to identify and prioritize the mitigation grant opportunities to pursue, including but not limited to FEMA's HMA programs and the Commonwealth's MVP Action Grants and others focused on climate resilience.
14	Develop a local Post-Disaster Substantial Damage Plan to assist with implementing substantial damage provisions of the NFIP, the State Building Code, and local floodplain regulations.
15	Review the CEMP for opportunities to incorporate mitigation measures into the Town's emergency preparedness and response activities.
17	Evaluate permit application forms to determine possible modifications focused on flood hazard prevention.

21	Explore the option of requiring the undergrounding of powerlines in new subdivisions or other large-scale developments to reduce the damage and disruption caused by extreme wind and severe winter storms.
24	Revisit zoning, open space, subdivision bylaws to ensure nature-based solutions are being encouraged to their full capacity.
28	Develop system/process for maintaining hazard impact/loss data.
34	Seek out partnerships between private landowners, land conservation groups, and state and local governments to enable future open space acquisitions.
35	Coordinate with the State and CSX Railway to mitigate risk of train going through wet areas and transporting hazardous materials.
36	Revisit the adoption of a Drought Management Bylaw as described in the Open Space and Recreation Plan.
37	Update the Open Space and Recreation Plan goals and actions to help prioritize nature-based solutions and other hazard mitigation priorities.
39	Explore the development of post-disaster mitigation policies and procedures.
Natural Resources	
6	Develop an invasive species and water pollution management plan, that includes education for privately owned facilities.
7	Continue coordinating with SRPEDD and the Resilient Taunton Watershed Network (RTWN) on plans/studies that promote resilience.
8	Maintain a map of areas that flood frequently (including repetitive loss areas) and prioritize them for inspection immediately after flood events. If outside FEMA special flood hazard areas, consider requiring existing regulatory standards (compliance wit
9	Work with neighboring communities to develop larger, regional MVP Action Grants.
11	Develop and adopt stream dumping regulations that prohibit dumping debris into the drainage network throughout Town.
26	Perform stormwater management duties required by MS4 and administer the Local Stormwater Bylaw.
30	Identify and prioritize specific strategies to preserve areas important to the retention of the Town's natural green infrastructure (including forest, wetlands, native vegetation), and as delineated on the Resilient Taunton Watershed Network's Green Infra
Education	
4	Educate neighborhoods with an increased wildfire risk due to dead trees how to mitigate their risk.
12	Document and provide information on areas of flooding concern that are not located in the Town's Floodplain District (outside of FEMA's mapped special flood hazard areas).
13	Identify and seek to address any unmet needs related to targeted outreach/education for the community's more vulnerable populations.

18	Leverage the Town's website, newsletters, social media / PSAs, cable television, and community events to promote risk awareness and low-cost or do-it-yourself mitigation activities.
19	Conduct annual outreach to owners of repetitive loss properties to promote awareness of mitigation grant funding that is available to mitigate future flood losses. Promote the availability of flood insurance.
20	Develop and maintain a library of publications and other resources on hazard mitigation and climate adaptation for property owners to learn more about how to prepare and protect their property from the adverse effects of natural hazards.
22	Provide information about areas that should be protected because of their natural protective functions, including floodplains, wetlands, forested lands, and other areas that can help reduce the impacts of natural hazards.
29	Conduct outreach to the NFIP policyholders and develop a plan to address repetitive loss properties.
38	Drought education for business owners.

Actions Sorted by Hazard

Table 74. Mitigation Actions Sorted by Hazards Addressed.

Action #	Action Title
All Hazards	
1	Integrate hazard mitigation/resilience into future updates of key plans (Master Plan, OSRP, MVP, HPP) in alignment with the HMP.
2	Build staff expertise and capacity for mitigation activities through incentivizing training and professional development opportunities.
3	Expand the Town's capacity to identify and prioritize the mitigation grant opportunities to pursue, including but not limited to FEMA's HMA programs and the Commonwealth's MVP Action Grants and others focused on climate resilience.
9	Work with neighboring communities to develop larger, regional MVP Action Grants.
18	Leverage the Town's website, newsletters, social media / PSAs, cable television, and community events to promote risk awareness and low-cost or do-it-yourself mitigation activities.
20	Develop and maintain a library of publications and other resources on hazard mitigation and climate adaptation for property owners to learn more about how to prepare and protect their property from the adverse effects of natural hazards.
28	Develop system/process for maintaining hazard impact/loss data.
	Average/Extreme Temperatures, Drought, Flooding from Precipitation, Hurricanes and Tropical Storms, Invasive Species, Other Severe Weather, Severe Winter Storms, Tornadoes, Wildfires/Brushfires
7	Continue coordinating with SRPEDD and the Resilient Taunton Watershed Network (RTWN) on plans/studies that promote resilience.
22	Provide information about areas that should be protected because of their natural protective functions, including floodplains, wetlands, forested lands, and other areas that can help reduce the impacts of natural hazards.
27	Revisit adoption of the MA Community Preservation Act (CPA).
30	Identify and prioritize specific strategies to preserve areas important to the retention of the Town's natural green infrastructure (including forest, wetlands, native vegetation), and as delineated on the Resilient Taunton Watershed Network's Green Infra
34	Seek out partnerships between private landowners, land conservation groups, and state and local governments to enable future open space acquisitions.
	Average/Extreme Temperatures, Flooding from Precipitation
10	Implement the Norton Complete Streets Plan.
	Average/Extreme Temperatures, Flooding from Precipitation, Hurricanes and Tropical Storms, Other Severe Weather, Tornadoes
24	Revisit zoning, open space, subdivision bylaws to ensure nature-based solutions are being encouraged to their full capacity.
	Average/Extreme Temperatures, Hurricanes and Tropical Storms, Other Severe Weather, Severe Winter Storms, Tornadoes
13	Identify and seek to address any unmet needs related to targeted outreach/education for the community's more vulnerable populations.
Drought	

Action #	Action Title
36	Revisit the adoption of a Drought Management Bylaw as described in the Open Space and Recreation Plan.
38	Drought education for business owners.
	Earthquakes
25	Conduct a seismic safety study for critical facilities and work with Wheaton College to study their older buildings.
	Flooding from Precipitation
11	Develop and adopt stream dumping regulations that prohibit dumping debris into the drainage network throughout Town.
12	Document and provide information on areas of flooding concern that are not located in the Town's Floodplain District (outside of FEMA's mapped special flood hazard areas).
26	Perform stormwater management duties required by MS4 and administer the Local Stormwater Bylaw.
Flooding from Precipitation and Dam Overtopping	
5	Review the State's Local Floodplain Action Guide (forthcoming in 2024) for possible zoning or administrative improvements that may be taken to further enhance the Town's existing flood risk reduction efforts.
8	Maintain a map of areas that flood frequently (including repetitive loss areas) and prioritize them for inspection immediately after flood events. If outside FEMA special flood hazard areas, consider requiring existing regulatory standards (compliance wit
14	Develop a local Post-Disaster Substantial Damage Plan to assist with implementing substantial damage provisions of the NFIP, the State Building Code, and local floodplain regulations.
17	Evaluate permit application forms to determine possible modifications focused on flood hazard prevention.
29	Conduct outreach to the NFIP policyholders and develop a plan to address repetitive loss properties.
32	Maintain or repair Chartley Dam and the Norton Reservoir Dam and others as necessary.
Flooding from Precipitation and Dam Overtopping, Hurricanes and Tropical Storms, Other Severe Weather, Severe Winter Storms, Tornadoes	
19	Conduct annual outreach to owners of repetitive loss properties to promote awareness of mitigation grant funding that is available to mitigate future flood losses. Promote the availability of flood insurance.
Flooding from Precipitation, Hurricanes and Tropical Storms, Invasive Species, Other Severe Weather, Severe Winter Storms, Tornadoes	
15	Review the CEMP for opportunities to incorporate mitigation measures into the Town's emergency preparedness and response activities.
16	Complete Low Impact Development (LID) stormwater facility at Crane Street along the Three Mile River.
33	Explore mitigation and flood relief improvements to the Barrows Court subdivision.
37	Update the Open Space and Recreation Plan goals and actions to help prioritize nature-based solutions and other hazard mitigation priorities.
39	Explore the development of post-disaster mitigation policies and procedures.
	Flooding from Precipitation, Hurricanes and Tropical Storms, Other Severe Weather, Severe Winter Storms, Tornadoes

Action #	Action Title
23	Pursue culvert and drainage improvements through MA Division of Ecological Restoration Grant opportunities.
Hurricanes and Tropical Storms, Other Severe Weather, Severe Winter Storms, Tornadoes	
21	Explore the option of requiring the undergrounding of powerlines in new subdivisions or other large-scale developments to reduce the damage and disruption caused by extreme wind and severe winter storms.
Hurricanes and Tropical Storms, Other Severe Weather, Severe Winter Storms, Tornadoes, Wildfires/Brushfires	
31	Encourage property owners to maintain trees on their properties, through pruning and clearing dead vegetation near buildings, to reduce structural damage from falling trees/branches during severe weather and possible brush fires during drought conditions.
Invasive Species	
6	Develop an invasive species and water pollution management plan, that includes education for privately owned facilities.
	Wildfires/Brushfires
4	Educate neighborhoods with an increased wildfire risk due to dead trees how to mitigate their risk.
35	Coordinate with the State and CSX Railway to mitigate risk of train going through wet areas and transporting hazardous materials.

Actions Sorted by Lead Position

Table 75. Mitigation Actions Sorted by Action Lead.

Action #	Action Title
Planning Board	
1	Integrate hazard mitigation/resilience into future updates of key plans (Master Plan, OSRP, MVP, HPP) in alignment with the HMP.
7	Continue coordinating with SRPEDD and the Resilient Taunton Watershed Network (RTWN) on plans/studies that promote resilience.
21	Explore the option of requiring the undergrounding of powerlines in new subdivisions or other large-scale developments to reduce the damage and disruption caused by extreme wind and severe winter storms.
	Town Administrator
2	Build staff expertise and capacity for mitigation activities through incentivizing training and professional development opportunities.
Norton Conservation Director/Stormwater Agent	
3	Expand the Town's capacity to identify and prioritize the mitigation grant opportunities to pursue, including but not limited to FEMA's HMA programs and the Commonwealth's MVP Action Grants and others focused on climate resilience.
6	Develop an invasive species and water pollution management plan, that includes education for privately owned facilities.
9	Work with neighboring communities to develop larger, regional MVP Action Grants.
11	Develop and adopt stream dumping regulations that prohibit dumping debris into the drainage network throughout Town.
12	Document and provide information on areas of flooding concern that are not located in the Town's Floodplain District (outside of FEMA's mapped special flood hazard areas).
16	Complete Low Impact Development (LID) stormwater facility at Crane Street along the Three Mile River.
19	Conduct annual outreach to owners of repetitive loss properties to promote awareness of mitigation grant funding that is available to mitigate future flood losses. Promote the availability of flood insurance.
20	Develop and maintain a library of publications and other resources on hazard mitigation and climate adaptation for property owners to learn more about how to prepare and protect their property from the adverse effects of natural hazards.
22	Provide information about areas that should be protected because of their natural protective functions, including floodplains, wetlands, forested lands, and other areas that can help reduce the impacts of natural hazards.
23	Pursue culvert and drainage improvements through MA Division of Ecological Restoration Grant opportunities.

Action #	Action Title
24	Revisit zoning, open space, subdivision bylaws to ensure nature-based solutions are being encouraged to their full capacity.
26	Perform stormwater management duties required by MS4 and administer the Local Stormwater Bylaw.
29	Conduct outreach to the NFIP policyholders and develop a plan to address repetitive loss properties.
30	Identify and prioritize specific strategies to preserve areas important to the retention of the Town's natural green infrastructure (including forest, wetlands, native vegetation), and as delineated on the Resilient Taunton Watershed Network's Green Infrastructure Map for Norton. The Town will also Acquire/protect/preserve areas identified as ecologically important for local and regional resilience in various studies/assessments/reports (such as Audubon MAPPR, RTWN Green Infrastructure Maps, Bio Map II, and others).
32	Maintain or repair Chartley Dam and the Norton Reservoir Dam and others as necessary.
33	Explore mitigation and flood relief improvements to the Barrows Court subdivision.
34	Seek out partnerships between private landowners, land conservation groups, and state and local governments to enable future open space acquisitions.
37	Update the Open Space and Recreation Plan goals and actions to help prioritize nature-based solutions and other hazard mitigation priorities.
Fire Chief	
4	Educate neighborhoods with an increased wildfire risk due to dead trees how to mitigate their risk.
15	Review the CEMP for opportunities to incorporate mitigation measures into the Town's emergency preparedness and response activities.
18	Leverage the Town's website, newsletters, social media / PSAs, cable television, and community events to promote risk awareness and low-cost or do-it-yourself mitigation activities.
35	Coordinate with the State and CSX Railway to mitigate risk of train going through wet areas and transporting hazardous materials.
39	Explore the development of post-disaster mitigation policies and procedures.
Building Commissioner	
5	Review the State's Local Floodplain Action Guide (forthcoming in 2024) for possible zoning or administrative improvements that may be taken to further enhance the Town's existing flood risk reduction efforts.
8	Maintain a map of areas that flood frequently (including repetitive loss areas) and prioritize them for inspection immediately after flood events. If outside FEMA special flood hazard areas, consider requiring existing regulatory standards (compliance with Floodplain District) through extended overlay zoning, etc.

Action #	Action Title
14	Develop a local Post-Disaster Substantial Damage Plan to assist with implementing substantial damage provisions of the NFIP, the State Building Code, and local floodplain regulations.
17	Evaluate permit application forms to determine possible modifications focused on flood hazard prevention.
25	Conduct a seismic safety study for critical facilities and work with Wheaton College to study their older buildings.
	Highway Superintendent
10	Implement the Norton Complete Streets Plan.
	Health Agent
13	Identify and seek to address any unmet needs related to targeted outreach/education for the community's more vulnerable populations.
	Community Preservation Review Committee Chair
27	Revisit adoption of the MA Community Preservation Act (CPA).
	Floodplain Administrator/Building Commissioner
28	Develop system/process for maintaining hazard impact/loss data.
Tree Warden	
31	Encourage property owners to maintain trees on their properties, through pruning and clearing dead vegetation near buildings, to reduce structural damage from falling trees/branches during severe weather and possible brush fires during drought conditions.
Selectboard Chair	
36	Revisit the adoption of a Drought Management Bylaw as described in the Open Space and Recreation Plan.
Water Superintendent	
38	Drought education for business owners.

Actions Sorted by Implementation Schedule

Table 76. Mitigation Actions Sorted by Implementation Schedule.

Action #	Action Title
2024-2026	
5	Review the State's Local Floodplain Action Guide (forthcoming in 2024) for possible zoning or administrative improvements that may be taken to further enhance the Town's existing flood risk reduction efforts.
2024-2029	
1	Integrate hazard mitigation/resilience into future updates of key plans (Master Plan, OSRP, MVP, HPP) in alignment with the HMP.
2	Build staff expertise and capacity for mitigation activities through incentivizing training and professional development opportunities.
3	Expand the Town's capacity to identify and prioritize the mitigation grant opportunities to pursue, including but not limited to FEMA's HMA programs and the Commonwealth's MVP Action Grants and others focused on climate resilience.
7	Continue coordinating with SRPEDD and the Resilient Taunton Watershed Network (RTWN) on plans/studies that promote resilience.
8	Maintain a map of areas that flood frequently (including repetitive loss areas) and prioritize them for inspection immediately after flood events. If outside FEMA special flood hazard areas, consider requiring existing regulatory standards (compliance wit
9	Work with neighboring communities to develop larger, regional MVP Action Grants.
15	Review the CEMP for opportunities to incorporate mitigation measures into the Town's emergency preparedness and response activities.
17	Evaluate permit application forms to determine possible modifications focused on flood hazard prevention.
19	Conduct annual outreach to owners of repetitive loss properties to promote awareness of mitigation grant funding that is available to mitigate future flood losses. Promote the availability of flood insurance.
20	Develop and maintain a library of publications and other resources on hazard mitigation and climate adaptation for property owners to learn more about how to prepare and protect their property from the adverse effects of natural hazards.
23	Pursue culvert and drainage improvements through MA Division of Ecological Restoration Grant opportunities.
24	Revisit zoning, open space, subdivision bylaws to ensure nature-based solutions are being encouraged to their full capacity.
26	Perform stormwater management duties required by MS4 and administer the Local Stormwater Bylaw.

