

TOWNS OF ABINGTON, EASTON, AND STOUGHTON

NATURAL HAZARD MITIGATION PLAN
2024 UPDATE

HAZARD MITIGATION PLAN AUGUST 2024



BETA

IMPROVING COMMUNITIES TOGETHER

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1.0 INTRODUCTION

1.1 HAZARD MITIGATION PLANNING

Natural hazard mitigation planning explores the natural hazards of concern to a given community or region, identifies specific locations within the Planning Area that are vulnerable to those hazards, and develops strategies to permanently reduce or eliminate the risk to human life and property. The hazard mitigation planning process coordinates available resources and identifies locally appropriate policies, actions, and tools that will mitigate the impacts of hazards known to affect the community. The Federal Emergency Management Agency (FEMA) provides guidance on the local hazard mitigation planning process and relies on municipal and regional Hazard Mitigation Plans (HMPs) to help focus federal resources and make cost-effective funding decisions on mitigation projects that address locally identified needs. Approved mitigation plans are a requirement for local governments to be eligible for the projects funded under the Hazard Mitigation Assistance (HMA) and other FEMA programs, including the Rehabilitation of High Hazard Potential Dams (HHPD). Therefore, an approved and adopted HMP supports federal mitigation objectives while also serving as a local hazard mitigation roadmap with action recommendations that can be updated and revised to keep the plan current, relevant, and effective.

The Towns of Abington, Easton, and Stoughton were part of a multi-jurisdictional HMP facilitated by the Old Colony Planning Council (OCPC) in 2015, but when that plan expired all three communities were left without an active document to guide mitigation actions. The impacts of climate change are also an impetus for an update to the HMP in Abington, Easton, and Stoughton. Planning for natural hazards requires an understanding of the projected impacts of climate change, and how the warming of the earth's atmosphere will continue to impact global weather patterns and local severe weather events. Climate change will alter precipitation patterns, the severity of weather events, and temperature, all of which have impacts that can already be seen in Massachusetts. These changes demand forward thinking analysis of future risks and future vulnerabilities to mitigate the variable extent and severity of climate-influenced natural hazards. Figure 1.1 below shows the climate change projections for Massachusetts detailed in the 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan.

Figure 1.1: Priority impacts from the MA Climate Assessment

Human Sector 	Infrastructure Sector 	Natural Environment 	Governance 	Economy 
• Health and Cognitive Effects from Extreme Heat • Health Effects from Degraded Air Quality • Emergency Service Response Delays and Evacuation Disruptions • Reduction in Food Safety and Security • Increase in Mental Health Stressors • Health Effects from Aeroallergens and Mold • Health Effects of Extreme Storms and Power Outages • Damage to Cultural Resources • Increase in Vector Borne Diseases Incidence and Bacterial Infections	• Damage to Inland Buildings • Damage to Electric Transmission and Utility Distribution Infrastructure • Damage to Rails and Loss of Rail/Transit Service • Loss of Urban Tree Cover • Damage to Coastal Buildings and Ports • Reduction in Clean Water Supply • Damage to Roads and Loss of Road Service • Loss of Energy Production and Resources • Increased Risk of Dam Overtopping or Failure	• Freshwater Ecosystem Degradation • Marine Ecosystem Degradation • Coastal Wetland Degradation • Forest Health Degradation • Shifting Distribution of Native and Invasive Species • Coastal Erosion • Soil Erosion	• Reduction in State and Municipal Revenues • Increase in Costs of Responding to Climate Migration • Increase in Demand for State and Municipal Government Services • Damage to Coastal State and Municipal Buildings and Land • Increase in Need for State and Municipal Policy Review and Adaptation Coordination • Damage to Inland State and Municipal Buildings and Land	• Reduced Ability to Work • Decrease in Marine Fisheries and Aquaculture Productivity • Reduction in the Availability of Affordably Priced Housing • Economic Losses from Commercial Structure Damage and Business Interruptions • Damage to Tourist Attractions and Recreation Amenities • Decrease in Agricultural Productivity

Source: Massachusetts State Hazard Mitigation and Climate Adaptation Plan, 2023.

Incorporation of climate change considerations into local and multi-jurisdictional HMPs helps to align the towns' goals with those of the State. The Massachusetts State Hazard Mitigation and Climate Adaptation Plan (SHMCAP) developed in 2018 was the first FEMA-approved State Hazard Mitigation Plan to actively consider the impacts of climate change in relation to the potential impacts of natural hazards.¹ Updated in 2023, the mission of the SHMCAP is to:

Increase the capacity of the Commonwealth to prepare for, mitigate against, adapt to, and reduce the risk of natural and other hazards and climate impacts through the development of a comprehensive and integrated hazard mitigation and climate change adaptation program. ... reduce risks from hazards and climate change impacts through an equitable and just approach to advance wellbeing in an equitable and sustainable manner; reduce loss of life; protect social, environmental, and economic wellbeing; and ensure health and safety of those living and visiting Massachusetts, including the built and natural environment that sustains it.²

The six goals set within the 2023 SHMCAP emphasize increasing statewide climate resilience and reducing the impacts of both natural hazards and climate change. Aligning local HMPs with the SHMCAP increases opportunities for local jurisdictions to receive funding and assistance from state and federal partners to mitigate impacts of hazards as they grow more dangerous and unpredictable with time due to climate change.

¹ "Chapter 7, State Strategy, Actions, and Implementation Plan," Massachusetts State Hazard Mitigation and Climate Adaptation Plan, 2023.

² "Hazard Mitigation and Climate Adaptation Strategy," Massachusetts State Hazard Mitigation and Climate Adaptation Plan, 2023.

1.2 A MULTI JURISDICTIONAL APPROACH

The Disaster Mitigation Act of 2000 (DMA) places high priority on the continuation of the planning process after initial submittal of a Hazard Mitigation Plan. The previous plan relevant to the towns of Abington, Easton, and Stoughton was the 2015 Natural Hazard Mitigation Plan for the Old Colony Planning Council (OCPC) Region (henceforth referred to as the 2015 plan).³ That plan updated a 2006 regional HMP and included hazard profiles and risk assessment for all 15 municipalities in the OCPC region. Many participating municipalities of the 2015 plan subsequently elected to develop single-jurisdictional HMPs, while others elected to continue with a multi-jurisdictional approach, only with smaller groupings. This 2024 multi-jurisdictional HMP serves as an update to the 2015 plan only for the Towns of Abington, Easton, and Stoughton. These towns will be referenced throughout the HMP update by name or collectively as the Planning Area.

This plan includes community and natural hazard profiles, risk assessments, and mitigation strategies for three municipalities across three counties: The Town of Abington in Plymouth County, the Town of Easton in Bristol County, and the Town of Stoughton in Norfolk County. These towns also span three watersheds: the Boston Harbor, South Coastal, and Taunton Watersheds. These three municipalities came together to update their HMP based on their regional connectedness in the Greater Brockton Area, but each community is presented with unique challenges and has developed individual mitigation strategies to mitigate future risk.

In order to complete this plan, the Committee reviewed the 2015 plan, the 2023 SHMCAP, each town's Municipal Vulnerability Plan (MVP), each town's Master Plan, Hazus analyses, and more. These plans helped to define the risk assessment and determine what each municipality has already done to incorporate climate resilience into the

³ "Natural Hazard Mitigation Plan for the Old Colony Region," May 2015, Brockton, Old Colony Planning Council.

2.0 REGIONAL PROFILE

2.1 HISTORY

2.1.1 ABINGTON

The Town of Abington was founded in 1712 and developed its agricultural base until the mid-1800s, when it became an important center for the manufacture of shoes. With the decline of the shoe industry, the population of the town stabilized and varied little until after World War II.

Abington was impacted by rapid residential growth and development after the war and into the 1970's. Today, the town can be described as a small bedroom community of over 17,000 people with several small and medium sized businesses. Its primary residential character is a distinct departure from its manufacturing and agricultural past.⁴ Abington is located in Plymouth County is bordered by Holbrook and Weymouth to the north, Rockland to the east, Whitman to the south, and by Brockton to the west.

2.1.2 EASTON

Easton is a rapidly growing suburban town located halfway between Boston and Providence. From 1970 to 2020 the population more than doubled, from 12,157 to 25,058. Situated on the northeastern edge of Bristol County, Easton borders both Norfolk and Plymouth counties. Historically, Easton's Bay Road served as the important link between Boston, an important port in the 19th century, and Taunton, the county seat of Bristol County.

Today, the town is conveniently located near Routes 24, 95, and 495. Easton is located in Bristol County and is bordered on the north by Stoughton and Sharon, on the east by Brockton and West Bridgewater, on the south by Raynham, Taunton, and Norton and on the west by Mansfield.⁵

2.1.3 STOUGHTON

The Town of Stoughton was officially incorporated in 1726 from a southwestern portion of Dorchester. Like its neighbors, Stoughton's early economy was primarily based on agriculture and shoemaking. Population growth remained stable until the mid-twentieth century, when the Town experienced a "substantial growth spurt," in the years after World War II.⁶ In recent years, the town has been characterized by a primarily residential population, with major employers such as IKEA serving as anchors for commercial and retail activity.

The Town of Stoughton is located in Norfolk County and is bordered by Avon and Randolph to the east, Brockton and Easton to the south, Canton to the north, and Sharon to the west.

2.2 DEMOGRAPHICS

Table 2.1 below shows a breakdown of key demographic information in the towns of Abington, Easton, and Stoughton.

⁴ Town of Abington, Massachusetts. 2009. "Master Plan Update." <https://www.abingtonma.gov/planning-board/pages/master-plan-update-2009>

⁵ Town of Easton, Massachusetts. 2008. "Historic Preservation Plan." https://www.easton.ma.us/departments/planning_and_community_development/plans_and_maps.php

⁶ Town of Stoughton, Massachusetts. 2013. "Master Plan." <https://www.stoughton.org/planning-board/pages/master-plan>

Table 2.1: Planning Area Demographic Profile, U.S. Census, 2020

Profile Topic	Abington	Easton	Stoughton
Population	17,062	25,058	29,281
Population per square mile	1713	871	1820
Persons under 18 years, percent	23.1%	20.5%	19.0%
Persons 65 years and over, percent	13.6%	17.2%	19.4%
White alone, percent	87.3%	87.7%	69.0%
Black or African American alone, percent	2.5%	4.1%	17.0%
Asian alone, percent	3.2%	2.4%	5.1%
Hispanic or Latino, percent	3.1%	4.6%	3.7%
Median Household income (in 2020 dollars), 2016-2020	\$106,001	\$106,900	\$90,201
High school graduate or higher, percent of persons aged 25 years+, 2016-2020	95.1%	95.9%	91.2%
Bachelor's degree or higher, percent of persons aged 25 years+, 2016-2020	38.2%	49.1%	40.3%
Owner-occupied housing unit rate, 2016-2020	74.2%	76.3%	74.6%
Median value of owner-occupied housing units, 2016-2020	\$385,000	\$421,800	\$374,300

Source: U.S. Census, 2020

2.3 LAND USE CHARACTERISTICS

All four participating communities in this updated 2024 Hazard Mitigation Plan (HMP) – the Towns of Abington, Easton, and Stoughton – are part of what the 2015 Old Colony HMP describes as the “Greater Brockton” area.⁷ Together, the three towns comprise a total area of approximately 56 square miles.⁸

Table 2.2: Planning Area Land Area

Town	Area (acres)	Area (sq mi)
Abington	6,505	10.17
Easton	18,670	29.2

⁷ *Old Colony Hazard Mitigation Plan, 2015*: <http://www.ocpcrpa.org/hmp.html>

⁸ 2020 Census Official Population Numbers

Town	Area (acres)	Area (sq mi)
Stoughton	10, 412	16.4

Source: MassGIS Town Data

Landforms in Southeastern Massachusetts are part of the Northeast Coastal Lowlands/Coastal Plain region, which was formed during the recession of the last glaciers 12,000 years ago. The area is characterized by low oval hills generally oriented north-south (drumlins), pockets of highly porous soils and major sand and gravel deposits, many swamps, rivers and ponds including un-drained kettle holes, and many areas with a high water table.⁹ A high water table occurs when rock and ground materials join the upper soil layer due to an excessive amount of water due to heavy rain or water from higher elevations spreading into often low-lying areas containing soil with poor drainage. With high water tables fully saturating soil and decreasing the ability for soil to naturally drain, water may settle above ground and cause flooding or may seep into basements and foundations to cause damage.¹⁰

Table 2.3: Land Use per Square Mile and Percentage shows the breakdown of land cover in each town by their use. The largest portion of land cover in every town is residential land use.

Table 2.3: Land Use per Square Mile and Percentage

Town	Abington		Easton		Stoughton	
Commercial	0.63 sq mi.	6.20%	0.82 sq mi.	2.79%	0.94 sq mi.	5.73%
Industrial	0.09 sq mi.	0.87%	0.50 sq mi.	1.70%	0.74 sq mi.	4.51%
Open Space	2.46 sq mi.	24.17%	10.83 sq mi.	37.05%	5.36 sq mi.	32.59%
Other	2.09 sq mi.	20.55%	6.25 sq mi.	21.39%	2.75 sq mi.	16.73%
Residential	4.68 sq mi.	46.06%	10.38 sq mi.	35.50%	6.43 sq mi.	39.10%
Water	0.22 sq mi.	2.15%	0.46 sq mi.	1.57%	0.22 sq mi.	1.34%

Source: Land Cover Land Use Data, MassGIS and the NOAA Office of Coastal Management (OCM), 2016¹¹

2.4 WATER RESOURCES

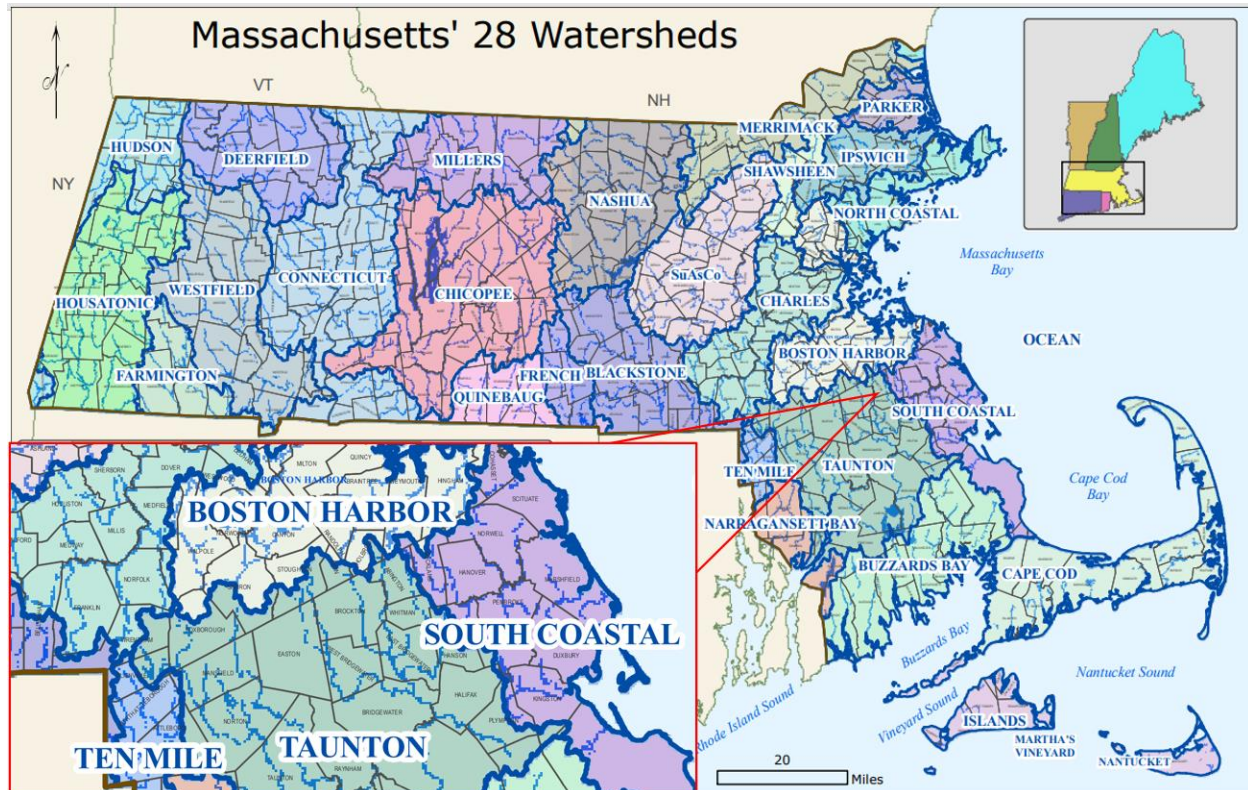
The municipalities discussed in this HMP are in the Boston Harbor, South Coastal, and Taunton Watersheds, shown in Figure 2.1 below.

⁹ Old Colony Hazard Mitigation Plan, 2015: <http://www.ocpcrpa.org/hmp.html>

¹⁰ "High Water Table & Your Home: Basement Waterproofing, Groundworks, <https://www.groundworks.com/glossary/high-water-table/>.

¹¹ Note: Calculations for this table were based on MassGIS data, categorizations should be considered estimates.

Figure 2.1: Massachusetts Watersheds



Source: MassGIS Watershed Map

The Old Colony Planning Council (OCPC) region has a variety of water resources within its borders, including several rivers and streams, lakes and ponds (often man-made), and wetlands. Communities in the planning area are close to the headwaters of several basins. Historic development patterns have confined some stream segments to narrow walled channels to protect nearby buildings. This leaves no room for safe flooding and informal flood storage, and results in frequent bank overtopping during heavy rainfall events. The region also has many sections with “relatively tight soils limiting on-site disposal opportunities and groundwater yields.”¹²

Most of the OCPC region is drained by the Taunton River and its tributaries with approximately 18 smaller rivers, streams, and brooks flowing into it. The Taunton River is the largest river in the region, running more than 37 miles from its headwaters at the confluence of Matfield and Town Rivers in Bridgewater to Mount Hope Bay. The region is also drained by three other watersheds, including the Neponset Watershed, which drains the northern parts of Avon and Stoughton; the South Coastal Watershed, which drains parts of Abington, Hanson, Pembroke, Kingston, Plympton and Plymouth; and the Buzzards Bay Watershed, which drains the western part of Plymouth.

The region also has a number of lakes and ponds. Some are natural glacial products, while others are impoundments made for power and water supplies. Major lakes and ponds in the region include the 354-acre Lake Nippenicket in Bridgewater.

¹² Old Colony Hazard Mitigation Plan, 2015: <http://www.ocpcrpa.org/hmp.html>

In addition to the water resources mentioned above, the Old Colony region is also home to a vast number of wetlands. More than 18% of the region rests in either a wetland or waterbody. The largest wetland area in the region is the 16,950-acre Hockomock Swamp Area of Critical Environmental Concern (ACEC), parts of which are located in portions of the communities of Bridgewater, Easton and West Bridgewater.

2.5 ASSESSED VALUATIONS

The Massachusetts Department of Revenue (DOR) requires each community in the state to assess the value of all property every year and do a complete re-certification every third year. Both a re-certification and an interim year adjustment (the two years in between the triennial re-certification) include a detailed analysis of the appropriate sales data as a basis for adjusting property values. The goal is to keep the values as close to market value as possible and avoid an excessive swing in assessments in any one year. Table 2.4 below contains the FY2022 Assessed Values for all property classes in each community.¹³

Table 2.4: FY2022 Assessed Values by Class¹⁴

Town	Abington	Easton	Stoughton
Residential	\$2,310,826,550	\$3,658,935,702	\$3,861,083,827
Commercial	\$218,827,950	\$271,013,298	\$522,416,001
Industrial	\$23,853,800	\$111,006,700	\$242,954,000
Open Space ¹⁵	\$56,752,400	\$91,288,200	\$92,394,784
Personal Property	\$61,005,100	\$100,704,435	\$189,140,330
Total	\$2,614,513,400	\$4,141,660,135	\$4,815,594,158

Source: Massachusetts Department of Revenue, Division of Local Services Municipal Databank: <https://www.mass.gov/municipal-databank-data-analytics-including-cherry-sheets>

2.6 CRITICAL INFRASTRUCTURE

The updated maps for each Town's critical facilities list are attached in Appendix A: Maps.

¹³ Note: The Hazus outputs used in the HMP's Risk Assessment were run in 2021 and therefore use Assessor's data from the previous year (2020), so there is some discrepancy throughout the plan based on data availability.

¹⁴ Massachusetts Department of Revenue, Division of Local Services Municipal Databank: <https://www.mass.gov/municipal-databank-data-analytics-including-cherry-sheets>

¹⁵ Note: Open Space Numbers are estimates from the Land Cover Land Use Data from MassGIS found from using parcel data and finding the sum of all vacant land identifications under the "Style" field.

3.0 PLANNING PROCESS

3.1 OVERVIEW

The Towns of Abington, Easton, and Stoughton initiated a hazard mitigation plan update in 2022. The Towns' previous HMP was a regional plan that was prepared by the Old Colony Planning Council from 2011 – 2013 and was adopted by Abington in September 2015, and by Easton and Stoughton in October 2015. The Towns elected to come together as a group and hire a consultant to support the plan update process, and BETA Group, Inc. (BETA) was brought on in mid-2022 to lead the effort under the guidance of the Planning Area Hazard Mitigation Planning Committee (HMPC). This HMP is the result of a dedicated group of individuals working for several months to propose ways to improve and sustain Abington, Easton, and Stoughton's resiliency and mitigation practices.¹⁶

3.2 HAZARD MITIGATION PLANNING COMMITTEE

3.2.1 CORE COMMITTEE

In order to better facilitate the flow of data and information in between BETA and each town, the HMPC was led primarily by a Core Committee with one Town official from each jurisdiction. The members of the core committee are listed in Table 3.1.

Table 3.1: Members of the Core Committee

Name	Town	Title	Representing
Liz Shea	Abington	Assistant Town Planner	Town Planning
Stephanie Danielson	Easton	Director of Planning and Economic Development	Planning and Economic Development
Sara Blackader*	Stoughton	Fire Department Office Administrator	Fire Department

*Sara Blackader replaced Michael Carroll in the Core Committee in December 2022.

3.2.2 GENERAL COMMITTEE MEMBERS

The HMPC was organized by the members of the Core Committee with input from BETA Inc. The Committee members are listed in Table 3.2. Team members were asked to participate throughout the planning process by providing local expertise and reviewing consultant work.

Table 3.2: HMPC Members

Name	Town	Title	Representing
Albert Benson	Easton	Conservation Commission Member	Conservation Commission
Craig Horsfall	Stoughton	Assistant Town Engineer	Engineering Department

¹⁶ The initial drafts of this document included the Town of East Bridgewater, which was later removed as of November 14, 2023 through coordination with MEMA.

Name	Town	Title	Representing
David DelPapa	Abington	Police Chief, Emergency Management Director	Police Department, Emergency Management
David Field	Easton	Director of Public Works	Public Works
Dottie Fulginiti	Easton	Chair of Select Board	Select Board
Gregory Swan	Easton	Director of Public Works	Department of Public Works
Jack Erickson	Stoughton	Building Commissioner & Zoning Officer	Building Department
James Conlon	Stoughton	Environmental Affairs Officer	Engineering Department
Jason Harris	Abington	Building Commissioner/Zoning Enforcement Officer	Inspectional Services/Building Department
Jeanne White	Abington	Administrative Assistant DPW and Board of Sewer Commissioners Member	Department of Public Works
Jennifer Carlino	Easton	Land Use and Environmental Planner	Environmental Protection
John M. Nuttall	Abington	Fire Chief	Fire Department
John Stone	Abington	Director of DPW	Department of Public Works
Justin Alexander	Easton	Fire Chief, Emergency Management Director	Fire Department, Emergency Management
Keith Boone	Easton	Police Chief	Police Department
Kelly Johnson	Abington	Recreation Director	Parks and Recreation and Department of Public Works
Kevin Greiner	Easton	Inspector of Buildings	Building Department
Kristin Kennedy	Easton	Director of Health and Community Services	Health & Community Services
Larry Langlois	Stoughton	Geographic Information System (GIS) Coordinator	Engineering Department
Lindsay Wright	Abington	Public Health RN	Health Department
Lynne LeBlanc	Easton	Chair of the Board of Health	Board of Health

Name	Town	Title	Representing
Marc Tisdelle	Stoughton	Town Engineer	Engineering Department
Michael Carroll	Stoughton	Fire Chief, Emergency Management Director	Fire Department, Emergency Management
Pamela McCarthy	Stoughton	Economic Development Director/Acting Town Planner	Planning Department
Paul Bunker	Abington	Chairman of Conservation Commission	Conservation Commission
Paul Giffune	Stoughton	DPW Superintendent	DPW
Phil McNulty	Stoughton	Water/Sewer Superintendent	DPW
Rich Tierney	Easton	Water Operations Manager	Water Operations

3.3 THE PLANNING PROCESS

The HMP planning process was designed to provide opportunities for stakeholders to be involved, through invitations to participate and direct requests for information or input to inform the plan's content. The planning process consisted of HMPC meetings; public postings and press releases; public input via an online survey and public meetings; HMPC, public, neighboring community, and local organization review of the plan; and the MEMA, FEMA, and local adoption review processes to achieve the final adoption of the plan. No stakeholder groups offered input on the development of the plan beyond those involved with the committee. Members of the public contributed through the public survey and public workshop.

The first kickoff meeting was held October 11, 2022, between BETA Inc. and the initial members of the Core Committee, Liz Shea, Stephanie Danielson, and Michael Carroll. The meeting laid out the timeline and goals for completing the project, as well as described the level of collaboration required by HMPC members, recommendations for the HMPC, and levels of public outreach necessary for the project.

The first full Committee Meeting was held October 27, 2022. The meeting discussed the scope of the project, scheduled the following four meetings of the HMPC and formalized the list of hazards to be addressed in the plan. This meeting also introduced the HMPC to the hazard mitigation planning process and their role providing information about the Town's critical facilities, sites of new developments, and local historic hazard events. At this meeting committee members discussed the most effective methods of public outreach available to them to encourage local residents, businesses, institutions, and organizations to participate in the planning process. Committee members decided that each Town's social media, project webpages, and Town calendars have strong community viewership and participation from the stakeholders mentioned above, and would be effective outlets for transmitting project information for the public. Each committee member also agreed to use their own platforms, whether that be as a member of a town board, committee, or neighborhood association, to keep constituents up to date and actively invite participation and input to the process.

The public survey was sent out November 11, 2022. The survey was directed at Planning Area residents and organizations. The public survey received 296 total responses and was closed on May 1, 2023. Of the responses, 91 came from Abington, 78 from Easton, 15 from Stoughton, and 3 other responses included town employees. The results of the public survey, including each question, are in Appendix C: Public Survey. The public survey was delivered to each town's Senior Center by Committee Members to reach out to vulnerable populations.

The second full Committee Meeting was held December 8, 2022. The meeting included a review and update of local critical facilities, review of past hazard events, discussion of the public survey and preparation for the public meeting to be held on January 17, 2023.

The Public Meeting was held January 17, 2023. Attendees from all three towns were present and engaged in discussion about potential natural hazard events and how those events have impacted their towns and neighborhoods previously. Discussion also focused on potential mitigation actions to take to reduce each community's vulnerability. A full summary of the meeting is located in Appendix B: Public Engagement. Advertising for the public meeting was completed on each town's social media and town calendars. The meeting was held virtually for optimal accessibility of attendance.

The third Committee Meeting was held virtually on February 3, 2023. Committee members reflected on the Public Meeting and reviewed and provided a status update on the 2015 mitigation strategies and updated the plan goals first established in 2015.

The fourth Committee Meeting was held virtually on April 6, 2023. The Committee broke into separate groups and continued review of 2015 mitigation actions, expanded upon new actions, and began a STAPLEE process to prioritize the new actions. This work was continued by each committee offline. The Committee then went over the details for mitigation action implementation and the process of local, state, and federal adoption for the HMP.

The Town of Easton Core Committee Member and BETA met with the representatives of Morse Pond Dam, the only High Hazard Potential Dam in the Planning Area, on August 14, 2023. The representatives provided information about the current status of the dam and the Town and representatives agreed that future collaboration regarding the dam's condition should be included as a mitigation action for Easton within the HMP.

The first semi-full draft of the plan was released to the public September 20, 2023 and sent to neighboring municipalities' emergency management agencies and planning departments. The plan was posted on each Town's official website and social media for local organizations and institutions to sit for a 30-day public comment and review period. This draft was missing several portions of East Bridgewater's of information due to slow receipt of Town input. The draft was sent on September 21, 2023 to planning staff and boards in Avon, Bridgewater, Brockton, Mansfield, Rockland, Sharon, West Bridgewater, and Whitman; the plan was also sent to the OCPC. The draft plan received no public comments.

Throughout the plan, committee members sought input from local representatives of businesses, academia and non-profit organizations, including community-based organizations by keeping project webpages updated and publishing all public events and interaction on Town social media. Members of the Planning and Economic Development offices were also present on the committee to help represent and make the connection between the planning process and local businesses.

The full draft was submitted to MEMA on December 26, 2023 after the removal of East Bridgewater from the plan.

