TOWN OF MILTON
HAZARD MITIGATION PLAN
2021 UPDATE

Source: Milton Parks and Recreation

MAPC 50 YEARS
METROPOLITAN AREA PLANNING COUNCIL
SMART GROWTH AND REGIONAL COLLABORATION

Final Plan Adopted by the Town
January 7, 2022

ACKNOWLEDGEMENTS & CREDITS

This plan was prepared for the Town of Milton by the Metropolitan Area Planning Council (MAPC) under the direction of the Massachusetts Emergency Management Agency (MEMA) and the Massachusetts Department of Conservation and Recreation (DCR). The plan was funded by the Federal Emergency Management Agency's (FEMA) Pre-Disaster Mitigation (PDM) Grant Program.

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SECTION 1: EXECUTIVE SUMMARY

Hazard Mitigation planning is a proactive effort to identify actions that can be taken to reduce the dangers to life and property from natural hazard events. In the communities of the Boston region of Massachusetts, hazard mitigation planning tends to focus most on flooding, the most likely natural hazard to impact these communities. This plan considers how our warming climate will affect natural hazards. Warming temperatures will fuel changing precipitation patterns, sea level rise, and an increasing frequency and intensity of severe storms. The Federal Disaster Mitigation Act of 2000 requires all municipalities that wish to be eligible to receive FEMA funding for hazard mitigation grants, to adopt a local multi-hazard mitigation plan and update this plan in five-year intervals.

PLANNING PROCESS

Planning for the Hazard Mitigation Plan update was led by the Milton Local Hazard Mitigation Planning Team, composed of staff from a number of different town departments. the team met on February 3, April 7, and July21, 2021 and discussed where the impacts of natural hazards most affect the town, the effects of climate change, goals for addressing these impacts, updates to the Town's existing mitigation measures, and new or revised hazard mitigation measures that would benefit the town.

Public participation in this planning process is important for improving awareness of the potential impacts of natural hazards and to build support for the actions the Town takes to mitigate them. The Town's Local Hazard Mitigation Planning Team hosted two public meetings. The first meeting was held via Zoom on June 15, 2021. The second meeting was held on Zoom before the Select Board on September 8, 2021. and the draft plan update was posted on the Town's website for public review. Key town stakeholders and neighboring communities were notified and invited to review the draft plan and submit comments. See Public Comments for feedback.

RISK ASSESSMENT

The Milton Hazard Mitigation Plan assesses the potential impacts to the town from flooding, high winds, winter storms, brush fire, geologic hazards, extreme temperatures, drought, and invasive species. For each risk, the assessment identifies the projected impacts of a warming climate. These are shown in the map series in Appendix B. The Milton Local Hazard Mitigation Planning Team identified 143 Critical Facilities. These are also shown on the map series and listed in Table 32, identifying which facilities are located within the mapped hazard zones.

Hazards U.S. – Multihazards (HAZUS-MH) is a standardized methodology developed by FEMA that utilizes Geographic Information Systems (GIS) to estimate physical, economic, and social impacts of disasters. The HAZUS-MH analysis for Milton estimates property damages from Hurricanes of category 2 and 4 ($31 million to $120 million), earthquakes of magnitudes 5 and 7 ($546 million to $4.2 billion), and the 1% and .2% chance of flooding ($9 to $15 million).

HAZARD MITIGATION GOALS

The Milton Local Hazard Mitigation Planning Team endorsed the following eleven hazard mitigation goals at the April 7, 2021, team meeting. The team added a tenth goal focused on incorporating future climate change projections.

1. Ensure that critical infrastructure sites are protected from natural hazards.
2. Protect existing residential and business areas from flooding.
3. Maintain existing mitigation infrastructure in good condition.
4. Continue to enforce existing zoning and building regulations.
5. Educate the public about zoning and building regulations, particularly with regard to changes in regulations that may affect teardowns and new construction.
6. Work with surrounding communities to ensure regional cooperation and solutions for hazards affecting multiple communities.
7. Encourage future development in areas that are not prone to natural hazards.
8. Educate the public about natural hazards and mitigation measures.
9. Make efficient use of public funds for hazard mitigation.
10. Consider the potential impacts of future climate change. Incorporate climate sustainability and resiliency in hazard mitigation planning.

HAZARD MITIGATION STRATEGY

The Milton Local Hazard Mitigation Planning Team identified a number of mitigation measures that would serve to reduce the Town's vulnerability to natural hazard events. Overall, the hazard mitigation strategy recognizes that mitigating hazards for Milton will be an ongoing process as our understanding of natural hazards and the steps that can be taken to mitigate their damages changes over time. Global climate change and a variety of other factors impact the Town's vulnerability in the future, and local officials will need to work together across municipal lines and with state and federal agencies in order to understand and address these changes. The Hazard Mitigation Strategy will be incorporated into the Town's other related plans and policies.

PLAN REVIEW & UPDATE PROCESS

The process for developing Milton's Hazard Mitigation Plan 2021 Update is summarized in Table 1.

Table 1: Plan Review and Update Process

Section	Reviews and Updates
Section 3: Public Participation	The Local Hazard Mitigation Planning Team placed an emphasis on public participation for the update of the Hazard Mitigation Plan, discussing strategies to enhance participation opportunities at the first local committee meeting. During plan development, the plan was discussed at two public meetings hosted by the Hazard Mitigation Team and the Select Board. The plan was also available on the Town's website for public comment. See Public Comments for feedback.
Section 4: Risk Assessment	MAPC gathered the most recently available climate, hazard and land use data and met with town staff to identify changes in local hazard areas and development trends. Town staff reviewed critical infrastructure with MAPC staff in order to create an up-to-date list. The Risk Assessment integrates projected climate impacts. MAPC also used the most recently available version of HAZUS and assessed the potential impacts of flooding using the latest data.
Section 5: Goals	The Hazard Mitigation Goals were reviewed and endorsed by the Milton Local Hazard Mitigation Planning Team.
Section 6: Existing Mitigation Measures	The list of existing mitigation measures was updated to reflect current mitigation activities in the town.
Sections 7 and 8: Hazard Mitigation Strategy	Mitigation measures from the 2014 plan were reviewed and assessed as to whether they were completed, in progress, or deferred. The Local Hazard Mitigation Planning Team determined whether to carry forward measures into the 2021 Plan Update or modify or delete them. The Plan Update's hazard mitigation strategy reflects both new measures and measures carried forward from the 2014 plan. The Local Hazard Mitigation Team prioritized all of these measures based on current conditions.
Section 9: Plan Adoption & Maintenance	This section of the plan was updated with a new on-going plan implementation review and five-year update process that will assist the Town in incorporating hazard mitigation issues into other Town planning and regulatory review processes and better prepare the Town for the next comprehensive plan update.

As indicated in Table 37, Milton made good progress implementing mitigation measures identified in the 2014 Hazard Mitigation Plan. GIS and mapping projects were completed. Communications upgrades and generator purchases were completed. The Master Plan and dam management plans were completed, and the Open Space and Recreation Plan is underway.

Several drainage projects were completed, and snow load evaluations were done for three of the public schools.

Some projects were partially completed, and/or will be continued to the next plan for on-going maintenance. Removal of the Baker Dam is dependent on abatement of contaminated sediments. The state recently endorsed a request for Superfund designation to address the sediments. Several flood management projects were not completed and remain priority items.

Moving forward into the next five-year plan implementation period there will be many more opportunities to incorporate hazard mitigation into the Town's decision-making processes. As in the past, the Town will document any actions taken within this iteration of the Hazard Mitigation Plan on challenges met and actions successfully adopted as part of the ongoing plan maintenance to be conducted by the Milton Hazard Mitigation Implementation Team, as described in Section 9 Plan Adoption and Maintenance.

SECTION 2: INTRODUCTION

PLANNING REQUIREMENTS UNDER THE FEDERAL DISASTER MITIGATION ACT

The Federal Disaster Mitigation Act, passed in 2000, requires that after November 1, 2004, all municipalities that wish to continue to be eligible to receive FEMA funding for hazard mitigation grants, must adopt a local multi-hazard mitigation plan and update this plan in five-year intervals. This planning requirement does not affect disaster assistance funding.

Federal hazard mitigation planning and grant programs are administered by the Federal Emergency Management Agency (FEMA) in collaboration with the states. These programs are administered in Massachusetts by the Massachusetts Emergency Management Agency (MEMA) in partnership with the Department of Conservation and Recreation (DCR).

The Town of Milton contracted with the Metropolitan Area Planning Council (MAPC), to assist the Town in updating its third local Hazard Mitigation Plan, which was first adopted in 2008 as a multijurisdictional plan and updated as a single municipality plan in 2014.

WHAT IS A HAZARD MITIGATION PLAN?

Natural hazard mitigation planning is the process of determining how to systematically reduce or eliminate the loss of life and property damage resulting from natural hazards such as floods, earthquakes, and hurricanes. Hazard mitigation means to permanently reduce or alleviate the losses of life, injuries, and property resulting from natural hazards through long-term strategies. These long-term strategies include planning, policy changes, programs, projects, and other activities. This plan incorporates consideration of future risks due to projections for the increased frequency and severity of extreme weather fueled by a warming planet.

PREVIOUS FEDERAL/STATE DISASTERS

Since 1991, there have been 24 natural hazard events that triggered federal or state disaster declarations that included Norfolk County. These are listed in Table 2 below. The majority of these events involved flooding, while others were due to hurricanes or nor'easters, and severe winter weather.

Table 2: Presidentially Declared Disasters, 1991-2018

Disaster Name	Date of Event	Declared Areas
Hurricane Bob	August 1991	Counties of Barnstable, Bristol, Dukes, Essex, Hampden, Middlesex, Plymouth, Nantucket, Norfolk, Suffolk
Severe Coastal Storm No Name Storm	October 1991	Counties of Barnstable, Bristol, Dukes, Essex, Middlesex, Plymouth, Nantucket, Norfolk, Suffolk

Disaster Name	Date of Event	Declared Areas
Blizzard	March 1993	Statewide
Blizzard	January 1996	Statewide
Severe Storms, Flood	October 1996	Counties of Essex, Middlesex, Norfolk, Plymouth, Suffolk
Heavy Rain, Flood	June 1998	Counties of Bristol, Essex, Middlesex, Norfolk, Suffolk, Plymouth, Worcester
Severe Storms, Flood	March 2001	Counties of Bristol, Essex, Middlesex, Norfolk, Suffolk, Plymouth, Worcester
Snowstorm	March 2001	Berkshire, Essex, Franklin, Hampshire, Middlesex, Norfolk, Worcester
Snowstorm	February 2003	Statewide
Snowstorm	December 2003	Barnstable, Berkshire, Bristol, Essex, Franklin, Hampden, Hampshire, Middlesex, Norfolk, Plymouth, Suffolk, Worcester
Flooding	April 2004	Essex, Middlesex, Norfolk, Suffolk, Worcester
Snow	January 2005	Statewide
Hurricane Katrina	August 2005	Statewide
Severe Storms, Flooding	October 2005	Statewide
Severe Storms, Flooding	May 2006	Statewide
Severe Storm, Inland, Coastal Flooding	April 2007	Statewide
Severe Storms, Flooding	December 2008	Statewide
Severe Storms, Flooding	March/April 2010	Bristol, Essex, Middlesex, Suffolk, Norfolk, Plymouth, Worcester
Severe Winter Storm, Snowstorm	January 2011	Berkshire, Essex, Hampden, Hampshire, Middlesex, Norfolk, Suffolk
Tropical Storm Irene	August 2011	Barnstable, Berkshire, Bristol, Dukes, Franklin, Hampden, Hampshire, Norfolk, Plymouth
Severe Winter Storm, Snowstorm and Flooding	February, 2013	Statewide
Severe winter storm, snowstorm, and flooding	April 2015	Barnstable, Bristol, Dukes, Essex, Middlesex, Nantucket, Norfolk, Plymouth, Suffolk, Worcester
Severe winter storm and flooding	March 2018	Barnstable, Bristol, Essex, Nantucket, Norfolk, Plymouth

Disaster Name	Date of Event	Declared Areas
Severe winter storm and Snowstorm	March 2018	Essex, Middlesex, Norfolk, Suffolk, Worcester
COVID-19	January 2020	Statewide

Source: MA Hazard Mitigation and Climate Adaptation Plan, 2018

FEMA FUNDED MITIGATION PROJECTS

Over the last 20 years the Town of Milton has received funding from FEMA for two mitigation projects under the Hazard Mitigation Grant Program (HMGP). These projects totaled $727, 600 with $539,770 covered by FEMA grants and $180,596 by local funding. The projects are summarized in Table 3 below.

Table 3: FEMA-Funded Mitigation Projects

Project Title (Funding Source)	Scope of Work	Total Cost	Federal Funding	Local Funding
Reedsdale Road Sewer Upgrade (HMGP)	Replace portions of existing sewer lines; resurface disturbed pavement; replace existing drainage line; install manholes.	$630,800.00	$470,808.81	$157,700.00
Culvert Replacement (HMGP)	Upgrade stone box culvert.	$96,800.00	$68,961.00	$22,896.00

(Source: database provided by MEMA)

COMMUNITY PROFILE

Milton is a suburban community of 27,568 situated between the Neponset River and the Blue Hills, just south of Boston. Milton is within the Neponset River watershed just upstream of the river's estuary at its mouth at Boston Harbor. Its physical geography is part of the Boston Basin, which consists of a low coastal plain with generally gently sloping terrain, with the exception of the Blue Hills in the southern part of town. The earliest permanent settlement occurred in 1634 when colonists created an agricultural community growing barley, rye, and Indian corn. 18th century Milton became an important industrial site with an iron slitting mill, paper and sawmills, and the first chocolate factory in New England. Prosperous Bostonians moved to Milton, creating an early estate district, which grew side-by-side with 125 farms. Between 1870 and 1915 streetcar lines fueled the rapid expansion of residential development and Milton grew into the town it is now, a streetcar suburb. By 1929 many of the big estates were broken up into subdivisions continuing the town's residential growth. Milton now retains a good many 19th century country houses and

estates and early 19th century workers' housing. With a land area of 13.1 square miles, population density is 1,989 people per square mile. In 2000 there were 9,161 housing units. Milton's local government structure is a five-member Select Board and representative Town Meeting. The town maintains a website at www.townofmilton.org

Table 4: Milton Population

Population: 27, 568 people

- 7% are under age 5
- 25% are under age 18
- 16% are over age 65
- 74% of the population is White
- 15% of the population is Black
- 7% of the population is Asian
- 3% of the population is Latinx

Source: 2018 American Community Survey

The Town of Milton has several unique characteristics to keep in mind while planning for natural hazards:

- Milton has been proactive in addressing the impact of climate on natural hazards. The community is certified by the state as a Municipal Vulnerability Preparedness community.
- More than half of Milton's land areas is preserved forest and parkland. The Department of Conservation and Recreation Blue Hill property dominates the southwest side of Milton.
- Records from flooding in 2010 highlight that significant flood damage occurred along Pine Tree and Unquity Brooks, and in the vicinity of Lyman Road.
- Milton has adopted a Stormwater Utility to provide the resources necessary to address localized flooding and nonpoint source pollution.
- The Neponset River forms the northern border of Milton. The Neponset is tidal up to the Baker Chocolate Dam and Milton can be impacted by both coastal and inland flooding.

SECTION 3: PLANNING PROCESS & PUBLIC PARTICIPATION

MAPC employs a six-step planning process based on FEMA's hazard mitigation planning guidance focusing on local needs and priorities but maintaining a regional perspective matched to the scale and nature of natural hazard events and regional climate change. Public participation is a central component of this process, providing critical information about the local occurrence of hazards while also serving as a means to build a base of support for hazard mitigation activities. MAPC supports participation by the general public and other plan stakeholders through two public meetings, posting of the plan to the Town's website, and invitations sent to neighboring communities, town boards and commissions, and other local or regional entities to review the plan and provide comment.

PLANNING PROCESS SUMMARY

The six-step planning process outlined below is based on the guidance provided by FEMA's Local Multi-Hazard Mitigation Planning Guidance. Public participation is a central element of this process, which attempts to focus on local problem areas and identify needed mitigation measures based on where gaps occur in the existing mitigation efforts of the municipality. In plan updates, the process described below allows staff to bring the most recent hazard information into the plan, including new hazard occurrence data, changes to a municipality's existing mitigation measures, and progress made on actions identified in previous plans.

Figure 1: Six-Step Planning Process

1. **Map the Hazards** – MAPC relies on data from a number of different federal, state, and local sources in order to map the areas with the potential to experience natural hazards. This mapping represents a multi-hazard assessment of the municipality and is used as a set of base maps for the remainder of the planning process. A particularly important source

of information is the knowledge drawn from local municipal staff on where natural hazard impacts have occurred. These maps can be found in Appendix B.

2. **Assess the Risks & Potential Damages** – Working with local staff, critical facilities, infrastructure, vulnerable populations, and other features are mapped and contrasted with the hazard data from the first step to identify those that might represent particular vulnerabilities to these hazards. Land use data and development trends are also incorporated into this analysis. In addition, MAPC develops estimates of the potential impacts of certain hazard events on the community. MAPC drew on the following resources to complete the plan:

    - General By-Laws of the Town of Milton
    - Zoning By-Law of the Town of Milton
    - Milton Master Plan, 2015
    - Town of Milton Community Resilience Building Workshop Summary of Findings 2020
    - Blue Hill Observatory
    - Boston HIRA
    - FEMA, Flood Insurance Rate Maps for Norfolk County, MA, 2012
    - FEMA, Hazards U.S. Multi-Hazard
    - FEMA, Local Mitigation Plan Review Guide, October 2011
    - Fourth National Climate Assessment, 2018
    - Massachusetts Flood Hazard Management Program
    - Massachusetts Office of Coastal Zone Management Shoreline Change Data
    - Massachusetts Office of Dam Safety, Inventory of Massachusetts Dams 2018
    - Massachusetts State Hazard Mitigation Plan, 2013
    - Massachusetts State Hazard Mitigation and Climate Adaptation Plan, 2018
    - Metropolitan Area Planning Council, GIS Lab, Regional Plans and Data
    - National Weather Service
    - Nevada Seismological Library
    - New England Seismic Network, Boston College Weston Observatory, http://aki.bc.edu/index.htm
    - NOAA National Climatic Data Center, http://www.ncdc.noaa.gov/
    - Northeast Climate Adaptation Science Center
    - Northeast States Emergency Consortium, http://www.nesec.org/
    - Tornado History Project
    - US Census, 2010 and American Community Survey 2017 5-Year Estimates
    - USGS, National Water Information System, http://nwis.waterdata.usgs.gov/usa/nwis

3. **Review Existing Mitigation** – Municipalities in the Boston Metropolitan Region have an active history in hazard mitigation as most have adopted flood plain zoning districts, wetlands protection programs, and other measures as well as enforcing the State building code, which has strong provisions related to hazard resistant building requirements. Many communities have started adopting regulations designed to promote climate resilience. All current municipal mitigation measures must be documented.

4. **Develop Mitigation Strategies** – MAPC works with the local municipal staff to identify new mitigation measures, utilizing information gathered from the hazard identification, vulnerability assessments, and the community's existing mitigation efforts to determine where additional work is necessary to reduce the potential damages from hazard events. Additional information on the development of hazard mitigation strategies can be found in Section 7.

5. **Plan Approval & Adoption** – Once a final draft of the plan is complete it is sent to MEMA for the state level review and, following that, to FEMA for approval. Typically, once FEMA has approved the plan the agency issues a conditional approval (Approval Pending Adoption), with the condition being adoption of the plan by the municipality. More information on plan adoption can be found in Section 9 and documentation of plan adoption can be found in Appendix D.

6. **Implement & Update the Plan** – Implementation is the final and most important part of any planning process. Hazard Mitigation Plans must also be updated on a five-year basis making preparation for the next plan update an important on-going activity. Section 9 includes more detailed information on plan implementation.

2014 PLAN IMPLEMENTATION & MAINTENANCE

The 2014 Town of Milton Hazard Mitigation Plan contained a risk assessment of identified hazards for the town and mitigation measures to address the risk and vulnerability from these hazards. Since approval of the plan by FEMA and local adoption progress has been made on implementation of the measures. The Town has advanced a number of projects for implementation including adoption of a Stormwater Bylaw and a Stormwater Utility.

THE LOCAL MULTIPLE HAZARD COMMUNITY PLANNING TEAM

MAPC worked with the local community representatives to organize a Local Hazard Mitigation Planning Team for Milton. MAPC briefed the local representatives as to the desired composition of that team as well as the need for public participation in the local planning process.

The Local Hazard Mitigation Planning Team is central to the planning process as it is the primary body tasked with developing a mitigation strategy for the community. The local team was tasked with working with MAPC to set plan goals, provide information on the hazards that impact the town, existing mitigation measures, and helping to develop new mitigation measures for this plan update. The Local Hazard Mitigation Planning Team membership is listed below.

Erica DeDonato	Environmental Coordinator, Project Manager
Chase Berkeley	Public Works Director
Hilary Waite	Executive Administrative Assistant to Town Administrator
Christopher Madden	Fire Chief
Chuck Caputo	Lieutenant Police
Thomas McCarthy	Assistant Director Public Works
Timothy Inacio	Engineer Public Works

Tim Czerwienski	Planning Director
Paul Hopkins	Member, Local Emergency Planning Committee
Alan Bishop	GIS, Public Works
Marina Fernandes	Town Engineer, Public Works
Mark Williams	Milton Emergency Management

The Milton Planning Board and Conservation Commission are the primary entities responsible for regulating development in town. Feedback was assured through the participation of the Director of Planning and Community Development. In addition, MAPC, the State-designated regional planning authority for Milton, works with all agencies that that regulate development in the region, including the listed municipal entities and state agencies, such as the Department of Transportation and the Department of Conservation and Recreation.

The Local Hazard Mitigation Planning Team met on the following dates: February 3, April 7, and July 21, 2021. The purpose of the meetings was to introduce the Hazard Mitigation planning program, consider climate impacts, review, and update hazard mitigation goals, and to gather information on local hazard mitigation issues and sites or areas related to these. Later meetings focused on verifying information gathered by MAPC staff and discussion of existing mitigation practices, the status of mitigation measures identified in the 2014 hazard mitigation plan, and potential new or revised mitigation measures. The agendas for these meetings are included in Appendix A.

PUBLIC MEETINGS

Public participation in the hazard mitigation planning process is important, both for plan development and for later implementation of the plan. Residents, business owners, and other community members are an excellent source for information on the historic and potential impacts of natural hazard events and particular vulnerabilities the community may face from these hazards. Their participation in this planning process also builds understanding of the concept of hazard mitigation and climate impacts, potentially creating support for mitigation actions taken in the future to implement the plan. To gather this information and educate residents on hazard mitigation, the Town hosted two public meetings, one during the planning process and one after a complete draft plan was available for review.

The public had an opportunity to provide input to the Milton hazard mitigation planning process during a public meeting held via Zoom on June 15, 2021. The draft plan update was presented via Zoom at a Select Board meeting on September 8, 2021. Both meetings were publicized in accordance with the Massachusetts Public Meeting Law. The attendance list for each meeting can be found in Table 5. See public meeting notices in Appendix C.

Table 5: Milton Public Meetings

Meeting #1 June 15
Total Attendance: 18

Meeting #2 September 8, 2021
Total Attendance:
5 members of the Select Board
Webinar and Cable TV audience

LOCAL STAKEHOLDER INVOLVEMENT

The local Hazard Mitigation Planning Team reached out to local stakeholders that might have an interest in the Hazard Mitigation Plan including neighboring communities, agencies, businesses, nonprofits, and other interested parties. Notice was sent to the following organizations and neighboring municipalities inviting them to review the Hazard Mitigation Plan and submit comments to the Town. In addition, meetings were advertised in the local press, on the Town website, and through Town social media platforms.

- Fontbonne Academy
- Fuller Village
- Seasons Hospice
- Milton Academy
- Neponset River Watershed Association
- Sustainable Milton
- Milton Residents Fund
- Milton Interfaith Clergy Association
- Milton Early Childhood Alliance
- Friends of the Blue Hills
- Laboure College
- Curry College
- Milton Chamber of Commerce
- Mattapan, Milton, Neponset Community
- Milton Historical Commission
- Milton Housing Authority
- Milton Neighborhood Coalition
- Rotary Club of Milton
- Town of Randolph
- Town of Canton
- Town of Dedham
- City of Boston
- City of Quincy

See Appendix C for public meeting notices. The draft Milton Hazard Mitigation Plan 2021 Update was posted on the Town's website for the second public meeting. Members of the public could access the draft document and submit comments or questions to the Town.

PUBLIC COMMENT

Comments from the first public comment period included a focus on trees. Several participants expressed concern about the health of trees and forested areas due to increasing pests and drought. More frequent wind events and damage due to downed trees and fire risk were identified as concerns. Participants supported greater funding for efforts to maintain and plant trees and noted the need to consider warming temperatures when planting new trees. Commenters also expressed support for targeting tree planting to areas in Milton with less tree cover including near East Milton Square and near Mattapan Square. Several flooding locations were identified including along Pine Tree Brook, on Route 138, and in the vicinity of Collamore Street. Also discussed was the need to support residents who may be more vulnerable to natural hazards. In particular, one participant discussed the burden of tree damage on low-income residents, and another focused on the need for outreach to residents in elder facilities. Consideration of an emergency fund to support low-income residents who experience property damage was proposed as a possible solution. Comment from the second meeting included a request from residents of Churchill Street to investigate flooding and include the location for mitigation in the plan.

CONTINUING PUBLIC PARTICIPATION

Following the adoption of the plan update, the planning team will continue to provide residents, businesses, and other stakeholders the opportunity to learn about the hazard mitigation planning process and to contribute information that will update the town's understanding of local hazards. As updates and a review of the plan are conducted by the Hazard Mitigation Implementation Team, these will be placed on the Town's web site, and any meetings of the Hazard Mitigation Implementation Team will be publicly noticed in accordance with town and state open meeting laws.

PLANNING TIMELINE

February 3, 2021	Meeting of the Milton Local Hazard Mitigation
April 7, 2021	Meeting of the Milton Local Hazard Mitigation
June 15, 2021	First Public Meeting held virtually
July 21 2021	Meeting of the Milton Local Hazard Mitigation
September 8, 2021	Second Public Meeting with the Milton Select Board

September 28, 2021	Draft Plan Update submitted to MEMA
October 6, 2021	Draft Plan Update submitted to FEMA
November 22, 2021	Notice of Approvable Pending Adoption sent by FEMA
December 22, 2021	Plan Adopted by the Milton Select Board
January 7, 2021	FEMA final approval of the plan for 5 years

POST-APPROVAL IMPLEMANTATION AND PLAN UPDATE TIMELINE

Mid-2024 2024	Conduct Mid-Term Plan Survey on Progress Seek FEMA grant to prepare next plan update
2025	Begin process to update the plan by 2024
2026	Submit Draft 2026 Plan Update to MEMA and FEMA
TBD	FEMA approval of 2026 Plan Update

SECTION 4: RISK ASSESSMENT

The risk assessment analyzes the potential natural hazards that could occur within the Town of Milton as well as the relationship between those hazards and current land uses, potential future development, and critical infrastructure. This section also includes a vulnerability assessment that estimates the potential damages that could result from certain large-scale natural hazard events. In order to update Milton's risk assessment, MAPC gathered the most recently available hazard and land use data and met with Town staff to identify changes in local hazard areas and development trends. MAPC also used FEMA's damage estimation software, HAZUS.

With the adoption of the Hazard Mitigation and Climate Adaptation Plan 2018 (SHMCAP), Massachusetts became the first state to integrate climate projections in a state hazard mitigation plan. Following the state model, the projected impacts of our warming climate on natural hazards are integrated throughout the risk assessment. Key impacts include rising temperatures, which in turn affect precipitation patterns, sea level, and extreme weather.

> *"Global climate is changing rapidly compared to the pace of natural variations in climate that have occurred throughout Earth's history. Global average temperature has increased by about 1.8°F from 1901 to 2016, and observational evidence does not support any credible natural explanations for this amount of warming; instead, the evidence consistently points to human activities, especially emissions of greenhouse or heat-trapping gases, as the dominant cause."*
>
> Fourth National Climate Assessment, 2018 (Chapter 2-1)

CLIMATE CHANGE OBSERVATIONS AND PROJECTIONS

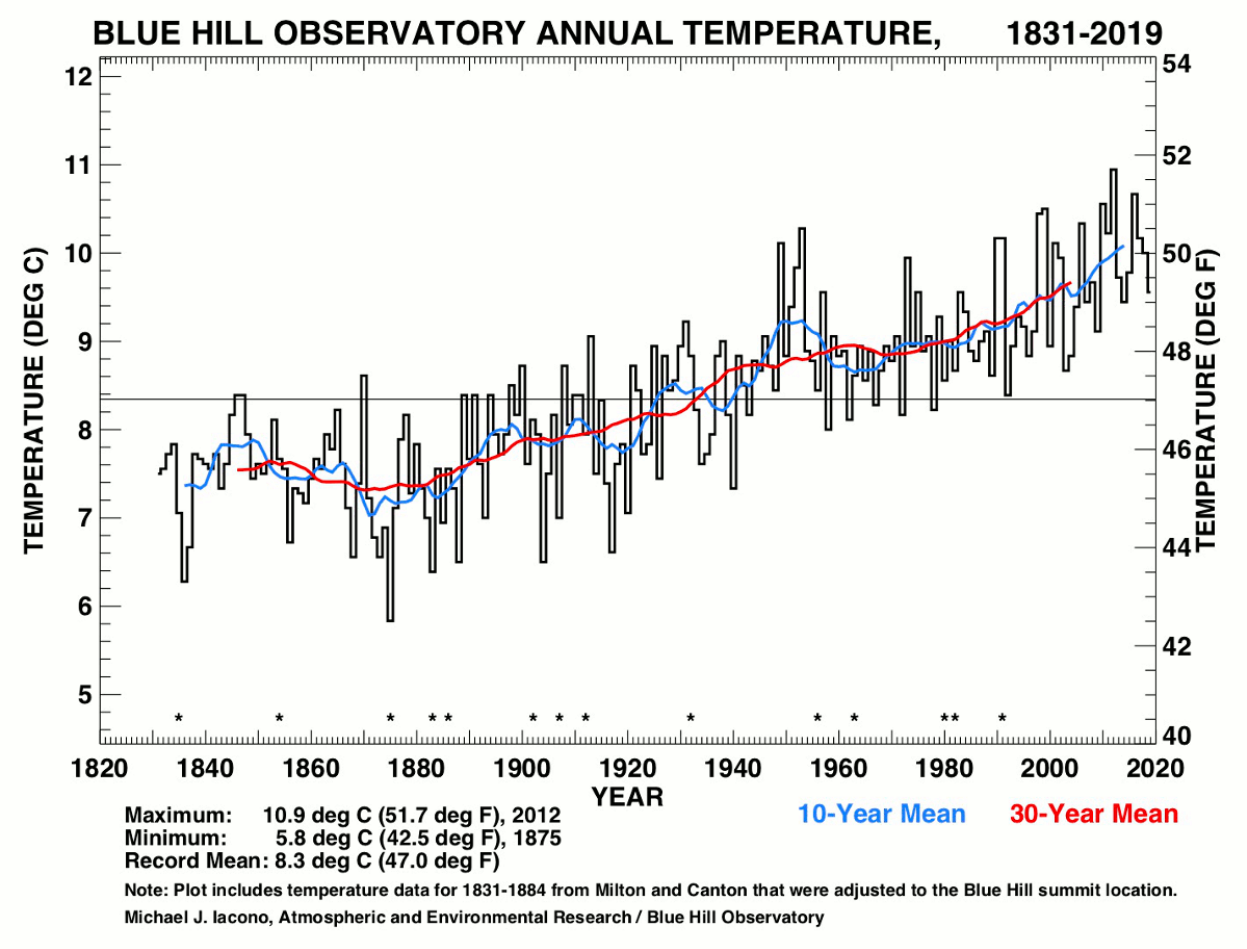
Climate change observations come from a variety of data sources that have measured and recorded changes in recent decades and centuries. Climate change projections, however, predict future climate impacts and, by their nature, cannot be observed or measured. As a result of the inherent uncertainty in predicting future conditions, climate projections are generally expressed as a range of possible impacts.

