TOWN OF WEYMOUTH
HAZARD MITIGATION PLAN
2021 UPDATE

Wessagusset Beach & George Lane Beach

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

Final Plan
Adopted by the Town
November 29, 2021

ACKNOWLEDGEMENTS & CREDITS

This plan was prepared for the Town of Weymouth 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 Weymouth Local Hazard Mitigation Planning Team, composed of staff from a number of different town departments. the team met on February 4, 2021, March 9, 2021, and August 11, 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 on July 29, 2021, was held via Zoom. The second meeting was held before the Planning Board on September 14, 2121and 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 Weymouth 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 Weymouth Local Hazard Mitigation Planning Team identified 134 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 Weymouth estimates property damages from Hurricanes of category 2 and 4 ($64 million to $246 million), earthquakes of magnitudes 5 and 7 ($935 million to $7 billion), and the 1% and .2% chance of flooding ($112 to $141 million).

HAZARD MITIGATION GOALS

The Weymouth Local Multiple Hazard Community Planning Team endorsed the following ten hazard mitigation goals at the March 9, 2021, team meeting. The team added a tenth goal focused on incorporating future climate change projections.

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

HAZARD MITIGATION STRATEGY

The Weymouth 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 Weymouth 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 Weymouth's Hazard Mitigation Plan 2020 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 Planning 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 Weymouth 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 2015 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 2015 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, Weymouth made excellent progress implementing mitigation measures identified in the 2015 Hazard Mitigation Plan. Four priority drainage projects were completed. These include drainage improvements at Puritan Road and Derby Street, and sluice and slide gate projects at Great Esker Park and Whitman's Pond Dam. Partially completed projects include coastal flooding work completed at Fore River Avenue and in progress at Fort Point Road. Flooding at Paomet Road was reduced, although work remains to be done. In addition, Weymouth received a grant from FEMA to elevate 5 homes; that work is underway. Weymouth also developed and now implements a plan for debris removal and disposal after major storms. Finally, although not listed in the 2015 plan, Weymouth reconstructed the Great Pond Dam, upgraded the sluice gate, and enlarged a culvert. This was a significant drainage project for the Town.

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 Weymouth 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 Weymouth 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 2015.

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 **Error! Reference source not found.** 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

Disaster Name	Date of Event	Declared Areas
Severe winter storm and flooding	March 2018	Barnstable, Bristol, Essex, Nantucket, Norfolk, Plymouth
Severe winter storm and Snowstorm	March 2018	Essex, Middlesex, Norfolk, Suffolk, Worcester

Source: MA Hazard Mitigation and Climate Adaptation Plan, 2018

FEMA FUNDED MITIGATION PROJECTS

Over the last 20 years the Town of Weymouth has received funding from FEMA for six mitigation projects under the Hazard Mitigation Grant Program (HMGP). These projects totaled $1,676,028 with $1,002,733 covered by FEMA grants and $416,984 by local funding. The projects are summarized in Table 3 below.

Table 3: FEMA-Funded Mitigation Projects

Project Title	Scope of Work	Total Cost	Federal Funding	Local Funding
Wituwamat Rd/Wessagusset Rd. Flood Mitigation Study	Study flood problems at Wessagusset and Witawamut Rd and determination of priority projects to mitigate flooding	$25,000	$18,750	$6,250
Wessagussett Road drainage improvements	Replace 10 structures and existing drain lines	$341,695	$256, 721	$85,424
Wessagussett drainage improvements	Install flapper valve, retrofit manhole	$59,565	$46,697	$12,868
Fort Point Road Home Elevations	Elevate 5 homes	$1,230,768	$923,076	$307,692
Hazard Mitigation Plan	Update Hazard Mitigation Plan	$19,000	$14,250	$4,750

(Source: database provided by MEMA)

COMMUNITY PROFILE

Weymouth is the second oldest town in the Commonwealth, behind Plymouth, and the site of the first town meeting. Established in 1622 and incorporated in 1635, the town was a fishing and agricultural community for almost two hundred years. Today, Weymouth is primarily a residential suburb of Quincy and Boston with a population of 57,746. As a coastal community, Weymouth

provides many recreational activities. The town offers an extensive program in water safety and swimming instruction at George Lane Beach, and boaters enjoy the waters of Quincy and Hingham Bays. Weymouth is located in eastern Massachusetts, 12 miles southeast of Boston and 42 miles northeast of Providence.

The Town of Weymouth is governed by a city form of government with a Mayor and a Town Council. It is one of fourteen communities in the Commonwealth with this form of government that is still formerly known as a Town. Weymouth is served by Routes 3, 18 & 53. It also enjoys commuter rail access to Boston. The town maintains a website at http://www.weymouth.ma.us/

Table 4: Weymouth Characteristics

Population: 57,746 people

- 5% are under age 5
- 18% are under age 18
- 18% are over age 65
- 84% of the population is White
- 6% of the population is Black
- 7% of the population is Asian

- 5.5% of households have no vehicle available

Number of Housing Units = 24,363

- 33.4% are renter-occupied housing units
- 27.8% of owner-occupied units are cost-burdened
- 50.7% of renter-occupied units are cost-burdened

Source: 2018 American Community Survey

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

- Weymouth 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.
- Records from flooding in 2010 highlight that flood damage was widespread across the town. Flooding from 2010 resulted in 615 disaster claims, 99% of the claims were *outside* the Special Flood Hazard Zone.
- Weymouth is subject to both coastal and inland flooding. Coastal flooding impacts roads and can isolate coastal locations in Weymouth.
- Drought is a concern due to limits on water supply affecting future development and firefighting, as well as for natural resource impacts.

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:

    - Weymouth Zoning Ordinance
    - Town of Weymouth Community Resilience Building Workshop Summary of Findings 2018
    - Town of Weymouth Open Space and Recreation Plan 2020
    - Blue Hill Observatory
    - Boston HIRA
    - FEMA, Flood Insurance Rate Maps for Norfolk County, MA, 2012
    - FEMA Flood Insurance Preliminary Rate Maps for Weymouth, MA 6/19/2020
    - 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.

2015 PLAN IMPLEMENTATION & MAINTENANCE

The 2015 Town of Weymouth 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 excellent progress has been made on implementation of the measures. Four priority drainage projects were completed. These include drainage improvements at Puritan Road and Derby Street, and sluice and slide gate projects at Great Esker Park and Whitman's Pond Dam. Partially completed projects include coastal flooding work completed at Fore River Avenue and in progress at Fort Point Road. Flooding at Paomet Road was reduced, although work remains to be done. In addition, Weymouth received a grant from FEMA to elevate 5 homes; that work is underway. Weymouth also developed and now implements a plan for debris removal and disposal after major storms.

THE LOCAL MULTIPLE HAZARD COMMUNITY PLANNING TEAM

MAPC worked with the local community representatives to organize a Local Hazard Mitigation Planning Team for Weymouth. 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.

Robert Luongo	Director, Planning and Community Development
Mary Ellen Schloss	Conservation Administrator

Eric Schneider	Principal Planner
Andrew Hultin	Assistant Conservation Administrator
John Mulveyhill	Director Emergency Management/Civil Defense
James McGrath	Assistant Town Engineer
Jeffrey Richards	Director, Department of Municipal Licenses and Inspections
Frank Singleton	Vice Chair, Conservation Commission, member MVP Core Team
James St. Croix	Lt. Police Department
Thomas Still	Deputy Fire Chief
Dennis Keohane	Weymouth Chamber of Commerce
Christine Howe	Grants and Procurement
Kate Marshall	Planner

The Weymouth Planning Board and Conservation Commission are the primary entities responsible for regulating development in town. Feedback was assured through the participation of the Conservation Administrator, Assistant Conservation Administrator, and the Director of Planning and Community Development. In addition, MAPC, the State-designated regional planning authority for Weymouth, 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 4, 2021, March 9, 2021and August 11, 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 2015 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 Weymouth hazard mitigation planning process during a public meeting held on July 29, 2021, on Zoom. The draft plan update was

presented at a Planning Board meeting on September 14, 2021. The meeting was broadcast on local cable television. 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: Weymouth Public Meetings

Meeting #1 July 29,2021 (virtual)
Total Attendance: 27
Meeting #2 September 14, 2021
Total Attendance: Planning Board, 5 team members, 10 members of the public

LOCAL STAKEHOLDER INVOLVEMENT

The local Hazard Mitigation Planning Team was encouraged to reach 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:

- Weymouth Chamber of Commerce
- South Shore Chamber of Commerce
- North Weymouth Civic Association
- Back River Watershed Association
- Weymouth-Braintree Regional Recreation Conservation District
- Idlewell Neighborhood Association
- North-South Rivers Watershed Association
- Pond Plain Improvement Association
- Whitman's Pond Association
- Southfield Residents Association
- Southfield Redevelopment Authority
- Fore River Watershed Association
- East Weymouth Neighborhood Association
- Weymouth Town Councilors
- Town of Braintree
- Town of Holbrook
- Town of Abington
- Town of Rockland
- Town of Hingham
- City of Quincy

See Appendix C for public meeting notices. The draft Weymouth 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 sea level rise projections with commenters noting that the plan should incorporate increasing projections for sea level rise. One commenter suggested the town develop an action plan for sea level rise and asked whether Weymouth's emergency evacuation plan contemplates superstorm events. Facilities of concern included a sewer pumping station, an electric substation, and the Enbridge compressor facility. Locations identified included the area surrounding Pratts Meadow, and Neck Street for the potential for cutting off access to seaward locations. Pratt's Meadow was identified as an area where land conservation would be beneficial. Open space protection for water quality and quantity was also recommended. Commenters also expressed concern about the potential for flooding of industrial facilities and the subsequent release of hazardous waste. Another concern noted by several participants related to drought and its impacts on water supply and natural resources, particularly fisheries. Commenters specifically noted the challenges of housing and Union Point development on Weymouth's water resources. A couple of commenters expressed support for nature-based solutions such as oyster beds and eel grass on the shoreline, and bioswales and rain gardens inland. Support was expressed for a stormwater utility, and for dam removal. It was noted that the state has released new mapping of environmental justice populations and the town was encouraged to prioritize these communities in their planning. Appreciation was expressed for town drainage projects in the Back River watershed, and for the activities of the Emergency Management Team. A commenter expressed concern, and support for town efforts to remove hazard impacts from the Back River ACEC. Finally, the criticality of the electrical utilities and the need to encourage their participation in climate planning was emphasized.

Comments at the second meeting included support for adopting a stormwater utility in order to provide needed financial resources. A commenter asked whether the town is starting to consider strategic retreat options in light of sea level rise and mapping for the Mill Cover area. Specific concerns about potential needed flood control work in the Weymouth-Braintree Conservation Recreation District were brought to the attention of the town. One commenter expressed appreciation for the efforts of the Mayor and the administration in advancing important stormwater projects.

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 4, 2021	Meeting of the Weymouth Local Hazard Mitigation team
March 9, 2021	Meeting of the Weymouth Local Hazard Mitigation team
July 29, 2021	First Public Meeting held virtually
August 11, 2021	Meeting of the Weymouth Local Hazard Mitigation Team
September 14, 2021	Second Public Meeting with the Weymouth Planning Board
October 1, 2021	Draft Plan Update submitted to MEMA
October 27, 2021	Draft Plan Update submitted to FEMA
November 18, 2021	Notice of Approvable Pending Adoption sent by FEMA
November 19, 2021	Plan Adopted by the Town of Weymouth
November 29, 2021	FEMA final approval of the plan for 5 years

POST-APPROVAL IMPLEMANTATION AND PLAN UPDATE TIMELINE

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

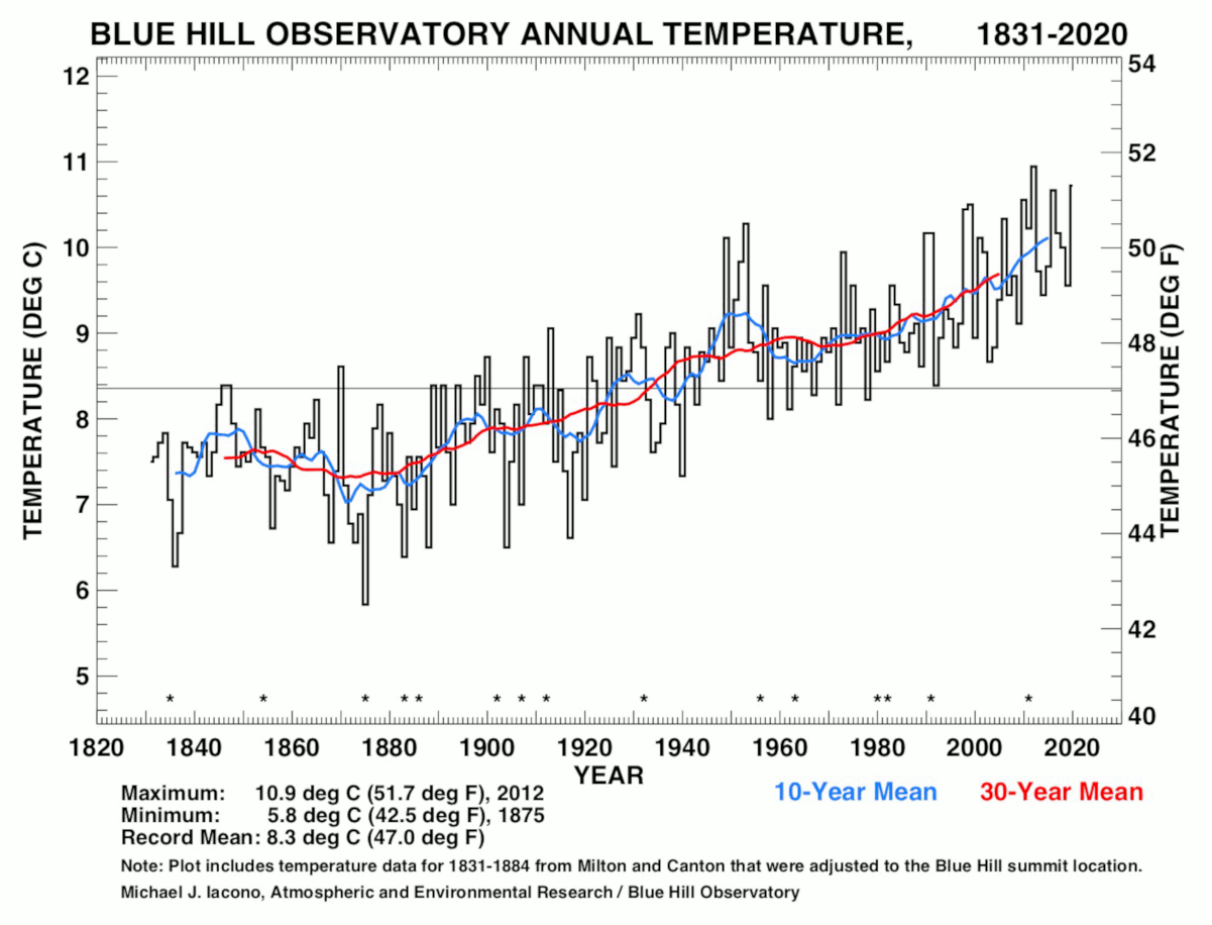
Climate change observations come from a variety of data sources that have measured and recorded changes in recent decades and centuries. Climate change projections, however, predict future climate impacts and, by their nature, cannot be observed or measured. As a result of the inherent uncertainty in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

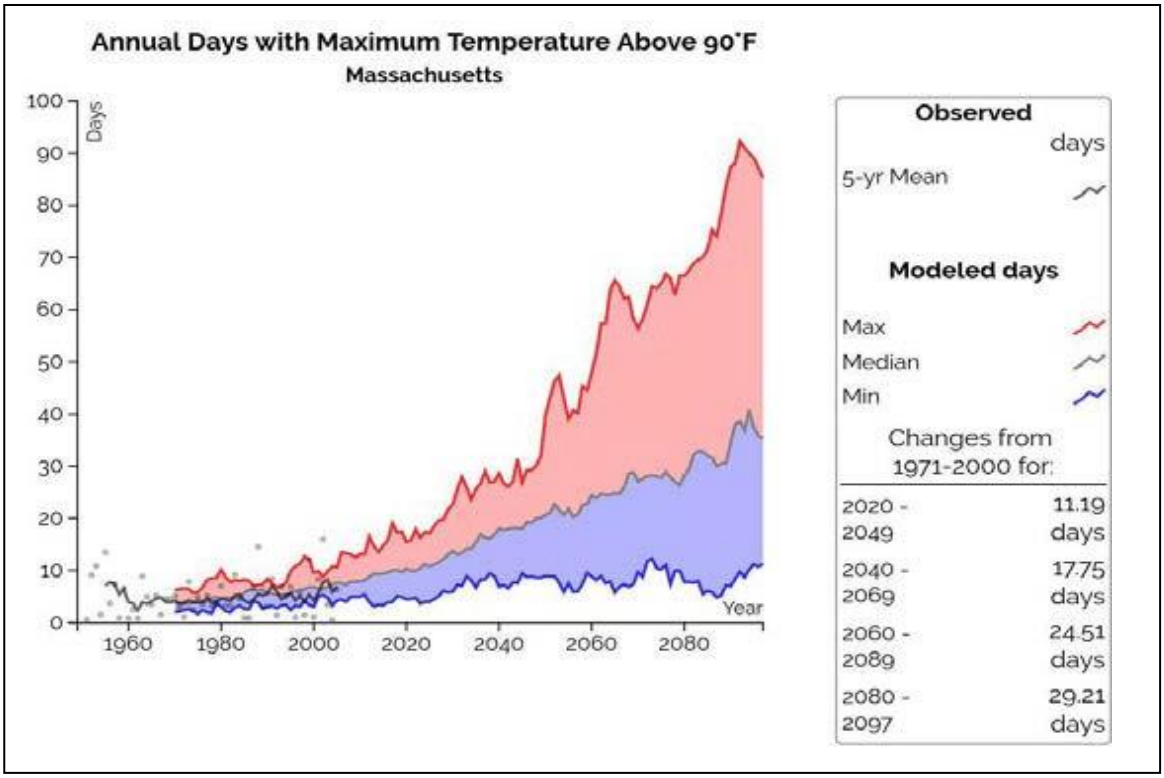
Records from the Blue Hill Observatory in Milton, MA show that average temperatures (30-year mean) have risen approximately 3 degrees (F) in the almost 200 years since record keeping began in 1831.