Table 3.3: Summary of HMPC Activities

Date	Summary of Action
10/11/2022	Kickoff Meeting
10/27/2022	First Committee Meeting
11/11/2022	Public Survey Sent to public
12/08/2022	Second Committee Meeting
01/17/2023	Public Outreach Meeting
02/03/2023	Third Committee Meeting
04/06/2023	Fourth Committee Meeting
08/14/2023	Meeting with Representatives of Morse Pond Dam
08/18/2023	Draft Plan provided to Committee
9/20/2023	Draft Plan released for 30-day public comment and sent to neighboring communities
12/16/2023	Full draft submitted to MEMA
5/13/2024	Full draft submitted to FEMA
7/23/2024	FEMA Comments Received
8/1/2024	Final draft submitted to FEMA
TBD	Final plan adopted by the Abington Board of Selectmen and the Easton and Stoughton Select Boards

4.0 RISK ASSESSMENT

4.1 INTRODUCTION TO NATURAL HAZARDS AND RISK ASSESSMENT

The Risk Assessment chapter identifies the hazards that can affect the Planning Area, and analyzes each of these hazards with respect to: where each hazard might affect the planning area (location); its potential magnitude (extent); how often events have happened in the past (previous occurrences); how likely they are to occur in the future (future probability); what parts of the community are most likely to be affected (vulnerability); and the potential consequences (impacts).

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 2015 Old Colony HMP identified the following hazards of concern across the entire OCPC region:

- Flood-Related Hazards – Flooding
- Wind-Related Hazards – Hurricanes & Tropical Storms, Tornadoes
- Winter-Related Hazards – Winter Storms
- Coastal Related Hazards – Coastal Erosion & Shoreline Change
- Fire-Related Hazards – Wildfires, Major Urban Fires
- Geologic Hazards – Earthquakes, Landslides and Tsunamis
- Other Natural Hazards – Extreme Temperatures

The 2015 plan hazards were re-assessed by the HMPC and minor adjustments to the list were made. This plan does not include any coastal communities; therefore, the 2024 HMP will not profile any coastal related hazards including tsunamis, coastal erosion, or shoreline change. The 2024 plan also excludes the landslide hazard, which was determined by the HMPC to be low risk and low severity, and not of concern in the Planning Area. The 2024 plan reorganizes several of the 2015 plan natural hazards into new categories:

- Flood-Related Hazards – Flooding, Dam Failure
- Wind-Related Hazards – Hurricanes & Tropical Storms, Severe Storms, Tornadoes
- Winter-Related Hazards – Winter Storms
- Fire-Related Hazards – Wildfires
- Geologic Hazards – Earthquakes
- Other Natural Hazards – Extreme Temperatures, Drought, Invasive Species

This chapter describes each natural hazard of concern in the Planning Area, each hazard's location of occurrence, each hazard's history within the area, the natural hazard's potential severity and magnitude of impact, and the frequency of a natural hazard event/the probability of an event's future occurrence.

Impacts are the consequences or effects of each hazard on the community's assets identified in the vulnerability assessment. The chapter's vulnerability assessment estimates the exposure of people, buildings, and infrastructure to the impacts of a natural hazard, and helps to assess the scale and severity the hazards may have on each community. Multiple factors of vulnerability are discussed in this chapter. The vulnerability assessment within each hazard profile includes qualitative analyses based on community

and HMPC input and based on Hazus data collected and analyzed in 2021 from the OCPC,¹⁷ to determine the risk each natural hazard has on each community.

The Hazus Program (also known as Hazus-MH) is a FEMA tool that analyzes potential risks by modelling for future potential damages from earthquakes, floods, tsunamis, and hurricanes. The final output provides a glimpse at community vulnerabilities and potential losses associated with large natural hazard events. The full Hazus reports for selected hazards are attached in Appendix D: Hazus Reports.

The factors for rating the risk of each natural hazard are listed in Table 4.1 below. The Risk Rating will help Abington, Easton, and Stoughton determine what actions to prioritize to best mitigate the natural hazards that pose the highest risks to each town.

Table 4.1: Guidelines for 2024 HMP Hazard Risk Rating

Rating Category	Levels of Risk	Risk Rating
Frequency/ Likelihood of Occurrence	Unlikely: Less than 1% probability in the next year Possible: Between 1-10% probability in the next year Likely: Between 10-100% probability in the next year Highly Likely: Near 100% probability in the next year	Unlikely = 0 Possible = 1 Likely = 2 Highly Likely = 3
Location of Occurrence/ Impact Area Assessment	Small: Less than 10% of the town affected Medium: 10 to 50% of the town affected Large: More than 50% of the town affected	Small = 1 Medium = 2 Large = 3
Severity/ Extent of Impacts	Minor: Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of facilities. Limited: Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than 1 day. Critical: Multiple injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than 1 week. Catastrophic: Multiple deaths and injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of facilities for 30 days or more.	Minor = 0 Limited = 1 Critical = 2 Catastrophic = 3

Source: Frequency and Severity ratings reworked from 2023 Massachusetts State Hazard Mitigation Plan

4.2 CUMULATIVE RISK RATING

The tables below detail the individual risk assessment ratings for each community. Scores were determined after the completion of the risk assessment from the rating scale listed in Table 4.1. Hurricanes & Tropical Storms and Winter Storms are the consistent highest risk natural hazards across all four towns.

¹⁷ The Hazus results were completed in 2021 and use 2010 Census data to perform analyses involving population so they do not align with 2022 population counts. This Hazus data set will be use as a representative depiction of possible damage in each municipality.

Table 4.2: Abington Risk Assessment

Hazard	Frequency/Probability of Future Occurrence	Impact Area Assessment	Severity/Extent	Risk Rating
Hurricanes & Tropical Storms	Likely	Large	Critical	8
Winter Storms	Highly Likely	Large	Critical	8
Severe Storms	Likely	Large	Limited	7
Extreme Temperatures	Highly Likely	Large	Limited	7
Flooding	Highly Likely	Small	Limited	5
Tornadoes	Possible	Small	Critical	5
Earthquakes	Unlikely	Large	Critical	5
Wildfires	Likely	Small	Limited	4
Drought	Likely	Medium	Minor	4
Dam Failure	Possible	Medium	Limited	3
Invasive Species	Likely	Small	Minor	3

Table 4.3: Easton Risk Assessment

Hazard	Frequency/Probability of Future Occurrence	Impact Area Assessment	Severity/Extent	Risk Rating
Hurricanes & Tropical Storms	Likely	Large	Critical	8
Winter Storms	Highly Likely	Large	Critical	8
Extreme Temperatures	Highly Likely	Large	Limited	7
Severe Storms	Likely	Large	Limited	6
Tornadoes	Possible	Small	Critical	5
Earthquakes	Unlikely	Large	Critical	5
Drought	Likely	Large	Minor	5
Flooding	Highly Likely	Small	Minor	4
Wildfires	Likely	Small	Limited	4
Dam Failure	Possible	Small	Limited	3
Invasive Species	Likely	Small	Minor	3

Table 4.4: Stoughton Risk Assessment

Hazard	Frequency/Probability of Future Occurrence	Impact Area Assessment	Severity/Extent	Risk Rating
Hurricanes & Tropical Storms	Likely	Large	Critical	8
Winter Storms	Highly Likely	Large	Critical	8
Extreme Temperatures	Highly Likely	Large	Limited	7
Severe Storms	Likely	Large	Limited	6
Tornadoes	Possible	Small	Critical	5
Earthquakes	Unlikely	Large	Critical	5
Flooding	Highly Likely	Small	Minor	4
Wildfires	Likely	Small	Limited	4
Drought	Likely	Medium	Minor	4
Invasive Species	Likely	Small	Minor	3
Dam Failure	Possible	Small	Minor	2

4.3 FEMA AND STATE DECLARED DISASTERS

Table 4.5 below shows the FEMA Declared Disaster Events that have occurred in the Planning Area since the 2015 plan was developed. These disaster declarations¹⁸ are designated under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, (42 U.S.C. 5121 et seq.), also known as the Stafford Act. The Stafford Act provides the mechanism by which the President of the United States can declare a disaster and therefore designate counties eligible for Hazard Mitigation Assistance.¹⁹

Table 4.5: FEMA Declared Disaster Events Since 2015

FEMA Declaration	Event Date	MA Counties Designated	Title/Description and Damage Amount (if available)
DR-4110-MA	February 8-9, 2013	Statewide	Severe Winter storm, blizzard conditions, and flooding
DR-4214-MA	January 26-29, 2015	Barnstable, Bristol, Dukes, Essex, Middlesex, Nantucket, Norfolk,	Severe Winter Storm, two fatalities were reported

¹⁸ Table 4.5 only shows natural hazard-related disasters from FEMA and excludes other events like the SARS-CoV-2 pandemic as this plan does not address public health or infectious disease hazards.

¹⁹ Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-707, signed into law November 23, 1988; amended the Disaster Relief Act of 1974, PL 93-288.

FEMA Declaration	Event Date	MA Counties Designated	Title/Description and Damage Amount (if available)
		Plymouth, Suffolk, Worcester	
DR-4372-MA	Mar 2-3, 2018	Barnstable, Bristol, Essex, Nantucket, Norfolk, Plymouth	Severe Winter Storm. There were two storm-related deaths.
DR-4379-MA	March 13-14, 2018	Essex, Middlesex, Norfolk, Suffolk, Worcester	Severe Winter Storm
DR-4651-MA	Jan 28, 2022 - Jan 29, 2022	Bristol, Norfolk, Plymouth, Suffolk	Strong Winter Storm

Source: Declared Disasters, Massachusetts, FEMA, 2013-2022, <https://www.fema.gov/disaster/declarations>.

The FEMA Declared Disasters that occurred within Bristol, Norfolk, and Plymouth counties are all related to Winter Storm events. Any other Declared Disaster event did not directly impact one of this HMP's Planning Area— but may have still had a significant impact on Massachusetts and the Planning Area's surrounding communities. The other declared disasters within this time period include all declarations of major disaster and emergency related to the Massachusetts Covid-19 Pandemic (DR-4496-MA, EM-3484, EM-3497, and EM-3438-MA). These disaster declarations are not recorded in Table 4.5 due to the HMP's focus on natural hazards only.

The State of Massachusetts also declares local States of Emergency which are declared by the Governor in the event or imminent threat of a disaster, including severe natural hazard events. The announcement of a State of Emergency does not guarantee any state funding as there is no state disaster relief fund. A list of recently declared States of Emergency in the Massachusetts are listed in the table below.

Table 4.6: Massachusetts State of Emergency Declarations²⁰

Declaration Date	Termination Date	Event
2/8/13	2/13/13	Winter Storm
1/26/15	1/28/15	Winter Storm
2/9/15	2/25/15	Winter Storm
3/3/18	3/6/18	Coastal Storm

²⁰ State of Emergency Information, Massachusetts Emergency Management Agency (MEMA), https://www.mass.gov/info-details/state-of-emergency-information?_gl=1*tdhzc9*_ga*MTIONDc3MjU4MC4xNjA1MDMyODc4*_ga_MCLPEGW7WM*MTcyMjQyMzg4OS4yOS4wLjE3MjI0MjM4ODkuMC4wLjA

Declaration Date	Termination Date	Event
9/12/23	9/16/23	Severe Weather & Flooding
9/15/23	9/16/23	Hurricane Lee

4.4 NEW AND UPCOMING DEVELOPMENTS

Each town within the Planning Area provided a list of new and upcoming developments to determine if any of these developments interacted with areas where natural hazard events may occur. Each Town identified the areas of new development and how they may be impacted by natural hazards due to their location within any higher risk areas. The tables below showcase the new and upcoming development projects in each town in the Planning Area, including the number of developments since the previous 2015 HMP, and those known to be upcoming within the next five years. Several smaller projects, including those of single-family residential homes, are not included in the matrices below to protect the privacy of residents.

The tables below showcase the new and upcoming development projects in Abington, Easton, and Stoughton that may have an impact on flooding in town. Information includes the number of developments since the previous 2015 HMP, and those known to be upcoming within the next five years. The final column in each table describes any of the previous or potential impacts to hazard areas or hazard mitigation efforts from each new or upcoming development.

In Abington, the largest impacts from new developments include increases to impervious surface in town, which may impact the town's ability to mitigate flooding. No other additional hazard mitigation impacts other than traffic impacts were noted, and the upcoming developments will not increase or decrease Abington's vulnerability to natural hazards.

In Easton, recent development adheres to the trend of benefiting at risk populations, including having a positive impact water supply distribution capability, providing shelter or care for vulnerable populations, and having a positive impact on water quality. Upcoming developments were not noted to have any additional impacts to Easton's vulnerability during natural hazard events.

Stoughton's recent developments were not noted to have any impact on hazard areas and did not increase or decrease Stoughton's vulnerability to natural hazards. The one upcoming development is noted to provide enhanced emergency response.

Table 4.7: Abington Recent and Planned Development

Property or Development Name	Type	Status	# of Structures	Known Hazard Zone(s)	Natural Hazard Risk and Mitigation Measures Taken
Recent Development from 2015 to Present					
154 Bedford St	Residential	Complete	10	No	Increase in the impervious surface
323 Centre Ave	Commercial	Complete	1	No	Traffic congestion
Add to bldg. 999 Adams St	Commercial	Complete	1	No	Land disturbance, detention basin constructed
1148 Bedford St	Residential	Complete	7	No	Increase in impervious surface
351 Summer St	Residential	Complete	10	Some wetlands	Increase impervious surface, near a stream, Raingarden installed
194 Bedford St	Commercial	Complete	Daycare	No	Increased pavement
1145 Bedford St	Commercial	Complete	1	No	Potential drainage impact. Bldg. set on a hill
500 Chestnut St	Commercial	Partially complete	5	Near wetlands	Large project, impervious surfaces set well off road
121 Randolph St	Residential	Almost complete	50	River runs adjacent and under	Wetlands and river all intertwined
176 Wales St	Residential	Just begun	10	No	Increase in imperious surface
Known or Anticipated Development in the Next Five (5) Years					
0 Plymouth St	Residential	Permitted 40B	144	Potential wetlands	Increase in traffic
0 Summer St	Residential	Permitted 40B	199	Wetlands	The site has very wet areas, traffic
0 Hancock St	Commercial	Current staging area for utility		Wetlands	Portions of the site are wet; traffic could be an issue as well

Table 4.8: Easton Recent and Planned Development

Property or Development Name	Type	Status	# of Structures	Known Hazard Zone(s)	Natural Hazard Risk and Mitigation Measures Taken
Recent Development from 2015 to Present					
530 & 550 Turnpike Street	Industrial/Warehouse	Under Construction	2	No	N/A
Fusion Investments, 464 & 466 Foundry St.	Residential	Future	1	No	N/A
PFAS Treatment Facility 95R & 100R Washington	Pump Stations, Water Supply	Under Construction	1	Close to Special Flood Hazard Area (SFHA)	Will have a positive impact water supply distribution capability
PFAS Treatment Facility, 218R Center Street	Pump Station, Water Supply	Under construction	1	Close to SFHA	Will have a positive impact on water quality
Water Quality Treatment Facility, 12 Red Mill Road	Pump Station, Water Supply	Under construction	1	No	Will have a positive impact on water quality
House of Possibilities, 350 Washington St	Community Based Respite Care Service Programs	Under construction	1	No	Provides shelter for vulnerable population
Easton Early Elementary School K-2, 50 Spooner Street	School	Completed	1	No	Will provide care for vulnerable population (children)
Stonehill College School of Business, 320 Washington Street	Academic Building	Existing	1	No	N/A
Langwater Farm, 215 Washington St	Farm	Completed	1	No	N/A
Known or Anticipated Development in the Next Five (5) Years					

Property or Development Name	Type	Status	# of Structures	Known Hazard Zone(s)	Natural Hazard Risk and Mitigation Measures Taken
Baron Estates, 71 Mill Street	Residential	Under construction	26	No	N/A
Owl Ridge Estates, 58 Mill Street	Residential	Under construction	6	No	N/A
Sawmill Village, 560 Foundry Street	Residential	Future	44	SFHA	N/A
Goodspeed Estates, 345 Center Street	Residential	Under construction	8	No	N/A
Webber Farm, 363 Bay Road	Residential	Under construction	14	No	N/A

Table 4.9: Stoughton Recent and Planned Development

Property or Development Name	Type	Status	# of Structures	Known Hazard Zone(s)	Natural Hazard Risk and Mitigation Measures Taken
Recent Development from 2015 to Present					
Village at Goddard Highlands, McEachron Dr, Murray Circle, Ripley Dr, Scofield Dr	Residential	Complete	70	No	N/A
1781-1795 Central St	Residential/Apt Building	Under Construction	5	No	N/A
Stoughton High School, 232 Pearl St	Commercial	Complete	1	No	N/A
Town of Stoughton DPW Water, 742 Plain St	Commercial	Complete	1	No	N/A

Property or Development Name	Type	Status	# of Structures	Known Hazard Zone(s)	Natural Hazard Risk and Mitigation Measures Taken
Town of Stoughton DPW Pump, 1000 Bay Rd	Commercial	Complete	1	No	N/A
3 Morton St	Mixed Use	Complete	1	No	N/A
760-770 Washington St	Mixed Use	Under Construction	3	No	N/A
630 Washington St	Commercial	Complete	1	No	N/A
104 Page St	Commercial	Complete	1	No	N/A
Harbor One Bank, 470 Washington St	Commercial	Complete	1	No	N/A
The Learning Center	Commercial	Complete	1	No	N/A
Known or Anticipated Development in the Next Five (5) Years					
Stoughton Fire Dept -Station 1, 400 Prospect St	Commercial	Future	1	No	Will provide enhanced emergency response

4.5 FLOOD-RELATED HAZARDS

4.5.1 FLOODING

DESCRIPTION

Floods are some of the most frequent natural hazard events to occur in the U.S.²¹ Floods are defined by FEMA's National Flood Insurance Program (NFIP) as:

A general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties from: overflow of inland or tidal waters; unusual and rapid accumulation or runoff of surface waters from any source; or a mudflow; or the collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood as defined above.²²

For this plan, flood-related hazards include riverine flooding and urban drainage flooding. Riverine flooding occurs when persistent moderate to heavy rain falls over a period causing local rivers and streams to crest their banks and flow into the adjacent floodplain. Severe storms with heavy rain can generate flash floods which strike and end quickly. Urban drainage flooding due to runoff occurs when water runs over impervious surfaces (paved areas, building roofs, and highways) whether from overbank flooding from rivers or in a flash flood scenario.

The number of flooding events is only expected to increase as climate change impacts the severity and frequency of precipitation events. Heavy precipitation or overbank flooding could also have a more intense impact on areas where vegetation has been depleted due to increased drought events through climate change.

LOCATION OF OCCURRENCE

Flood extent can be defined through many means, including but not limited to land area inundated, volume of water, velocity of flow, extent of damages, etc. In order to develop risk-based standards and policies for the NFIP, FEMA flood risk products focus primarily on two extents of flooding: the 100- and 500-year events. The 100-year flood, defined as a flood that has a 1 in 100 chance of occurring each year, is a larger and higher risk flood. Lower risk but more frequent floods, such as the 10-year or 10% chance flood, have a higher chance of occurring. The standard for ranking floods for the NFIP is the 100-year or base flood.²³

The base flood is recorded spatially in floodplains as a Special Flood Hazard Area (SFHA) on Flood Insurance Rate Maps (FIRMs) that show where NFIP policies are regulated. FIRMs are used to provide the minimum standards for delineated floodplains to protect the natural ecosystems from the impacts of development and to protect home and property owners from flood damage. Floodplains are low-lying areas adjacent to rivers, lakes, oceans, or other water bodies that are part of a complex system subject to geomorphic and hydrologic processes.²⁴ In Massachusetts, floodplain management is addressed through coordination with the NFIP, through the statewide mandatory building code, and by local floodplain and

²¹ FEMA Building Science Branch, Hazard Overview: Floods, FEMA P-1086, March 2017

²² National Flood Insurance Program Requirements, 59.1 - Flood Definition, 2020.

²³ National Flood Insurance Program (NFIP) Floodplain Management Requirements, A Study Guide and Desk Reference for Local officials – FEMA 480, 2005

²⁴ "Floodplains," Massachusetts State Hazard Mitigation and Climate Action Plan, 2023.

wetlands protections discussed in Existing Capabilities and Mitigation Measures to ensure flood resistant construction.²⁵

The impact area for flooding will be determined by looking at areas of repeated flooding, and a comparison of the Town's total acreage compared to the portion of the Town covered by the SFHA.

ABINGTON

The HMPC and survey respondents identified areas of repeated flooding in Abington, primarily caused by urban drainage flooding. Currently, known areas of flooding in Abington include:

- Route 123 and Route 139
- Lynwood Street towards Mill Street (in the front of new development and former farm property)
- John L. Sullivan Way
- Centre Avenue
- Buckboard Lane
- Carriage Hill Drive
- Dorsey Street
- Green Street Park
- Meadow on Platt Street that borders French Stream
- West Chapel Street (area reported since new development)
- Lincoln Street
- Hancock Street
- Central Street east of Route 58
- Route 18
- Wyman Road and Summit Road
- Behind Frolio Middle School

According to the Plymouth County Flood Insurance Study, potential flooding sources in Abington include the Shumatuscacant River and tributaries thereof, Stream River, Beaver Brook, French Stream, and Meadow Brook.²⁶

In Abington, around 672 acres of the town lies within the SFHA.²⁷ Of properties in town, seven properties are located in the SFHA, two in Zone A and five in Zone AE, while nine properties are located in Zone X (where insurance is not required due to a more moderate risk of flooding). The total impact area for riverine flooding and urban drainage flooding in Abington is **Small: Less than 10% of the town affected.**

As Table 4.7 suggests, future development along Hancock Street may increase flooding risk for properties in the area. Similarly, the Town's Master Plan contains goals to focus development in the downtown Abington and North Abington commercial centers,²⁸ which may increase flood risk along Centre Avenue, Route 123 and Route 139, Central Street east of Route 58, and Route 18 if proper mitigation measures for retaining stormwater onsite are not taken.

²⁵ Commonwealth of Massachusetts, "Floodplain Management," Mass.gov, n.d., <https://www.mass.gov/guides/floodplain-management>.

²⁶ Flood Insurance Study, Plymouth County, Massachusetts, Number 25023CV001D, FEMA, July 22, 2020.

²⁷ Determined through GIS analysis using National Flood Hazard Layer.

²⁸ Abington Master Plan Update, Town of Abington Planning Board, 2019.

EASTON

The HMPC and survey respondents identified areas of repeated flooding in town. Currently, known areas of flooding in Easton include:

- Sawmill Pond Rd at Bay Rd around #486
- Prospect Road around #80 and #33
- Culvert under Route 138 near the mobile home park
- Bay Rd near #224 has a confluence of three culverts
- Purchase Street near Easton Country Club
- Linden Street
- Eleanore Strasse Road
- Chester Avenue

According to the Plymouth County Flood Insurance Study, potential flooding sources in Easton include the Black Brook, Gowards Brook, Mulberry Brook, Poquanticut Brook, Queset Brook, and Whitman Brook. Of these, the Black Brook and Queset Brook drain the largest areas, with 6.2 square miles and 9.5 square miles, respectively. These larger collection areas lead to higher flows during rain events – the peak discharge rate of the Black Brook below Foundry Street in Easton during a 1% annual chance event is 550 cfs (cubic feet per second), while Queset Brook at State Route 138 in Easton passes 600 cfs during the same type of event.²⁹

In Easton, around 5,056 acres of the town lies within the SFHA.³⁰ Of all properties in town, 32 properties are located in the SFHA, 23 in Zone A and nine in Zone AE, while 32 properties are located in Zone X.³¹ The total impact area for riverine flooding and urban drainage flooding in Easton is **Small: Less than 10% of the town affected.**

The planned residential development at Bay Road noted in Table 4.8 may impact the flooding noted in multiple areas along that route, and the addition of residential structures has the potential to increase the number of vulnerable people in the area.³²

STOUGHTON

The HMPC and survey respondents identified areas of repeated flooding in town. Currently, known areas of flooding in Stoughton include:

- Red Wing Brook area
- Pratts Court
- Ames Long Pond (specifically culvert on West Street at Ames Long Pond between Highland Street and Lake Drive)
- Storm drain behind Police Station
- Steep Hill Brook

According to the Norfolk County Flood Insurance Study, potential flooding sources in Stoughton include Dorchester Brook, Norroway Brook (upper) and its tributaries, Pinewood Pond, Redwing Brook and its tributary, upper and lower Steep Hill Brook and its tributaries, a tributary to Steep Hill Brook, Woods Pond, and York Brook. The most significant of these is Steep Hill Brook, which drains an area of 5.3 square miles

²⁹ Flood Insurance Study, Bristol County, Massachusetts, Number 25005CV001D, FEMA, July 6, 2021.

³⁰ Determined through GIS analysis using National Flood Hazard Layer.

³¹ Flood Insurance Study, Bristol County, Massachusetts, Number 25005CV001D, FEMA, July 6, 2021.

³² Envision Easton Community Master Plan, December, 2014.

and produces a discharge of 1,225 cfs at the Stoughton/ Canton corporate limits during the 1% annual chance rainfall event.³³

In Stoughton, round 1,389 acres of the town lies within the SFHA.³⁴ Of all properties in town, 13 properties are located in the SFHA, 11 in Zone A and two in Zone AE, while 41 properties are located in Zone X.³⁵ The total impact area for riverine flooding and urban drainage flooding in Stoughton is **Small: Less than 10% of the town affected.**

Stoughton's Master Plan promotes infill development in the Town Center, which may increase stormwater runoff by introducing more impervious surfaces and place greater strain on the existing storm sewer network. Appropriate stormwater management design and implementation as part of new developments will be imperative to ensure new development does not increase flood risk in the Town Center.

HISTORY OF LOCALIZED FLOODING

ABINGTON

The Shumatuscant River, though relatively small, has in the past overtopped its banks. This overtopping was primarily due to inadequate culverts, which could not pass the storm runoff. Landfilling in some areas has contributed to this problem. In 1955, the Town of Abington experienced flooding problems due to two successive tropical hurricanes. Inadequate culverts at Adams, Central, and Center Streets caused localized flooding along the Shumatuscant River. In March 1968, a relatively heavy rainstorm, preceded by another storm one week earlier, again caused high flows; but, due to the construction of three new bridges at Adams, Central, and Center Streets, the Shumatuscant River did not cause any significant flooding problems.³⁶

Table 4.10 below lists known flooding events and damages recorded in the Planning Area Counties of Plymouth, Bristol, and Norfolk from 2015 through 2022. Specific losses incurred by Abington, Easton, and Stoughton are noted where information was available. This table does not list every natural hazard event that has occurred in the Planning Area, but does list those that impacted Abington, Easton, or Stoughton directly, or which resulted in a high damage cost in any of the associated counties.

Table 4.10 Flooding History in Bristol, Norfolk, and Plymouth Counties

Date	Type	County Affected	Damage (County-wide)	Comments
3/29/2010	Flooding	Bristol, Plymouth, Norfolk	\$23,580,000 (B)*, \$8,320,000 (N) \$8,070,000 (P)	Flooding occurred across the Planning Area closing roads, and school and causing major damage. (Related to FEMA-1895-DR declared in 2010)
7/28/2015	Flooding	Plymouth	\$15,000	Showers and thunderstorms blocked several roads and trapped 2 cars.
6/21/2016	Flash Flood	Bristol	\$30,000	Over an inch of rain fell in 30 minutes in one area and several streets flooded.

³³ Flood Insurance Study, Norfolk County, Massachusetts, Number 25021CV001D, FEMA, July 6, 2021.

³⁴ Determined through GIS analysis using National Flood Hazard Layer.

³⁵ Flood Insurance Study, Norfolk County, Massachusetts, Number 25021CV001D, FEMA, July 6, 2021.

³⁶ Flood Insurance Study, Plymouth County, Massachusetts, Number 25023CV001D, FEMA, July 22, 2020.

Date	Type	County Affected	Damage (County-wide)	Comments
10/25/2017	Flooding	Bristol	No damages documented	Flooding in Easton on Belmont St., public report of a Storm Total Rainfall of 2.96 inches.
7/6/2018	Flooding	Norfolk	\$10,000	Rainfall of 1.90 inches was reported in Stoughton.
7/12/2019	Flash Flood	Plymouth	\$70,000	Heavy rain and thunderstorms, Plymouth recorded 5.32 inches of rain in just six hours.
6/28/2020	Flash Flood, Flooding	Norfolk, Plymouth	\$30,000,000 (N) and \$15,000 (P)	Flash flood caused intense damage to Norwood Hospital, cars, and nearly 250 homes. Flooding reported on Pearl St. in Stoughton and several other streets in Plymouth County.
9/2/2021	Flash Flood	Bristol, Plymouth	\$120,000 (B) and \$25,000 (P)	Flash flooding in Fall River blocked roads and damaged vehicles. In Plymouth County, floods washed out a portion of a road in Wareham.

Source: National Centers for Environmental Information Storm Events Database, NOAA, 2015-2022.

*Notes: (B) – Bristol County; (N) – Norfolk County; (P) – Plymouth County

SEVERITY & POTENTIAL EXTENT OF IMPACT

Flooding can cause injury or death to at-risk populations like seniors, Environmental Justice populations, low-income population, and populations with mobility challenges and can cause significant damage to property, crops, and livestock. At-risk populations may also struggle to respond physically to a flooding event that requires evacuation, or financially if property damage were to occur. People and property in FEMA defined floodplains or areas that are in close vicinity to a waterbody are most at risk from floods. Additionally, certain types of infrastructure are at a higher risk from floods including dams, bridges, culverts and roadways. Unmaintained stormwater infrastructure can also exacerbate flooding issues during high precipitation events because of the lack of sufficient drainage.³⁷

ABINGTON

According to the Plymouth County FIS, the 1955 flood was a catalyst for major flood mitigation investment in the Town of Abington. In 1956, three new bridges were constructed at Adams, Central, and Center Streets to replace the culverts damaged in 1955. These bridges were designed to safely pass the "rare" flood that, in 1955, was considered to be the flood flow expected to occur once every 500 to 1,000 years. These bridges have decreased the potential for major flooding. The bridge at Center Street serves as the outlet for Island Grove Pond. At the upstream face of the bridge, an overflow weir was constructed and

³⁷ Abington Conservation Commission Chairman, Public Meeting held January 17, 2023

provided with stop planks and the capability of being adjusted to different weir elevations, providing some flood protection capabilities.³⁸

The Hazus data for Abington discusses the potential severity of 100-year and 500-year flood events. The potential severity for a major flood event occurring in Abington is **Limited: Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than 1 day.** This rating was determined by taking the replacement cost value of all buildings in the SFHA and then calculating what percentage of that number is the Value of Damages to determine around 7.8% of all the total replacement value will be damaged in a 100-year event, and 14.6% in a 500-year event.