Temperature

Our climate has always been regulated by gases, including carbon dioxide, methane, and nitrous oxide, which blanket the earth. These gases trap heat that would otherwise be reflected out to space; without them our planet would be too cold to support life. We refer to these gases as "greenhouse gases" (GHGs) for their heat trapping capacity. The combustion of fossil fuels, our primary energy source in the age of industrialization, releases GHGs into the atmosphere. In the past century, human activity associated with industrialization has contributed to a growing concentration of GHGs in our atmosphere.

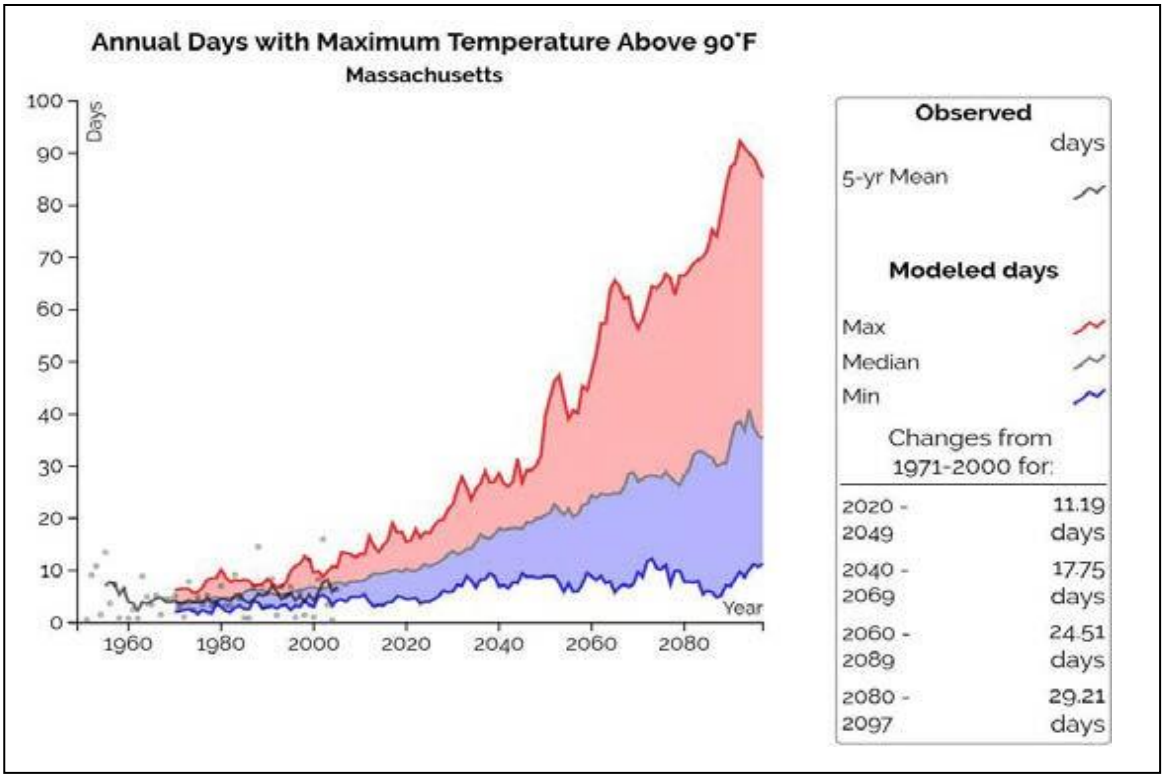
Records from the Blue Hill Observatory in Milton, MA show that average temperatures (30-year mean) have risen approximately 3 degrees (F) in the almost 200 years since record keeping began in 1831.

Figure 2: Observed Increase in Temperature



Climate projections include an increase in average temperature and in the number of extreme heat days. Extreme cold day are projected to decrease in number. The Northeast Climate Adaptation Science Center (NECASC) projects average temperatures in Massachusetts will increase by 5 degrees F by mid-century and nearly 7 degrees F by the end of the century. Figure 3 shows the NECASC range of projections for increases in the number of days over 90 degrees annually.

Figure 3: Projected Increase in Annual Days Over 90 Degrees F



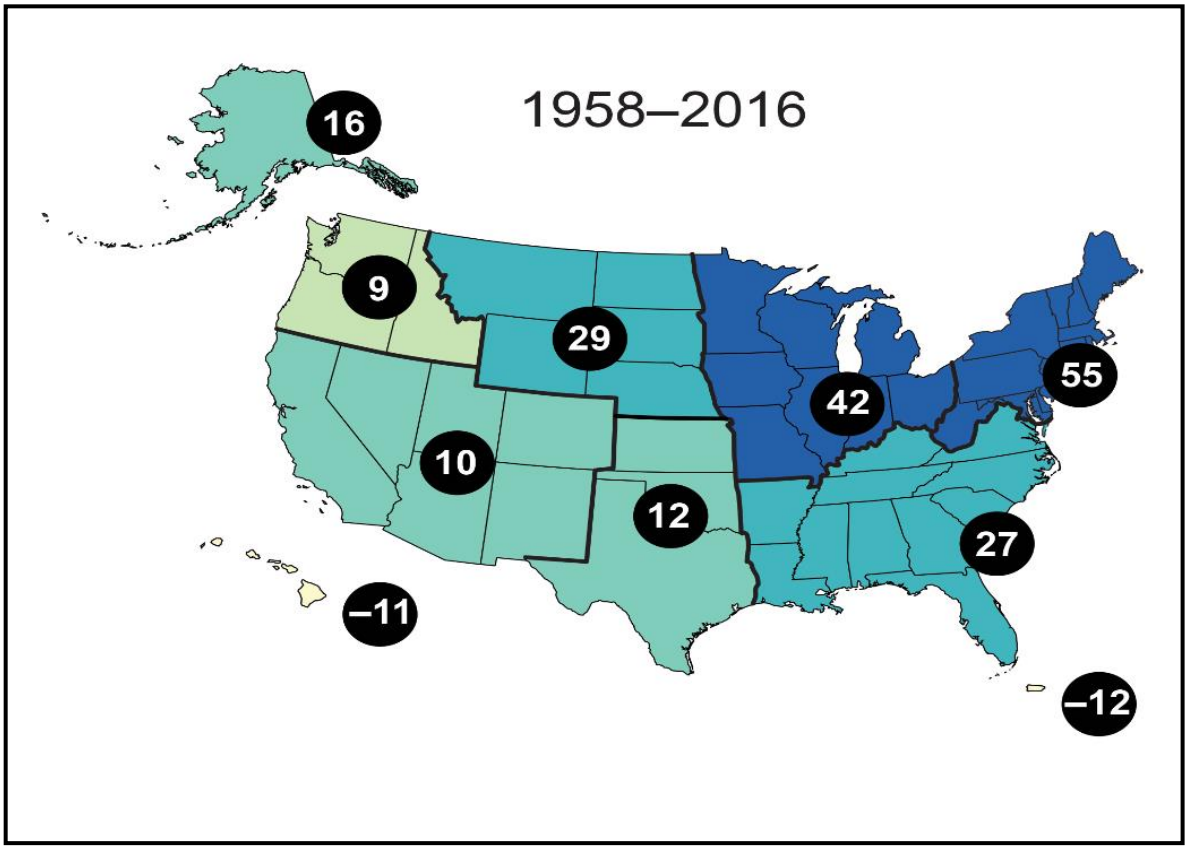
Source: Northeast Climate Adaptation Science Center

Precipitation Patterns

Annual precipitation in Massachusetts has increased by approximately 10% in the fifty-year period from 1960 to 2010 (MA Climate Adaptation Report, 2011). Moreover, there has been a significant increase in the frequency and intensity of large rain events. For the Northeast US, according to the Fourth National Climate Assessment 2018, in the past sixty years there has been a 55% increase in the amount of annual precipitation that falls in the top 1% of storm events (Figure 4). Changes in precipitation are fueled by warming temperatures which increase evaporation and, therefore, the amount of water vapor in the air.

Total annual precipitation in Massachusetts is projected to increase by 1 to 6 inches by mid-century, and by 1.2 to 7.3 inches by the end of this century (SHMCAP p. 2-22). The Fourth National Climate Assessment predicts that the pattern of increasing frequency and intensity of extreme rain events will continue. By 2070 to 2099, (relative to 1986 to 2015) they project a 30-40% increase in total annual precipitation falling in the heaviest 1% of rain events (Figure 5).

Figure 4: Observed Change in Total Annual Precipitation Falling in the Heaviest 1% of Events

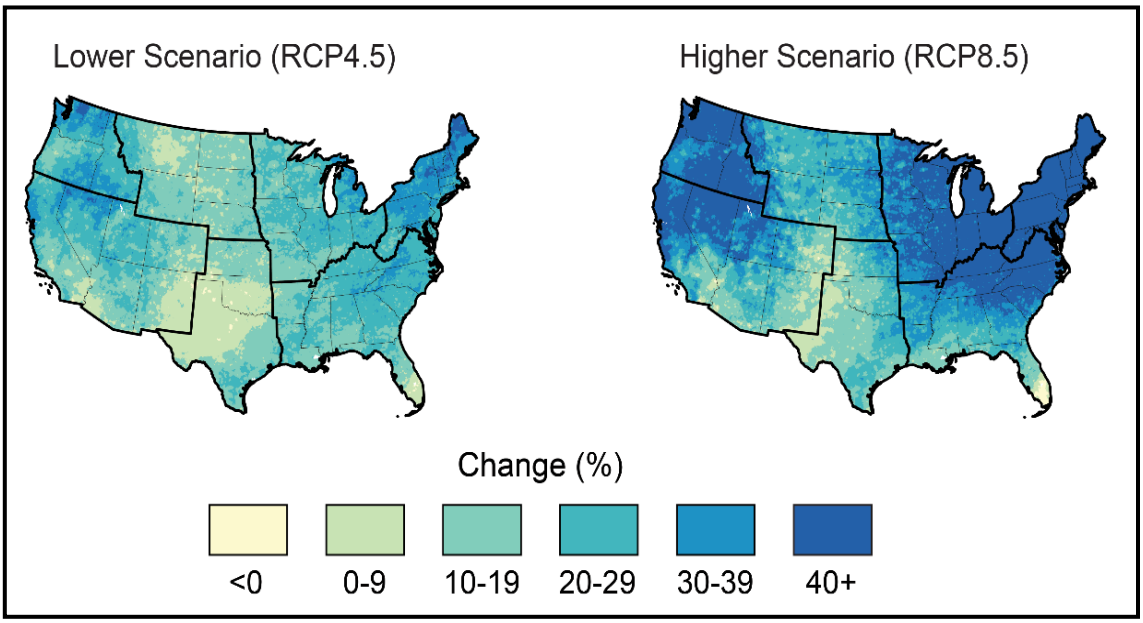


Source: Fourth National Climate Assessment, 2018

Numbers circled in black indicate % change.

Despite overall increasing precipitation, more frequent and significant summer droughts are also a projected consequence of climate change. This is due to projections that precipitation will increase in winter and spring and decrease slightly in the summer and, a result of earlier snow melt, and higher temperatures that will reduce soil moisture.

Figure 5: Projected Change in Total Annual Precipitation Falling in the Heaviest of 1% of Events for 2070-2099

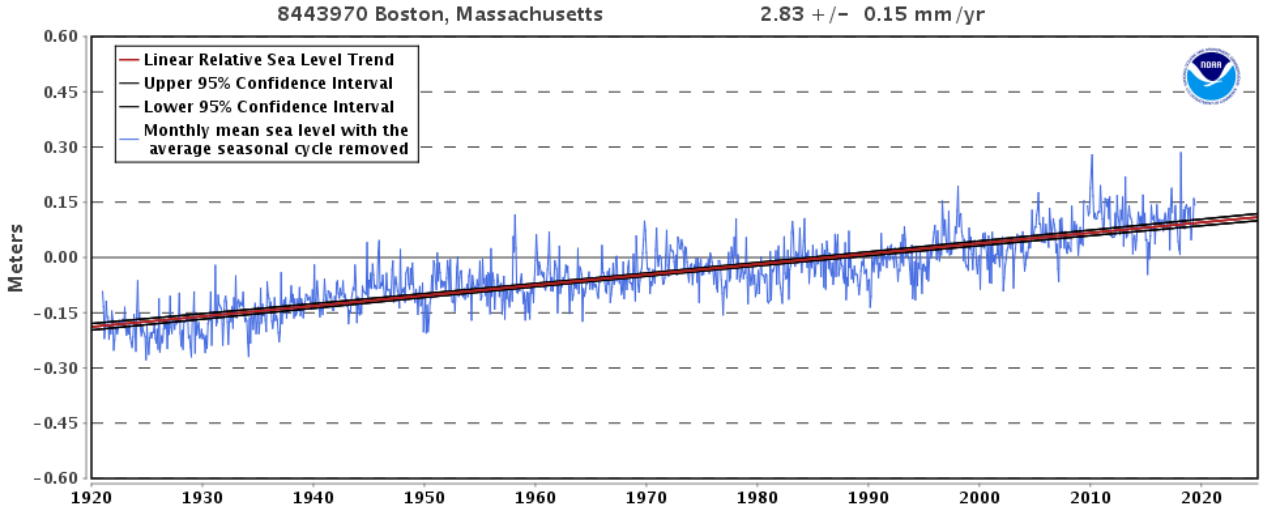


Source: Fourth National Climate Assessment, 2018

Sea Level Rise

Records from the Boston Tide Station show nearly one foot of sea level rise in the past century (Figure 6). Warming temperatures contribute to sea level rise in two ways. First, warm water expands to take up more space. Second, rising temperatures are melting land-based ice which enters the oceans as melt water. A third, quite minor, contributor to sea level rise in New England is not related to climate change. New England is still experiencing a small amount of land subsidence (drop in elevation) in response to the last glacial period.

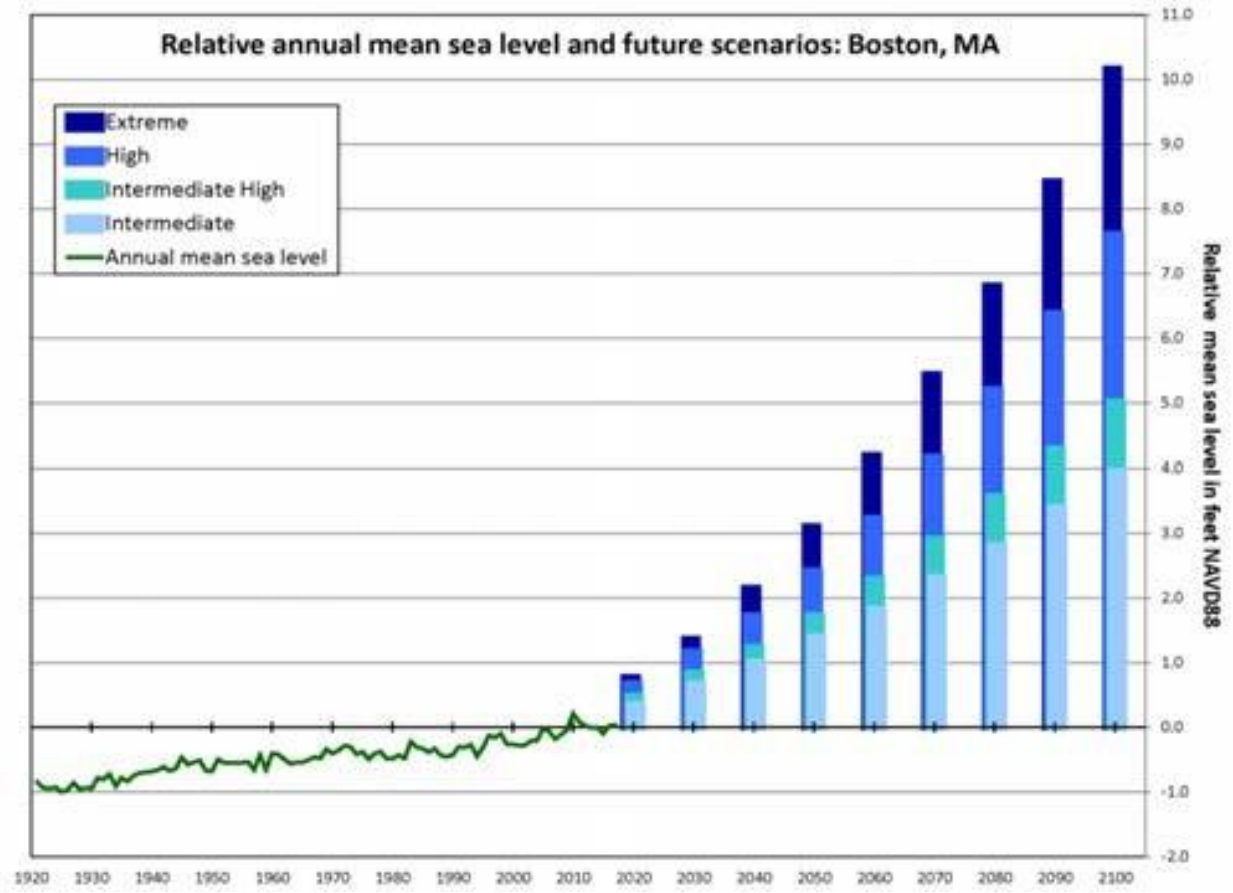
Figure 6: Observed Increase in Sea Level Rise



Source: NOAA

Projections of sea level rise through 2100 vary significantly depending on future greenhouse gas emissions and melting of land-based glaciers. Currently sea level is rising at an increasing rate. Figure 7 shows the recent rate of sea level rise, and a range of sea level rise scenarios. Projections for 2100 range from 4 feet to 10 feet. With ten feet representing the most extreme scenario. For 2050, the projections range approximately 1.5 to 3 feet.

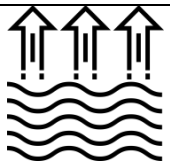
Figure 7: Recent and Projected Increase in Sea Level Rise



Source: SHMCAP

Following the outline of the Massachusetts State Hazard Mitigation and Climate Adaptation Plan (SHMCAP), this local hazard mitigation plan organizes consideration of natural hazards based on their relationship to projected climate changes. Table 6 below, from the SHMCAP, summarizes the natural hazards reviewed in this plan, climate interactions, and expected impacts.
It should be noted that ice jams are an unlikely natural hazard; with only two occurrences in Norfolk County in 1970 and 1971. There was no damage reported as a result of these ice jams and Milton has chosen not to profile ice jams since they are a secondary hazard

Table 6: Climate Change and Natural Hazards

Primary Climate Change Interaction	Natural Hazard	Other Climate Change Interactions	Representative Climate Change Impacts
 **Changes in Precipitation**	Inland Flooding	Extreme Weather	Flash flooding, urban flooding, drainage system impacts (natural and human-made), lack of groundwater recharge, impacts to drinking water supply, public health impacts from mold and worsened indoor air quality, vector-borne diseases from stagnant water, episodic drought, changes in snow-rain ratios, changes in extent and duration of snow cover, degradation of stream channels and wetland
	Drought	Rising Temperatures, Extreme Weather	
	Landslide	Rising Temperatures, Extreme Weather	
 **Sea Level Rise**	Coastal Flooding	Extreme Weather	Increase in tidal and coastal floods, storm surge, coastal erosion, marsh migration, inundation of coastal and marine ecosystems, loss and subsidence of wetlands
	Coastal Erosion	Changes in Precipitation, Extreme Precipitation	
	Tsunami	Rising Temperatures	
 **Rising Temperatures**	Average/Extreme Temperatures	N/A	Shifting in seasons (longer summer, early spring, including earlier timing of spring peak flow), increase in length of growing season, increase of invasive species, ecosystem stress, energy brownouts from higher energy demands, more intense heat waves, public health impacts from high heat exposure and poor outdoor air quality, drying of streams and wetlands, eutrophication of lakes and ponds
	Wildfires	Changes in Precipitation	
	Invasive Species	Changes in Precipitation, Extreme Weather	
 **Extreme Weather**	Hurricanes/Tropical Storms	Rising Temperatures, Changes in Precipitation	Increase in frequency and intensity of extreme weather events, resulting in greater damage to natural resources, property, and infrastructure, as well as increased potential for loss of life
	Severe Winter Storm / Nor'easter	Rising Temperatures, Changes in Precipitation	
	Tornadoes	Rising Temperatures, Changes in Precipitation	
	Other Severe Weather (Including Strong Wind and Extreme Precipitation)	Rising Temperatures, Changes in Precipitation	
Non-Climate-Influenced Hazards	Earthquake	Not Applicable	There is no established correlation between climate change and this hazard

OVERVIEW OF HAZARDS AND IMPACTS

Table 7 summarizes the frequency and severity of hazard risks for Massachusetts and Milton. The Massachusetts frequency assessment is based on data in the SHMCAP. The Milton frequency assessment reflects data from the National Climatic Data Center (NOAA) for Norfolk County*, from the SHMCAP** and, from the local Hazard Mitigation Team***.

Table 7: Hazards Risk Summary

Hazard	Frequency	
	Massachusetts	Milton
Inland Flooding	43 floods per year	3.3 floods per year*
Drought	2% chance of drought warning in any given month	2% chance of drought warning in any given month**
Landslides	1 notable event every other year	None recorded***
Coastal Flooding	6 floods per year	2 floods per year*
Coastal Erosion	Highly variable (frequency can't be measured)	Stable***
Tsunami	1in 39 years	1 in 39 years**
Extreme Temperatures	2 heat events and 1.5 cold events yearly	1 heat event every 2.5 years and 1 cold event every five years*
Brush Fires	One notable event per year	Minor events annually***
Invasives	Increasing	Increasing***
Hurricane/Tropical Storm	One storm every two years	None recorded
Severe Winter Storms/Nor'easters	One notable winter storm and one nor'easter per year	2 per year*
Tornadoes	1.7 per year	None recorded
Other Severe Weather (Thunderstorms/High Winds)	20-30 thunderstorms annually; 43.5 high wind events annually	3 thunderstorms per year*
Earthquake	10 - 15% chance of Mag 5 in a 10-year period	10 - 15% chance of Mag 5 in a 10-year period **

CHANGING PRECIPITATION PATTERNS

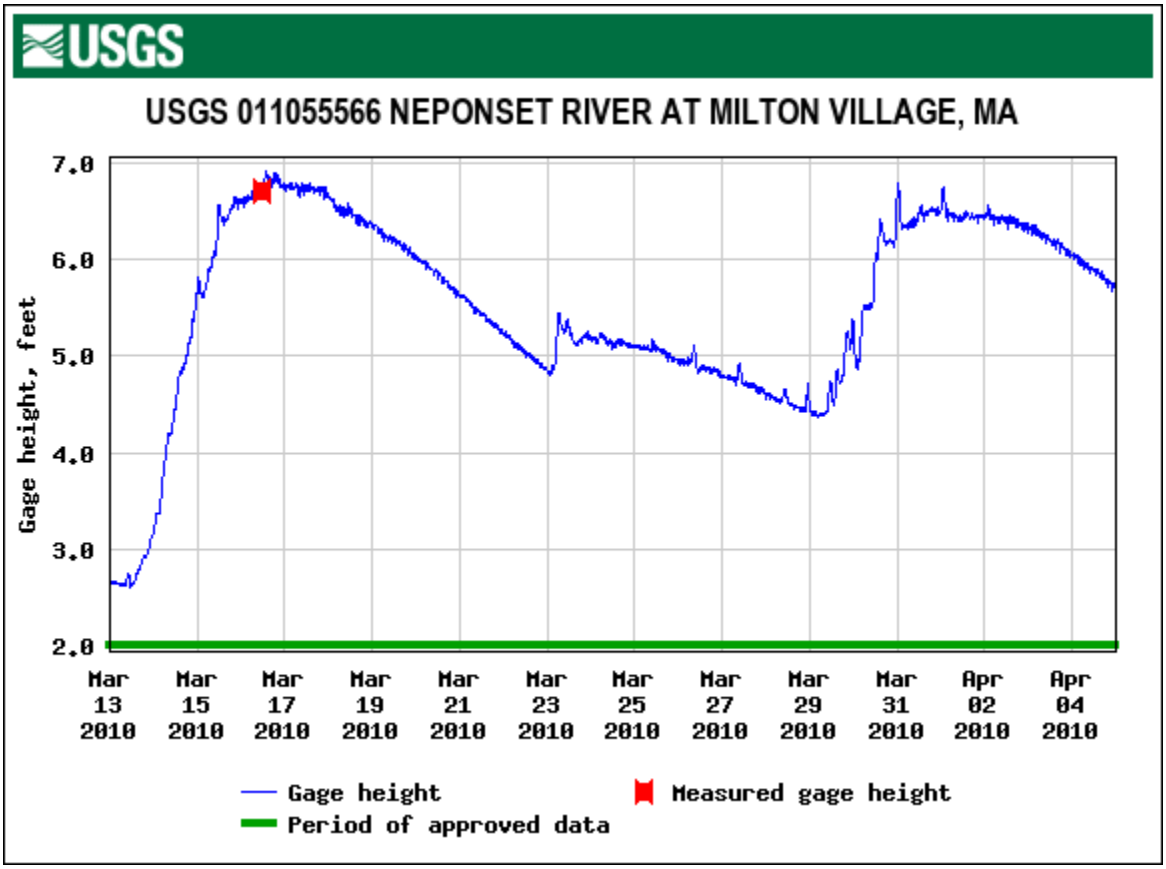
INLAND FLOODING

Inland flooding can be associated with overflowing rivers and streams, stormwater flooding associated with impervious surfaces and stormwater infrastructure, and in more rare cases ice jams, ground failures (erosion), and in some communities beaver dams. Inland flooding is generally caused by hurricanes, nor'easters, severe rainstorms, and thunderstorms. Nor'easters can occur at any time of the year, but they are most common in winter. Hurricanes are most common in the summer and early fall. Large rainstorms or snowfalls can also lead to inland flooding. Climate change has the potential to exacerbate these issues over time due to increasing extreme rainfall events. Increase in average annual rainfall may also lead to more incidents of basement flooding caused by high seasonal groundwater levels.

Flooding was the most prevalent serious natural hazard identified by local officials in Milton. The Town of Milton is subject to two kinds of flooding; coastal flooding (discussed further under Sea Level Rise) where storms lead to flooding along the tidal Neponset River and inland flooding where the rate of precipitation or amount of water overwhelms the capacity of natural and structured drainage systems to convey water causing it to overflow the system.

The March 2010 rainstorms fit the profile of a type of event expected to increase in frequency as the climate warms. That is, significant precipitation, falling in late winter as rain rather than snow, on ground saturated with snow melt, and while vegetation is still dormant. The Blue Hill Observatory in Milton recorded 17.7 inches of rain from three storms in the 19 days from March 13 to 31. As shown in the USGS gage located approximately 75 feet downstream of Baker Dam on the Neponset River, the river surged recording the highest level at the gage dating back to 1997 on March 16, 2010 (Figure 8). The March 2010 storms were a federally declared disaster making federal assistance available to residents who did not carry flood insurance. Based on the claims, Milton experienced extensive flood damage, with thirteen flood insurance claim and 439 disaster claims, 99% of which were located *outside* of FEMA Special Flood Hazard Areas. Many of the claims are in the vicinity of Milton's streams, but others are not associated with waterways or wetlands. See Map 3 in Appendix B for claim locations.

Figure 8: March 2010 USGS Neponset River Gage



Local data for previous flooding occurrences are not collected by the Town of Milton. The best available local data is for Norfolk County through the National Climatic Data Center. Norfolk County, which includes the Town of Milton, experienced 36 flood events from 2010 to 2020. No deaths or injuries were reported and the total reported property damage in the county was $25 million dollars. Nearly all of the damage is attributed to the events in March 2010. This is an average of 3.3 flood events each year. Measures of flooding severity include river forecasts of minor, moderate, or severe flooding.

Table 8: Norfolk County Flood Events, 2010-2020

Date	Deaths	Injuries	Property Damage
03/14/2010	0	0	16.64M
03/29/2010	0	0	8.320M
04/01/2010	0	0	0.00K
07/24/2010	0	0	20.00K
08/05/2010	0	0	0.00K
08/25/2010	0	0	8.00K
08/28/2011	0	0	0.00K

Date	Deaths	Injuries	Property Damage
08/15/2012	0	0	0.00K
10/29/2012	0	0	0.00K
06/07/2013	0	0	0.00K
07/29/2013	0	0	0.00K
08/09/2013	0	0	15.00K
10/22/2014	0	0	0.00K
10/23/2014	0	0	0.00K
8/15/2015	0	0	0.00K
8/18/2015	0	0	0.00K
6/07/2016	0	0	5.00K
8/14/2016	0	0	5.00K
4/1/2017	0	0	5.00K
7/12/2017	0	0	0.00K
7/18/2017	0	0	1.00K
8/2/2017	0	0	0.00K
9/30/2017	0	0	10.00K
10/25/2017	0	0	0.00K
10/29/2017	0	0	0.00K
01/12/2018	0	0	0.00K
01/13/2018	0	0	0.00K
04/16/2018	0	0	0.00K
07/06/2018	0	0	10.00K
10/29/2018	0	0	0.00K
11/03/2018	0	0	0.00K
4/15/2019	0	0	0.00K
7/6/2019	0	0	0.00K
7/16/2019	0	0	0.00K
6/21/2020	0	0	0.00K
6/28/2020	0	0	14.70K
Total	**0**	**0**	**25.054 M**

Source: NOAA, National Climatic Data Center

ICE JAMS

Ice jams occur in cold weather when normally flowing water begins to freeze effectively damming the waterway and causing localized flooding in the area. Flooding may also occur when ice jams

break up and ice may pile up at culverts or around bridges. There is no recent history of ice jams leading to flooding in Milton and Town staff did not identify this hazard as an issue for the town.

DAM FAILURE OR OVERTOPPING

Dams can fail because of structural problems or age, independent of any storm event. Earthquakes can be a cause of dam failure by causing structural damage. Dams can also fail structurally because of flooding arising from a storm, or they can overspill due to flooding. In the event of a dam failure, the energy of the water stored behind even a small dam can cause loss of life and property damage if there are people or buildings downstream. The number of fatalities from a dam failure depends on the amount of warning provided to the population and the number of people in the path of the dam's floodwaters.

A concern for dams in Massachusetts is that many were built in the 19th century without the benefits of modern engineering or construction oversight. In addition, some dams have not been properly maintained. The increasing intensity of precipitation is the primary climate concern related to dams, as they were most likely designed based on historic weather patterns. The SHMCAP indicates that changing precipitation patterns may increase the likelihood of overflow events. Dam failure is a highly infrequent occurrence, but a severe incident could result in loss of lives and significant property damage. According to the Association of State Dam Safety Officials, three dams have failed in Massachusetts since 1984, one of which resulted in a death.

According to Town officials, there is very little risk of dam failures in Milton. The dams in Milton are containment and flood control dams that pose few risks. There could, however, be ecological benefits and perhaps flood control benefits in removing some of the dams. Analysis has been done on the two Neponset River dams and the dams on Pine Tree Brook, where removal or modification could restore fish passage and improve ecological function. According to town officials, there are 7 dams in the Town; 2 dams on Pine Tree Brook, 2 dams on the Neponset River, the remaining are spillways for minor flood control purposes. The DCR Office of Dam Safety additionally lists the Pine Tree Brook Reservoir Dam. The Blue Hills Reservoir Dam, located in Quincy, is also listed for its potential impacts in Milton.

Neponset River Dams – The Neponset River forms the boundary of the City of Boston and the Town of Milton. There are two major dams on the Neponset River adjacent to the Town, both owned & operated by the Massachusetts Department of Conservation & Recreation. The first is the Baker Chocolate Dam at just upstream of Milton Landing and the second is the Tileston and Hollingsworth Dam at the Bay State Paper Company. If either of these two dams broke it is unlikely that there would be any loss of life. The presence of contaminated sediments upstream of the two dams has long been an impediment to efforts to remove the dams and restore a free-flowing river. The area has recently been nominated for inclusion as a Superfund site for cleanup of the sediments.

Harland Street Dam: The Harland Street dam is a flood control structure built by USDA / SCS in the early 1960's. The Town does the required periodic maintenance work to the surrounding berms and stream ways thus the structure's integrity is kept in check. DCR lists this as the Pine Tree Brook flood control dam.

Popes Pond Dam: This pond and its dam are owned by the Town. The pond drains into Pine Tree Brook. The stream-way has the capacity to handle the pond's water in the event of a dam failure.

Blue Hill Reservoir Dam: The reservoir and dam, owned by the DCR, are located in Quincy just over the town line. The dam is a broad earthen dam. If the dam broke, it would flood into the headwaters of Pine Tree Brook. Issues of potential downstream damage are unknown at this time.