Action #	Action Title
29	Conduct outreach to the NFIP policyholders and develop a plan to address repetitive loss properties.
32	Maintain or repair Chartley Dam and the Norton Reservoir Dam and others as necessary.
34	Seek out partnerships between private landowners, land conservation groups, and state and local governments to enable future open space acquisitions.
35	Coordinate with the State and CSX Railway to mitigate risk of train going through wet areas and transporting hazardous materials.
38	Drought education for business owners.
2025-2027	
6	Develop an invasive species and water pollution management plan, that includes education for privately owned facilities.
2025-2028	
10	Implement the Norton Complete Streets Plan.
30	Identify and prioritize specific strategies to preserve areas important to the retention of the Town's natural green infrastructure (including forest, wetlands, native vegetation), and as delineated on the Resilient Taunton Watershed Network's Green Infra
2025-2029	
13	Identify and seek to address any unmet needs related to targeted outreach/education for the community's more vulnerable populations.
18	Leverage the Town's website, newsletters, social media / PSAs, cable television, and community events to promote risk awareness and low-cost or do-it-yourself mitigation activities.
28	Develop system/process for maintaining hazard impact/loss data.
33	Explore mitigation and flood relief improvements to the Barrows Court subdivision.
37	Update the Open Space and Recreation Plan goals and actions to help prioritize nature-based solutions and other hazard mitigation priorities.
2026-2027	
4	Educate neighborhoods with an increased wildfire risk due to dead trees how to mitigate their risk.
	2026-2029
14	Develop a local Post-Disaster Substantial Damage Plan to assist with implementing substantial damage provisions of the NFIP, the State Building Code, and local floodplain regulations.
16	Complete Low Impact Development (LID) stormwater facility at Crane Street along the Three Mile River.
22	Provide information about areas that should be protected because of their natural protective functions, including floodplains, wetlands, forested lands, and other areas that can help reduce the impacts of natural hazards.

Action #	Action Title
27	Revisit adoption of the MA Community Preservation Act (CPA).
31	Encourage property owners to maintain trees on their properties, through pruning and clearing dead vegetation near buildings, to reduce structural damage from falling trees/branches during severe weather and possible brush fires during drought conditions.
36	Revisit the adoption of a Drought Management Bylaw as described in the Open Space and Recreation Plan.
39	Explore the development of post-disaster mitigation policies and procedures.
2027-2029	
21	Explore the option of requiring the undergrounding of powerlines in new subdivisions or other large-scale developments to reduce the damage and disruption caused by extreme wind and severe winter storms.
25	Conduct a seismic safety study for critical facilities and work with Wheaton College to study their older buildings.
2028-2029	
11	Develop and adopt stream dumping regulations that prohibit dumping debris into the drainage network throughout Town.
12	Document and provide information on areas of flooding concern that are not located in the Town's Floodplain District (outside of FEMA's mapped special flood hazard areas).

Appendix D. Plan Implementation and Review Supporting Materials.

Plan Update Evaluation Worksheet

Table 77. Plan Update Evaluation Worksheet.

Plan Section	Considerations	Explanation
Planning Process	Should the town invite any additional stakeholders to participate in the planning process? What public outreach activities have occurred? How can public involvement be improved?	
Risk Assessment	What disasters has the town, or the region experienced? Should the list of hazards be modified? Are new data sources, maps or studies available? If so, what have they revealed, and should the information be incorporated into the plan update? Has development in the region occurred and could it create or reduce risk?	
Capability Assessment	Has the town adopted new policies, plans, regulations, or reports that could be incorporated into this plan? Are there different or additional administrative, human, technical, and financial resources available for mitigation planning? Are there different or new education and outreach programs and resources available for mitigation activities?	
Mitigation Strategy	Is the mitigation strategy being implemented as anticipated? Were the cost and timeline estimate accurate? Should new mitigation actions be added to the Action Plan? Should existing mitigation actions be revised or removed from the plan? Are there new obstacles that were not anticipated in the plan that will need to be considered in the next plan update? Are there new funding sources to consider? Have elements of the plan been incorporated into other planning mechanisms?	
Implementation Plan	Was the plan monitored and evaluated as anticipated? What are needed improvements to the plan implementation procedures?	

Mitigation Action Progress Worksheet

Table 78. Mitigation Action Progress Worksheet.

Mitigation Action Progress Worksheet				
Progress Report Period	From Date		To Date	
Action/Project Title				
Responsible Department				
Contact Name				
Contact Phone/Email				
Project Description				
Project Goal				
Project Objective				
Project Cost				
Project Status				
Date of Project Approval	Date of Project Start	Anticipated Date of Completion	Project Canceled	Project Delayed
Explanation of Delay or Cost Overruns				
Project Report Summary				
What was accomplished for this project during this reporting period?				
What obstacles, problems, or delays did the project encounter?				
Plans for next reporting period.				

Appendix E. CRS 511.a Checklist

CRS Step	Page #
1. Organize to prepare the Plan. (max:15)	
a. Involvement of Office Responsible for Community Planning (4)	
b. Planning committee of department staff (9)	
c. Process formally created by the community's governing board (2)	
2. Involve the public. (max: 120)	
a. Planning process conducted through a planning committee (60)	
b. Public meetings held at the beginning of the planning process (15)	
c. Public meeting held on draft Plan (15)	
d. Other public information activities to encourage input (Up to 30)	
3. Coordinate with other agencies. (max: 35)	
a. Review of existing studies and plans [REQUIRED] (5)	
b. Coordinating with communities and other agencies (Up to 30)	
4. Assess the hazard. (max: 35)	
a. Plan includes an assessment of the flood hazard [REQUIRED] with:	
(1) A map of known flood hazards (5)	
(2) A description of known flood hazard (5)	
(3) A discussion of past floods (5)	
b. Plan includes assessment of less frequent floods (10)	
c. Plan includes assessment of areas likely to flood (5)	
d. The Plan describes other natural hazards [REQUIRED FOR DMA] (5)	
5. Assess the problem. (max: 52)	
a. Summary of each hazard identified in the hazard assessment and	
their community impact [REQUIRED] (2)	
b. Description of the impact of the hazards on: (max: 25)	
(1) Life, safety, health, procedures for warning and evacuation (5)	
(2) Public health including health hazards to floodwaters/mold (5)	
(3) Critical facilities and infrastructure (5)	
(4) The community's economy and tax base (5)	
(5) Number and type of affected buildings (5)	
c. Review of all damaged buildings/flood insurance claims (5)	
d. Areas the provide natural floodplain functions (5)	
e. Development/redevelopment/Population Trends (7)	

f. Impact of future flooding conditions outline in Step 4, item c (5)	
6. Set goals. [REQUIRED] (2)	
7. Review possible activities. (max: 35)	
a. Preventive activities (5)	
b. Floodplain Management Regulatory/current & future conditions (5)	
c. Property protection activities (5)	
d. Natural resource protection activities (5)	
e. Emergency services activities (5)	
f. Structural projects (5)	
g. Public information activities (5)	
8. Draft an action plan. (max: 60)	
a. Actions must be prioritized [REQUIRED]	
(1) Recommendations for activities from two of the six categories (10)	
(2) Recommendations for activities from three of the six categories (20)	
(3) Recommendations for activities from four of the six categories (30)	
(4) Recommendations for activities from five of the six categories (45)	
b. Post-disaster mitigation policies and procedures (10)	
c. Action items for mitigation of other hazards (5)	
9. Adopt the plan. (2)	
10. Implement, evaluate and revise. (max: 26)	
a. Procedures to monitor and recommend revisions [REQUIRED] (2)	
b. Same planning committee or successor committee that qualifies	
under Section 511.a.2 (a) does the evaluation (24)	

Appendix F. Hazus Reports

Hazus: Flood Global Risk Report

Region Name: Norton_Flood

Flood Scenario: 100year

Print Date: Tuesday, November 28, 2023

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

FEMA

RiskMAP
Increasing Resilience Together

Table of Contents

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is approximately 5 square miles and contains 219 census blocks. The region contains over 7 thousand households and has a total population of 19,202 people. The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 5,367 buildings in the region with a total building replacement value (excluding contents) of 3,358 million dollars. Approximately 86.27% of the buildings (and 60.50% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,367 buildings in the region which have an aggregate total replacement value of 3,358 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	2,031,582	60.5%
Commercial	703,384	20.9%
Industrial	152,768	4.5%
Agricultural	6,955	0.2%
Religion	22,116	0.7%
Government	131,852	3.9%
Education	309,284	9.2%
Total	**3,357,941**	**100%**

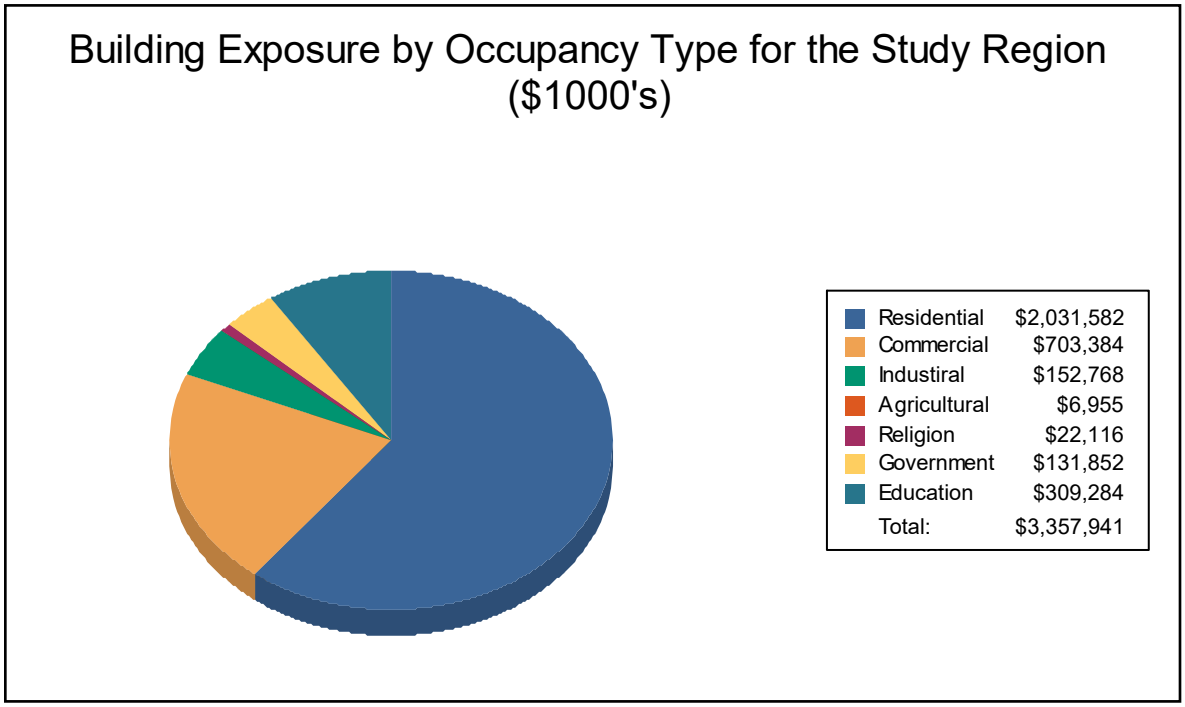
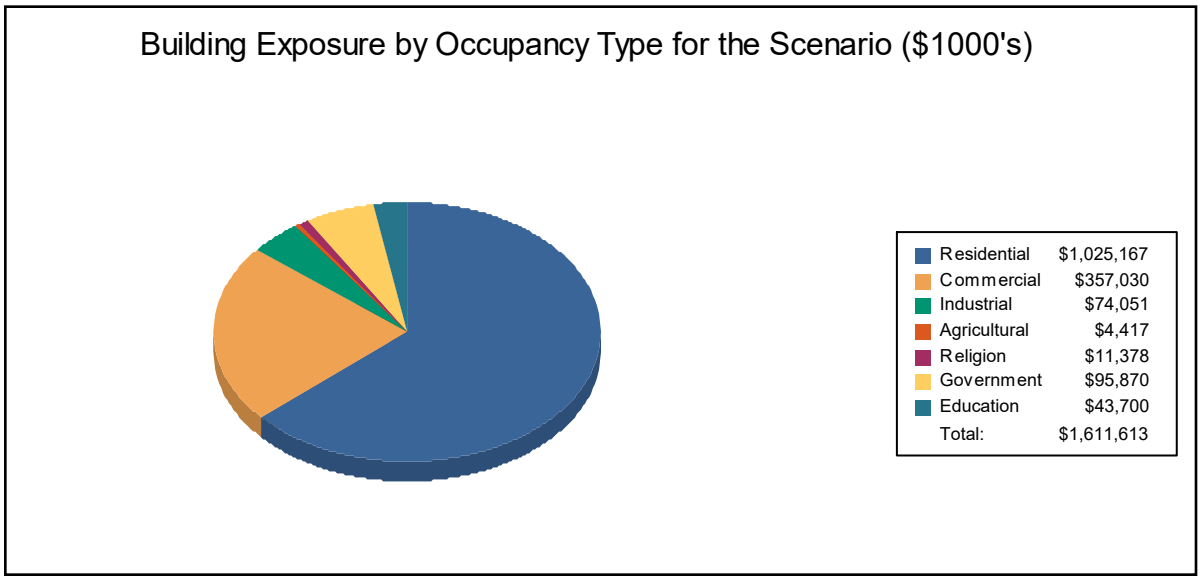


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,025,167	63.6%
Commercial	357,030	22.2%
Industrial	74,051	4.6%
Agricultural	4,417	0.3%
Religion	11,378	0.7%
Government	95,870	5.9%
Education	43,700	2.7%
Total	**1,611,613**	**100%**



Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 7 schools, 3 fire stations, 2 police stations and 2 emergency operation centers.