Table 4.11: Abington Flood Hazus Data, 2021

Abington		100-Year	500-Year
Building Characteristics	Estimated Total Number of Buildings	5,222	5,222
	Estimated total building replacement value	\$2,154,962,000	\$2,154,962,000
	Estimated residential building value	\$1,751,843,000	\$1,751,843,000
	Estimated non-residential building value	\$403,119,000	\$403,119,000
Building Damages	Damage Level 1-10	11	24
	Damage Level 11-20	4	11
	Damage Level 21-30	0	1
	Damage Level 31-40	0	0
	Damage Level 41-50	0	0
	Damage Level >50	0	0
Population Needs	# of households displaced	72	125
	# of people seeking public shelter	0	1
Debris	Building debris generated (tons)	93	251
	# of truckloads to clear building debris (@ 25 tons/truck)	4	11
Value of Damages (Millions of dollars)	Value of Damages (Millions of dollars)	\$16,960,000	\$31,430,000
	Total property damage	\$5,090,000	\$10,070,000
	Total losses due to business interruption	\$11,870,000	\$21,360,000

Approximately 91% of the building damages (and 81% of the building value) under the 100-year flood scenario were associated with residential housing.³⁹ A 100-year flood event has the potential to cause damage to a total of 15 buildings, 2 commercial and 13 residential buildings. The 500-yr flood event has the potential to cause damage to 36 buildings, 5 commercial and 31 residential buildings. Hazus also measures for potential losses of emergency operation centers, fire stations, hospitals, police stations, and

³⁸ Flood Insurance Study, Plymouth County, Massachusetts, Number 25023CV001D, FEMA, July 22, 2020.

³⁹ FEMA Hazus: Flood Global Risk Report (100-year flood events), May 2021

schools.⁴⁰ In both the 100- and 500-year flood events Hazus estimates no damage will be done to any essential facilities (critical facilities) in Abington. With the possibility of increased frequency and severity of storms and precipitation due to climate change, the number of damaging flood events in Abington will increase in coming years, with the potential to cause more damage than current estimates predict.

EASTON

The Hazus data for Easton discusses the potential severity of 100-year and 500-year flood events. The potential severity for a major flood event occurring in Easton is **Minor: Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of facilities.** Around 0.71% of all the total replacement value will be damaged in a 100-year event, and 1.1% in a 500-year event.

Table 4.12: Easton Flood Hazus Data, 2021⁴¹

Easton		100-Year	500-Year
Building Characteristics	Estimated Total Number of Buildings	7,494	7,494
	Estimated total building replacement value	\$3,588,253,000	\$3,588,253,000
	Estimated residential building value	\$2,683,317,000	\$2,683,317,000
	Estimated non-residential building value	\$904,936,000	\$904,936,000
Building Damages	Damage Level 1-10	27	37
	Damage Level 11-20	6	9
	Damage Level 21-30	2	3
	Damage Level 31-40	0	1
	Damage Level 41-50	0	0
	Damage Level >50	0	0
Population Needs	# of households displaced	154	203
	# of people seeking public shelter	2	9
Debris	Building debris generated (tons)	200	621
	# of truckloads to clear building debris (@ 25 tons/truck)	9	25
Value of Damages (Millions of dollars)	Value of Damages (Millions of dollars)	\$25,470,000	\$38,990,000
	Total property damage	\$13,610,000	\$23,020,000
	Total losses due to business interruption	\$11,860,000	\$15,960,000

Approximately 90% of the buildings (and around 75% of the building value) under the 100-year flood scenario were associated with residential housing.⁴² A 100-year flood event has the potential to cause

⁴⁰ FEMA Hazus: Flood Global Risk Report (100 and 500-year flood events), May 2021

⁴¹ Ibid.

⁴² FEMA Hazus: Flood Global Risk Report (100-year flood events), May 2021

damage to a total of 35 buildings, all of which are residential buildings. The 500-yr flood event has the potential to cause damage to 50 buildings, also all residential buildings. Hazus measures for potential losses of emergency operation centers, fire stations, hospitals, police stations, and schools. In both the 100- and 500-year flood events Hazus estimates no damage will be done to any essential facilities (critical facilities) in Easton.⁴³ With the possibility of increased frequency and severity of storms and precipitation due to climate change, the number of damaging flood events in Easton will increase in coming years, with the potential to cause more damage than current estimates predict.

STOUGHTON

The Hazus data for Stoughton discusses the potential severity of 100-year and 500-year flood events. The potential severity for a major flood event occurring in Stoughton **Minor: Very few injuries, if any. Only minor property damage and minimal disruption on quality of life.** Around 0.51% of all the total replacement value will be damaged in a 100-year event, and 0.59% in a 500-year event.

Table 4.13: Stoughton Flood Hazus Data, 2021⁴⁴

Stoughton		100-Year	500-Year
Building Characteristics	Estimated Total Number of Buildings	9,285	9,285
	Estimated total building replacement value	\$4,325,604,000	\$4,325,604,000
	Estimated residential building value	\$3,087,567,000	\$3,087,567,000
	Estimated non-residential building value	\$1,238,037,000	\$1,238,037,000
Building Damages	Damage Level 1-10	22	25
	Damage Level 11-20	3	6
	Damage Level 21-30	0	0
	Damage Level 31-40	0	0
	Damage Level 41-50	0	0
	Damage Level >50	0	0
Population Needs	# of households displaced	83	99
	# of people seeking public shelter	7	6
Debris	Building debris generated (tons)	114	144
	# of truckloads to clear building debris (@ 25 tons/truck)	5	6
Value of Damages (Millions of dollars)	Value of Damages (Millions of dollars)	\$22,200,000	\$25,650,000
	Total property damage	\$11,460,000	\$13,190,000
	Total losses due to business interruption	\$10,740,000	\$12,470,000

⁴³ FEMA Hazus: Flood Global Risk Report (100 and 500-year flood events), May 2021

⁴⁴ Ibid.

Approximately 90% of the buildings (and around 71% of the building value) under the 100-year flood scenario were associated with residential housing.⁴⁵ A 100-year flood event has the potential to cause damage to a total of 25 buildings, all of which are residential buildings. The 500-yr flood event has the potential to cause damage to 31 buildings, also all residential buildings. Hazus measures for potential losses of emergency operation centers, fire stations, hospitals, police stations, and schools. In both the 100- and 500-year flood events Hazus estimates no damage will be done to any essential facilities (critical facilities) in Stoughton.⁴⁶ With the possibility of increased frequency and severity of storms and precipitation due to climate change, the number of damaging flood events in Stoughton will increase in coming years, with the potential to cause more damage than current estimates predict.

FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

Based on the frequency of past flood events, and the projections for increased frequency and intensity of precipitation events in the coming years due to climate change, the probability of future occurrence of the flood hazard is **Highly Likely: Near 100% probability in the next year.**

4.5.2 DAM FAILURE

DESCRIPTION

Dam failures can result from natural events, human-induced events, or a combination of both. Failures due to natural events such as prolonged periods of rainfall and flooding can result in overtopping, which is the most common cause of dam failure. Overtopping happens when a dam's spillway capacity is exceeded and portions of the dam begin to pass water, erode, and ultimately fail. Other causes of dam failure include design flaws, foundation failure, internal soil erosion, inadequate maintenance, or misoperation.

Complete failure can occur if internal erosion or overtopping causes a structural breach, which releases a high-velocity wall of debris-laden water that rushes downstream, damaging or destroying everything in its path. An additional hazard concern is the cascading effect of one dam failure causing multiple dam failures downstream due to the sudden release of flow.

Dams are classified by size and hazard ratings. The size classification provides a relative description of small, medium, or large, based on the storage capacity and height of the impounded water. The hazard classification relates to the probable consequences of failure or misoperation of the dam; however, the categorization does not relate to the current condition of the dam. The hazard classifications are defined by the MA Department of Conservation and Recreation's Office of Dam Safety (ODS) as follows:

- **High** – Failure or misoperation will result in a probable loss of human life serious damage to homes, industrial or commercial facilities, important public utilities, main highways or railroads.
- **Significant** – Failure or misoperation may result in loss of human life and damage to homes, industrial or commercial facilities, secondary highways or railroads or cause interruption of use or service of relatively important facilities.
- **Low** – Failure or misoperation results in minimal property damage to others. Loss of life is not expected.⁴⁷

The condition of a dam reflects the state of the dam structure itself. The ratings of dams are satisfactory, poor, unsafe, and emergency. A dam's condition will impact how often it should be inspected or how

⁴⁵ FEMA Hazus: Flood Global Risk Report (100-year flood events), May 2021

⁴⁶ FEMA Hazus: Flood Global Risk Report (100 and 500-year flood events), May 2021

⁴⁷ Dam Hazard Potential Classification Table, MA Department of Conservation and Recreation 302 CMR 10.00.

urgent repairs should take place. For emergency dams, repairs need to occur upon notification of the condition to the Commissioner of the Department of Conservation and Recreation and monitoring of the condition should occur hourly. Meanwhile, poor or unsafe dams “must be inspected and reported at least every three months by a registered professional engineer employed by the owner until the dam safety repairs are completed and the dam is found to be in satisfactory condition.”⁴⁸

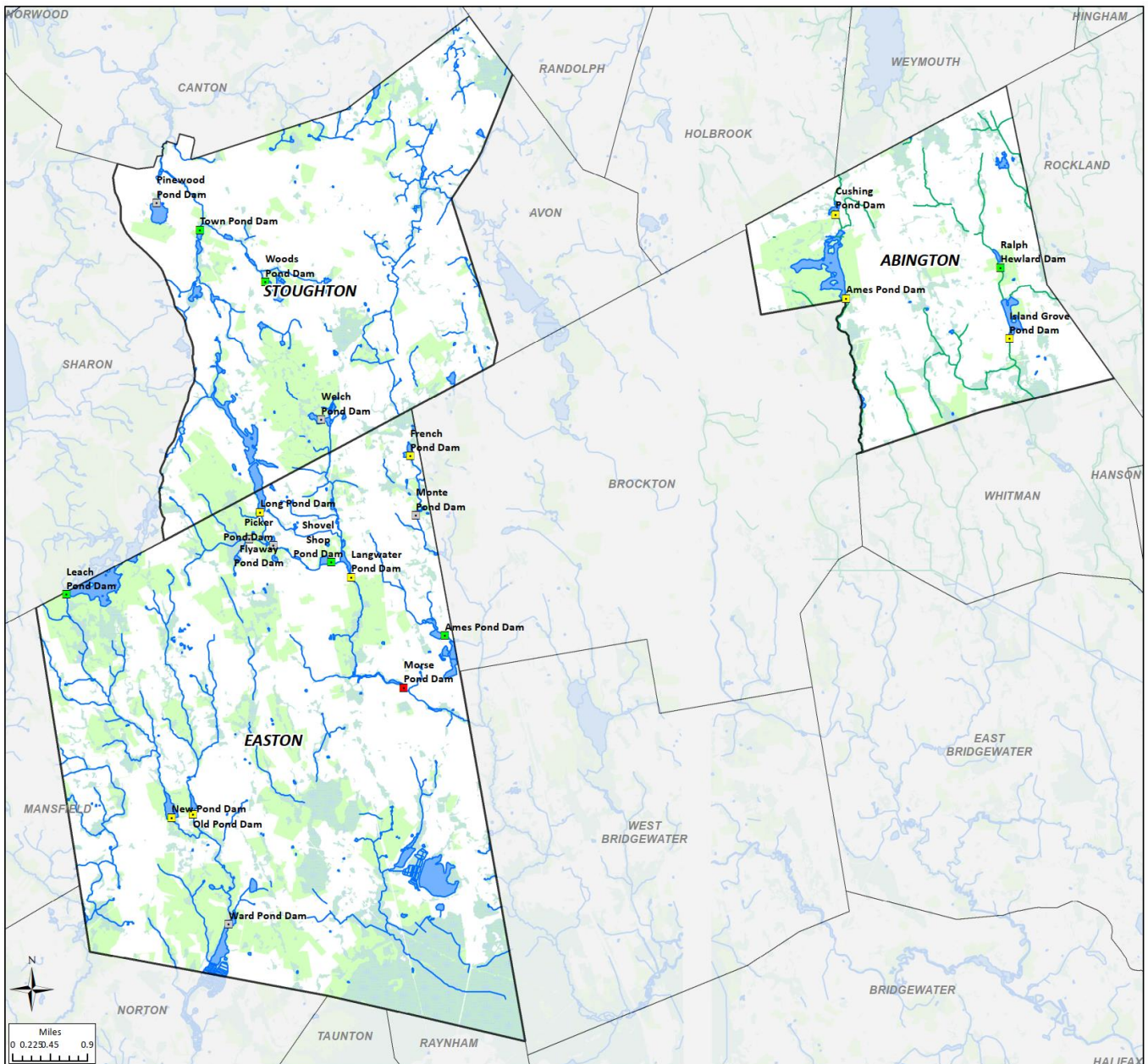
The Planning Area contains only one High Hazard Potential Dam (HHPD) – Morse Pond Dam in Easton. The condition and status of coordination with the dam owner for Morse Pond Dam is discussed in the Easton section below.

DAM LOCATIONS

The locations of the dams in each town with their corresponding hazard classification are shown in Appendix A: Maps. The impact area for dam failure will be determined by the number and location of dams within each town alongside each dam’s hazard potential classification and condition.

⁴⁸ MA Department of Conservation and Recreation 302 CMR 10.00. Inspection Schedule.

Figure 4.1: Dams in the Planning Area by Hazard Potential



**Dams in the Planning
Area by Hazard Potential**
Abington, Easton, and Stoughton
Hazard Mitigation Plan

This map is not the product of a Professional Land Survey. It was created by BETA Group, Inc. for general reference, informational, planning, or guidance use, and is not a legally authoritative source as to location of natural or manmade features. Proper interpretation of this map may require the assistance of appropriate professional services. BETA Group, Inc. makes no warranty, express or implied, related to the spatial accuracy, reliability, completeness, or currentness of this map.

Source:
DCR Office of Dam Safety, 2022.
MassGIS, Prot. and Rec. Open Space, 2022.
MassDEP, Hydrography, 2019.
MassDEP, Wetlands, 2017.



This map is intended for planning purposes only
Date: 7/25/2023

Legend

Dam Hazard Code		Streams
■	High Hazard	Waterbodies
■	Significant Hazard	Wetland
■	Low Hazard	Open Space
■	N/A	

ABINGTON

Abington has five dams, four of which are rated as having significant hazard potential, meaning their failure may result in loss of human life and damage to homes, industrial or commercial facilities, secondary highways or railroads or cause interruption of use or service of relatively important facilities.

Table 4.14: Abington Dam List

Dam Name	Ownership	Hazard Potential Classification	Condition at Last Inspection
Island Grove Pond Dam	Public	Significant	Fair
Ames Pond Dam	Public	Significant	Satisfactory
Ralph Hewlard Dam	Public	Low	Satisfactory
Cushing Pond Dam	Public	Significant	Fair
Hunt's Pond Dam	Public	Significant	Unsafe

Source: Office of Dam Safety, Massachusetts Department of Conservation and Recreation, 2022.

Hunt's Pond Dam, owned by the Town of Brockton and the Town of Abington, is located on the border of Abington and Brockton. A 2022 inspection designated Hunt's Pond Dam as a Significant hazard dam in an Unsafe condition. The report recorded large trees and heavy brush on the embankment, erosion and undermining of the concrete auxiliary spillway, displaced stones in the retaining wall, exposed roots and undulations at the dam's crest, two sinkholes near the primary spillway channel, and depressions behind the right primary spillway discharge channel. The Town of Abington submitted an Emergency Action Plan (EAP) for the dam in 2019, but the most recent March 2022 inspection recommends further analysis, repairs, and modification to endure dam safety.

Island Grove Pond Dam was last inspected in 2017 and was rated as is a Significant hazard dam in Fair condition. The inspection recorded debris along the primary spillway, displaced stones in the masonry walls, eroded riprap and cracks and seepage in the auxiliary spillway.

If any Abington dams were to fail, the total impact area would be **Medium: 10 to 50% of the town affected.**

EASTON

Easton is the Town in this plan with the most dams, with a total of 13. It also contains the one HHPD in the Planning Area, Morse Pond Dam. Morse Pond Dam was built prior to 1775, and the last recorded inspection of the dam was in 2019. The 2018 Easton MVP workshop also recommended attention to the dam, including the need to verify ownership to maintain communication with the owner and observe regularly for upkeep. Like many dams in New England, Morse Pond Dam's age is the critical factor for protecting against dam failure; the dam needs constant maintenance and inspections in order to keep it up to State safety standards.

The EAP for the dam was last updated in 2016 by GZA GeoEnvironmental, Inc. (GZA) for ODS – and a new EAP is recommended so the Town and dam owner can begin to take action to protect the surrounding area and ensure the dam is more resilient to climate change. The EAP for Morse Pond Dam, including inundation maps, was provided to the Town after a meeting with dam owner representatives on August 14, 2023. It states that a failure of the dam would result in damages to downstream residents in Easton

and West Bridgewater.⁴⁹ Within the 2016 EAP, the GZA recommends the development of an Operation and Maintenance Manual for the dam, vegetation clearing, and repairs to the spillway, safety railing, and training walls. A previous Certificate of Non-Compliance report from April of 2015 recommends follow-up inspections every six-months, a Phase II evaluation from GZA, and the repair or breach of the dam. The dam is currently in poor condition according to the most recent inspection, and maintenance is critical to ensuring the safety of the dam and inundation area in the event of a dam breach. In 2015 dam owners also received an estimate for probable repair cost for the dam due to the recommendations within the Certificate of Non-Compliance.

No work or updates were completed on Morse Pond Dam due to a lack of funding necessary to complete repairs. There is also a need for increased coordination between the Town, ODS, and dam representatives to update dam-related documents and plans to gain a better understanding of the dam's current condition since the most recent 2019 inspection and 2015 estimates for repair.

The existing 2016 EAP provides inundation maps that detail how downstream of the dam are a residential, commercial, and industrial area, and that the discharge channel flows through a developed residential area. The area at risk in a potential dam break is four miles downstream along Queset Brook and the Hockomock River. During a "sunny day" scenario,⁵⁰ the approximate dam break flood inundation area includes portions of the occupied buildings along Central Street, presenting the potential for loss of life. A "wet weather" scenario is consistent with the inundation from the model baseflow of a 500-year flood. The current EAP does not include an estimate size of population at risk in the event of a dam failure event.

The EAP also includes the most recent Dam break and Failure evaluations completed in 2009, which, if a breach were to occur, could impact three downstream culverts and the Turnpike Street Bridge, as well as the potential to impact houses and businesses downstream in a trapezoidal area around one to six feet of depth.⁵¹ The 2016 EAP is accessible through Easton's Department of Planning and Economic Development.

Dam representatives emphasized the importance of coordination between the Town, dam owners, and ODS for securing funding of inspections and repairs on the dam in order for it to be properly maintained. Morse Pond Dam is intended to be assessed every two years and is therefore in need of a new inspection.⁵² Representatives also provided the HMPC and Town of Easton with a copy of the dam's most recent EAP for record.

Easton's actions in Section 6.2.2 discuss the Town's mitigation actions and recommend several actions required for the Town and dam owner to take in order to be compliant with FEMA's HHPD protocols. Morse Pond Dam has the potential to cause damage the developed commercial and occupied residential areas, which prompted GZA to rank the dam as High Hazard Potential.⁵³ As climate change impacts the severity and intensity of precipitation events to these areas, they become more vulnerable were the dam to fail.

⁴⁹ Emergency Action Plan. MA00785 Morse Pond Dam. Easton, MA. GZA GeoEnvironmental, Inc., March 2016.

⁵⁰ A "sunny day" failure with assumes starting pool elevations in the impoundment coincident with the normal pool elevation and a "wet weather" failure with a starting pool elevation coincident with the top of dam and the FEMA 500-year flood constant flow routed through Morse Pond.

⁵¹ Ibid.

⁵² National Inventory of Dams, MA00785

⁵³ Emergency Action Plan. MA00785 Morse Pond Dam. Easton, MA. GZA GeoEnvironmental, Inc., March 2016.

Table 4.15: Easton Dam List

Dam Name	Ownership	Hazard Potential Classification	Condition at Last Inspection
Langwater Pond Dam	Public	Significant	Satisfactory
Monte Pond Dam	Private	Non-Jurisdictional	N/A
French Pond Dam	Private	Significant	Poor
New Pond Dam	Public	Significant	Fair
Morse Pond Dam	Private	High	Poor
Ames Pond Dam	Private	Low	Fair
Shovel Shop Pond Dam	Public	Low	Fair
Old Pond Dam	Public	Significant	Poor
Long Pond Dam	Public	Significant	Fair
Picker Pond Dam	Public	Non-Jurisdictional	N/A
Ward Pond Dam	Public	Non-Jurisdictional	N/A
Flyaway Pond Dam	Public	Non-Jurisdictional	N/A
Leach Pond Dam	Public	Low	Poor

Source: Office of Dam Safety, Massachusetts Department of Conservation and Recreation, 2022.

If the Morse Pond Dam or French Pond Dam were to fail in a high precipitation event, the total impact area has the potential to be **Medium: 10 to 50% of the town affected**. However due to the state and hazard rating of the majority of Easton Dams, the overall impact area is **Small: Less than 10% of the town affected**.

STOUGHTON

Stoughton has four total dams, none of which have a hazard classification higher than Low.

Table 4.16: Stoughton Dam List

Dam Name	Ownership	Hazard Potential Classification	Condition at Last Inspection
Pinewood Pond Dam	Public	Non-Jurisdictional	N/A
Town Pond Dam	Public	Low	Fair
Welch Pond Dam	Public	Non-Jurisdictional	N/A
Woods Pond Dam	Public	Low	Poor

Source: Office of Dam Safety, Massachusetts Department of Conservation and Recreation, 2022.

If any Stoughton dams were to fail, the impact area would be **Small: Less than 10% of the town affected**.

HISTORY OF DAM FAILURE

Date	Type	County Affected	Damage (County-wide)	Comments
1/27/2023	Dam Failure, Flooding	Plymouth	Not yet calculated	A privately owned dam in Halifax failed, causing flooding in homes in East Bridgewater

In January of 2023, 20 feet of a privately owned earthen dam on the border of Halifax and East Bridgewater failed, causing damage to 10-12 properties.⁵⁴ Water began to drain into Robbins Pond in East Bridgewater and roads were closed, but no injuries were reported. Both the East Bridgewater fire Department and MEMA responded to the incident which was ultimately taken over by the Massachusetts Department of Conservation and Recreation's Office of Dam Safety as the owner began the process of repairs.⁵⁵

SEVERITY & POTENTIAL EXTENT OF IMPACT

The potential consequences of failure or misoperation of a dam are based on both hazard classification and current condition of the dam. Dams with a High hazard potential and/or current unsafe or emergency conditions may cause loss of human life and serious damage to homes, industrial or commercial facilities, important public utilities, and main highways or railroads – and have a higher probability of failing due to their condition. Populations at risk include those residing in the inundation areas of dams, especially seniors and residents with mobility challenges and those in the inundation areas of HHPDs. For these populations, access to information about the dam failure may be lacking or not timely, and access to transportation and mobility in the case of an evacuation is important to protecting these populations.

HHPDs are especially at risk to the cascading impacts of storms, earthquakes, landslides, wildfires, and other natural hazard events that may affect upstream and downstream flooding potential. HHPDs also have a higher risk potential for significant economic, environmental, or social impacts, as well as multi-jurisdictional impacts, from a dam incident. The expanded potential impact of HHPDs increases the number of locations and vulnerable populations at risk as well as increasing the potential impacts to institutions and critical infrastructure and facilities. Additionally, assumptions made from risk-based data and modeling can potentially increase the emergency response operations in the case of a dam breach, so having an updated EAP and inundation maps for HHPDs is critical to ensuring the safety of locations and populations.

Dams like Hunt's Pond Dam in Abington that have an unsafe condition and Significant hazard potential and Morse Pond Dam in Easton which has a poor condition and High hazard potential should be monitored closely to mitigate the risk of dam failure impacting the town.

ABINGTON

Because of the four Significant hazard dams, the potential severity for dam failure events is **Limited: Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of**

⁵⁴ "MEMA (@MassEMA)," Twitter, January 31, 2023, <https://twitter.com/MassEMA>.

⁵⁵ Leah Comins, "East Bridgewater Fire Responds to Flooding in Town Following Dam Breach," East Bridgewater Fire Department, January 27, 2023, <https://ebfire.org/2023/01/27/east-bridgewater-fire-responds-to-flooding-in-town-following-dam-breach/>.

facilities for more than 1 day. Increased precipitation levels due to climate change may impact this rating in the next iteration of this plan.

EASTON

Because of the one High hazard and five Significant hazard dams, the potential severity for dam failure events is **Limited: Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than 1 day.** Increased precipitation levels due to climate change may impact this rating in the next iteration of this plan.

STOUGHTON

Because of the hazard rating of the dams, the potential severity for dam failure events is **Minor: Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of facilities.** Increased precipitation levels due to climate change may impact this rating in the next iteration of this plan.

FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

As discussed in the next chapter, the general condition and location of dams in the Abington, Easton, and Stoughton makes the likelihood of a future dam failure **Possible: Between 1-10% probability in the next year.** The risk of dam failure is expected to rise with the impacts of climate change, due to the increase in risk of flooding events – dam failure may become a higher risk, especially as longer periods of drought leave areas more susceptible to the impacts of flooding.

4.6 WIND RELATED HAZARDS

4.6.1 HURRICANES & TROPICAL STORMS

DESCRIPTION

Hurricanes that strike the Eastern United States originate in the tropical and subtropical North Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico. The Atlantic hurricane season spans a six-month period (June 1 through November 30). Storms in this period may hit Massachusetts as tropical depressions, tropical storms, or hurricanes – each a different level of a tropical cyclone, or low-pressure systems that usually form over the tropics. Most of the destruction in a tropical cyclone or hurricane event is caused by very high winds, heavy rain, lightning, tornadoes, and storm surges.

- Tropical Depression – Maximum sustained surface wind speed is less than 39 MPH
- Tropical Storm – Maximum sustained surface wind speed from 39-73 MPH
- Hurricane – Maximum sustained surface wind speed exceeds 73 MPH

Hurricane damage is rated by the Saffir-Simpson Wind Rating Scale. The scale does not consider the other forms of damage that may be caused by hurricane storm surges or tornadoes. Instead, it considers potential property damage caused by the high-sustained winds brought by hurricane forces. Below is a description from each ranking on the scale. Most hurricanes that reach Massachusetts are not as severe as their initial strength at formation, often weakening over landfall and approaching MA as tropical storms.

Due to climate change, the severity of tropical storms is expected to increase because warmer ocean temperatures cause the formation of stronger storms. Paired with increases in precipitation due to climate change, hurricanes will only become more dangerous over time for Massachusetts communities.

Table 4.17: Saffir Simpson Hurricane Wind Scale

Category	Sustained Winds	Types of Damage Due to Hurricane Winds
1	74-95 MPH	Very dangerous winds will produce some damage: Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap, and shallowly 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	Extremely dangerous winds will cause extensive damage: Well-constructed frame homes could sustain major roof and siding damage. Many shallowly 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	Devastating damage will occur: 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	Catastrophic damage will occur: 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	Catastrophic damage will occur: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: NOAA, Saffir-Simpson Hurricane Wind Scale, <https://www.nhc.noaa.gov/aboutsshws.php>

LOCATION OF OCCURRENCE

Though none of the municipalities in this plan are coastal communities, hurricanes and tropical storms still have the potential to cause damage across the region. The towns may experience wind damage or inland flooding, as demonstrated in the History of Hurricanes and Tropical Storms in Table 4.18.

Abington, Easton, and Stoughton all experience hurricane and tropical storm events town-wide, so the total impact area is **Large: More than 50% of the town affected.**

HISTORY OF HURRICANES AND TROPICAL STORMS

Table 4.18 below lists known significant hurricane and tropical storm events and damages recorded in Plymouth, Bristol, and Norfolk County from 2015 through 2022. Specific losses incurred by Abington, Easton, and Stoughton are noted where information was available. This table does not list every event that has occurred in the area but does list those that impacted Abington, Easton, or Stoughton directly, or had a high damage cost to the county.

Table 4.18: Hurricane and Tropical Storm History in Bristol, Norfolk, and Plymouth Counties

Date	Type	County Affected	Damage (County-wide)	Comments
9/5/2016	Tropical Storm	Norfolk	\$21,000	Tropical Storm Hermine caused high winds that knocked down trees and wires across roads in Norfolk County
9/20/2017	Tropical Storm	Bristol, Norfolk, Plymouth	\$20,000 (B)*, \$25,000 (N), \$40,000 (P)	Tropical Storm Jose brought strong wind gusts and heavy downpours, cause multiple trees and wires down.
9/7/2019	Tropical Storm	Plymouth	\$500	Hurricane Dorian cause minor wind damage.
8/4/2020	Tropical Storm	Bristol, Norfolk, Plymouth	\$7,000 (B), \$500 (N), \$500 (P)	Tropical Storm Isaias recorded high wind gusts with tree and power line damage.
8/22/2021	Tropical Storm	Norfolk	\$500	Tropical Storm Henri caused flash flooding, waterspouts, and heavy winds across MA.

Source: National Centers for Environmental Information Storm Events Database, NOAA, 2015-2022.