Hemingway Pond: This pond and its spillway are owned by the DCR and maintained by the Town of Milton under a 99-year agreement. The pond drains into a stream that has the capacity to handle the waters in the event of a spillway structure failure.

Houghton's Pond: This pond and its dam are located in the Blue Hills Reservation and owned by the State. The pond drains into a stream that has the capacity to handle the waters in the event of a spillway structure failure.

Hillside Pond: This pond and its dam are located in the Blue Hills Reservation and is owned by the DCR. The pond drains into a stream that has the capacity to handle the waters in the event of a spillway structure failure.

Data in this chart from August 2018 were provided by the DCR Office of Dam Safety.

Table 9: Status of Dams in Milton

Dam Name	River	Owner	Hazard Classification
Pine Tree Brook Reservoir Dam	Pine Tree Brook	Department of Conservation and Recreation	N/A
Pine Tree Brook Flood Control Dam (Harland Street)	Pine Tree Brook (reservoir)	Town of Milton	Significant
Baker Chocolate Dam	Neponset River	Department of Conservation and Recreation	Significant
Tileston and Hollingsworth Dam	Neponset River	Department of Conservation and Recreation	Significant
Popes Pond Dam		Town of Milton Conservation Commission	Low
Blue Hills Reservoir Dam		Department of Conservation and Recreation (operated by the MWRA)	High

Source: DCR Office of Dam Safety

DCR Dam Hazard Classification

High: Dams located where failure or mis-operation will likely cause loss of life and serious damage to homes(s), industrial or commercial facilities, important public utilities, main highways(s) or railroad(s).

Significant: Dams located where failure or mis-operation may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s)

Low: Dams located where failure or mis-operation may cause minimal property damage to others. Loss of life is not expected.

LOCALLY IDENTIFIED AREAS OF INLAND FLOODING

Information on potential flood hazard areas was taken from two sources. The first is the National Flood Insurance Rate Maps (FIRM). The FIRM flood zones are shown on Map 3 in Appendix B. The "Locally Identified Areas of Flooding" described below were identified by Town staff as areas where flooding is known to occur. These areas do not necessarily coincide with the flood zones on the FIRMs. Flood sources include inadequate drainage systems, high groundwater, coastal storms, or other local conditions that may not be within a Special Flood Hazard Area. The numbers correspond to the numbers on Map 8, "Local Hazard Areas."

Table 10: Locally Identified Areas of Flooding

Map ID	Name	Description
1	Cunningham Brook	Cunningham Brook – Flooding from the brook has impacted adjacent playing fields, community pool, and skating area as well as the nearby residential properties. Flooding was severe in 2010.
2	Unquity Brook	Brook overflows flooding roads in this area and creating severe erosion in the upper reaches.
3	Bryant Avenue	Drainage capacity issue impacts the Expressway and homes on the East side of the highway.
4	Milton Landing	Neponset River floods this area. These are tidal impacts.
5	Russell Pond	The primary flooding impact in this large wetland area is to Harland Street; it floods quite often, but homes are not impacted.
6	Thayer Nursery	Adjacent catch basin clogs, due to poor onsite erosion control measures at Thayer flooding adjacent properties. Drainage work here has reduced but not eliminated flooding concerns.
7	Unquity Brook 2	Banks overflow and flooding prevents storm water drainage leading to road and property flooding.

8	Pine Tree Brook	Parkway and other roads flood as a result of severe storms.
9	Unquity House	Severe flooding from the infrastructure impacted by the Neponset River.
10	Ridge Road	Poor drainage leads to flooding of four to five houses in this area. . DPW drainage work here has reduced, but not eliminated flooding.
11	Trout Brook	Private common driveway floods, blocking access for those homes. The area directly behind these houses is the historic watershed of a moved stream.
12	Silver Brook	Stream that handles the outflow of Houghton's Pond, flooding in this area takes place when the culverted outflow Blue Hill River is blocked. There is no history of flooding here in recent memory.
13	Lower Granite Avenue	Flooding from the river on exceptional moon tides and during storm surges.
19	Christopher Dr/Hurlcroft Road	Flooding can be caused by a combination of rain and tidal impacts. Some of the land in these areas was once wetland.

REPETITIVE LOSS STRUCTURES

As defined by FEMA, a repetitive loss property is a NFIP-insured structure that has had two or more paid flood losses of $1,000 or more in any given 10-year period since 1978. There are 7 repetitive loss properties in Milton. The properties are shown on the maps in Appendix A. These repetitive loss properties had a total of 17 losses from 1978 to 2020, totaling $181,251 in paid claims. For more information on repetitive losses see https://www.fema.gov/txt/rebuild/repetitive_loss_faqs.txt and https://www.fema.gov/repetitive-flood-claims-grant-program-fact-sheet.

Table 11 summarizes the number and location of repetitive loss structures located within Milton and the number of losses and total claims associated with them. All of the properties are single-family homes.

Table 11: Summary of Repetitive Losses and Claims

	A, AE, AO, AH Zones	VE Zone	X Zones	Total
Number of Properties	1	0	6	7
Number of Losses	2	0	15	17
Total Claims	$5,906	0	$175,345	$181,251

Source: Department of Conservation and Recreation, FEMA Repetitive Loss data

DROUGHT

Drought is a temporary irregularity in precipitation and differs from aridity since the latter is restricted to low rainfall regions and is a permanent feature of climate. Drought is a period characterized by long durations of below normal precipitation. Drought conditions occur in virtually all climatic zones, yet its characteristics vary significantly from one region to another since it is relative to the normal precipitation in that region. Drought can affect agriculture, water supply, aquatic ecology, wildlife, and plant life.

Droughts are projected to increase in frequency and intensity in the summer and fall as weather patterns change. Factors contributing to this include increasing evaporation as a result of warmer weather, earlier snow melt, and more extreme weather patterns. Drought impacts can include reduced groundwater and surface water levels, affecting water quality and quantity, and the organisms that rely on aquatic resources. Drought also increases stress on plant communities and, the likelihood of forest and brush fires. Communities may be affected by water use restrictions, affecting drinking water supply and outdoor water use. Economic sectors impacted could include recreation, agriculture, and forestry.

Five levels of drought have been developed to characterize drought severity: Normal, Advisory, Watch, Warning, and Emergency. These drought levels are based on the conditions of natural resources and are intended to provide information on the current status of water resources. The levels provide a basic framework from which to take actions to assess, communicate, and respond to drought conditions.

Milton does not collect data relative to drought events. Because drought tends to be a regional natural hazard, this plan references state data as the best available data for drought. Drought is a town wide hazard in Milton. The SHMCAP using data collected since 1850, calculates that statewide there is a 1% chance of being in a drought emergency in any given month. For drought warning and watch levels, the chance is 2% and 8% respectively in any given month (Table 12).

Table 12: Frequency of Massachusetts Drought Levels

Drought Level	Frequency Since 1850	Probability of Occurrence in a Given Month
Drought Emergency	5 occurrences	1% chance
Drought Warning	5 occurrences	2% chance
Drought Watch	46 occurrences	8% chance

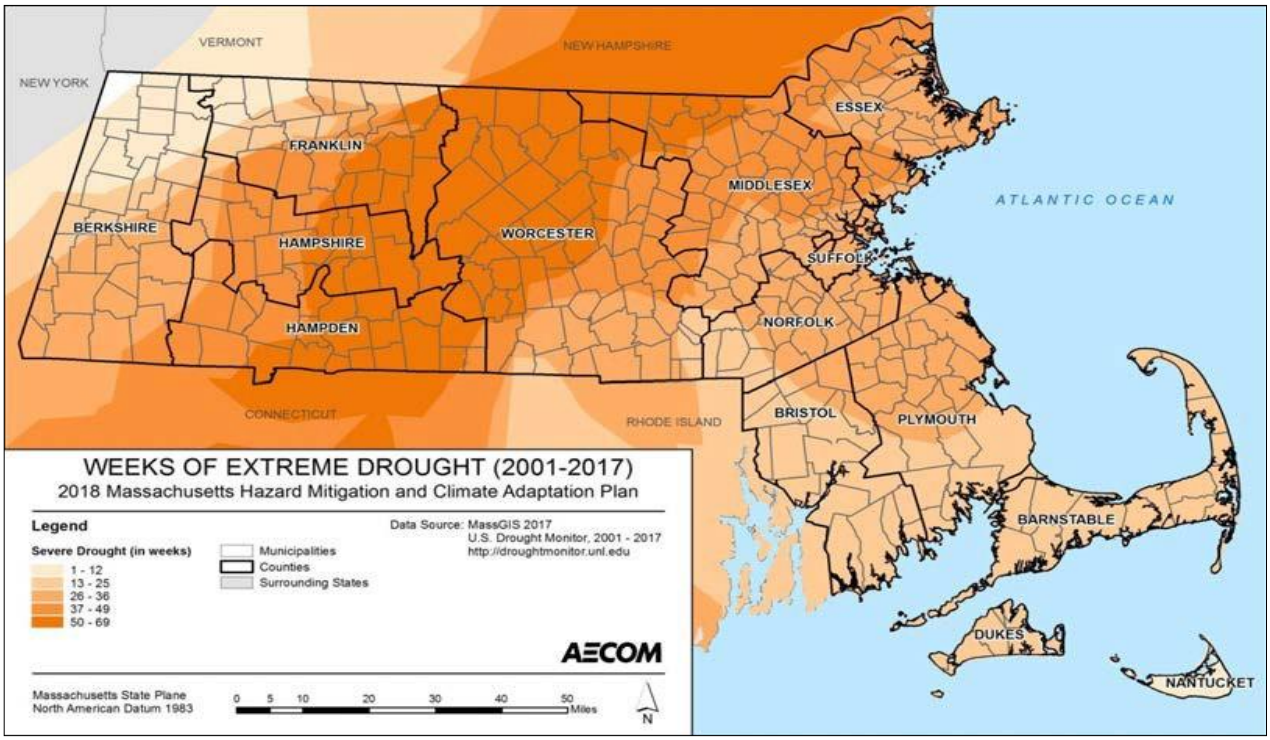
Source: SHMCAP

Drought emergencies have been reached infrequently, with five events occurring between 1850 and 2012: 1883, 1911, 1941, 1957, and 1965 to 1966. Due to its long duration, the drought from 1965 to 1966 is viewed as the most severe drought to have occurred in Massachusetts in modern times. The drought that extended from July 2016 to April 2017 reached the Drought

Warning level. Determinations regarding the end of a drought or reduction of the drought level focus on two key drought indicators: precipitation and groundwater levels. These two factors have the greatest long-term impact on stream flow, water supply, reservoir levels, soil moisture, and the potential for forest fires.

The U.S. Drought Monitor characterizes droughts as moderate, severe, extreme, or exceptional. Severe drought is characterized by likely crop and pasture losses, water shortages, and water restrictions. As shown in Figure 9 below, Milton experienced between 26 and 36 weeks of severe drought between 2001 and 2017. Town staff and meeting participants expressed concern for the health of trees, damage from falling trees, and increased fire risk.

Figure 9: Weeks of Severe Drought (2001-2017)



Source: SHMCAP

LANDSLIDES

According to the U.S. Geological Survey, "The term landslide includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Although gravity acting on an over steepened slope is the primary reason for a landslide, there are other contributing factors." Among the contributing factors are erosion by rivers or ocean waves over steepened slopes; rock and soil slopes weakened through saturation by snowmelt or heavy rains; earthquake created stresses that make weak slopes fail; excess weight from accumulation of rain or snow; and stockpiling of rock or ore from waste piles or man-made structures. In Massachusetts, according to the SHMCAP, the most common cause of landslides are geologic conditions combined

with steep slopes and/or heavy rains. Landslides associated with heavy rains typically occur on steep slopes with permeable soils underlain by till or bedrock.

Landslides can result from human activities that destabilize an area or can occur as a secondary impact from another natural hazard, such as flooding. In addition to structural damage to buildings and the blockage of transportation corridors, landslides can lead to sedimentation of water bodies. Typically, a landslide occurs when the condition of a slope changes from stable to unstable. Natural precipitation such as heavy snow accumulation, torrential rain, and run-off may saturate soil, creating instability enough to contribute to a landslide. More frequent extreme rain events may increase the chance of landslides as saturated soils are conducive to landslides. Drought may also increase the likelihood of landslides if loss of vegetation decreases soil stability.

The SHMCAP, utilizing data from the MA Department of Transportation from 1986 to 2006 to estimates that, on average, roughly one to three known landslides have occurred each year. A slope stability map published by the MA Geological Survey and UMass-Amherst indicates that the most significant risk of landslide is in western Massachusetts. According to the SHMCAP, factors that influence landslide severity include soil properties, topographic position and slope, and historical incidence.

Milton is classified as having a low incidence of landslides, and moderate susceptibility to landslides in the northeast half of the town (see Map 4, Appendix B). Should a landslide occur in the future, the type and degree of impacts would be highly localized. The town's vulnerabilities could include damage to structures, damage to transportation and other infrastructure, and localized road closures. Injuries and casualties, while possible, would be unlikely given the low extent and impact of landslides in Milton. There are no recorded instances of landslides having occurred in the Town of Milton.

SEA LEVEL RISE

COASTAL FLOODING

Coastal flooding is most often associated with severe coastal storms that, through the combination of winds and tides, drive tidal waters to higher levels than normally experienced, leading to the inundation of low-lying land areas and the overtopping of sea walls. In low-lying areas coastal flooding can also be associated with routine tidal flooding or higher astronomic tides. Fueled by the warming climate, coastal flooding will become more frequent and severe due to the combination of sea level rise and more frequent and intense storms.

The Neponset River is tidal from its mouth up to the Baker Dam. Areas along the Milton shoreline will be impacted by future sea level rise. Map 10 in Appendix B identifies areas predicted to be inundated at mean higher high water for sea level rise scenarios of one, three, six, and ten feet. It should be noted that the maps reflect static sea level rise and do not take into account storm surge. The map shows that static sea level rise of three feet will likely have limited impacts on

structures as much of the shoreline rises steeply from the river. Greater impacts may be along Gulliver Creek.

Map 11 shows the projected future extent of flooding during the 1% storm with 1.2, 2.4, and 4.2 feet of sea level rise. The analysis was done by the Woods Hole Group, under contract to MassDOT. Under the current FEMA FIRM, .7% of buildings in Milton are located in the Special Flood Hazard Area. With 1.2 feet of sea level rise 1.4% of buildings are in 1% chance locations, with 2.4 feet of sea level rise the number increases to1.9% and with 4.2 feet of sea level rise to 2.2%.

Local data for previous coastal flooding occurrences are not collected by the Town of Milton. The best available local data is for Norfolk County through the National Climatic Data Center. Eastern Norfolk County, which includes the Town of Milton, experienced 21 coastal flood events from 2010 through 2020 (see Table 13). No deaths or injuries were reported and the total reported property damage in the county was $1.1 million dollars. This is an average of 2 coastal floods each year. Measure of the severity of coastal flooding include water level elevation and duration of the event. The National Weather Service issues minor, moderate, and major coastal flood warnings.

Table 13: Eastern Norfolk County Coastal Floods, 2010 - 2020

DATE	DEATHS	INJURIES	PROPERTY DAMAGE
1/2/2010	0	0	0
3/1/2010	0	0	20,000
12/27/2010	0	0	100,000
6/3/2012	0	0	0
6/4/2012	0	0	0
6/4/2012	0	0	450,000
10/29/2012	0	0	0
12/27/2012	0	0	0
2/9/2013	0	0	500,000
3/7/2013	0	0	75,000
12/15/2013	0	0	0
1/2/2014	0	0	0
1/3/2014	0	0	0
10/23/2014	0	0	0
11/2/2014	0	0	0
1/27/2015	0	0	0
2/8/2016	0	0	0
1/4/2018	0	0	0
1/30/2018	0	0	0
3/2/2018	0	0	0
10/28/19	0	0	0

TOTAL	**0**	**0**	**1,145,000**

Source: NOAA, National Climatic Data Center

COASTAL EROSION

Coastal shorelines change constantly in response to storms, seasons, sea level, and human alterations. Coastal erosion is measured as a rate of change over time. According to the SHMCAP frequency of erosion cannot be measured. Risings seas and more frequent and intense storms will tend to increase erosion, although some areas may actually accrete material. Erosion may be exacerbated by efforts to protect shorelines as when engineered hard structures reduce sediment sources to downdrift areas or increase erosion seaward of structures due to interaction with waves. The severity of erosion is related to such factors as exposure to high energy waves, sediment size, sea level rise, near-shore bathymetry, and human interference with sediment supply.

Massachusetts Coastal Zone Management in cooperation with the U. S. Geological Survey (USGS) provides shoreline change data for the Massachusetts coast. They provide long-term (1800's – 2014) and short-term (1970-2014) data. However, the analysis does not include estuarine areas like the Milton's tidal shoreline of the Neponset River. Erosion of the shoreline could occur during significant storms, but we are unable to assess the potential magnitude of such impacts. Town officials report no current issues with coastal erosion. Milton's tidal areas are not subject to open ocean waves and are hence less likely to be subject to erosion.

TSUNAMI

A tsunami is a surge of water typically caused by an offshore earthquake. Other cause may include volcanos and landslides. Tsunamis can cause wave heights of 100 feet or more. According to the SHMCAP, Massachusetts has never experienced a significant tsunami, although two tsunamis have occurred with no deaths or damages recorded. Damage from a tsunami could be very significant, but it is a low likelihood event, having occurred approximately once every 39 years along the entire east coast. No tsunami has impacted Massachusetts since 1950. According to the SHMCAP, collapse of glaciers resulting from our warming climate could cause landslides that could generate tsunamis more powerful than those caused by earthquakes. The severity of a tsunami is related to its wave height at the shore, and the extent of runup. The tidal portion of the Neponset River could experience impacts. Areas adjacent to Gulliver's Creek would likely be at greatest risk.

RISING TEMPERATURES

AVERAGE AND EXTREME TEMPERATURES

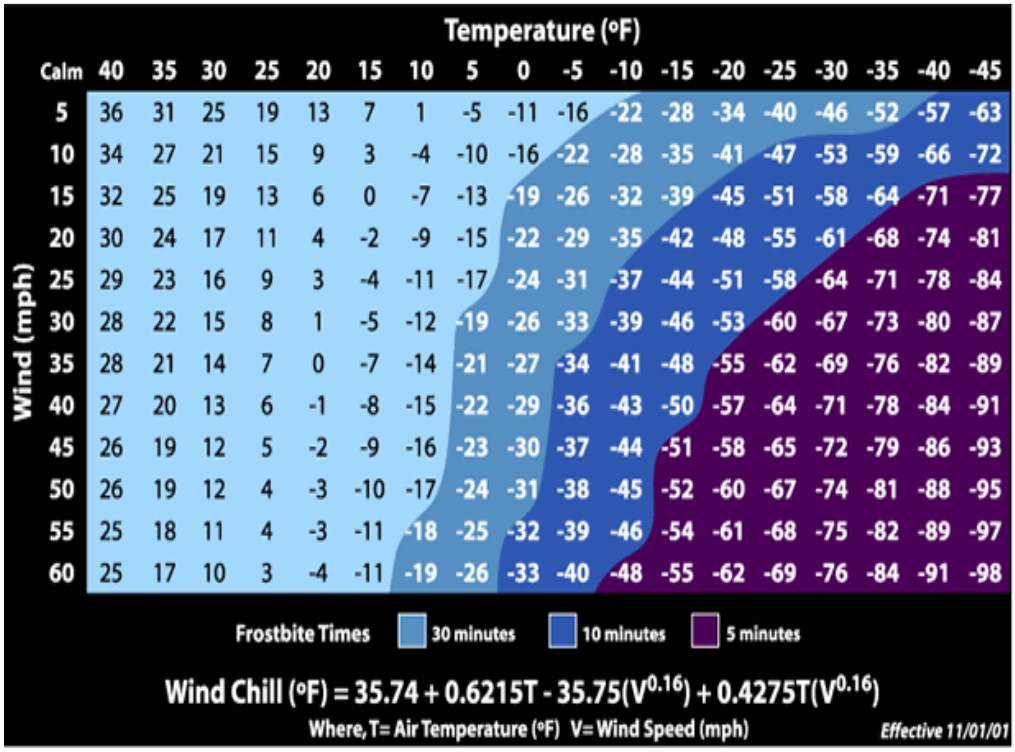
Extreme temperatures occur when either high temperature or low temperatures relative to average local temperatures occur. These can occur for brief periods of time and be acute, or they can occur over long periods of time where there is a long stretch of excessively hot or cold weather. Milton has four well-defined seasons. The seasons have several defining factors, with

temperature one of the most significant. Extreme temperatures can be defined as those that are far outside of the normal seasonal ranges for Massachusetts

EXTREME COLD

The severity of extreme cold temperature is typically measured using the Wind Chill Temperature Index, which is provided by the National Weather Service (NWS). The wind chill is the apparent temperature felt on exposed skin due to the combination of air temperature and wind speed. The index is provided in Figure 10 below. A Wind Chill warning is issued when the Wind Chill Index is forecast to fall below -25 degrees F for at least 3 hours. Extreme cold is a dangerous situation that can result in health emergencies for susceptible people, such as those without shelter, those who are stranded, or those who live in homes that are poorly insulated or without heat.

Figure 10 Wind Chill Temperature Index and Frostbite Risk



Source: National Weather Service

The Town of Milton does not collect data for previous occurrences of extreme cold. The best available local data are for Norfolk County, through the National Climatic Data Center (NCDC). There have been two extreme cold events in the past ten years, which caused no deaths, no injuries, or property damage. This is an average of one event every 5 years. Extreme cold is a town wide hazard for Milton.

Table 14: Norfolk County Extreme Cold and Wind Chill Occurrences 2010-2020

Date	Deaths	Injuries	Damages
2/16/2015	0	0	0

2/14/2016	0	0	0

Source: NOAA, National Climatic Data Center

EXTREME HEAT

A heat wave in Massachusetts is defined as three or more consecutive days above 90°F. Another measure used for identifying extreme heat events relies on the Heat Index. According to the National Weather Service (NWS), the Heat Index is a measure of how hot it really feels relative humidity is factored in with the actual air temperature. The NWS issues an advisory when the heat index (Figure 11) is forecast to exceed 100°F for two or more hours; an excessive heat advisory is issued if the forecast predicts the temperature will rise above 105°F.

Figure 11: Heat Index Chart

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

Category	Heat Index	Health Hazards
Extreme Danger	130 °F – Higher	Heat Stroke or Sunstroke is likely with continued exposure.
Danger	105 °F – 129 °F	Sunstroke, muscle cramps, and/or heat exhaustion possible with prolonged exposure and/or physical activity.
Extreme Caution	90 °F – 105 °F	Sunstroke, muscle cramps, and/or heat exhaustions possible with prolonged exposure and/or physical activity.
Caution	80 °F – 90 °F	Fatigue possible with prolonged exposure and/or physical activity.

The Town of Milton does not collect data on excessive heat occurrences. The best available local data are for Norfolk County, through the National Climatic Data Center. In the past ten years there has been one excessive heat day and no deaths, injuries, or property damage (see Table 15). This is an average of one extreme heat occurrence every 2.5 years.

Table 15: Norfolk County Extreme Heat Occurrences 2010-2020

Date	Deaths	Injuries	Damage
7/22/2011	0	0	0
7/1/2018	0	0	0
7/3/2018	0	0	0
8/28/2018	0	0	0

Source: NOAA, National Climatic Data Center

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

Older adults are often at elevated risk due to a high prevalence of pre-existing and chronic conditions. People who live in older housing stock and in housing without air conditioning have increased vulnerability to heat-related illnesses. Power failures are more likely to occur during heat waves, affecting the ability of residents to remain cool during extreme heat. Individuals with pre-existing conditions and those who require electric medical equipment may be at increased risk during a power outage.

Due to what is termed the "heat island effect," areas with less shade and more dark surfaces (pavement and roofs) will experience even hotter temperatures; these surfaces absorb heat during the day and release it in the evening, keeping nighttime temperatures warmer as well. Map 10 in Appendix B displays areas that are among the hottest 5% of land in the MAPC region based on land surface temperature derived from satellite imagery on July 13, 2016, when the high temperature at Logan Airport was 92°F. Generally, Milton has very substantial tree cover. East Milton Square is the one hot spot area. It is worth noting however, that heat impacts are more likely to be felt by residents without air conditioning, by those who work outdoors, and those with underlying health conditions. East Milton and the neighborhoods south of Mattapan Square have the least dense tree cover.

Average temperatures in Massachusetts are projected to increase by 3.8 to 10.8 degrees by the end of the century (SHMCAP). Over time our climate will become more similar to areas south of New England. Impacts on natural resources include a longer growing season and northern migration of plants and animals, including invasive species. The SHMCAP identifies ecosystems that are expected to be particularly vulnerable to warming temperatures. These include coldwater fisheries, vernal pools, spruce-fir forests, northern hardwood forests (Maple, Beach, Birch), Hemlock forests, and urban forests (due to heat island impacts).

WILDFIRE

A wildfire is a non-structure fire occurring in a forested, shrub or grassland areas. In the Boston Metro region these fires rarely grow to the size of a wildfire, as seen more typically in the

western U.S. A more likely occurrence is brush fires that typically burn no more than the underbrush of a forested area. There are three different classes of wildfires:

- Surface fires are the most common type and burn along the floor of a forest, moving slowly and killing or damaging trees
- Ground fires are usually started by lightning and burn on or below the forest floor
- Crown fires spread rapidly by wind, jumping along the tops of trees

A wildfire differs greatly from other fires by its extensive size, the speed at which it can spread out from its original source, its potential to unexpectedly change direction, and its ability to jump gaps such as roads, rivers, and fire breaks. Wildfire season can begin in March and usually ends in late November. The majority of wildfires typically occur in April and May, when most vegetation is void of any appreciable moisture, making them highly flammable. Once "green-up" takes place in late May to early June, the fire danger usually is reduced somewhat. As the climate warms, drought and warmer temperatures may increase the risk of wildfire as vegetation dries out and becomes more flammable. The National Wildfire Coordinating Group classifies the severity of wildfires based on their acreage.

Fires can present a hazard where there is the potential to spread into developed or inhabited areas, particularly residential areas where sufficient fuel materials might exist to allow the fire the spread into homes. Protecting structures from fire poses special problems and can stretch firefighting resources to the limit. If heavy rains follow a fire, other natural disasters can occur, including landslides, mudflows, and floods. If the wild fire destroys the ground cover, then erosion becomes one of several potential problems.

POTENTIAL BRUSHFIRE HAZARD AREAS

The SCHMCAP includes a graphic that depicts statewide fire risk incorporating three risk components: fuel, wildland-urban interface, and topography (Figure 12). The wildland-urban interface reflects communities where housing and vegetation intermingle, and fire can spread from structures to vegetated areas. The most susceptible fuels are pitch pine, scrub oak and oak forests. Topography can affect the behavior of fires, as fire spreads more easily uphill. The developed areas of Milton are in the no risk zone for wildfire, while the Blue Hills Reservation is a high-risk area. Fire was not identified as a common occurrence, but increasing damage to trees from pests, drought, and warmer temperatures was identified as creating increasing fire risk. The most common cause of wildfires is the careless disposal of smoking materials and untended campfires.

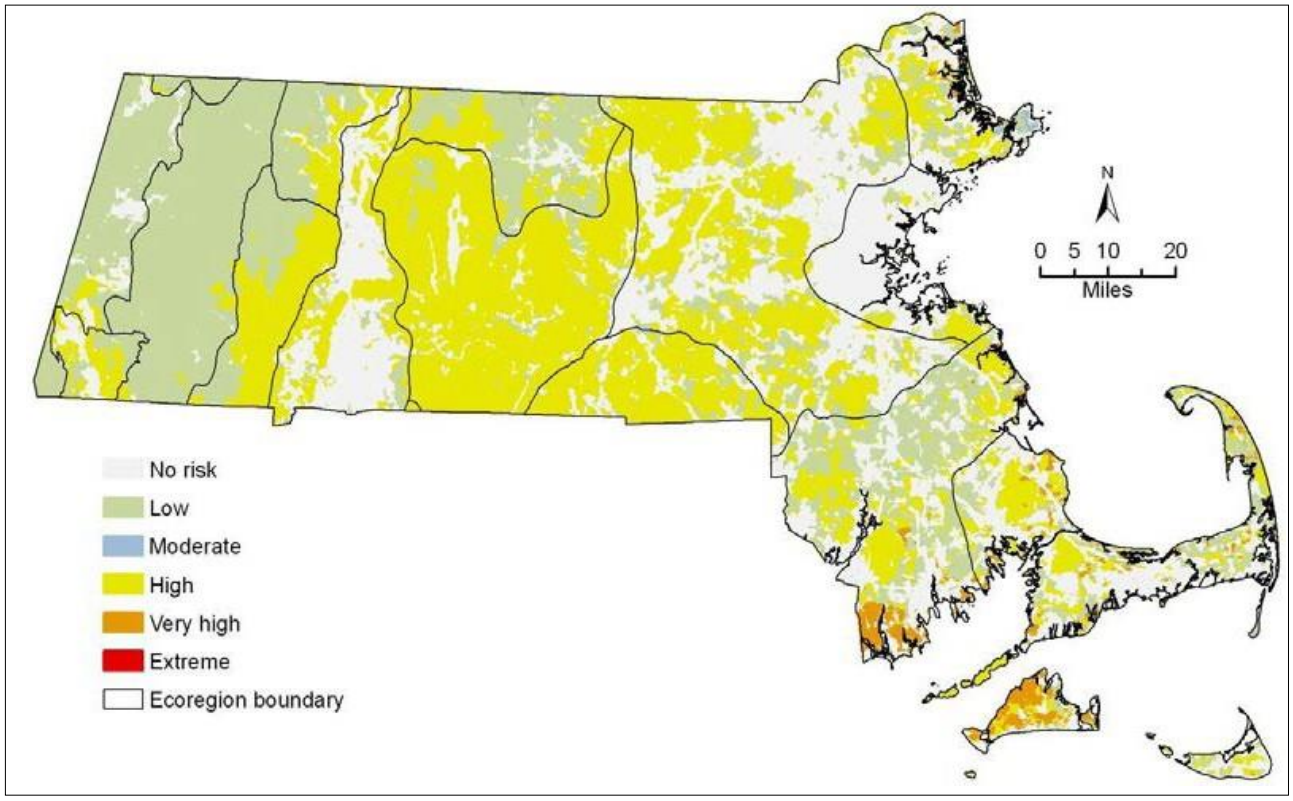
The following areas of town were identified as having the highest potential for brush fires. The numbers correspond to the numbers on Map 8, “Hazard Areas”:

Table 16: Locally Identified Areas of Brushfire Risk

Map ID	Name	Description

14	Blue Hills Reservation	This large state park is carefully monitored for fire.
15	Neponset Marsh	Occasional phragmites fires have been small. To date larger fires have been on the Boston side of the Neponset River.
16	DCR land along the Neponset River	Every couple of years sees a significant fire here.
17	Saw Cut Notch	Infrequent fires occur here.
18	Cunningham Park	Fires are frequent due to teen gatherings .

Figure 12: Wildfire Risk Areas



Source: SHMCAP

While there are substantial areas of fire risk, town officials indicate that significant brush fires are not a common occurrence.

INVASIVE SPECIES

The 2018 SHMCAP includes invasive species as a natural hazard for the first time. They are defined as "non-native species that cause or are likely to cause harm to ecosystems, economies, and/or public health." In new habitats invasive species displace native species if they have competitive advantages including that they are not subject to biological controls from their native habitat. Some of the more recognizable invasive plant species noted in the SHMCAP include

Norway maple, garlic mustard, Japanese barberry, black swallow-wort, buckthorn, purple loosestrife, water milfoil, Japanese knotweed, and phragmites. Invasive pests include gypsy moth, hemlock wooly adelgid, and the Asian long-horned beetle. Green crabs are a notable marine invasive. The Massachusetts Invasive Plant Advisory Group categorizes invasive severity as either limited prevalence in Massachusetts, partial containment potential, or public health threat.

Invasive species are not currently of great concern. The team did note that phragmites are a fire risk. Also noted is that the prevalence of Japanese Knotweed can make it difficult to encourage a healthy diversity of species when permitting new development.