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



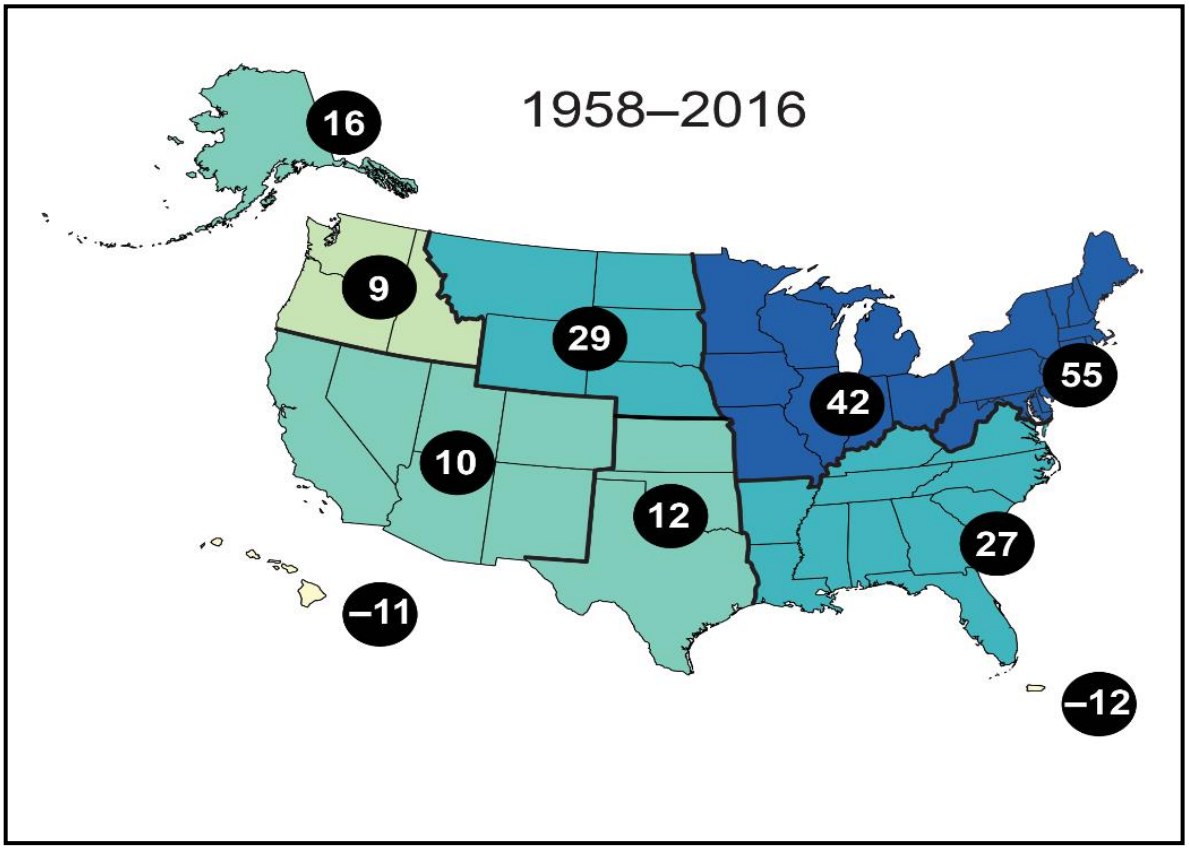
Source: Northeast Climate Adaptation Science Center

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

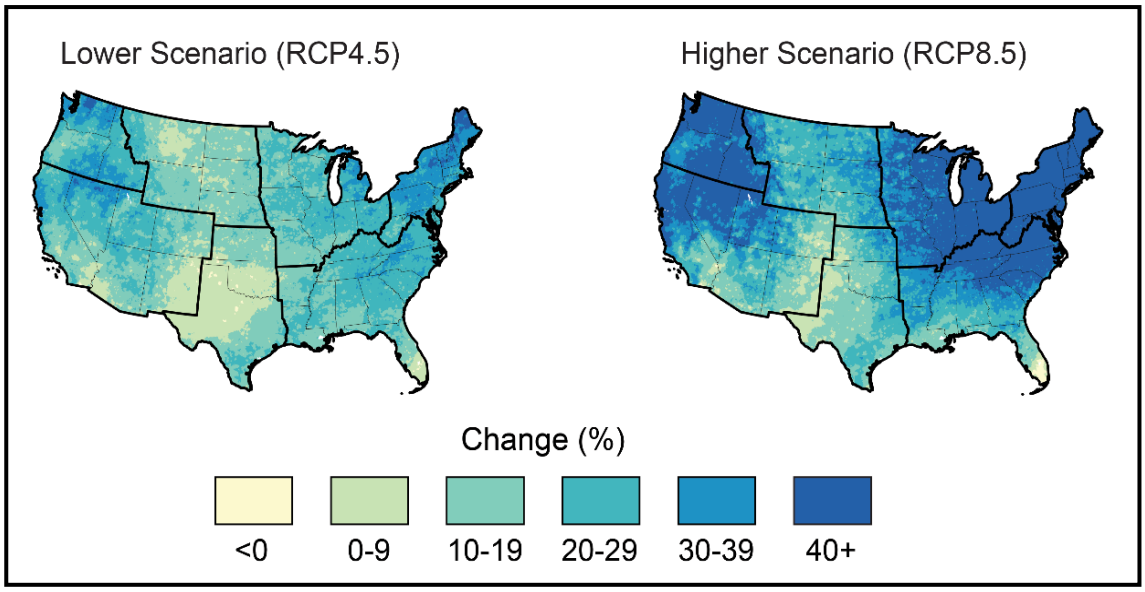


Source: Fourth National Climate Assessment, 2018

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

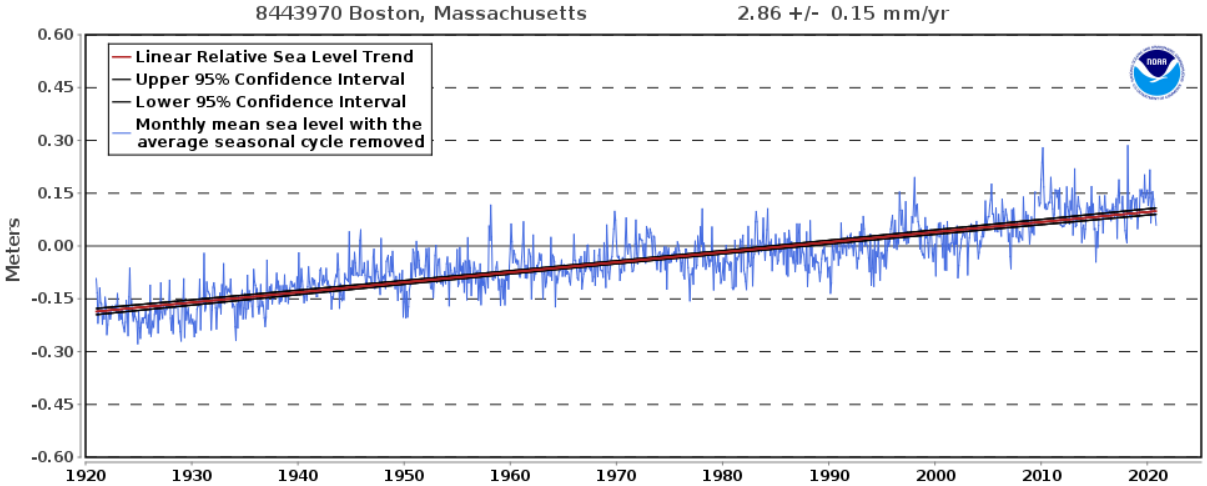


Source: Fourth National Climate Assessment, 2018

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.

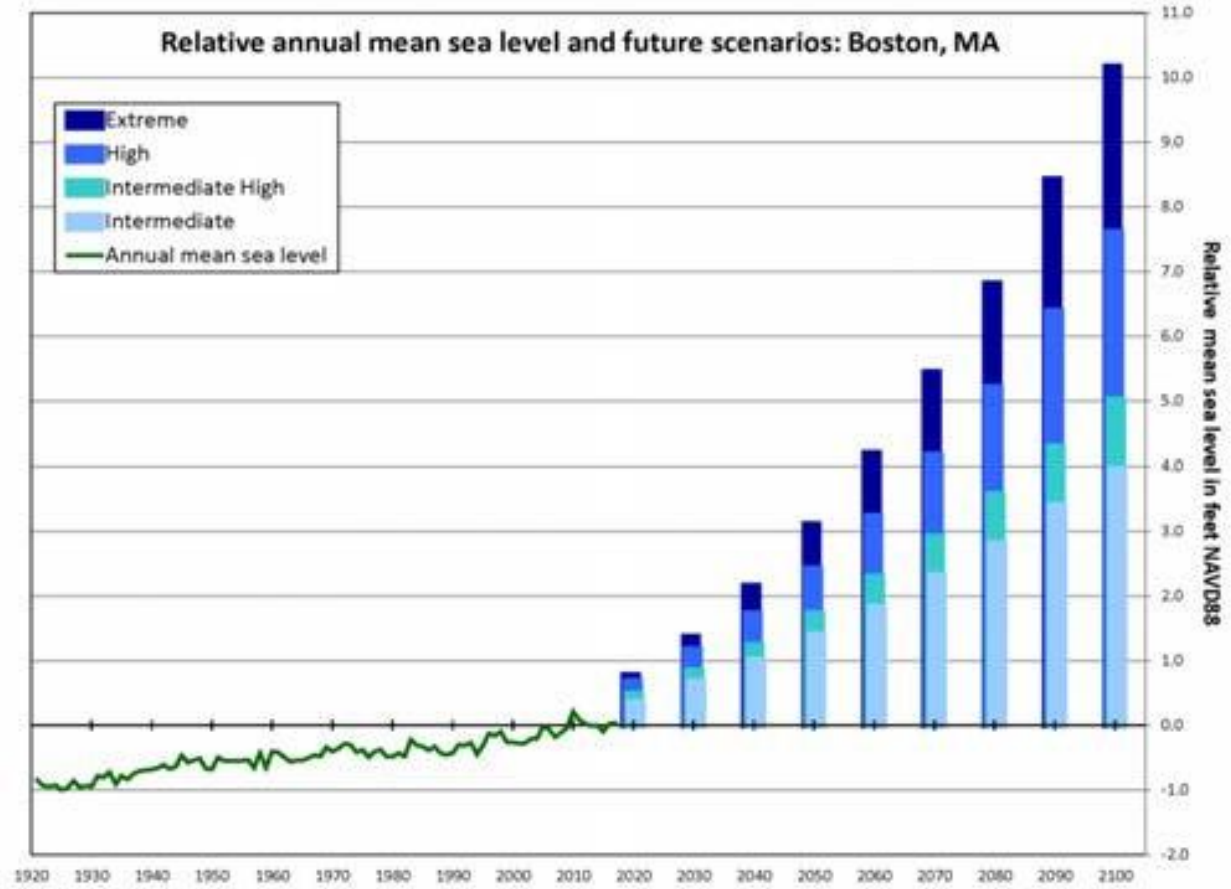
Figure 6: Observed Increase in Sea Level Rise



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 Weymouth 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 Weymouth. The Massachusetts frequency assessment is based on data in the SHMCAP. The Weymouth 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	Weymouth
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)	Periodic in limited locations***
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	Annual occurrences***
Invasives	Increasing	Increasing***
Hurricane/Tropical Storm	One storm every two years	1 tropical storm in 1888
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

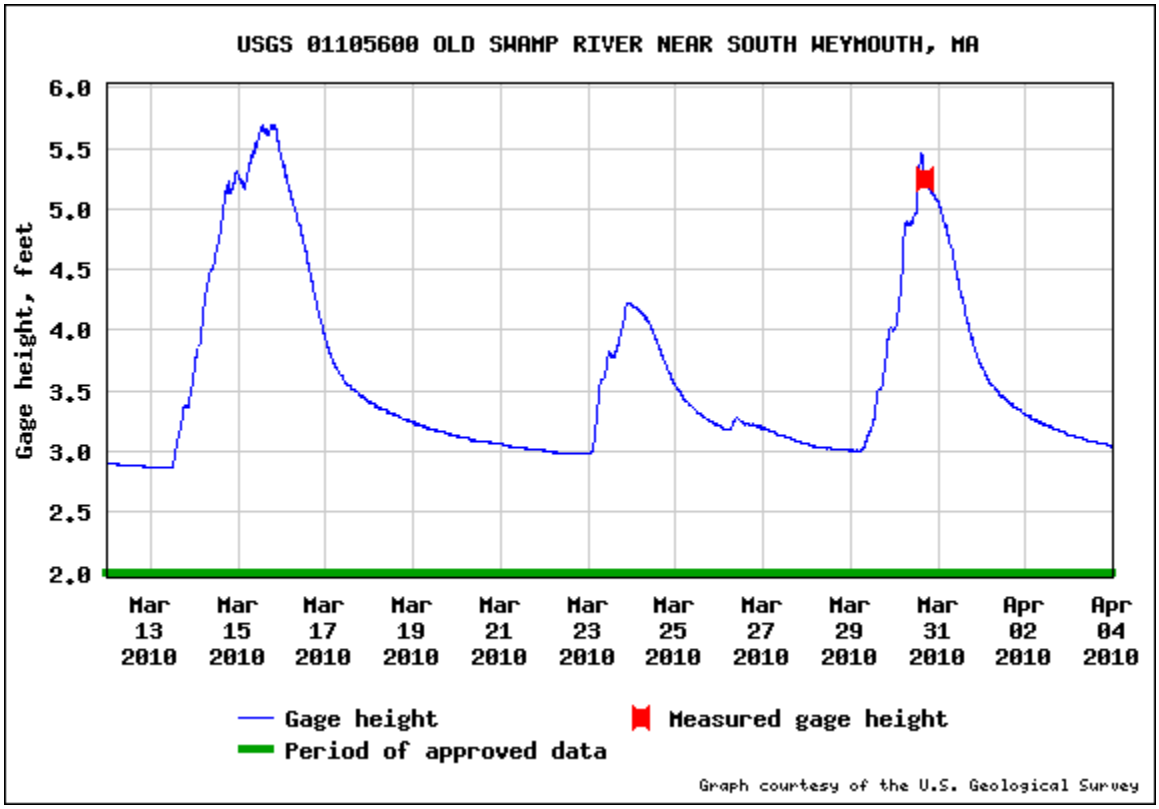
INLAND FLOODING

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 Weymouth. The Town of Weymouth is subject to two kinds of flooding; coastal flooding (discussed further under Sea Level Rise) where wind and tide leads to flooding along the shore and tidal waterways 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. Inland flooding is significant and widespread across Weymouth.

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, Weymouth experienced extensive flood damage, with eight flood insurance claim and 615 disaster claims, 99% of which were located *outside* of FEMA Special Flood Hazard Areas. The claims are widespread across Weymouth. See Map 3 in Appendix B for claim locations.

Figure 8: March 2010 USGS Old Swamp River Gage



Local data for previous flooding occurrences are not collected by the Town of Weymouth. The best available local data is for Norfolk County through the National Climatic Data Center. Norfolk County, which includes the Town of Weymouth, 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
08/15/2012	0	0	0.00K

Date	Deaths	Injuries	Property Damage
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 Weymouth 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.