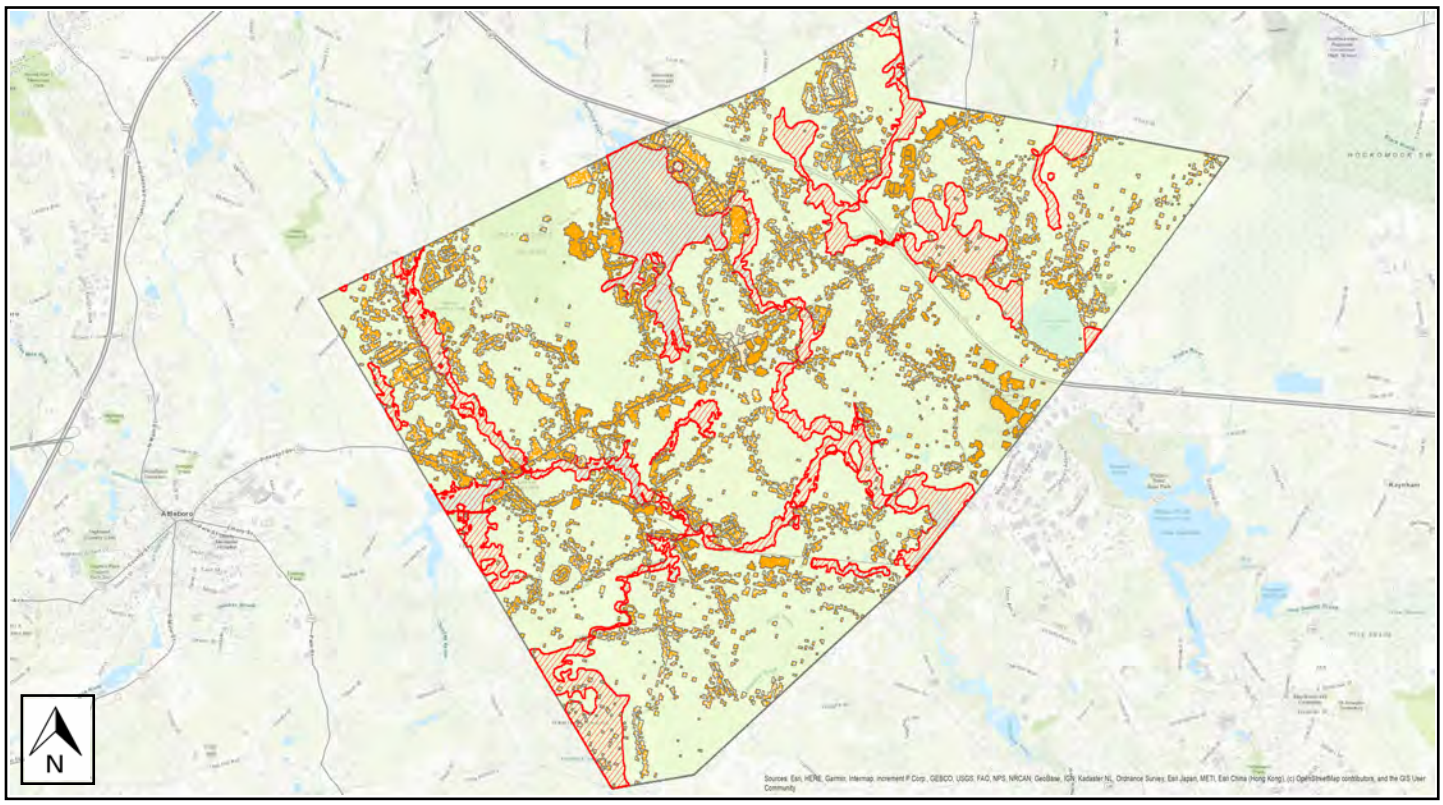
Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	Norton_Flood
Scenario Name:	100year
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure



Building Damage

General Building Stock Damage

Hazus estimates that about 1 building will be at least moderately damaged. This is over 67% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Total Economic Loss (1 dot = $300K) Overview Map

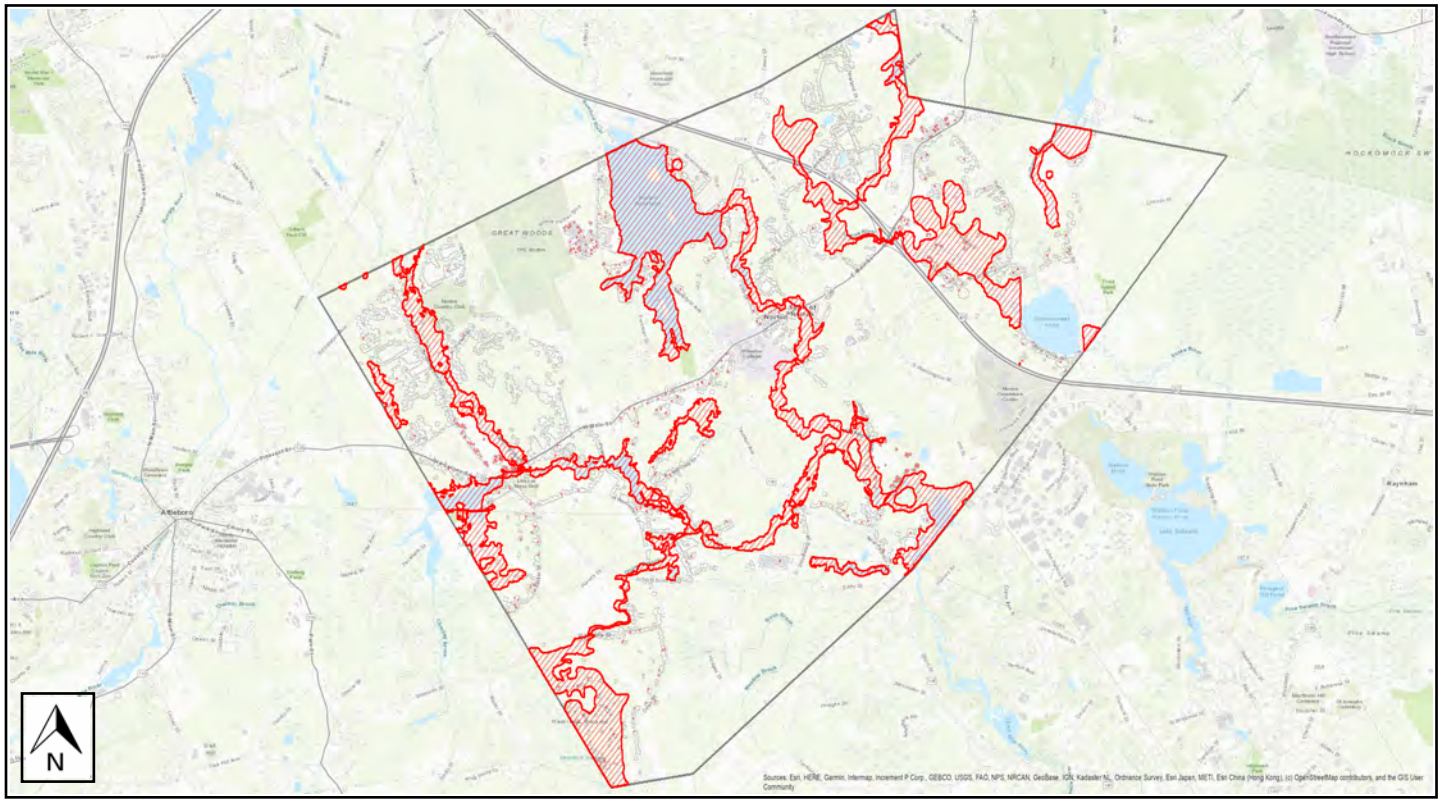


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	5	83	1	17	0	0	0	0	0	0	0	0
Total	**5**		**1**		**0**		**0**		**0**		**0**	

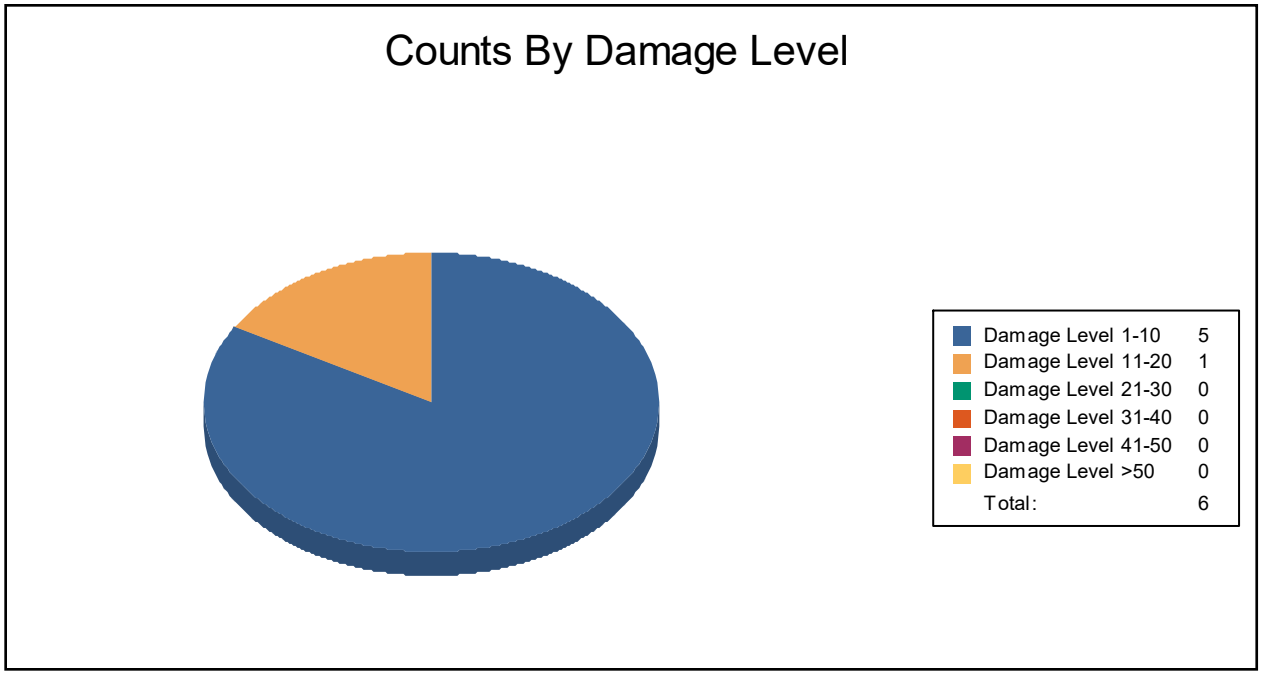


Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0	0	0	0	0	0	0	0	0	0	0
ManufHousing	0	0	0	0	0	0	0	0	0	0	0	0
Masonry	0	0	0	0	0	0	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	5	83	1	17	0	0	0	0	0	0	0	0

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	2	0	0	0
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	2	0	0	0
Schools	7	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

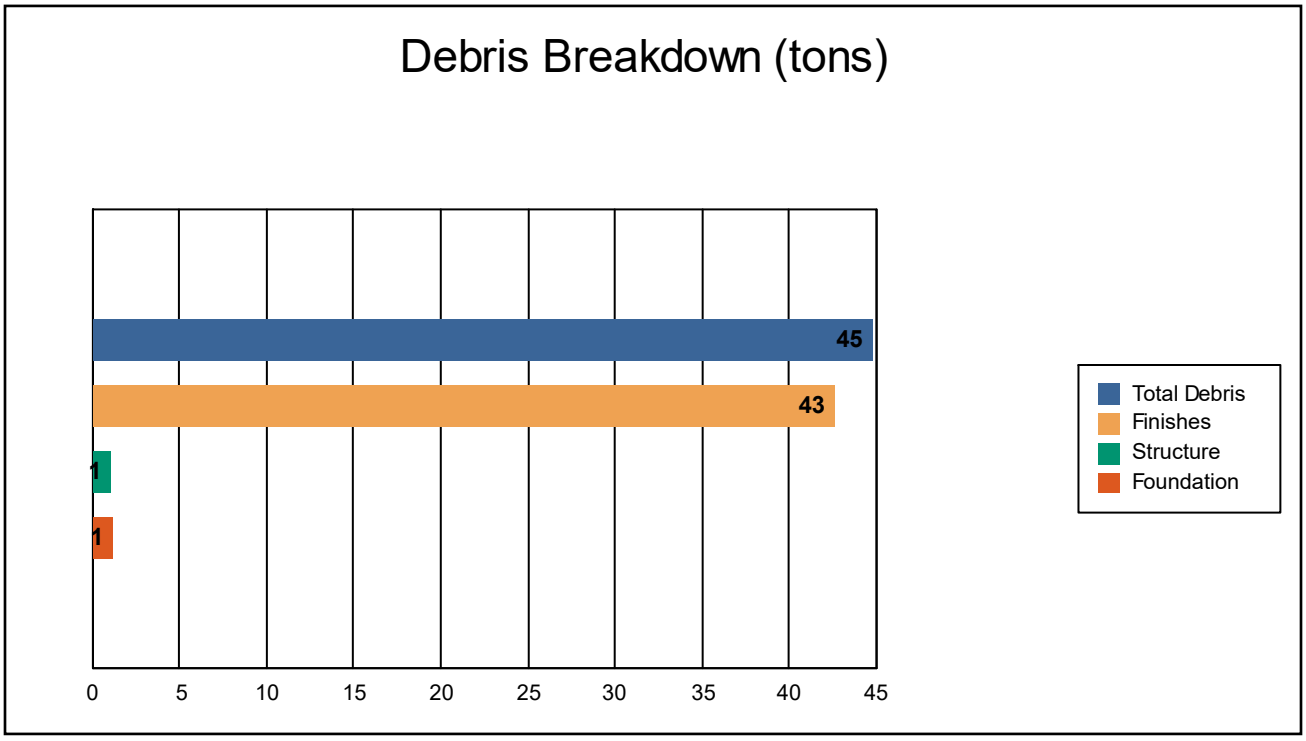
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(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.

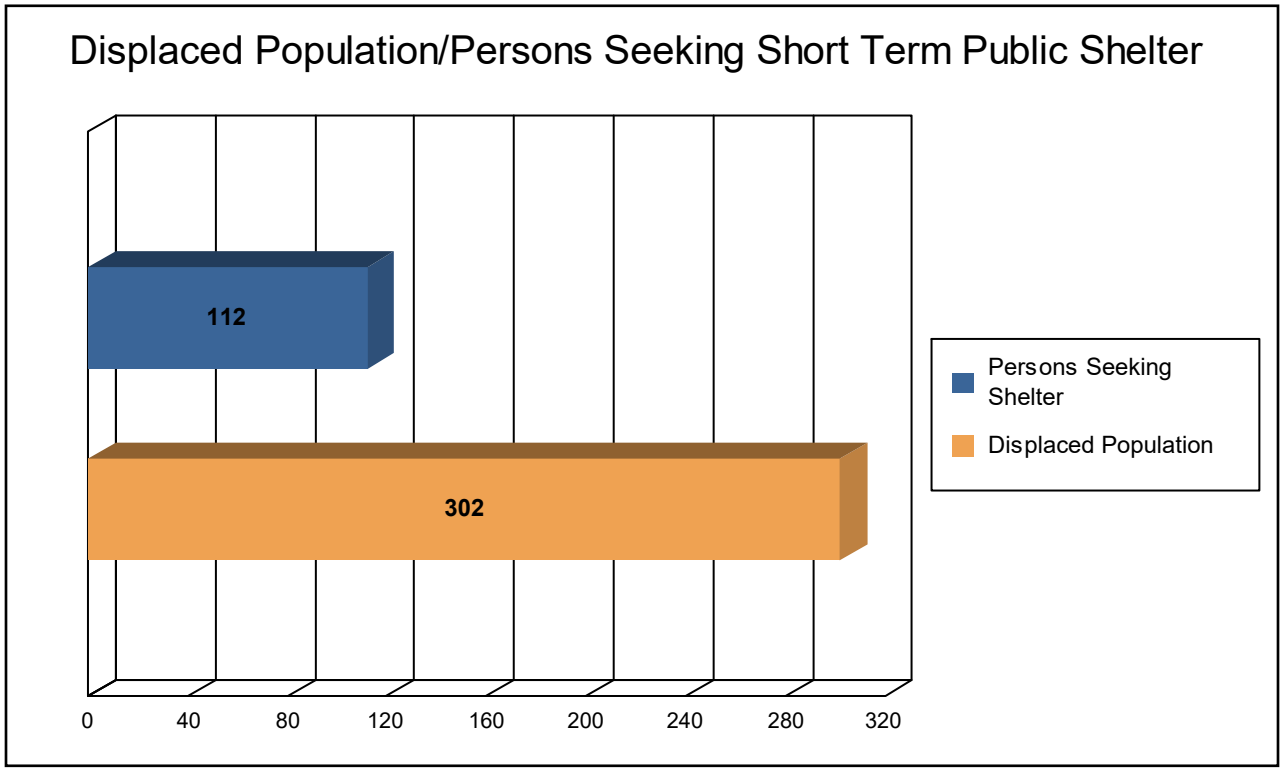


The model estimates that a total of 45 tons of debris will be generated. Of the total amount, Finishes comprises 95% of the total, Structure comprises 2% of the total, and Foundation comprises 3%. If the debris tonnage is converted into an estimated number of truckloads, it will require 2 truckloads (@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 101 households (or 302 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 112 people (out of a total population of 19,202) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 18.60 million dollars, which represents 1.15 % of the total replacement value of the scenario buildings.