EXTREME WEATHER

HURRICANES AND TROPICAL STORMS

A hurricane is a violent wind and rainstorm with wind speeds of 74 to 200 miles per hour. A hurricane is strongest as it travels over the ocean and is particularly destructive to coastal property as the storm hits land. A tropical storm has similar characteristics, but wind speeds are between 34 and 73 miles per hour. Climate models suggest that hurricanes and tropical storms will become more intense as warmer ocean waters provide more fuel for the storms. In addition, rainfall amounts associated with hurricanes are predicted to increase because warmer air can hold more water vapor. Since 1900, 39 tropical storms have impacted New England (NESEC). Massachusetts has experienced approximately 32 tropical storms, nine Category 1 hurricanes, five Category 2 hurricanes and one Category 3 hurricane.

Although uncommon, the Town of Milton's entire area is vulnerable to hurricanes, which occur between June and November. As shown on Map 5 in Appendix B, no tropical storms have tracked through Milton. A hurricane or storm track is the line that delineates the path of the eye of a hurricane or tropical storm. The town also experiences the impacts of the wind and rain from hurricanes and tropical storms regardless of whether the storm track passed through the town. The hazard mapping indicates that the 100-year wind speed in Milton is 110 miles per hour.

Table 17: Hurricane Records for Massachusetts, 1938 to 2018

Hurricane Event	Date
Great New England Hurricane*	September 21, 1938
Great Atlantic Hurricane*	September 14-15, 1944
Hurricane Doug	September 11-12, 1950
Hurricane Carol*	August 31, 1954
Hurricane Edna*	September 11, 1954
Hurricane Diane	August 17-19, 1955
Hurricane Donna	September 12, 1960
Hurricane Gloria	September 27, 1985
Hurricane Bob	August 19, 1991
Hurricane Earl	September 4, 2010
Tropical Storm Irene	August 28, 2011

Hurricane Event	Date
Hurricane Sandy	October 29-30, 2012

*Category 3
Source: National Oceanic and Atmospheric Administration

Hurricane intensity is measured according to the Saffir/Simpson scale, which categorizes hurricane intensity linearly based upon maximum sustained winds, barometric pressure, and storm surge potential. These are combined to estimate potential damage. The following gives an overview of the wind speeds, surges, and range of damage caused by different hurricane categories:

Table 18: Saffir/Simpson Scale

Scale No. (Category)	Winds (mph)	Surge (ft)	Potential Damage
1	74 – 95	4 - 5	Minimal
2	96 – 110	6 - 8	Moderate
3	111 – 130	9 - 12	Extensive
4	131 – 155	13 - 18	Extreme
5	> 155	>18	Catastrophic

Source: NOAA

Hurricanes typically have regional impacts beyond their immediate tracks. Falling trees and branches are a significant problem because they can result in power outages when they fall on power lines or block traffic and emergency routes. Hurricanes are a town-wide hazard in Milton. Potential hurricane damages to Milton have been estimated using HAZUS-MH. Total damages are estimated at $31 million for a Category 2 hurricane and $120 million for a Category 4 hurricane. Hurricanes and tropical storms are an infrequent event having no record of passing directly through Milton.

SEVERE WINTER STORM/NOR'EASTER

A northeast storm, known as a nor'easter, is typically a large counterclockwise wind circulation around a low-pressure center. Featuring strong northeasterly winds blowing in from the ocean over coastal areas, nor'easters are relatively common in the winter months in New England occurring one to two times a year. The storm radius of a nor'easter can be as much as 1,000 miles and these storms feature sustained winds of 10 to 40 mph with gusts of up to 70 mph. These storms are accompanied by heavy rain or snow, depending on temperatures. Many of the historic flood events identified in the previous section were precipitated by nor'easters, including the "Perfect Storm" event in 1991. More recently, blizzards in February 2013, January 2015, and in March 2018 were large nor'easters that caused significant snowfall amounts.

Milton is vulnerable to both the wind and precipitation that accompany nor'easters. High winds can cause damage to structures, fallen trees, and downed power lines leading to power outages. Intense rainfall can overwhelm drainage systems causing localized flooding of rivers and streams as well as urban stormwater ponding and localized flooding. Fallen tree limbs as well as heavy

snow accumulation and intense rainfall can impede local transportation corridors, and block access for emergency vehicles. Nor'easters are also a cause of coastal flooding.
A blizzard is a winter snow storm with sustained or frequent wind gusts to 35 mph or more, accompanied by falling or blowing snow which reduces visibility to or below ¼ mile. These conditions must be the predominant condition over a three-hour period. Extremely cold temperatures are often associated with blizzard conditions but are not a formal part of the definition. The hazard related to the combination of snow, wind, and low visibility significantly increases when temperatures drop below 20 degrees.

The Regional Snowfall Index (RSI) characterizes and ranks the severity of northeast snowstorms. RSI has five categories: Extreme, Crippling, Major, Significant, and Notable. RSI scores are a function of the area affected by the snowstorm, the amount of snow, and the number of people living in the path of the storm. The largest RSI values result from storms producing heavy snowfall over large areas that include major metropolitan centers. The RSI categories are summarized below:

Table 19: Regional Snowfall Index

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

Source: SHMCAP

The most significant winter storm in recent history was the "Blizzard of 1978," which resulted in over three feet of snowfall and multiple day closures of roadways, businesses, and schools. In Milton, blizzards and severe winter storms have occurred in the following years:

Table 20: Severe Weather Major Disaster Declarations in Eastern MA

Storm Event	Date
Severe Winter Storm and Snowstorm	March 2018
Severe Winter Storm, Snowstorm, and Flooding	January 2015
Severe Winter Storm, Snowstorm, and Flooding	February 2013
Hurricane Sandy	October/November 2012
Severe Storm and Snowstorm	October 2011
Tropical Storm Irene	August 2011
Severe Winter Storm and Snowstorm	January 2011
Severe Winter Storm and Flooding	December 2008

Severe Storms and Inland and Coastal Flooding	April 2007
Severe Storm and Flooding	October 2005
Severe Storms & Flooding	March 2001
Blizzard	January 1966
Winter Coastal Storm	December 1992
Severe Coastal Storm	October 1991
Hurricane Bob	August 1991
Hurricane Gloria	September 1985
Coastal Storm, Flood, Ice, Snow	February 1978
Hurricane, floods	August 1955
Hurricanes	September 1954

Source: FEMA

Winter storms, including heavy snow, blizzards, and ice storms, are the most common and most familiar of the region's hazards that affect large geographic areas. The majority of blizzards and ice storms in the region cause more inconvenience than they do serious property damage, injuries, or deaths. However, periodically, a storm will occur which is a true disaster, and necessitates intense large-scale emergency response. The impacts of winter storms are often related to the weight of snow and ice, which can cause roof collapses and also causes tree limbs to fall. This in turn can cause property damage and potential injuries. Power outages may also result from fallen trees and utility lines.

Winter storms are a potential town-wide hazard in Milton. Map 6 in Appendix A indicates that the average annual average snowfall in most of Milton is between 48 and 72 inches. A number of public safety issues can arise during snow storms. Impassible streets are a challenge for emergency vehicles and affect residents and employers. Snow-covered sidewalks force people to walk in streets, which are already less safe due to snow, slush, puddles, and ice. Large piles of snow can also block sight lines for drivers, particularly at intersections. Refreezing of melting snow can cause dangerous roadway conditions. In addition, transit operations may be impacted, as they were in the 2015 blizzards which caused the closure of the MBTA system for one day and limited services on the commuter rail for several weeks.

As with hurricanes, warmer ocean water and air will provide more fuel for winter storms. According to the SHMCAP it appears that Atlantic coast nor'easters are increasing in frequency and intensity. Further, the SHMCAP notes that research suggests that warmer weather in the Artic is producing changes to atmospheric circulation patterns that favor the development of winter storms in the Eastern United States.

The Town of Milton does not keep local records of winter storms. Data for Norfolk County is the best available data to help understand previous occurrences and impacts of heavy snow events. According to National Climate Data Center (NCDC) records, from 2010 to 2020, western Norfolk County experienced 18 heavy snowfall events, resulting in no injuries, two deaths, and limited property damage. Heavy snow is considered to be high frequency events based on past occurrences, as there have been 18 events in the past ten years, for an average of almost 2 events each winter.

Table 21: Heavy Snow Events and Impacts in Norfolk County, 2010 to 2020

Date	Deaths	Injuries	Property Damage ($)
1/12/2011	0	0	0
1/26/2011	0	0	0
12/29/2012	0	0	5K
2/8/2013	0	0	0
3/7/2013	0	0	0
3/18/2013	0	0	0
12/14/2013	0	0	0
1/2/2014	0	0	0
1/21/2014	0	0	0
2/5/2014	0	0	0
1/26/2015	0	0	0
2/2/2015	0	0	0
2/8/2015	0	0	0
2/14/2015	0	0	0
1/23/16	0	0	0
2/5/2016	2	0	100K
3/14/2017	0	0	0
11/15/2018	0	0	0
Total	**2**	**0**	**105K**

Source: NOAA, National Climatic Data Center

ICE STORMS

The ice storm category covers a range of different weather phenomena that collectively involve rain or snow being converted to ice in the lower atmosphere leading to potentially hazardous conditions on the ground. Hail size typically refers to the diameter of the hailstones. Warnings and reports may report hail size through comparisons with real-world objects that correspond to certain diameters:

Table 22: Hail Size Comparisons

Description	Diameter (inches)
Pea	0.25
Marble or mothball	0.50
Penny or dime	0.75
Nickel	0.88

Quarter	1.00
Half dollar	1.25
Walnut or ping pong ball	1.50
Golf ball	1.75
Hen's egg	2.00
Tennis ball	2.50
Baseball	2.75
Teacup	3.00
Grapefruit	4.00
Softball	4.50

Source: NOAA

While ice pellets and sleet are examples of these, the greatest hazard is created by freezing rain conditions, which is rain that freezes on contact with hard surfaces leading to a layer of ice on roads, walkways, trees, and other surfaces. The conditions created by freezing rain can make driving particularly dangerous and emergency response more difficult. The weight of ice on tree branches can also lead to falling branches damaging electric lines.

Town-specific data for previous ice storm occurrences are not collected by the Town of Milton. The best available local data is for Norfolk County through the National Climatic Data Center. Norfolk County experienced thirteen events from 2010 to 2020. That is an average of 1.32events each year. There is some indication that if winters warm, temperatures may be more likely to produce icing conditions.

Table 23: Norfolk County Hail Events, 2010 to 2020

DATE	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE
6/5/2010	1.5	0	0	0
6/20/2010	1	0	0	0
6/1/2011	0.75	0	0	0
6/23/2012	0.88	0	0	0
7/18/2012	0.75	0	0	0
5/21/2013	0.75	0	0	0
9/1/2013	0.75	0	0	0
8/7/2014	0.75	0	0	0
5/12/2015	0.75	0	0	0
6/23/2015	1	0	0	0
8/4/2015	1	0	0	0
6/30/2019	0.75	0	0	0
6/28/2020	1	0	0	0
TOTAL		**0**	**0**	**0**

Source: NOAA, National Climatic Data Center

*Magnitude refers to diameter of hail stones in inches

TORNADOES

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud. These events are spawned by thunderstorms and occasionally by hurricanes and may occur singularly or in multiples. They develop when cool air overrides a layer of warm air, causing the warm air to rise rapidly. Most vortices remain suspended in the atmosphere. Should they touch down, they become a force of destruction. Some ingredients for tornado formation include:

- Very strong winds in the mid and upper levels of the atmosphere
- Clockwise turning of the wind with height (from southeast at the surface to west aloft)
- Increasing wind speed with altitude in the lowest 10,000 feet of the atmosphere (i.e., 20 mph at the surface and 50 mph at 7,000 feet)
- Very warm, moist air near the ground with unusually cooler air aloft
- A forcing mechanism such as a cold front or leftover weather boundary from previous shower or thunderstorm activity

Tornado damage severity is measured by the Enhanced Fujita scale, which is based on the amount of damage created. As of February 1, 2007, the National Weather Service began rating tornados using the Enhanced Fujita-scale (EF-scale), which allows surveyors to create more precise assessments of tornado severity. The EF-scale is summarized below:

Table 24: Enhanced Fujita Scale

Scale	Wind speed		Relative frequency	Potential damage	
	mph	km/h			
EF0	65–85	105–137	53.5%	Minor damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e., those that remain in open fields) are always rated EF0.	
EF1	86–110	138–178	31.6%	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.	
EF2	111–135	179–218	10.7%	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.	
EF3	136–165	219–266	3.4%	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.	
EF4	166–200	267–322	0.7%	Extreme damage to near-total destruction. Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.	
EF5	>200	>322	<0.1%	Massive Damage. Strong frame houses leveled off foundations and swept away; steel-reinforced concrete structures critically damaged; high-rise buildings have severe structural deformation. Incredible phenomena will occur.	

Source: SHMCAP 2018

The frequency of tornadoes in eastern Massachusetts is low; on average, there are six tornadoes that touchdown somewhere in the Northeast region every year. The strongest tornado in Massachusetts history was the Worcester Tornado in 1953 (NESEC). Recent tornado events in Massachusetts were in Springfield in 2011 and in Revere in 2014. The Springfield tornado caused significant damage and resulted in four deaths in June of 2011. The Revere tornado touched down in Chelsea just south of Route 16, moved north into Revere's business district along Broadway, and ended near the intersection of Routes 1 and 60. The path was approximately two miles long and 3/8 mile wide, with wind speeds up to 120 miles per hour. Approximately 65 homes had substantial damages and 13 homes and businesses were rendered uninhabitable.

Since 1950, there have been eleven tornadoes in Norfolk County recorded by the Tornado History Project. There have been one F3 and one F2, and three FI tornados. These eleven tornadoes resulted in a total of one fatality and 23 injuries and $4.1 million in damages, as summarized in Table 25. This an average of one tornado every 6 years.

Table 25: Tornado Records for Norfolk County

Date	Fujita	Fatalities	Injuries	Width	Length	Damage
June 1953	3	0	17	667	28	$500K – 5M
11/21/1956	2	0	0	17	0.1	$500-$5000
8/9/1972	1	1	6	30	4.9	$5K-$50K
9/6/1973	1	0	0	10	1.1	$5K-$50K
7/10/1989	0	0	0	23	0.1	$500-$5000
5/18/1990	0	0	0	10	0.2	$500-$5000
5/18/1990	0	0	0	10	0.2	$500-$5000
6/30/2001	0	0	0	80	0.1	-
8/21/2004	1	0	0	40	6	$1,500,000
5/9/2013	0	0	0	50	0.38	$20,000
06/23/2015	0	0	0	200	0.48	-

Source: The Tornado History Project

Buildings constructed prior to current building codes may be more vulnerable to damages caused by tornadoes. Evacuation of impacted areas may be required on short notice. Sheltering and mass feeding efforts may be required along with debris clearance, search and rescue, and emergency fire and medical services. Key routes may be blocked by downed trees and other debris, and widespread power outages are also typically associated with tornadoes.

Although tornadoes are a potential town-wide hazard in Milton, tornado impacts are relatively localized compared to severe storms and hurricanes. Damages from any tornado in Milton would greatly depend on the track of the tornado. Based on the record of previous occurrences since 1956, tornado events in Milton are a low frequency event as have been no occurrences in Milton. According to the SHMCAP, it is possible that severe thunderstorms which can include tornadoes may increase in frequency and intensity. However, scientists have less confidence in the models that seek to project future changes in tornado activity.

OTHER SEVERE WEATHER

SEVERE THUNDERSTORMS

While less severe than the other types of storms discussed, thunderstorms can lead to localized damage and represent a hazard risk for communities. A thunderstorm typically features lightning, strong winds, rain, and/or hail. Thunderstorms sometime give rise to tornados. On average, these storms are only around 15 miles in diameter and last for about 30 minutes. A severe thunderstorm can include winds of close to 60 mph and rain sufficient to produce flooding. The severity of thunderstorms ranges from commonplace and of short duration to intense storms that cause damage due to high winds, flooding, or lightning strikes.

The best available data on previous occurrences of thunderstorms in Milton is for is for Norfolk County through the National Climatic Data Center (NCDC). For the years 2010 to 2020, NCDC records show 35 thunderstorm events in Norfolk County (Table 26). These storms resulted in a

total of $307,500 in property damage. There were no injuries or deaths reported. This is an average of 3 events per year.

Table 26: Norfolk County Thunderstorm Events, 2010 to 2020

DATE	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE
6/6/2010	53	0	0	0
6/20/2010	50	0	0	5,000
6/24/2010	50	0	0	0
8/19/2011	50	0	0	1,000
6/23/2012	50	0	0	25,000
8/10/2012	50	0	0	5,000
8/15/2012	40	0	0	500
6/17/2013	50	0	0	3,000
7/29/2013	50	0	0	20,000
7/3/2014	50	0	0	20,000
7/28/2014	60	0	0	50,000
6/23/2015	50	0	0	5,000
8/4/2015	50	0	0	10,000
8/15/2015	50	0	0	10,000
2/25/2016	50	0	0	15,000
6/7/2016	50	0	0	10,000
7/18/2016	50	0	0	50,000
7/22/2016	50	0	0	50,000
7/23/2016	40	0	0	5,000
8/14/2016	50	0	0	5,000
6/9/2017	45	0	0	1,000
6/13/2017	48	0	0	1,000
6/23/2017	50	0	0	1,000
8/2/2017	50	0	0	2,500
9/6/2017	50	0	0	1,000
7/17/2018	45	0	0	3,000
9/6/2018	50	0	0	1,000
11/3/2018	50	0	0	500
7/17/2019	50	0	0	2,000
7/31/2019	50	0	0	5,000
6/6/2020	50	0	0	10,000
6/28/2020	50	0	0	8,900
7/2/20	50	0	0	31,000
7/23/20	50	0	0	11,200
TOTAL		**0**	**0**	**359,600**

Source: NOAA, National Climatic Data Center

*Magnitude refers to maximum wind speed

Severe thunderstorms are a town-wide hazard for Milton. The town's vulnerability to severe thunderstorms is similar to that of nor'easters. High winds can cause falling trees and power outages, as well as obstruction of key routes and emergency access. Heavy precipitation may also cause localized flooding, both riverine and urban drainage related.

Based on the record of previous occurrences, thunderstorms in Milton are high frequency events as this hazard has occurred an average of three times per year in the past ten years. As noted previously, the intensity of rainfall events has increased significantly, and those trends are expected to continue. The SHMCAP does not specifically address whether climate will affect the intensity or frequency of thunderstorms.

NON-CLIMATE INFLUENCED HAZARDS

EARTHQUAKES

Earthquakes are the sole natural hazard for which there is no established correlation with climate impacts. Damage in an earthquake stems from ground motion, surface faulting, and ground failure in which weak or unstable soils, such as those composed primarily of saturated sand or silts, liquefy. The effects of an earthquake are mitigated by distance and ground materials between the epicenter and a given location. An earthquake in New England affects a much wider area than a similar earthquake in California due to New England's solid bedrock geology (NESEC).

Seismologists use a magnitude scale known as the Richter scale to express the seismic energy released by each earthquake. The typical effects of earthquakes in various ranges are summarized below:

Table 27: Richter Scale and Effects

Richter Magnitudes	Earthquake Effects
Less than 3.5	Generally, not felt, but recorded
3.5- 5.4	Often felt, but rarely causes damage
Under 6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1-6.9	Can be destructive in areas up to about 100 km. across where people live.
7.0- 7.9	Major earthquake. Can cause serious damage over larger areas.
8 or greater	Great earthquake. Can cause serious damage in areas several hundred meters across.

Source: Nevada Seismological Library (NSL), 2005

From 1668 to 2016, 408 earthquakes were recorded in Massachusetts (NESEC). Most have originated from the La Malbaie fault in Quebec or from the Cape Anne fault located off the coast of Rockport. The region has experienced larger earthquakes in the distant past, including a

magnitude 5.0 earthquake in 1727 and a 6.0 earthquake that struck in 1755 off the coast of Cape Anne. More recently, a pair of damaging earthquakes occurred near Ossipee, NH in 1940. A 4.0 earthquake centered in Hollis, Maine in October 2012 was felt in the Boston area. Historic records of some of the more significant earthquakes in the region are shown in Table 28.

Table 28: Historic Earthquakes in Massachusetts or Surrounding Area

Location	Date	Magnitude
MA - Cape Ann	11/10/1727	5
MA - Cape Ann	12/29/1727	NA
MA - Cape Ann	2/10/1728	NA
MA - Cape Ann	3/30/1729	NA
MA - Cape Ann	12/9/1729	NA
MA - Cape Ann	2/20/1730	NA
MA - Cape Ann	3/9/1730	NA
MA - Boston	6/24/1741	NA
MA - Cape Ann	6/14/1744	4.7
MA - Salem	7/1/1744	NA
MA - Off Cape Ann	11/18/1755	6
MA - Off Cape Cod	11/23/1755	NA
MA - Boston	3/12/1761	4.6
MA - Off Cape Cod	2/2/1766	NA
MA - Offshore	1/2/1785	5.4
MA - Wareham/Taunton	12/25/1800	NA
MA - Milton	10/5/1817	4.3
MA - Marblehead	8/25/1846	4.3
MA - Brewster	8/8/1847	4.2
MA - Boxford	5/12/1880	NA
MA - Newbury	11/7/1907	NA
MA - Wareham	4/25/1924	NA
MA - Cape Ann	1/7/1925	4
MA - Nantucket	10/25/1965	NA
MA - Boston	12/27/74	2.3
MA - Nantucket	4/12/12	4.5
ME - Hollis	10/17/12	4.0

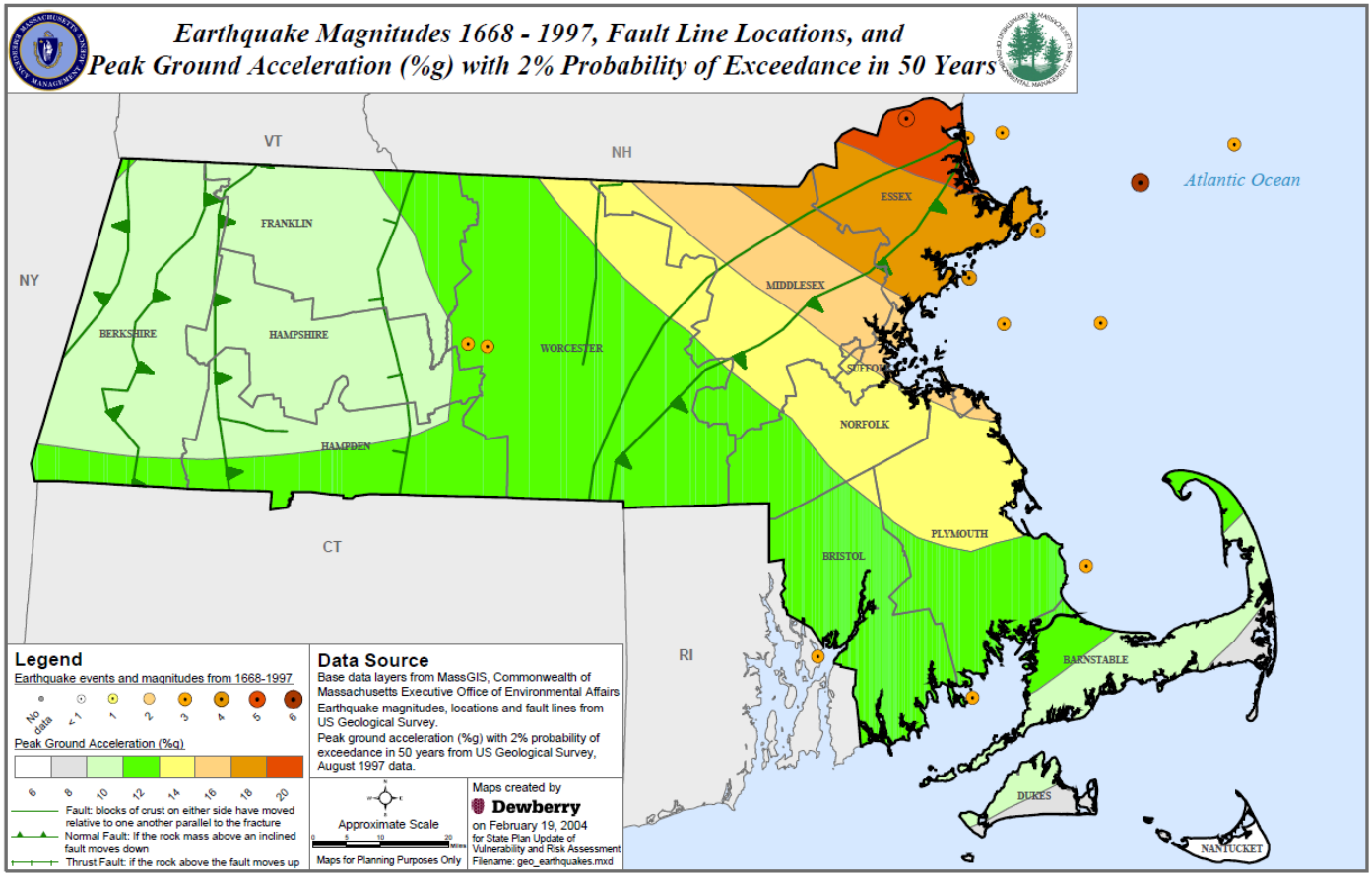
Source: Boston HIRA

One measure of earthquake risk is ground motion, which is measured as maximum peak horizontal acceleration, expressed as a percentage of gravity (%g). The range of peak ground acceleration in Massachusetts is from 10 %g to 20 %g, with a 2% probability of exceedance in 50 years. Milton is in the middle part of the range for Massachusetts, at 14 %g to 16 %g, making it a relatively moderate area of earthquake risk within the state, although the state as a whole is

considered to have a low risk of earthquakes compared to the rest of the country. There have been no recorded earthquake epicenters within Milton.

Although New England has not experienced a damaging earthquake since 1755, seismologists state that a serious earthquake occurrence is possible. There are five seismological faults in Massachusetts, but there is no discernible pattern of previous earthquakes along these fault lines. Earthquakes occur without warning and may be followed by aftershocks. The majority of older buildings and infrastructure were constructed without specific earthquake resistant design features.

Figure 13: State of Massachusetts Earthquake Probability Map



Earthquakes are a hazard with multiple impacts beyond the obvious building collapse. Buildings may suffer structural damage which may or may not be readily apparent. Earthquakes can cause major damage to roadways, making emergency response difficult. Water lines and gas lines can break, causing flooding and fires. Another potential vulnerability is equipment within structures. For example, a hospital may be structurally engineered to withstand an earthquake, but if the equipment inside the building is not properly secured, the operations at the hospital could be severely impacted during an earthquake. Earthquakes can also trigger landslides.

According the SHMCAP there is a 10-15% chance of a magnitude 5 earthquake in a given ten-year period. Earthquakes are a potential town-wide hazard in Milton. Although new construction under the most recent building codes generally will be built to seismic standards, much of the development in the town pre-dates the most recent building code. Potential earthquake damages to Milton have been estimated using HAZUS-MH. Total building damages are estimated at $546 million for a 5.0 magnitude earthquake and $4.2 billion for a 7.0 magnitude earthquake. Other potential impacts are detailed in Table 34.

LAND USE AND DEVELOPMENT TRENDS

Existing Land Use

The most recent land use statistics available from the state are from aerial imagery completed in 2016. Table 29 shows the acreage and percentage of land in 13 categories. If the primary residential categories are aggregated, residential uses make up 40.8% of the area of the town. Commercial and industrial uses combined make up .8% of the town. Agriculture, Open Land, and Recreation total 8.6% of the land. The tax-exempt category represents 33% of Milton's land. The largest parcel of tax-exempt land in Milton is the Blue Hills Reservation. Most of the rest of the tax-exempt land is also open space.

Table 29: Town of Milton, MA 2016 Land Use

Land Use Type	Acres	Percentage
Residential - single family	2989	35.1
Residential - multi-family	483	5.7
Mixed use, primarily residential	32	.4
Mixed use, primarily commercial	155	1.8
Commercial	42	.5
Mixed use, other	23	.3
Industrial	10	.1
Agriculture	1	0
Open land	559	6.6
Recreation	170	2.0
Unknown	199	2.3
Right-of-way	815	9.6
Tax exempt	2821	33
Water	81	1.0
Forest	134	1.6
Total	**8514**	**100.0**

For more information on how the land use statistics were developed and the definitions of the categories, please go to https://docs.digital.mass.gov/dataset/massgis-data-land-use-2005.

Economic Elements

Milton is primarily a suburban residential community. Many residents commute to Boston, which is accessible by public transportation. Milton's most important economic assets are the three village business districts, the hospital and Milton healthcare facility, and the Town's two major educational institutions, Curry College and Milton Academy.

NATURAL, CULTURAL, AND HISTORICAL RESOURCE AREAS

The Local Committee identified several sites of cultural importance to the Town, including the Suffolk Resolves House, the China Trade Museum, Bent's Cookie Factory, the Tucker House, the Wakefield Estate, Milton Academy, and four historic districts. In addition, the Blue Hills Reservation, and wetlands along the Neponset River both represent significant natural resources in the Town.

DEVELOPMENT TRENDS

Development trends throughout the metropolitan region are tracked by MassBuilds, MAPC's Development Database, which provides an inventory of new development over the last decade. The database tracks both completed developments and those currently under construction. The database includes seven completed projects in the Town of Milton since 2015.

The database also includes several attributes of the new development, including housing units, and commercial space. The seven developments in Milton include a total of 656 housing units and over 700,000 square feet of commercial space.

Table 30: Summary of Milton Developments, 2016-2021

Name	Status	Year	Housing Units	Commercial Square Feet	Project Type
Woodmere	Complete	2018	36		Residential
Hendries Ice Cream Factory Redevelopment	Complete	2021	38	3,850	Mixed Use
Wolcott Woods	Partially Complete	2023	54		Residential
Milton Woods	Partially Complete	2021	23		Residential
Wentworth Farms	Partially Complete	2022	10		Residential
Pine Gardens Way	Partially Complete	2023	5		Residential

POTENTIAL FUTURE DEVELOPMENT

MAPC consulted with the Local Hazard Mitigation Planning Team to determine areas that may be developed in the future, based on the Town's comprehensive planning efforts and current trends and projects. These areas are listed below with their flood and heat risk outlined in Table 31. In order to characterize any change in the town's vulnerability associated with new developments, a

GIS mapping analysis was conducted which overlaid the development sites with the FEMA Flood Insurance Rate Map and the hottest 5% of land surface in the MAPC region. Potential future development projects:

A) 711 Randolph Avenue (40B) 90 housing units, in litigation
B) 485-487 Blue Hills Parkway (40B), 52 housing units, 2,404 sq/ft commercial, under review
C) 582 Blue Hill Avenue (40B), 118 housing units, under review
D) 648 Canton Avenue (40B), 124 housing units, under review
E) 19-21 Bassett Street/4-24 Franklin Street (40B), 101 housing units, under review
F) 16 Amor Road (40B), 16 housing units, application pending
G) 936 Brush Hill Road (40B), 20 housing units, application pending
H) 652 Canton Avenue (40B), 80 housing units, application pending
I) 440 Granite Avenue, 40 housing units, mixed use, application pending
J) 1 Eliot Street, mixed use, anticipated development
K) 2 Adams Street, mixed use, anticipated development

FUTURE DEVELOPMENT IN HAZARD AREAS

Table 31 shows the relationship between potential future development areas and the applicable mapped hazard areas (see Table 32 for column definitions). This information is provided so that planners can ensure that development proposals comply with floodplain zoning and that careful attention is paid to drainage, heat, and sea level rise.

While three of the potential development sites include land in the floodplain, there remains enough land to site facilities outside of the flood zone. As new development and redevelopment occurs it will be subject to the latest building code requirements and zoning regulations pertaining to wind, earthquakes, and flooding. Overall, Milton's potential future development would not significantly increase the Town's vulnerability if existing regulations are adhered to.

Table 31: Relationship of Potential Development to Hazard Areas

Map ID	Potential Future Project	Flood Zones	Local Flood Areas	3 feet Sea Level Rise	Hot Spot
A	711 Randolph Avenue	4% in AE, 55% in X (.2%)			
B	485-487 Blue Hills Parkway				
C	582 Blue Hill Avenue				
D	648 Canton Avenue				
E	19-21 Bassett St./4-24 Franklin St.				100%
F	16 Amor Road				

G	936 Brush Hill Road				
H	652 Canton Avenue				
I	440 Granite Avenue				
J	1 Eliot Street	25% in AE		3%	
K	2 Adams Street	14% in AE		13%	

CRITICAL FACILITIES & INFRASTRUCTURE IN HAZARD AREAS

Critical facilities and infrastructure includes facilities that are important for disaster response and evacuation (such as emergency operations centers, fire stations, water pump stations, communications, and electricity) and facilities where additional assistance might be needed during an emergency (such as nursing homes, elderly housing, day care centers, etc.). There are 113 facilities identified in Milton. These are listed in Table 32 and are shown on the maps in Appendix B.