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

Table 9: Status of Dams in Weymouth

Dam Name	River	Owner	Hazard Classification
Iron Hill Dam	Weymouth Back River	Weymouth DPW	High Hazard
Whitman's Pond Dam	Weymouth Back River	Weymouth DPW	High Hazard
Great Pond Dam	Tributary to Mill River	Weymouth DPW	Significant Hazard
Weymouth Herring Run Wall	Iron Stone Overflow Outlet	Weymouth DPW	NA
Smelt Brook Dam (located in Braintree)	Smelt Brook	Weymouth/Braintree Regional Recreation - Conservation District	High Hazard

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.

Both the Whitman's Pond Dam and the Great Pond Dam are part of the Weymouth public water supply system, impounding the town's two drinking water reservoirs. The DCR Office of Dam Safety has classified the Whitman's Pond Dam as high hazard and the Great Pond Dam as significant hazard. The Iron Hill Dam is also owned by the Weymouth DPW: it is a flood control dam located on the Weymouth Back River immediately downstream of the Whitman's Pond Dam. DCR classified it as high hazard. The Weymouth/Braintree Regional Recreation-Conservation District owns and operates the Pond Meadow Dam which impounds the Smelt Brook in Braintree. It is listed here because it is located upstream of Weymouth and is jointly owned by the two-town district. DCR classifies it as high hazard dam.

The Town has submitted a grant application to the Commonwealth to assist with removal of the dam on the Old Swamp River, as it has adverse ecological and water quality impacts (#95 on the Critical Infrastructure list). There is another dam, on the Mill River behind Mill Street which is not on the Critical Infrastructure list or the DCR list of dams. This is apparently an old private dam. It does not appear to be a high safety concern, but it does appear to have adverse ecological impacts. More information is needed to assess potential actions.

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	Gaslight/ Fountain Lane	Ditching and other work has largely reduced flooding. Maintenance is needed.
2	Plymouth River @ Route 53:	Mass DOT is responsible for an undersized culvert. This is a significant flooding concern.
3	Carolyn Road:	Ledge upstream and poor drainage lead to flooding in this area. Most often flooding is limited to yards.
4	Old Swamp River	Culvert improvements have reduced flooding here.
5	Tamarack/ Hickory/ Dacia:	Low slope in the stream and development of this relatively flat area coupled with limited drainage and ledge preventing ground absorption of stormwater leads to flooding in this area.
6	Fort Point Road	Tidal flooding associated with astronomical high tides and storm events. The town received a FEMA grant to elevate five homes.
7	Fore River Avenue	Seawall repairs have reduced flooding here. But flooding will still occur in larger storms and with sea level rise.
8	Wituwamat and Paomet Roads	Tidal flooding. Previous mitigation funds were used to install flapper valves, which has significantly reduced flooding. When the tide is high flooding still occurs. Evacuation has been required and homes were condemned.
9	Saltwater Creek	Inadequate drain associated with the State highway here leads to flooding of area: also tidal flooding. Evacuations have been necessary here. MA DOT has a tidegate/flapper project that will reduce flooding somewhat.
15	Fort Point Road	Flooding at this location cuts off access to Weymouth Neck.
17	King Cove Beach Road	Poor drainage leads to flooding. Residents must access their homes from above during flood events.
22	Endicott Street	A culvert blockage restricts an unnamed brook causing roadway and yard flooding
23	Village Road	A wetlands system causes flooding to properties along the road, access is difficult
24	Hill Street	Nuisance yard flooding happens here due to wetlands and inadequate drainage ditches.
25	Mayflower Avenue	Runoff due to insufficient drainage capacity causes yard and road flooding
18	King Cove	This is an area identified as subject to erosion, it could potentially affect the bridge at Route 3A.
19	Webb State Park	This is an area identified as subject to erosion, it could potentially affect the safety of the walking path.

20	Great Esker Park	This is an area identified as subject to erosion. No immediate structural impacts were noted.

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 37 repetitive loss properties in Weymouth. The properties are shown on the maps in Appendix A. These repetitive loss properties had a total of 115 losses from 1978 to 2020, totaling $1,431,186 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 Weymouth and the number of losses and total claims associated with them. The 37 properties include 31 single-family residences, 3 multi-family residences, and 3 non-residential properties.

Table 11: Summary of Repetitive Losses and Claims

	A, AE, AO, AH Zones	VE Zone	X Zones	Total
Number of Properties	23	7	7	37
Number of Losses	73	28	14	115
Total Payments	$1,032,131	$199,811	$199,244	$1,431,186

Source: 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.

Weymouth 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 Weymouth. 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

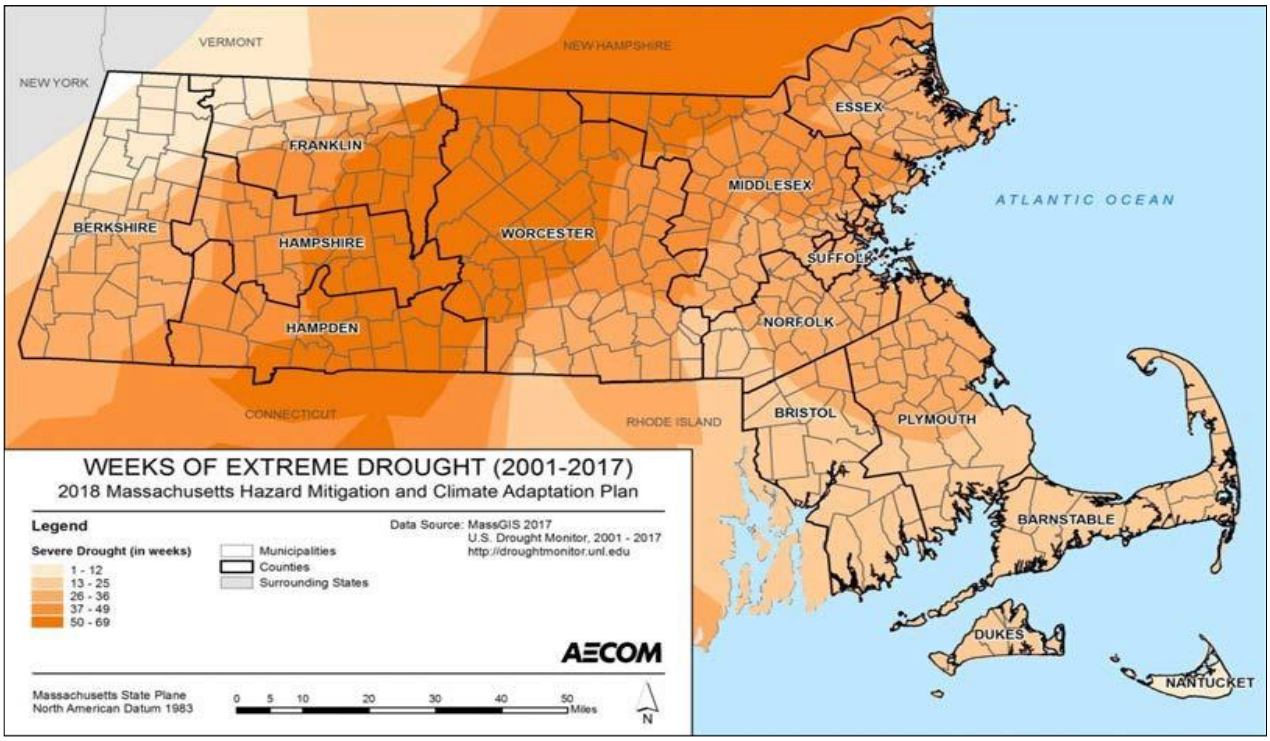
Source: SHMCAP

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, Weymouth experienced between 26 and 36 weeks of severe drought between 2001 and 2017.

Weymouth relies on the Great Pond Reservoir and wells in the Mill River basin. Drought is a significant issue as the town has invested heavily in water conservation in order to keep water usage within safe yield requirements. Adequacy of water supply is an ongoing concern, particularly in light of ongoing development at Southfield and elsewhere in Weymouth. Conservation staff report that low flow and even no flow events in local rivers, as well as low levels in ponds has occurred during recent periods of drought.

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.

The southern half of Weymouth is classified as having a low incidence of landslides. The northern half is classified as having moderate susceptibility and low incidence (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 Weymouth. However, landslides associated with coastal banks are a potential risk in Weymouth. A partial collapse of the Regatta Road coastal bank occurred in late August 2021, associated with the heavy rains from Hurricane Ida. An earlier partial collapse of the coastal bank behind Regatta Road occurred in the 2000s. The Town has plans to stabilize the coastal bank behind Regatta Road and build a new revetment at the toe of slope along a 1,000-foot stretch of the coastal bank. Other coastal bank locations in Weymouth may be susceptible to failure.

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.

Weymouth has nearly 13 miles of coastline. Flood events have been significant enough to close roads, require evacuations, and isolate coastal areas. Weymouth has had to invest significant capital funds in repairing and elevating seawalls and buttressing natural protection. Projections of future sea level rise identify locations that will be subject to flooding in future years. While those areas do expand with increasing sea level rise, another significant impact will be more frequent and deeper flooding in the locations already subject to coastal flooding.

Map 10 in Appendix B identifies areas predicted to be inundated at mean 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. 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. Under the current FEMA FIRM, 2% of buildings in Weymouth are located in the Special Flood Hazard Area. With

1.2 feet of sea level rise 3.5% of building are in the 1% chance locations, with 2.4 feet of sea level rise the number increases to 4.6% and with 4.2 feet of sea level rise to 5.6%.

Local data for previous coastal flooding occurrences are not collected by the Town of Weymouth. The best available local data is for Norfolk County through the National Climatic Data Center. Eastern Norfolk County, which includes the Town of Weymouth, 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. Town staff identified three locations where erosion is occurring, or is of concern, they are at King's Cove, at Webb State Park, and at Great Esker Park. The CZM analysis does not include King Cove or Great Esker Park. Their analysis indicates that CZM's analysis of the Weymouth coastline generally shows no statistical change, meaning that the rates of change are within the bounds of measurement uncertainty for the project.

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. Areas most at risk would be the locations that currently experience flooding during storm tides.

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. Weymouth 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

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

Frostbite Times: 30 minutes, 10 minutes, 5 minutes

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

Where, T= Air Temperature (°F) V= Wind Speed (mph) Effective 11/01/01

Source: National Weather Service

The Town of Weymouth 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 Weymouth.

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 Weymouth 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. Commercial areas, particularly along Routes 3A, 18, and 53 show up as "hot spots" on Map 10. Town Hall and many of the schools are in hot spots, again due to the prevalence of pavement and buildings. 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.

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

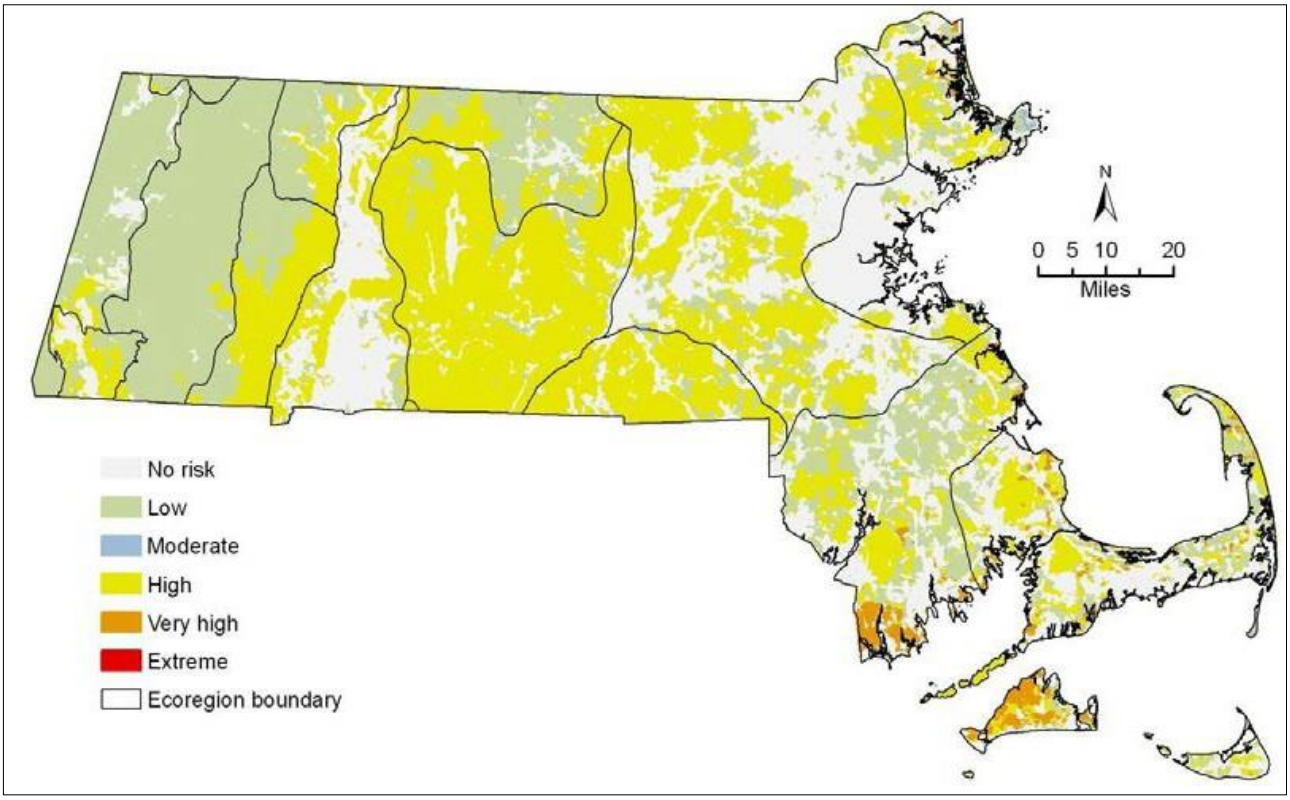
The SCHMCAP includes a graphic that depicts statewide fire risk incorporating three risk components: fuel, wildland-urban interface, and topography (Figure 12). The wildland-urban interface reflects communities where housing and vegetation intermingle, and fire can spread from structures to vegetated 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. Weymouth is shown in the no risk zone. Fire officials indicate that fires occur periodically in Weymouth's wooded areas. Great Esker Park has had the most frequent fires related to homeless populations. 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
10	Bradford Torrey Wildlife Sanctuary	Forested conservation land with trails.
11	Avalon/behind BJ's	Wooded area.
12	Cavern Rock	Forested conservation land with a loop trail.
13	House Rock Park	Forested conservation land with loop trail. .
14	Great Esker Park	Parkland, woods, and saltmarsh bordering the Back River.
21	Great Pond Water Supply woods	Forested area that surrounds Weymouth water supply

Figure 12: Wildfire Risk Areas



Source: SHMCAP

While there a 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.

In Weymouth milfoil was identified as a concern due to its presence in the water supply. Health impacts to both people and trees due to invasive insects and plants were also noted as a concern.

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 Weymouth's entire area is vulnerable to hurricanes, which occur between June and November. As shown on Map 5 in Appendix B, a tropical storm tracked through Weymouth in 1888 and a tropical depression tracked through Weymouth in 1876. 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 Weymouth 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 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 Weymouth. Potential hurricane damages to Weymouth have been estimated using HAZUS-MH. Total damages are estimated at $64 million for a Category 2 hurricane and $246 million for a Category 4 hurricane. Hurricanes and tropical storms are an infrequent event having passed directly through Weymouth only twice.

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.