*Notes: (B) – Bristol County; (N) – Norfolk County; (P) – Plymouth County

SEVERITY & POTENTIAL EXTENT OF IMPACT

The Hazus results of potential hurricane events for each municipality showcase the possible damage from 100-year and 500-year hurricane events, which have a 1% or 0.2% chance of occurring each year, respectively. The 500-year (0.2% chance) is the more severe storm of the two. The hurricane models were based on a potential hypothetical hurricane scenario where the storm passed through the center of each town.

In each town, populations including senior and Environmental Justice populations are more vulnerable in a potential hurricane or tropical storm scenario. Maps identifying where these populations may reside in each Town are provided in Appendix A. Ensuring critical facilities maintain safe construction and maintenance to withstand wind speeds and severe storms will help to reduce risk for the critical facilities and other buildings that may be impacted by hurricanes and tropical storms. The Hazus data outlines in the sections below describes the potential for property damage and any interruption to regular operations from a hurricane or tropical storm event.

ABINGTON

A 100-year hurricane event has the potential to cause damage to around 416 buildings, 388 being residential, 19 being commercial, and the rest being agricultural (2), educational (1), governmental (½), industrial (5), or religious (½). A 500-year hurricane event has the potential to impact 1,508 residential buildings and 93 commercial buildings along with the other categories: agricultural (6), educational (3), governmental (2), industrial (25), or religious (6). In both the 100- and 500-year hurricane events Hazus estimates no damage will be done to any essential facilities (critical facilities) in Abington. Hazus does estimate an expected loss of use for several critical facilities, including one day of loss for emergency

operation centers in the 100- and 500-year events, two days loss for fire stations for both events, one day for police stations in both events, and eight days of school loss in the 100-year hurricane event.⁵⁶

Table 4.19 shows the Hazus data for a potential hypothetical hurricane scenario where the storm passed through the center of Abington.

Table 4.19: Abington Hurricane Hazus Data, 2021⁵⁷

Abington		100-Year	500-Year
Building Characteristics	Estimated Total Number of Buildings	5,222	5,222
	Estimated total building replacement value	\$2,154,962,000	\$2,154,962,000
	Estimated residential building value	\$1,751,843,000	\$1,751,843,000
	Estimated non-residential building value	\$403,119,000	\$403,119,000
Building Damages	No damage	4,805.77	3,578.60
	Minor damage	367.43	1,264.87
	Moderate damage	46.94	334.68
	Severe damage	1.49	29.16
	Destruction	0.04	14.69
Population Needs	# of households displaced	15	95
	# of people seeking public shelter	9	51
Debris (tons)	Building debris generated (tons)	5,327	14,639
	Tree debris (tons)	3,941	9,083
	# of truckloads to clear building debris (@ 25 tons/truck)	55	222
Damages	Value of Damages	\$21,983,170	\$87,288,730
	Total property damage	\$21,112,120	\$80,317,320
	Total losses due to business interruption	\$871,050	\$6,971,410

The potential severity for a hurricane event is **Critical: Multiple injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than 1 week.** Hurricane event damage is hard to predict due to factors such as the severity of the incoming storm and abrupt or unexpected changes in weather patterns. Around the nation, extreme hurricane events have caused severe damage through flooding and severe storm conditions; this damage is expected to increase with climate change.

⁵⁶ FEMA Hazus: Hurricane Global Risk Report (100 and 500-year hurricane events), May 2021

⁵⁷ Ibid.

EASTON

The Hazus data shows a potential hypothetical hurricane scenario where the storm passes through the center of Easton. A 100-year hurricane event has the potential to cause damage to around 582 buildings, 525 being residential, 27 being commercial, and the rest being agricultural (3), educational (1), governmental (less than 1), industrial (10), or religious (1). A 500-year hurricane event has the potential to impact 2,108 residential buildings and 124 commercial buildings along with the other categories: agricultural (12), educational (9), governmental (3), industrial (45), or religious (5).

In the 100-year hurricane event Hazus estimates no damage will be done to any essential facilities (critical facilities) in Easton while one school has the probability of at least moderate damage (less than 50%) in the 500-year hurricane event. Hazus estimates an expected loss of use for several critical facilities, including two days of loss for emergency operation centers in the 100- and 500-year events, three days loss for fire stations for both events, one day for police stations in both events, ten days of school loss in the 100-year hurricane event and one day of loss for schools in the 500-year hurricane event.⁵⁸

Table 4.20: Easton Hurricane Hazus Data, 2021⁵⁹

Easton		100-Year	500-Year
Building Characteristics	Estimated Total Number of Buildings	7,494	7,494
	Estimated total building replacement value	\$3,588,253,000	\$3,588,253,000
	Estimated residential building value	\$2,683,317,000	\$2,683,317,000
	Estimated non-residential building value	\$904,936,000	\$904,936,000
Building Damages	No damage	6,926	5,190
	Minor damage	508	1,785
	Moderate damage	58	461
	Severe damage	2	39
	Destruction	0	18
Population Needs	# of households displaced	14	100
	# of people seeking public shelter	9	59
Debris (tons)	Building debris generated (tons)	14,824	37,308
	Tree debris (tons)	13,047	29,858
	# of truckloads to clear building debris (@ 25 tons/truck)	71	298
Damages	Value of Damages	\$33,902,250	\$134,628,470
	Total property damage	\$32,772,240	\$124,175,840

⁵⁸ FEMA Hazus: Hurricane Global Risk Report (100 and 500-year hurricane events), May 2021

⁵⁹ Ibid.

Easton		100-Year	500-Year
	Total losses due to business interruption	\$1,130,010	\$10,452,630

The potential severity for a hurricane event is **Critical**: *Multiple injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than 1 week.* Hurricane event damage is hard to predict due to factors such as the severity of the incoming storm and abrupt or unexpected changes in weather patterns. The severity of damage is expected to increase with climate change.

STOUGHTON

A 100-year hurricane event that passes through the center of Stoughton has the potential to cause damage to around 548 buildings, 509 being residential, 26 being commercial, and the rest being agricultural (2), educational (less than 1), governmental (less than 1), industrial (8), or religious (2). A 500-year hurricane event has the potential to impact 2,241 residential buildings and 141 commercial buildings along with the other categories: agricultural (9), educational (4), governmental (2), industrial (43), or religious (9). In both the 100- and 500-year hurricane events Hazus estimates no damage will be done to any essential facilities (critical facilities) in Stoughton. Hazus does estimate an expected loss of use for several critical facilities, including two days of loss for emergency operation centers in the 100- and 500-year events, one day loss for fire stations for both events, two days for hospitals Stoughton is the only town with hospital beds), one day loss for police stations in both events, nine days of school loss in the 100-year hurricane event and three days loss for schools in the 500-year hurricane event.⁶⁰

Table 4.21: Stoughton Hurricane Hazus Data, 2021⁶¹

Stoughton		100-Year	500-Year
Building Characteristics	Estimated Total Number of Buildings	9,285	9,285
	Estimated total building replacement value	\$4,325,604,000	\$4,325,604,000
	Estimated residential building value	\$3,087,567,000	\$3,087,567,000
	Estimated non-residential building value	\$1,238,037,000	\$1,238,037,000
Building Damages	No damage	8,737	6,836
	Minor damage	487	1,947
	Moderate damage	59	457
	Severe damage	2	33
	Destruction	0	12
Population Needs	# of households displaced	13	111
	# of people seeking public shelter	8	64

⁶⁰ FEMA Hazus: Hurricane Global Risk Report (100 and 500-year hurricane flood events), May 2021

⁶¹ Ibid.

Stoughton		100-Year	500-Year
Debris (tons)	Building debris generated (tons)	8,589	23,462
	Tree debris (tons)	6,744	15,634
	# of truckloads to clear building debris (@ 25 tons/truck)	74	313
Damages	Value of Damages	\$33,152,390	\$127,341,740
	Total property damage	\$31,903,430	\$118,209,610
	Total losses due to business interruption	\$1,248,960	\$9,132,140

The potential severity for a hurricane event is **Critical**: *Multiple injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than 1 week.* Hurricane event damage is hard to predict due to factors such as the severity of the incoming storm and abrupt or unexpected changes in weather patterns. The severity of damage is expected to increase with climate change.

FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

Based on the frequency of past hurricane and tropical storm events, the projections for increased frequency and intensity of storm events in the coming years due to climate change, the probability of future occurrence is **Likely**: *Between 10-100% probability in the next year.*

4.6.2 SEVERE STORMS

DESCRIPTION

Severe storms beyond tropical and winter storms can occur in Massachusetts, often containing high winds, hail or thunderstorm conditions.

Thunderstorms are formed when the right atmospheric conditions combine to provide moisture, lift, and warm unstable air that can rise rapidly. Thunderstorms occur any time of the day and in all months of the year but are most common during summer afternoons and evenings and in conjunction with frontal boundaries. These events usually bring heavy rains (which can cause flash floods), strong winds, hail, lightning, and tornadoes.⁶² Thunderstorms can be dangerous and destructive for several reasons. Storms can form in less than 30 minutes, giving very little warning; they have the potential to produce lightning, hail, tornadoes, powerful straight-line winds, and heavy rains that produce flash flooding.⁶³ During a thunderstorm, severe downdrafts may cause microbursts, a rapid column of airflow with the force of tornado able to knock down mature tree that can create wind speeds over 150 MPH. In Massachusetts, thunderstorms generally occur with precipitation, but dry thunderstorm events also have the potential to start fires.

Hail is formed in towering cumulonimbus clouds (thunderheads) when strong updrafts carry water droplets to a height at which they freeze. Eventually, these ice particles become too heavy to hold up and they fall to the ground at speeds of up to 120 MPH. Hail falls along paths called swaths, which can vary

⁶² "Thunderstorms," National Oceanic and Atmospheric Administration, <https://www.nssl.noaa.gov/education/svrwx101/thunderstorms/>

⁶³ Massachusetts State Hazard Mitigation and Climate Adaptation Plan, 2018

from a few square acres to up to 10 miles wide and 100 miles long. Hail larger than $\frac{3}{4}$ inch in diameter can do great damage to both property and crops, and some storms produce hail over two inches in diameter. Hail causes about \$1 billion in damages annually in the U.S.⁶⁴ High winds and damaging hail can take down trees, knock out power, and damage infrastructure. The size of hailstones is best determined by measuring their diameter with a ruler. Table 4.22 shows a list of recorded hail sizes and their reference object counterpart.

Table 4.22: Hail Size Chart and Object Reference

Hail Size (in.)	Object Analogue Reported
0.5	Marble, moth ball
0.75	Penny
0.88	Nickel
1	Quarter
1.25	Half dollar
1.5	Walnut, ping pong
1.75	Golf ball
2	Hen egg
2.5	Tennis ball
2.75	Baseball
3	Teacup
4	Softball
4.5	Grapefruit

Source: NOAA Storm Prediction Center

There is no single standard for measuring the strength or magnitude of a lightning storm. Lightning events are often measured by the damage they produce. The charge and temperature of each bolt of lightning is different yet could be lethal or cause damage. June, July, and August are peak months for lightning activity in the United States. In 2021, Massachusetts had a total lightning count of 109,277 which includes cloud-to-ground strokes and cloud-only lightning events.⁶⁵

Table 4.23 shows the levels of wind speed categorized by damage type in severe storm events. Severe Storm conditions can cause damage like power outages due to downed trees or other wind damage, road blockages and some flooding.

Table 4.23: Wind Speed Estimates and Descriptions of Damage for Severe Storms

Wind Speed Estimate	Description
25-31 MPH	Large branches in motion; whistling heard in telephone wires

⁶⁴ "Hail," NOAA National Severe Storms Laboratory, <https://www.nssl.noaa.gov/education/svrwx101/hail/>

⁶⁵ "2021 Annual Lightning Report", Vaisala, 2021.

32-38 MPH	Whole trees in motion; inconvenience felt walking against the wind
39-54 MPH	Twigs break off trees; wind generally impedes progress
55-72 MPH	Damage to chimneys and TV antennas; pushes over shallow rooted trees
73-112 MPH	Peels surfaces off roofs; windows broken; light mobile homes pushed or overturned; moving cars pushed off road
113-157 MPH	Roofs torn off houses; cars lifted off ground

Source: National Weather Service

LOCATION OF OCCURRENCE

The entire state of Massachusetts experience severe storms including thunderstorms and high wind events. Coastal areas are more prone to high winds. Eastern Massachusetts experiences an average of 10-20 thunderstorms per year according to NOAA.⁶⁶

Abington, Easton, and Stoughton all experience severe storm events town wide, the total impact area is **Large: More than 50% of the town affected.**

HISTORY OF SEVERE STORMS

Table 4.24 lists known severe storm-related events and damages recorded in Plymouth, Bristol, and Norfolk County from 2015 through 2022. Specific losses incurred by Abington, Easton, and Stoughton are noted where information was available. Some of these events will overlap with those listed in Table 4.28 for winter storms due to the recorded presence of high winds or other conditions characteristic of severe storms. This table does not list every event that has occurred in the area but does list those that impacted Abington, Easton, or Stoughton directly, or had a high damage cost to the county.

Table 4.24: Severe Storm History in Bristol, Norfolk, and Plymouth Counties

Date	Type	County Affected	Damage (County-wide)	Comments
2/25/2016	High Wind	Bristol, Norfolk, Plymouth	\$15,000 (B)*, \$50,000 (N), \$20,000 (P)	Thunderstorms and winds knocked down trees and power lines
3/31/2016	High Wind	Plymouth	\$30,000	Wind damage across MA and RI, trees downed on service wires in Abington
4/3/2016	Strong Wind	Plymouth	\$15,000	Strong winds and snow brought a tree down and caused 2 deaths in Abington.
7/22/2016	Thunderstorm Winds	Bristol, Norfolk	\$5,000 (B), \$50,000 (N)	Showers and thunderstorms in the area caused downed trees in Stoughton and Easton

Date	Type	County Affected	Damage (County-wide)	Comments
3/2/2018	High Wind	Norfolk, Plymouth	\$35,000 (N), \$45,000 (P)	Trees and wires down in Norfolk County, high wind, heavy snow, flooding, one death reported in Plymouth County
1/24/2019	High Wind	Bristol, Plymouth	\$2,000 (B) \$15,000 (P)	Trees and wires down from high winds
10/16/2019 and 10/17/2019	Strong Wind	Bristol, Plymouth	\$3,000 (B), \$500 (P)	Trees down due to strong winds
2/7/2020	High Wind	Plymouth	\$3,000	Damaging winds caused power outages and trees down, in Abington a tree fell, blocking Route 18
6/28/2020	Thunderstorm Winds	Plymouth	\$8,000	Thunderstorms and flash flooding cause downed trees
11/30/2020	High Wind	Bristol	\$12,500	Wind gusts toppled trees in Easton and across Bristol County
6/8/2021	Thunderstorm Winds	Norfolk	\$3,200	Scattered thunderstorms and flash flooding, trees down in Stoughton
7/23/2021	Hail	Plymouth	No damages documented	Dime sized hail reported
10/26/2021	High Wind	Bristol, Norfolk, Plymouth	\$1,880,039 (B), \$276,553 (N) \$2,650,000 (P)	Nor'easter underwent bombogenesis and caused mass power outages and delays to municipal and school operations, and damaged utilities requiring cleanup in Bristol and Norfolk Counties

Source: National Centers for Environmental Information Storm Events Database, NOAA, 2015-2022.

*Notes: (B) – Bristol County; (N) – Norfolk County; (P) – Plymouth County

SEVERITY & POTENTIAL EXTENT OF IMPACT

Like hurricanes and tropical storms, populations including senior populations, populations with mobility challenges, and Environmental Justice populations are more vulnerable according to their physical and financial ability to respond in a potential severe storm scenario. Maps identifying where these populations may reside in each Town are provided in Appendix A. Ensuring critical facilities maintain safe construction and maintenance to withstand wind speeds and severe storms will help to reduce risk for the critical facilities and other buildings that may be impacted by a severe storm event.

ABINGTON

Severe storm and thunderstorm conditions often occur in Abington, causing damage like power outages due to downed trees or other wind damage, road blockages and some flooding. Severe winds also occur within or outside of thunderstorm events, which increases the overall frequency of these events.

Populations relying on electricity for medical devices, low-income individuals, and those without personal transportation means are especially vulnerable to severe storms that result in power outages. In severe storm scenarios, ensuring vulnerable populations in each town in the Planning Area have access to safe and reliable electricity and mobility sources could help save lives.⁶⁷

Protection against wind damage is key to mitigating severe storm damage. Several past severe wind and storm events have caused casualties and blocked important roads like Route 18 due to fallen trees. The HMPC specifically noted that diseased trees in each town were a cause for concern as severe storm events increase in severity due to climate change. The potential severity for severe storms is **Limited: Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than 1 day.**

EASTON AND STOUGHTON

Severe storm and thunderstorm conditions often occur in Easton, and Stoughton as well, causing damage like power outages due to downed trees or other wind damage, road blockages and some flooding. Easton has struggled with windstorms knocking down power lines and trees that block roadways. Downed power lines have resulted in at least one and sometimes many days of outages in many areas of town. In Stoughton, diseased trees in town are a cause for concern as severe storm events increase in severity due to climate change. The HMPC specifically noted that diseased trees in town were a cause for concern as severe storm events increase in severity due to climate change. The potential severity for severe storms in Easton, and Stoughton is **Limited: Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than 1 day.**

FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

Based on the frequency of extreme thunderstorm and lightning events and the projections for climate change, the probability of future occurrence of the thunderstorm hazard is **Likely: Between 10-100% probability in the next year.**

4.6.3 TORNADOES

DESCRIPTION

A tornado is a violent windstorm with a twisting, funnel-shaped cloud. Winds in most tornadoes are less than 100 MPH, but in the most violent, and least frequent tornadoes, wind speeds can exceed 250 MPH. Tornadoes typically track along the ground for a few miles or less and are less than 100 yards wide, though some can remain in contact with the earth for well over fifty miles and exceed one mile in width. They are often spawned by thunderstorms or hurricanes. Tornadoes are produced when cool air overrides a layer of warm air, forcing the warm air to rise rapidly. The damage from a tornado is a result of high wind velocity and wind-blown debris.

Tornadoes are ranked by severity on the Enhanced Fujita Scale (EF Scale) from F0, weak with light damage, to F5, violent with incredible damage. Each rating on the scale increases in wind speed and damage

⁶⁷ Abington Resident, Abington Public Health Nurse, and Chair of the Town of Easton Commission on Disability, Public Meeting held January 17, 2023

inflicted.⁶⁸ The speed of a tornado is difficult to safely calculate and is not necessarily a reflection of the storm's strength. Severity is measured by the amount of damage inflicted on an area. The EF Scale, adapted from the National Weather Service's depiction, is shown in Table 4.25.

Tornadoes may cause infrastructure damage, storm drainage issues, dangerous debris and loss of electricity depending on their strength.

Table 4.25: Enhanced Fujita Scale with Descriptions

EF Rating	3 Second Gust (mph)	Description
0	65-85	Light Damage. Some damage to chimneys; branches broken off trees, shallow-rooted trees uprooted, sign boards damaged.
1	86-110	Moderate damage. Roof surfaces peeled off; mobile homes pushed foundations or overturned; moving autos pushed off road.
2	111-135	Considerable damage. Roofs torn from frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light objects become projectiles.
3	136-165	Severe damage. Roofs and some walls torn from well-constructed houses; trains overturned; most trees in forested area uprooted; heavy cars lifted and thrown.
4	166-200	Devastating damage. Well-constructed houses leveled; structures with weak foundation blown some distance; cars thrown; large missiles generated.
5	Over 200	Incredible damage. Strong frame houses lifted off foundations, carried considerable distances, and disintegrated; auto-sized missiles airborne for several hundred feet or more; trees debarked.

Source: "The Enhanced Fujita Scale," National Weather Service.

LOCATION OF OCCURRENCE

Tornado events are not a common occurrence in Massachusetts, and most of the tornadoes that do occur do not incur severe damage or have long lives. According to the SHMCAP, the areas at greatest risk of a tornado touchdown in Massachusetts run from central to northeastern part of the state. On average, six tornadoes touch down in the Northeast every year. Some portions of Norfolk County are also more tornado-prone than the rest of the state.⁶⁹ Though damage may be severe, the overall area of impact of a tornado would likely be **Small: Less than 10% of the town affected.**

HISTORY OF TORNADOES

Table 4.26 below lists known tornado events and damages recorded in Plymouth, Bristol, and Norfolk County from 2015 through 2022. Specific losses incurred by Abington, Easton, or Stoughton are noted where information was available. This table does not list every event that has occurred in the area, but does list those that impacted one of Abington, Easton, and Stoughton directly, or had a high damage cost to each county.

⁶⁸ National Weather Service, The Enhanced Fujita Scale (EF Scale), <https://www.weather.gov/oun/efscale>.

⁶⁹ "Tornado Hazard Profile," Massachusetts State Hazard Mitigation and Climate Adaptation Plan, 2018.

Table 4.26: Tornado History in Bristol, Norfolk, and Plymouth Counties

Date	Type	County Affected	Damage (County-wide)	Comments
6/23/2015	Tornado	Norfolk	\$20,000	EF0 tornado touched down in Wrentham and downed several trees related to a thunderstorm with damaging wind sheer
10/23/2018	Tornado	Bristol	\$20,000	Wind shear caused an EF0 to touch down in Norton with trees down that caused damage to some structures
10/7/2020	Tornado	Norfolk	\$6,000	EF0 spotted in Millis that downed trees and a streetlamp, related to a derecho that left many out of power in the state

Source: National Centers for Environmental Information Storm Events Database, NOAA, 2015-2022.

SEVERITY & POTENTIAL EXTENT OF IMPACT

Tornadoes and their associated winds can cause damage to buildings, trees, and power lines. Evacuation routes may be blocked by downed trees and other debris. Tornadoes are a town-wide hazard, however damage due to tornadoes depends on the track of the tornado and is limited.

Vulnerable populations during a tornado event include seniors, populations with mobility challenges, and Environmental Justice due to each group's physical and financial ability to respond in a potential tornado scenario. Maps identifying where these populations may reside in each Town are provided in Appendix A. Ensuring critical facilities maintain safe construction and maintenance to withstand extreme wind speeds will help to reduce risk for the critical facilities and other buildings that may be impacted by a tornado storm event.

For Abington, Easton, and Stoughton, the infrequency of tornado occurrence creates the possibility for a severe tornado to wreak havoc on an area not used to or prepared for this type of event. Because the severity of a tornado is based on damage, the potential severity for tornadoes is **Critical: Multiple injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than 1 week.**

FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

Due to the landscape and type of severe storms in Massachusetts, especially in the eastern parts of the state, the probability of a tornado occurring is **Possible: Between 1-10% probability in the next year in Bristol, Norfolk, and Plymouth Counties.**

4.7 WINTER RELATED HAZARDS

4.7.1 WINTER STORMS

DESCRIPTION

Winter storms are categorized by heavy amounts of snow, ice, and extreme cold, all of which may occur independently or at the same time. Winter storms vary in size and strength and can be accompanied by strong winds that create blizzard conditions and dangerous wind chill. There are three categories of winter storms:

- A blizzard is the most dangerous of the winter storms; it consists of low temperatures, heavy snowfall, and winds of at least 35 miles per hour.
- Snow squalls are brief, intense snow showers accompanied by strong, gusty winds where accumulation may be significant.⁷⁰
- Ice storms occur when moisture falls and freezes immediately upon impact.

Ice storms result from the accumulation of freezing rain, which is rain that becomes super-cooled and freezes upon impact with cold surfaces.⁷¹ The Sperry–Piltz Ice Accumulation (SPIA) Index is a scale for rating ice storm intensity, based on the expected storm size, ice accumulation, and damages on structures, especially exposed overhead utility systems.⁷² The SPIA Index uses forecast information to rate an upcoming ice storm's impact from zero (little impact) to five (catastrophic damage to exposed utility systems) measured by radial ice accumulation, wind speeds, and temperatures during the storm event. Because the SPIA Index includes measures for wind speeds and temperature in its rating system, damages from the Index can be applied to other winter storm events that accumulate ice and include high winds.

Table 4.27: Sperry-Piltz Ice Accumulation (SPIA) Index

Ice Damage Index	Damage Descriptions
0	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
2	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
3	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 to 5 days.
4	Prolonged and widespread utility interruptions with extensive damage to main distribution feeder lines and some high voltage transmission lines/structures. Outages lasting 5 to 10 days.

⁷⁰ "Winter Storms," NOAA National Severe Storms Laboratory, <https://www.nssl.noaa.gov/education/svrwx101/winter/types/>

⁷¹ Ibid.

⁷² "SPIA Index," <https://www.spia-index.com/>

Ice Damage Index	Damage Descriptions
5	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.

Source: SPIA® Index

LOCATION OF OCCURRENCE

Abington, Easton, and Stoughton are all susceptible to winter storms. Though they may experience different icy conditions or inches of snow, the nature of winter storms means that all the towns will be impacted within one storm system. While higher snow accumulations are more prevalent in Western and Central Massachusetts and nor'easters may heavily impact coastal areas⁷³, municipalities between these two extremes still face the extreme conditions of winter storms on a nearly yearly basis.

Abington, Easton, and Stoughton all experience winter storm events town wide, the total impact area is **Large: More than 50% of the town affected.**

HISTORY OF WINTER STORMS

Table 4.28 below lists known significant winter storm events and damages recorded in Plymouth, Bristol, and Norfolk County from 2015 through 2022. Specific losses incurred by Abington, Easton, and Stoughton are noted where information was available. This table does not list every event that has occurred in the area but does list those that impacted Abington, Easton, or Stoughton directly, or had a high damage cost to the county.

Table 4.28: Winter Storm History in Bristol, Norfolk, and Plymouth Counties

Date	Type	County Affected		Damage (County-wide)	Comments
2/8/2013	Severe Winter Storm	Bristol, Plymouth	Norfolk,	\$245,000 (B), \$508,000 (N), \$9.3 Million (P)*	Severe Winter storm conditions, blizzard conditions with high wind gusts, and flooding caused extreme damage to coastal communities. Recorded average of 2-2.5 ft of snow, FEMA declared disaster DR-4110-MA
1/26/2015	Severe Winter Storm	Bristol, Plymouth	Norfolk,	No damages documented	Average snowfall reported 2-3 feet, two storm-related fatalities reported in MA, FEMA declared disaster DR-4214-MA

⁷³ "Severe Winter Storm/Nor'easter Profile." Massachusetts State Hazard Mitigation and Climate Adaptation Plan, 2018.

Date	Type	County Affected		Damage (County-wide)	Comments
2/14/2015	Heavy Snow	Bristol,	Norfolk,	\$10,000 (P)	8-17 inches of snow in Bristol County, a barn collapsed in Stoughton. 12-19 inches of snow in Norfolk County, blizzard conditions and 12-17 inches in Plymouth County
2/5/2016	Heavy Snow	Bristol, Plymouth		\$40,000 (B), \$150,000 (P)	6-11 inches of snow in Bristol County, trees and powerlines downed in Easton. 1-10 inches in Plymouth County
12/22/2017	Winter Weather	Bristol, Plymouth		\$20,000 (B) \$20,000 (P)	Icy conditions cause multi-car accident on I-95, roughly one tenth ice accumulation recorded in Plymouth County causing several vehicle accidents
3/3/2018	Nor'easter, Flooding	Bristol,	Norfolk,	No damages documented	Heavy snow, rainfall, and winds cause storm conditions that took out power and caused two storm-related deaths reported in the state, FEMA declared disaster DR-4372-MA
3/13/2018	Winter Storm	Bristol, Norfolk		\$100,000 (B), \$57,000 (N), \$50,000 (P)	11-7 inches of snow in Bristol County, trees and wires down across the county. 10-20 inches across Norfolk County with similar results. There were two storm related deaths in the state, FEMA declared disaster DR-4379-MA
10/30/2020	Winter Weather, Heavy Snow	Bristol,	Norfolk,	\$2,400 (B), \$1,800 (N)	3-4 inches of very heavy, wet snow fell across Bristol County, caused tree and powerlines to collapse, 5-7 inches in Norfolk County, and 11-18 inches in Plymouth County

Date	Type	County Affected		Damage (County-wide)	Comments
12/16/2020	Heavy Snow	Bristol, Plymouth	Norfolk,	No damages documented	7-10 inches in Bristol County, 12-17 inches of snow in Norfolk County, and 8-14 in Plymouth County
1/28/2022	Strong Winter Storm	Bristol, Plymouth	Norfolk,	\$2,500 (P)	Southeast MA covered in 30 in of snow with high wind gusts, FEMA declared disaster DR-4651-MA

Source: National Centers for Environmental Information Storm Events Database, NOAA, 2013-2022.

*Notes: (B) – Bristol County; (N) – Norfolk County; (P) – Plymouth County

SEVERITY & POTENTIAL EXTENT OF IMPACT

Even as winters are globally becoming warmer, blizzard and severe storm conditions are increasing due to climate change. These types of storms already occur frequently, and climate change will exacerbate that frequency and severity, putting more focus on higher damage predictions.⁷⁴ The combined impacts of winter storm events come from high winds, heavy snow, icy conditions, and possible extremely cold temperatures.

For Abington, Easton, and Stoughton, this means power outages, blocked roads, and damaged infrastructure as well as potential loss of human life from a multitude of secondary impacts like vehicular accidents or hypothermia. Especially vulnerable populations include those with limited access to mobility, including senior citizens and those with mental or physical disabilities due to extreme cold and dangerous conditions that could potentially leave people stranded or isolated for long periods of time.

The potential severity for winter storms in the Planning Area is **Critical: Multiple injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than 1 week.**

FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

The probability of future occurrences of winter storm events impacting Abington, Easton, and Stoughton based on past event occurrences and the impact of climate change is **Highly Likely: Between 10-100% probability in the next year.** Even as winters are globally becoming warmer, blizzard and severe storm conditions are increasing due to climate change.