Explanation of Columns in Table 32

- ***Column 1 ID #:*** The first column in Table 32 is an ID number which appears on the maps that are part of this plan. See Appendix B.
- ***Column 2 Name:*** The second column is the name of the site.
- ***Column 3 Type*:** The third column indicates what type of site it is.
- ***Column 4 FEMA Flood Zone*:** The fourth column addresses the risk of flooding. A "No" entry in this column means that the site is not within any of the mapped risk zones on the Flood Insurance Rate Maps (FIRM maps). If there is an entry in this column, it indicates the type of flood zone. as follows:
  Zone AE Zones AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the FIS by detailed methods. Mandatory flood insurance purchase requirements apply.
- **Zone A** Areas subject to inundation by the 1-percent-annual-chance flood event. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.
  ***Column 5 Locally Identified Area of Flooding*:** The fifth column indicates the risk of flooding in local hazard areas. A "No" entry in this column means that the site is not within any of the mapped flood hazard zones. If there is an entry in this column, it indicates the local hazard area.
- ***Column 6* Brushfire Risk:** Areas identified as potential or existing brushfire risk locations.
- ***Column 7 Hot Spots*:** Hot spots indicates areas that are within the 5% of hottest land areas in the MAPC region based on satellite data from 2016.
- ***Column 8 Sea Level Rise – 3 ft.*:** Areas predicted to be inundated at the higher of the daily high with 3 feet of sea level rise.

Table 32: Critical Facilities and Relationship to Hazard Areas

ID	NAME	TYPE	FEMA Flood Zone	Locally Identified Flood Area	Brushfire Risk	Hot Spot	Sea Level Rise - 3 ft.
1	Post Office	Post Office	No	No	No	No	No
2	Glover School	School	No	No	No	No	No
3	Verizon	Telecommunications	No	No	No	No	No
4	Andrews Park	Recreation	No	No	No	No	No
5	Unquity House Elder Housing	Elder Housing	No	Unquity House	No	No	No
6	St Mary Of the Hills Elem	School	No	No	No	No	No
7	Parkway Nursery School	Child Care	No	No	No	No	No
8	Post Office	Post Office	No	No	No	No	No
9	St Agatha Elementary School	School	No	No	No	Yes	No
10	Nstar Power Substation #362	Power Substation	No	Unquity Brook	No	No	No
11	Tucker Elementary School	School	No	No	No	No	No
12	Pierce Middle School	School	No	No	No	No	No
13	Fontbonne Academy HS	School	No	No	No	No	No
14	Sunshine Pre School	Child Care	No	No	No	No	No
15	Kelly Field	Recreation	No	No	No	No	No
16	Milton Academy Day Care	Child Care	No	No	No	No	No
17	First Baptist Church Day Care	Child Care	No	No	No	No	No
18	Milton Academy	School	No	No	No	No	No
19	Milton Hospital	Medical Facility	No	No	No	No	No
20	Thacher Montessori School	School	No	No	No	No	No
21	Milton Fire Dept HQ	Fire Station	No	No	No	No	No
22	Fuller Village EH	Elder Housing	No	No	No	No	No
23	Town Office/ Town Hall	Emergency Operations Center	No	No	No	No	No
25	Carriage House Nursery School	Child Care	No	No	No	No	No
26	Brooks Field	Recreation	No	No	No	Yes	No
27	Collicot/Cunningham Elementary School	School	No	No	No	No	No
28	Winter Valley Elder Housing	Elder Housing	No	No	No	No	No
29	Milton Police Dept HQ	Police Station	No	Unquity Brook 2	No	No	No

30	Milton Police Station/ EOC	Emergency Operations Center	No	Unquity Brook 2	No	No	No
31	Milton Hospital	Hazardous Material Site	No	No	No	No	No
32	Milton High School	School	No	No	No	No	No
33	Blue Hill Observatory WGBH Transmitter	Communication Tower	Area Not Included	No	No	No	No
36	Church of God of Prophecy	Church	No	No	No	No	No
37	Home Incorporated	Elder Housing	No	No	No	No	No
38	Milton Housing Authority	Municipal	No	No	No	No	No
39	Curry College Early Childhood Ctr.	School	No	No	No	No	No
40	Curry College	School	No	No	No	No	No
41	Carriage House Harvard Campus	Child Care	No	No	No	No	No
42	Milton Health Care Facility	Nursing Home	No	No	No	No	No
43	Delphi Academy	School	No	No	No	No	No
44	Concord Baptist Church	Church	No	No	No	No	No
45	State Police Station/Milton	Police Station	Area Not Included	No	Blue Hills Reservation	No	No
46	Algonquin Gas/ Duke Energy	Gas Pipeline	No	No	No	No	No
47	DPW Sewer Pump Station	Natural Gas Pumping	AE	No	No	No	No
48	Milton Yacht Club	Water Facility	AE	Milton Landing	No	No	No
49	Parkway United Methodist Church	Church	No	No	No	No	No
50	St Agatha's Church	Church	No	No	No	No	No
51	Granite Ave Bridge	Bridge	AE	No	No	No	Yes
52	Adam Street Bridge	Bridge	No	No	No	No	Yes
53	Central Ave Bridge	Bridge	AE	No	No	No	No
54	Mattapan Bridge	Bridge	AE	No	No	No	No
55	St Pius Church	Church	No	No	No	No	No
56	Boston Emergency Water Connection	Water Supply	AE	No	No	No	No
57	Baptist Bible College	Recreation	No	No	No	No	No
58	Boston Emergency Water Connection	Water Supply	No	No	No	No	No
59	Canton Emergency Water Connection	Water Supply	Area with no DFIRM - Paper FIRMs in Effect	No	No	No	No
60	Canton Emergency Water Connection	Water Supply	Area with no DFIRM	No	No	No	No

			- Paper FIRMs in Effect				
61	Canton Emergency Water Connection	Water Supply	Area with no DFIRM - Paper FIRMs in Effect	No	No	No	No
62	Canton Emergency Water Connection	Water Supply	No	No	No	No	No
63	Captain Forbs House	Historic	No	No	No	No	No
64	Centre Preschool	School	No	No	No	No	No
65	Church of our Saviour	Church	No	No	No	No	No
66	Cunningham Foundation	Hazardous Material Site	No	Cunningham Brook	No	No	No
67	Discovery School House	School	No	No	No	No	No
68	DPW Sewer Pump Station	Sewer Pump Station	Area Not Included	No	No	No	No
69	DPW Sewer Pump Station	Sewer Pump Station	Area Not Included	No	No	No	No
70	DPW Sewer Pump Station	Sewer Pump Station	Area Not Included	Russel Pond	No	No	No
71	DPW Sewer Pump Station	Sewer Pump Station	No	No	No	No	No
72	DPW Sewer Pump Station	Sewer Pump Station	No	No	No	No	No
73	DPW Sewer Pump Station	Sewer Pump Station	No	No	No	No	No
74	DPW Sewer Pump Station	Sewer Pump Station	No	No	No	No	No
75	Algonquin Gas/ Duke Energy	Hazardous Material Site	No	No	No	No	No
76	Early Learning Center Pre School	School	No	No	No	No	No
77	East Congregational Church	Church	No	No	No	No	No
78	First Baptist Church	Church	No	No	No	No	No
79	First Congregational Church	Church	No	No	No	No	No
80	First Parrish Church	Church	No	No	No	No	No
83	Heritage Hall / American Legion Post	Place of Assembly	No	No	No	No	No
87	Mary C Lane Playground	Recreation	No	No	No	No	No
88	Mass Highway Facility / State DPW	DPW	AE	Lower Granite Avenue	No	No	No

89	Mattapan Baptist Church	Church	No	No	No	No	No
90	Milton Community Pre School	School	No	No	No	No	No
91	Milton Council on Aging	Place of Assembly	No	No	No	No	No
92	Milton DPW	DPW	No	No	No	No	No
93	St Elizabeth's Church	Church	No	No	No	No	No
94	Milton Fire Dep E2	Fire Station	No	No	No	Yes	No
95	Milton Fire Dep E4	Fire Station	No	No	No	No	No
97	Goddard School Early Childhood	Child Care	No	No	No	No	No
98	Milton Art Center	Municipal	No	No	No	No	No
99	Milton Main Library	Library	No	No	No	No	No
102	MWRA Water Connection	Water Supply	No	No	No	Yes	No
103	MWRA Water Connection	Water Supply	AE	No	No	No	No
104	MWRA Water Connection	Water Supply	No	No	No	No	No
105	MWRA Master Meter # 107	MWRA	No	No	No	Yes	No
106	MWRA Master Meter # 27	MWRA	No	No	No	No	No
107	MWRA Master Meter # 55	MWRA	No	No	No	No	No
108	Oblates of Mary	Place of Assembly	No	No	No	No	No
109	Quincy Emergency Water Connection	Water Supply	No	No	No	No	No
110	Quincy Emergency Water Connection	Water Supply	No	No	No	No	No
111	Quincy Emergency Water Connection	Water Supply	No	No	No	No	No
112	Quincy Emergency Water Connection	Water Supply	A	No	No	No	No
113	Quincy Emergency Water Connection	Water Supply	No	No	No	No	No
114	Quincy Emergency Water Connection	Water Supply	No	No	No	No	No
115	Russel Pond	Dam	A	Russel Pond	No	No	No
116	Wollaston Golf Course	Hazardous Material Site	No	No	No	No	No
117	St Mary's of the Hills Church	Church	No	No	No	No	No
118	St Michael's Episcopal Church	Church	No	No	No	No	No
119	The Village Pre School	School	No	No	No	No	No
120	Shields Playground	Recreation	No	No	No	No	No
121	Sisters of St Joseph Convent	Church	No	No	No	No	No

122	Suffolk Resolves House	Municipal	No	No	No	No	No
123	Trailside Museum	Municipal	Area Not Included	No	Blue Hills Reservation	No	No
124	Water Storage Tank 700K	Water Supply	Area Not Included	No	Blue Hills Reservation	No	No
125	Water Storage Tank 685 K	Water Supply	No	No	No	No	No
127	Ulin Skating Rink	Ice Rink	Area Not Included	No	Blue Hills Reservation	No	No
128	Milton Academy Skating Rink	Ice Rink	No	No	No	No	No
129	Paul's Bridge	Bridge	No	No	No	No	No
130	Cell Towers	Communication Tower	No	No	No	No	No
131	Cell Tower New	Communication Tower	No	No	No	No	No
132	Neponset Valley Yacht Club	Water Facility	Area Not Included	Lower Granite Avenue	No	No	Yes
133	Milton Cemetery	Cemetery	No	No	No	No	No
134	Wollaston Golf Course Heliport	Heliport	No	No	No	No	No
135	Milton Academy Heliport	Heliport	No	No	No	No	No
136	CVS/ market	Pharmacy	No	No	No	Yes	No
137	Milton Healthcare Facility Heliport	Heliport	No	No	No	No	No
138	Houghton's Pond Heliport	Heliport	Area Not Included	No	Blue Hills Reservation	No	No
139	Kelly Field Heliport	Heliport	No	No	No	No	No
140	Harland St. Dam	Dam	A	Russel Pond	Blue Hills Reservation	No	No
141	Camp Sayre	Recreation	No	No	Blue Hills Reservation	No	No
142	Cell Tower	Communication Tower	No	No	No	Yes	No
144	Park N Ride	Transportation Facility	AE	Lower Granite Avenue	No	No	No
145	Capen Street MBTA Trolley Station	Transportation Facility	No	No	No	No	No
146	Valley Road MBTA Trolley Station	Transportation Facility	No	No	DCR land along the Neponset	No	No
147	Central Avenue MBTA Trolley Station	Transportation Facility	No	No	No	No	No
148	Milton MBTA Trolley Station	Transportation Facility	No	No	No	No	No
149	Baker Chocolate Dam	Dam	AE	No	No	No	No

150	Tileston and Hollingsworth Dam	Dam	AE	No	No	No	No
151	Animal Shelter	Animal Shelter	No	No	No	No	No
153	Congregation Beth Shalom	Church	No	No	No	No	No
154	Little Sprouts Preschool	Child Care	No	No	No	No	No

VULNERABILITY ASSESSMENT

The purpose of the vulnerability assessment is to estimate the extent of potential damages from natural hazards of varying types and intensities. A vulnerability assessment and estimation of damages was performed for hurricanes, earthquakes, and flooding through the HAZUS-MH software.

Introduction to HAZUS-MH

HAZUS- MH (multiple-hazards) is a computer program developed by FEMA to estimate losses due to a variety of natural hazards. The following overview of HAZUS-MH is taken from the FEMA website. For more information on the HAZUS-MH software, go to https://www.fema.gov/hazus/

> "HAZUS-MH is a nationally applicable standardized methodology and software program that contains models for estimating potential losses from earthquakes, floods, and hurricane winds. HAZUS-MH was developed by the Federal Emergency Management Agency (FEMA) under contract with the National Institute of Building Sciences (NIBS). Loss estimates produced by HAZUS-MH are based on current scientific and engineering knowledge of the effects of hurricane winds, floods, and earthquakes. Estimating losses is essential to decision-making at all levels of government, providing a basis for developing and evaluating mitigation plans and policies as well as emergency preparedness, response, and recovery planning.
>
> HAZUS-MH uses state-of-the-art geographic information system (GIS) software to map and display hazard data and the results of damage and economic loss estimates for buildings and infrastructure. It also allows users to estimate the impacts of hurricane winds, floods and earthquakes on populations."

There are three modules included with the HAZUS-MH software: hurricane wind, flooding, and earthquakes. There are also three levels at which HAZUS-MH can be run. Level 1 uses national baseline data and is the quickest way to begin the risk assessment process. The analysis that follows was completed using Level 1 data. Level 1 relies upon default data on building types, utilities, transportation, etc. from national databases as well as census data. While the databases include a wealth of information on the Town of Milton, it does not capture all relevant information. In fact, the HAZUS training manual notes that the default data is "subject to a great deal of uncertainty."

However, for the purposes of this plan, the analysis is useful. This plan is attempting to generally indicate the possible extent of damages due to certain types of natural disasters and to allow for a comparison between different types of disasters. Therefore, this analysis should be considered to be a starting point for understanding potential damages from the hazards.

ESTIMATED DAMAGES FROM HURRICANES

The HAZUS software was used to model potential damages to the community from a 100-year and 500-year hurricane event; storms that are 1% and 0.2% likely to happen in a given year, and roughly equivalent to a Category 2 and Category 4 hurricane. The damages caused by these hypothetical storms were modeled as if the storm track passed directly through the town, bringing the strongest winds and greatest damage potential.

Though there are no recorded instances of a hurricane equivalent to a 500-year storm passing through Massachusetts, this model was included in order to present a reasonable "worst case scenario" that would help planners and emergency personnel evaluate the impacts of storms that might be more likely in the future, as we enter into a period of more intense and frequent storms.

Table 33: Estimated Damages from Hurricanes

	Category 2	Category 4
Building Characteristics		
Estimated total number of buildings	9,053	
Estimated total building replacement value (2014 $)	$4,415,000,000	
Building Damages		
# of buildings sustaining minor damage	389	1,834
# of buildings sustaining moderate damage	28	339
# of buildings sustaining severe damage	1	24
# of buildings destroyed	0	13
Population Needs		
# of households displaced	1	18
# of people seeking public shelter	0	7
Debris		
Building debris generated (tons)	1,348	6,508
Tree debris generated (tons)	4,492	10,792
# of truckloads to clear building debris	54	260
Value of Damages		
Total property damage (buildings and content)	$29,693,230	$112,778,680
Total losses due to business interruption	$943,110	$7,220,070

ESTIMATED DAMAGES FROM EARTHQUAKES

The HAZUS earthquake module allows users to define an earthquake magnitude and model the potential damages caused by that earthquake as if its epicenter had been at the geographic center of the study area. For the purposes of this plan, two earthquakes were selected: magnitude 5.0 and a magnitude 7.0. Historically, major earthquakes are rare in New England, though a magnitude 5 event occurred in 1963.

Table 34: Estimated Damages from Earthquakes

	Magnitude 5.0	Magnitude 7.0
Building Characteristics		
Estimated total number of buildings	9,053	
Estimated total building replacement value (2014 $)	$4,415,000,000	
Building Damages		
# of buildings sustaining slight damage	2,665	275
# of buildings sustaining moderate damage	1,395	1,845
# of buildings sustaining extensive damage	367	2,607
# of buildings completely damaged	91	4,307
Population Needs		
# of households displaced	314	4,998
# of people seeking public shelter	198	3,067
Debris		
Building debris generated (tons)	78,000	648,000
# of truckloads to clear debris (@ 25 tons/truck)	3,120	25,920
Value of Damages		
Total property damage	$474,259,700	3,730,155,900
Total losses due to business interruption	$71,403,000	$433,259,600

ESTIMATED DAMAGES FROM FLOODING

The HAZUS flooding module allows users model the potential damages caused by a 100-year flood event and a 500-year flood event.

Table 35: Estimated Damages from Flooding

	100-Year Flood	500-Year Flood

Building Characteristics		
Estimated total number of buildings	9,053	
Estimated total building replacement value (2014 $)	$4,415,000,000	
Building Damages		
# of buildings sustaining limited damage	25	29
# of buildings sustaining moderate damage	14	22
# of buildings sustaining extensive damage	0	0
# of buildings substantially damaged	0	0
Population Needs		
# of households displaced	307	378
# of people seeking public shelter	7	7
Value of Damages		
Total property damage	$9,310,000	$14,690,000
Total losses due to business interruption	$10,590,000	$13,940,000

IMPACTS ON PEOPLE

Just as some locations in Milton will be more vulnerable to climate impacts than others, it is also true that climate change and natural hazards will not affect all residents of Milton equally. People who may be more susceptible to negative health effects can include older adults, young children, pregnant women, people with disabilities, and people with pre-existing health conditions, as they are more likely to be physically vulnerable to the health impacts of extreme heat and poor air quality. Individuals with physical mobility constraints may need additional assistance with emergency response. Older adults are often at elevated risk due to a high prevalence of pre-existing and chronic conditions. People who live in substandard housing and in housing without air conditioning have increased vulnerability to heat-related illnesses. Black and Latino residents in Massachusetts are hospitalized for asthma at considerably higher rates than the population as whole, reflecting the reality that longstanding societal inequities can lead to differential health outcomes based on race and ethnicity.

Low-income people are often more susceptible to financial shocks, which can occur after extreme weather, and which can impact financial security and the ability to secure safe shelter and meet medical needs. Social isolation can also influence vulnerability, as it limits access to critical information, municipal resources, and social support systems. In the absence of strong social support networks and translation services, people living alone and those with limited English language proficiency may experience social isolation. People of color and undocumented immigrants may also experience social isolation where there are historically strained or tenuous relationships with government officials and first responders. Certain occupations may also

experience more severe impacts. People who work outdoors, or in unregulated temperatures, are at increased risk for heat-related illnesses.

In developing mitigation measures Milton will want to consider the needs of all of its residents. In Milton, 5% of residents are below the poverty level (4-person household earning less than $24,563) and 30% are low-income (4-person household earning less than $78,150) (American Community Survey). The over 65 population is growing, and 31% of residents 65 or older live alone (Census 2010). Although Black residents in Milton are hospitalized for asthma at lower rates than the statewide average, their hospitalization rates are higher than those for White residents in Milton. (MA DPH).

RISK ASSESSMENT SUMMARY

CLIMATE CHANGE	NATURAL HAZARD	PRIORITY (H/M/L)	KEY CONCERNS SOCIETY	KEY CONCERNS BUILT ENVIRONMENT	KEY CONCERNS NATURAL RESOURCES
Changes in Precipitation 	Inland Flooding	High	Property damage, displacement	Granite Ave., Parkway Crescent, and surrounding streets yard flooding	
	Drought	Medium	MWRA supplies water, not a water supply concern	Property damage from falling trees	Can cause wildfires, also tree damage as trees are stressed
	Landslide	Low – no history	NA	NA	NA
Sea Level Rise 	Coastal Flooding	Medium (increasing)	Property damage, yard flooding	High tide flooding at Riverside, Granite and California Aves, Lochland Street (Gulliver Creek)	
	Coastal Erosion	Low – tidal areas are protected from open ocean	NA	NA	NA
	Tsunami	Low – no history			
Rising Temperatures 	Average and Extreme Temperatures	Medium	East Milton has least tree coverage. EJ neighborhoods near Mattapan Sq. are more densely populated.		Increasing tree attrition in the last decade. More likely to fall during storms.
	Wildfires	Medium	Generally, no impact on property	Generally, no impact on property	Increasing risk of brush fires.
	Invasive species	Low/Medium		Phragmites near dam, not a big threat to property.	Japanese knotwood makes it difficult to encourage ecologically diverse plantings.
Extreme Weather	Hurricanes / Tropical Storms	Medium/High	Power outages	Flooding and wind damage	
	Severe Winter Storms	Medium/High	Power outages, travel interruption	Salt storage sufficient only for 1.5 storms	Salt use can impact groundwater

	Tornadoes	Low/Medium	No history, but incidence is increasing in Massachusetts		
	Other (Wind/ Thunderstorms)	High	Property damage, power outages		Downed trees
Non-Climate Hazard	Earthquake	Low – no history	Damage would be significant given the age of building stock	Damage would be significant given the age of building stock	

SECTION 5: HAZARD MITIGATION GOALS

The Milton Local Hazard Mitigation Planning Team reviewed and discussed the goals from the 2014 Hazard Mitigation Plan for the Town of Milton. All of the goals are considered critical for the Town, and they are not listed in order of importance. Prior to the Hazard Mitigation Plan update process, the Town of Milton developed a Climate Change Vulnerability Analysis and Action Plan. The local team chose to incorporate climate considerations as noted in Goal 10.

GOAL 1: Ensure that critical infrastructure sites are protected from natural hazards.

GOAL 2: Protect existing residential and business areas from flooding

GOAL 3: Maintain existing mitigation infrastructure in good condition.

GOAL 4: Continue to enforce existing zoning and building regulations.

GOAL 5: Educate the public about zoning and building regulations, particularly with regard to changes in regulations that may affect teardowns and new construction.

GOAL 6: Work with surrounding communities to ensure regional cooperation and solutions for hazards affecting multiple communities.

GOAL 7: Encourage future development and redevelopment in areas that are not prone to natural hazards.

GOAL 8: Educate the public about natural hazards and mitigation measures.

GOAL 9: Make efficient use of public funds for hazard mitigation.

GOAL 10: Consider the potential impacts of future climate change. Incorporate climate sustainability and resiliency in hazard mitigation planning.

SECTION 6: EXISTING MITIGATION MEASURES

The existing protections in the Town of Milton are a combination of zoning, land use, and environmental regulations, infrastructure maintenance, and drainage infrastructure improvement projects. Infrastructure maintenance generally addresses localized drainage clogging problems, while large scale capacity problems may require pipe replacement or invert elevation modifications. These more expensive projects are subject to the capital budget process and lack of funding is one of the biggest obstacles to completion of some of these. Milton's adoption of a stormwater utility will contribute significantly to efforts to address stormwater flooding.

The Town's existing mitigation measures, which were in place prior to the original 2005 Plan, are listed by hazard type here and are summarized in Table 36 below. Many upgrades to existing measures are noted in the following sections.

EXISTING MULTI-HAZARD MITIGATION MEASURES

Comprehensive Emergency Management Plan (CEMP) – Every community in Massachusetts is required to have a Comprehensive Emergency Management Plan. These plans address mitigation, preparedness, response, and recovery from a variety of natural and man-made emergencies. These plans contain important information regarding flooding, hurricanes, tornadoes, dam failures, earthquakes, and winter storms. Therefore, the CEMP is a mitigation measure that is relevant to all of the hazards discussed in this plan. Milton's CEMP is 12 years old and due for an update and the establishment of a program to keep this plan updated annually.

Communications Equipment – Milton has full coverage of the Town with emergency services radio and reverse 911 capabilities for distribution of emergency messages. Incident command units are available through MEMA. During Hurricane Irene the Town discovered a gap in their communications system when the power went out and all phone and internet connections were lost for a period of days. These communication capabilities are essential during and following a hazard event in order to maintain the flow of information between local emergency managers and the public, state and federal agencies, and other critical information sources.

Emergency Power Generators – The Town maintains emergency power generators in several important public facilities and emergency shelters.

Massachusetts State Building Code – The Massachusetts State Building Code contains many detailed regulations regarding wind loads, earthquake resistant design, flood-proofing, and snow loads.

Local Emergency Management Planning Committee (LEPC) – The LEPC meets regularly and is very active with participation from various Town departments, community institutions, and the private sector. The structure of this committee should be evaluated to ensure it is representative of all vulnerable groups and to unify emergency management and LEPC functions.

EXISTING TOWN-WIDE MITIGATION FOR FLOOD-RELATED HAZARDS

Milton employs a number of practices to help minimize potential flooding and impacts from flooding, and to maintain existing drainage infrastructure. Existing town-wide mitigation measures include the following:

National Flood Insurance Program (NFIP) – Milton participates in the NFIP with 90 policies in force as of the May 31, 2011. FEMA maintains a database on flood insurance policies and claims. This database can be found on the FEMA website at http://www.fema.gov/business/nfip/statistics/pcstat.shtm

The following information is provided for the Town of Milton:

Flood insurance policies in force (as of May 31, 2011)	107
Coverage amount of flood insurance policies	$31,254,200
Premiums paid	$73,938
Closed losses (Losses that have been paid)	75
Total payments (Total amount paid on losses)	$592,005

The Town complies with the NFIP by enforcing floodplain regulations, maintaining up-to-date floodplain maps, and providing information to property owners and builders regarding floodplains and building requirements.

Since the 2014 plan, the policies in force have increased by 17 and the closed paid losses have increased by 28. The total payments increased by $55,000 since 2014.

Public Works Operations/Maintenance Activities – The Public Works Department actively maintains the Town's storm drain system. The following specific activities serve to maintain the capability of the drainage system through the reduction of sediment and litter build up and proper maintenance and repair.

- *Street sweeping* – All streets are swept once annually.
- *Catch basin cleaning* – All are cleaned every 3 years
- *Roadway treatments* – Streets are treated with a mix of sand and salt. The Town is exploring the use of liquid brine and more modern techniques and equipment.

Town of Milton Community Development Plan – The Milton Community Development Plan was adopted in 2004. While it is much broader-based and focuses on all aspects of development in the Town, issues that touch on flooding and hazard mitigation can be found throughout the plan. The plan focuses more on policies and strategies than on detailed recommendations. Some of the recommendations consistent with hazard mitigation efforts include protecting wetlands along the Neponset River and promotion of cluster development.

Conservation/Recreation Open Space Plan – The Town of Milton Open Space and Recreation Plan expired in March 2011. The plan identified a number of open space parcels prioritized for

acquisition that would also potentially benefit hazard mitigation efforts. The plan update should explicitly identify open space opportunities that would have a hazard mitigation effort.

Floodplain Zoning District – Zoning is intended to protect the public health and safety through the regulation of land use. The Zoning Bylaws of the Town of Milton include Flood Plain District Regulations (Section IV C). The Flood Plain District is an overlay district, corresponding to the 100-year floodplain as defined by the most recent Flood Insurance Study and Flood Insurance Rate Map (FIRM). Within the District, no development activity, whether structural or non-structural, shall occur unless it complies with all applicable development regulations and is able to demonstrate that the proposed development will not result in any increase in flood levels during the occurrence of the base flood. All development in the floodplain must comply with the State's building code for floodplain areas, its wetlands protection regulations, its inland wetlands restrictions, and requirements for subsurface disposal (Title 5).

Subdivision Rules and Regulations - The Milton Subdivision Rules and Regulations contains provisions that serve to reduce the impacts of floods and erosion. Through its design and layout standards, the regulations contribute to the Town's overall efforts to mitigate the risks for damage through flooding. Base Flood elevation data must be provided for proposed subdivisions in a floodplain and drainage impact mitigation design is necessary.

Cluster Zoning – The Town of Milton has provisions in the Zoning Bylaw allowing for cluster development (Section VI J and VI K). The purpose of this section is "to permit development on large tracts of land in a manner which preserves open space and topography, wooded areas, and natural features of substantial portions of those tracts" and "to provide a process requiring careful site planning and high-quality design resulting in developments in harmony with the surrounding open spaces, which enhance the neighborhoods in which they occur and the Town as a whole." Through these purposes, wetland areas and floodplains can be preserved as permanent open space. An update of this ordinance section is in process.

Stormwater Bylaw – The purpose of the Stormwater Bylaw (chapter 21) is in part to mitigate flooding through site design and structural improvements that promote the infiltration of stormwater on site or otherwise retain stormwater in areas of new development where there is a significant increase in impervious surfaces and/or a change in drainage patterns. Engineering Division of the DPW requires a 20% post-construction reduction of runoff.

Wetland Regulations – The purpose of the Wetland Regulations (Section IV B) is to provide for the reasonable protection and conservation of certain irreplaceable natural features, resources and amenities for the health, safety, and welfare of the present and future inhabitants of the Town. The bylaw requires a special permit from the Conservation Commission for any fill or excavation activities in any stream, tidal river, swamp, marsh, or along the shore of any pond. The bylaw requires a 25-foot buffer (zone of non-disturbance).

DCR dam safety regulations – The state has enacted dam safety regulations mandating inspections and emergency action plans. All new dams are subject to state permitting.

Pine Tree Brook Flood Control Structures - Pine Tree Brook contains extensive wooded wetlands, a flood control structure at Harland Street, and a small pond and a large ponding area, all upstream of the Ulin Skating rink on Unquity Road. Pine Tree Brook continues on to an additional pond, Popes Pond, with its own control structure. These structures allow the land behind them to function as detention basins and let the water out slowly during and after a storm. These flood control structures were built in the early 1960s.

EXISTING TOWN-WIDE MITIGATION FOR WIND-RELATED HAZARDS

Massachusetts State Building Code – The town enforces the Massachusetts State Building Code whose provisions are generally adequate to protect against most wind damage. The code's provisions are the most cost-effective mitigation measure against tornados given the extremely low probability of occurrence. If a tornado were to occur, the potential for severe damages would be extremely high.

EXISTING TOWN-WIDE MITIGATION FOR WINTER-RELATED HAZARDS

Snow disposal –The town conducts general snow removal operations with its own equipment. The need for a designated snow disposal site was identified.

EXISTING TOWN-WIDE MITIGATION FOR FIRE-RELATED HAZARDS

Burn Permits – The Milton Fire Department requires a written permit for outdoor burning and follows the State program and regulations.

Subdivision/Development Review – The Fire Department is involved in review of all major development projects.

EXISTING TOWN-WIDE MITIGATION FOR GEOLOGIC HAZARDS

Massachusetts State Building Code – The State Building Code contains a section on designing for earthquake loads (780 CMR 1612.0). Section 1612.1 states that the purpose of these provisions is "to minimize the hazard to life to occupants of all buildings and non-building structures, to increase the expected performance of higher occupancy structures as compared to ordinary structures, and to improve the capability of essential facilities to function during and after an earthquake." This section goes on to state that due to the complexity of seismic design, the criteria presented are the minimum considered to be "prudent and economically justified" for the protection of life safety. The code also states that absolute safety and prevention of damage, even in an earthquake event with a reasonable probability of occurrence, cannot be achieved economically for most buildings.

Section 1612.2.5 sets up seismic hazard exposure groups and assigns all buildings to one of these groups according to a Table 1612.2.5. Group II includes buildings which have a substantial public hazard due to occupancy or use and Group III are those buildings having essential facilities which are required for post-earthquake recovery, including fire, rescue and police stations, emergency rooms, power-generating facilities, and communications facilities.

COMPILATION OF EXISTING MITIGATION

Table 36 summarizes the many existing natural hazard mitigation measures already in place in Milton when the first Hazard Mitigation Plan was developed in 2014. Because of the number of entities, public and private, involved in natural hazard mitigation, it is likely that this list is a starting point for a more comprehensive inventory of all measures.