Weymouth 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 Weymouth, 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 Weymouth. Map 6 in Appendix A indicates that the average annual average snowfall in most of Weymouth is between 48 and 72 inches. The most northerly and southerly extremes of Weymouth have average snowfall of 26 to 48 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 Weymouth 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 Weymouth. 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 Weymouth, tornado impacts are relatively localized compared to severe storms and hurricanes. Damages from any tornado in Weymouth would greatly depend on the track of the tornado. Based on the record of previous occurrences since 1956, Tornado events in Weymouth are a low frequency event as there have been no instances of tornado activity in Weymouth. 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 Weymouth 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 Weymouth. 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 Weymouth 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 - Woburn	10/5/1817	4.3
MA - Marblehead	8/25/1846	4.3

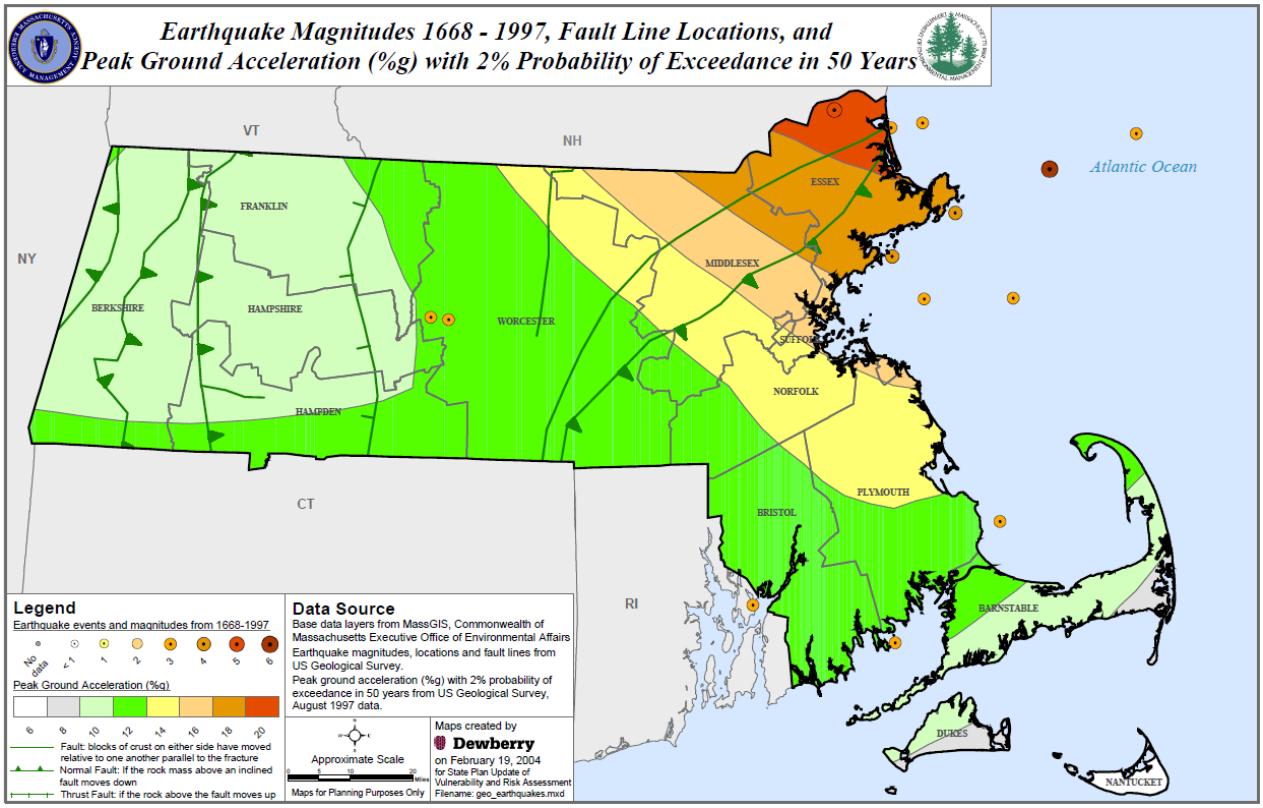
Location	Date	Magnitude
MA - Brewster	8/8/1847	4.2
MA - Boxford	5/12/1880	NA
MA - Newbury	11/7/1907	NA
MA - Wareham	4/25/1924	NA
MA - Cape Ann	1/7/1925	4
MA - Nantucket	10/25/1965	NA
MA - Boston	12/27/74	2.3
MA - Nantucket	4/12/12	4.5
ME - Hollis	10/17/12	4.0

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. Weymouth 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 Weymouth.

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 Weymouth. 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 Weymouth have been estimated using HAZUS-MH. Total building damages are estimated at $935 million for a 5.0 magnitude earthquake and $7 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 42.7% of the area of the town. Commercial and industrial uses combined make up 8.1% of the town. Agriculture and Open Land total 22.5% of the land. The tax-exempt category represents 10.2% of Weymouth's land. Most of this land is additional open space.

Table 29: Town of Weymouth, MA 2016 Land Use

Land Use Type	Acres	Percentage
Residential - single family	4016	35.1
Residential - multi-family	850	7.5
Residential – other	6	0.1
Commercial	703	6.2
Water	528	4.6
Industrial	213	1.9
Agriculture	5	0.1
Open land	2569	22.4
Unknown	150	1.3
Right-of-way	1208	10.6
Tax exempt	1165	10.2
Total	**11,413**	**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

Weymouth's most important economic assets include the Libbey Industrial Park, businesses at Finnell Drive, the South Shore Hospital, and retail areas at Middle Street, Main Street. and Washington Street. Union Point has the potential to add significant residential and commercial development to Weymouth. The added development will bring with it pressure on water resources and the potential for additional flooding.

NATURAL, CULTURAL, AND HISTORICAL RESOURCE AREAS

The town has five National Register Historic Districts and seven individual sites on the National Register of historic Places. Other places of historic note include the Abigail Adams Birthplace, the Holbrooke House, home to the Weymouth Historical Society, and the Emery Estate, a 26-acre town owned property with a home modeled on Mount Vernon. There are numerous glacial features in the town, including the Great Esker Park, one of the largest intact eskers in the United States and House Rock Park, location of a large perched rock. Other natural features include the Herring Run in East Weymouth and the Smelt Run in Weymouth Landing. The Weymouth Back River, bordered almost extensively by protected open space, is a designated Area of Critical Concern (ACEC).

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 fourteen completed projects in the Town of Weymouth since 2015.

The database also includes several attributes of the new development, including housing units, and commercial space. The fourteen developments in Weymouth include a total of 1,012 housing units and over 328,000 square feet of commercial space.

Table 30: Summary of Weymouth Developments, 2016-2021

Name	Status	Year	Housing Units	Commercial Square Feet	Project Type
555 Broad Street	Complete	2017	2	1,250	Mixed Use
Clapp Memorial	Complete	2017	21		Residential
278 Washington Street	Complete	2018	4	2,372	Mixed Use
Brewster Ambulance	Complete	2017		30,240	Commercial
Main and Winter	Complete	2016		275,000	Commercial
1072 Washington Street	Complete	2017	2	1,200	Mixed Use
Aura at Weymouth	Complete	2019	24		Residential
Alexan/Gradient	Complete	2017	242		Residential
White Street subdivision	Complete	2020	6		Residential
Union Point – Faring Way	Complete	2016	221		Residential
Union Point – Snow Bird	Complete	2016	26		Residential
Union Point – Mastlight	Complete	2018	28	14,000	Mixed Use
Union Point – Brookfield Village	Under Construction	2021	108		Residential
Union Point – Woodstone Crossing	Complete	2019	200		Residential
Seascape at Broad Reach	Complete	2020	50		Residential
143-145 Washington Street	Complete	2020	43	4,000	Mixed Use
165 Washington Street	Complete	2019	12		Residential
10 Front Street	Complete	2020	23	Existing	Mixed Use

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.

Table 31 shows the relationship between potential future development areas and the applicable mapped hazard areas (flood zones and heat). 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 other issues.

Table 31: Relationship of Potential Development to Hazard Areas

Map ID	Potential Future Project	Flood Zones	Sea Level Rise	High Heat
A	122 Washington St.	-	-	-
B	15-17 Front St.	-	-	-
C	655 Washington St.	-	-	45%
D	1325 Washington St.	-	-	-
E	1431-39 Main St.	-	-	-

The identified locations are not in FEMA Special Flood Hazard Areas or in areas projected to be impacted by future sea level rise. 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, Weymouth's potential future development would not significantly increase the Town's vulnerability if existing regulations are adhered to.

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 133 facilities identified in Weymouth. 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.
- **Zone AE** Areas subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods. Base Flood Elevations (BFEs) are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.
- **Zone AH** Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are 1–3 feet. BFEs derived from detailed hydraulic analyses are shown in this zone. Mandatory flood insurance purchase requirements and floodplain management standards apply.
- **Zone X (shaded)** Moderate risk areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent-annual-chance flood by a levee. No BFEs or base flood depths are shown within these zones. (formerly Zone B)
- ***Column 5: Locally Identified Area of Flooding*:** The fifth column indicates the risk of flooding in local hazard areas. If there is an entry in this column, it indicates the local hazard area.
- ***Column 6:*** Hot spots indicates areas that are within the 5% of hottest areas in the MAPC region based on satellite data from 2016.
- ***Column 7:*** The seventh column indicates the risk of brushfire. If there is an entry in this column, it indicates the local hazard area.
- ***Column 8:*** This column indicates locations subject to inundation at Mean Higher High Water 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	Hot Spot	Brushfire Risk	Sea Level Rise
1	Main Street Well	Well					
2	Circuit Ave Well	Well					
3	Winter Street Well #2	Well					

ID	NAME	TYPE	FEMA Flood Zone	Locally Identified Flood Area	Hot Spot	Brushfire Risk	Sea Level Rise
4	Winter Street Well #1	Water Pump Station					
5	Washington Street Pump Station	Water Pump Station					
6	Libbey Industrial Park Well	Well					
7	Prospect Hill Booster Pump	Water Pump Station					
8	Town Hall	Municipal					
9	Arthur J Bilodeau Water Treatment Plant	Waste Water Treatment					
10	Great Pond Water Treatment Plant	Waste Water Treatment					
11	ES-16	Sewer Pump Station					
12	ES-15	Sewer Pump Station	AE				
13	ES-17	Sewer Pump Station					
14	ES-24	Sewer Pump Station					
15	ES-23	Sewer Pump Station					
16	ES-27	Sewer Pump Station					
17	ES-28	Sewer Pump Station					
18	ES-26	Sewer Pump Station					
19	ES-10	Sewer Pump Station					
20	ES-8	Sewer Pump Station					
21	ES-9	Sewer Pump Station					
22	ES-22	Sewer Pump Station					
23	Private	Sewer Pump Station					
24	ES-21	Sewer Pump Station					
25	ES-30 / Libbey Industrial Parkway Pump Station	Sewer Pump Station					
26	Private	Sewer Pump Station					
27	Private	Sewer Pump Station					
28	Private	Sewer Pump Station					
29	ES-14	Sewer Pump Station				Great Pond	
30	ES-7	Sewer Pump Station					
31	ES-18	Sewer Pump Station					
32	ES-20	Sewer Pump Station					
33	PS-4	Sewer Pump Station	AE				
34	PS-3 Wituwamat Rd	Sewer Pump Station	AE	Paomet			yes

ID	NAME	TYPE	FEMA Flood Zone	Locally Identified Flood Area	Hot Spot	Brushfire Risk	Sea Level Rise
35	PS-12 Emerson St.	Sewer Pump Station	AE				
36	PS-25 Alton Terr.	Sewer Pump Station	AE				
37	PS-2 Wharf St.	Sewer Pump Station	AE				
38	PS-1 Weymouth Landing	Sewer Pump Station	X				
39	PS-6 Healy Road	Sewer Pump Station					
40	PS-5 Seaver Road	Sewer Pump Station					
41	PS-13 Pine St.	Sewer Pump Station		Old Swamp			
42	PS-19 Pond St.	Sewer Pump Station					
43	PS-11 Thicket St.	Sewer Pump Station					
44	ES-31 Roosevelt Rd	Sewer Pump Station					
45	Wessagussett School	School			Yes		
46	Elden M. Johnson School	School					
47	McCulloch Building	Senior Center, Munic					
48	Academy Avenue School	School					
49	Abigail Adams Intermediate School	School					
50	Maria Weston Chapman Middle School	School			Yes		
51	Lawrence W. Pingree School	School			Yes		
52	Frederick C. Murphy School	School					
53	William Seach School	School					
54	Thomas V. Nash Jr. School	School			Yes		
55	Weymouth High School	School			Yes		
56	Ralph Talbot School	School					
57	Fulton School Residences	Elder Housing					
58	Union Elementary School	School					
59	Fore River Power Plant	Power Plant					
60	MWRA Sewer Pump Station	Sewer Pump Station					
61	Police Station	Police Station					
62	Elizabeth Catherine Rest Home	Nursing Home					
63	Elizabeth Catherine Rest Home	Nursing Home					
64	Pope Nursing Home	Nursing Home					
66	MediPlex Nursing Home	Nursing Home					
68	South Shore Hospital	Hospital			Yes		

ID	NAME	TYPE	FEMA Flood Zone	Locally Identified Flood Area	Hot Spot	Brushfire Risk	Sea Level Rise
69	Station 1	Fire Station					
70	Central Fire Station 2	Fire Station					
71	Station 3	Fire Station			Yes		
72	Station 5	Fire Station					
73	Hollis Public Works Facility (compost)	Municipal					
74	DPW Building (fuel depot)	DPW					
75	Johnson Early Childhood and Daycare	Child Care					
76	Pilgrim Day Care	Child Care					
77	Just Right Child Care	Child Care					
80	Lakeview Manor Preschool	Child Care					
81	South Shore Day Care Services	Child Care					
82	East Congregational Church Daycare	Child Care					
83	First Baptist Christian School	Child Care					
85	Holy Nativity Preschool	Child Care					
86	Old South Union Preschool	Child Care					
87	Kinder Kare Learning Center	Child Care					
88	Puddle Jumpers Head Start	Child Care					
89	Early Childhood Preschool	Child Care					
94	Mill River	Dam					
95	Old Swamp River	Dam	AE				
96	Cranberry Pond	Dam					
97	Iron Hill Dam	Dam					
98	Herring Brook 1	Dam	AE				
99	Weymouth Great Pond Water Supply	Water Supply	AE				
100	Whitman's Pond Dam	Dam	AE				
101	Sewer Pump Station	Sewer Pump Station	AE				
102	DPW Building	Emergency Operations Center					
103	DPW Building	Hazardous Material Site			Yes		
104	Cancer Treatment	Medical Facility					
106	Dialysis	Medical Facility					
108	Dialysis Center	Medical Facility					
109	Medical Facility	Medical Facility					
110	Water Supply South Cove	Water Supply	A				
111	Weymouth Great Pond Dam	Dam	A				

ID	NAME	TYPE	FEMA Flood Zone	Locally Identified Flood Area	Hot Spot	Brushfire Risk	Sea Level Rise
112	Fore River Bridge	Bridge	VE				
113	Back River Bridge	Bridge					
114	Police Dept. Communication Tower	Communication Tower					
115	DPW Communication Tower	Communication Tower			Yes		
116	Emergency Management Communication Tower	Communication Tower					
117	East Weymouth Commuter Rail Station	Transportation Facility					
118	Weymouth Landing Commuter Rail Station	Transportation Facility					
119	South Weymouth Commuter Rail Station	Transportation Facility					
120	Harbormaster	Municipal	VE				Yes
121	State Boat Ramp	Boat Ramp	VE				Yes
122	Wessagussett Yacht Club	Water Facility	VE				
123	Union Towers	Elder Housing					
124	Union Towers II	Elder Housing					
125	109 Broad Street	Elder Housing					
126	Pope Tower	Elder Housing	AE				
127	Cadman Towers	Elder Housing					
128	Winrose Memory Care	Nursing Home					
129	Atlantic Development elder care	Nursing Home					
130	Children's Hospital Outpatient	Medical Facility					
131	Union Point	Sewer Pump Station					
132	Fairing Way Nursing Facility	Elder Housing					
133	Algonquin Gas Compressor Station	Utility					
134	Essex Water Tank	Water Tank					
135	Great Hill Water Tank	Water Tank					
136	Reed Avenue Water Tank	Water Tank					
137	Lockewoods Water Tank	Water Tank					
138	Allerton House	Elder Housing			Yes		
139	Quincy Community Action	Child Care	AE				
140	Flood control tunnel - Weymouth Landing	Flood Control	AE				
141	Smelt Brook Dam	Dam	X				
142	Flood control tunnel - Jackson Square	Flood Control					

ID	NAME	TYPE	FEMA Flood Zone	Locally Identified Flood Area	Hot Spot	Brushfire Risk	Sea Level Rise
143	Sluice gate - Weymouth Landing	Flood Control					

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 Weymouth, 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	17,286	
Estimated total building replacement value (2014 $)	$8,122,000,000	
Building Damages		
# of buildings sustaining minor damage	1043	3,229
# of buildings sustaining moderate damage	133	580
# of buildings sustaining severe damage	3	60
# of buildings destroyed	1	47
Population Needs		
# of households displaced	13	165
# of people seeking public shelter	5	68
Debris		
Building debris generated (tons)	4,671	18,417
Tree debris generated (tons)	6,545	15,192
# of truckloads to clear building debris	187	738
Value of Damages		
Total property damage (buildings and content)	$63,727,160	$245,692,090
Total losses due to business interruption	$3,212,830	$22,240,320

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	17,286	
Estimated total building replacement value (2014 $)	$8,122,000,000	
Building Damages		
# of buildings sustaining slight damage	5,014	695
# of buildings sustaining moderate damage	2,665	3,884
# of buildings sustaining extensive damage	736	4,922
# of buildings completely damaged	184	7,724
Population Needs		
# of households displaced	1,109	5,440
# of people seeking public shelter	558	2,893
Debris		
Building debris generated (tons)	190,000	1,461,000
# of truckloads to clear debris (@ 25 tons/truck)	7,600	58,440
Value of Damages		
Total property damage	$935,221,500	6,986,294,100
Total losses due to business interruption	$171,691,400	$970, 029,500

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	17,286	
Estimated total building replacement value (2014 $)	$8,122,000,000	

Building Damages		
# of buildings sustaining limited damage	44	54
# of buildings sustaining moderate damage	192	215
# of buildings sustaining extensive damage	6	21
# of buildings substantially damaged	18	22
Population Needs		
# of households displaced	2,039	2,462
# of people seeking public shelter	138	161
Value of Damages		
Total property damage	$111,690,000	$140,640,000
Total losses due to business interruption	$52,930,000	$69,380,000

IMPACTS ON PEOPLE

Just as some locations in Weymouth 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 Weymouth 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 Weymouth will want to consider the needs of all of its residents. In Weymouth 7% of residents are below the poverty level (4-person household earning less than $24,563) and 44% 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). 2% of residents are limited English speakers and 12% speak another language at home (Census 2010).