Building-Related Losses

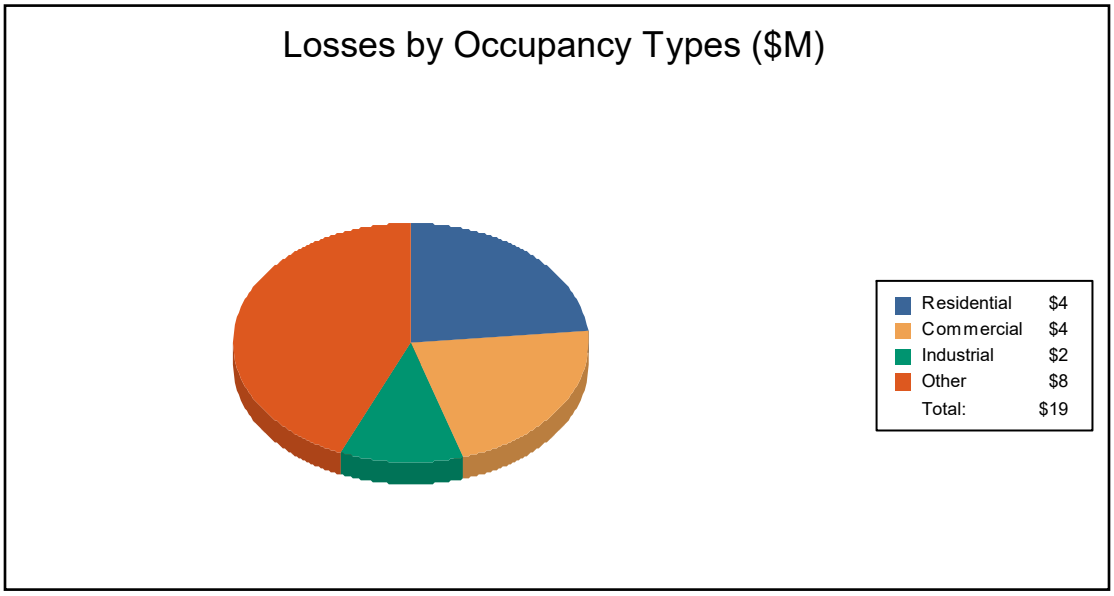
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 7.88 million dollars. 58% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 23.20% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	2.14	0.30	0.52	0.12	3.08
	Content	0.98	1.14	1.24	0.81	4.17
	Inventory	0.00	0.44	0.16	0.03	0.63
	Subtotal	**3.12**	**1.87**	**1.93**	**0.96**	**7.88**
Business Interruption						
	Income	0.09	0.87	0.03	0.35	1.33
	Relocation	0.68	0.21	0.05	0.27	1.20
	Rental Income	0.23	0.15	0.01	0.08	0.47
	Wage	0.21	1.02	0.05	6.46	7.73
	Subtotal	**1.20**	**2.25**	**0.13**	**7.15**	**10.72**
ALL	**Total**	**4.32**	**4.12**	**2.05**	**8.11**	**18.60**



Appendix A: County Listing for the Region

Massachusetts

- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	19,202	2,031,582	1,326,359	3,357,941
Total	**19,202**	**2,031,582**	**1,326,359**	**3,357,941**
Total Study Region	**19,202**	**2,031,582**	**1,326,359**	**3,357,941**

Hazus: Hurricane Global Risk Report

Region Name:	Norton_Wind
Hurricane Scenario:	Probabilistic 500-year Return Period
Print Date:	Tuesday, November 28, 2023

Disclaimer:
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

Table of Contents

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 29.31 square miles and contains 4 census tracts. There are over 6 thousand households in the region and a total population of 19,202 people. The distribution of population by State and County is provided in Appendix B.

There are an estimated 5 thousand buildings in the region with a total building replacement value (excluding contents) of 3,358 million dollars. Approximately 86% of the buildings (and 61% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,367 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.

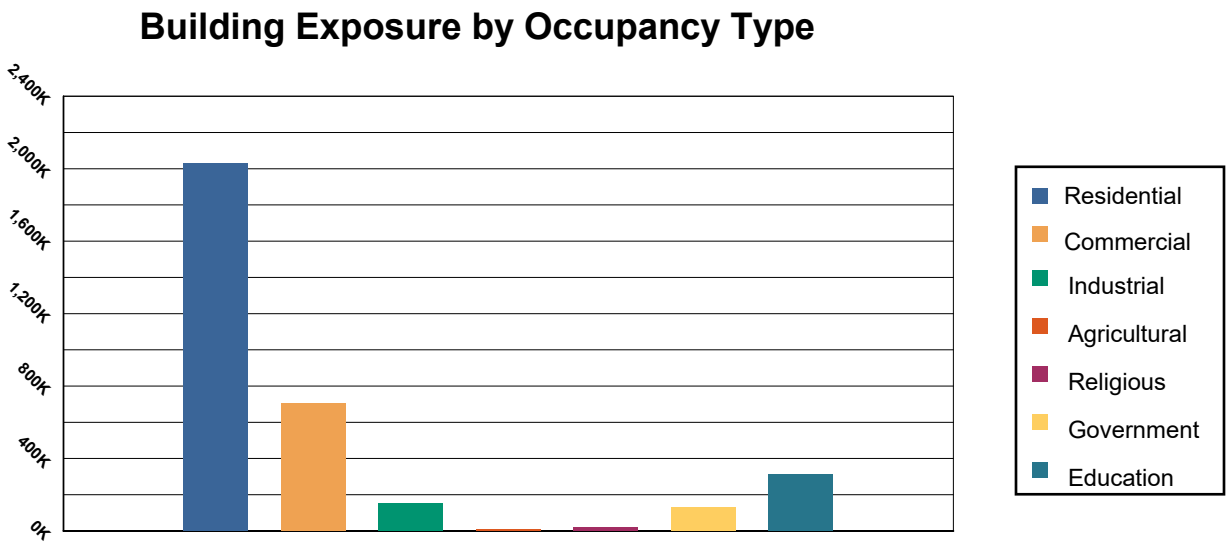


Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	2,031,582	60.50%
Commercial	703,384	20.95%
Industrial	152,768	4.55%
Agricultural	6,955	0.21%
Religious	22,116	0.66%
Government	131,852	3.93%
Education	309,284	9.21%
Total	**3,357,941**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 7 schools, 3 fire stations, 2 police stations and 2 emergency operation facilities.

Hurricane Scenario

Hazus used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 354 buildings will be at least moderately damaged. This is over 7% of the total number of buildings in the region. There are an estimated 10 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

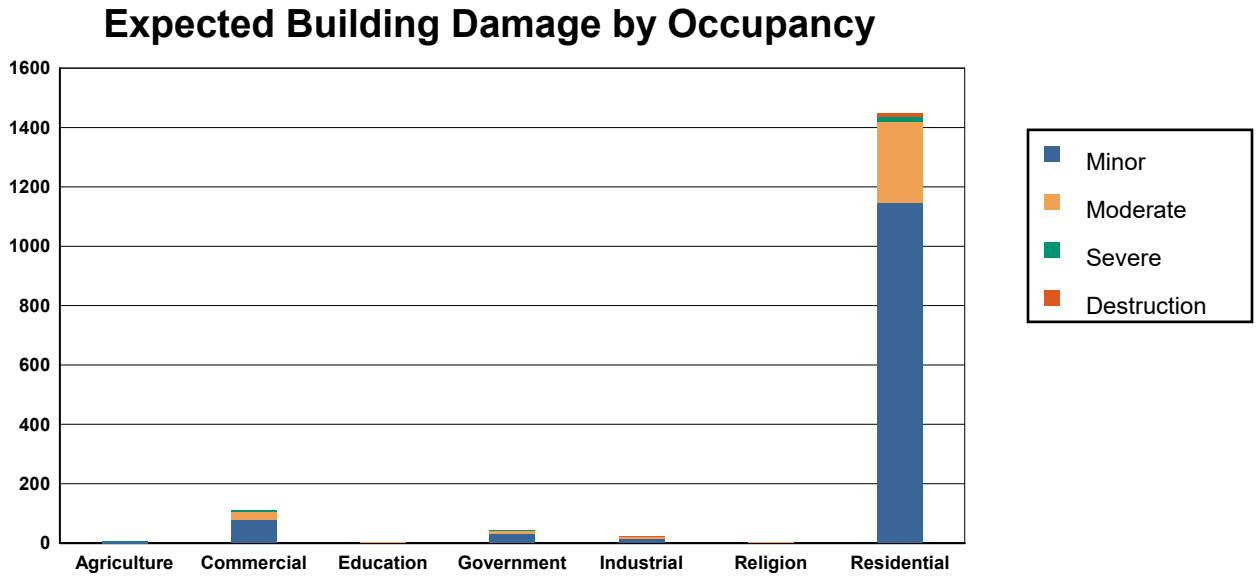


Table 2: Expected Building Damage by Occupancy : 500 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	11.69	68.74	3.55	20.86	1.14	6.71	0.55	3.23	0.08	0.46
Commercial	316.32	73.91	79.21	18.51	28.00	6.54	4.43	1.03	0.03	0.01
Education	9.08	75.69	2.18	18.16	0.68	5.67	0.06	0.48	0.00	0.00
Government	132.62	75.35	31.61	17.96	10.77	6.12	1.00	0.57	0.00	0.00
Industrial	67.37	75.69	15.48	17.39	5.25	5.90	0.86	0.96	0.05	0.06
Religion	11.25	75.01	2.99	19.92	0.71	4.72	0.05	0.35	0.00	0.00
Residential	3,183.46	68.76	1,146.57	24.76	271.56	5.87	18.19	0.39	10.23	0.22
Total	**3,731.79**		**1,281.58**		**318.11**		**25.13**		**10.39**	

Table 3: Expected Building Damage by Building Type : 500 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	46	74.91	11	17.89	4	6.67	0	0.53	0	0.00
Masonry	268	65.57	80	19.64	57	13.94	3	0.76	0	0.09
MH	46	86.61	4	7.18	2	4.46	0	0.23	1	1.53
Steel	265	75.46	58	16.60	23	6.69	4	1.24	0	0.01
Wood	3,016	69.72	1,092	25.25	192	4.44	16	0.38	9	0.21

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, none of the beds will be in service. By 30 days, none will be operational.

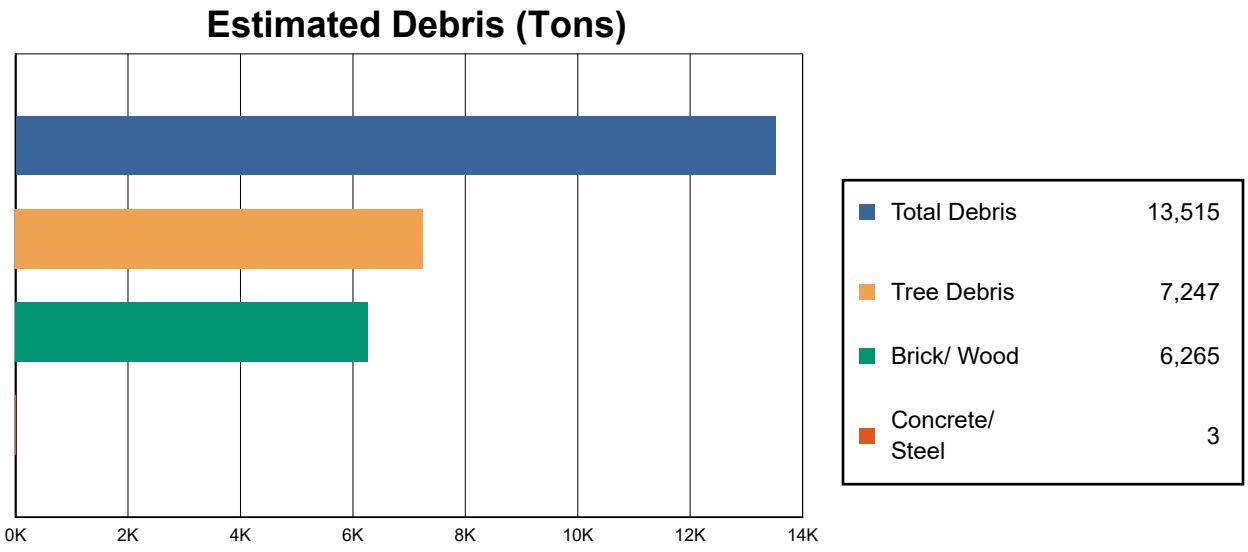
Thematic Map of Essential Facilities

Table 4: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	Expected Loss of Use < 1 day
EOCs	2	0	0	2
Fire Stations	3	0	0	3
Police Stations	2	0	0	2
Schools	7	0	0	5

Induced Hurricane Damage

Debris Generation

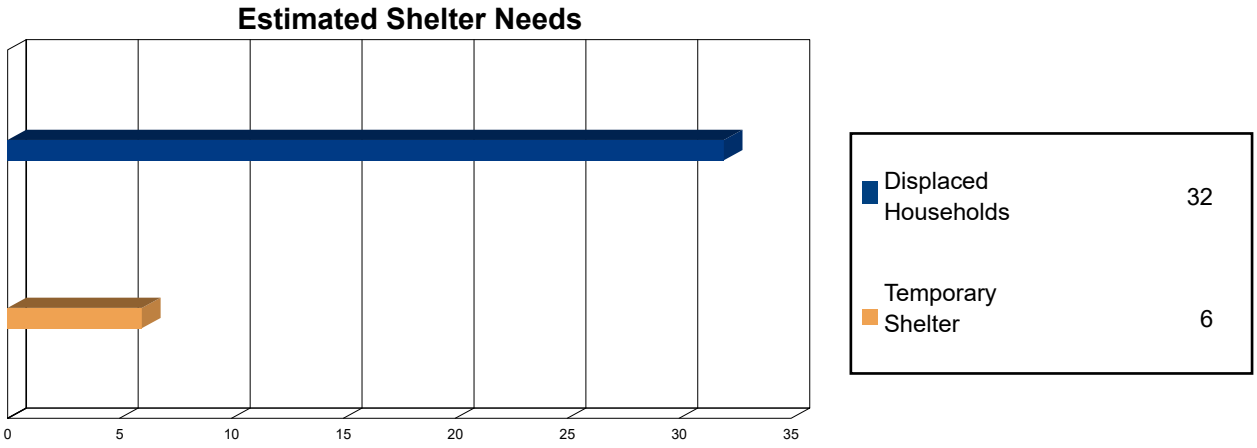


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 13,515 tons of debris will be generated. Of the total amount, 4,949 tons (37%) is Other Tree Debris. Of the remaining 8,566 tons, Brick/Wood comprises 73% 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 251 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 2,298 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 32 households to be displaced due to the hurricane. Of these, 6 people (out of a total population of 19,202) will seek temporary shelter in public shelters.