4.8 FIRE-RELATED HAZARDS

4.8.1 WILDFIRES

DESCRIPTION

A fire that burns through vegetation that is predominantly shrubs, brush, and scrub growth is known as a brushfire. Favorable fire conditions arise from extended periods of hot, dry weather and accumulated

⁷⁴ "Climate Change and Natural Hazard Taxonomy," Massachusetts State Hazard Mitigation and Climate Adaptation Plan, 2018.

vegetation. While wildfires are generally associated with thousands of acres of trees burning, brushfires tend to be smaller, confined to the understory, and manageable. Both wildfires and brushfire spread faster in hot, dry conditions where fuels like shrubs, trees, and dry grasses are available.

Wildfires and brushfires can be caused by human interference (i.e., campfires or auto accidents) or by various natural (i.e., lightning) actions. Wildfire season in Massachusetts lasts from March to June, with April being the month that fires are most likely to occur. Factors like yearly snowpack, droughts, and weather conditions like wind can all impact the start, strength, and spread of brushfires in the area.

Wildfires are classified by their size and progression through the National Fire Danger Rating System (NFDRS). Once a wildfire has been detected and the area assessed, the wildfire is assigned one of the following categories from lowest to highest:

- Fire Danger Level: Low (usually burn off after a few hours of water, caused by intense heat sources like lightning)
- Fire Danger Level: Moderate (growing and threatening, especially on windy days, easier to control)
- Fire Danger Level: High (aggressive fires that spread easily in small fuel and ignite readily)
- Fire Danger Level: Very High (spread rapidly and intensely after ignition and are visible from far away)
- Fire Danger Level: Extreme (major very aggressive fire that may last for days and is visible from far distances).⁷⁵

These categories may change as the wildfire continues to burn depending on the types of fuels, weather conditions, and slopes in the vicinity of the fire.

LOCATION OF OCCURRENCE

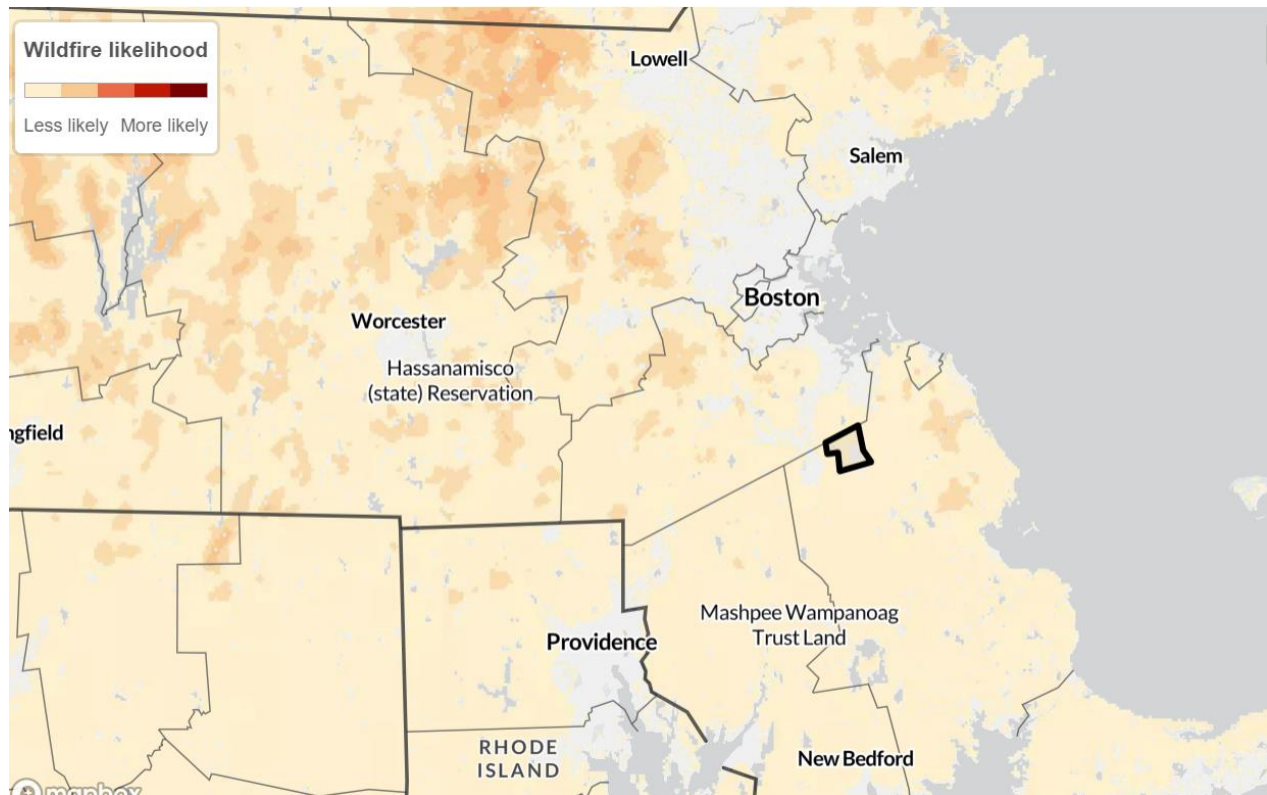
The ecosystems that are most susceptible to the wildfire hazard are pitch pine, scrub oak, and oak forests, as these areas contain the most flammable vegetative fuels.⁷⁶

Within the context of the United States wildfires do not commonly occur in Massachusetts. Figure 4.2 shows the potential of wildfire occurrences within the region. Within Abington, Easton, and Stoughton the impact area of a wildfire is **Small: Less than 10% of the town affected.**

⁷⁵ “National Fire Danger Rating System,” United States Department of Agriculture, <https://www.fs.usda.gov/detail/cibola/landmanagement/resourcemanagement/?cid=stelprdb5368839>

⁷⁶ “Fire-Related Hazards,” Natural Hazard Mitigation Plan for the Old Colony Region, 2015.

Figure 4.2: Wildfire Risk in the United States



Source: Wildfire Risk to Communities. USDA Forest Service. <https://wildfirerisk.org/>

HISTORY OF WILDFIRES

No wildfires were recorded from 2015 - 2023 in the Planning Area by the National Centers for Environmental Information Storm Events Database from NOAA or the Fire, Weather & Avalanche Center.

SEVERITY & POTENTIAL EXTENT OF IMPACT

Due to the impacts of climate change, longer periods of drought and more severe storms that bring lightning strikes greatly increase the potential for ignition of fires in town. A large brushfire on could destroy large tracts of forest, homes, and utility lines affecting power, internet, and phone service. Smoke inhalation could cause breathing problems to residents, especially to vulnerable populations like seniors, low-income residents without sufficient access to safe air quality, or those with pre-existing conditions including Asthma.

In Abington, though high rates of development are lessening the risk for wildfires, areas like Ames Nowell State Park, that contain a majority deciduous forest, may be susceptible to fires in their driest season.^{77 78} Areas of potential fire spread in Abington, however, are not near to densely populated areas, so Abington's neighborhoods are not extremely vulnerable to large wildfires.

⁷⁷ Commonwealth of Massachusetts, "MassGIS Data: 2016 Land Cover/Land Use," Mass.gov, n.d., <https://www.mass.gov/info-details/massgis-data-2016-land-coverland-use>.

⁷⁸ "How different tree species impact the spread of wildfire," Alberta Government, 2012.

Much of Easton is covered in forested wetland, which are less likely to promote fire spread.⁷⁹ The area most at risk for the spread of fire is likely the area containing the Clifford G. Grant Reservation, Easton Town Forest, and Oliver Ames Parker Reservation. This large area contains a mix of deciduous and evergreen forest and is close to Easton Middle school – but it also contains wetlands, which may help to slow the spread of a wildfire if one were to occur. The Easton Fire Department is also located less than 1000 feet away from the property, providing quick response.⁸⁰

In Stoughton, areas like the Chemung Hill Conservation Area, Ames Long Pond Area, and Stoughton Memorial Conservation Land present potential for fire spread due to their deciduous and evergreen forest makeup. Of these three locations, only the Chemung Hill conservation Area is adjacent to a more populous neighborhood and approximately 2 miles from the Stoughton Fire Department.⁸¹

Even after a fire has been stopped by fire services, there are lasting impacts to individuals and communities like the potential loss of property or life. Because of this, the damage potential for brushfires in Abington, Easton, and Stoughton is rated as **Limited: Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than 1 day.**

FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

Yearly snowpack is expected to decrease because of climate change, meaning that there will be fewer water sources resulting from snow melt and drier spring and summer groundwater conditions – causing more ample opportunity for the spread of wildfires or brushfires on dried vegetation and ground. Increased periods of drought will also cause the potential for wildfire to start and spread to increase. Rising temperatures also impact the number of lightning events per year, meaning the chance of lightning ignition of wildfires becomes a higher risk. Therefore, the probability of future occurrence is **Possible: Between 1-10% probability in the next year.**

4.9 GEOLOGIC HAZARDS

4.9.1 EARTHQUAKES

DESCRIPTION

An earthquake is the result of a sudden release of energy in the Earth's crust that creates seismic waves. The felt motion is the result of several kinds of seismic vibrations. The primary, secondary, and surface waves cause different vibrations that may impact structure. Primary waves are the first waves to cause the vibrations of a building and secondary waves can cause structures to vibrate from side to side. Surface waves arrive last and may cause low-frequency vibrations and are more likely to cause tall buildings to vibrate. Surface waves decline less rapidly than body waves, so as the distance from the fault increases, tall buildings located at farther distances from the epicenter can still be damaged. Damaging earthquakes can cause soil liquefaction, ground displacement, flooding, and increase fire risks.⁸²

Earthquakes are measured on the Mercalli scale; a modified version that is commonly used in news stories and public communication is shown in Figure 4.3.

⁷⁹ Robert Sanders, "Wildfire Management vs. Fire Suppression Benefits Forest and Watershed," Berkeley News, October 29, 2018, <https://news.berkeley.edu/2016/10/24/wildfire-management-vs-suppression-benefits-forest-and-watershed/>.

⁸⁰ Commonwealth of Massachusetts, "MassGIS Data: 2016 Land Cover/Land Use," Mass.gov, n.d., <https://www.mass.gov/info-details/massgis-data-2016-land-coverland-use>.

⁸¹ Ibid.

⁸² "Geological and Mining Engineering and Sciences: Earthquakes," Michigan Technological University.

Figure 4.3: Modified Mercalli Scale

Earthquake Magnitude Scale		
Magnitude	Earthquake Effects	Estimated Number Each Year
2.5 or less	Usually not felt, but can be recorded by seismograph.	Millions
2.5 to 5.4	Often felt, but only causes minor damage.	500,000
5.5 to 6.0	Slight damage to buildings and other structures.	350
6.1 to 6.9	May cause a lot of damage in very populated areas.	100
7.0 to 7.9	Major earthquake. Serious damage.	10-15
8.0 or greater	Great earthquake. Can totally destroy communities near the epicenter.	One every year or two

Source: “Modified Mercalli Intensity Scale,” Michigan Technological University.

LOCATION OF OCCURRENCE

Earthquakes can occur anywhere within Massachusetts, which is situated on the North American Plate, though the Planning Area is more likely to feel the aftershocks of earthquakes originating from Canada, where the plates are more seismically active.⁸³ A significant earthquake event has the potential to impact a large area – **Large: More than 50% of the town affected.**

HISTORY OF EARTHQUAKES

No earthquakes of note have been recorded in the years since the 2015 plan.

SEVERITY & POTENTIAL EXTENT OF IMPACT

Hazus tracks the building damage by building type and zoning type for earthquake scenarios. It also estimates the number of people that will be injured and killed, broken down into four levels that describe the extent and severity of injuries. The levels are:

1. Severity Level 1: Injuries will require medical attention, but hospitalization is not needed.
2. Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
3. Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
4. Severity Level 4: Victims are killed by the earthquake.⁸⁴

All new buildings and developments in each municipality are required to meet the MA State standards for structural design that are based on the 2015 International Building Code from the International Code Council (ICC). The standards use an equation to determine the seismic loads for foundation and retaining walls that must be examined by a design professional for approval.⁸⁵ While new buildings uphold international standard, the buildings most at risk during an earthquake are structures built before 1975 when the first edition of the Massachusetts State Building Code became effective.⁸⁶ Earthquakes could also cause severe damage to dams and other important infrastructure.

⁸³ “Earthquake Hazard Profile,” Massachusetts State Hazard Mitigation and Climate Adaptation Plan, 2018.

⁸⁴ FEMA Hazus: Earthquake Global Risk Report (Center of Town event), May 2021

⁸⁵ 780 CMR: Massachusetts Amendments to the International Building Code 2015

⁸⁶ Commonwealth of Massachusetts, “Dates and Editions of Massachusetts Building Code (780 CMR),” Mass.gov, n.d., <https://www.mass.gov/service-details/dates-and-editions-of-massachusetts-building-code-780-cmr>.

In each town, populations including seniors, populations with mobility challenges, and Environmental Justice populations are more vulnerable in a potential earthquake scenario. Maps identifying where these populations may reside in each Town are provided in Appendix A. Ensuring the residential buildings of vulnerable populations and other critical facilities maintain safe construction and maintenance to withstand earthquakes will help to reduce risk for damage to buildings and potential injuries or fatalities. The Hazus data outlines in the sections below describes the potential for property damage, injury, casualties, and any interruption to regular operations from a hurricane or tropical storm event

As shown in the Tables below, the potential severity for a major earthquake event in each town represented from the Hazus analyses for the Planning Area is close to exactly **Critical: Multiple injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than 1 week.**

ABINGTON

The Hazus analysis for earthquakes is based on a potential event where the epicenter of a magnitude 5 earthquake originated in the center of Abington. In this scenario, 2,650 buildings in town suffer damage, and 59 of those buildings are potentially destroyed completely. This potential earthquake event causes \$244,992,900 in property damage. Most of the impacted buildings (1,978) are single family residential homes, followed by other residential and commercial buildings. Hazus estimates at least moderate damage (more than 50%) will be done to essential facilities, including five schools, the emergency operation center, the police station, and the fire station.

Table 4.29: Abington Earthquake Hazus Data, 2021⁸⁷

Abington		5 Magnitude, Center of Town
Building Characteristics	Estimated Total Number of Buildings	5,222
	Estimated total building replacement value	\$2,154,962,000
	Estimated residential building value	\$1,751,843,000
	Estimated non-residential building value	\$403,119,000
Building Damages	# of buildings sustaining no damage	2,571
	# of buildings sustaining slight damage	1,531
	# of buildings sustaining moderate damage	829
	# of buildings sustaining extensive damage	231
	# of buildings completely damaged	59
Population Needs	# of households displaced	301
	# of people seeking public shelter	162
Debris	Building debris generated (tons)	50,000
	Brick/Wood	21,000

⁸⁷ Ibid.

Abington		5 Magnitude, Center of Town
	Reinforced Steel/Concrete	29,000
	# of truckloads to clear building debris (@ 25 tons/truck)	2,000
Damages	Value of Damages	\$291,820,000
	Total property damage	\$244,992,900
	Total losses due to business interruption	\$46,855,600
Casualties ¹ Injuries will require medical attention but hospitalization is not needed. ² Injuries will require hospitalization but are not considered life-threatening. ³ Injuries will require hospitalization and can become life threatening if not promptly treated.	2:00 AM	
	Level 1 Injuries ¹	36
	Level 2 Injuries ²	8
	Level 3 Injuries ³	1
	Deaths	2
	2:00 PM	
	Level 1 Injuries ¹	106
	Level 2 Injuries ²	26
	Level 3 Injuries ³	4
	Deaths	7
	5:00 PM	
	Level 1 Injuries ¹	68
	Level 2 Injuries ²	17
	Level 3 Injuries ³	2
	Deaths	4

EASTON

The Hazus analysis for earthquakes is based on a potential event where the epicenter of a magnitude 5 earthquake originated in the center of Easton. In this scenario, 3,792 buildings in town suffer damage to some degree, and 88 of those buildings are potentially destroyed completely. This potential earthquake event causes \$429,643,100 in total property damage. Most of the impacted buildings (around 2,813) are single family residential homes, followed by other residential and commercial buildings. Hazus estimates at least moderate damage (more than 50%) will be done to essential facilities, including seven schools, one emergency operation center, the police station, and one fire station.

Table 4.30: Easton Earthquake Hazus Data, 2021⁸⁸

Easton		5 Magnitude, Center of Town
Building Characteristics	Estimated Total Number of Buildings	7,494
	Estimated total building replacement value	\$3,588,253,000
	Estimated residential building value	\$2,683,317,000
	Estimated non-residential building value	\$904,936,000
Building Damages	# of buildings sustaining no damage	3,703
	# of buildings sustaining slight damage	2,161
	# of buildings sustaining moderate damage	1,194
	# of buildings sustaining extensive damage	349
	# of buildings completely damaged	88
Population Needs	# of households displaced	273
	# of people seeking public shelter	159
Debris	Building debris generated (tons)	98,000
	Brick/Wood	37,240
	Reinforced Steel/Concrete	60,760
	# of truckloads to clear building debris (@ 25 tons/truck)	3,920
Damages	Value of Damages	\$507,680,000
	Total property damage	\$429,643,100
	Total losses due to business interruption	\$78,036,500
Casualties ¹ Injuries will require medical attention but hospitalization is not needed. ² Injuries will require hospitalization but are not considered life-threatening. ³ Injuries will require hospitalization and can become life threatening if not promptly treated.	2:00 AM	
	Level 1 Injuries ¹	58
	Level 2 Injuries ²	13
	Level 3 Injuries ³	2
	Deaths	3
	2:00 PM	
	Level 1 Injuries ¹	152
	Level 2 Injuries ²	38
	Level 3 Injuries ³	5

⁸⁸ Ibid.

Easton		5 Magnitude, Center of Town
	Deaths	10
	5:00 PM	
	Level 1 Injuries ¹	103
	Level 2 Injuries ²	25
	Level 3 Injuries ³	4
	Deaths	7

STOUGHTON

The Hazus analysis for earthquakes is based on a potential event where the epicenter of a magnitude 5 earthquake originated in the center of Stoughton. In this scenario, 4,692 or 49.4% buildings in town suffer damage to some degree and 106 of those buildings are potentially destroyed completely. This potential earthquake event causes \$537,601,400 in total property damage. Most of the potentially damaged buildings (around 3,541) are single family residential homes, followed by other residential and commercial buildings. Hazus estimates at least moderate damage (more than 50%) will be done to essential facilities, including one hospital, eight schools, two emergency operation centers, the police station, and the fire station.

Table 4.31: Stoughton Earthquake Hazus Data, 2021⁸⁹

Stoughton		5 Magnitude, Center of Town
Building Characteristics	Estimated Total Number of Buildings	9,285
	Estimated total building replacement value	\$4,325,604,000
	Estimated residential building value	\$3,087,567,000
	Estimated non-residential building value	\$1,238,037,000
Building Damages	# of buildings sustaining no damage	4,594
	# of buildings sustaining slight damage	2,707
	# of buildings sustaining moderate damage	1,467
	# of buildings sustaining extensive damage	412
	# of buildings completely damaged	106
Population Needs	# of households displaced	425
	# of people seeking public shelter	245
Debris	Building debris generated (tons)	119,000
	Brick/Wood	45,220
	Reinforced Steel/Concrete	73,780

⁸⁹ Ibid.

Stoughton		5 Magnitude, Center of Town
	# of truckloads to clear building debris (@ 25 tons/truck)	4,760
Damages	Value of Damages	\$633,210,000
	Total property damage	\$537,601,400
	Total losses due to business interruption	\$95,610,700
Casualties ¹ Injuries will require medical attention but hospitalization is not needed. ² Injuries will require hospitalization but are not considered life-threatening. ³ Injuries will require hospitalization and can become life threatening if not promptly treated.	2:00 AM	
	Level 1 Injuries ¹	59
	Level 2 Injuries ²	13
	Level 3 Injuries ³	2
	Deaths	3
	2:00 PM	
	Level 1 Injuries ¹	173
	Level 2 Injuries ²	43
	Level 3 Injuries ³	6
	Deaths	12
	5:00 PM	
	Level 1 Injuries ¹	112
	Level 2 Injuries ²	27
	Level 3 Injuries ³	4
	Deaths	7

FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

Earthquakes are a geologic hazard, not impacted by changes in the climate; therefore, the probability of future earthquake events occurring is still **Possible**: *Between 1-10% probability in the next year.*

4.10 OTHER NATURAL HAZARDS

4.10.1 DROUGHT

DESCRIPTION

Drought is characterized as a continuous period in which rainfall is significantly below the normal amount for a particular area. These events are a gradual phenomenon that occur slowly, over a multi-year period.

The National Drought Mitigation Center uses five classes of categorization for the impact of drought:

- Meteorological – A measure of departure of precipitation from normal, defined solely on the degree of dryness. Due to climatic differences, what might be considered a drought in one location of the country may not be a drought in another location.

- Hydrological – The effects of periods of precipitation shortfalls on the surface or subsurface water supply. Occurs when these water supplies are below normal.
- Agricultural – It occurs when there is not enough water available for a particular crop to grow at a particular time. Agricultural drought is defined in terms of soil moisture deficiencies relative to the water demands of plant life, primarily crops.
- Socioeconomic – Occurs when the demand for an economic good exceeds the supply as a result of a weather-related shortfall in the water supply.
- Ecological – An episodic deficit in water availability that drives ecosystems beyond thresholds of vulnerability, impacts ecosystem services, and triggers feedbacks in natural and/or human systems (Crausbay et al., 2017).⁹⁰

The U.S. Drought Monitor (USDM) uses the frequency of occurrence of a drought event “relative to all historical measured events expressed as percentiles to gage the severity of a measurement at individual stations and to gage the severity of overall drought.”⁹¹ The 2019 MA Drought Management Plan (DMP) revises the USDM percentages of drought and splits them into four categories instead of USDM’s five. Using local streamflow data instead of national averages, the 2019 DMP specifies the USDM data for Massachusetts conditions and sets local expectations and definitions for drought definitions.

Figure 4.4: Comparison of Percentile Ranges for the Massachusetts DMP and the USDM

USDM Names	Recurrence	Percentile Ranges	MA DMP Levels	MA Percentile Ranges	MA DMP Names
D0: Abnormally Dry	once per 3 to 5 years	21 to 30	1	>20 and ≤30%	Mild Drought
D1: Moderate	once per 5 to 10 years	11 to 20	2	>10 and ≤20%	Significant Drought
D2: Severe Drought	once per 10 to 20 years	6 to 10	3	>2 and ≤10%	Critical Drought
D3: Extreme Drought	once per 20 to 50 years	3 to 5			
D4: Exceptional Drought	once per 50 to 100 years	0 to 2	4	≤2%	Emergency

Source: “Exhibit 1. Comparison of Percentile Ranges for the Massachusetts DMP and the USDM,” Massachusetts Drought Management Plan 2019.

LOCATION OF OCCURRENCE

All four towns are susceptible to drought conditions. Each drought period can affect all or parts of each community at different levels of intensity based on long term-factors like the volume of groundwater recharge accumulated from yearly snowpack and precipitation. The state measures droughts in six regions in the Massachusetts Drought Management Plan to better focus on specific watersheds and tailor drought response actions.⁹² For Abington and Stoughton, the impact area of a drought is **Medium: 10 to 50% of**

⁹⁰ Wilhite, D.A.; and M.H. Glantz, “Understanding the Drought Phenomenon: The Role of Definitions,” *Water International* 10(3):111–120, 1985, Retrieved from the National Drought Mitigation Center, 2022.

⁹¹ U.S. Drought Monitor

⁹² “Drought Hazard Profile,” Massachusetts State Hazard Mitigation and Climate Adaptation Plan, 2018.

the town affected. These two towns rely on water services from authorities. Abington receives water service from the Abington - Rockland Joint Water Works⁹³ and Stoughton relies on the Massachusetts Water Resources Authority.⁹⁴

Easton has a potential drought impact area that is **Large: More than 50% of the town affected**, due to use of a well-based system in both towns. Easton has six wells and one well field.⁹⁵ Droughts have the potential to lower the water table and well output, increase water costs, and may influence overall water quality due to a lower dilution of contaminants.⁹⁶

HISTORY OF DROUGHTS

Table 4.32 below lists known drought periods and damages recorded in Plymouth, Bristol, and Norfolk County from 2015 through 2022. Specific losses incurred by Abington, Easton, and Stoughton are noted where information was available. This table does not list every event that has occurred in the area but does list those that impacted Abington, Easton, or Stoughton directly, or had a high damage cost to each county.

Table 4.32 Drought History in Bristol, Norfolk, and Plymouth Counties

Date	Type	County Affected	Damage (County-wide)	Comments
8/31/2016 1/24/2017	- Drought	Bristol, Norfolk, Plymouth	N/A	An extended period of drought that shifted between severe, extreme and moderate in MA.
7/7/2020 12/8/2020	- Drought	Bristol, Norfolk, Plymouth	N/A	An extended period of drought that shifted between severe, extreme and moderate in MA.
5/10/2022 Ongoing as of this plan	- Drought	Bristol, Norfolk, Plymouth	N/A	An extended period of drought that shifted between severe, extreme and moderate in MA. Abington and Easton instated a Water Ban in the worst weeks of the drought.

Source: National Centers for Environmental Information Storm Events Database, USDN, NOAA, 2015-2022.

SEVERITY & POTENTIAL EXTENT OF IMPACT

Though drought events may not have a notable severe impact in any of the Planning Area's counties, they are likely to result in meteorological and hydrological consequences that could make natural and urban

⁹³ "Abington - Rockland Joint Water Works | Abington MA," n.d., <https://www.abingtonma.gov/abington-rockland-joint-water-works>.

⁹⁴ "MWRA: About MWRA," n.d., <https://www.mwra.com/02org/html/whatis.htm>.

⁹⁵ "Annual Water Quality Report: Reporting Year 2021," 2021 Consumer Report, n.d., https://cms2.revize.com/revize/eastonma/departments/dpw/water_division/docs/2021ConsumerConfidenceReport.pdf.

⁹⁶ Bobby Magill and Emily Dooley, "It's Not Just Water Supply: Drought Harms Water Quality, Too," July 12, 2021, <https://news.bloomberglaw.com/environment-and-energy/its-not-just-water-supply-drought-harms-water-quality-too>.

landscapes more vulnerable to flood conditions. Dry and compacted ground conditions limit the absorption of water in heavy precipitation events, increasing the risk of flooding and dam failure.⁹⁷ Droughts also impact local habitats and may cause water shortages for the populations of each town.

Droughts also have the potential to cause health problems associated with poor water quality, decrease opportunity for recreation, and increase the potential for heat stroke. Increased drought magnitude may also increase water costs, so vulnerable populations like seniors, and low-income or Environmental Justice Populations may be more severely impacted economically and physically by drought events.

ABINGTON

Abington belongs to the Abington - Rockland Joint Water Works, and very few residents rely on private wells.⁹⁸ In August 2022, the Water Authority instated an outside use water ban due to drought conditions and experience high levels of PFAS in town water. A major project to redesign one of the system's plants is set to begin in 2023.⁹⁹ Due to MA drought trends and climate change, the potential severity for these increasingly common events is **Minor: Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of facilities.**

EASTON

Though drought events may not have a notable severe impact in any of the Planning Area's counties, they are likely to result in meteorological and hydrological consequences that could make stormwater systems more vulnerable to flood conditions. Easton, relies on a well-system for water supply. A drought event could impact water quality and levels for many residents, causing harm to the health, safety, and welfare of the community.¹⁰⁰ Agricultural resources in town have been impacted by recent severe droughts.

The potential severity for these increasingly common events is **Minor: Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of facilities**, but that may change in the next iteration of the HMP depending on the impacts of climate change and the frequency of severe droughts that may have a more of an impact on local agricultural operations.

STOUGHTON

Though the historic data is gathered at a county level, the Town of Stoughton keeps records of water events through the News tab on their website and publishes any information to the public. Several Town meetings minutes and reports in 2016 note that the drought at the time impacted gravel and grass landscaping around school complexes and noted that trees and their roots may have weakened due to lack of sufficient water.¹⁰¹

In early August 2022 the Stoughton Fire Department published warnings on their social media accounts regarding the extreme heat and drought of the time and the increased possibility for wildfires to start. The Department's notification is an example of how notification of a hazard event could help to prevent

⁹⁷ "Drought, Floods and the Climate Crisis," Tearfund, n.d., <https://www.tearfund.org/stories/2022/08/drought-floods-and-the-climate-crisis>.

⁹⁸ Assistant Town Planner, Public Meeting held January 17, 2023

⁹⁹ "PFAS Levels in Water Again Rise above Limits," Abington News, September 1, 2022, <https://abingtonnews.org/2022/09/01/pfas-levels-in-water-again-rise-above-limits/>.

¹⁰⁰ "Water Supply," Drought.gov, July 21, 2020. <https://www.drought.gov/topics/water-supply>.

¹⁰¹ Conservation Committee Meeting Minutes, Abington, MA, October 6, 2016.

further natural hazard events from occurring. Drought levels impact the chance of wildfire occurrences because they provide the opportunity for more dry fuel to be at risk of spreading fires.¹⁰²

The potential severity for these increasingly common events is **Minor**: *Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of facilities.* Drought events do have the potential to cause other natural hazard events like wildfires to begin, so this ranking is based solely on drought events alone.

FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

Climate change may be bringing more annual precipitation events and totals, but it will also cause more unpredictable and severe drought periods seasonally. These droughts will impact groundwater and reservoir water supply systems, which will exacerbate dry periods due to reduced evaporation and ground absorption levels. More drought events mean flooding events become more common because of saturation levels, and more brushfire events because of an increase in dry fuels for fire spread. The probability of future occurrences of severe or extreme drought events impacting the Planning Area based on past event occurrences and the impact of climate change is **Likely**: *Between 10-100% probability in the next year.*

4.10.2 EXTREME TEMPERATURES

DESCRIPTION

The State HMP states that an average of two extreme heat and one and a half extreme cold weather events per year have occurred in the last two decades, and the number of these events is only expected to rise as climate change impacts global temperatures and weather patterns.¹⁰³

Extreme heat is rated on a scale that includes more than just temperature. The measurement also includes relative humidity to account for the physical impact of heat on humans. The scale is also based on low-wind and shady conditions since exposure to full sun can increase overall temperatures.¹⁰⁴ Extreme heat can also be impacted by the level of development in an area; areas with more asphalt and less greenery or fewer trees can be measured at much hotter temperatures than nearby green space.

Extreme cold is regionally defined. In Massachusetts, it involves temperatures below 0° Fahrenheit.¹⁰⁵ Extreme cold is measured through the wind chill index. The index attempts to quantify the cooling effect of wind with the actual outside air temperature to determine a wind chill temperature, which is often colder than the base temperature. The wind chill temperature represents how cold it feels to humans and animals, based on the rate of heat loss from exposed skin. Extreme cold conditions may occur during, after, or without any connection to a winter storm.

The two figures below show the National Weather Service's indices for windchill and extreme heat – both are coded to give a sense of what temperatures are extremely dangerous to exist in based of temperature and humidity for the Heat Index and temperature and wind chill for the windchill chart.

¹⁰² "Oppressive Heat and Increased Fire Danger Through This Weekend 5-8 August 2022," Town of Stoughton News and Announcements, 2022.

¹⁰³ Massachusetts State Hazard Mitigation and Climate Adaptation Plan, 2018.

¹⁰⁴ Ibid.

¹⁰⁵ Ibid.

Figure 4.5 National Weather Service Heat Index

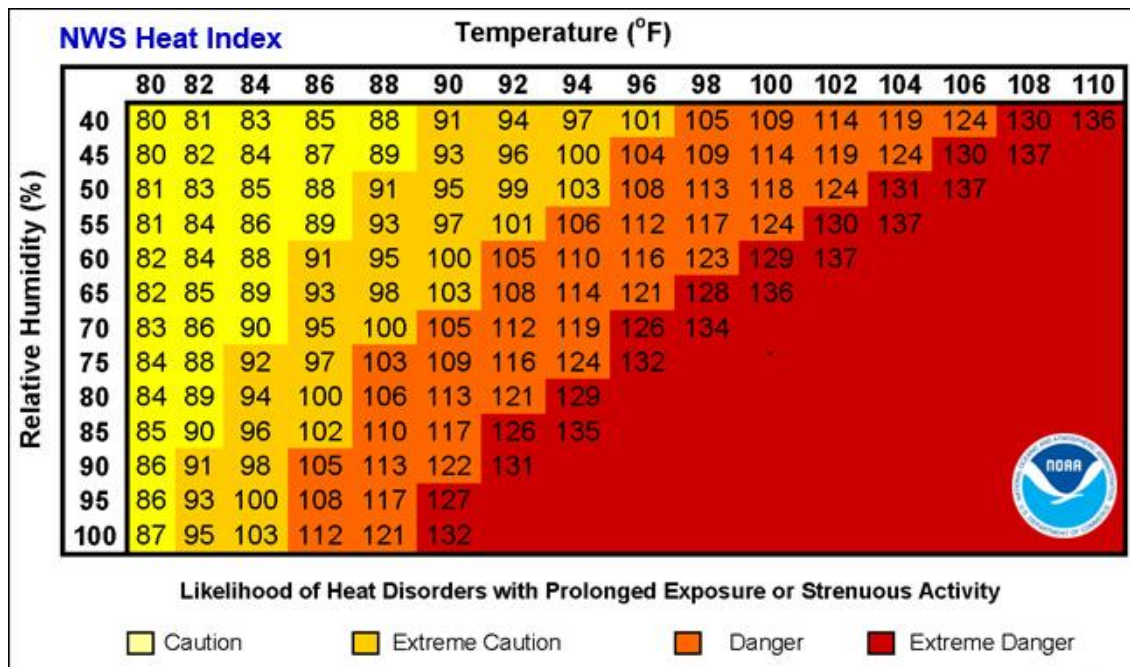
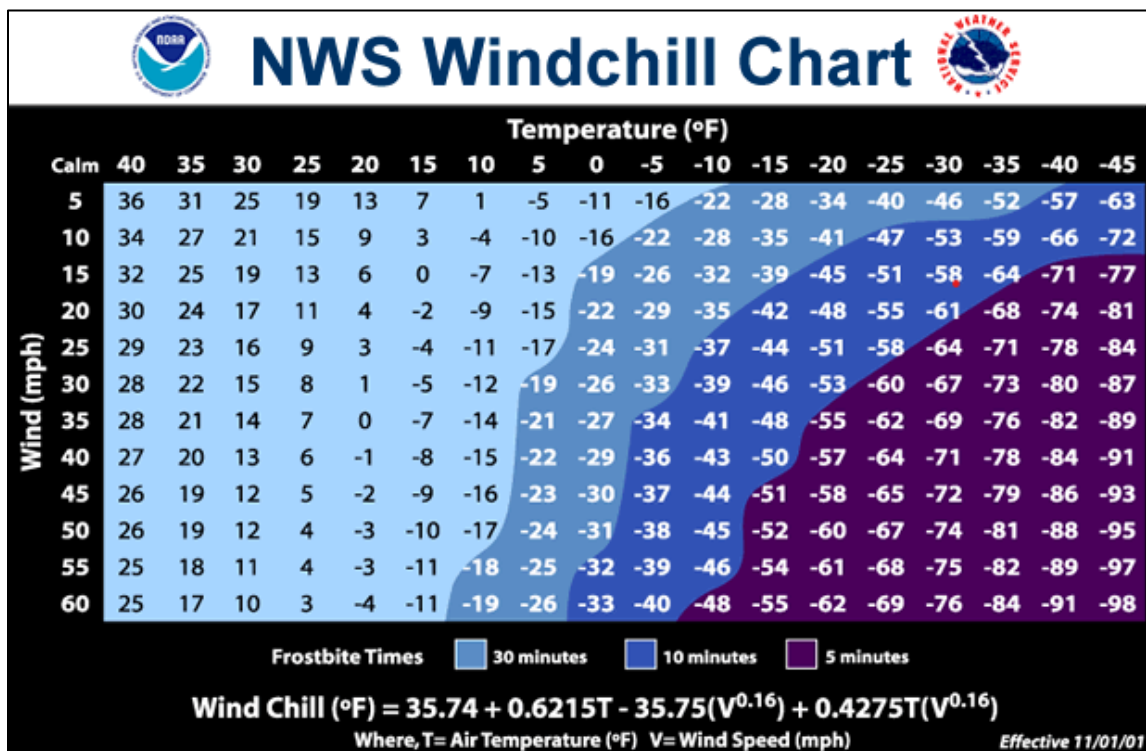


Figure 4.6 National Weather Service Windchill Chart

LOCATION OF OCCURRENCE

According to NOAA, Massachusetts is made up of three climate divisions: Western, Central, and Coastal. Abington, Easton, and Stoughton fall within the Coastal division despite not being literal coastal communities. Average annual temperatures vary slightly over the divisions, with annual average

temperatures of around 50°F in the Coastal division. Extreme temperature events occur more frequently and vary more in the inland regions where temperatures are not moderated by the Atlantic Ocean.

Extreme temperature events will impact all Towns, and their impact area is **Large: More than 50% of the town affected.**

HISTORY OF EXTREME TEMPERATURES

Table 4.33 below lists periods of extreme temperature and damages recorded in Plymouth, Bristol, and Norfolk County from 2015 through 2022. The National Centers for Environmental Information Storm Events Database defines both extreme heat and extreme cold by locally/regionally established excessive thresholds and rely on the NWS Heat Index and Windchill Charts shown in Figures Figure 4.5 and Figure 4.6. Specific losses incurred by Abington, Easton, and Stoughton are noted where information was available. This table does not list every event that has occurred in the area but does list those that impacted Abington, Easton, or Stoughton directly, or had a high damage cost to each county.

Table 4.33: Extreme Temperature History for Bristol, Norfolk, and Plymouth Counties

Date	Type	County Affected	Damage (County-wide)	Comments
2/16/2015	Extreme Cold/Wind Chill	Norfolk, Plymouth	No damages documented	Norfolk County recorded wind chills as low as 29 below zero, and Plymouth County recorded 28 below zero – all related to a serious winter storm
2/13/2016 - 2/14/2016	Extreme Cold/Wind Chill	Bristol, Norfolk, Plymouth	No damages documented	Wind chills as low as 28 below zero were reported in Bristol County, wind chills as low as 40 below zero in Norfolk County, and 36 below zero were reported in Plymouth County - from Arctic high pressure
7/3/2018	Excessive Heat	Plymouth	No damages documented	From Marshfield, Plymouth County reported a Heat Index of 107 after a period of high pressure and humidity

Source: National Centers for Environmental Information Storm Events Database, NOAA, 2015-2022.

SEVERITY & POTENTIAL EXTENT OF IMPACT

Extreme cold or heat are dangerous to human life, livestock, crops, and infrastructure. Heat stroke, hypothermia, freezing and bursting pipes, and utility failure are some of the common impacts of extreme temperatures. Extreme heat can cause heat stroke or other heat-related illnesses and occur alongside or exacerbate drought and brushfire conditions. Extreme cold can cause dangerous or icy road conditions, power outages, and chances of hypothermia are a real threat to Massachusetts citizens, especially vulnerable populations with limited access to mobility like senior citizens, those with mental or physical disabilities, or children.

The potential severity for extreme temperature is **Limited: Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than 1 day.** Though infrastructural damage may be less common, the highest risk for extreme temperature events is the potential for loss of life.

FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

The risk of extreme heat is increasing due to climate change. A heat wave is defined as 3 or more days of temperatures of 90° Fahrenheit or above. By the end of the century the number of days in Massachusetts's summers above 90° Fahrenheit could increase to 13-56 days per summer.¹⁰⁶ Meanwhile, while the overall number of days of extreme cold may decrease, Arctic warming may cause a disruption to the Arctic polar vortex, pushing the extent of extreme cold and severe winter weather farther into the United States.¹⁰⁷

The increase of extreme heat events causes the potential for power outages, heat-related illnesses, and other secondary impacts. The probability of future occurrences of extreme temperature events based on past event occurrences and the impact of climate change is **Likely: Between 10-100% probability in the next year.**

4.10.3 INVASIVE SPECIES

DESCRIPTION

The Massachusetts Invasive Plant Advisory Group (MIPAG) defines invasive species 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.”¹⁰⁸ These invasive species can come in the form of plants, insects, disease, or other wildlife, and often harm or even overtake the species that are natural to the area.

MIPAG defines invasive species for Massachusetts as “invasive,” “likely invasive,” and “potentially invasive” through meeting a number of criteria. “Invasive” plants are non-native species that cause economic or environmental harm, “likely invasive” are those that do not fully meet the “invasive” qualities of harm, and “potentially invasive” species are non-native and not yet naturalized in the state but have the potential to become more invasive. To come to a complete definition the criterion must be met in specific groupings and order. The criteria are:

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 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).
6. Be widespread in Massachusetts, or at least common in a region or habitat type(s) in the state.
7. Have many occurrences of numerous individuals in Massachusetts that have high numbers of individuals forming dense stands in minimally managed habitats.
8. Be able to out-compete other species in the same natural plant community.
9. Have the potential for rapid growth, high seed or propagule production and dissemination, and establishment in natural plant communities.
10. Have at least one occurrence in Massachusetts that has high numbers of individuals forming dense stands in minimally managed habitats.

¹⁰⁶ Massachusetts State Hazard Mitigation and Climate Adaptation Plan, 2018.

¹⁰⁷ “Research Links Extreme Cold Weather in the United States to Arctic Warming,” NOAA, September 2021.

¹⁰⁸ “About the group,” Massachusetts Invasive Plant Advisory Group (MIPAG) <https://www.massnrc.org/mipag/>.

11. Have the potential, based on its biology and its colonization history in the northeast or elsewhere, to become invasive in Massachusetts.
12. Be 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.
13. The species, if it becomes naturalized in Massachusetts, based on its biology and biological 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 of the Northeast.¹⁰⁹

Of the 725 non-native plants in Massachusetts, MIPAG has identified 72 species in the state as "Invasive," "Likely Invasive," or "Potentially Invasive."¹¹⁰

INSTANCES OF INVASIVE SPECIES (LOCATION AND HISTORY)

Several invasive species are present throughout the Planning Area. According to invasive species trackers, state and local inventories, these species include oriental bittersweet (*Celastrus orbiculatus Thunb.*), European buckthorn (*Rhamnus cathartica L.*), purple loosestrife (*Lythrum salicaria*), Eurasian watermilfoil (*Myriophyllum spicatum L.*), Norway Maple (*Acer platanoides*), Common Reed (*Phragmites australis*), and knotweed (*Polygonum*).

Each participating town's Conservation Commission routinely issue Notices of Intent to clear invasive species from development sites. Though each town has a different experience with invasive species, all have noted the impact of oriental bittersweet on tree health, which is important to consider alongside damaging events like high wind or heavy snow events. Towns also noted the danger of plants like purple loosestrife and phragmites taking over wetlands areas that otherwise may provide flood storage, though no instances of this have been recorded at this time.

SEVERITY & POTENTIAL EXTENT OF IMPACT

There is no distinct impact on specific populations due to invasive species, though agriculture may be impacted and therefore impact the livelihood of those working in this sector.

ABINGTON

A 2019 Town report recommends an approval of a vote of Community Preservation Act funds to assist in clearing invasive species out of Island Grove. The Abington Master Plan also strategizes on how to protect Ames Nowell State Park from invasive species in the pond there.¹¹¹

The potential severity for invasive species encroachment is **Minor**: *Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of facilities.* The largest impact that invasive species have is on the health of the natural habitat of the area – which could have secondary effects on crops and water supply over time, raising the severity to medium or even high depending on how long an invasive species goes unchecked.

¹⁰⁹ "The Evaluation of Non-Native Plant Species for Invasiveness in Massachusetts" Massachusetts Invasive Plant Advisory Group, February 28, 2005

¹¹⁰ "Invasive Plants," Mass Audubon, <https://www.massaudubon.org/learn/nature-wildlife/invasive-plants>.

¹¹¹ "Strategy 2, Action 2.2," Abington Master Plan, 2019.

EASTON

Easton protects against the further encroachment of invasive species in their Low Impact Development (LID) requirements for landscaping design and stormwater management in their zoning bylaw. Invasive species have been especially noted for control in the Olmsted Rockery Area.

The potential severity for invasive species encroachment is **Minor: Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of facilities.** The largest impact that invasive species have is on the health of the natural habitat of the area – which could have secondary effects on crops and water supply over time, raising the severity to medium or even high depending on how long an invasive species goes unchecked.

STOUGHTON

Invasive species, especially buckthorn (*Rhamnus cathartica*), Norway Maple (*Acer platanoides*), Common Reed (*Phragmites australis*), and knotweed (*Polygonum*) have been noted as encroaching on Harris Pond and several detention basins across town. The Conservation Commission approved the treatment and removal of invasives in a detention basin of Turnpike Street in 2018, Ames Pond in 2016, and off Carson Road in 2015, along with several other sites across town.

The potential severity for invasive species encroachment is **Minor: Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of facilities.** The largest impact that invasive species have is on the health of the natural habitat of the area – which could have secondary effects on crops and water supply over time, raising the severity to medium or even high depending on how long an invasive species goes unchecked.

FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

The probability of future occurrences of invasive species based on past growth and the impact of climate change is **Likely: Between 10-100% probability in the next year.** Warming temperatures due to climate change may weaken native species and give way to the opportunity for invasive warmer-climate species.

5.0 EXISTING CAPABILITIES AND MITIGATION MEASURES

5.1 PURPOSE

The purpose of this section is to identify the relevant assets, policies, and tools that the Towns of Abington, Easton, and Stoughton have at their disposal to address any needs related to hazard mitigation, and to identify any gaps and areas for improvement. This review of existing capabilities includes an analysis of any mitigation actions identified in the 2015 Old Colony Hazard Mitigation Plan and is an important step in developing an updated strategy for the town to pursue during the next planning cycle.

The National Mitigation Framework emphasizes the valuable role of collaboration among various sectors to ensure that mitigation capabilities continue to grow and that comprehensive mitigation includes strategies for all community sectors. Examples of sectors with mitigation capabilities are those agencies and stakeholders responsible for:

- Emergency management.
- Economic development.
- Land use and development.
- Housing.
- Health and social services.
- Infrastructure (including transportation and other community lifelines).
- Natural and cultural resources.

In addition, FEMA's National Response Framework, 4th Edition identifies critical community lifelines, which are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function. Community lifelines include the following:

- Safety and Security.
- Food, Water, Shelter.
- Health and Medical.
- Energy.
- Communications.
- Transportation.
- Hazardous Material.

This section will discuss the Towns' participation in local, state, and federal programs, identify town facilities and assets, and outline the policies, codes, and regulations in place to mitigate the natural hazards of concern described in the Natural Hazards Section. Describing the current capabilities provides a rationale for which mitigation projects can be undertaken to address the vulnerabilities identified in the Risk Assessment. Gaps and limitations for in capabilities may be addressed as actions in the mitigation strategy.

5.2 FEDERAL AND STATE CAPABILITIES

5.2.1 MASSACHUSETTS MUNICIPAL VULNERABILITY PREPAREDNESS (MVP) PROGRAM

All four communities in this multijurisdictional HMP – Abington, Easton, and Stoughton – have conducted a Community Resilience Building (CRB) workshop under the Massachusetts Municipal Vulnerability Preparedness (MVP) Planning Program to address the growing vulnerabilities associated with climate change. Participation in the MVP Program, supported by the Executive Office of Energy and Environmental

Affairs (EEA), provides an opportunity for grant funding from the state for climate resilience and natural hazard related projects. Details of each town's workshops are shown below in Table 5.1.

Table 5.1 MVP Program Community Resilience Building Workshops.

Town	Date of Community Resilience Building Workshop
Abington	May 2020
Easton	November – December 2018
Stoughton	January 2020

MVP workshops are memorialized in a Summary of Findings Document that outlines a prioritized set of actions for a community to take to increase climate resilience. All actions are in different stages of completion, and the actions, recommendations, and other findings in each CRB Summary of Findings should be discussed by each town in an annual meeting regarding MVP and HMP priorities. In addition, the MVP Planning Program requires participating municipalities to submit a two-page yearly progress report in order to retain eligibility to compete for project funding under the MVP Action Grant program¹¹². All towns in the Planning Area are currently MVP certified and should commit to maintaining certification by submitting the yearly progress report.

A number of priority MVP actions identified by each town's Summary of Findings Report have been incorporated into this HMP as mitigation actions.

5.2.2 MASSACHUSETTS STATE FIRE AND BUILDING CODE

Massachusetts State Fire Code requires residents to obtain permits from local authorities before conducting outdoor burns. The Towns of Abington, Easton, and Stoughton all fully enforce this requirement.

Each Town also enforces Massachusetts State Building Code through local Building Inspectors and other administrative enforcement mechanisms detailed in Town bylaws. These codes ensure safety and capacity compliance, as well as protection for earthquakes, wind loads, and flooding.

5.2.3 COMPREHENSIVE EMERGENCY MANAGEMENT PLAN

Massachusetts Emergency Management Agency (MEMA) maintains a Comprehensive Emergency Management Plan (CEMP) to address all hazards that may threaten Massachusetts. Most recently updated in 2019, the CEMP addresses mitigation, preparedness, response, and recovery from a variety of natural and manmade emergencies. It also assigns roles and responsibilities for coordinating the response to an emergency or disaster.¹¹³

¹¹² Executive Office of Energy and Environmental Affairs. 2023. "MVP Planning Grant." January 3, 2023. <https://www.mass.gov/service-details/mvp-planning-grant>

¹¹³ Massachusetts Emergency Management Agency. 2019. "Comprehensive Emergency Management Plan." <https://www.mass.gov/lists/comprehensive-emergency-management-plan>.

5.2.4 NATIONAL FLOOD INSURANCE PROGRAM (NFIP)

Table 5.2 Planning Area NFIP Participation Summary¹¹⁴¹¹⁵

	Abington	Easton	Stoughton
Current Status	Participating	Participating	Participating
Current Flood Insurance Rate Map (FIRM) Effective Date	7/6/2021	7/7/2009	7/17/2012
Current Flood Insurance Study (FIS) and Effective Date	Plymouth County, 7/6/2021	Bristol County, 7/6/2021	Norfolk County, 7/6/2021
Year Entered into Program	1977	1982	1982
Policies in Force	16	64	54
Insurance in Force	\$ 4,343,000.00	\$ 19,860,300.00	\$ 18,150,600.00
Number of Paid Losses (Since Program Entry)	13	25	36
Total Losses Paid	\$ 30,729.82	\$ 128,057.06	\$ 81,919.50
Properties in FEMA-designated Floodplains: A Zones	2	23	11
Properties in FEMA-designated Floodplains: AE Zones	5	9	2
Properties in FEMA-designated Floodplains: X Zones	9	32	41
Repetitive Loss (RL) Properties	0	2 (Residential)	1 (Residential)

All jurisdictions participating in the NFIP must designate a Local Floodplain Administrator who is responsible for ensuring continued compliance with the federal regulations. Historically, Abington's Building Official fills the role, and Easton and Stoughton's Building Inspectors fill the role in their respective towns.

Abington, Easton, and Stoughton continue to actively participate in the NFIP by adopting updates to the FIRMs as federal studies are completed, participating in Community Assistance Visits with state and/or federal representatives, answering and advising on floodplain management inquiries from the public, and promoting sound floodplain management decisions.

Each Town implements the substantial improvement and substantial damage (SI/SD) provisions of their floodplain management regulations as required per the NFIP (CFR Title 44, Parts 59 through 65) and the Massachusetts State Building Code (780 CMR). Abington addresses SI/SD provisions in its Flood Plain and Wetlands Protection District, while Easton and Stoughton both discuss SI/SD provisions in their Floodplain Overlay District Regulations. When necessary, the Towns coordinate with State Flood Hazard

¹¹⁴ Federal Emergency Management Agency. "HudEX Report." August 4, 2022.

¹¹⁵ Federal Emergency Management Agency. "Policies in Force Report." August 4, 2022.

Management Program staff to ensure that protocol is followed after a flooding event and that a post-disaster plan will be in place to implement all SI/SD provisions.

5.3 LOCAL CAPABILITIES

5.3.1 TREE MAINTENANCE

Falling trees and tree branches are a potential impact of hazards such as winter storms, hurricanes and tropical storms, and other severe storms. These impacts can be caused by high winds and snow or ice accumulation and can subsequently cause downed power lines and local or widespread power outages. By regularly assessing tree health and ability to withstand high winds and snow or ice accumulation and maintaining a regular program of tree maintenance, communities can proactively mitigate the impacts of storm hazards.

Often, local utilities are responsible for tree trimming near power lines. During the HMP planning process, Abington noted that maintaining a good relationship with local gas and electric utilities has been beneficial for the town's planning and responses to hazardous storms. Communicating directly with utility providers about lead and response times is an important capability that can lead to improved post-hazard outcomes for all communities in this HMP.

5.3.2 STREET SWEEPING AND CATCH BASIN MAINTENANCE

Street sweeping removes sediment from paved roadways that may otherwise be washed into storm sewer systems. This prevents accumulation of sediment inside catch basins and stormwater infrastructure, freeing the system's capacity to accept and transport stormwater during high rainfall events.

Nutrients such as phosphorus and nitrogen can also be carried into surface waters attached to sediment transported through stormwater conveyance systems. These nutrients contribute to poor surface water quality and algal blooms that make water unsafe for human and animal contact. Reducing the amount of sediment transported into streams, lakes, and rivers can reduce negative impacts on water quality and contribute to their long-term ecological health.

Communities can help mitigate flood hazards and improve water quality through a regular program of street sweeping; all four towns in the Planning Area adhere to a street sweeping program.

5.3.3 EMERGENCY POWER GENERATORS

Emergency power generators support critical facilities when electric grids fail, and the power goes out. Some facilities can experience significant impacts without power. For example, a sewer pump station with no power source will cease to function, causing sewer backups and overflows upstream of its location in the sanitary sewer system. An emergency dispatch center with no power source would not be able to route first responders to community members seeking help during a hazardous situation.

Abington, Easton, and Stoughton all have emergency power generators sited at several of their critical facilities, including town halls; in the event of such hazards, mitigating the impact of power outages caused by hazards such as winter storms and other severe storms. Generators must be maintained and, when necessary, replaced to ensure the continued hazard mitigation provided by these important assets. Continuing to add new generators and maintain existing ones are incorporated into the actions from Abington and Stoughton's 2015 actions and will be carried forward to ensure all critical facilities contain a source of backup power. Abington specifically needs to upgrade generators at their Highway Department and Vehicle Maintenance building and Stoughton's goal included adding generators to assist any residents on life support.

5.3.4 DISASTER RESPONSE MONITORING

In Abington, individual natural hazard events are tracked and maintained in a central database through the Fire Department's record management system. The system helps to identify patterns in location and damage for natural hazards that occur in town so that emergency response crews can increase their level of readiness to respond in case of a natural hazard event.

5.4 ABINGTON

Type of Existing Protection - Abington	Description	Area Covered	Effectiveness	Improvements Needed
Financial Capabilities				
Capital Improvement Plan (CIP)	Town maintains a five-year CIP that is updated and adopted by the Board of Selectmen annually. CIP includes items that contribute to natural hazard mitigation, including culvert replacement (Washington St) and regular replacement of a street sweeper.	Town-wide	Somewhat Effective	Lack of funding is a barrier to completing some of the larger hazard mitigation projects on the CIP, such as dam and culvert repairs. Town could incorporate recommendations from HMP into capital improvement planning.
Sewer Enterprise Fund	Town has implemented a sewer enterprise fund to adequately maintain wastewater services.	Town-wide	Effective	None
Conservation Special Revenue Fund	Town implemented 1.5% tax surcharge to fund open space acquisition in 2015, matched by State. Funding is available through the Community Preservation Act.	Town-wide	Effective	None
Hazard Mitigation Funding	Town is eligible for MA Municipal Vulnerability Preparedness (MVP) Action Grant funding due to participation in MVP program.	Town-wide	Somewhat Effective	Additional staff resources could be used to write grant applications and seek additional funding opportunities.
Water Special Revenue Fund	Town has implemented a water special revenue fund to adequately maintain drinking water services.	Town-wide	Effective	None
Planning and Regulatory Capabilities				
Flood Plain and Wetlands Protection District Bylaw (§175-35)	Establishes a Floodplain Overlay District to mitigate the impact of future development on flooding and flood response, eliminate costs associated with response, and reduce damage to public and private property from flooding. Addresses subdivision standards. Last updated 2021.	Floodplain Overlay District	Effective	Confirm with State NFIP Coordinator's office that Bylaw complies with minimum NFIP standards. Town could incorporate future climate change projections into Flood Plain and Wetlands Protection District.