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, lack of insurance	Dams, culverts, roadways. Water/sewer infrastructure at Union Pt. Groundwater mounding.	No FEMA floodplain mapping at Union Pt.
	Drought	High	Water availability for future development.	Water supply for fire	No and low flow in rivers. Low pond levels.
	Landslide	High	Property damage	Roads and infrastructure, coastal bank collapse	Sediment and debris deposited in waterways
Sea Level Rise	Coastal Flooding	High	Access roads blocked for emergency access and evacuation	Groundwater mounding,	Loss of high salt marsh habitat
	Coastal Erosion	Medium – limited in geography		Bridge St. Wessagussett Rd., King's Cove	Webb State Park, Esker Park
	Tsunami	Low (high impact/low likelihood)	NA	NA	NA
Rising Temperatures	Average and Extreme Temperatures	Medium	Incr. need for warming and cooling shelters/ heat-health impacts	Backup generators	Invasive species, Swamp River cold water fisheries
	Wildfires	Medium	tax town resources		Tree impacts
	Invasive species	Medium	Disease from new pests	Milfoil in water supply	Tree impacts from pests, heat. Milfoil in South Cove water supply
Extreme Weather	Hurricanes / Tropical Storms	High (more frequent)	Power outages	Localized flooding, road closures, traffic issues	Debris washing up from storms – removal issues
	Severe Winter Storms	High	Power outages – heat loss	Plowing challenges, outages	

	Tornadoes	Low (high impact/low likelihood)	NA	NA	NA
	Other (Wind/ Thunderstorms)	High	Power outages, need to open warming centers	Downed wires – takes resources to babysit wire, lightning causes cellular outages	
Non-Climate Hazard	Earthquake	Low (high impact/low likelihood)	NA	Low magnitude events, most foundations are concrete	NA

SECTION 5: HAZARD MITIGATION GOALS

The Weymouth Local Hazard Mitigation Planning Team reviewed and discussed the goals from the 2015 Hazard Mitigation Plan for the Town of Weymouth. 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 Weymouth developed a climate change planning process as part of the state Municipal Vulnerability Preparedness program. 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, 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 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 sustainability and resiliency in hazard mitigation planning.

SECTION 6: EXISTING MITIGATION MEASURES

The existing protections in the Town of Weymouth 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. Weymouth'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 have occurred and are noted in the following sections.

EXISTING TOWN-WIDE MITIGATION FOR FLOOD-RELATED HAZARDS

Weymouth 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) – Weymouth participates in the NFIP with 271 policies in force as of the January 12, 2021. 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 Weymouth:

Flood insurance policies in force (as of January 12, 2021)	271
Coverage amount of flood insurance policies	$62,357,700
Premiums paid	$287,882
Closed losses (Losses that have been paid)	306
Total payments (Total amount paid on losses)	$2,456,555

The Town complies with the NFIP by enforcing floodplain regulations, maintaining up-to-date floodplain maps, and providing information to property owners and builders regarding floodplains and building requirements. The paid losses have increased from 180 to 306. The total payments increased from nearly $1.4 million in 2015 to $2.4 million in 2021.

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 is conducted annually.

- Catch basins are cleaned to prevent sedimentation.
- DPW cleans inlet grates of culverts to remove debris prior to major storms.
- Roadway winter treatments: Minimal use of sand to reduce siltation.
- Continued repair and rehabilitation of drainage systems.

Town of Weymouth Master Plan – The Master Plan was drafted in 2001. Rather than developing a new Master Plan, Weymouth has adopted topical and site-specific planning in recent years. These plans address flood hazards as they are relevant to the topics addressed (housing, economic development).

Weymouth Open Space Plan – A Town plan was approved in 2012. The most recent Open Space Plan was adopted in 2019. The plan identifies current open space areas, as well as properties that could be acquired for open space, which serve a number of different purposes including mitigation of flooding and storm damage.

Town of Weymouth Flood Hazard Mitigation Plan - The Town commissioned Bourne Consulting Engineering to write the Plan in 2001. The plan identified critical drainage problems and outlines a number of capital projects that would address town-wide flooding. Action has been undertaken on multiple project sites since the plan was originally written.

Floodplain District Zoning: Zoning is intended to protect the public health and safety through the regulation of land use. The Weymouth Floodplain District is an overlay district that includes all special food hazard areas designated as Zone A, AE, -AO, or VE on the Flood Insurance Rate Maps (FIRM) prepared and issued by the Federal Emergency Management Agency (FEMA). The Town updated the ordinance to reflect FEMA map changes since the 2015 map was adopted. New maps are currently in draft form, the Town will update the ordinance when the new maps are adopted.
The following is a summary of the requirements to be met within the Floodplain District:

a. Uses within the district are subject to the provision of the State Building Code entitled "Design Requirements for Floodplains and Coastal High Hazard Areas"
b. All new construction and substantial improvements to residential structures must have the first habitable floor at least one foot above the 100-year flood elevation.
c. In the VE Zone, new structures are prohibited, and existing structures shall not be enlarged seaward of the mean high tide.
d. No building, filling or other encroachments shall be permitted in the floodway.
   Any proposal for new construction subject to the floodplain overlay district shall require a special permit from the Board of Zoning Appeals.

Stormwater Ordinance – The purpose of the Weymouth Stormwater Ordinance is to prevent and reduce flooding, protect water quality, increase groundwater recharge, reduce erosion and sedimentation, promote environmentally sensitive site design practices, ensure long-term maintenance of stormwater controls, and help the Town meet Federal requirements under Phase II of the National Pollutant Discharge Elimination System (Clean Water Act). Flood prevention is emphasized in this ordinance. The Town plan to adopt an update to the Ordinance in 2021 in order to stay in compliance with the requirements of the Clean Water Act.

Wetlands Protection Ordinance – The purpose of the Wetlands Protection Ordinance is to further protect the Town's wetlands, related water resources, and adjoining land areas for, among other reasons, flood control, erosion and sedimentation control, storm damage prevention, and water pollution control. The Ordinance expands the jurisdiction of the Conservation Commission beyond that authorized in the Massachusetts Wetlands Protection Act. Of most relevance for flood hazard mitigation, the Ordinance expands the Commission's jurisdiction to include all lands subject to flooding or inundation by groundwater or surface water. The Ordinance also establishes a 100-foot buffer around areas subject to inland or coastal flooding.

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.

Dams: Emergency Action Plans (EAP) and upgrades – The Town has current EAPs for all of its high hazard dams. An EAP is also prepared for the Smelt Brook Dam in Braintree, which is located upstream of Weymouth in Braintree, and is operated by the Weymouth/Braintree Regional Recreation-Conservation District. Since the 2015 plan, Weymouth reconstructed the Great Pond dam, upgraded the sluice gate, and upsized a culvert.

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.

Tree-trimming program – The Weymouth Park and Tree Division maintains trees on town property, and the electric utility company National Grid conducts tree trimming and maintenance around power lines.

Zoning Ordinance -- Communications tower construction requires structural support and foundation plans be stamped and approved by a registered engineer.

EXISTING TOWN-WIDE MITIGATION FOR WINTER-RELATED HAZARDS

Snow disposal –The town conducts general snow removal operations with its own equipment and has adequate snow storage/disposal space in four of the most densely developed sections of town.

Catch basin Cleaning: The Weymouth DPW clears snow from clogged catch basins to prevent flooding.

Massachusetts State Building Code: The town enforces the Massachusetts State Building Code, which contains regulations regarding snow loads on building roofs. The town has adopted the state building code.

EXISTING TOWN-WIDE MITIGATION FOR FIRE-RELATED HAZARDS

Burn Permits – The Town fire department requires a written permit for outdoor burning, which includes explanation of the related regulations and precautions for the permit-holder to take. The permit-holder must call the fire department on the proposed burn day to confirm weather conditions are suitable for outdoor burning. Outdoor burning is only allowed from January to May.

Subdivision/Development Review – The Fire Department participates in the review of new subdivisions and 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.

EXISTING TOWN-WIDE MITIGATION FOR MULTIPLE HAZARDS

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.

Local Emergency Planning Committee (LEPC) – The LEPC is active; it is headed by the Emergency Management/Civil Defense Director.

Public Education – The Town provides a variety of fire and winter hazard public education and outreach.

Communications Equipment – Weymouth has full coverage of the Town with emergency services

radio. Since the 2005 plan new radios were acquired for the Police and Fire Departments and Department of Public Works (using UHF), as well as the Emergency Management Agency (using UHF and VHF). All the town's radios are interoperable according to NIMS standards. Incident command units are available through Norfolk County and MEMA. The Town made significant investments in upgraded equipment since the adoption of the 2015 plan.

Emergency Power Generators – The Town has invested in generator for most facilities and critical equipment. The McCulloch Building is the key remaining building that needs generator backup.

Massachusetts State Building Code – The Massachusetts State Building Code contains many detailed regulations regarding wind loads, earthquake resistant design, flood-proofing, and snow loads. The town has adopted the state building code.

COMPILATION OF EXISTING MITIGATION

Table 36 summarizes the many existing natural hazard mitigation measures already in place in Weymouth when the first Hazard Mitigation Plan was developed in 2015. 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 Weymouth

Type of Existing Mitigation Measures	Effective Y/N	Changes Needed/Notes
FLOOD HAZARDS		
Participation in the National Flood Insurance Program	Y	
DPW street sweeping annually	Y	
DPW catch basin cleaning	Y	More funding needed
DPW roadway treatments minimize sand use	Y	
DPW cleans culvert inlet grates ahead of storms	Y	More funding needed
DPW ongoing repair and rehabilitation of drainage systems	Y	More funding needed
Master Plan (2001)	Y	Replaced by focused planning (housing, economic development, etc.)
Open Space and Recreation Plan (2019)	Y	Updated plan adopted in 2019
Flood Hazard Mitigation Plan (2001)	N	New planning should incorporate climate change
Zoning- Floodplain District	Y	Will be updated with pending FEMA maps
Stormwater Ordinance	N	Will need to update this year to meet MS4 requirements

Type of Existing Mitigation Measures	Effective Y/N	Changes Needed/Notes
Wetlands Protection Ordinance and Regulations	Y	Planning to update procedural rules
DAMS		
DCR dam safety regulations	Y	
Emergency Action Plans	Y	Regularly updated
WIND HAZARDS		
MA state building code	Y	
Tree trimming program – Tree Division and National Grid	Y	
Zoning restrictions for communication towers	Y	
WINTER HAZARDS		
Snow disposal areas	Y	
Catch basin cleaning	Y	
MA state building code	Y	
FIRE HAZARDS		
Open Burn Permits required	Y	
Fire Department reviews subdivision and development plans	Y	
MA state fire prevention and building codes	Y	
GEOLOGIC HAZARDS		
State Building code addresses earthquake hazards	Y	
MULTIPLE HAZARDS		
Comprehensive Emergency Management Plan (CEMP)	Y	Regularly updated
Local Emergency Planning Committee (LEPC)	Y	
Public Education	N	Need to continue to improve social media presence
Communications equipment	Y	Significant investments in upgrades
Emergency power generators	Y	McCulloch Building needs generator

MITIGATION CAPABILITIES AND LOCAL CAPACITY FOR IMPLEMENTATION

Under the Massachusetts system of "Home Rule," the Town of Weymouth is authorized to adopt and from time to time amend local ordinances and regulations that support the town's capabilities to mitigate natural hazards. These include Zoning Ordinances, Subdivision and Site Plan Review Regulations, Wetlands Ordinance, Health Regulations, Public Works regulations, and local enforcement of the State Building Code. Local Ordinances may be amended by the Town Council

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 Weymouth has recognized several existing mitigation measures that require implementation or improvements and has the capacity within its local boards and departments to address these.

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

- Update the Floodplain District to incorporate requirements of the new state model Floodplain bylaw.
- Consider adopting a Stormwater Utility or stormwater user fee to provide a dedicated, predictable revenue stream to finance upgrades to the stormwater infrastructure. This would address the noted need for additional funds for DPW for maintenance and rehabilitation of stormwater systems.
- Update stormwater regulations to comply with federal requirements.
- Develop a social media program for emergency alerts and public education.
- Incorporate climate resilience in the local wetlands bylaw and regulations.
- Analyze future threats to critical infrastructure, facilities, and residences based on projections of sea level rise and increasing storms.

SECTION 7: MITIGATION MEASURES FROM PREVIOUS PLAN

IMPLEMENTATION PROGRESS ON THE PREVIOUS PLAN

At a meeting of the Weymouth Hazard Mitigation Planning Committee, Town staff reviewed the mitigation measures identified in the 2015 Weymouth 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 2015 plan.

Table 37: Mitigation Measures from the 2015 Plan

Mitigation Action	Priority in 2015 plan	Current Status	Include in 2021 plan?
Drainage Improvements at Puritan Road	High	Complete	No
Drainage Improvements at River Street	High	No funds were available for this project.	Yes
Elevation of residences along Fort Point Road	High	A FEMA grant is funding elevation of 5 homes. 2 are complete, the others are in progress. Additional structures will need to be raised in this area.	Yes
Upgrade Seawalls, jetties, and dikes	High	Fore River Avenue work is complete. Work at Fort Point Road is in progress (some participants withdrew from the grant program). Weymouth just received a final design and permitting grant for the seawall at Fort Pt. Rd.	Yes
Enlarge drainage system at Derby Street, add detention basin	Medium	Complete	No
Drainage improvements on Paomet Road	Medium	Coordination with Norfolk County mosquito ditching has reduced flooding. Drainage improvements did not occur.	Yes
Slide Gate at Great Esker Park	Medium	Complete	No
Replace sluice gate at Whitman's Pond Dam	Medium	Complete	No
Debris management for major storms/	Medium	Complete. CEMP planning is carried out.	No

Mitigation Action	Priority in 2015 plan	Current Status	Include in 2021 plan?
hurricanes			
Public education for fire prevention - local CATV	Medium	Fire prevention has done additional public outreach, but more can be done.	Yes
Municipal Building Earthquake Assessment	Medium	Based on review of state building code, further assessment was deemed unnecessary.	No

As indicated in Table 37, Weymouth made excellent progress implementing mitigation measures identified in the 2015 Hazard Mitigation Plan. Four priority drainage projects were completed. These include drainage improvements at Puritan Road and Derby Street, and sluice and slide gate projects at Great Esker Park and Whitman's Pond Dam. Partially completed projects include coastal flooding work completed at Fore River Avenue and in progress at Fort Point Road. Flooding at Paomet Road was reduced, although work remains to be done. In addition, Weymouth received a grant from FEMA to elevate 5 homes; that work is underway. Weymouth also developed and now implements a plan for debris removal and disposal after major storms. Finally, although not listed in the 2015 plan, Weymouth reconstructed the Great Pond Dam, upgraded the sluice gate, and enlarged a culvert. This was a significant drainage project for the Town.

Overall, five mitigation measures from the 2015 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 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 Weymouth and a discussion of inter-municipal issues.

OVERVIEW OF REGIONAL FACILITIES WITHIN WEYMOUTH

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

- State Routes 3, 3A, 18, and 53 (MassDOT)
- Kingston and Plymouth Commuter Rail, South Weymouth Station stop (MBTA)
- Greenbush Commuter Rail, Weymouth Land and East Weymouth stop (MBTA)
- Abigail Adams State Park (Mass DCR)

INTER-COMMUNITY CONSIDERATIONS

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

A) <u>Coordinate and Review Developments on a Regional Basis</u>
As Weymouth 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.

B) <u>Water Connections</u>

Most of Weymouth is part of the Boston Harbor Watershed. A small area in south Weymouth is in the North and South Rivers Watershed. Weymouth and Braintree share a border along the Fore River and Weymouth and Hingham share a border along the Back River. Management of water resources and flooding is a concern that crosses town borders.

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 ordinance enforced by the Conservation Commission and the recent adoption of a Stormwater Ordinance, 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. Priorities for the future include adoption of stormwater regulations.