Economic Loss

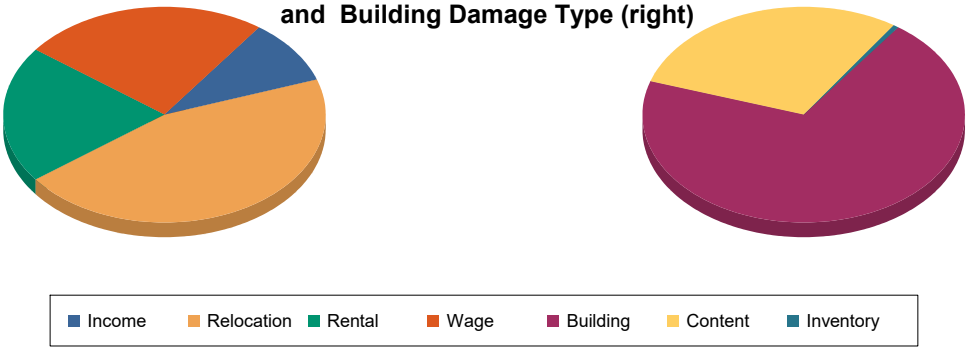
The total economic loss estimated for the hurricane is 129.6 million dollars, which represents 3.86 % of the total replacement value of the region's buildings.

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 130 million dollars. 9% 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

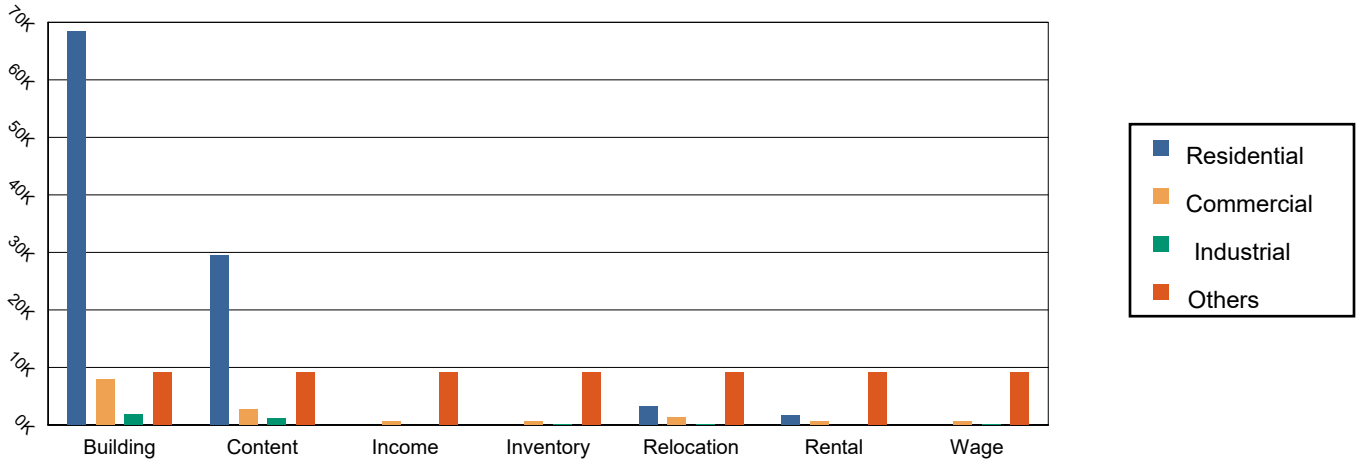


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	68,341.35	7,943.56	1,855.47	3,996.85	82,137.23
	Content	29,452.26	2,664.09	1,124.37	1,372.76	34,613.49
	Inventory	0.00	580.58	138.15	45.52	764.25
	Subtotal	**97,793.61**	**11,188.24**	**3,117.98**	**5,415.13**	**117,514.97**
Business Interruption Loss						
	Income	0.00	670.60	19.95	468.78	1,159.33
	Relocation	3,153.83	1,284.61	120.92	872.51	5,431.87
	Rental	1,716.07	644.05	17.52	115.11	2,492.75
	Wage	0.00	622.95	32.72	2,309.00	2,964.66
	Subtotal	**4,869.91**	**3,222.21**	**191.10**	**3,765.40**	**12,048.62**

Total

Total	**102,663.52**	**14,410.45**	**3,309.09**	**9,180.53**	**129,563.58**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Massachusetts				
Bristol	19,202	2,031,582	1,326,359	3,357,941
Total	**19,202**	**2,031,582**	**1,326,359**	**3,357,941**
Study Region Total	**19,202**	**2,031,582**	**1,326,359**	**3,357,941**

Hazus: Hurricane Global Risk Report

Region Name:	Norton_Wind
Hurricane Scenario:	Probabilistic 1000-year Return Period
Print Date:	Tuesday, November 28, 2023

Disclaimer:
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

Table of Contents

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 29.31 square miles and contains 4 census tracts. There are over 6 thousand households in the region and a total population of 19,202 people. The distribution of population by State and County is provided in Appendix B.

There are an estimated 5 thousand buildings in the region with a total building replacement value (excluding contents) of 3,358 million dollars. Approximately 86% of the buildings (and 61% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 5,367 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.

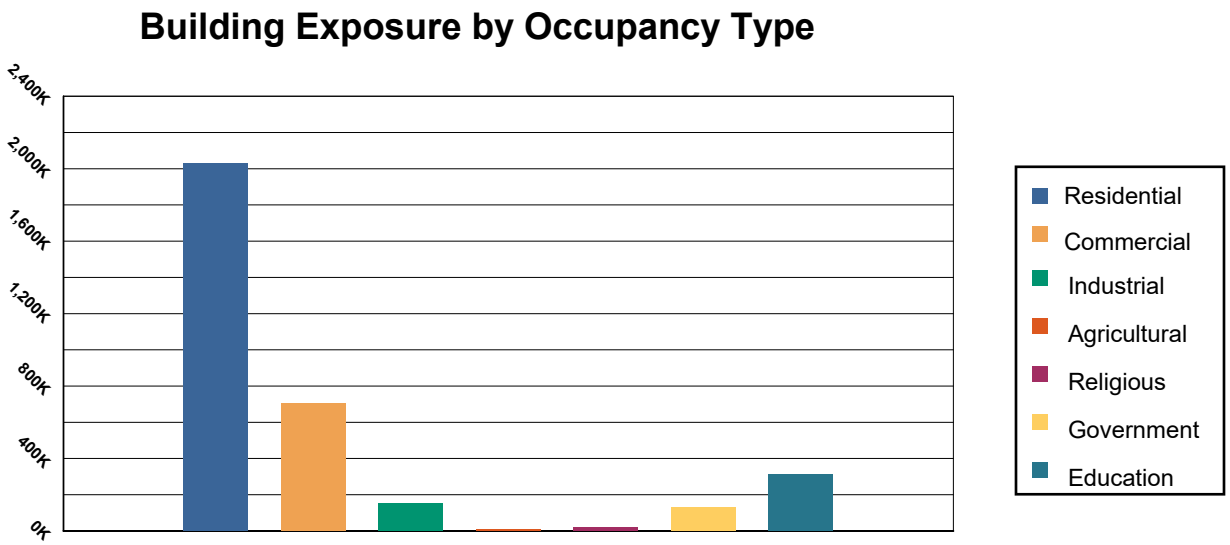


Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	2,031,582	60.50%
Commercial	703,384	20.95%
Industrial	152,768	4.55%
Agricultural	6,955	0.21%
Religious	22,116	0.66%
Government	131,852	3.93%
Education	309,284	9.21%
Total	**3,357,941**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 7 schools, 3 fire stations, 2 police stations and 2 emergency operation facilities.

Hurricane Scenario

Hazus used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 564 buildings will be at least moderately damaged. This is over 10% of the total number of buildings in the region. There are an estimated 24 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.

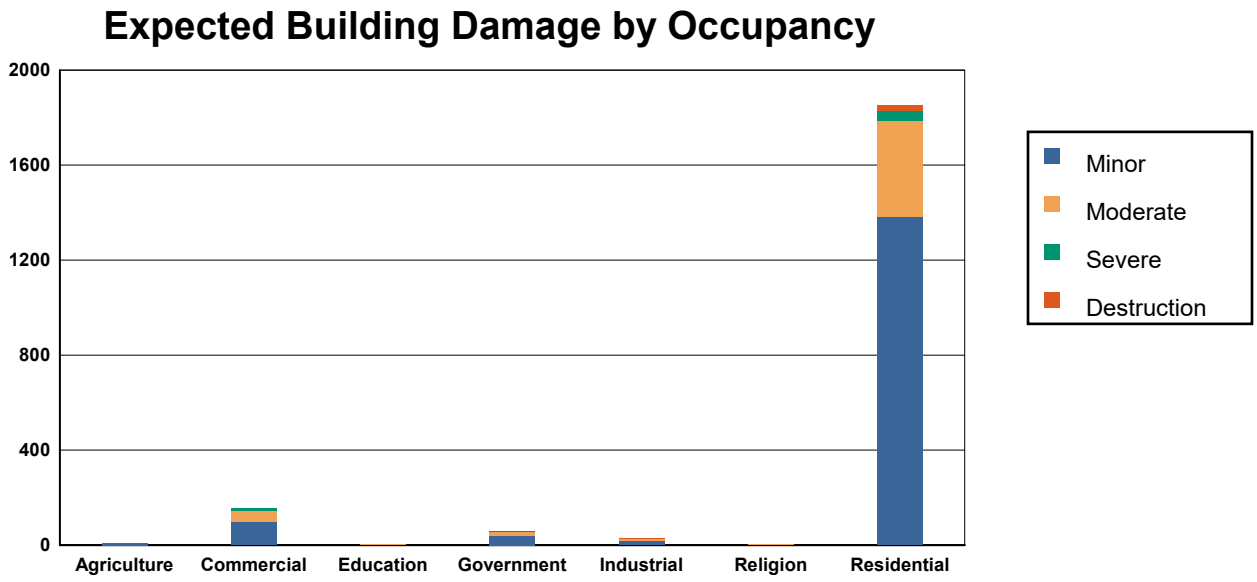


Table 2: Expected Building Damage by Occupancy : 1000 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	10.28	60.47	4.23	24.88	1.59	9.38	0.77	4.55	0.12	0.72
Commercial	274.04	64.03	98.08	22.92	46.91	10.96	8.89	2.08	0.08	0.02
Education	7.93	66.04	2.71	22.61	1.20	9.99	0.16	1.36	0.00	0.00
Government	116.17	66.01	38.52	21.89	18.48	10.50	2.82	1.60	0.00	0.00
Industrial	59.25	66.58	18.99	21.34	8.92	10.02	1.75	1.96	0.09	0.11
Religion	9.84	65.58	3.76	25.07	1.27	8.46	0.13	0.89	0.00	0.00
Residential	2,776.70	59.97	1,382.96	29.87	404.65	8.74	41.50	0.90	24.18	0.52
Total	**3,254.21**		**1,549.26**		**483.02**		**56.04**		**24.47**	

Table 3: Expected Building Damage by Building Type : 1000 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	41	65.38	13	21.61	7	11.50	1	1.51	0	0.00
Masonry	231	56.49	93	22.69	78	19.08	6	1.56	1	0.19
MH	40	76.40	6	10.58	5	8.74	0	0.70	2	3.57
Steel	231	65.87	71	20.33	40	11.27	9	2.51	0	0.02
Wood	2,635	60.92	1,331	30.76	302	6.97	36	0.84	22	0.51

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, none of the beds will be in service. By 30 days, none will be operational.

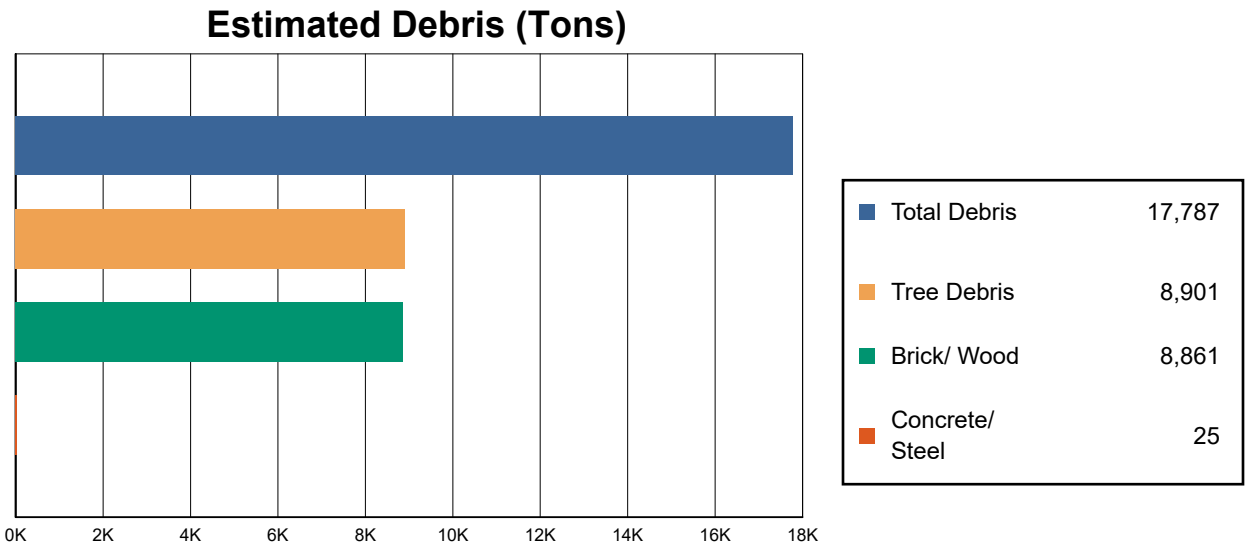
Thematic Map of Essential Facilities

Table 4: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	Expected Loss of Use < 1 day
EOCs	2	0	0	2
Fire Stations	3	0	0	3
Police Stations	2	0	0	2
Schools	7	1	0	0

Induced Hurricane Damage

Debris Generation

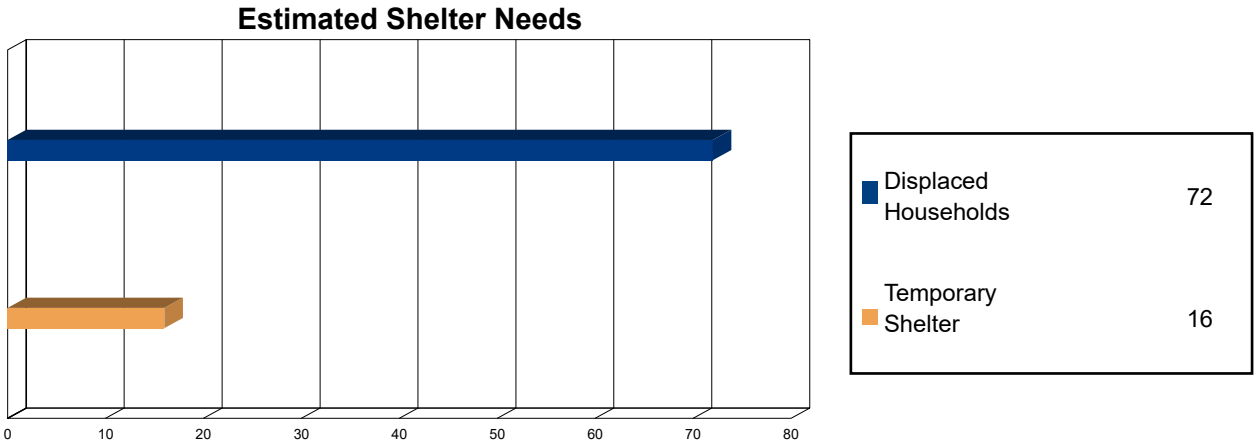


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 17,787 tons of debris will be generated. Of the total amount, 6,063 tons (34%) is Other Tree Debris. Of the remaining 11,724 tons, Brick/Wood comprises 76% 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 355 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 2,838 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 72 households to be displaced due to the hurricane. Of these, 16 people (out of a total population of 19,202) will seek temporary shelter in public shelters.