Type of Existing Protection - Abington	Description	Area Covered	Effectiveness	Improvements Needed
Watershed Protection District (§175-24)	Protects public health by preventing contamination of ground and surface water resources that provide drinking water to the Town.	Watershed Protection District	Effective	None
Stormwater Bylaw (numeric incorporation pending)	Establishes the issuance of Town Stormwater Management Permits for construction, stormwater and erosion-related decision-making processes surrounding development, the authority of the Town to ensure compliance, and ensures alignment with all applicable state and federal mandates.	Town-wide	Effective	None
Environmental Performance Bylaws (§175-61 – 67.1)	Mandates safe disposal of sewage and lays out standards for drainage, vegetation removal, buffer strips, and outdoor lighting.	Town-wide	Effective	None
Wetlands Protection (§171)	Protects wetlands, water resources, and adjoining land areas.	Town-wide	Effective	None
Master Plan (2009)	Identifies floodplain and wetland protections in land uses and the criticality of open space for flood protection.	Town-wide	Somewhat Effective	Future plan update could identify strategies to encourage drought tolerant landscaping design in Town.
Abington Open Space and Recreation Plan (2015)	Identifies core habitat areas and endangered species, risks of development impacts, and possibility of forest-related fires.	Town-wide	Somewhat Effective	Future plan update could identify potential open spaces to be used as flood storage, opportunities for public education on watershed and flood protection.
Economic Development Supplement to Abington Master Plan (2019)	Sets goals to protect natural resources, discourage development within the watershed protection overlay district, and incorporates strategies to minimize impervious surfaces.	Town-wide	Effective	None
Hazard Mitigation Plan (HMP)	Updated and adopted every five years.	Town-wide	Effective	None

Type of Existing Protection - Abington	Description	Area Covered	Effectiveness	Improvements Needed
Administrative, Technical, and Operational Capabilities				
Disaster Warning System	Town has a CodeRed program to alert residents to emergency conditions.	Town-wide	Somewhat Effective	CodeRed website should be updated to reflect up-to-date information.
Zoning Enforcement	All Bylaws, Rules, and Regulations are enforced by the Planning Board and Building Inspector according to the mechanism laid out in §175-80 Enforcement.	Town-wide	Effective	None
Site Plan Review	Zoning bylaw §175-77 establishes a site plan review process by which the Planning Board and Building Inspector may review proposed development for consistency with existing bylaws.	Town-wide	Effective	Incorporate language to diminish heat island effect and encourage energy and water efficient technologies.
Drainage Swale & Pond Maintenance	DPW maintains drainage swales to capture sediment, encourage infiltration, and reduce the risk of flooding from stormwater runoff.	Town-wide	Effective	None
Tree Maintenance	When funding and staff time are available, street trees are trimmed or removed according to a list maintained by DPW. This is a preventive measure aimed at reducing the risk of power outages in severe storms.	Town-wide	Somewhat Effective	Hazard trees are proactively identified but could be proactively maintained as well.
Emergency Power Generators	The town maintains emergency power generators in several important public facilities/shelters to preserve essential services throughout power outages.	Town-wide	Effective	Generators need to be maintained and replaced as needed, especially in the Highway Department and Vehicle Maintenance building.
Regional & Local Emergency Planning Committees	The town regularly participates in local and regional emergency planning committees.	Town-wide	Effective	None
Catch Basin Maintenance	The town regularly cleans and maintains the catch basins throughout town, ensuring their capacity in the event of heavy rainfall.	Town-wide	Effective	None

Type of Existing Protection - Abington	Description	Area Covered	Effectiveness	Improvements Needed
Dam Inspection and Maintenance	Island Grove and Hunts Pond (which is co-owned with Brockton) are on a regular inspection and maintenance schedule.	Dams	Effective	The rest of the publicly-owned dams should be added to this regular list.
Street Sweeping	The town conducts street sweeping on an annual basis. This prevents nutrient-laden sediment from washing into local waterbodies and causing algal blooms and poor water quality; it also helps prevent the accumulation of sediment in catch basins and subsequent flooding.	Town-wide	Effective	None
Fire Department Review of New Development	The Fire Department participates in the review of all new development in town.	Town-wide	Effective	None
Cooling Centers	The town opens cooling centers as weather conditions warrant.	Town-wide	Effective	None
Animal Shelter	Town does not have this protection, which would allow residents with pets to safely evacuate when necessary.	N/A	N/A	Consider studying emergency animal shelter for pets to encourage evacuation when needed.
Planning Board	Prepares and adheres to Town's master plan; reviews Site Plan Applications and Special Permits.	Town-wide	Effective	None
Zoning Board of Appeals	Reviews applications for special permit, petitions for zoning variance, and appeal of decisions by Building Inspector/Selectmen.	Town-wide	Effective	None
Conservation Commission	Reviews development proposals near resource areas; manages and acquires protected land.	Town-wide	Effective	None
Inspectional Services Department	Responsible for ensuring that buildings are constructed and repaired safely, and buildings, structures and land are used properly. Issues building, electrical, gas and plumbing permits that allow the construction, reconstruction, repair, alteration and demolition of buildings and structures as	Town-wide	Effective	None

Type of Existing Protection - Abington	Description	Area Covered	Effectiveness	Improvements Needed
	well as the installation of equipment. Annually inspects restaurants, lodgings, and other places of assembly.			
Department of Public Works	Responsible for the care and maintenance of the town's parks, playing fields, public roads, sidewalks, sewer, and stormwater infrastructure, pumping stations, and town vehicles.	Town-wide	Effective	None
Mutual Aid Agreements	Town Sewer Department has municipal sewer agreements with Brockton and Rockland.	Regional	Effective	None
Education and Outreach Capabilities				
Public Information & Outreach	The town provides residents with information about potential natural hazards with leaflets and brochures in municipal buildings throughout the town, as well as the town website and social media accounts.	Municipal Buildings & Town Website	Effective	Information could be updated and/or replaced on a regular basis.
Evacuation Route Signage	Town does not have this protection, which directs residents and visitors to the nearest evacuation route in the event of an emergency.	N/A	N/A	Though flooding potential may be smaller in Abington, consider implementing evacuation route signage in areas of consistent flooding issues.
Town Staff Disaster Mitigation Training	Town does not have this protection.	N/A	N/A	Consider implementing disaster mitigation training for staff.
Public Disaster Mitigation Education	Town does not have this protection.	N/A	N/A	Consider implementing disaster mitigation education program for community members.
Business Community Disaster Mitigation Outreach	Town does not have this protection.	N/A	N/A	Consider implementing disaster mitigation outreach program for business community.
Programs				

Type of Existing Protection - Abington	Description	Area Covered	Effectiveness	Improvements Needed
Participation in the National Flood Insurance Program (NFIP)	Provides flood insurance for structures located within a floodplain.	Town-wide	Effective	None

5.5 EASTON

Type of Existing Protection - Easton	Description	Area Covered	Effectiveness	Improvements Needed
Financial Capabilities				
Capital Improvement Plan (CIP)	Town maintains a five-year CIP that is updated and adopted by the Board of Selectmen annually. CIP includes items that contribute to natural hazard mitigation, including small bridge/culvert construction.	Town-wide	Effective	None
Annual Budget	Town includes line items for natural hazard mitigation such as tree maintenance.	Town-wide	Effective	None
Sewer Enterprise Fund	Town has implemented a sewer enterprise fund to adequately maintain wastewater services.	Town-wide	Effective	None
Water Enterprise Fund	Town has implemented a sewer enterprise fund to adequately maintain drinking water services.	Town-wide	Effective	None
Solid Waste and Recycling Enterprise Fund	Town has implemented a sewer enterprise fund to adequately maintain solid waste and recycling services.	Town-wide	Effective	None
Hazard Mitigation Funding	Town is eligible for MA Municipal Vulnerability Preparedness (MVP) Action Grant funding due to participation in MVP program.	Town-wide	Somewhat Effective	Additional staff resources could be used to write grant applications and seek additional funding opportunities.

Type of Existing Protection - Easton	Description	Area Covered	Effectiveness	Improvements Needed
Review Fees	Town collects review fees for some development projects to offset the cost of complex technical review.	Town-wide	Effective	None
Planning and Regulatory Capabilities				
Flood Plain Overlay District (Ch 235-47)	Establishes a Flood Plain Overlay District to preserve and protect waterbodies, protect persons and property against the hazards of flooding, and to protect the community against detrimental uses and development of adjacent lands.	Flood Plain Overlay District	Somewhat Effective	Update to comply with minimum NFIP standards using Massachusetts 2020 Model Floodplain Bylaw.
Stormwater Management (Ch 501 Art VIII)	Establishes stormwater-related development requirements, requires incorporation of Low Impact Development (LID) strategies whenever possible, requires annual report detailing maintenance and observation of proper function from owner of stormwater management system.	Town-wide	Effective	None
Wetlands Protection (Ch 227)	Protects resource areas including wetlands, water resources, and adjoining land areas, establishes permitting processes to perform development activities within resource areas, and describes enforcement actions.	Town-wide	Effective	None
Wetlands Regulations (Ch 503)	Clarifies Ch 227 Wetland Protections by establishing definitions, uniform procedures, and performance standards by which Easton Conservation Commission carries out its responsibilities.	Town-wide	Effective	None
Subdivision Rules & Regulations (Ch 501)	Regulates the development of subdivisions to protect the safety, convenience, and welfare of the public. Requires the submission of an Environmental Impact Statement for the review of subdivision plan.	Town-wide	Effective	None
Reconstruction after catastrophe or demolition (Ch 235-25)	Establishes standards for the reconstruction of structures after a demolition or catastrophe.	Town-wide	Effective	Consider prohibiting reconstruction of structures in the Flood Plain Overlay District after catastrophe.
Aquifer Protection Overlay District (Ch 235-46)	This district protects existing and potential groundwater supplies and recharge areas, as groundwater is the sole source of drinking water in town. The bylaw is designed to protect groundwater supplies from detrimental development and land use practices,	Aquifer Protection District	Effective	None

Type of Existing Protection - Easton	Description	Area Covered	Effectiveness	Improvements Needed
	and to ensure the adequate quality and quantity of drinking water for distribution within town.			
Mobile Home Tie-down Regulations	The town requires and inspects that all mobile homes in town are tied down to protect against high winds and other hazards.	Mobile Home Parks	Effective	None
Envision Easton (2014)	Includes actions to: Evaluate the impact of climate change on water resources and establish appropriate mitigation plans and policies; Develop and implement a program to mitigate the impact of invasive species, development pressures and climate change. Several actions are included regarding mitigation of flood hazards and protecting watershed.	Town-wide	Effective	None
Illicit Discharge Detection and Elimination Plan (2019)	Developed to address the requirements of the 2018 Massachusetts Small Municipal Separate Storm Sewer System (MS4) Permit. Intended to systematically find and eliminate sources of non-stormwater discharges to storm sewer systems and implement procedures to prevent such discharges.	Town-wide	Effective	None
Stormwater Pollution Prevention Plan (2020)	Developed for DPW pursuant to Section 2.3.7.b of the 2018 MS4 Permit. Identifies pollution prevention measures and management practices for DPW yard.	Town-wide	Effective	None
Open Space and Recreation Plan (2017)	Identifies natural hazards and development impacts as disturbances to local habitats; discusses floodplain and risk of flood in areas of open space, mentions local history of Flyaway dam breach in 1968 (dam was not reconstructed).	Town-wide	Effective	None
Administrative, Technical, and Operational Capabilities				
Tree Maintenance Program	The town works with utility providers to trim trees that may impact utility lines. This is a preventive measure aimed at reducing the risk of power outages in severe storms.	Town-wide	Effective	None
Disaster Warning System	Town has a CodeRed program to alert residents to emergency conditions.	Town-wide	Effective	None

Type of Existing Protection - Easton	Description	Area Covered	Effectiveness	Improvements Needed
Emergency Power Generators	The town maintains emergency power generators in several important public facilities/shelters to preserve essential services throughout power outages.	Town-wide	Effective	Generators need to be maintained and replaced as needed
Regional & Local Emergency Planning Committees	The town regularly participates in local and regional emergency planning committees.	Town-wide	Effective	None
Catch Basin Maintenance	The town regularly cleans and maintains the catch basins throughout town, ensuring their capacity in the event of heavy rainfall.	Town-wide	Effective	None
Street Sweeping	The town conducts street sweeping on an annual basis. This prevents nutrient-laden sediment from washing into local waterbodies and causing algal blooms and poor water quality; it also helps prevent the accumulation of sediment in catch basins and subsequent flooding.	Town-wide	Effective	None
Dam Management Program	The Planning Department through the environmental planner maintains a database of the Town's dams that includes all critical dam information and has a schedule for completing necessary repairs and maintenance.	Town-wide	Effective	Adding privately-owned dams to this management program may help to improve it.
Mutual Aid Agreement	Town participates in Southeastern Massachusetts Regional 911 District with Norton, Mansfield, and Foxborough for regional dispatch.	Regional	Effective	None
Site Plan Review	Town code (Ch 235-57) establishes a site plan review and approval process by which the Planning and Zoning Boards, as well as the Zoning Board of Appeals, may review proposed development for consistency with existing codes.	Town-wide	Effective	None
Shelter Program	Community Based Respite Care Service Programs to protect vulnerable populations in the case of a natural hazard event	Town-wide	Effective	None
Education and Outreach Capabilities				
Public Information & Outreach	The town provides residents with information about potential natural hazards via the town's website, reverse 911 calls,	Municipal Buildings &	Effective	None

Type of Existing Protection - Easton	Description	Area Covered	Effectiveness	Improvements Needed
	brochures and flyers in Town Hall, the Town Crier, and social media networks.	Town Website		
Program Participation				
Green Community Designation	The town has been designated by the DOER as a Green Community. With that designation the community is working towards improving energy efficiency and reducing greenhouse gas emissions, both of which mitigate impacts associated with climate change.	Town-wide	Effective	None
Participation in the National Flood Insurance Program (NFIP)	Provides flood insurance for structures located within a floodplain.	FEMA Flood Zones	Effective	None

5.6 STOUGHTON

Type of Existing Protection - Stoughton	Description	Area Covered	Effectiveness	Improvements Needed
Financial Capabilities				
Capital Improvement Plan (CIP)	Town maintains a five-year CIP that is updated and adopted by the Board of Selectmen annually.	Town-wide	Effective	None
Hazard Mitigation Funding	Town is eligible for MA Municipal Vulnerability Preparedness (MVP) Action Grant funding due to participation in MVP program.	Town-wide	Somewhat Effective	Provide additional staff resources to write grant applications and seek additional funding opportunities.
Planning and Regulatory Capabilities				
Wetlands, Flood Hazard, and Watershed Districts (Zoning Bylaw §9.2)	Protects wetlands, other water resource areas, and adjoining land areas; protects community against hazards to life and property posed by flooding.	Wetlands, Flood Hazard, and	Somewhat Effective	Evaluate redundancies with Floodplain Overlay District.

Type of Existing Protection - Stoughton	Description	Area Covered	Effectiveness	Improvements Needed
		Watershed District		
Aquifer Protection Overlay District (Zoning Bylaw §9.1)	Protects aquifer and aquifer recharge areas to protect potential public water supply.	Aquifer Protection Overlay District	Effective	None
Floodplain Overlay District (Zoning Bylaw §9.7)	Establishes a Floodplain Overlay District to mitigate the impact of future development on flooding and flood response, eliminate costs associated with response, and reduce damage to public and private property from flooding.	Floodplain Overlay District	Somewhat Effective	Update to comply with minimum NFIP standards using Massachusetts 2020 Model Floodplain Bylaw. Could evaluate redundancies with Wetlands, Flood Hazard, and Watershed District.
Wetlands Protection (Ch 191)	Protects wetlands, water resources, flood-prone areas, and adjoining upland areas. Last updated 2010.	Town-wide	Effective	None
Stormwater Management (Ch 159)	Prevents pollutants from entering town municipal separate storm sewer system, describes policies for municipal agencies and regulations and best practices for residents.	Town-wide	Effective	None
Land Subdivision Rules and Regulations	Requires fire alarm boxes to be placed under Fire Department Supervision, prevents planting of invasive trees, establishes flood hazard avoidance standards for subdivision located in any part within Flood Hazard, Wetlands, and Watershed District including requiring drainage systems to be designed to one hundred (100) year flood elevations. Last updated 1999.	Town-wide	Effective	None
Reconstruction After Catastrophe or Demolition (§5.7)	Establishes standards for the reconstruction of structures after a demolition or catastrophe.	Town-wide	Effective	Consider prohibiting reconstruction of structures in the Flood Plain Overlay District after catastrophe.
Board of Health Well Regulations	Protects public health by regulating the construction and operation of private wells. Amended 2014.	Town-wide	Effective	None

Type of Existing Protection - Stoughton	Description	Area Covered	Effectiveness	Improvements Needed
Comprehensive Master Plan (2013)	Discusses potential risk of sewage leaking on natural resources and property, identifies urban core and discusses urban core development, mentions creation of a street tree master plan to mitigate hazard impacts on trees.	Town-wide	Somewhat Effective	Conduct an interim mid-plan cycle evaluation of goals and recommendations.
Stormwater Management Plan (2022)	Describes the activities and measures that will be implemented to meet the terms and conditions of the 2018 MS4 Permit.	Town-wide	Effective	None
Open Space and Recreation Plan (2018)	Goals include protection of town ground and surface water and protection and enhancement of natural areas for wildlife habitat, wetland preservation, conservation, and recreation.	Town-wide	Effective	None
Administrative, Technical, and Operational Capabilities				
Tree Maintenance Program	The town works with utility providers to trim trees that may impact utility lines. This is a preventive measure aimed at reducing the risk of power outages in severe storms.	Town-wide	Effective	None
ALERT Stoughton	Town has a disaster warning system to alert residents to emergency conditions.	Town-wide	Effective	None
Zoning Enforcement	All Zoning Bylaws are enforced according to the mechanism laid out in §10.2 Enforcement.	Town-wide	Effective	None
Site Plan Approval	Protects community by providing a comprehensive review of land and development plans to ensure compliance with existing bylaws.	Town-wide	Effective	None
Emergency Power Generators	The town maintains emergency power generators in several important public facilities/shelters to preserve essential services throughout power outages.	Town-wide	Effective	Generators need to be maintained and replaced as needed

Type of Existing Protection - Stoughton	Description	Area Covered	Effectiveness	Improvements Needed
Regional & Local Emergency Planning Committees	The town regularly participates in local and regional emergency planning committees.	Town-wide	Effective	None
Catch Basin Maintenance	The town regularly cleans and maintains the catch basins throughout town, ensuring their capacity in the event of heavy rainfall.	Town-wide	Effective	None
Street Sweeping	The town conducts street sweeping on an annual basis. This prevents nutrient-laden sediment from washing into local waterbodies and causing algal blooms and poor water quality; it also helps prevent the accumulation of sediment in catch basins and subsequent flooding.	Town-wide	Effective	None
Fire Department Review of New Developments	The Fire Department participates in the review of all new development in town.	Town-wide	Effective	None
Cooling Centers	The town opens cooling centers as weather conditions warrant.	Town-wide	Effective	None
Inflow and Infiltration (I&I) Program	Annual I&I Program in place to address high priority areas (\$400k +/-YR). Pump station evaluations and upgrades were performed in 2018.	Town-wide	Effective	None
Hydraulic & Hydrologic (H/H) Study	Town is conducting a Hydraulic & Hydrologic Study of flood prone areas in the Town through the MVP Action Grant Program. Areas of flooding will be analyzed with the H/H model. Any deficiencies will be identified and prioritized accordingly. The South Street culvert was replaced in 2019 to alleviate a known flooding issue.	Town-wide	Effective	None
Educational and Outreach Capabilities				

Type of Existing Protection - Stoughton	Description	Area Covered	Effectiveness	Improvements Needed
Community Emergency Response Team (CERT)	Town provides free, regular training and maintains a roster of CERT volunteers that professional responders can call on during a disaster situation.	Town-wide	Effective	None
Public Information & Outreach	The town provides residents with information about potential natural hazards with leaflets and brochures in municipal buildings throughout the town.	Municipal Buildings	Somewhat Effective	Information could be updated and/or replaced on a regular basis
Program Participation				
Participation in the National Flood Insurance Program (NFIP)	Provides flood insurance for structures located within a floodplain.	Town-wide	Effective	None
StormReady Certification	Recognizes town achievements in hazardous weather preparedness.	Town-wide	Effective	None
MS4 Program Compliance	Outfalls are being inspected through the MS4 Permit. Any outfalls in disrepair are identified and repaired as needed. Illicit discharges are investigated through the MS4 Permit IDDE program. Illicit discharges that are identified are resolved accordingly.	Town-wide	Effective	None

6.0 MITIGATION STRATEGY

Whereas the two preceding Chapters identify risks from natural hazards and programmatic capabilities, this chapter defines a broad mission for the Town in mitigating these risks and establishes a series of hazard mitigation goals and specific implementation actions.

6.1 GOALS

The HMPC reviewed the goals set forth by the 2015 Plan and updated them to reflect new climate change-oriented priorities. The priorities of each community remained the same in regard to the protection of vulnerable populations and areas from the impact of natural hazards. However, an increased focus on climate change helped to guide each community in developing a new set of relevant mitigation actions to align with the 2024 goals.

- **Planning Area Goal:** Reduce the loss of life, property, infrastructure, and environmental and cultural resources from natural disaster.
- **Goal 1:** Investigate, design, and implement structural projects that will reduce and minimize the risks and impacts from riverine and stormwater flooding; and reduce and minimize the risks and impacts from potential HHPD failure including the Morse Pond Dam.
- **Goal 2:** Investigate, design, and implement projects that will reduce and minimize the risks and impacts from non-flooding hazards, such as wildfires, earthquakes, tornadoes, etc.
- **Goal 3:** Improve pre-disaster planning, communication, and coordination between federal, state, county, community, private, (including utilities) and non-profit entities so that they can plan for and mitigate natural hazards in a clear and comprehensive manner.
- **Goal 4:** Increase the awareness of the public, public officials, volunteer board and committee members, and members of the business community to the risks presented by the multiple natural hazards that affect the region as well as to the mitigation activities and grant opportunities available to minimize the impacts of these hazards.
- **Goal 5:** Improve existing municipal policies and programs where appropriate to further reduce or eliminate the impacts of natural hazards.
- **Goal 6:** Pursue mitigation strategies that reduce local contributions to climate change and increase resilience to the impacts of climate change.

6.2 REVIEW OF LOCAL 2015 ACTIONS

The HMPC and project consultant reviewed the 2015 Mitigation Actions to determine which actions were completed, ongoing, or no longer relevant. Towns reviewed the actions that were specific to each town. The action review included questions regarding what was accomplished for this project during the reporting period; what obstacles, problems, or delays did the project encounter; and if uncompleted, is the project still relevant and should it be changed or revised?

Actions were then categorized as either completed, ongoing (initially addressed but requiring ongoing maintenance or attention and carried forward from the 2015 plan), or not started/partially addressed (revised from the 2015 plan or removed because were no longer relevant).

Many of the 2015 actions were incorporated into each Town's subsequent MVP process. The description of the status of each action identified in the 2015 plan and how or if it was incorporated into Town practices are noted in the final column in the tables below. Several of the 2015 actions were not incorporated into town planning mechanisms and will be carried through to the current plan or discontinued due to a change in town priorities.

6.2.1 ABINGTON

2015 Mitigation Action	Responsible Party	Progress	Status
1. Upgrade vintage generators located at the Highway Department and Vehicle Maintenance building.	Highway Department	In progress	Capital Plan items: This item is on the 2025 Capital plan. Because it is scheduled, this action is considered “in progress” and not carried forward into the 2024 new actions list.
2. Develop and implement a local flood mitigation dam management program, including inspecting, maintaining and upgrading the following dams for present functions and stormwater management potential: Atwoods Pond Dam, Cushing Pond Dam, Cleveland Pond, Island Grove Pond Dam and Hunt’s Pond Dam.	Highway Department, Private Property Owners	In progress	Partially incorporated into MVP recommendations. Two dams are on an inspection schedule, these are Island Grove and Hunts Pond (which is co-owned with Brockton). Action continued and reworked into Action 8.
3. Enlarge the capacity of the undersized drainage culvert that crosses Central Street, just east of Route 58. The culvert is insufficient to handle flows during storm events and negatively effects nearby private properties.	Highway Department	No progress	No immediate plans due to lack of funding and manpower. Continued as Action 8.
4. Work with the state to enlarge several culverts on Route 18 in need of replacement and/or upgrades.	Highway Department, MassDOT	No progress	No immediate plans due to lack of funding and manpower. The culvert on Washington Street that connects to one of the Rt. 18 culverts is in the Capital Improvement Plan. Continued as Action 8.
5. Enlarge the capacity of an underground culvert on Wyman Road through to Summit Road that is often blocked with debris and subsequently floods nearby residential properties.	Highway Department	No progress	No immediate plans due to lack of funding and manpower. Continued as Action 8.

2015 Mitigation Action	Responsible Party	Progress	Status
6. Enlarge the capacity of the culvert that drains a holding pond behind the Frolio Middle School, which is often insufficient to handle additional flows during storm events. The Highway Department installed an overflow culvert to alleviate the situation, but at times continues to overflow.	Highway Department	No progress	No immediate plans due to lack of funding and manpower. Continued as Action 8.
7. Conduct regular maintenance of retention and detention ponds in town, as many are overgrown with weeds and grass.	Highway Department	No progress	No immediate plans to improve this process due to lack of funding and manpower. Continued as Action 8.
8. Improve community awareness during emergency events by having the ability to broadcast over the local cable access channel from the EOC. This is not currently possible as the cable access station is miles from the EOC. By installing the necessary equipment at the EOC, valuable information can be relayed to the residents in a fast, efficient manner.	Abington Emergency Management Agency	Alternative mitigation measures taken to meet this need.	Incorporated into MVP recommendations The Town is now using "Code Red" which residents can sign up for. The Town is also making more use of the Town's website and posting some of the twitter posts from Public Safety. The Town is also using the phone system for emergency messages to be communicated. Action revised and continued as Actions 1 through 3.

6.2.2 EASTON

2015 Mitigation Action	Responsible Party	Progress	Status
1. Develop and implement a local flood mitigation dam management program, including inspecting, maintaining and upgrading the following dams for present functions and stormwater management potential: Ames Long Pond Dam, Shovelshop Pond Dam, Langwater Pond Dam,	Department of Public Works, Private Property Owners	Ongoing	The Planning Department through the environmental planner maintains a database of the Town's dams that includes all critical dam information and has a schedule for completing necessary repairs and maintenance. Verify ownership, ensure owner understands

Morse Pond Dam, Old Pond Dam and New Pond Dam.			responsibility for good repair and observe regularly for upkeep. This action is complete and is now an Existing Capability.
2. Reduce the threat of flooding on Union Street at French's Pond and Dorchester Brook.	Department of Public Works	No longer applicable	No issues since 2010 floods. No work completed, and no further action needed.
3. Reduce the threat of flooding on Bay Road between Highland Street and Dean Street.	Department of Public Works	Complete	Drainage corrected to minimize threat of flooding.
4. Reduce the threat of flooding on Depot Street (Route 123) between Black Brook Road and Center Street.	Department of Public Works	Complete	Extensive roadway improvements made on Depot Street between 2020 and 2023, including modern drainage infrastructure.
5. Create and maintain a database of all responses due to natural disasters or storm events. This datum will be reviewed and analyzed periodically, and recommendations will be developed for remediation.	Department of Public Works, Police and Fire Departments	Complete	Individual events are tracked and maintained in a central database through the Fire Department's record management system.
6. Compile and maintain a list of all private small- and large-scale wastewater treatment plants in town.	Health Department	Incomplete	A formal list has not been developed. This action has been adapted into an action in the 2024 Mitigation Actions. Continued as Action 9.
7. Compile and maintain a list as well as map all private drinking water wells in town	Health Department	Incomplete	Requires staff time to consolidate source of information and map locations, has been adapted into an action in the 2024 Mitigation Actions. Continued as Action 9.

6.2.3 STOUGHTON

2015 Mitigation Action	Responsible Party	Progress	Status
1. Develop and implement a local flood mitigation dam management program, including inspecting, maintaining and upgrading the following dams for present functions and stormwater management	Department of Public Works, Private Property Owners	In progress	Dam Inspection performed by Town Engineering Staff for Wood Pond Dam and Town Pond Dam in 2016. This program is ongoing and will be carried forward in the

2015 Mitigation Action	Responsible Party	Progress	Status
potential: Pinewood Lake Dam, Town Pond Dam, and Wood Pond Dam.			Town's actions in the 2024 Mitigation Actions.
2. Enlarge the culvert on West Street at Ames Long Pond between Highland Street and Lake Drive to eliminate flooding.	Department of Public Works & Engineering	In progress	Town is conducting a Hydraulic & Hydrologic Study of the culvert and storm drain capacities in the Town through the MVP Action Grant Program. Any deficiencies will be identified and prioritized accordingly. Included within the Town's action in the 2024 Mitigation Actions. Included as Action 19.
3. Enlarge the culvert at the driveway of 1821 Washington Street to eliminate flooding concerns (This driveway provides access to two houses off of Washington Street).	Department of Public Works, Private Property Owner	Complete	Culvert was replaced by property owner.
4. Enlarge the storm drain behind the Police Station to eliminate flooding concerns.	Department of Public Works	In progress	Town is conducting a Hydraulic & Hydrologic Study of the culvert and storm drain capacities in the Town through the MVP Action Grant Program. This culvert will be analyzed with the H&H model. Any deficiencies will be identified and prioritized accordingly. Reworked as Action 12.
5. Develop a plan to protect critical documents and materials-store digitally or hard copies of public records in a hazard-free offsite location to protect important or irreplaceable documents.	Town Clerk	Complete	Digital copies are kept by Clerk.
6. Locate and map the location of all vulnerable populations (elderly, disabled, etc.) in town.	Stoughton Emergency Management Agency	Complete	Emergency medical dispatch (EMD) plan complete funded by Hazardous Materials Emergency Preparedness (HMEP) grant

2015 Mitigation Action	Responsible Party	Progress	Status
7. Develop and distribute educational materials for the public to generate awareness of hazards, mitigation steps, and disaster responses.	Stoughton Emergency Management Agency	No progress	0% complete due to budget and personnel constraints have restricted this action from moving forward No funding secured, will be carried forward as an action in 2024 Mitigation Actions. Included as Actions 1, 2, 8, and 18.
8. Work with the necessary state and federal agencies to develop and sign an evacuation route for the town in the event of a major natural hazard.	Stoughton Emergency Management Agency, MEMA, MassDOT	Complete	EMD plan complete, HMEP grant funded
9. Work with businesses and non-profit organizations in town to develop emergency action plans that can be utilized in the event of a natural hazard.	Stoughton Emergency Management Agency	No progress	0% complete due to budget and personnel constraints have restricted this action from moving forward No funding secured will be carried forward as an action in 2024 Mitigation Actions. Reworked as Action 18.
10. Install signs that direct people what to do in case of an emergency in all public buildings and facilities.	Stoughton Emergency Management Agency	No progress	0% complete due to budget and personnel constraints have restricted this action from moving forward No funding secured Discontinued – no longer considered a priority for natural hazard mitigation.
11. Assist residents on life support systems to obtain generators.	Stoughton Emergency Management	No progress	0% complete due to budget and personnel constraints have restricted this action from moving forward

2015 Mitigation Action	Responsible Party	Progress	Status
	Agency, Private Owners		No funding secured, carried forward and amended as Action 2.
12. Inspect, repair and maintain town-owned detention basins for the purpose of increasing their capacity.	Department of Public Works	In progress	DPW budget has been increased to improve maintenance frequency of stormwater basins. Included as Action 11 and 12.
13. Inspect and repair stormwater outfalls throughout town as needed.	Department of Public Works	Complete. Ongoing capability.	Outfalls are being inspected through the MS4 Permit. Any outfalls in disrepair are identified and repaired as needed.
14. Perform tests (smoke detection, etc.) to detect illicit sewer discharge in the drainage system.	Department of Public Works	Complete. Ongoing capability.	Illicit discharges are investigated through the MS4 Permit IDDE program. Illicit discharges that are identified are resolved accordingly.
15. Evaluate critical facilities that either have flooding issues or are in a flood zone and conduct studies to develop potential solutions.	Department of Public Works, Engineering Department	Complete. Ongoing capability.	Town is conducting a Hydraulic & Hydrologic Study of flood prone areas in the Town through the MVP Action Grant Program. Areas of flooding will be analyzed with the H&H model. Any deficiencies will be identified and prioritized accordingly. The South Street culvert was replaced in 2019 to alleviate a known flooding issue.
16. Evaluate and upgrade older sewer lines and pump stations throughout town.	Department of Public Works, Engineering Department	Complete. Ongoing capability.	Annual I&I Program in place to address high priority areas (\$400k +/-/YR). Pump station evaluations and upgrades were performed in 2018.
17. Evaluate the entire stormwater system in town.	Department of Public Works, Engineering Department	Ongoing	Town is conducting a Hydraulic & Hydrologic Study of the culvert and storm drain capacities in the Town through the MVP Action Grant Program. This culvert will be analyzed with the H&H model. Any

2015 Mitigation Action	Responsible Party	Progress	Status
			deficiencies will be identified and prioritized accordingly. Reworked as Action 12.
18. Upgrade the dam at Pratt's Court (Town Pond Dam).	Department of Public Works	Ongoing	Dam inspection report recommended minor repairs of dam, abutments and embankment. Funding source not yet secured. Continued in Action 19.
19. Construct improvements to Red Wing Brook to reduce the threat of flooding.	Department of Public Works	In Progress	Preliminary mitigation plans developed. Funding source needed. Included in Action 12.
20. Reconstruct the sewer where the road has settled near the intersection of Turnpike Street and Pleasant Street.	Department of Public Works	In progress	Roadway reconstruction in design phase with MassDOT. Because it is scheduled and currently underway, this action is not included in the 2024 action list.
21. Upgrade numerous catch basins as needed throughout town.	Department of Public Works	Complete	Catch Basins replaced or repaired as needed.