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**							
	Drainage improvements Paomet and Wessagussett Rds.	Site Specific	Public Works	2026	Medium	Medium	Town	Medium
	Develop strategies to reduce inland flooding	Town wide	Planning Building	2022	High	Low	Town	Medium
	Identify areas to absorb stormwater runoff	Town wide	Planning Conservation	2022	High	Low	Town	Medium
	Adopt a stormwater utility	Town wide	DPW	2023	High	Low	Town	High
	Endicott Street drainage channel repairs	Site specific	DPW	2024	High	High	FEMA/ Capital	High
	Woodrock Road drainage improvement study	Site Specific	DPW	2022	High	High	FEMA/ Capital	High
	Park Avenue drainage study and repairs	Site specific	DPW	2022	Medium	High	FEMA/ Capital	High
	Pond Meadow Park flood control work	Site specific	DPW	2022	High	Low	Town	High
	Drought							
	Reevaluate outdoor water use restriction standards	Town wide	Conservation DPW	2022	High	Low	Town	High
	Pursue alternate water supply options to handle future development.	Town wide	Planning	2022	High	High	Town	High
	Landslide							
	Stabilize Regatta Road coastal bank	Site specific	Planning Engineering	2022	High	High	FEMA Town	High
	Identify areas of landslide risk	Town wide	Building	2026	Low	Low	Town	Low
Sea Level Rise	**Coastal Flooding (and Tsunamis)**							
	Roadway and drainage improvements to River St. at Lane Beach	Site specific	Public Works	2022	High	High	FEMA State grants	High
	Elevation of structures Fort Point Road neighborhood	Site specific	Emer. Mgmt.	2024	High	High	FEMA private match	High

	Reconstruction Fort Point Road seawall and drainage system	Site specific	Public Works	2023	High	High	State grants	High
	Study sea level rise impacts on natural resource areas	Coastal areas	Conservation Planning	2023	High	Medium	State grants	Medium
	ACTION	GEOGRAPHIC COVERAGE	LEAD	TIME FRAME	EST. BENEFIT	EST. COST	FUNDING SOURCE	PRIORITY
	Vulnerability analysis of town infrastructure	Coastal areas	DPW	2023	High	Medium	State grants	High
	Consider property purchases for protection from sea level rise	Coastal areas	Planning	2023	Medium	High	CPC FEMA	Medium
	Coastal Erosion							
	Work with private property owners to mitigate coastal erosion areas	Site specific	Conservation	2023	Low	Low	Town	Medium
Rising Temperatures	**Extreme Heat and Heat Waves**							
	Develop heat control strategies for public schools	Site Specific	Schools	2024	High	High	Town State or FEMA grants	High
	Target natural cooling strategies to high heat areas	Site specific	Planning DPW	2022	High	Medium	Town	Medium
	Site design requirements to increase tree planting	Town wide	Planning	2022	High	Low	Town	Medium
	Wildfires							
	Fire prevention public education	Town wide	Fire	2022	Medium	Low	Town	Medium
	Invasive species							
	Investigate and manage invasive species impacts	Town wide	Conservation Tree Warden	2023	Medium	Medium	Town State grants	Medium
Extreme Weather	**Hurricanes and Tropical Storms** (see Severe Winter Storm/Nor'easter)							
	Severe Winter Storm/Nor'easter							
	Tree management	Town wide	DPW	2022	High	Medium	Town	Medium
	Tornadoes (see Severe Winter Storm/Nor'easter))							
	Other Severe Weather (strong winds, thunderstorms) (see Severe Winter Storm/Nor'easter)							
	Earthquake							

Non-Climate Hazard	Analyze town buildings for vulnerability	Site specific	Emer. Mgmt Inspectional Services	2026	Low	Low	Town	Low

DESCRIPTION OF MITIGATION MEASURES

Changes in Precipitation

Inland Flooding

Drainage improvements Paomet and Wessagussett Roads: The town coordinates with Norfolk County mosquito control operations which improves drainage. To fully address flooding conditions roadway drainage improvements are needed.

Develop strategies to reduce inland flooding: Records from 2010 indicate that flooding in large rainstorms is widespread across Weymouth. The town will analyze flooding areas and implement regulatory strategies to reduce flood damage. Regulatory strategies may include tightened stormwater management and restrictions on impervious surfaces.

Identify locations to absorb stormwater runoff: Consider locations such as open space and parking lots. Identify opportunities for land purchases or easements for flood storage.

Adopt a stormwater utility: Adopt a stormwater utility to provide needed funding for stormwater management.

Endicott Street drainage channel repairs: A blockage restricts an unnamed brook causing roadway and yard flooding. Design, permit, and implement upgrades to relieve flooding.

Woodrock Road drainage improvement study: Woodrock Road experiences flooding related to the adjacent Plymouth River. A drainage study is needed to determine

Park Avenue drainage study and repairs: Park Avenue experiences flooding associated with an adjacent unnamed stream. Identify and implement drainage solutions.

Pond Meadow Park: Work with the Town of Braintree to complete needed flood protection work identified by the Army Corps of Engineers for the Weymouth Braintree Regional Recreation-Conservation District.

Drought

Reevaluate outdoor water use restriction standards: Drought has significant negative impacts on natural resources. Evaluate options to establish standards, based on the health of local ponds and streams, for implementing outdoor water use restriction.

Pursue alternate water supply options to handle future development: The Town is currently evaluating water supply options to address anticipated future development at Southfield and other locations.

Landslide

Stabilize Regatta Road coastal bank: Address a bank collapse of approximately 1,000 feet. Stabilize the coastal bank and build a new revetment at the toe of slope.

Identify areas of potential landslide risk: The Town will review potential landslide risk locations.

Sea Level Rise

Coastal Flooding

Roadway and drainage improvements to River St. at Lane Beach: Design is required to raise the road, or implement another alternative, to alleviate coastal flooding on River Street. There are related issues in the adjacent parking lot that should also be addressed as part of the roadway work.

Elevation of structures Fort Point Road neighborhood: Two elevation projects have been completed. Additional homes in the area should be elevated.

Reconstruction Fort Point Road seawall and drainage system: The Town recently received a grant for final design and permitting of reconstruction of the seawall. When this phase is completed, the Town will seek funding for the reconstruction of the wall.

Study sea level rise impacts on natural resource areas: Projected sea level rise will have significant impacts on coastal resources including salt marshes, dunes and coastal banks. Study impacts and identify strategies to protect and bolster coastal resources.

Vulnerability analysis of town infrastructure: Mapping analysis in this plan identifies locations likely to be subject to flooding from future sea level rise. Significant areas of the town, including roadways and infrastructure are implicated. Complete an analysis of potential impacts and options to address impacts.

Consider property purchases for protection from sea level rise: Identify properties that can provide buffers to coastal storms and seek funding for purchase.

Coastal Erosion

Work with private property owner to mitigate coastal erosion areas: Identify locations at risk and work with property owners to institute appropriate strategies to reduce coastal erosion.

Rising Temperatures

Extreme Heat and Heatwaves

Develop heat control strategies for public schools: Many of Weymouth's Schools are in identified hot spot locations (hottest 5% of land in the MAPC region). Investigate and improve, as necessary, HVAC capacity to provide appropriate temperatures for learning and health. Pursue opportunities to reduce heat through strategies such as tree planting, reduced paving, and reflective paving and roofs.

Target natural cooling strategies to high heat areas: Data in the plan show that Black and Latino residents are much more likely to suffer health impacts from high heat. Target tree planting resources to high heat areas in state-identified Environmental Justice communities. Consider other natural solutions such as pocket parks.

Site design requirements to increase tree planting: Implement site design requirements to increase tree cover in areas such as parking lots and large developments.

Wildfires

Fire prevention public education:

The Fire Department participates in community events providing targeted outreach and informational brochures. The Fire Department maintains a web page with fire prevention materials. The Fire Department plans on working with local CATV to produce fire prevention videos and bulletins.

Invasive Species

Investigate and manage invasive species: Focus on impacts to critical resources including water supply, coastal banks, and tree health.

Extreme Weather

Hurricanes/Tropical storms: see Severe Winter Storm/Nor'easter

Severe Winter Storm/Nor'easter

Tree management: Downed trees and trees limbs are a critical risk during snow storms and wind storms. Proactively trim and remove hazardous trees.

Tornadoes: see Severe Winter Storm/Nor'easter
Other Severe Weather: see Severe Winter Storm/Nor'easter

Non-Climate Hazard

Earthquake
Analyze town buildings for vulnerability: Periodically assess status of town buildings for vulnerabilities.

SECTION 9: PLAN ADOPTION & MAINTENANCE

PLAN ADOPTION

The Weymouth Hazard Mitigation Plan 2021 Update was adopted by the Mayor 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 Weymouth 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 Weymouth 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
- Council on Aging
- 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 Town of Weymouth has taken steps to implement findings from the 2015 Hazard Mitigation Plan into the following policy, programmatic areas, and plans: the adoption of stormwater regulations, and the Community Resilience Building Workshop Summary of Findings completed by the city in 2018 and referenced in Appendix E, and the Open Space and Recreation Plan, updated in 2020. 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

Weymouth Zoning Ordinance

Town of Weymouth Community Resilience Building Workshop Summary of Findings 2018

Town of Weymouth Open Space and Recreation Plan 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

Weymouth Hazard Mitigation Plan Update

LOCAL HAZARD MITIGATION PLANNING TEAM

Meeting #1

Thursday, February 4, 2021

9:00 am

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 and development areas
   a) Flood Hazard Areas
   b) Fire Hazard Areas (brushfires/ wildfires)
   c) Anticipated development
6. Review critical infrastructure
7. Next steps

Weymouth Hazard Mitigation Plan Update

LOCAL HAZARD MITIGATION PLANNING TEAM

Meeting #2

Tuesday, March 9, 2021

10:00 am

via Zoom

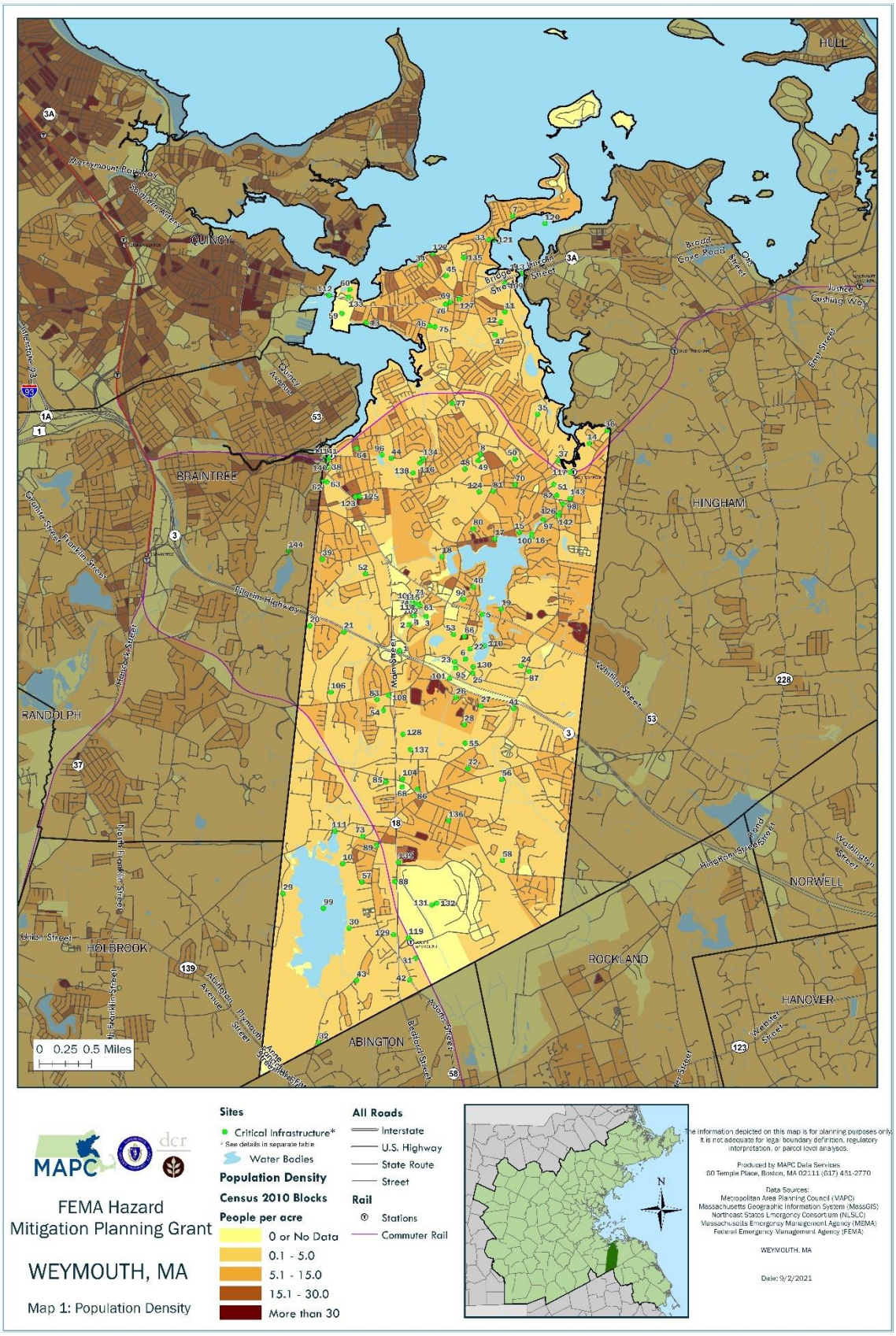
AGENDA

1. Review Hazard Mitigation Goals
2. Review/update mitigation measures from the original (2008) plan
3. Review/update mitigation measures from the 2015 plan
4. Plan first public meeting

Weymouth Hazard Mitigation Plan
Team Meeting
August 11, 2021
2:00 – 3:30
via Zoom