Economic Loss

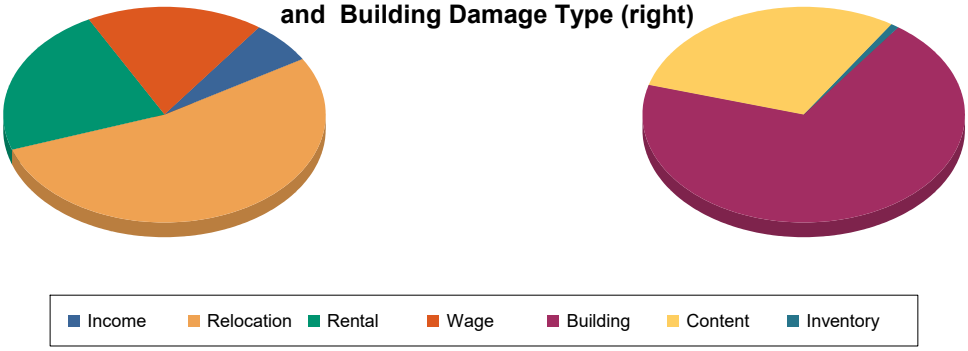
The total economic loss estimated for the hurricane is 185.5 million dollars, which represents 5.52 % of the total replacement value of the region's buildings.

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 186 million dollars. 9% 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 77% 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

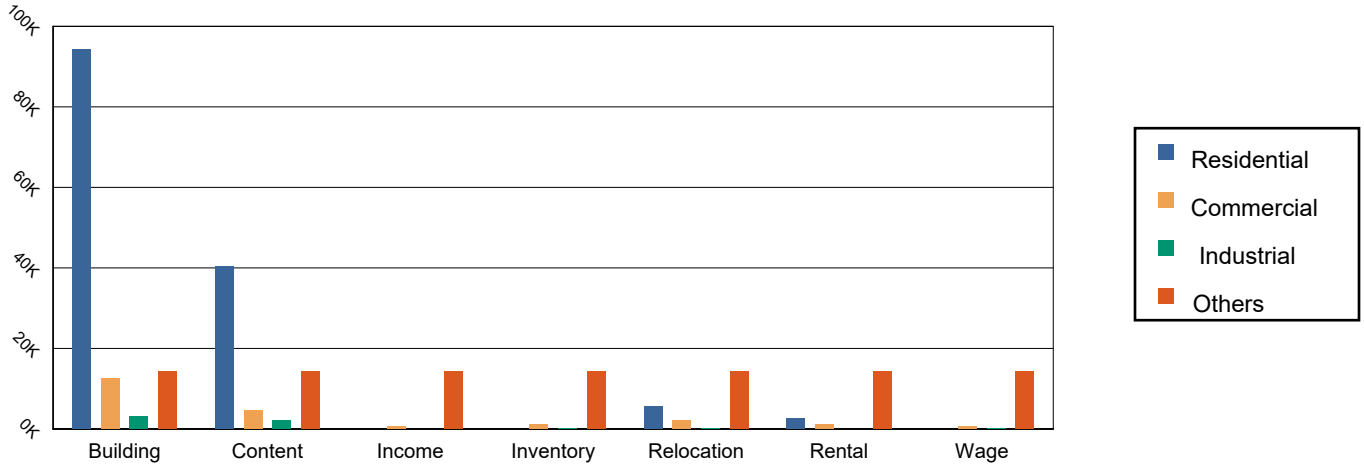


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	94,341.77	12,418.24	3,083.69	6,788.55	116,632.25
	Content	40,324.58	4,712.78	2,034.47	2,849.01	49,920.84
	Inventory	0.00	1,045.49	249.60	65.12	1,360.20
	Subtotal	**134,666.35**	**18,176.51**	**5,367.76**	**9,702.67**	**167,913.29**
Business Interruption Loss						
	Income	0.64	670.66	29.56	448.28	1,149.14
	Relocation	5,671.06	2,042.10	206.63	1,429.08	9,348.87
	Rental	2,720.28	1,047.91	29.02	196.59	3,993.80
	Wage	1.51	644.52	48.48	2,417.74	3,112.26
	Subtotal	**8,393.50**	**4,405.19**	**313.69**	**4,491.68**	**17,604.06**

Total

Total	143,059.84	22,581.70	5,681.46	14,194.36	185,517.36

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Massachusetts				
Bristol	19,202	2,031,582	1,326,359	3,357,941
Total	**19,202**	**2,031,582**	**1,326,359**	**3,357,941**
Study Region Total	**19,202**	**2,031,582**	**1,326,359**	**3,357,941**

Hazus: Earthquake Global Risk Report

Region Name: Norton_EQ

Earthquake Scenario: 1500-year

Print Date: November 28, 2023

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

Table of Contents

General Description of the Region

Hazus-MH is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 29.31 square miles and contains 4 census tracts. There are over 6 thousand households in the region which has a total population of 19,202 peopleF. The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 5 thousand buildings in the region with a total building replacement value (excluding contents) of 3,358 (millions of dollars). Approximately 86.00 % of the buildings (and 60.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 6,714 and 262 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 5 thousand buildings in the region which have an aggregate total replacement value of 3,358 (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 81% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 0 hospitals in the region with a total bed capacity of beds. There are 7 schools, 3 fire stations, 2 police stations and 2 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes no hazardous material sites, no military installations and no nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 6,976.00 (millions of dollars). This inventory includes over 47.85 miles of highways, 23 bridges, 236.12 miles of pipes.

Table 1: Transportation System Lifeline Inventory

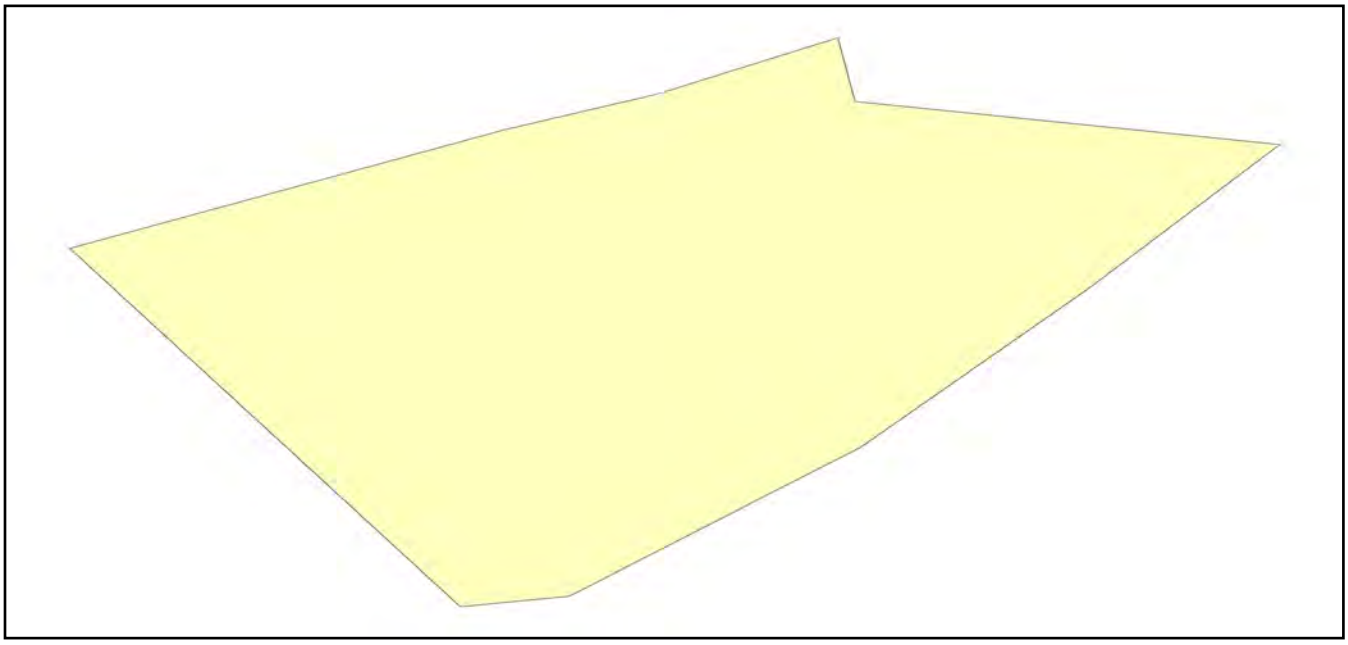
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	23	51.6405
	Segments	27	456.0212
	Tunnels	0	0.0000
		Subtotal	**507.6617**
Railways	Bridges	4	20.7600
	Facilities	0	0.0000
	Segments	6	6185.9738
	Tunnels	0	0.0000
		Subtotal	**6206.7338**
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	0	0.0000
	Tunnels	0	0.0000
		Subtotal	**0.0000**
Bus	Facilities	0	0.0000
		Subtotal	**0.0000**
Ferry	Facilities	0	0.0000
		Subtotal	**0.0000**
Port	Facilities	0	0.0000
		Subtotal	**0.0000**
Airport	Facilities	0	0.0000
	Runways	0	0.0000
		Subtotal	**0.0000**
		Total	**6,714.40**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	4.5647
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**4.5647**
Waste Water	Distribution Lines	NA	2.7388
	Facilities	1	156.8418
	Pipelines	0	0.0000
		Subtotal	**159.5806**
Natural Gas	Distribution Lines	NA	1.8259
	Facilities	0	0.0000
	Pipelines	1	96.7454
		Subtotal	**98.5713**
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**0.0000**
Electrical Power	Facilities	0	0.0000
		Subtotal	**0.0000**
Communication	Facilities	0	0.0000
		Subtotal	**0.0000**
		Total	**262.70**

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.



Scenario Name	1500-year
Type of Earthquake	Probabilistic
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	1,500.00
Longitude of Epicenter	NA
Latitude of Epicenter	NA
Earthquake Magnitude	6.00
Depth (km)	NA
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	NA

Direct Earthquake Damage

Building Damage

Hazus estimates that about 89 buildings will be at least moderately damaged. This is over 2.00 % of the buildings in the region. There are an estimated 0 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

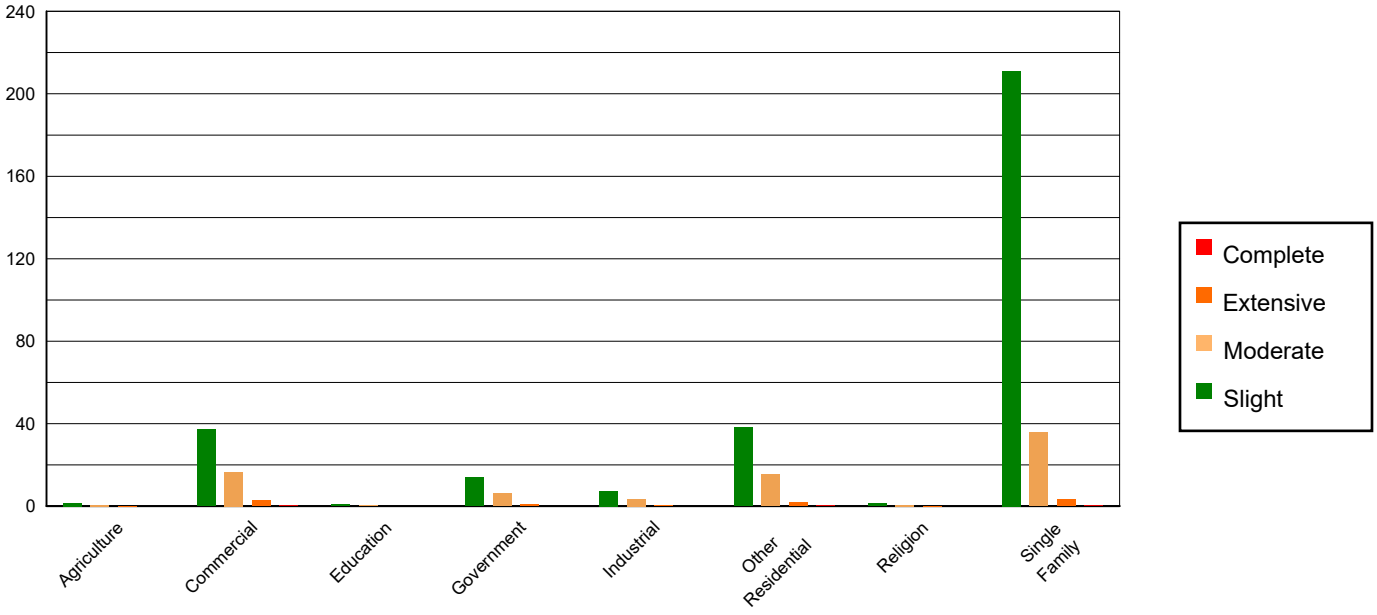


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	14.90	0.30	1.47	0.47	0.53	0.67	0.09	0.91	0.00	0.59
Commercial	371.20	7.47	37.31	11.98	16.57	20.99	2.73	28.21	0.20	25.63
Education	10.50	0.21	0.99	0.32	0.44	0.55	0.06	0.66	0.01	0.74
Government	154.85	3.12	14.02	4.50	6.22	7.88	0.85	8.83	0.05	6.93
Industrial	77.69	1.56	7.33	2.35	3.43	4.34	0.52	5.40	0.03	3.92
Other Residential	442.25	8.91	38.02	12.21	15.56	19.71	2.00	20.67	0.18	22.55
Religion	13.15	0.26	1.20	0.39	0.54	0.69	0.10	1.03	0.01	1.28
Single Family	3881.74	78.16	211.00	67.77	35.64	45.16	3.31	34.29	0.30	38.37
Total	**4,966**		**311**		**79**		**10**		**1**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	4117.72	82.91	213.44	68.55	27.70	35.09	1.09	11.24	0.00	0.00
Steel	327.81	6.60	27.65	8.88	12.54	15.88	1.46	15.09	0.04	4.99
Concrete	57.09	1.15	5.60	1.80	2.66	3.37	0.20	2.05	0.01	0.70
Precast	19.52	0.39	2.08	0.67	1.67	2.12	0.40	4.14	0.00	0.56
RM	84.42	1.70	5.70	1.83	3.78	4.79	0.69	7.09	0.00	0.00
URM	318.14	6.41	48.58	15.60	25.72	32.58	5.58	57.70	0.73	93.26
MH	41.57	0.84	8.29	2.66	4.87	6.17	0.26	2.71	0.00	0.49
Total	**4,966**		**311**		**79**		**10**		**1**	

*Note:

RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had hospital beds available for use. On the day of the earthquake, the model estimates that only hospital beds (%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, % of the beds will be back in service. By 30 days, % will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	0	0	0	0
Schools	7	0	0	7
EOCs	2	0	0	2
PoliceStations	2	0	0	2
FireStations	3	0	0	3