6.3 2024 MITIGATION STRATEGY

Removing and precluding development from hazardous areas is the best method of mitigation. However, for areas where development has already occurred, or for vulnerabilities that are less geographically specific, additional mitigation measures must be pursued. After reviewing the Town's identified risks and vulnerabilities to natural hazards, the input and feedback from the public workshop and survey, recommendations from the Town, and the local Capability Assessment, the HMPC selected mitigation actions to incorporate into the 2024 Update. The Committee has identified a comprehensive range of actions that would reduce the Planning Area's vulnerability to the identified hazards. The 2024 actions align with one or more of the following mitigation categories:

- Public Education and Awareness
- Property Protection
- Natural Resource Protection
- Structural Projects
- Emergency Services
- Planning and Prevention

The HMPC reviewed and re-prioritized the 2011 Risk Assessment Table and the associated actions based on historical damage, safety of the population, property protection and consistency with town-wide goals and objectives. The HMPC has worked to develop actions that are bounded by a time frame and are compatible and consistent with state hazard mitigation goals outlined in the 2018 MA State Hazard Mitigation and Climate Adaptation Plan.

Table 6.1 below outlines the 2024 Hazard Mitigation Strategies for each town. The strategy consists of a series of pre-disaster mitigation actions. Each action presented below includes a summary of the specific problem and proposed possible solution, details of the primary tasks to be undertaken, an appropriate lead for action implementation, and anticipated costs and financing options. Each of the prospective project leads identified in the following mitigation action descriptions were given an opportunity to review and provide input on the draft plan. Other relevant departments or agencies that can offer support to the project are also listed.

The cost ranges used for this strategy are as follows:

Staff Time – municipal personnel time

Minimal – less than \$5,000

Moderate – more than \$5,000, but less than \$25,000

Significant – over \$25,000

The time frames used for this strategy are as follows:

Short Term: within 1-3 years

Medium Term: within 3-5 years

Long Term: greater than 5 years

HMPC members were asked to rank the priority and feasibility of each of the 2024 Mitigation Strategy actions in categories to guide the focus of the Planning Area's resources towards actions with the greatest potential benefit. At this stage in the process, the HMPC has limited access to detailed analyses of the cost and benefits of any given mitigation measure, so prioritization is based on the members' understanding of existing and potential hazard impacts and an approximate sense of the costs associated with pursuing any given mitigation measure.

The HMPC employed a mitigation strategy prioritization process that considers potential benefits and estimated project costs, as well as other factors in FEMA's STAPLEE (Social, Technical, Administrative, Legal, Economic, and Environmental) analysis. The method used for this HMP focuses on four key themes as follows:

Benefits: Determine whether the proposed mitigation measure will improve property protection, natural resource protection, technical capacity, public awareness, or post-hazard emergency response;

Feasibility: Determine whether the proposed mitigation measure is feasible in terms of Town staffing, public and Town support, and whether it is technically feasible;

Economic: Evaluate each mitigation measure in terms of estimated cost and potential funding sources; and

Regulatory: Evaluate each mitigation measure for consistency with local, state, and federal permitting/ regulatory requirements and goals.

Each proposed mitigation action presented in this section was given a score based on 13 subcategories within these four larger categories documented above (i.e., Benefits, Feasibility, Economic, Regulatory). For each of these subcategories, the proposed action was given a score of 3 if the action was thought to be the "best" fit with a particular category (likely to provide the benefit under consideration, required little additional training or funding, feasible, most true or beneficial, etc.), 2 if it was "average" and "somewhat true," or 1 if it was "poor" (did not provide the benefit under consideration, difficult to permit, costly, not true, etc.). The comprehensive result of this priority ranking is showcased in Appendix E: Mitigation Action Prioritization Tables, and the final total scoring for each action is also included in each Town's mitigation action table.

The total results of each final ranking were close in range, and final ranking was decided between Low, Medium, and High. Low being less than or equal to 27, Medium being between greater than 27 and less than or equal to 29, and High being greater than 29. These results are showcased visually in Appendix E: Mitigation Action Prioritization Tables.

6.3.1 ABINGTON

#	New Proposed Action	Action Type	Hazard (H) and/or Vulnerability (V) Addressed	Responsible Agency	Support	Cost and Potential Sources	Time Frame	Priority (High Med, Low)
1	Creation of lists for Fire Departments/Emergency Services to have on-hand to know to check in on specific seniors or people with mental or physical disabilities in an emergency scenario	Planning and Prevention	H: Flooding, Dam Failure, Hurricanes & Tropical Storms, Severe Storms, Tornadoes, Winter Storms, Wildfires, Earthquakes, Extreme Temperatures, Drought	Fire Department, Emergency Management	School Dept	Staff Time (Fire Department Budget)	Medium Term	L
2	Develop and incentivize neighbor-to-neighbor support systems for residents, businesses, and organizations.	Public Education and Awareness	H: Flooding, Hurricanes & Tropical Storms, Severe Storms, Tornadoes, Winter Storms, Wildfires, Earthquakes, Extreme Temperatures, Drought	Emergency Management		Staff Time (Fire and Police Departments Budgets)	Long Term	L
3	Develop a Community Emergency Response Team (CERT) that helps to	Emergency Services	H: Flooding, Winter Storms, Severe Storms,	Emergency Management		Staff Time (Fire and Police Departments),	Medium Term	L

#	New Proposed Action	Action Type	Hazard (H) and/or Vulnerability (V) Addressed	Responsible Agency	Support	Cost and Potential Sources	Time Frame	Priority (High Med, Low)
	update public emergency response information		wind, Wildfire, and Earthquake			9-1-1 Training Grant		
4	Conduct a study to determine climate-related risks to the Town's water supply and alternatives to improve water supply resiliency to climate change. (MVP)	Natural Resource Protection	H: Drought V: Water availability during emergency response	Abington Rockland Joint water works	Hope to incorporate some of this in an updated MVP plan	Update plan via grant from MVP Minimal	Short Term	H
The Town's water supply is supplied by Rockland Water Works and is currently brought into Abington from Great Sandy Bottom Pond in Pembroke through a single pipe that crosses through several adjacent towns. The study should focus on risks from drought, to infrastructure, and to water quality and associated treatment processes to ensure a safe water supply.								
5	Stormwater Bylaw has been adopted, education and enforcement if necessary. Incorporate future climate projections into Floodplain and Wetland Protection Districts.	Public Education and Awareness	H: Flooding	Planning & Building services		Minimal, Staff Time (Planning Department Budget)	Medium term	H
6	Expand water resources with expansion of wells	Planning prevention	H: Drought	Abington/Rockland Joint waterworks		Significant (Potential grants include Drinking Water Supply Protection)	Short and Long term	H

#	New Proposed Action	Action Type	Hazard (H) and/or Vulnerability (V) Addressed	Responsible Agency	Support	Cost and Potential Sources	Time Frame	Priority (High Med, Low)
						Grant Program or BRIC)		
7	Develop a Tree Trimming program	Planning & Prevention & Property Protection	H: Winter Storms, Severe Storms, Wildfire, Tornadoes, Hurricanes and Tropical Storms	DPW		Staff Time (DPW Budget)	Long term	L
8	Establish detention basin, dam, and culvert cleaning and maintenance program and determine opportunities for open space to be used as future flood storage.	Planning & Prevention, Property Protection, natural resource protection	H: Flooding, Dam Failure	DPW	Planning	Staff Time (DPW Budget)	Long term	M
Drainage culverts such as the culvert that crosses Central Street, just east of Route 58, several culverts on Route 18, the culvert on Wyman Road through to Summit Road, the culvert behind the Frolio Middle School need attention for maintenance and cleaning in order to solve issues that have occurred at each location. Publicly owned dams including Atwoods Pond Dam, Cushing Pond Dam, Cleveland Pond need to be added to a more regular inspection schedule. Establishing a comprehensive stormwater system and dam cleaning and maintenance program may help to alleviate these issues.								
9	Installation of refillable water stations	Emergency services	H: Extreme Temperatures, Drought	Health Dept	DPW	Staff Time (Health Department and DPW Budgets)	Short term	H

#	New Proposed Action	Action Type	Hazard (H) and/or Vulnerability (V) Addressed	Responsible Agency	Support	Cost and Potential Sources	Time Frame	Priority (High Med, Low)
10	Preservation of trees and or replacement of more mature trees during development	Planning & Prevention, Public Education and awareness	V: Natural Resource Protection, H: Wildfires, Severe Storms	Planning via a bylaw		Staff Time (Planning Department, DPW Budgets)	Short Term	H
11	Educate Town Staff with training for climate resilience, safety, and hazard mitigation grant writing	Education and Awareness	H: Flooding, Dam Failure, Hurricanes & Tropical Storms, Severe Storms, Winter Storms, Wildfires, Earthquakes, Extreme Temperatures, Drought, Invasive Species	Public Health Nurse and Planning & Building Department		Staff Time (Public Health Nurse Budget)	Medium Term	M

6.3.2 EASTON

#	New Proposed Action	Action Type	Hazard (H) and/or Vulnerability (V) Addressed	Responsible Agency	Support	Cost and Potential Sources	Time Frame	Priority (High Med, Low)
1	Create an Invasive Species Control plan	Planning and Prevention Natural Resource Protection	H: Invasive Species	DPW	Conservation commission	Staff Moderate (DPW Budget)	Short Term	L
2	Develop and incentivize neighbor-to-neighbor support systems.	Public Education and Awareness	V: Personal injury, H: Flooding, Hurricanes & Tropical Storms, Severe Storms, Tornadoes, Winter Storms, Wildfires, Earthquakes, Extreme Temperatures	Community Engagement & Programming	Community Emergency Response Team (CERT) Health & Community Services	Staff Moderate (CERT, Emergency Management), 9-1-1 Training Grant	Long Term	L
3	Look for regional opportunities for forest management grants (MVP)	Planning and Prevention Natural Resource Protection	V: Air quality, flood storage H: Wildfire	Conservation Commission		Staff/minimal (Conservation Commission Budget)	Medium Term	L
4	Safeguard electrical systems during storm events through tree protection and management	Property Protection	H: Severe Storms V: Power outages, personal injury, lost business costs	Local community, National grid	DPW Environmental Planning	Significant Staff (DPW Budget) National Grid	Medium	H

#	New Proposed Action	Action Type	Hazard (H) and/or Vulnerability (V) Addressed	Responsible Agency	Support	Cost and Potential Sources	Time Frame	Priority (High Med, Low)
5	Update FIRM with elevations	Property Protection, Natural Resource Protection	H: Flooding V: property damage	Local community, FEMA	Planning Department	Staff (Planning Department Budget) Moderate	Long Term	L
6	Update the Floodplain protection bylaw	Property Protection, Natural Resource Protection	H: Flooding V: property damage	Planning, conservation, DCR		Staff (Planning Department Budget) Minimal	Short Term	M
7	Improve floodplain protection, evaluate revisions to wetland bylaw and floodplain protection district	Property Protection, Natural Resource Protection	H: Flooding V: property damage	Conservation, Planning	DEP	Staff (Planning Department Budget) Minimal	Medium Term	L
8	Provide additional flood storage, at Sam Wright Field, 445 Bay Road and provide additional flood storage, upgrade Highland Street culvert and Sam Wright Field culvert at Mulberry Meadow Brook	Structural Projects, Natural Resource Protection, Planning & Protection	H: Flooding V: property damage	Conservation	DPW	Staff (Planning Department and DPW Budgets) Minimal, Flood Mitigation Assistance Grant, Significant	Short Term	M

#	New Proposed Action	Action Type	Hazard (H) and/or Vulnerability (V) Addressed	Responsible Agency	Support	Cost and Potential Sources	Time Frame	Priority (High Med, Low)
9	Compile and maintain a list of all private small- and large-scale wastewater treatment plants and private drinking water wells in town.	Structural Projects, Natural Resource Protection	H: Flooding V: property damage	Conservation, DPW		Staff (Planning Department Budget) moderate Flood Mitigation Assistance Grant, significant	Medium Term	L
10	Coordinate with Office of Dam Safety (ODS) and DPW for annual inspection and maintenance of dams Coordinate maintenance and repair and add funding to departmental operation budgets.	Structural Projects, Property Protection, Natural Resource Protection	H: Flooding, Dam Failure, Earthquake V: property damage	Planning, conservation, DPW		Staff (Planning Department and DPW Budgets) moderate Rehabilitation of High Hazard Potential Dam Program, Moderate to Significant	Short to Medium Term	M
11	Coordinate with the owners of Morse Pond Dam to find funding to update inspections and the EAP. Cooperate with ODS and the owner to find funding to repair or breach the dam after the	Structural Projects, Property Protection, Natural Resource Protection	H: Flooding, Dam Failure, Earthquake, V: property damage	Planning, Conservation, DPW		Staff (Planning Department and DPW Budgets) moderate, Rehabilitation of High Hazard Potential Dam Program	Short to Medium Term	H

#	New Proposed Action	Action Type	Hazard (H) and/or Vulnerability (V) Addressed	Responsible Agency	Support	Cost and Potential Sources	Time Frame	Priority (High Med, Low)
	completion of an updated inspection.¹¹⁶							
Morse Pond Dam is the only HHPD in the Planning Area, and therefore special attention needs to be made to coordinate with ODS and the Town, and the dam owner to properly account for the location and size of the population at risk, as well as potential impacts to institutions and critical infrastructure/facilities/lifelines. The dam needs to be re-inspected to update the current conditions for the EAP. Based on a new inspection, the Town must then work with the dam owner to find funding that will ensure rehabilitation and protection or breaching of the existing structure.								

6.3.3 STOUGHTON

#	New Proposed Action	Action Type	Hazard (H) and/or Vulnerability (V) Addressed	Responsible Agency	Support	Cost and Potential Sources	Time Frame	Priority (High Med, Low)
1	All emergency calls, website posts, Facebook posts, texts, etc. need to be translated. Train/educate Town staff on resources available for communication with various populations	Emergency Services, Public Education and Awareness	H: Flooding, Dam Failure, Hurricanes & Tropical Storms, Severe Storms, Tornadoes, Winter Storms, Wildfires, Extreme Temperatures, Drought	Emergency Management	Town Administration	Minimal, Town meeting (Emergency Management Budget), 9-1-1 Support & Incentive Grant	Medium Term	H

¹¹⁶ Actions 10 and 11 address Goal 1 to reduce and minimize the risks and impacts from potential HHPD failure including the Morse Pond Dam.

#	New Proposed Action	Action Type	Hazard (H) and/or Vulnerability (V) Addressed	Responsible Agency	Support	Cost and Potential Sources	Time Frame	Priority (High Med, Low)
2	Create a generator safety education program and share educational resources to assist vulnerable residents to obtain generators.	Public Education and Awareness	H: Severe Storms, Winter Storms V: Power Outages	Emergency Management	Town Administration	Minimal, MEMA, FEMA Massachusetts Gap Energy Grant Program	Medium Term	H
3	Local Emergency Planning Committee (LEPC) - Tabletop and live training and incorporation of Hazard Mitigation grant writing training	Public Education and Awareness	H: Flooding, Dam Failure, Hurricanes & Tropical Storms, Severe Storms, Tornadoes, Winter Storms, Wildfires, Earthquakes, Extreme Temperatures, Drought, Invasive Species	EMD	LEPC	Minimal, MEMA, FEMA, Hazard Mitigation Assistance Program	Short term	H
4	Incident Command System (ICS) Training for LEPC	Public Education and Awareness	H: Flooding, Dam Failure, Hurricanes & Tropical Storms, Severe Storms, Tornadoes, Winter Storms, Wildfires,	EMD	MEMA	Minimal, MEMA, FEMA, 9-1-1 Training Grant	Short term	H

#	New Proposed Action	Action Type	Hazard (H) and/or Vulnerability (V) Addressed	Responsible Agency	Support	Cost and Potential Sources	Time Frame	Priority (High Med, Low)
			Earthquakes, Extreme Temperatures					
5	Support Equipment for Emergency Response purposes due to Large Scale events	Emergency Services, Structural Projects	H: Flooding, Dam Failure, Hurricanes & Tropical Storms, Severe Storms, Tornadoes, Winter Storms, Wildfires, Earthquakes	Town of Stoughton, Fire Department	MEMA	Significant, MEMA, FEMA, Emergency Management Performance Grant	Short term	H
6	Develop a Town Wide Community Resilience program	Public Education and Awareness	H: Flooding, Hurricanes & Tropical Storms, Severe Storms, Tornadoes, Winter Storms, Wildfires, Earthquakes, Extreme Temperatures	Fire/EMD	Local, Regional & State resources	Minimal, On-going Grants, Hazard Mitigation Assistance Program	Short term	H
7	Communications redundancy for Radio Towers	Planning and Prevention, Structural Projects	H: Flooding, Dam Failure, Hurricanes & Tropical Storms, Severe Storms, Tornadoes,	Fire/Police/DPW	Local, Regional & State resources	Significant, Grants, 9-1-1 Development Grant	Short Term	H

#	New Proposed Action	Action Type	Hazard (H) and/or Vulnerability (V) Addressed	Responsible Agency	Support	Cost and Potential Sources	Time Frame	Priority (High Med, Low)
			Winter Storms, Wildfires, Earthquakes, Extreme Temperatures					
8	Construct Emergency Operations Center and Public Health facility with Heating and Cooling capabilities, charging	Structural Projects, Emergency Services	H: Flooding, Hurricanes & Tropical Storms, Severe Storms, Tornadoes, Winter Storms, Wildfires, Earthquakes, Extreme Temperatures	Fire/EMD/ IT	MEMA, Town Administration	Significant, Hazard Mitigation Grant Program, Town meeting	Medium Term	H
9	Increase of emergency staffing	Planning and Prevention	H: Flooding, Dam Failure, Hurricanes & Tropical Storms, Severe Storms, Tornadoes, Winter Storms, Wildfires, Earthquakes, Extreme Temperatures	Emergency Management	LEPC, MEMA	Significant, (Emergency Management Budget), AFG Grants	Medium Term	H

#	New Proposed Action	Action Type	Hazard (H) and/or Vulnerability (V) Addressed	Responsible Agency	Support	Cost and Potential Sources	Time Frame	Priority (High Med, Low)
10	Lake management program for all Town Ponds (Invasive species control, hydro-raking)	Natural Resource Protection	H: Invasive Species	Conservation Commission, Engineering Dept	Town Meeting, Conservation Commission	Significant, Town meeting (DPW Budget)	Short Term	H
11	Conduct a Hydrological and Hydraulic Analysis of all culverts and stormwater drainage infrastructure, especially at West Street at Ames Long Pond between Highland Street and Lake Drive. Create Stormwater Master Plan.	Planning and Prevention	H: Flooding, Dam Failure, Severe Storms	Engineering Dept, Conservation Commission, Fire, DPW	Consultants, Engineering Dept.	Town Staff (DPW Budget), National Culvert Removal, Replacement, & Restoration Grant Meeting	Medium Term	H

#	New Proposed Action	Action Type	Hazard (H) and/or Vulnerability (V) Addressed	Responsible Agency	Support	Cost and Potential Sources	Time Frame	Priority (High Med, Low)
12	Implements repairs/upgrades recommended from the H/H Analysis and Stormwater Master Plan. (Culvert on West Street at Ames Long Pond between Highland Street and Lake Drive, Culvert behind Police Station, Dam at Pratt's Court, Red Wing Brook flooding, CB upgrades)	Planning and Prevention, Structural Projects	H: Flooding, Severe Storms	Engineering Department, Public Works	Town Meeting, Select Board	Significant Town Staff (DPW Budget), National Culvert Removal, Replacement, & Restoration Grant, Town Meeting	Long Term	H
13	Acquire Open Space to protect natural resources, habitat, and Town wells or planned well areas in Town (Cedar Swamp, Bird Street, Glen Echo, all wellhead areas)	Property Protection, Natural Resource Protection	H: Flooding, Drought	Conservation Commission, Water Department	Town Meeting, Select Board, Conservation Commission	Significant MA Land & Water Conservation Fund Grant Program, Town Meeting	Medium Term	H

#	New Proposed Action	Action Type	Hazard (H) and/or Vulnerability (V) Addressed	Responsible Agency	Support	Cost and Potential Sources	Time Frame	Priority (High Med, Low)
14	Expand Sewer to eliminate septic systems in High Groundwater areas (Phase 1 of Park Street Sewer under construction, Phase 2 in Planning stages)	Planning and Prevention, Structural Projects	H: Flooding V: natural resource protection	Engineering Department, Public Works	Town Meeting, Select Board	Significant, Town Meeting (Planning Department and DPW Budget), Statewide Water Management Act Grant	Long Term	H
15	Create Tree and Debris Management Program for all primary electrical distribution lines in Town	Planning and Prevention	H: Hurricanes & Tropical Storms, Tornadoes, Severe Storms	Fire Department, Public Works	Town Meeting, Select Board	Significant, Town Staff (DPW Budget), Power Companies	Medium Term	H
16	Maintain Sewer Lines in accordance with I/I program (Annual program \$400K +/-)	Planning and Prevention, Structural Projects	H: Flooding, Severe Storms	Public Works Sewer Department	Town Meeting, Select Board	Significant, Town Staff (DPW Budget), Sewer Utility Grants	Short Term	H
17	Implement LID Stormwater features on Town Owned properties (Cedar Hill, DPW, Town Hall, Rec Center, Schools)	Planning and Prevention, Structural Projects	H: Flooding, Severe Storms	Engineering, Public Works	Town meeting, Selectboard	Significant, Town Staff (DPW Budget), Priority Project Program	Long Term	H

#	New Proposed Action	Action Type	Hazard (H) and/or Vulnerability (V) Addressed	Responsible Agency	Support	Cost and Potential Sources	Time Frame	Priority (High Med, Low)
18	Develop and distribute educational materials and prepare signs for the public to generate awareness of hazards, mitigation steps, and disaster responses. Work with local business and organizations to educate regarding emergency response and action plans.	Planning and Prevention	H: Flooding, Dam Failure, Hurricanes & Tropical Storms, Severe Storms, Tornadoes, Winter Storms, Wildfires, Earthquakes, Extreme Temperatures, Drought, Invasive Species	Fire, EMD	Town Administration	Staff (Emergency Management and Planning Department Budgets), 9-1-1 Training Grant, MEMA, FEMA	Medium Term	H
19	Inspect, repair and maintain town-owned detention basins and dams (including dam management for Pinewood Lake Dam, Town Pond Dam, and Wood Pond Dam) for the purpose of increasing their capacity.	Planning and Prevention	H: Flooding, Dam Failure, Severe Storms	DPW, Engineering	Town Administration	Significant, Town Staff (DPW Budget), National Dam Safety Program	Medium Term	H

7.0 PLAN EVALUATION AND MAINTENANCE

FEMA requires HMPs to outline a maintenance process to ensure the Plan remains active and relevant to the current and future conditions of the Town. The process must identify the following items:

- Plan Monitoring, Evaluation and Updates – Method and schedule for monitoring, evaluating and updating the plan once every five years;
- Incorporation of Mitigation Strategies – Explanation of how local governments will incorporate mitigation strategies into existing mechanisms; and
- Continued Public Involvement – Requirements that public participation continue throughout the plan maintenance process.

This section details how each town within the Planning Area will meet these Plan maintenance requirements.

7.1 PLAN MONITORING, EVALUATION, AND UPDATES

As required by FEMA, the written plan will be evaluated and updated at least once every five years; evaluation will be coordinated by the Town Planner of Abington as the lead town on the planning grant for this iteration of the HMP, with the support of the Emergency Management Directors from each town and involve all relevant authorities having jurisdiction. In the interim, the Town Planner and Emergency Management Director will conduct annual reviews of the progress of mitigation actions and update as necessary. If a major natural disaster occurs before the next 5-year HMP update, the towns may wish to reconvene the HMPC to discuss how effective the proposed mitigation actions were in mitigating the impact of the event, and the HMPC may choose to update the Plan if it is determined that imminent changes are required to address new conditions and better mitigate future events. As necessary, HMPC members and/or departments may be added or removed from the committee to obtain the most accurate and applicable information possible.

During the 5-year period that the HMP is active, each of the members of the Core Committee may choose to reconvene the HMPC within two months after a natural hazard event. Upon convening, the committee would review all mitigation actions that address the specific hazard in question and evaluate the status of implementation for each relevant action. The committee will evaluate each action based on a series of questions developed to help rate the effectiveness of relevant mitigation action:

1. If an action was completed, did it impact the result of the event for the community? How?
2. What was the main result of an implemented action; was it a lower damage cost? Was it protection of lives and property? Etc.
3. If the action was completed and the result was not in the favor of the Town, how can that action be changed to better suit the town's needs?
4. If an action was not yet implemented or is in process, would the completed action have potentially decreased the risk of damage from the natural hazard?
5. Are there any actions missing from the HMP that should be added in the wake of this hazard event?

Depending on the Committee's evaluation, actions may be amended, removed, or added in a timely matter with a presentation to the public to record public comment and incorporate more effective mitigation actions for the extent of the HMP's effectiveness.

Evaluations and updates at the end of the 5-year cycle will take place in much the same way this updated plan was developed. The process will include meetings of the HMPC, review of goals and objectives,

updating the community profile, review and modification of potential hazards and hazard related data, review of existing hazard-prone areas and the addition of any new areas, updating existing and planned hazard mitigation measures, and an evaluation as to the effectiveness of the plan to date. The next update will begin in year 4 of this plan, to ensure that the subsequent update is ready within the required 5-year window.

7.2 INCORPORATION OF MITIGATION STRATEGIES

Mitigation strategies outlined in this Plan will be incorporated into existing municipal plans, bylaws and regulations as feasible. During future HMP updates, existing and proposed mitigation actions will be evaluated for effectiveness, level of completion, and continued appropriateness. Upon approval of this HMP, the HMPC will provide all interested parties and implementing departments with a copy of the plan and will initiate a discussion regarding how the plan can be integrated into that department's ongoing work. At a minimum, the plan will be reviewed and discussed with the following town staff and departments in each community, many of whom were part of the HMPC:

- Fire / Emergency Management
- Police
- Public Works / Highway
- Engineering
- Planning and Community Development
- Conservation
- Department of Human Services
- Health
- Building

Other groups that will be coordinated with include large institutions, Chambers of Commerce, land conservation organizations and watershed groups.

After this plan has been approved by both FEMA and the Select Boards of each town in the Planning Area, links to the final plan will be emailed to all Town staff, boards, and committees, with a reminder to review the plan periodically and work to incorporate its contents, especially the proposed mitigation actions presented in the 2024 Mitigation Strategy, into other planning processes, documents, and plans including Capital Improvement Plans. In addition, during annual review meetings for the HMP implementation process, the HMPC will review whether any other relevant municipal plans are in the process of being updated. If so, the committee will remind staff working on these plans, policies, etc., of the HMP, and urge them to incorporate the HMP data, findings, and actions into their respective efforts.

7.3 CONTINUED PUBLIC INVOLVEMENT

During the periodic five-year update process, the HMPC will hold at least one public workshop or similar meeting to solicit feedback from the public on the progress made to date. Concerned citizens will also be invited to review the revised Plan and submit any additional comments or recommendations for improving the Plan. All events will be publicly advertised in local newspapers and town websites, at a minimum. Copies of the Plan will be provided in public places such as each Town Hall (Clerk's office) and all public libraries. The Plan will also be made available to the public via each Town's website.

7.4 PLAN ADOPTION

At the conclusion of planning efforts conducted by the HMPC, the draft of the Abington, Easton, and Stoughton HMP was reviewed by the HMPC, stakeholders and the public, and informally approved by all applicable Town departments, boards, and other agencies identified as members of the HMPC. The plan

was then submitted to the Massachusetts Emergency Management Agency (MEMA) and the Federal Emergency Management Agency (FEMA) for review and approval. If approved by MEMA and FEMA, the plan will be brought before each town's Select Board for adoption, and the Plan will enter the five year "maintenance" phase. An example certificate of adoption is provided in Appendix F: Sample Certificate of Adoption.