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

APPENDIX B: HAZARD MAPPING



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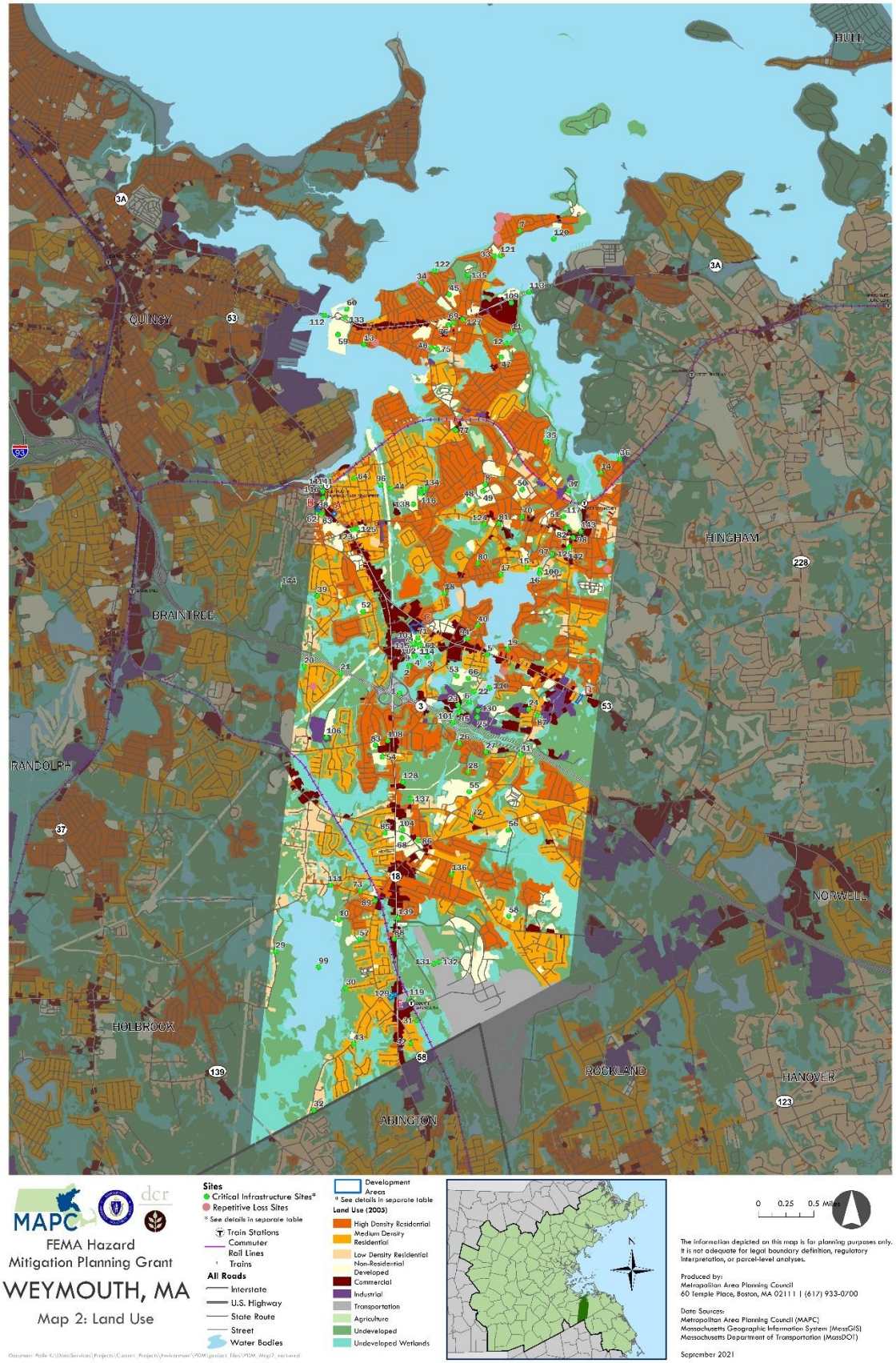
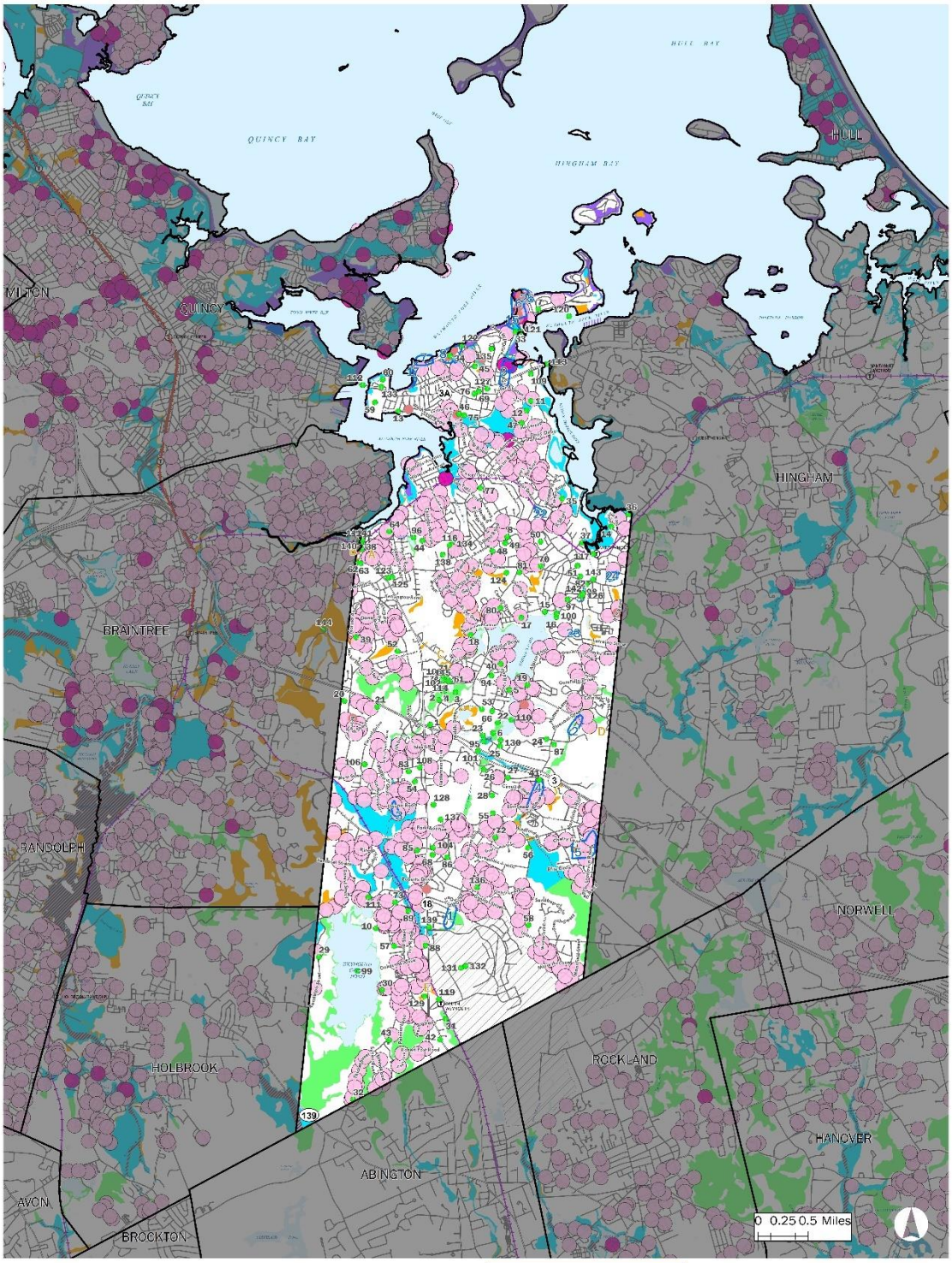

HULL
QUINCY
HINGHAM
BRAINTREE
RANDOLPH
NORWELL
HOLBROOK
ROCKLAND
HANOVER
ABINGTON
MAPC
dcr
FEMA Hazard
Mitigation Planning Grant
WEYMOUTH, MA
Map 2: Land Use
Sites
Critical Infrastructure Sites*
Repetitive Loss Sites
* See details in separate table
Train Stations
Commuter Rail Lines
Trains
All Roads
Interstate
U.S. Highway
State Route
Street
Water Bodies
Development Areas
* See details in separate table
Land Use (2005)
High Density Residential
Medium Density Residential
Low Density Residential
Non-Residential Developed
Commercial
Industrial
Transportation
Agriculture
Undeveloped
Undeveloped Wetlands
0 0.25 0.5 Miles
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:
Metropolitan Area Planning Council
60 Temple Place, Boston, MA 02111 | (617) 933-0700
Data Sources:
Metropolitan Area Planning Council (MAPC)
Massachusetts Geographic Information System (MassGIS)
Massachusetts Department of Transportation (MassDOT)
September 2021



MAPC

dcr

FEMA Hazard Mitigation Planning Grant

WEYMOUTH

Map 3: Flood Zones

Sites
- Critical Infrastructure Sites*
- Repetitive Loss Sites

* See details in separate table

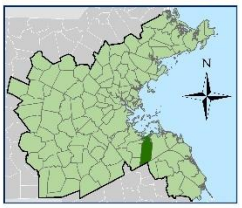
Flood Zones, 2017 (Annual Chance)
- A: 1% Annual Chance of Flooding, no BFE
- AE: 1% Annual Chance of Flooding, with BFE
- AE: Regulatory
- VE: High Risk Coastal
- X: 0.2% Annual

March 2010 Flood Claims
- Disaster Assistance
- Flood Insurance

Locally Identified Hazard Areas*
- Flooding
- Development Areas*

* See SeaFan IV Risk Assessment
^ See details in separate table

- Train Stations Commuter
- Rail Lines Trains



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Massachusetts Emergency Management Agency (MEMA)
Massachusetts Department of Conservation and Recreation (DCR)

September 2021

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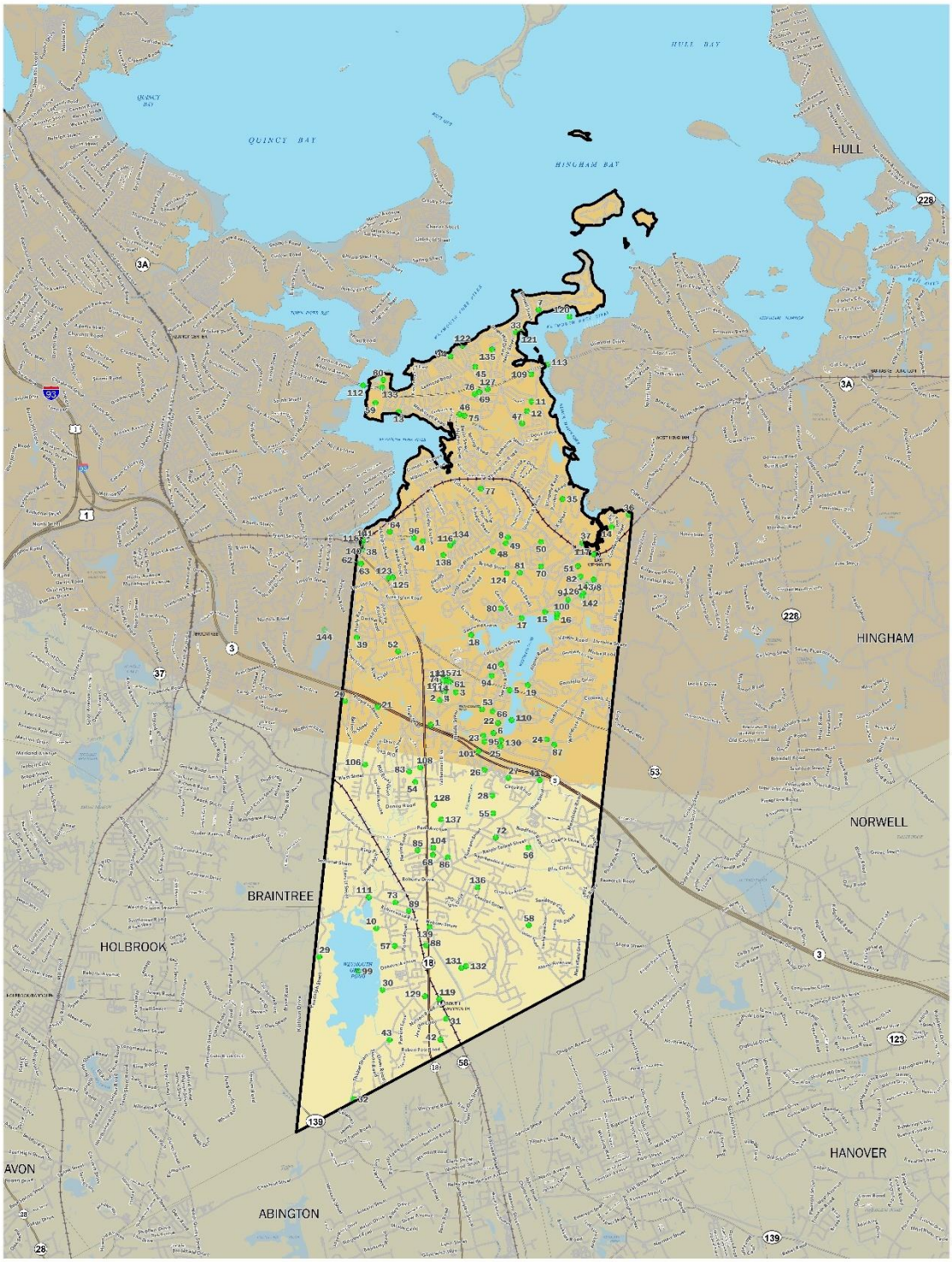

MAPC

FEMA Hazard Mitigation Planning Grant
WEYMOUTH, MA

Map 4: Earthquakes / Landslides

Sites
- Critical Infrastructure Sites*

* See details in separate table

Earthquakes
- Epicenters
- Train Stations
- Commuter Rail Lines
- Trains

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

- Water Bodies

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

0 0.25 0.5 Miles

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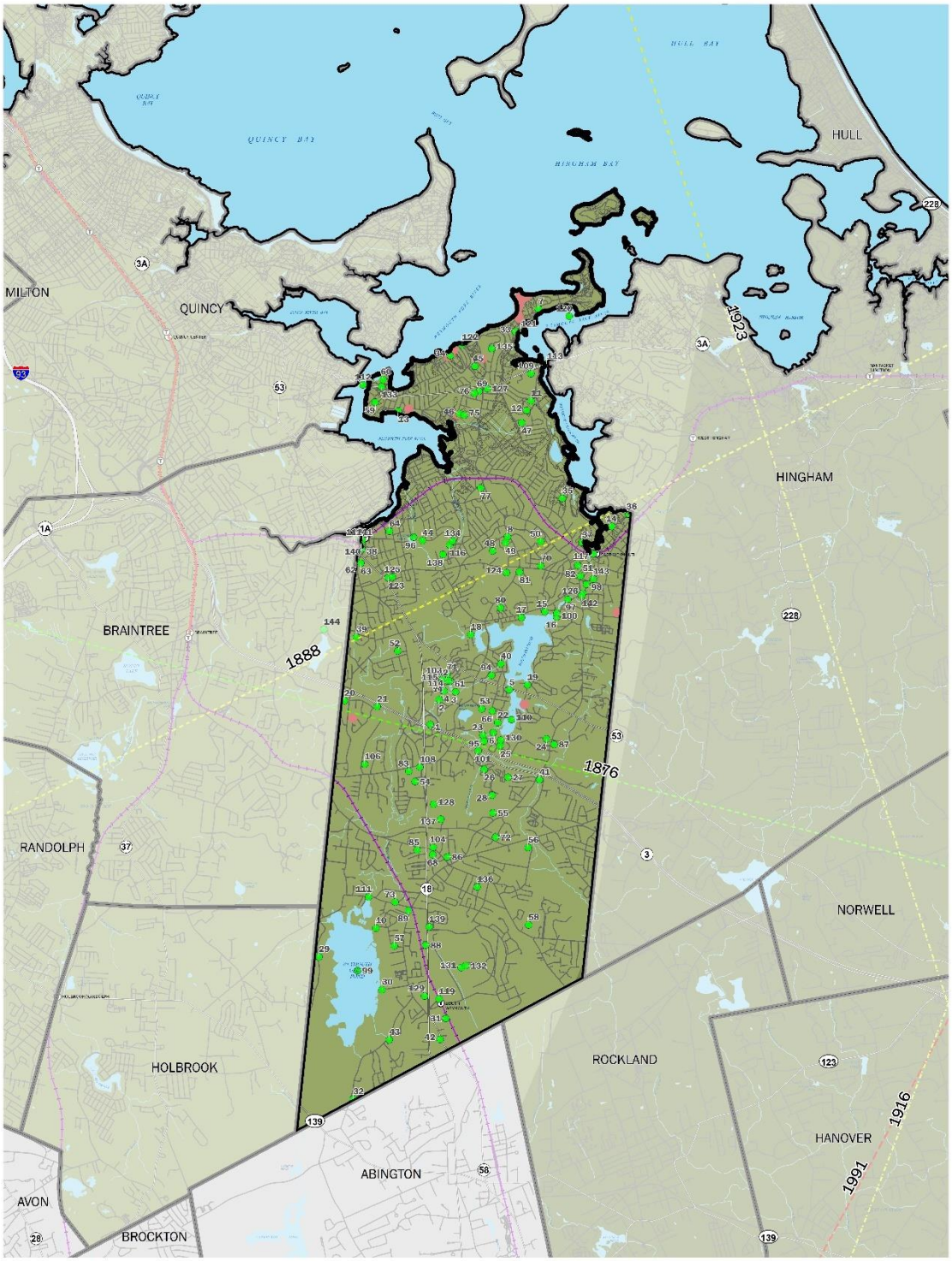
Produced by:
Metropolitan Area Planning Council
60 Temple Place, Boston, MA 02111 | (617) 933-0700

Data Sources:
Metropolitan Area Planning Council (MAPC)
Massachusetts Geographic Information System (MassGIS)
Massachusetts Department of Transportation (MassDOT)

September 2021



MAPC

dcr

FEMA Hazard
Mitigation Planning Grant

WEYMOUTH, MA

Map 5: Hurricanes / Tornadoes

Sites
- Critical Infrastructure Sites*
- Repetitive Loss Sites

* Sites are not to scale at this scale

Tornadoes
- Tornado

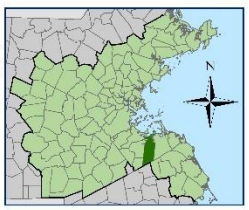
All Roads
- Interstate
- U.S. Highway
- State Route
- Street
- Train Stations
- Commuter Rail Lines
- Trains
- Water Bodies

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

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



0 0.25 0.5 Miles

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Data Sources:
Metropolitan Area Planning Council (MAPC)
Massachusetts Geographic Information System (MassGIS)
Massachusetts Department of Transportation (MassDOT)