Transportation Lifeline Damage

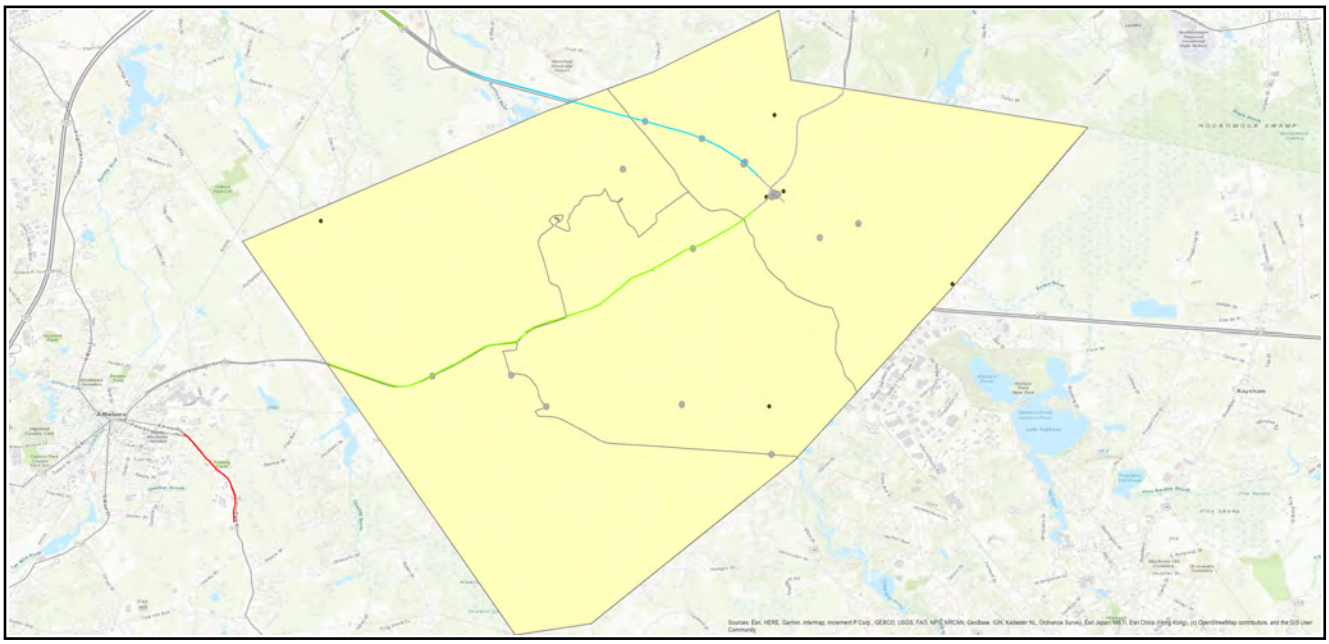


Table 6: Expected Damage to the Transportation Systems

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	27	0	0	14	14
	Bridges	23	0	0	23	23
	Tunnels	0	0	0	0	0
Railways	Segments	6	0	0	6	6
	Bridges	4	0	0	4	4
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	0	0	0	0	0
	Runways	0	0	0	0	0

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	1	0	0	1	1
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	0	0	0	0	0
Communication	0	0	0	0	0

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	142	1	0
Waste Water	85	0	0
Natural Gas	10	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	6,730	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

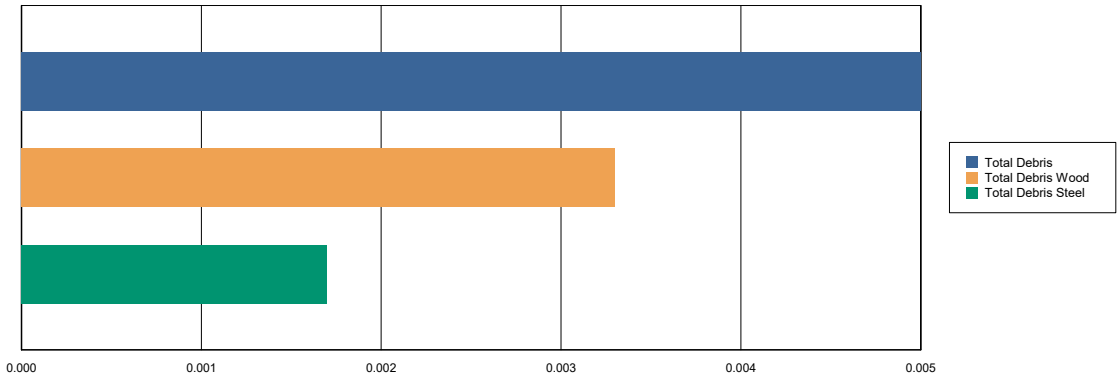
Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there 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 5,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 66.00% 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 200 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)



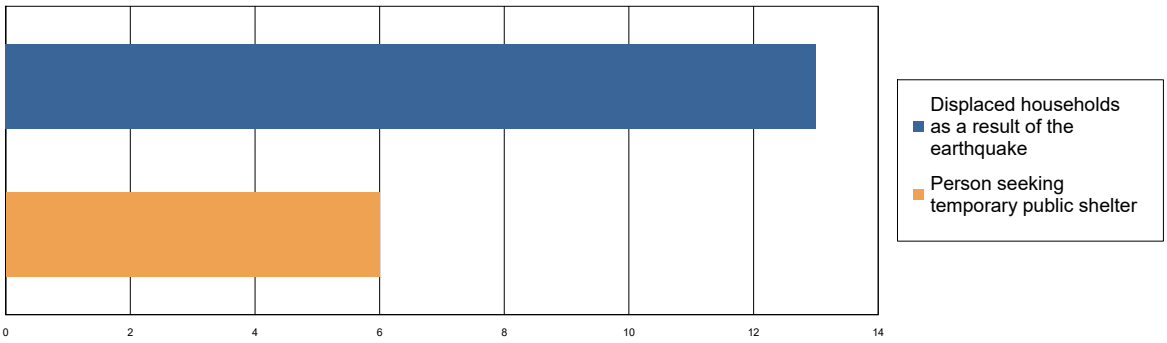
Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.00	0.00	0.01	200 (@25 tons/truck)

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 13 households to be displaced due to the earthquake. Of these, 6 people (out of a total population of 19,202) 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
13	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	0.03	0.00	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.02	0.00	0.00	0.00
	Other-Residential	0.98	0.14	0.01	0.03
	Single Family	0.99	0.10	0.01	0.02
	Total	**2**	**0**	**0**	**0**
2 PM	Commercial	1.96	0.27	0.02	0.04
	Commuting	0.00	0.00	0.00	0.00
	Educational	1.12	0.16	0.01	0.03
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.14	0.02	0.00	0.00
	Other-Residential	0.27	0.04	0.00	0.01
	Single Family	0.26	0.03	0.00	0.00
	Total	**4**	**1**	**0**	**0**
5 PM	Commercial	1.46	0.20	0.02	0.03
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.23	0.03	0.00	0.01
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.09	0.01	0.00	0.00
	Other-Residential	0.39	0.06	0.01	0.01
	Single Family	0.38	0.04	0.00	0.01
	Total	**3**	**0**	**0**	**0**

Economic Loss

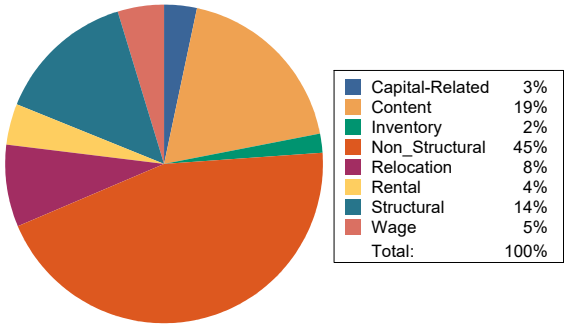
The total economic loss estimated for the earthquake is 27.53 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

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 25.56 (millions of dollars); 21 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 39 % 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)

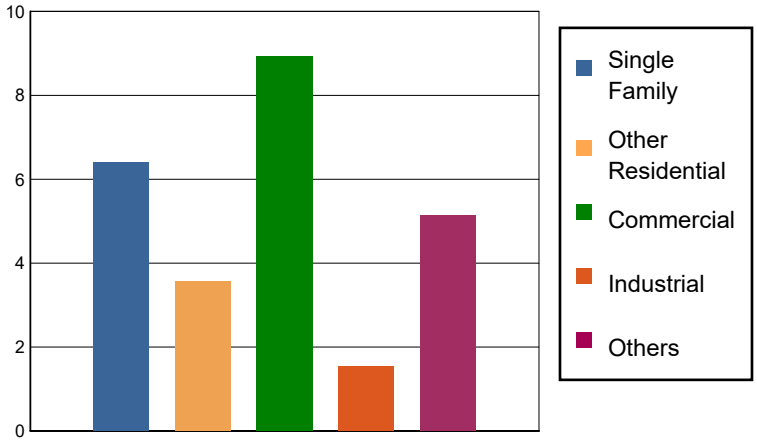


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.2051	0.7458	0.0297	0.2612	1.2418
	Capital-Related	0.0000	0.0873	0.6940	0.0178	0.0564	0.8555
	Rental	0.0883	0.2643	0.5530	0.0140	0.1272	1.0468
	Relocation	0.2990	0.1706	0.7920	0.0834	0.7820	2.1270
	Subtotal	**0.3873**	**0.7273**	**2.7848**	**0.1449**	**1.2268**	**5.2711**
Capital Stock Losses							
	Structural	0.8695	0.4647	1.3932	0.2312	0.6560	3.6146
	Non_Structural	3.9083	1.9178	2.8778	0.6684	2.0807	11.4530
	Content	1.2316	0.4605	1.5110	0.4331	1.1492	4.7854
	Inventory	0.0000	0.0000	0.3540	0.0691	0.0138	0.4369
	Subtotal	**6.0094**	**2.8430**	**6.1360**	**1.4018**	**3.8997**	**20.2899**
	Total	**6.40**	**3.57**	**8.92**	**1.55**	**5.13**	**25.56**

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	456.0212	0.0000	0.00
	Bridges	51.6405	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**507.6617**	**0.0000**	
Railways	Segments	6185.9738	0.0000	0.00
	Bridges	20.7600	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**6206.7338**	**0.0000**	
Light Rail	Segments	0.0000	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Bus	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Airport	Facilities	0.0000	0.0000	0.00
	Runways	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
	Total	**6,714.40**	**0.00**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	4.5647	0.0041	0.09
	Subtotal	**4.5647**	**0.0041**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	156.8418	1.9590	1.25
	Distribution Lines	2.7388	0.0021	0.08
	Subtotal	**159.5806**	**1.9611**	
Natural Gas	Pipelines	96.7454	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	1.8259	0.0007	0.04
	Subtotal	**98.5713**	**0.0007**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Electrical Power	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Communication	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
	Total	**262.72**	**1.97**	

Appendix A: County Listing for the Region

Bristol,MA

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Massachusetts					
	Bristol	19,202	2,031	1,326	3,358
Total Region		**19,202**	**2,031**	**1,326**	**3,358**

Hazus: Earthquake Global Risk Report

Region Name: Norton_EQ

Earthquake Scenario: 2500-year

Print Date: November 28, 2023

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

Table of Contents

General Description of the Region

Hazus-MH is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 29.31 square miles and contains 4 census tracts. There are over 6 thousand households in the region which has a total population of 19,202 peopleF. The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 5 thousand buildings in the region with a total building replacement value (excluding contents) of 3,358 (millions of dollars). Approximately 86.00 % of the buildings (and 60.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 6,714 and 262 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 5 thousand buildings in the region which have an aggregate total replacement value of 3,358 (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 81% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 0 hospitals in the region with a total bed capacity of beds. There are 7 schools, 3 fire stations, 2 police stations and 2 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes no hazardous material sites, no military installations and no nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 6,976.00 (millions of dollars). This inventory includes over 47.85 miles of highways, 23 bridges, 236.12 miles of pipes.

Table 1: Transportation System Lifeline Inventory

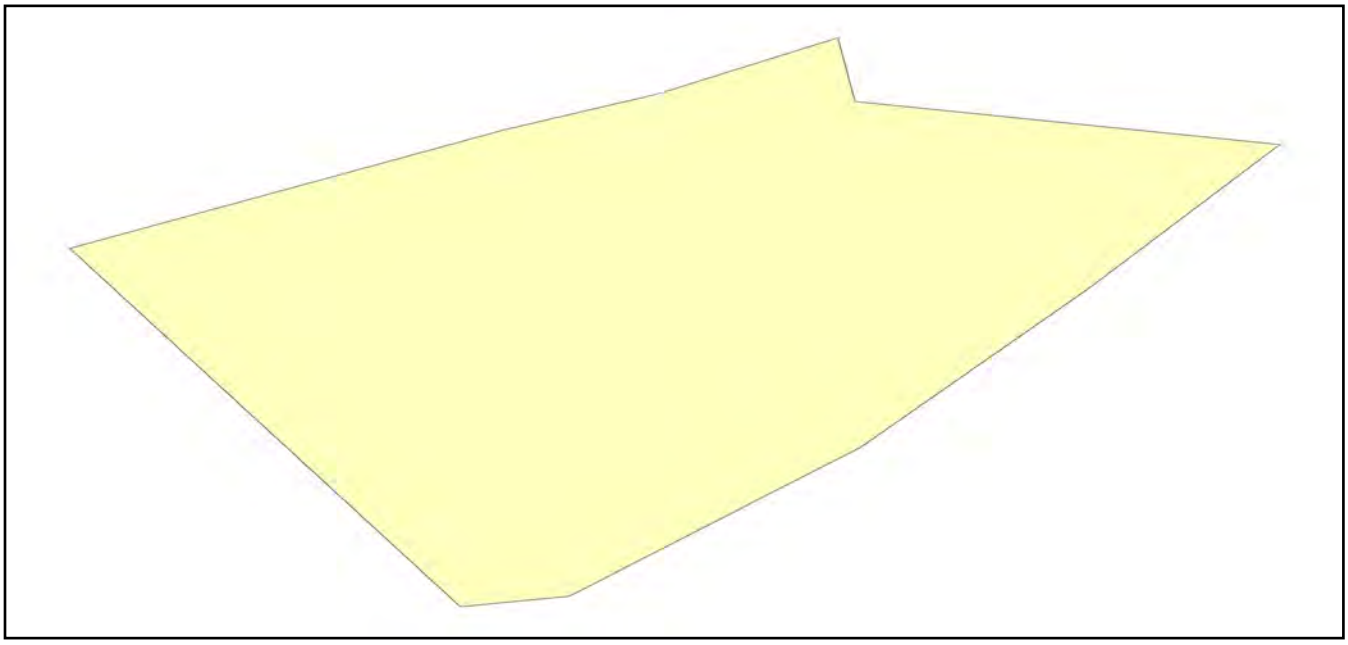
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	23	51.6405
	Segments	27	456.0212
	Tunnels	0	0.0000
		Subtotal	**507.6617**
Railways	Bridges	4	20.7600
	Facilities	0	0.0000
	Segments	6	6185.9738
	Tunnels	0	0.0000
		Subtotal	**6206.7338**
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	0	0.0000
	Tunnels	0	0.0000
		Subtotal	**0.0000**
Bus	Facilities	0	0.0000
		Subtotal	**0.0000**
Ferry	Facilities	0	0.0000
		Subtotal	**0.0000**
Port	Facilities	0	0.0000
		Subtotal	**0.0000**
Airport	Facilities	0	0.0000
	Runways	0	0.0000
		Subtotal	**0.0000**
		Total	**6,714.40**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	4.5647
	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**4.5647**
Waste Water	Distribution Lines	NA	2.7388
	Facilities	1	156.8418
	Pipelines	0	0.0000
		Subtotal	**159.5806**
Natural Gas	Distribution Lines	NA	1.8259
	Facilities	0	0.0000
	Pipelines	1	96.7454
		Subtotal	**98.5713**
Oil Systems	Facilities	0	0.0000
	Pipelines	0	0.0000
		Subtotal	**0.0000**
Electrical Power	Facilities	0	0.0000
		Subtotal	**0.0000**
Communication	Facilities	0	0.0000
		Subtotal	**0.0000**
		Total	**262.70**

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.