Table 36: Existing Natural Hazard Mitigation Measures in Milton

Type of Existing Mitigation Measures	Effective Y/N	Improvements/Changes Needed
FLOOD HAZARDS		
Participation in the National Flood Insurance Program	Y	
Public Works Operations/Maintenance Activities	Y	Updated plan
Community Development Plan	Y	Updated in 2015
Open Space Plan (expired)	N	Update process has started
Floodplain District	Y	Updated this year
Subdivision Rules and Regulations	Y	
Cluster Zoning	Y	Needs updating
Stormwater Bylaw	Y	Updated in 2019
Wetlands Protection Bylaw and Regulations	Y	
DCR Dam Safety regulations	Y	
Pine Tree Brook Flood Control Structures	Y	Needs regular maintenance
WIND HAZARDS		
MA state building code	Y	
WINTER HAZARDS		
Snow disposal area	Y	Need a new site for snow disposal
FIRE HAZARDS		
Open Burn Permits required	Y	
Subdivision and development review	Y	
GEOLOGIC HAZARDS		
State Building code addresses earthquake hazards	Y	
MULTIPLE HAZARDS		
Comprehensive Emergency Management Plan (CEMP)	Y	
Communications equipment	Y	
Emergency Power Generators	Y	

Type of Existing Mitigation Measures	Effective Y/N	Improvements/Changes Needed
Massachusetts State Building Code	Y	
Participation in the Local Emergency Planning Committee	Y	

MITIGATION CAPABILITIES AND LOCAL CAPACITY FOR IMPLEMENTATION

Under the Massachusetts system of "Home Rule," the Town of Milton is authorized to adopt and from time to time amend local bylaws and regulations that support the town's capabilities to mitigate natural hazards. These include Zoning Bylaws, Subdivision and Site Plan Review Regulations, Wetlands Bylaws, Health Regulations, Public Works regulations, and local enforcement of the State Building Code. Local Bylaws may be amended by the Select Board to improve the town's capabilities, and changes to most regulations simply require a public hearing and a vote of the authorized board or commission.

The Town of Milton has recognized several existing mitigation measures that require implementation or improvements and has the capacity within its local boards and departments to address these. Recent updates have included stormwater and floodplain bylaws.

The Town can improve its hazard mitigation capabilities with the following measures:

- Complete the update of the Open Space and Recreation Plan and incorporate Hazard Mitigation and Climate Resilience as a formal component of the plan. Identify opportunities for open space protection and land acquisition that would have specific hazard mitigation co-benefits, such as managing stormwater to reduce flooding, protecting vegetation for shade to mitigate extreme heat, and managing forests to mitigate climate impacts.
- Update the Cluster Zoning bylaw.
- Incorporate climate resilience in the local wetlands bylaw and regulations.
- Update the Zoning Bylaw and relevant regulations to incorporate low impact and green infrastructure strategies and requirements.
- Analyze future threats to critical infrastructure, facilities, and residences based on projections of sea level rise and increasing storms.
- Financing the implementation of mitigation measures: the Town can incorporate a program of mitigation measures into its Capital Investment Program to ensure that these receive priority along with other categories of municipal investment such as roadways and municipal buildings.

SECTION 7: MITIGATION MEASURES FROM PREVIOUS PLAN

IMPLEMENTATION PROGRESS ON THE PREVIOUS PLAN

At a meeting of the Milton Hazard Mitigation Planning Committee, Town staff reviewed the mitigation measures identified in the 2014 Milton Hazard Mitigation Plan and determined whether each measure had been implemented or deferred. Of those measures that had been deferred, the committee evaluated whether the measure should be deleted or carried forward into this Hazard Mitigation Plan 2021 Update. The decision on whether to delete or retain a particular measure was based on the committee's assessment of the continued relevance or effectiveness of the measure and whether the deferral of action on the measure was due to the inability of the Town to take action on the measure. Table 37 summarizes the status of mitigation measures from the 2014 plan.

Table 37: Mitigation Measures from the 2014 Plan

Mitigation Action	Priority in 2014 plan	Current Status	Include in 2021 plan?
Floodplain Information Service	Medium	Complete – the information is publicly available on the town GIS mapping portal	No
Town Dam Mapping	Medium	Complete	No
Riparian and Dam Vegetation Management	High	The town completed a dam management plan. The riparian management plan is still needed.	Yes
Master Plan Update	Medium	Complete	No
Open Space Plan	High	The town initiated an update to the Open Space Plan	Yes
Dredge Pine Tree Brook	High	Not complete	Yes
Wetlands Restoration	High	These projects did not occur and are not a current priority.	No
Coordinate Drainage and Sewer Repair Projects	High	Complete	No
Unquity Brook Sidewalls	High	Not complete	Yes
Baker Dam Removal Project	High	Studies were completed that found PCBs upstream of the dam. The town is working with MA DEP and the EPA on sediment abatement options.	Yes

Mitigation Action	Priority in 2014 plan	Current Status	Include in 2021 plan?
Expand Gate Valve Exercise Program	High	Complete	No
Storm Drain System Improvements	High	Significant work has been done, but much work is still needed.	Yes
Floodplain Management	High	Done, but this item is ongoing.	Yes
Floodplain Mapping	High	Done, but this item is ongoing.	Yes
Acquisition of Vacant Flood Prone Lands	Medium	No purchases were completed.	Yes
Tree Pruning Program	High	This work is regularly accomplished by the local utility.	No
Municipal Building Evaluation	Medium	Snow load evaluations completed at Pierce Middle School-Collicot, Cunningham, and Tucker School. Others still need evaluation for snow and high wind evaluation was not done.	Yes
Woody Debris Storage Site	Medium	Not complete	Yes
Snow Disposal Site	Medium	Not complete	Yes
Seismic Study	Low	Not complete	Yes
Encourage the reduction of non-structural and structural hazards	Low	Not complete	Yes
Controlled Burns	Low	This would only be considered as a last resort. The town cooperates with the DCR on controlled burns with town boundaries.	No
Brush Fire Education	Medium	Not implemented. The department plans to implement with newly acquired on-line capabilities.	Yes
Upgrade EOC Communications Reliability	Medium	Upgrades including new switch and fiber were implemented. But further upgrades are needed.	Yes
Intercommunication Capability	Medium	Complete	No

Mitigation Action	Priority in 2014 plan	Current Status	Include in 2021 plan?
Emergency Power Generators	Medium	Complete	No
Emergency Shelter	Medium	Brooks Field House at Milton is recognized as a Red Cross Approved shelter.	No
LEPC Evaluation	Medium	This is reviewed every five years. Next submission will be in 2022.	Yes
Update CEMP	High	Currently being reviewed.	Yes

As indicated in Table 37, Milton made good progress implementing mitigation measures identified in the 2014 Hazard Mitigation Plan. GIS and mapping projects were completed. Communications upgrades and generator purchases were completed. The Master Plan and dam management plans were completed, and the Open Space and Recreation Plan is underway. Several drainage projects were completed, and snow load evaluations were done for three of the public schools.

Some projects were partially completed, and/or will be continued to the next plan for on-going maintenance. Removal of the Baker Dam is dependent on abatement of contaminated sediments. The state recently endorsed a request for Superfund designation to address the sediments. Several flood management projects were not completed and remain priority items.

Overall, thirteen mitigation measures from the 2014 plan will be continued in the plan update. Most retain the same priority in this 2021 Update. Moving forward into the next five-year plan implementation period there will be many more opportunities to incorporate hazard mitigation into the Town's decision-making processes. The challenges the Town faces in implementing these measures are primarily due to limited funding and available staff time. This plan should help the Town prioritize the best use of its limited resources for enhanced mitigation of natural hazards.

SECTION 8: HAZARD MITIGATION STRATEGY

WHAT IS HAZARD MITIGATION?

Hazard mitigation means to permanently reduce or alleviate the losses of life, injuries and property resulting from natural hazards through long-term strategies. These long-term strategies include planning, policy changes, education programs, infrastructure projects and other activities. FEMA currently has three mitigation grant programs: the Hazards Mitigation Grant Program (HGMP), the Pre-Disaster Mitigation program (PDM), and the Flood Mitigation Assistance (FMA) program. The three links below provide additional information on these programs.

https://www.fema.gov/hazard-mitigation-grant-program
https://www.fema.gov/pre-disaster-mitigation-grant-program
https://www.fema.gov/flood-mitigation-assistance-grant-program

Hazard Mitigation Measures can generally be sorted into the following groups:

- Prevention: Government administrative or regulatory actions or processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses. Examples include planning and zoning, building codes, capital improvement programs, open space preservation, and stormwater management regulations.
- Property Protection: Actions that involve the modification of existing buildings or infrastructure to protect them from a hazard or removal from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, flood proofing, storm shutters, and shatter resistant glass.
- Public Education & Awareness: Actions to inform and educate citizens, elected officials, and property owners about the potential risks from hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and school-age and adult education programs.
- Natural Resource Protection: Actions that, in addition to minimizing hazard losses also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.
- Structural Projects: Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include storm water controls (e.g., culverts), floodwalls, seawalls, retaining walls, and safe rooms.
- Emergency Services Protection: Actions that will protect emergency services before, during, and immediately after an occurrence. Examples of these actions include protection of warning system capability, protection of critical facilities, and protection of emergency response infrastructure.
  (Source: FEMA Local Multi-Hazard Mitigation Planning Guidance)

REGIONAL AND INTER-COMMUNITY CONSIDERATIONS

Some hazard mitigation issues are strictly local. The problem originates primarily within the municipality and can be solved at the municipal level. Other issues are inter-community and require cooperation between two or more municipalities. There is a third level of mitigation which is regional and may involve a state, regional or federal agency or three or more municipalities.

REGIONAL PARTNERS

In developed urban and suburban communities such as the metropolitan Boston area, mitigating natural hazards, particularly flooding, is more than a local issue. The drainage systems that serve these communities are complex systems of storm drains, roadway drainage structures, pump stations and other facilities owned and operated by a wide array of agencies including the Town, the Department of Conservation and Recreation (DCR), the Massachusetts Water Resources Authority (MWRA), Massachusetts Department of Transportation (MassDOT) and the Massachusetts Bay Transportation Authority (MBTA). The planning, construction, operation, and maintenance of these structures are integral to the flood hazard mitigation efforts of communities. These agencies must be considered the communities' regional partners in hazard mitigation. These agencies also operate under the same constraints as communities do including budgetary and staffing constraints and they must make decisions about numerous competing priorities.

Following, is a brief overview of regional facilities found in Milton and a discussion of inter-municipal issues.

OVERVIEW OF REGIONAL FACILITIES WITHIN MILTON

Major facilities owned, operated, and maintained by state or regional entities include:

- State Routes 93, 28, and 138 (MassDOT)
- Mattapan Trolley (MBTA)
- Blue Hills Reservation (Mass DCR)

INTER-COMMUNITY CONSIDERATIONS

Mitigation measures for the following regional issues should be taken into account as Milton develops its own local plan:

A) <u>Coordinate and Review Developments on a Regional Basis</u>
As Milton and the surrounding communities are undergoing development, it is vital that these communities communicate and provide input during the review processes. When addressing housing, transportation, and economic development projects, the impacts to neighbors must be addressed. Milton is a member of MAPC's Inner Core Committee and the Three Rivers Interlocal Council, two of the subregions that meet to share information and coordinate activities.

B) Neponset River Watershed

Milton works with the Neponset River Watershed Association and surrounding communities to address stormwater flooding, water supply and water quality. The Neponset River serves as a shared border with Boston for Milton's northern boundary.

NEW DEVELOPMENT AND INFRASTRUCTURE

As part of the process of developing recommendations for new mitigation measures for this plan update, the Town considered the issues related to new development, redevelopment, and infrastructure needs in order limit future risks. Taking into consideration the Wetlands Act and bylaw enforced by the Conservation Commission and the recent adoption of the Stormwater Bylaw and Stormwater Utility, and the Floodplain Bylaw, the town determined that existing regulatory measures are taking good advantage of local Home Rule land use regulatory authority to minimize natural hazard impacts of development.

PROCESS FOR SETTING PRIORITIES FOR MITIGATION MEASURES

The last step in developing the Town's mitigation strategy is to assign a level of priority to each mitigation measure so as to guide the focus of the Town's limited resources towards those actions with the greatest potential benefit. At this stage in the process, the Local Hazard Mitigation Planning Team had limited access to detailed analyses of the cost and benefits of any given mitigation measure, so prioritization is based on the local team members' understanding of existing and potential hazard impacts and an approximate sense of the costs associated with pursuing any given mitigation measure.

Priority setting was based on local knowledge of the hazard areas, including impacts of hazard events, the extent of the area impacted, and the relation of a given mitigation measure to the Town's goals. In addition, the local Hazard Mitigation Planning Team also took into consideration factors such as the number of homes and businesses affected, whether or not road closures occurred and what impact closures had on delivery of emergency services and the local economy, anticipated project costs, whether any environmental constraints existed, and whether the Town would be able to justify the costs relative to the anticipated benefits.

Table 38 below demonstrates the prioritization of the Town's potential hazard mitigation measures. For each mitigation measure, the geographic extent of the potential benefiting area is identified as is an estimate of the overall benefit and cost of the measures. The benefits, costs, and overall priority were evaluated in terms of:

Estimated Benefits	
High	Action will result in a significant reduction of hazard risk to people and/or property from a hazard event
Medium	Action will likely result in a moderate reduction of hazard risk to people and/or property from a hazard event

Low	Action will result in a low reduction of hazard risk to people and/or property from a hazard event
Estimated Costs	
High	Estimated costs greater than $100,000
Medium	Estimated costs between $10,000 to $100,000
Low	Estimated costs less than $10,000 and/or staff time
Priority	
High	Action very likely to have political and public support and necessary maintenance can occur following the project, and the costs seem reasonable considering likely benefits from the measure
Medium	Action may have political and public support and necessary maintenance has potential to occur following the project
Low	Not clear if action has political and public support and not certain that necessary maintenance can occur following the project

INTRODUCTION TO MITIGATION MEASURES TABLE

Description of the Mitigation Measure – The description of each mitigation measure is brief and cost information is given only if cost data were already available from the community. The cost data represent a point in time and would need to be adjusted for inflation and for any changes or refinements in the design of a particular mitigation measure.

Priority – As described above and summarized in Table 38, the designation of high, medium, or low priority was done considering potential benefits and estimated project costs, as well as other factors in the STAPLEE (Social, Technical, Administrative, Legal, Economic, and Environmental) analysis.

Implementation Responsibility – The designation of implementation responsibility was done based on a general knowledge of what each municipal department is responsible for. It is likely that most mitigation measures will require that several departments work together and assigning staff is the sole responsibility of the governing body of each community.

Time Frame – The time frame was based on a combination of the priority for that measure, the complexity of the measure and whether or not the measure is conceptual, in design, or already designed and awaiting funding. Because the time frame for this plan is five years, the timing for all mitigation measures has been kept within this framework. The identification of a likely time frame is not meant to constrain a community from taking advantage of funding opportunities as they arise.

Potential Funding Sources – This column attempts to identify the most likely sources of funding for a specific measure. The information on potential funding sources in this table is preliminary and varies depending on a number of factors. These factors include whether or not a mitigation measure has been studied, evaluated, or designed, or if it is still in the conceptual stages. MEMA

and DCR assisted MAPC in reviewing the potential eligibility for hazard mitigation funding. Each grant program and agency has specific eligibility requirements that would need to be taken into consideration. In most instances, the measure will require a number of different funding sources. Identification of a potential funding source in this table does not guarantee that a project will be eligible for, or selected for, funding. Upon adoption of this plan, the local team responsible for its implementation should begin to explore the funding sources in more detail.

Additional information on funding sources – The best way to determine eligibility for a particular funding source is to review the project with a staff person at the funding agency. The following websites provide an overview of programs and funding sources.

Army Corps of Engineers (ACOE) – The website for the North Atlantic district office is http://www.nae.usace.army.mil/. The ACOE provides assistance in a number of types of projects including shoreline/streambank protection, flood damage reduction, flood plain management services and planning services.

Massachusetts Emergency Management Agency (MEMA) – The grants page https://www.mass.gov/hazard-mitigation-assistance-grant-programs describes the various Hazard Mitigation Assistance Program.

Table 38: Mitigation Measures Prioritization

CLIMATE CHANGE	ACTION	GEOGRAPHIC COVERAGE	LEAD	TIME FRAME	EST. BENEFIT	EST. COST	FUNDING SOURCE	PRIORITY
Changes in Precipitation 	**Inland Flooding**							
	Riparian Management Plan	Pine Tree Brook	Public Works	2026	High	Medium	Town	High
	Open Space Plan	Town-wide	Planning	2023	Medium	Medium	Town	High
	Dredging Pine Tree Brook	Pine Tree Brook	Public Works	2026	High	High	Town	High
	Unquity Brook sidewalls	Unquity Brook	Public Works	2023	High	High	Town/FEMA	High
	Baker Dam removal project	Neponset River	State/ACOE	2026	High	High	State/ACOE	High
	Storm drain system improvements	Multiple	Public Works	2026	High	Low	Town	High
	Floodplain management	Floodplain areas	Planning	2022	High	Low	Town	High
	Floodplain mapping	Floodplain areas	Planning	2022	High	Low	Town	High
	Acquisition of vacant flood prone lands	Various	Planning	2025	Medium	High	FEMA/CPA	Medium
	Incorporate LID and GI in regulations	Town-wide	Planning	2024	Medium	Low	Town	Medium
	Churchill Street flood mitigation	Site specific	Public Works	2022	High	High	Town/FEMA	Medium
	Drought							
	Require drought resilient landscaping in development permits	Town-wide	Planning	2024	Medium	Low	Town	Medium
	Plant trees resistant to drought and heat	Town-wide	Public Works	2022	Medium	Medium	Town	Medium
	Landslide							
	Assess steep slopes vulnerable to failure	Site specific	Public Works	2026	Medium	Low	Town	Low
Sea Level Rise 	**Coastal Flooding (and Tsunamis)**							
	Coastal Resilience planning at Milton Landing	Milton Landing	Planning	2024	High	Low	State grant	High
	Evaluate salt marsh resilience	Neponset estuary	Planning	2024	High	Low	State grant	High
	Participate in harbor protection study	Neponset estuary	Engineering	2023	High	Low	Town	Medium

CLIMATE CHANGE	ACTION	GEOGRAPHIC COVERAGE	LEAD	TIME FRAME	EST. BENEFIT	EST. COST	FUNDING SOURCE	PRIORITY
	ACTION	GEOGRAPHIC COVERAGE	LEAD	TIME FRAME	EST. BENEFIT	EST. COST	FUNDING SOURCE	PRIORITY
	Protect Granite Avenue pump station	Granite Avenue	Public Works	2023	High	High	FEMA	High
	Coastal Erosion							
	Monitor erosion in the tidal Neponset	Neponset estuary	Public Works	2026	Low	Low	Town	Low
Rising Temperatures 	**Extreme Heat and Heat Waves**							
	Site design requirements to increase tree planting	Town-wide	Planning	2024	Medium	Medium	Town	Medium
	Add solar canopies to municipal lots	Site—specific	Public Works	2023	Medium	High	State grants	Medium
	Wildfires							
	Brush fire education	Forested areas	Fire	2023	Medium	Low	Town	Medium
	Invasive species							
	Include invasives management in permit requirements	Town-wide	Planning	2023	Low	Low	Town	Low
Extreme Weather 	**Hurricanes and Tropical Storms** (see Other Severe Weather)							
	Severe Winter Storm/Nor'easter							
	Snow disposal site	Site specific	Public Works		Medium	Low	Town	Medium
	Tornadoes (or see Other Severe Weather)							
	Other Severe Weather (strong winds, thunderstorms)							
	Municipal building evaluation	Muni buildings	Public Works	2026	Low	Low	Town	Medium
	Woody debris storage	Town-wide	Public Works	2023	Low	Low	Town	Medium
Multihazards	**Multihazards**							
	Upgrade EOC communications	Town-wide	IT/Police/ Facilities	2022	High	Medium	Town	High
	LEPC Evaluation	Town-wide	Police/Select Board	2022	Medium	Low	Town MEMA	High
	Update CEMP	Town-wide	Planning/Fire	2022	Medium	Low	grants	High
	Upgrade COA to shelter standards	Site-specific	Police	2025	High	High	FEMA	Medium
Non-Climate Hazard	**Earthquake**							
	Seismic study	Site-specific	Public Works	2026	Low	Medium	Town	Low

CLIMATE CHANGE	ACTION	GEOGRAPHIC COVERAGE	LEAD	TIME FRAME	EST. BENEFIT	EST. COST	FUNDING SOURCE	PRIORITY
	Education and outreach on earthquake risks	Town-wide	Public Works	2026	Medium	Low	town	Low

Changes in Precipitation

Inland Flooding

Riparian and Dam Vegetation Management: The Town needs a maintenance program and equipment to support vegetation management along riparian areas, most significantly, along the Pine Tree Brook. Vegetation falls into and gathers in the waterway creating temporary dams that can back up water during storm events leading to flooding of adjacent homes. In a more natural system, this scenario would not be a problem but in many parts of the Town, homes are close enough to the waterway to be impacted. This flooding can also block roads impacting emergency response. In addition, vegetation on dams is threatening structural integrity and must be addressed.

Open Space Plan: Milton will be updating the Town's Open Space Plan. The hazard mitigation value of conservation land should be considered in this plan as part of any prioritization of lands for conservation. Having this plan is necessary in order to access certain State conservation funding programs.

Dredging Pine Tree Brook: Sand accumulation in certain areas of the Brook has exacerbated flooding of these areas, particularly road flooding in culvert and low bridge areas.

Unquity Brook Sidewalls: The Town will restore or stabilize the granite walls along Unquity Brook between Adams and Brook Streets. These failing walls are disrupting stream flow and full damming of the stream could lead to the flooding of as many as 500 homes.

Baker Dam Removal Project: The state has recently announced support for federal designation as a Superfund site. Removal, or containment, of contaminated sediments is a necessary step to allow dam removal.

Storm Drain System Improvements: Investigate the need for improvements to the stormwater drainage system in the following areas: Quarry Hills, and the Cunningham Brook, Pine Tree Brook, and Trout Brook watersheds.

Floodplain Management: Continue to enforce the Floodplain Zoning District (Section 470) and associated building regulations for floodplain areas. Update this district to remain consistent with FEMA guidelines and floodplain mapping.

Floodplain Mapping: Maintain up to date maps of local FEMA identified floodplains.

Acquisition of Vacant Flood Prone Lands: Acquire priority open space parcels in floodplain areas in order to maintain flood storage and water infiltration capacity. These parcels may also be used for general conservation and recreation purposes.

Incorporate LID and GI requirements in regulations: The Planning Board will consider updates to regulations that will encourage Low Impact Development and Green Infrastructure, and additional strategies to reduce impervious surfaces.

Churchill Street flood mitigation: Clean and inspect stormwater system. Conduct an engineering review to assess potential options to address flooding. Seek funding to implement identified solutions.

Drought

Require drought resilient landscaping in development permits: The Planning Board will consider strategies to require drought resilient landscaping as part of the permitting process.

Plant trees resilient to drought and heat: The Town has an ongoing tree planting program. In choosing tree varieties, the Town will consider trees better adapted to changing climate conditions.

Landslide

Assess steep slopes that are potentially vulnerable to failure: Evaluate the potential for landslides.

Sea Level Rise

Coastal Flooding

Coastal resilience planning for Milton Landing: Milton Landing has important assets and will be vulnerable to future sea level rise. Initiate planning for this location.

Evaluate salt marsh resilience: There are significant stands of salt marsh along the Neponset River. They are an important natural resource asset and can protect against flooding. They are vulnerable to sea level rise. Study the impacts of sea level rise and salt marsh resilience.

Participate in harbor protection study: Participate in the regionwide effort to consider a system of harbor defenses against coastal storms and sea level rise.

Protect Granite Avenue pump station: The Granite Avenue pump station is vulnerable to flooding and future sea level rise. Evaluate options to elevate the pump station, or to harden systems to survive flooding impacts. Implement recommended protection strategies.

Coastal Erosion

Monitor Erosion in the tidal Neponset River: Erosion is not a current concern, but that may change with sea level rise and the increasing frequency and intensity of coastal storms.

Rising Temperatures

Extreme Heat and Heat Waves

Site design requirements for tree planting: Adopt site design requirements that to increase tree plantings to reduce heat near buildings and parking areas. Prioritize planting at higher heat locations in Milton.

Add solar canopies to municipal parking lots: Identify municipal parking locations and look for funding support to install solar canopies.

Wildfires

Brush Fire Education: Implement an education program for property owners in or near brush fire hazard areas with regard to controlling vegetation near homes to limit the ability of brush fires to spread to a building. This mitigation measure was first identified in the 2005 plan.

Invasive Species

Include invasives management in permit requirements: Require invasive species management in permitting development projects.

Extreme Weather

Winter Storms

Snow Disposal Site: Based on experience during the blizzards of 2010, 2011, and 2015, the Town needs to identify a site where accumulated snow can be stored.

Other Severe Storms (wind) (includes Hurricanes and Tropical Storms and Tornadoes)

Municipal Building Evaluation: Some municipal buildings may be vulnerable to high winds during a hurricane or nor'easter. Potentially vulnerable buildings will be evaluated, and improvements identified.

Woody Debris Storage Site: Following a significant wind or ice storm, the Town must have a location where woody debris removed from road ways and other properties can be stored until it

can be chipped. The Town will identify a location separate from a snow disposal site as storms can generate both snow and woody debris and both cannot be stored in the same place.

Multihazards

Upgrade EOC Communications Reliability: Make needed upgrades to equipment and technology.

LEPC Evaluation: The LEPC is an important part of the Town's Hazard Mitigation efforts. Regular evaluation is an important aspect of its functioning.

Update CEMP: While the CEMP is not a hazard mitigation document, an up-to-date and effective CEMP is important for reducing hazard vulnerabilities in the Town. The Town anticipates completing an update to the plan in 2022.

Upgrade COA to shelter standards: Install a hard-wired generator and showers in order to make the Council on Aging building available for use as a Red Cross recognized shelter.

Non-Climate Hazard

Earthquake

Seismic Study: The Town will conduct a study of the seismic vulnerability and upgrade needs for critical infrastructure sites, both public and private. This mitigation measure was carried forward from the 2005 plan.

Education and Outreach: Provide information to government, building and school facility managers and teachers on securing bookcases, filing cabinets, light fixtures, and other objects that can cause injuries and block exits; • Encourage facility managers, business owners, and teachers to refer to FEMA's practical guidebook: "Reducing the Risks of Nonstructural Earthquake Damage;" • Encourage homeowners and renters to use "Is Your Home Protected from Earthquake Disaster? A Homeowner's Guide to Earthquake Retrofit" for economical and efficient techniques.

SECTION 9: PLAN ADOPTION & MAINTENANCE

PLAN ADOPTION

The Milton Hazard Mitigation Plan 2021 Update was adopted by the Select Board on *[ADD DATE]*. See Appendix D for documentation. The plan was approved by FEMA on [*ADD DATE*] for a five-year period that will expire on [*ADD DATE*].

PLAN MAINTENANCE

MAPC worked with the Milton Hazard Mitigation Team to prepare this plan. This group will continue to meet on an as-needed basis to coordinate the implementation and maintenance of this plan. A member of the Town staff will be designated as the team coordinator. Additional members could be added to the local team from businesses, non-profits, and institutions. The Town will encourage public participation during the next 5-year planning cycle. As updates and a review of the plan are conducted by the Hazard Mitigation Team, these will be placed on the Town's web site, and any meetings of the Hazard Mitigation Team will be publicly noticed in accordance with town and state open meeting laws.

IMPLEMENTATION AND EVALUATION SCHEDULE

Mid-Term Survey on Progress – The coordinator of the Hazard Mitigation Team will prepare and distribute a survey in year three of the plan. The survey will be distributed to all the local team members and other interested local stakeholders. The survey will poll the members on progress and accomplishments for implementation, any new hazards or problem areas that have been identified, and any changes or revisions to the plan that may be needed.

This information will be used to prepare a report or addendum to the local hazard mitigation plan in order to evaluate its effectiveness in meeting the plan's goals and identify areas that need to be updated in the next plan. The Hazard Mitigation Implementation Team will have primary responsibility for tracking progress, evaluating, and updating the plan.

Begin to Prepare for the next Plan Update – FEMA's approval of this plan is valid for five years, by which time an updated plan must be approved by FEMA in order to maintain the Town's approved plan status and its eligibility for FEMA mitigation grants. Given the lead time needed to secure funding and conduct the planning process, the Hazard Mitigation Implementation Team will begin to prepare for an update of the plan in year three. This will help the Town avoid a lapse in its approved plan status and grant eligibility when the current plan expires.

The Hazard Mitigation Implementation Team will use the information from the Mid-Term progress review to identify the needs and priorities for the plan update and seek funding for the plan update process. Potential sources of funding may include FEMA Pre-Disaster Mitigation grants and the Hazard Mitigation Grant Program. Both grant programs can pay for 75% of a planning project, with a 25% local cost share required

Prepare and Adopt an Updated Local Hazard Mitigation Plan – Once the resources have been secured to update the plan, the Hazard Mitigation Team may decide to undertake the update themselves, contract with the Metropolitan Area Planning Council to update the plan or to hire another consultant. However, the Hazard Mitigation Implementation Team decides to update the

plan, the Town will need to review the current FEMA hazard mitigation plan guidelines for any changes in requirements for hazard mitigation plans since the previous plan. Once the next plan update is prepared, the Town will submit it to MEMA and FEMA for review and approval and adopt the plan update in order to obtain formal FEMA approval of the plan.

INTEGRATION OF THE PLANS WITH OTHER PLANNING INITIATIVES

Upon approval of the Milton Hazard Mitigation Plan 2021 Update by FEMA, the Local Hazard Mitigation Team 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 departments:

- Fire/Emergency Management
- Police
- Public Works
- Planning
- Building Department
- Conservation

Other groups that will be coordinated with include large institutions, Chambers of Commerce, land conservation organizations and watershed groups. The plan will also be posted on the Town's website with the caveat that a local team coordinator will review the plan for sensitive information that would be inappropriate for public posting. The posting of the plan on the website will include a mechanism for citizen feedback such as an e-mail address to send comments.

The hazard mitigation plan informed the development of the recently adopted Stormwater Management Bylaw and Stormwater Utility and provided crucial data and analysis for the climate resilience planning completed by the Town and referenced in Appendix E. The Hazard Mitigation Plan will also be integrated into other town plans and policies as they are updated and renewed, including the Open Space and Recreation Plan, Comprehensive Emergency Management Plan, Master Plan, and Capital Plan.

The Town of Milton has taken steps to implement findings from the 2014 Hazard Mitigation Plan into the following policy, programmatic areas, and plans: the adoption of stormwater regulations, and a Stormwater Utility, and the Community Resilience Building Workshop Summary of Findings completed by the city in 2020 and referenced in Appendix E, and the Community Development Plan updated in 2015. The Hazard Mitigation Plan will also be integrated into other town plans and policies as they are updated and renewed, including the Comprehensive Emergency Management Plan, and Capital Plan.

SECTION 10: LIST OF REFERENCES

General By-Laws of the Town of Milton

Zoning By-Law of the Town of Milton

Milton Master Plan, 2015

Town of Milton Community Resilience Building Workshop Summary of Findings 2020

Blue Hill Observatory

FEMA, Flood Insurance Rate Maps for Norfolk County, MA, 2012

FEMA, Hazards U.S. Multi-Hazard

FEMA, Local Mitigation Plan Review Guide, October 2011

Fourth National Climate Assessment, 2018

Massachusetts Flood Hazard Management Program

Massachusetts Office of Coastal Zone Management Shoreline Change Data

Massachusetts Office of Dam Safety, Inventory of Massachusetts Dams 2018

Massachusetts State Hazard Mitigation Plan, 2013

Massachusetts State Hazard Mitigation and Climate Adaptation Plan, 2018

Metropolitan Area Planning Council, GIS Lab, Regional Plans and Data

National Weather Service

Nevada Seismological Library

New England Seismic Network, Boston College Weston Observatory, http://aki.bc.edu/index.htm

NOAA National Climatic Data Center, http://www.ncdc.noaa.gov/

Northeast Climate Adaptation Science Center

Northeast States Emergency Consortium, http://www.nesec.org/

Tornado History Project

US Census, 2010 and American Community Survey 2017 5-Year Estimates

USGS, National Water Information System, http://nwis.waterdata.usgs.gov/usa/nwis

APPENDIX A: MEETING AGENDAS

Milton Hazard Mitigation Plan Update

LOCAL HAZARD MITIGATION PLANNING TEAM

Meeting #1

Wednesday, March 3, 2021

1-3 pm

via Zoom

AGENDA

1. Welcome and introductions
2. Overview of the planning process
3. Climate integration/MVP review
4. Review hazards – identify key concerns
5. Identify/update local hazard areas
   a) Flood Hazard Areas
   b) Fire Hazard Areas (brushfires/ wildfires)
6. Review critical infrastructure
7. Next steps

Milton Hazard Mitigation Plan Update

LOCAL HAZARD MITIGATION PLANNING TEAM

Meeting #2

Wednesday April 7, 2021

1:00 pm

via Zoom

AGENDA

- Review Hazard Mitigation Goals
- Review/update mitigation measures from the original (2008) plan
- Review/update mitigation measures from the 2014 plan
- Plan first public meeting

Milton Hazard Mitigation Plan Update

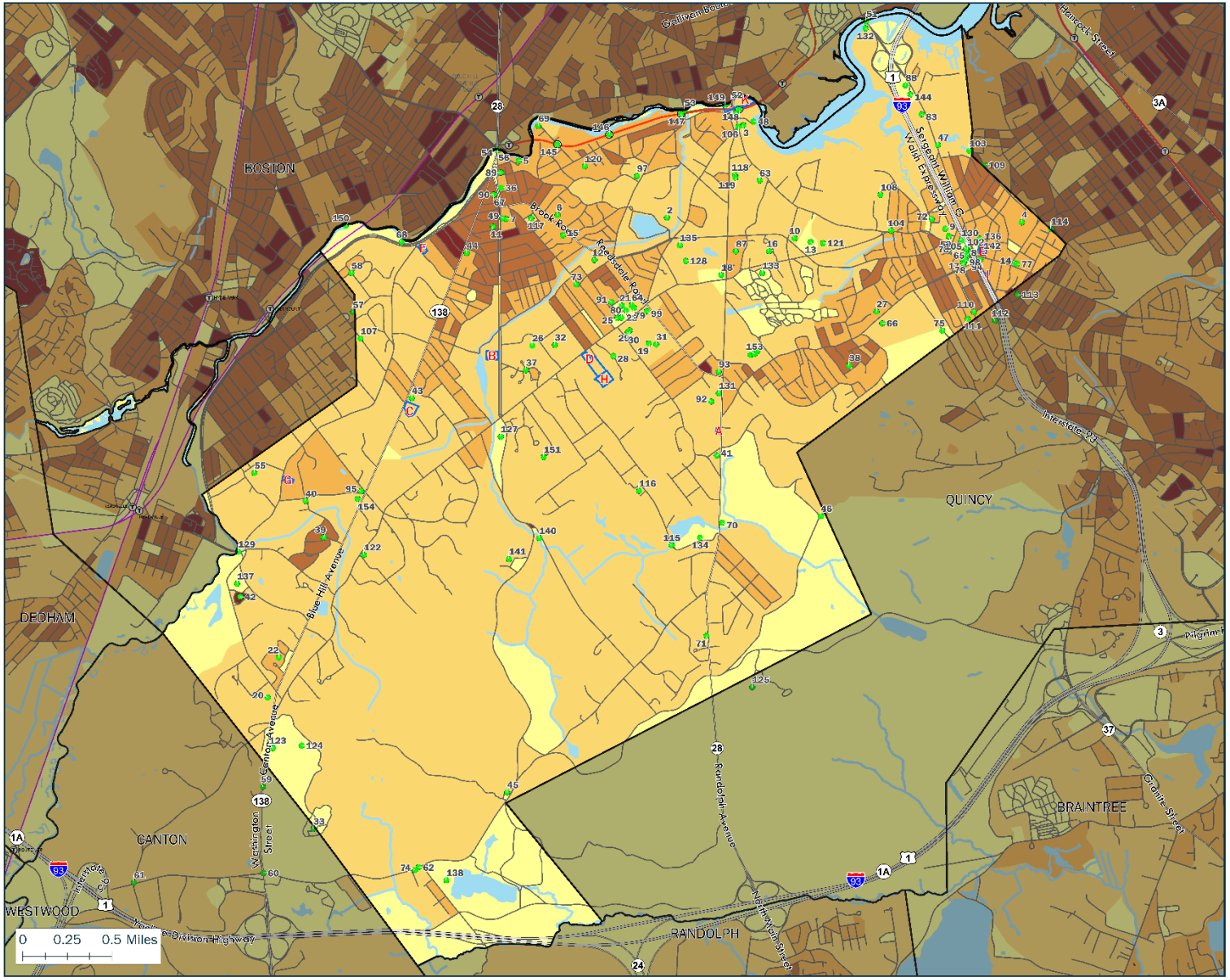
LOCAL HAZARD MITIGATION PLANNING TEAM

Meeting #3

July 21, 2021
1:00 – 2:30
Milton Town Hall

1. Recap 1st public meeting and feedback
2. Develop mitigation measures for the plan update
3. Next steps –final public meeting

APPENDIX B: HAZARD MAPPING



MAPC dcr

FEMA Hazard Mitigation Planning Grant
MILTON, MA

Map 1: Population Density

Sites
- Critical Infrastructure*
- Development Areas

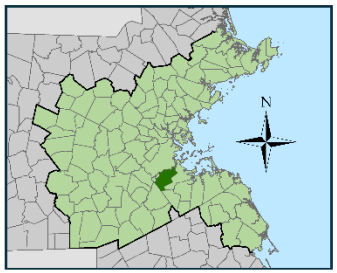
* See details in separate table

Water Bodies

Population Density
Census 2010 Blocks
People per acre
- 0 or No Data
- 0.1 - 5.0
- 5.1 - 15.0
- 15.1 - 30.0
- More than 30

All Roads
- Interstate
- U.S. Highway
- State Route
- Street

Rail
- Stations
- Commuter Rail



The information depicted on this map is for planning purposes only. It is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analyses.

Produced by MAPC Data Services
60 Temple Place, Boston, MA 02111 (617) 451-2770

Data Sources:
Metropolitan Area Planning Council (MAPC)
Massachusetts Geographic Information System (MassGIS)
Northeast States Emergency Consortium (NESEC)
Massachusetts Emergency Management Agency (MEMA)
Federal Emergency Management Agency (FEMA)

MILTON, MA

Date: 7/29/2021

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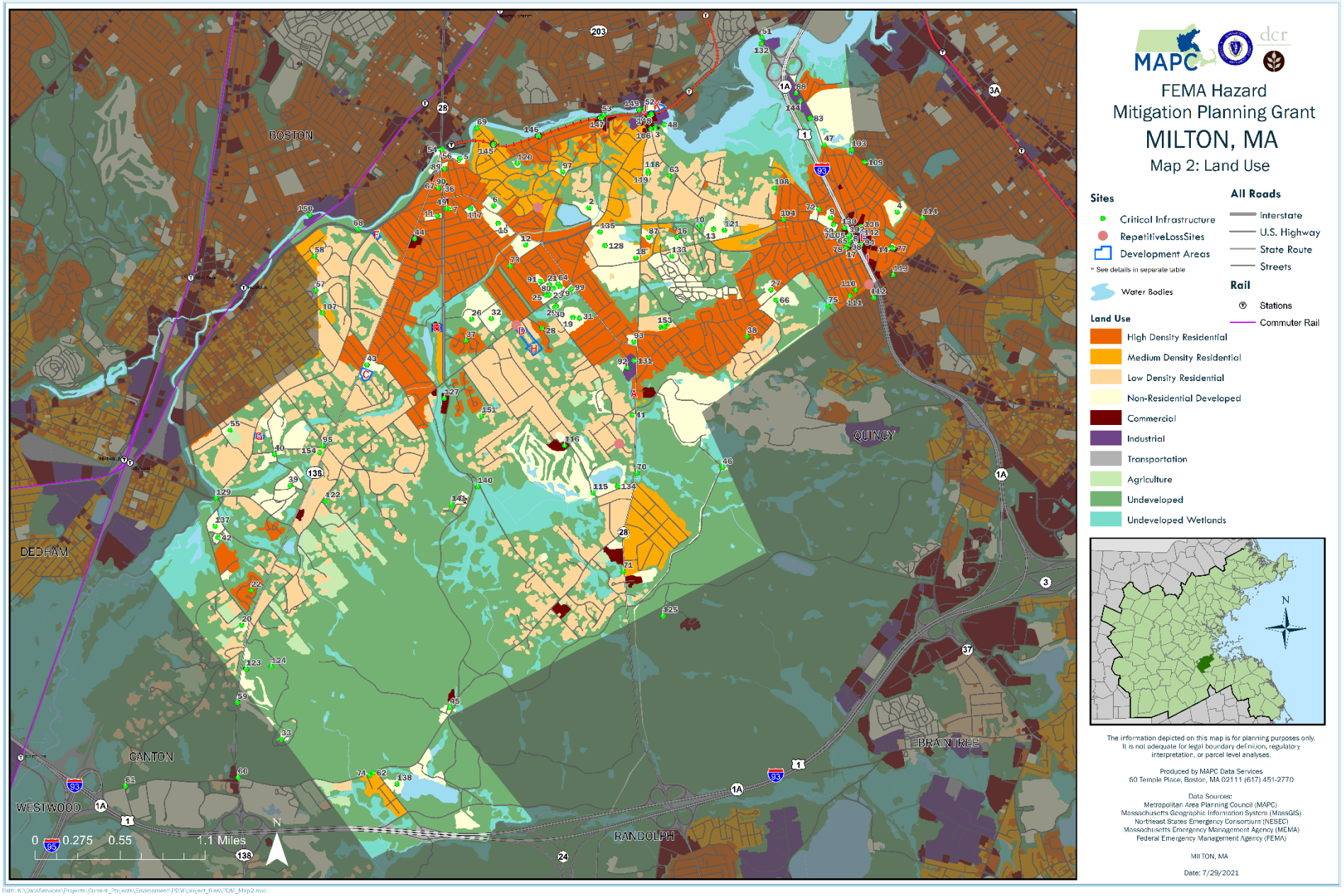
FEMA Hazard
Mitigation Planning Grant
MILTON, MA
Map 2: Land Use
Sites
Critical Infrastructure
RepetitiveLossSites
Development Areas
* See details in separate table
Water Bodies
Land Use
High Density Residential
Medium Density Residential
Low Density Residential
Non-Residential Developed
Commercial
Industrial
Transportation
Agriculture
Undeveloped
Undeveloped Wetlands
All Roads
Interstate
U.S. Highway
State Route
Streets
Rail
Stations
Commuter Rail
BOSTON
QUINCY
DEDHAM
CANTON
WESTWOOD
RANDOLPH
BRAINTREE
0 0.275 0.55 1.1 Miles
N
The information depicted on this map is for planning purposes only. It is not adequate for legal boundary definition, regulatory interpretation, or parcel level analyses.
Produced by MAPC Data Services
60 Temple Place, Boston, MA 02111 (617) 451-2770
Data Sources:
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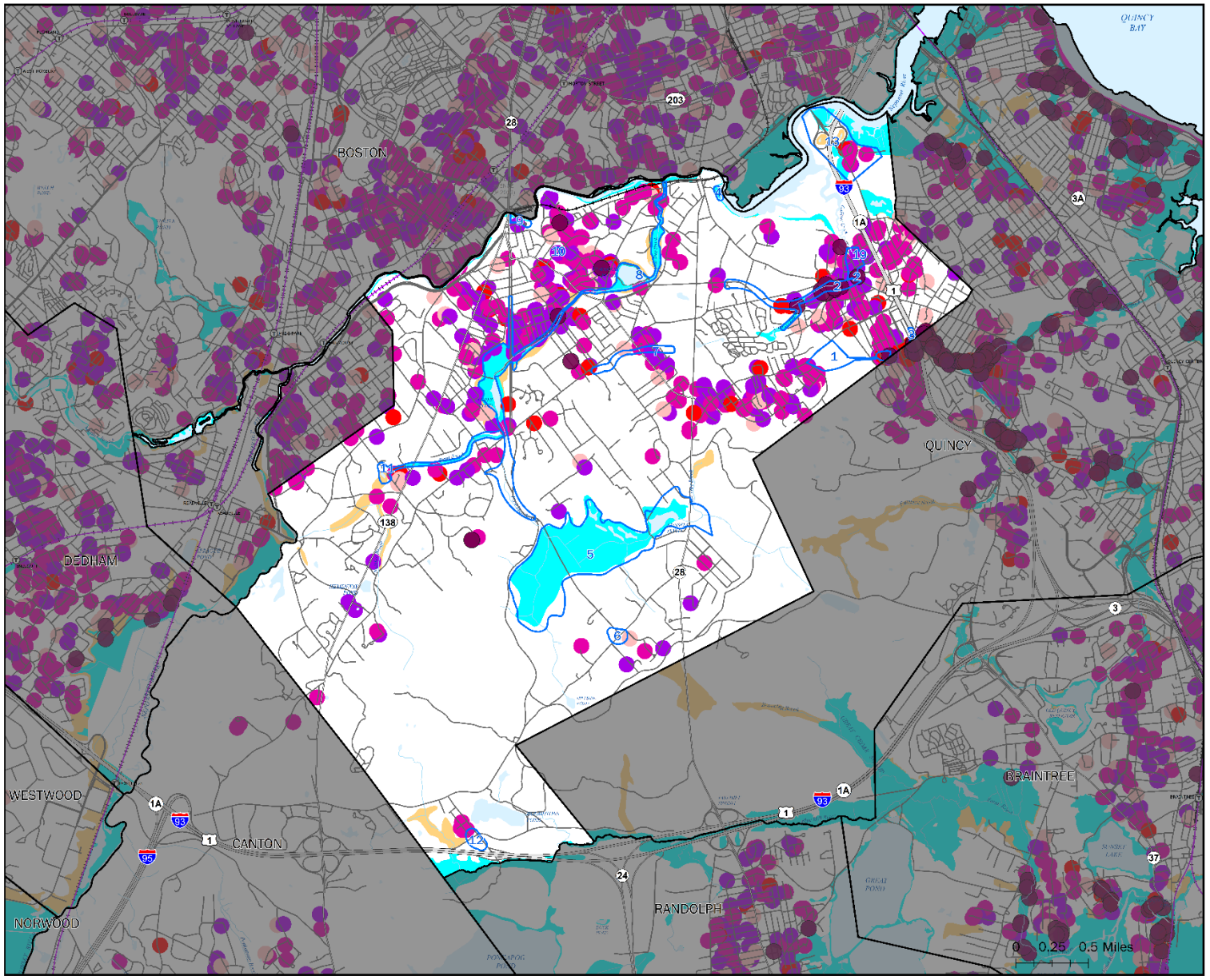
Federal Emergency Management Agency (FEMA)
MILTON, MA
Date: 7/29/2021



MAPC

FEMA Hazard Mitigation Planning Grant
MILTON, MA

Map 3: Flood Zones

Sites
- Locally Identified Flooding
  * See details in separate table
- Water Bodies

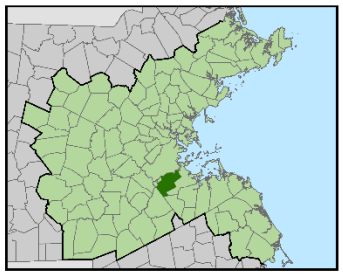
Flood Zones, 2017 (Annual Chance)
- Zone A: 1%
- Zone AE: 1%
- Zone AH: 1%
- Zone AO: 1%
- Zone VE: 1% with Velocity Hazard
- 0.2% Annual Chance

All Roads
- Interstate
- U.S. Highway
- State Route
- Streets

Rail
- Stations
- Commuter Rail
- Trains

March 2010 Flood Claims
- Flood Insurance

Disaster Assistance
- 0 to 1 inch
- 2 to 6 inches
- 6 inches to 2 feet
- 2 feet plus



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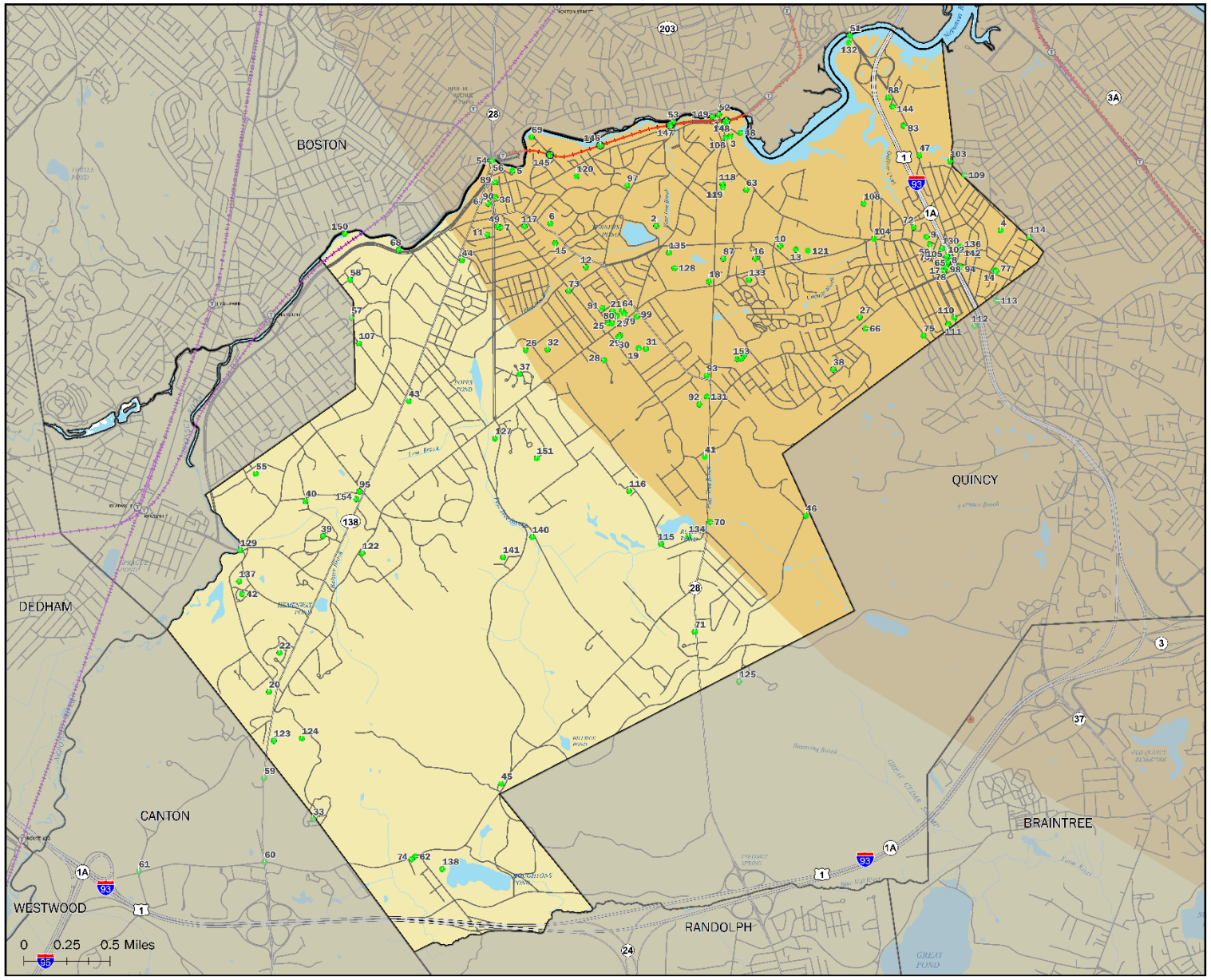
Produced by MAPC Data Services
60 Temple Place, Boston, MA 02111 (617) 451-2770

Data Sources:
Metropolitan Area Planning Council (MAPC)
Massachusetts Geographic Information System (MassGIS)

Flood Zones datalayer updated by MassGIS October 2013 from finalized data provided by Federal Emergency Management Agency (FEMA)

MILTON, MA
Date: 7/29/2021



MAPC dcr

FEMA Hazard Mitigation Planning Grant
MILTON , MA
Map 4: Earthquakes / Landslides

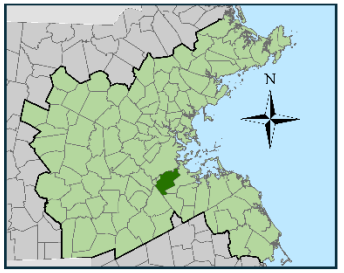
Sites
- Critical Infrastructure Sites*
  * See details in separate table
- Train Stations
- Commuter Rail Lines
- Trains

Water Bodies

All Roads
- Interstate
- U.S. Highway
- State Route
- Street

Earthquakes
- Epicenters

Landslides
- High landslide incidence (greater than 15% of the area is involved in landsliding)
- High susceptibility to landsliding and moderate incidence
- High susceptibility to landsliding and low incidence
- Moderate susceptibility to landsliding and low incidence
- Low landslide incidence (less than 1.5 % of the area is involved in landsliding



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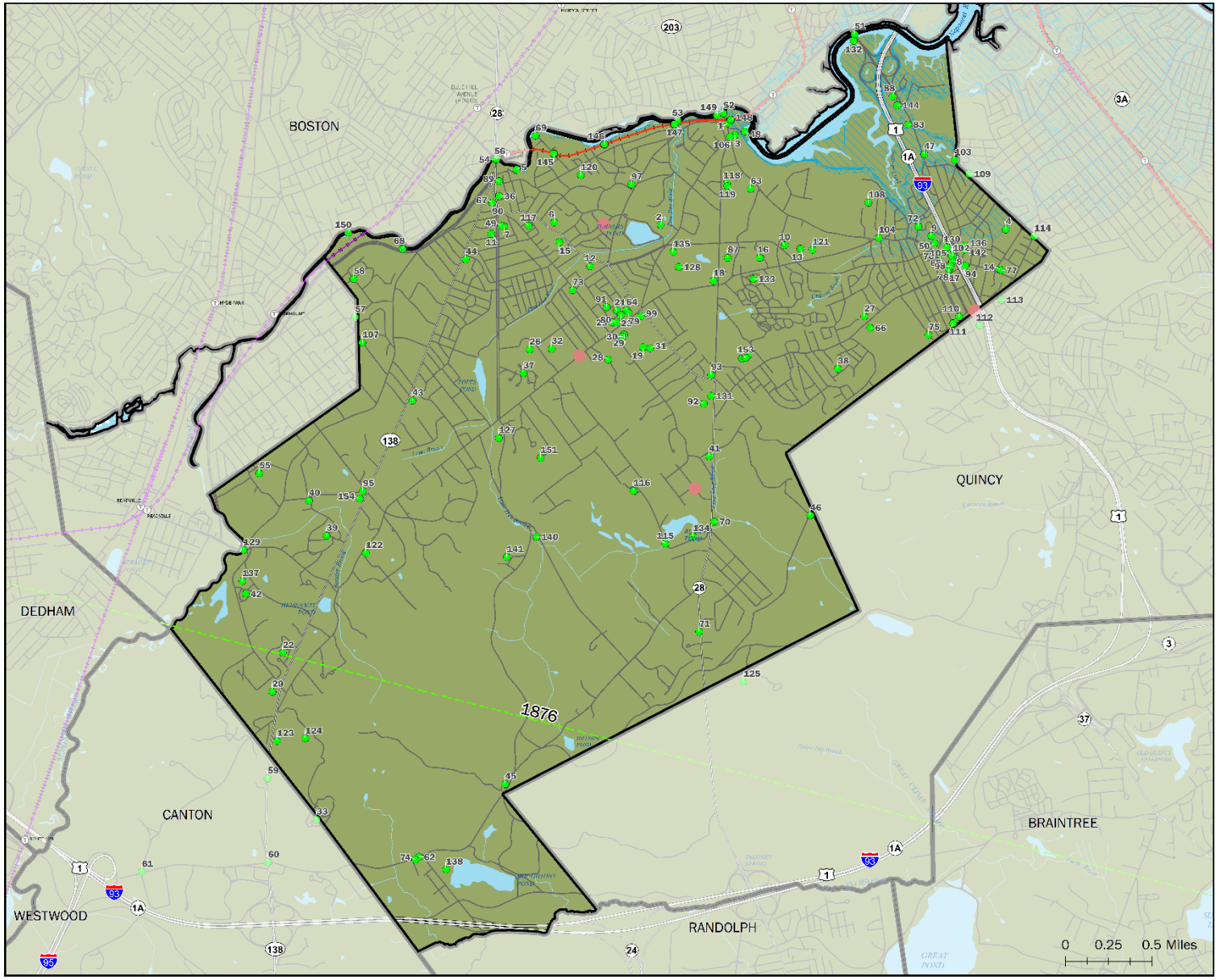
60 Temple Place, Boston, MA 02111 (617) 451 2770

Data Sources:
Metropolitan Area Planning Council (MAPC)
Massachusetts Geographic Information System (MassGIS)
Northeast States Emergency Consortium (NESEC)
Massachusetts Emergency Management Agency (MEMA)
Federal Emergency Management Agency (FEMA)

Date: 7/29/2021

MILTON, MA



MAPC dcr

FEMA Hazard Mitigation Planning Grant
MILTON , MA

Map 5: Hurricanes / Tornadoes

Sites
- Critical Infrastructure Sites*
- Repetitive Loss Sites
- * See details in separate table
- Train Stations
- Commuter Rail Lines
- Trains

Tornadoes
- Tornado

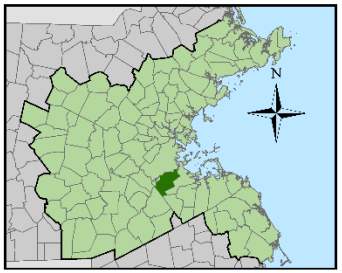
Storm Tracks
- Tropical Depression
- Tropical Storm
- Category 1 Hurricane
- Category 2 Hurricane
- Category 3 Hurricane

Year of storm noted on map

Hurricane Surge Inundation Area

Water Bodies

100 Year Wind Speeds
Miles Per Hour
- 90 MPH
- 100 MPH
- 110 MPH
- 120 MPH
- 130 MPH



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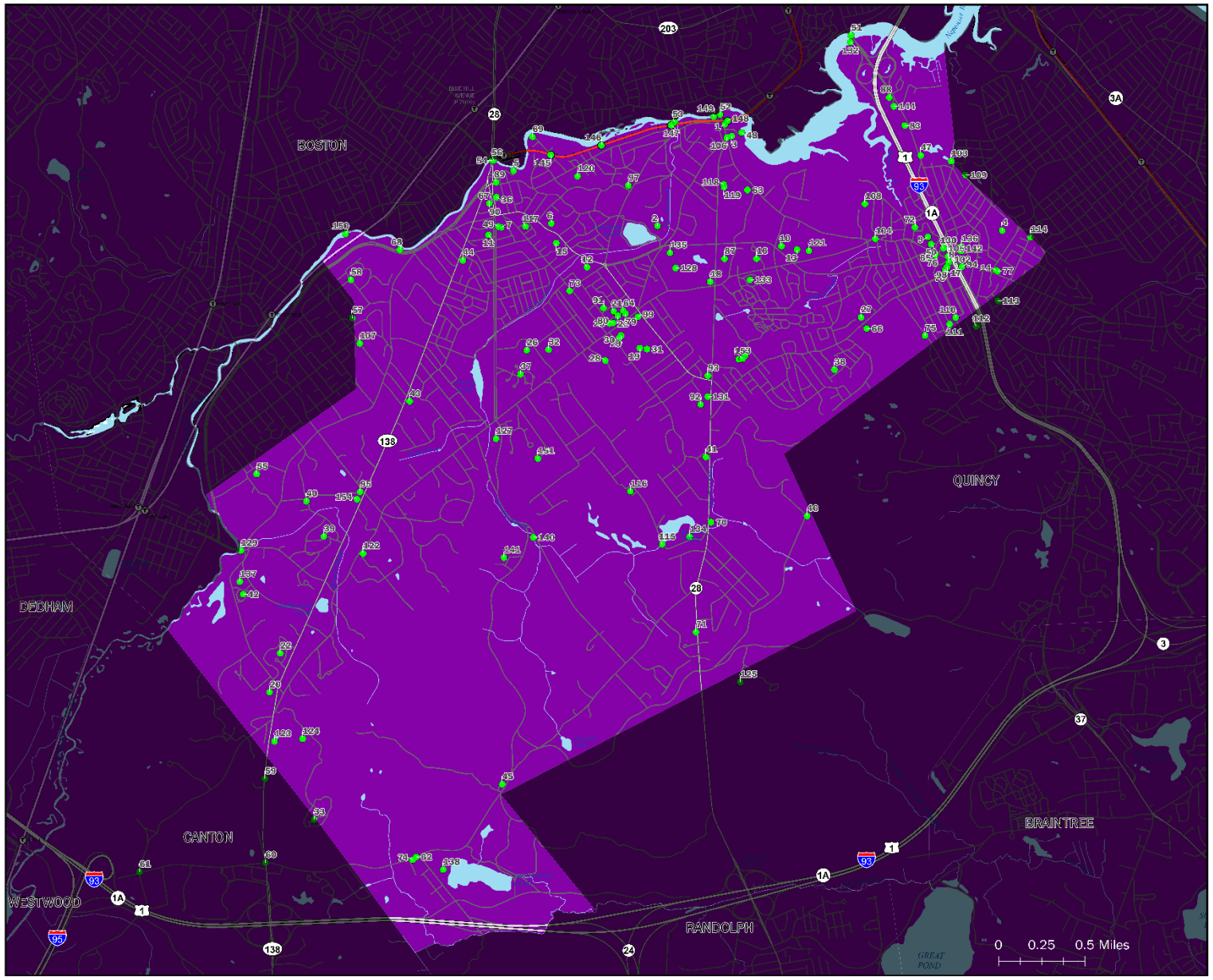
Date: 7/29/2021



FEMA Hazard Mitigation Planning Grant
MILTON, MA

Map 6: Average Snowfall

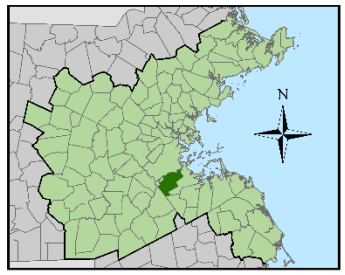
Sites
- Critical Infrastructure Sites*

* See details in separate table

Average Annual Snowfall
- 36.1 to 48.0 inches
- 48.1 to 72.0 inches

- Water Bodies
- Train Stations
- Commuter Rail Lines
- Trains

All Roads
- Interstate
- U.S. Highway
- State Route
- Street



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Data Sources:
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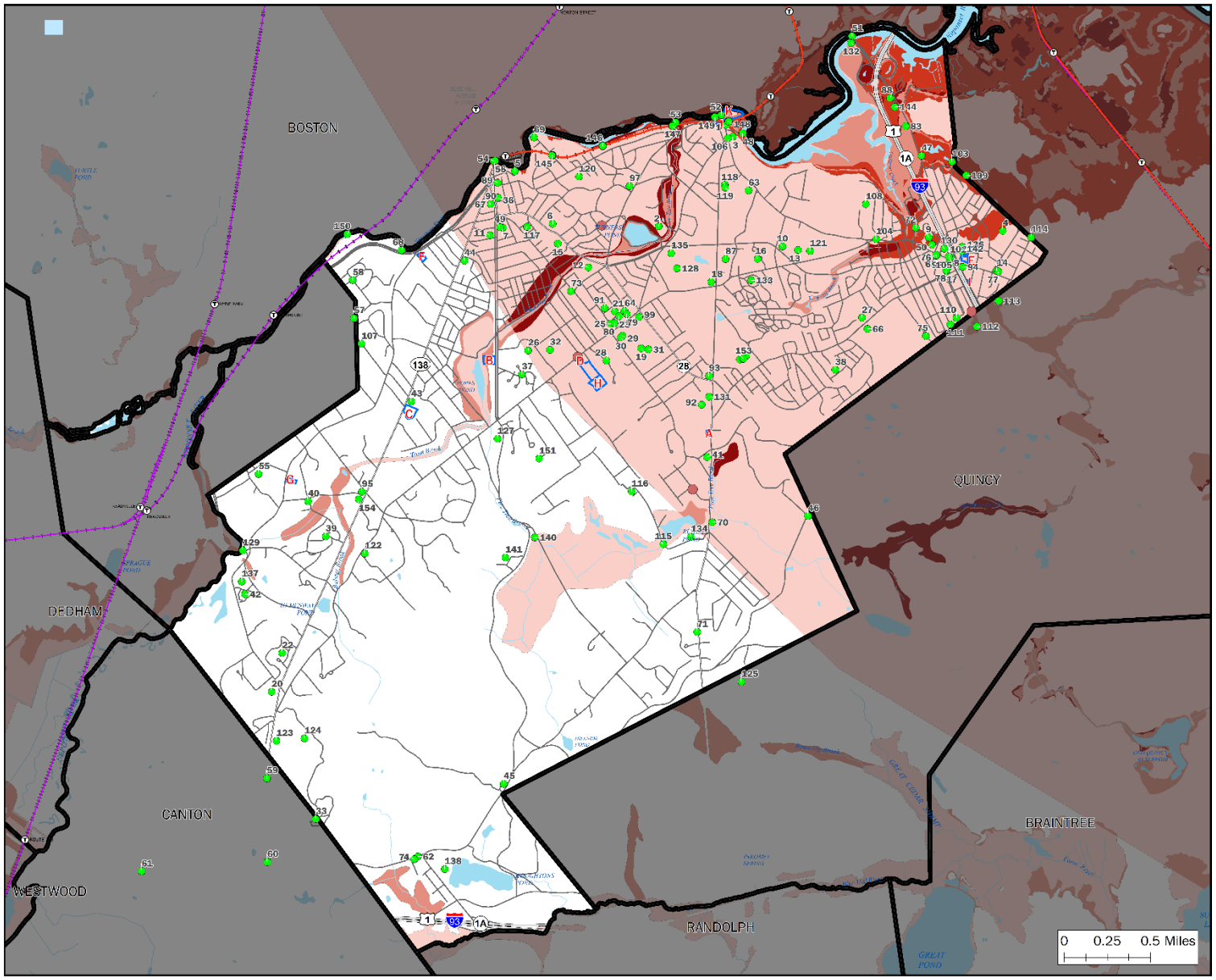
Massachusetts Geographic Information System (MassGIS)
Northeast States Emergency Consortium (NESEC)
Massachusetts Emergency Management Agency (MEMA)
Federal Emergency Management Agency (FEMA)