Scenario Name	2500-year
Type of Earthquake	Probabilistic
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	2,500.00
Longitude of Epicenter	NA
Latitude of Epicenter	NA
Earthquake Magnitude	7.00
Depth (km)	NA
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	NA

Direct Earthquake Damage

Building Damage

Hazus estimates that about 162 buildings will be at least moderately damaged. This is over 3.00 % 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

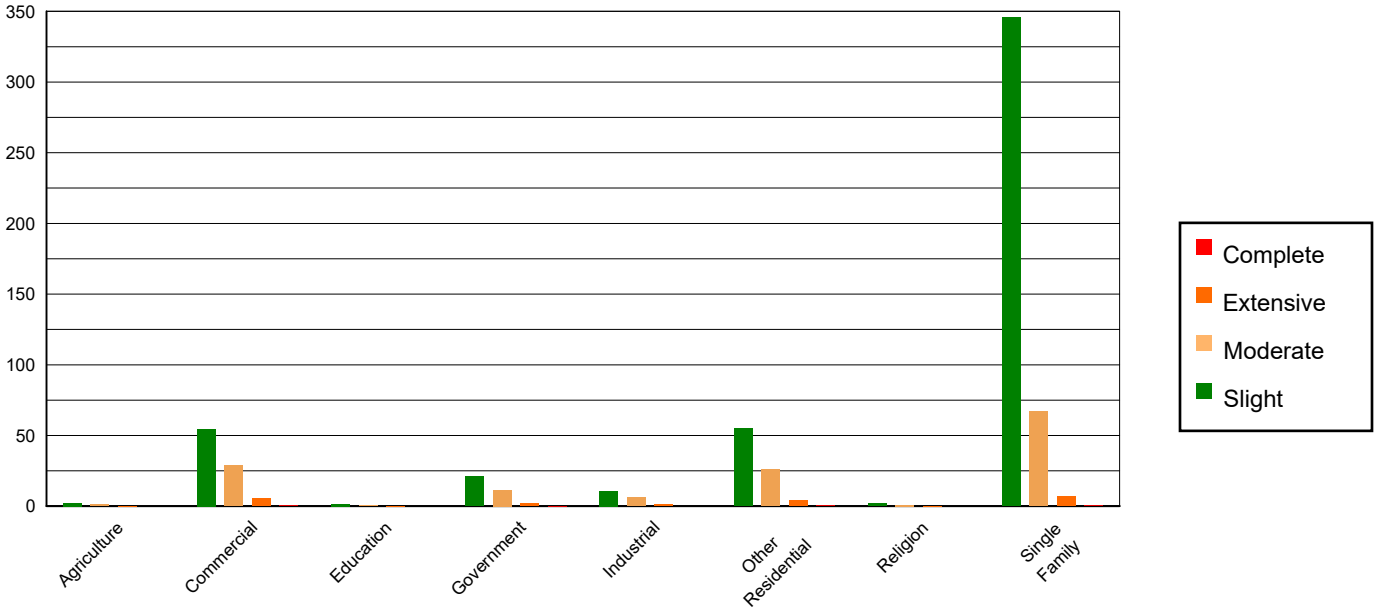


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	13.59	0.29	2.25	0.46	0.96	0.68	0.18	0.95	0.01	0.66
Commercial	338.84	7.19	54.59	11.09	28.66	20.22	5.44	27.94	0.47	27.07
Education	9.63	0.20	1.46	0.30	0.77	0.54	0.13	0.65	0.01	0.77
Government	141.70	3.01	20.90	4.25	11.41	8.05	1.85	9.47	0.14	8.31
Industrial	70.83	1.50	10.81	2.20	6.17	4.35	1.12	5.72	0.08	4.62
Other Residential	412.66	8.76	54.98	11.17	25.98	18.33	3.98	20.42	0.39	22.49
Religion	12.25	0.26	1.70	0.34	0.86	0.60	0.18	0.92	0.02	1.20
Single Family	3712.26	78.79	345.57	70.20	66.95	47.23	6.61	33.93	0.61	34.89
Total	**4,712**		**492**		**142**		**19**		**2**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	3941.15	83.64	358.07	72.74	57.72	40.72	3.01	15.42	0.00	0.00
Steel	298.75	6.34	42.26	8.59	24.59	17.35	3.70	18.99	0.19	10.82
Concrete	51.47	1.09	8.33	1.69	5.17	3.65	0.56	2.85	0.03	1.70
Precast	17.57	0.37	2.75	0.56	2.59	1.83	0.75	3.85	0.01	0.83
RM	79.13	1.68	7.92	1.61	6.15	4.34	1.38	7.06	0.00	0.19
URM	288.89	6.13	62.07	12.61	37.01	26.11	9.30	47.73	1.47	84.73
MH	34.81	0.74	10.86	2.21	8.51	6.00	0.80	4.10	0.03	1.74
Total	**4,712**		**492**		**142**		**19**		**2**	

*Note:

RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had hospital beds available for use. On the day of the earthquake, the model estimates that only hospital beds (%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, % of the beds will be back in service. By 30 days, % will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	0	0	0	0
Schools	7	0	0	7
EOCs	2	0	0	2
PoliceStations	2	0	0	2
FireStations	3	0	0	3

Transportation Lifeline Damage

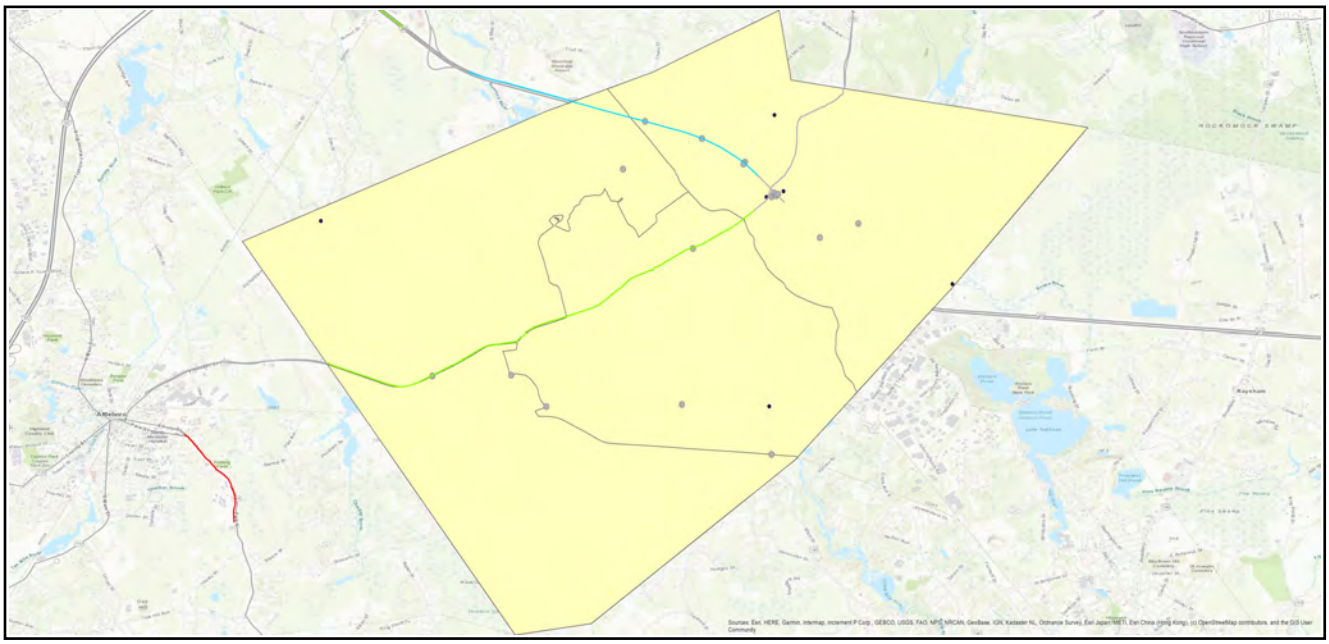


Table 6: Expected Damage to the Transportation Systems

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	27	0	0	14	14
	Bridges	23	0	0	23	23
	Tunnels	0	0	0	0	0
Railways	Segments	6	0	0	6	6
	Bridges	4	0	0	4	4
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	0	0	0	0	0
	Runways	0	0	0	0	0

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	1	0	0	1	1
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	0	0	0	0	0
Communication	0	0	0	0	0

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	142	2	0
Waste Water	85	1	0
Natural Gas	10	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	6,730	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

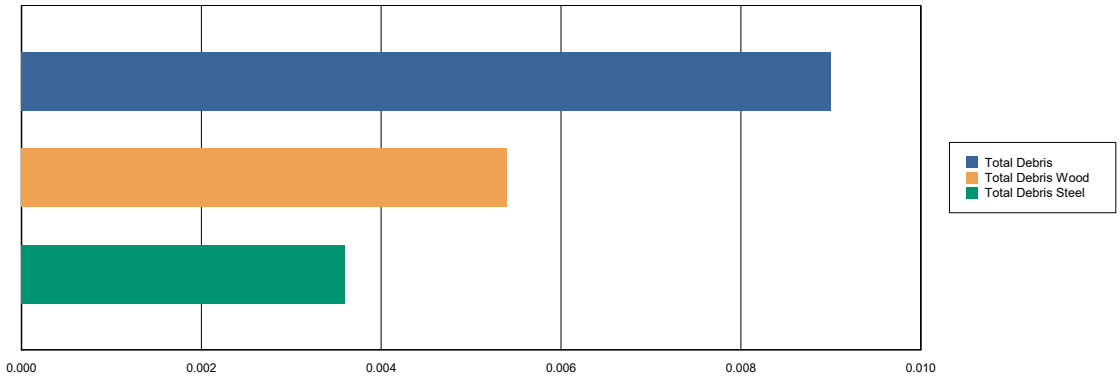
Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there 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 9,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 60.00% 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 360 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Earthquake Debris (millions of tons)



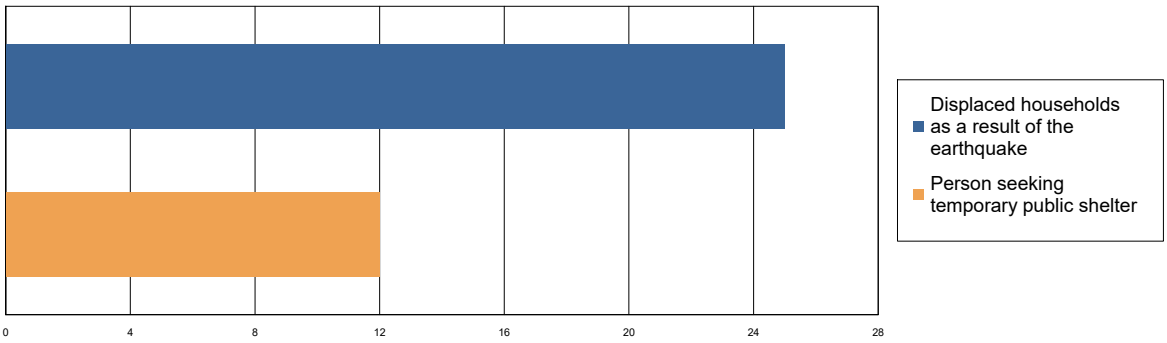
Brick/ Wood	Reinforced Concrete/Steel	Total Debris	Truck Load
0.01	0.00	0.01	360 (@25 tons/truck)

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 25 households to be displaced due to the earthquake. Of these, 12 people (out of a total population of 19,202) 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
25	12

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	0.06	0.01	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.04	0.01	0.00	0.00
	Other-Residential	1.72	0.27	0.03	0.05
	Single Family	1.77	0.20	0.02	0.03
	Total	**4**	**0**	**0**	**0**
2 PM	Commercial	3.63	0.55	0.05	0.10
	Commuting	0.00	0.00	0.00	0.00
	Educational	2.06	0.32	0.03	0.06
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.26	0.04	0.00	0.01
	Other-Residential	0.47	0.08	0.01	0.01
	Single Family	0.47	0.05	0.00	0.01
	Total	**7**	**1**	**0**	**0**
5 PM	Commercial	2.70	0.41	0.04	0.07
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.42	0.07	0.01	0.01
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.16	0.02	0.00	0.00
	Other-Residential	0.68	0.11	0.01	0.02
	Single Family	0.68	0.08	0.01	0.01
	Total	**5**	**1**	**0**	**0**

Economic Loss

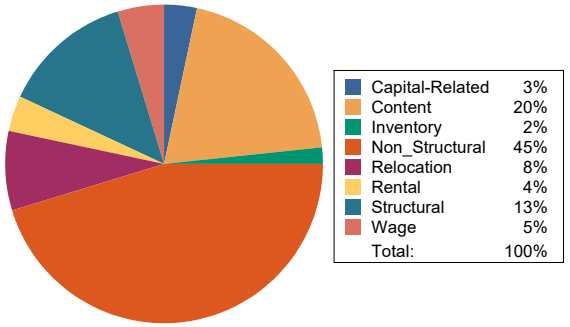
The total economic loss estimated for the earthquake is 53.35 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

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 49.04 (millions of dollars); 20 % 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 40 % 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)

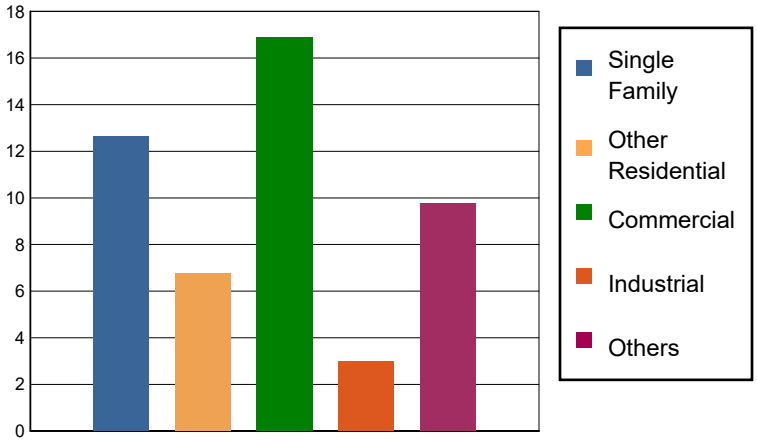


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	0.3865	1.3746	0.0566	0.4637	2.2814
	Capital-Related	0.0000	0.1645	1.2793	0.0339	0.0996	1.5773
	Rental	0.1649	0.4571	0.9780	0.0256	0.2381	1.8637
	Relocation	0.5695	0.2934	1.4467	0.1542	1.4654	3.9292
	Subtotal	**0.7344**	**1.3015**	**5.0786**	**0.2703**	**2.2668**	**9.6516**
Capital Stock Losses							
	Structural	1.5602	0.7927	2.5323	0.4285	1.2004	6.5141
	Non_Structural	7.6403	3.7064	5.5460	1.3015	3.9658	22.1600
	Content	2.6854	0.9750	3.0283	0.8610	2.2933	9.8430
	Inventory	0.0000	0.0000	0.7033	0.1373	0.0277	0.8683
	Subtotal	**11.8859**	**5.4741**	**11.8099**	**2.7283**	**7.4872**	**39.3854**
	Total	**12.62**	**6.78**	**16.89**	**3.00**	**9.75**	**49.04**

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	456.0212	0.0000	0.00
	Bridges	51.6405	0.0017	0.00
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**507.6617**	**0.0017**	
Railways	Segments	6185.9738	0.0000	0.00
	Bridges	20.7600	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**6206.7338**	**0.0000**	
Light Rail	Segments	0.0000	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Bus	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Airport	Facilities	0.0000	0.0000	0.00
	Runways	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
	Total	**6,714.40**	**0.00**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	4.5647	0.0081	0.18
	Subtotal	**4.5647**	**0.0081**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	156.8418	4.2998	2.74
	Distribution Lines	2.7388	0.0041	0.15
	Subtotal	**159.5806**	**4.3039**	
Natural Gas	Pipelines	96.7454	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	1.8259	0.0014	0.08
	Subtotal	**98.5713**	**0.0014**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Electrical Power	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Communication	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
	Total	**262.72**	**4.31**	

Appendix A: County Listing for the Region

Bristol,MA

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Massachusetts					
	Bristol	19,202	2,031	1,326	3,358
Total Region		**19,202**	**2,031**	**1,326**	**3,358**