MILTON, MA

Date: 7/29/2021



MAPC dcr

FEMA Hazard Mitigation Planning Grant

MILTON, MA

Map 7: Composite Natural Hazards

Sites

- Critical Infrastructure
- Repetitive Loss Sites
- Development Areas
  * See details in separate table

Composite Natural Hazards

- Low (2 Hazards)
- Moderate (3 Hazards)
- High (4 Hazards)
- Very High (5 Hazards)

Composite natural hazards shown for areas of existing development. Hazards include:

- 100 year wind speed of 110 MPH or higher
- Moderate landslide risk
- FEMA flood zones (100 year and 500 year)
- Average snowfall of 36.1" or more
- Hurricane surge inundation areas

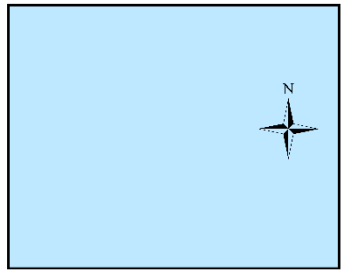
- Water Bodies

All Roads

- Interstate
- U.S. Highway
- State Route
- Street
- Train Stations
- Commuter Rail Lines
- Trains

Subway Lines

- Blue
- Green
- Orange
- Red
- Silver



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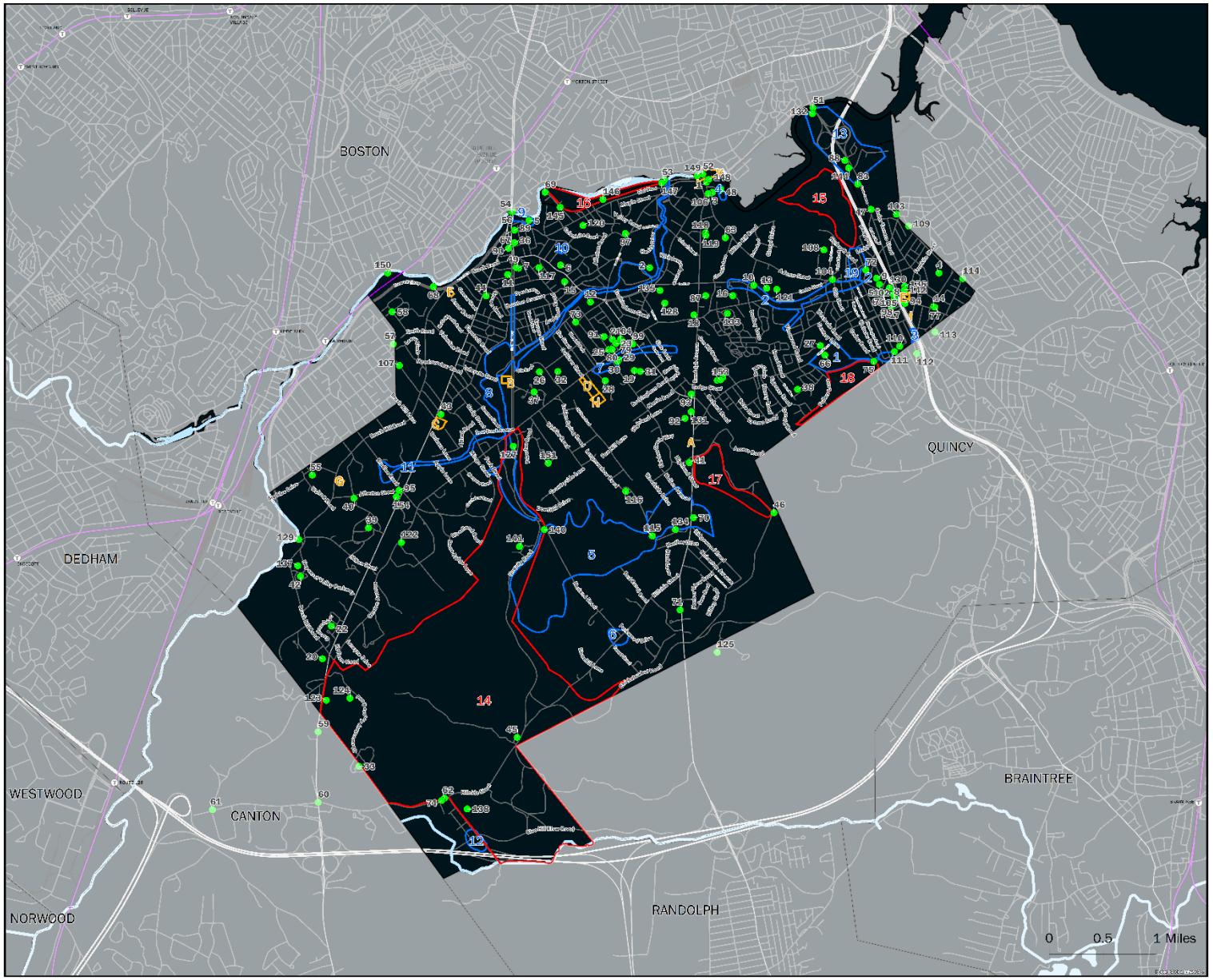
Data Sources

Composite Natural Hazard:
Wind, Landslide Risk, Snow -Northeast States Emergency Consortium (NESEC)
Flood Zones 2013 FEMA/MassGIS
Hurricane Surge - 2013 U.S. Army Corps of Engineers, New England District
Roads/Trains: MassDOT/ CTPS
Repetitive Loss Sites: DCR/Office of Flood Hazard Management
Critical Infrastructure: Metropolitan Area Planning Council (MAPC) /

MILTON, MA

Date: 7/29/2021



FEMA Hazard Mitigation Planning Grant

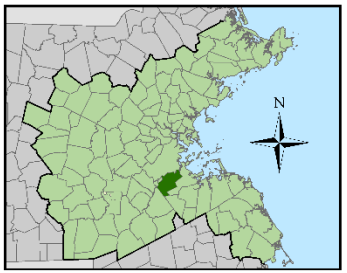
MILTON, MA

Map 8: Local Hazard Areas

Sites
- Critical Infrastructure Sites*
- Repetitive Loss Sites
  * See details in separate table
- Train Stations
- Commuter Rail Lines
- Trains

Locally Identified Hazard Areas
- Brush Fires
- Flooding
- Historic
  * See Section IV Risk Assessment
- Development Sites
  * See details in separate table

All Roads
- Interstate
- U.S. Highway
- State Route
- Street



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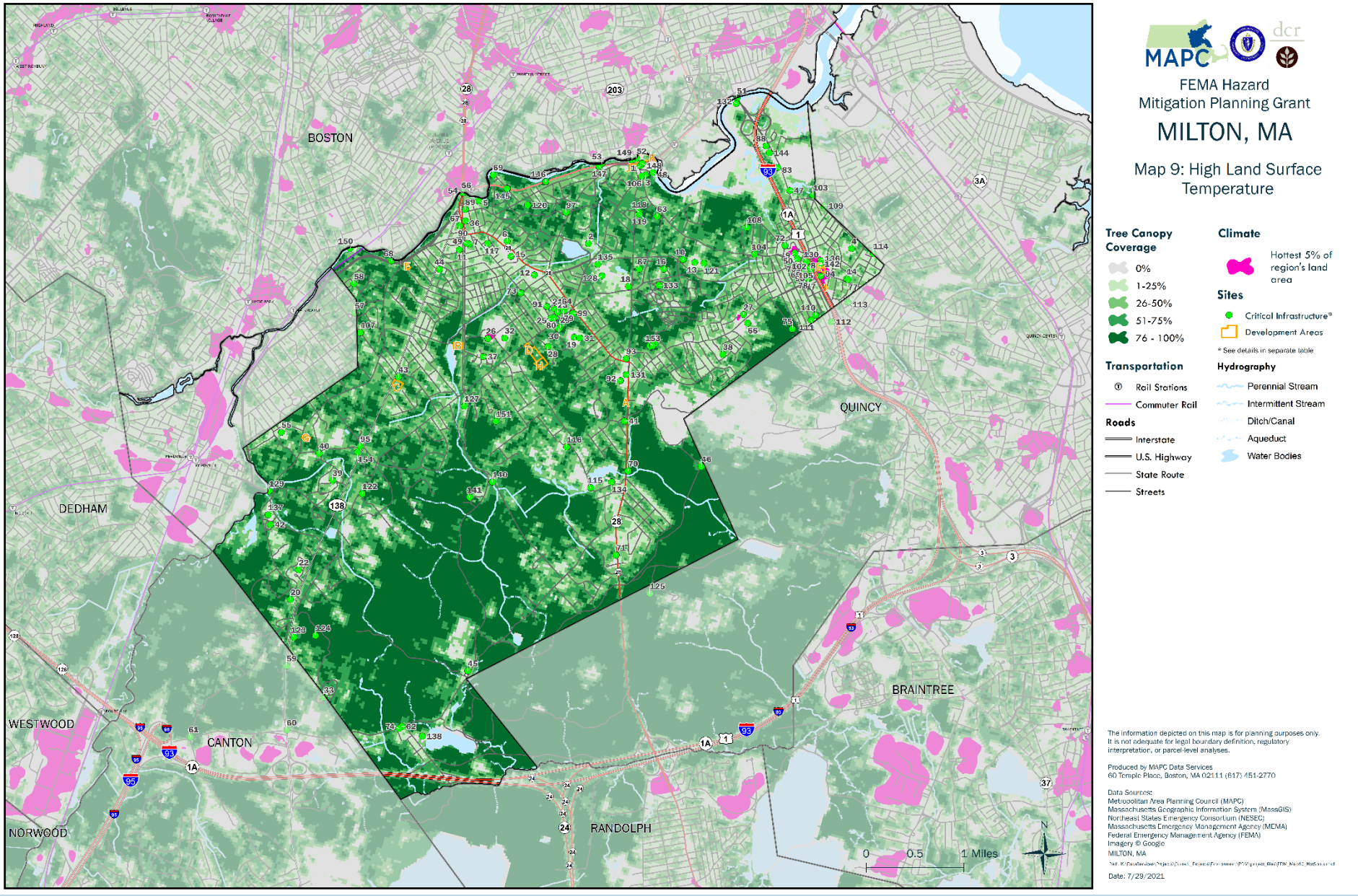
Federal Emergency Management Agency (FEMA)
Imagery © DigitalGlobe, 2015

MILTON, MA
Date: 7/29/2021



MAPC

FEMA Hazard Mitigation Planning Grant

MILTON, MA

Map 9: High Land Surface Temperature

Tree Canopy Coverage
- 0%
- 1-25%
- 26-50%
- 51-75%
- 76 - 100%

Climate
- Hottest 5% of region's land area

Sites
- Critical Infrastructure*
- Development Areas

* See details in separate table

Transportation
- Rail Stations
- Commuter Rail

Roads
- Interstate
- U.S. Highway
- State Route
- Streets

Hydrography
- Perennial Stream
- Intermittent Stream
- Ditch/Canal
- Aqueduct
- Water Bodies

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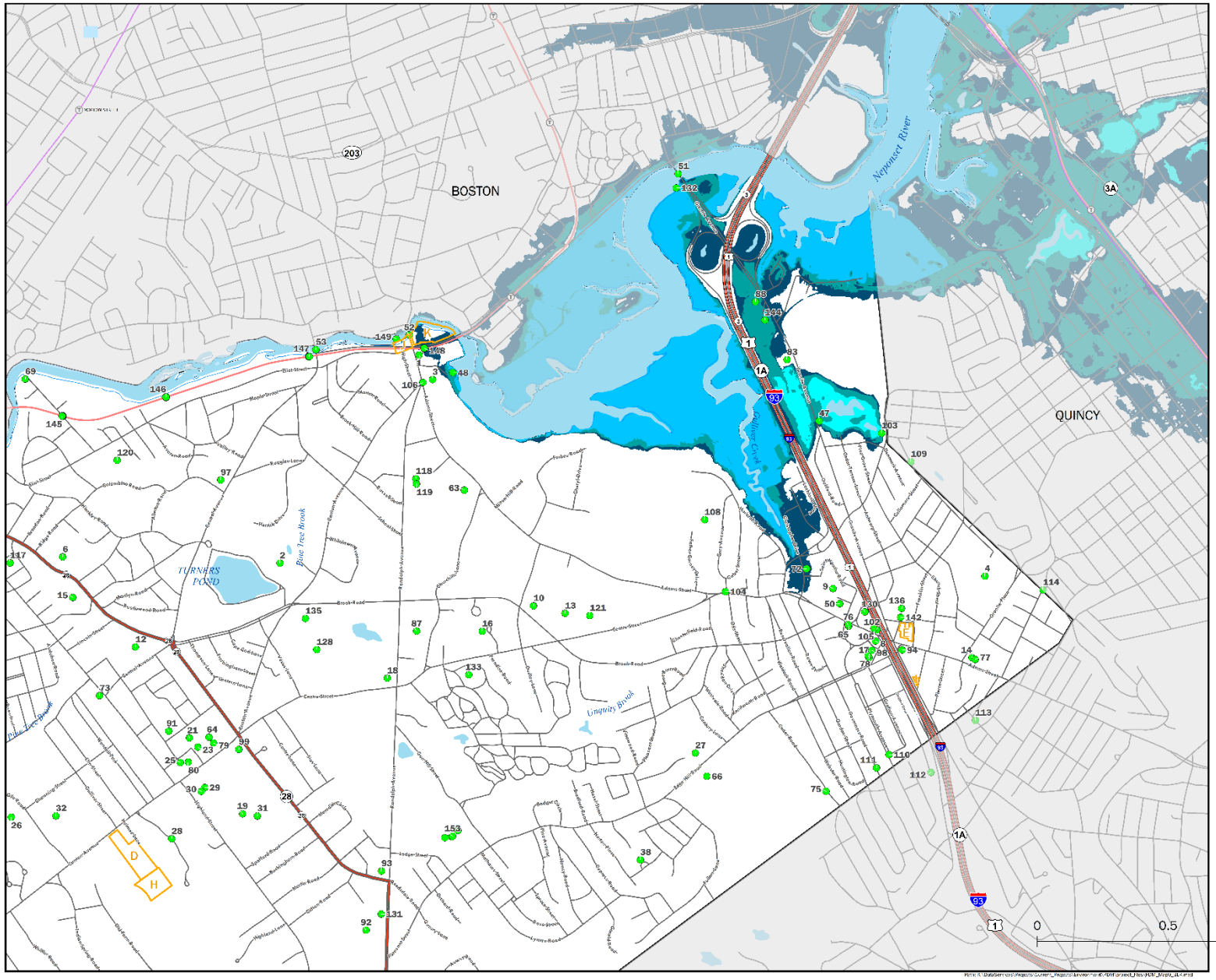
MILTON, MA

Date: 7/29/2021



MAPC

FEMA Hazard Mitigation Planning Grant

MILTON, MA

Map 10: Sea Level Rise

Sites
- Critical Infrastructure Sites*
- Repetitive Loss Sites
- Development Sites

Train Stations
- Commuter Rail Lines
- Trains

Future Coastline
- Sea Level Rise (1 ft.)
- Sea Level Rise (3 ft.)
- Sea Level Rise (6 ft.)
- Sea Level Rise (10 ft.)

All Roads
- Interstate
- U.S. Highway
- State Route
- Street

N

0 0.5 1 Miles

MILTON, MA

Date: 8/2/2021

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Massachusetts Emergency Management Agency (MEMA)
Federal Emergency Management Agency (FEMA)
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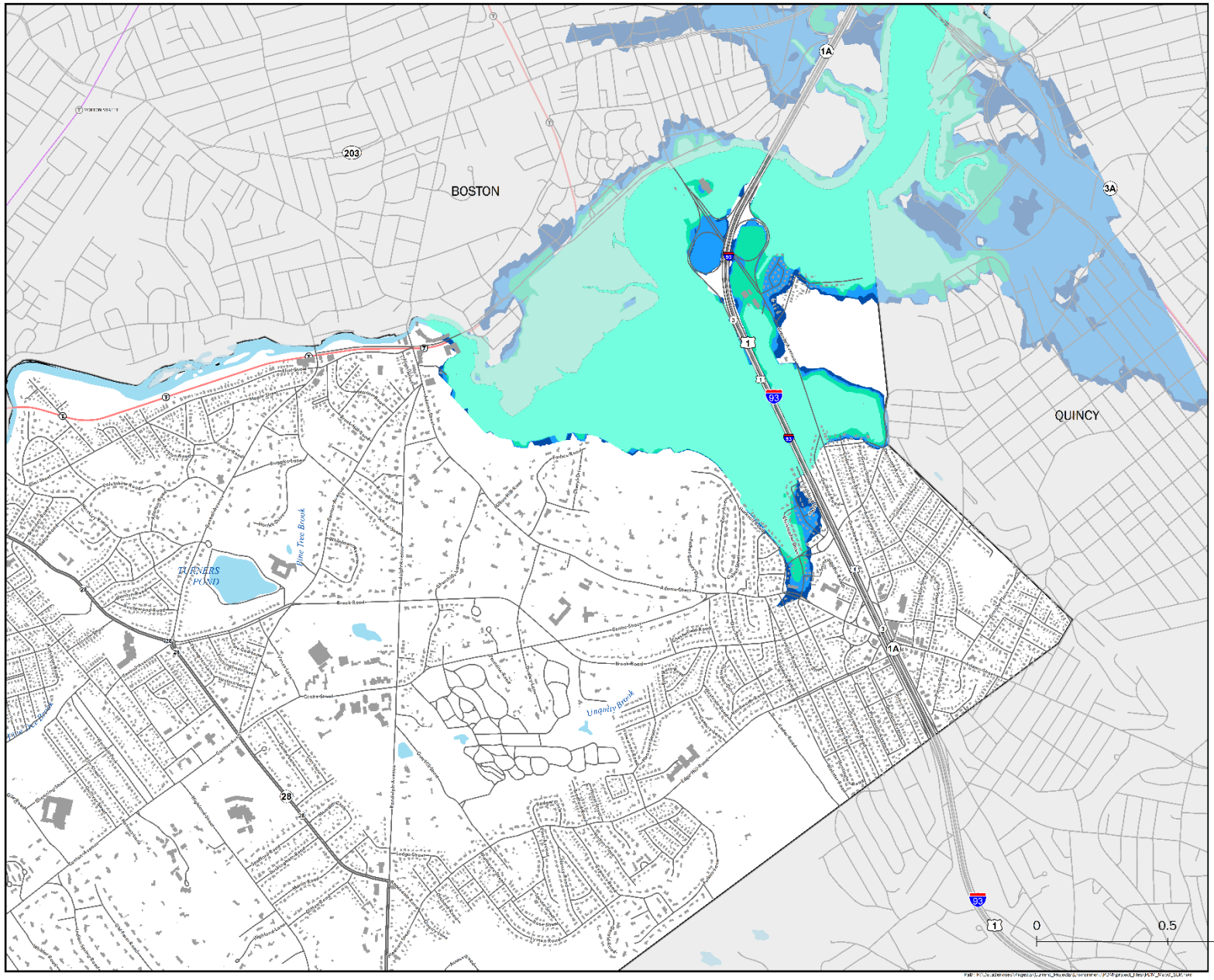


FEMA Hazard Mitigation Planning Grant

MILTON, MA

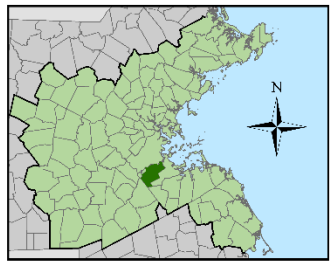
Map 11: Coastal Flooding 1% Storm Floodplains Comparison of Future Predictions

Annual Chance of Coastal Flooding

- Building Roofprints
- Present Mean Sea Level (NAVD88), 1% chance or greater
- 1.2ft Mean Sea Level (NAVD88), 1% chance or greater
- 2.4ft Mean Sea Level (NAVD88), 1% chance or greater
- 4.2ft Mean Sea Level (NAVD88), 1% chance or greater

All Roads

- Interstate
- U.S. Highway
- State Route
- Street



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Massachusetts Emergency Management Agency (MEMA)
Federal Emergency Management Agency (FEMA)
Imagery © Google

0 0.5 1 Miles

MILTON, MA

Date: 8/3/2021

APPENDIX C: PUBLIC MEETINGS

Amanda Linehan, Communications Manager, Metropolitan Area Planning Council
617-933-0705, alinehan@mapc.org

CALENDAR LISTING / MEDIA ADVISORY

MILTON'S DRAFT HAZARD MITIGATION PLAN TO BE PRESENTED AT JUNE 15 PUBLIC MEETING

Meeting to present Milton's Hazard Mitigation Plan and solicit public comments

Who: Milton residents, business owners, representatives of non-profit organizations and institutions, and others who are interested in preventing and reducing damage from natural hazards and future climate change impacts.

What: On Tuesday, June 15 at 7:00 PM, a presentation will be made by the Metropolitan Area Planning Council (MAPC), which is assisting the Town on the development of its Hazard Mitigation Plan update.

The plan identifies natural hazards affecting Milton such as floods, hurricanes, winter storms, and earthquakes, as well as actions that the Town can take to reduce its vulnerability to these hazards. Upon approval of the plan by the Town and by FEMA, Milton will be eligible for hazard mitigation grants.

When: Tuesday, June 15 at 7:00 PM

Where: The meeting will be held virtually on Zoom.

Register in advance with this link:
https://zoom.us/meeting/register/tJwlce6urzMtHtVezC9qufO5YIzY-FiFEaTN

After registering, you will receive a confirmation email with information about joining the meeting.

MAPC is the regional planning agency for 101 communities in the metropolitan Boston area, promoting smart growth and regional collaboration. More information about MAPC is available at www.mapc.org.

##

CLIMATE CHANGE AND NATURAL HAZARDS PUBLIC MEETING

Natural hazards can have serious impacts on the Town of Milton and its residents

The Town of Milton is updating its Hazard Mitigation Plan to prepare for future extreme weather events. The plan will make the Town eligible to apply for funding of priorities identified in the plan.

Have you experienced flooding? Do you have concerns about future climate impacts? Please join us. We are seeking your input.

Date: Tuesday, June 15, 2021
Time: 7:00 PM
Location: Virtual Meeting on Zoom

Register in advance with this link:
https://zoom.us/meeting/register/tJwlce6urzMtHtVezC9qufO5YIzY-FiFEaTN

For more information, please contact Anne Herbst via phone at (617) 933-0781 or email aherbst@mapc.org

Amanda Linehan, Communications Manager, Metropolitan Area Planning Council
617-933-0705, alinehan@mapc.org

CALENDAR LISTING / MEDIA ADVISORY

MILTON'S DRAFT HAZARD MITIGATION PLAN TO BE PRESENTED AT SEPTEMBER 8 PUBLIC MEETING

Meeting to present Milton's Hazard Mitigation Plan and solicit public comments

Who: Milton residents, business owners, representatives of non-profit organizations and institutions, and others who are interested in preventing and reducing damage from natural hazards.

What: At the Milton Select Board meeting on Wednesday, September 8 at 7:00 PM, a presentation will be made by the Metropolitan Area Planning Council (MAPC), which is assisting the Town on the development of its Hazard Mitigation Plan update.

The plan identifies natural hazards affecting Milton such as floods, hurricanes, winter storms, and earthquakes, as well as actions that the Town can take to reduce its vulnerability to these hazards. Upon approval of the plan by the Town and by FEMA, Milton will be eligible for hazard mitigation grants.

When: Wednesday, September 8 at 7:00 PM

Where: The meeting will be held on Zoom. The Zoom link will be posted, with the agenda, at: https://www.townofmilton.org/select-board and broadcast on Local Cable Channel 8

MAPC is the regional planning agency for 101 communities in the metropolitan Boston area, promoting smart growth and regional collaboration. More information about MAPC is available at www.mapc.org.

##

HAZARD MITIGATION PLAN PUBLIC MEETING

Natural hazards can have serious impacts on the Town of Milton and its residents

The Town of Milton has prepared a draft Hazard Mitigation Plan, as well as a Climate Plan, to help the town reduce its vulnerability to natural hazards such as flooding, hurricanes, and winter storms. Please join the Select Board for a public presentation of the Hazard Mitigation Plan. Your questions and suggestions for the draft plan are welcome, please join us!

Date: September 8, 2021
Time: 7:00 p.m.
Location: Zoom
Launch Meeting - Zoom

For more information, please contact Anne Herbst at (617) 933-0781 or email aherbst@mapc.org.

PUBLIC MEETING NOTICE
OFFICE OF THE MILTON TOWN CLERK

In conformity with the provisions of Chapter 30A, §20, Massachusetts General Laws, I hereby file notice that a meeting of the:

BOARD/COMMITTEE: Select Board

DATE: Wednesday, September 8th, 2021 TIME: 7:00 PM

ZOOM LINK:

https://us02web.zoom.us/j/96653229852?pwd=Um9Ydk9pUjFJNFhNaERZbnR3SlpLUT09

DIAL IN #: 1-929-205-6099

MEETING ID: 966 5322 9852 PASSCODE: 822961

NOTE Notices and lists of topics are to be posted 48 hours in advance of the meetings **excluding** Saturdays, Sundays, and legal holidays. Please keep in mind the hours of operation of the Office of the Town Clerk and make the necessary arrangements to be sure your posting is made in an adequate amount of time **one hour prior to the closing** of the Town Clerk Office. The timestamp on this document may be up to 15 minutes earlier than what is posted on the website. The Website timestamp is the official posting time of a meeting.

Susan M Galvin 09/03/2021 11:47 am

Posting Authority

AGENDA

(Must be included at time of posting)

(Conducted pursuant to Chapter 20 of the Acts of 2021, "An Act Relative to Extending Certain Covid-19 Measures adopted during the State of Emergency." This Act signed by Governor Baker on June 16, 2021 includes an extension of the remote meeting provisions, until April 1, 2022.)

1. Call to Order
2. Pledge of Allegiance
3. Public Comment
4. COVID19 Update
5. Discussion/Approval – Request of Town Moderator to Conduct October 25, 2021 Special Town Meeting remotely
6. Presentation and Discussion - Mixed-use commercial and residential development at 426-440 Granite Avenue
7. Discussion/Vote on Equity and Justice Committee Proposal for DE&I Policy
8. Discussion/Vote on new Equity and Justice Committee Members
9. Discussion/Approval – Presentation of the Milton Hazard Mitigation Plan, 2021 Update
10. Discussion/Approval - Massachusetts Housing Partnership (MHP) 40B Technical Assistance Grant Program for Milton, Multiple Projects Phase II.
11. Discussion and Possible Determination by the Select Board that 41 Wharf Street is a Unique Property pursuant to M.G.L. c. 30B, § 16(e)(2)
12. Finance Committee Report

a. American Rescue Plan Act (ARPA) Approval of Public Works Department's request for funding for Water Main Improvement Project W-21-1 ($1,000,000)
b. Coronavirus Aid Relief and Economic Security Act (CARES) Approval of remaining

APPENDIX D: PLAN ADOPTION

MICHAEL D. DENNEHY
TOWN ADMINISTRATOR

COMMONWEALTH OF MASSACHUSETTS
TOWN OF MILTON
OFFICE OF THE SELECT BOARD
525 CANTON AVENUE, MILTON, MA 02186
TEL 617-898-4843
FAX 617-698-6741

SELECT BOARD
KATHLEEN M. CONLON
CHAIR
ARTHUR J. DOYLE
VICE CHAIR
MICHAEL F. ZULLAS
SECRETARY
MELINDA A. COLLINS
MEMBER
RICHARD G. WELLS, JR.
MEMBER

CERTIFICATE OF ADOPTION
SELECT BOARD

TOWN OF MILTON, MASSACHUSETTS

A RESOLUTION ADOPTING THE
TOWN OF MILTON HAZARD MITIGATION PLAN 2021 UPDATE

WHEREAS, the Town of Milton established a Committee to prepare the *Town of Milton Hazard Mitigation Plan 2021 Update*; and

WHEREAS, the *Town of Milton Hazard Mitigation Plan 2021 Update* contains several potential future projects to mitigate potential impacts from natural hazards in the Town of Milton, and

WHEREAS, duly noticed public meetings were held by the LOCAL HAZARD MITIGATION PLANNING TEAM on June 15, 2021, and September 8, 2021, and

WHEREAS, the Town of Milton authorizes responsible departments and/or agencies to execute their responsibilities demonstrated in the plan, and

NOW, THEREFORE BE IT RESOLVED that the Town of Milton Select Board adopts the *Town of Milton Hazard Mitigation Plan 2021 Update*, in accordance with M.G.L. 40 §4 or the charter and bylaws of the Town of Milton.

Adopted and Signed, this 22nd day of December

Michael Dennehy, Town Administrator

APPENDIX E: MVP WORKSHOP RESULTS

The following five actions that were identified as top priorities for Milton. The numbers in parenthesis indicate the number of votes received.

- Communication plan that ensures ability to reach all residents (13)
- Assess and upgrade culverts, ensuring they are appropriately sized (6)
- Complete a feasibility study of microgrid power and renewable energy options for the town (5)
- Risk assessment of neighborhoods impacted by flooding (5)
- Dam removal for ecological restoration (5)

Below are the top actions identified by each group, organized by priority:
Infrastructure:

- Assess and upgrade culverts, ensuring they are appropriately sized (6)
- Complete a feasibility study of microgrid power and renewable energy options for the town (5)
- Develop a nursery program that partners with schools to care for and plant trees (4)
- Conduct a drinking water vulnerability assessment

Societal:

- Communication plan that ensures ability to reach all residents (13)
- Implementation and promotion of Smart 911 (2)
- Establish communication standards and strategy
- Identify/survey senior citizen population and develop communication/outreach strategies

Environmental:

- Risk assessment of neighborhoods impacted by flooding (5)
- Dam removal for ecological restoration (5)
- Education around smart tree planting (i.e. native, drought-resistant) and maintenance best practices (4)
- Coordination with state on Blue Hills Reservation management planning/risk assessment (1)

Priority Next Steps:
Action: Conduct a culvert assessment, ensuring they are appropriately sized. Work with various partners to identify, prioritize, and address culvert and stormwater infrastructure maintenance needs based on age, quality, and capacity.

Action: Communication plan that ensures ability to reach all residents. Develop a communication plan that leverages pre-existing communication channels, ensures web accessibility, and includes low-tech strategies to maximize reach to all populations.

Action: Conduct a risk assessment for neighborhoods impacted by flooding. Conduct a thorough risk assessment of neighborhoods impacted by flooding with special attention to areas with a high concentration of vulnerable populations.