September 2021

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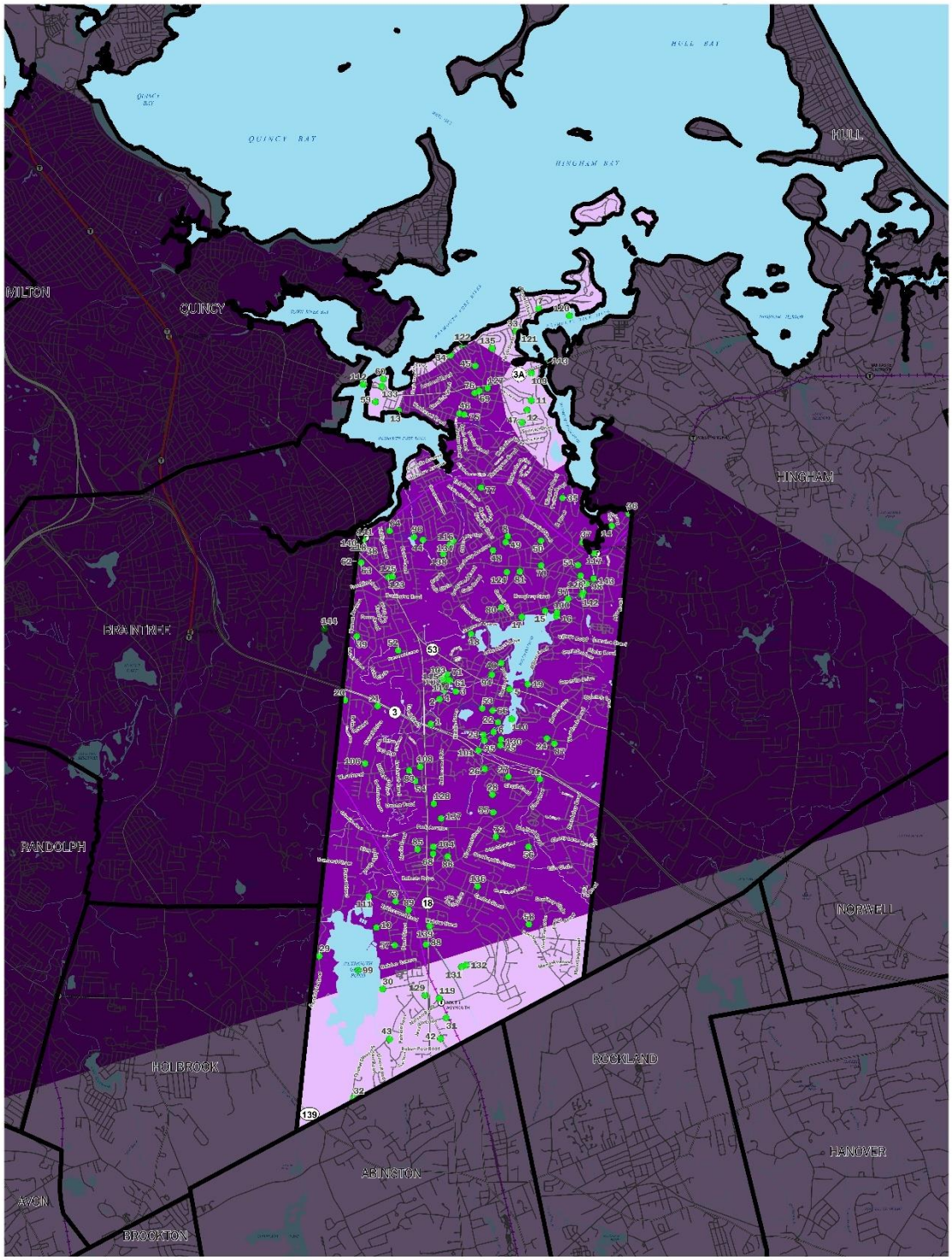


MAPC dcr

FEMA Hazard Mitigation Planning Grant

WEYMOUTH, MA

Map 6: Average Snowfall

Sites

Critical Infrastructure Sites*

* See details in seperate table

Average Annual Snowfall

36.1 to 48.0 inches

48.1 to 72.0 inches

Water Bodies

Train Stations

Commuter Rail Lines

Trains

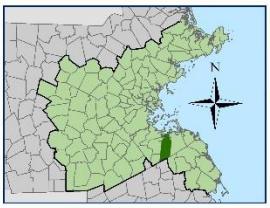
All Roads

Interstate

U.S. Highway

State Route

Street



0 0.25 0.5 1 Miles

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Metropolitan Area Planning Council
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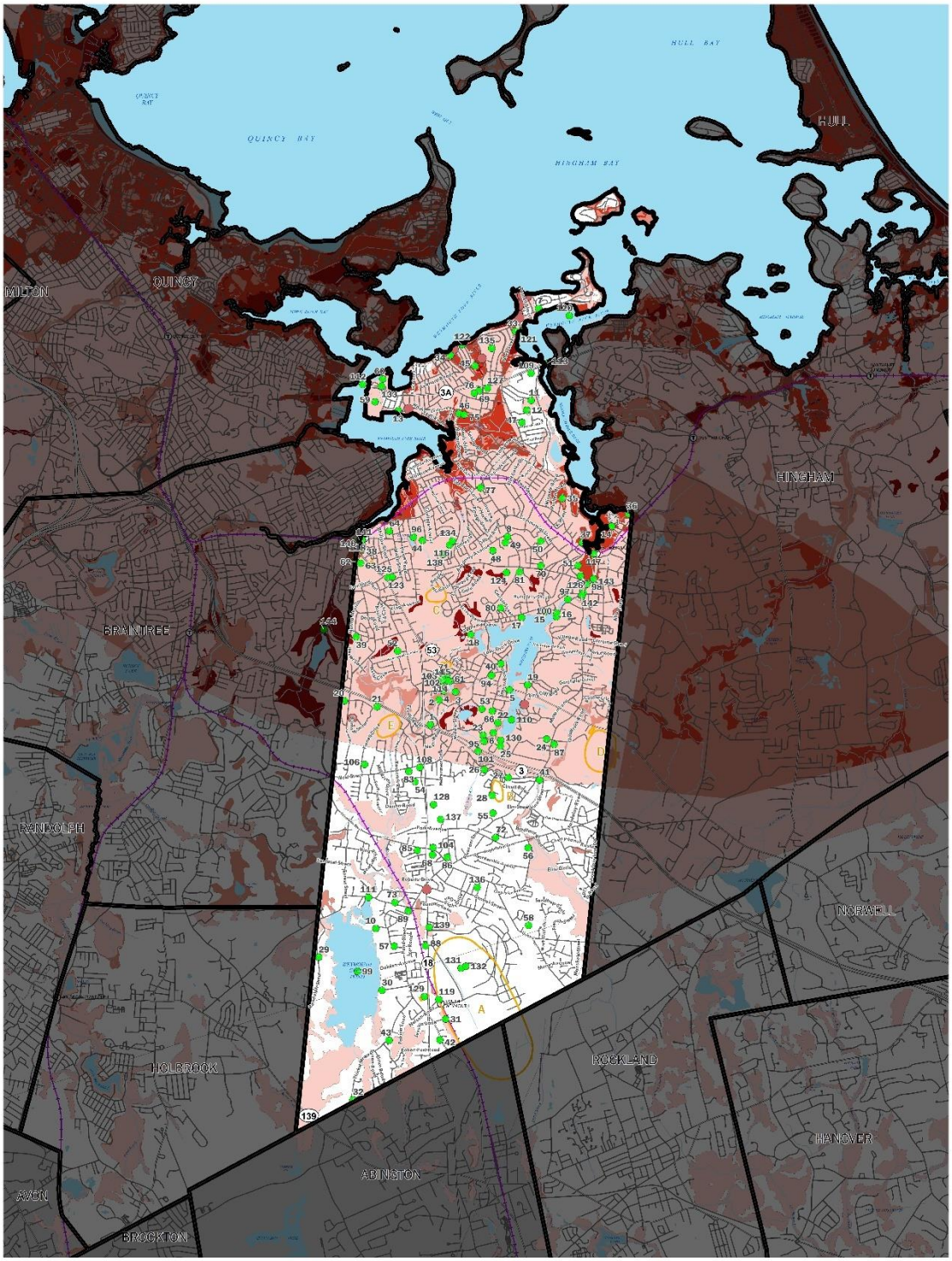
Data Sources:
Metropolitan Area Planning Council (MAPC)
Massachusetts Geographic Information System (MassGIS)
Massachusetts Department of Transportation (MassDOT)

September 2021



MAPC dcr

FEMA Hazard
Mitigation Planning Grant
WEYMOUTH, MA
Map 7: Composite Natural Hazards

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

* See details in separate table

Composite natural hazards shown for areas of existing development. Hazards include:
- 100 year wind speed of 110 MPH or higher
- Moderate seismic 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

Sites
- Critical Infrastructure
- RepetitiveLossSites
- Development Areas

0 0.25 0.5 1 Miles

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Produced by:
Metropolitan Area Planning Council
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Data Sources:
Metropolitan Area Planning Council (MAPC)
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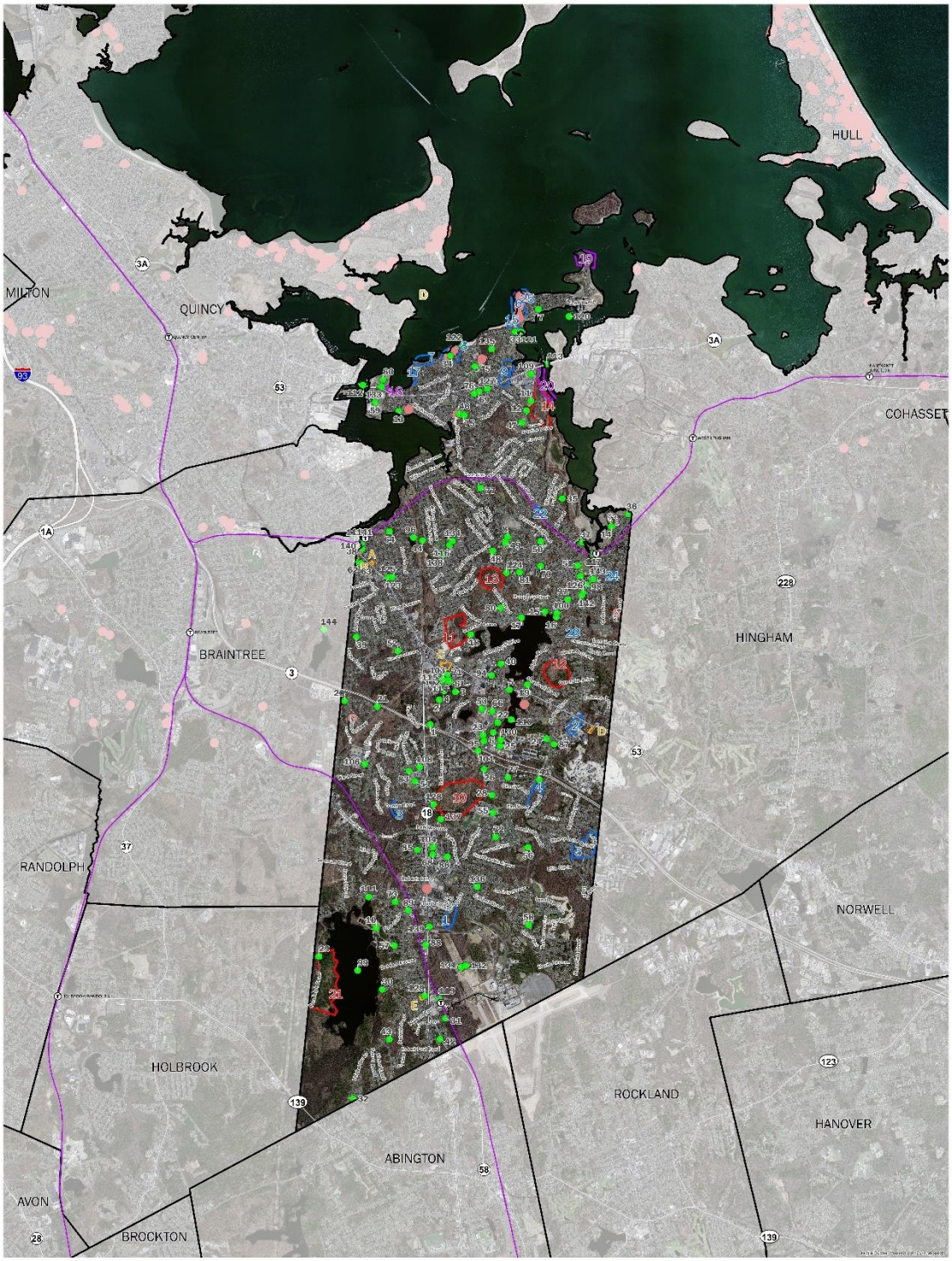

MAPC

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FEMA Hazard Mitigation Planning Grant

WEYMOUTH, MA

Map 8: Local Hazard Areas

Sites
- Critical Infrastructure Sites*
- Repetitive Loss Sites

* See details in separate table

Locally Identified Hazard Areas
- Brush Fires
- Flooding
- Historic

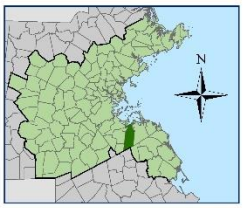
* See Section IV Risk Assessment

- Development Sites

* See details in separate table

- Train Stations
- Commuter Rail Lines
- Trains

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



0 0.275 0.55 1.1 Miles

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Data Sources:
Metropolitan Area Planning Council (MAPC)
Massachusetts Geographic Information System (MassGIS)
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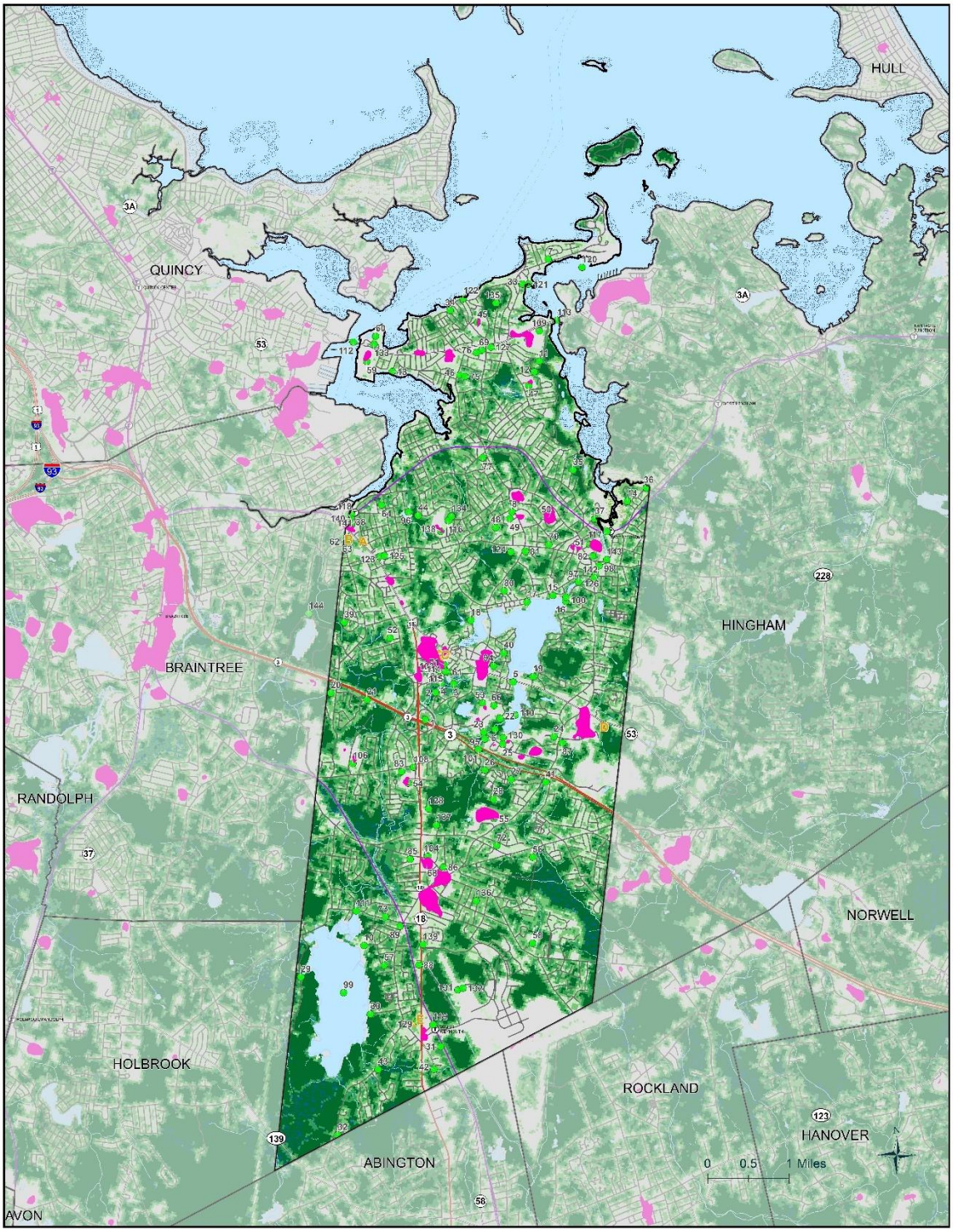
Imagery from 2008

September 2021

Document Path: G:\DataServices\Projects\Current_Projects\Environment\PDM\project_files\PDM_Map8_vertical



MAPC

dcr

FEMA Hazard Mitigation Planning Grant

WEYMOUTH, MA

Map 9: High Land Surface Temperature

Climate Hazards

Hottest 5% of region's land area

Tree Canopy Coverage

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76 - 100%

Transportation

- Rail Stations
- Commuter Rail

Roads

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

Sites

- Critical Infrastructure*
- Development Areas

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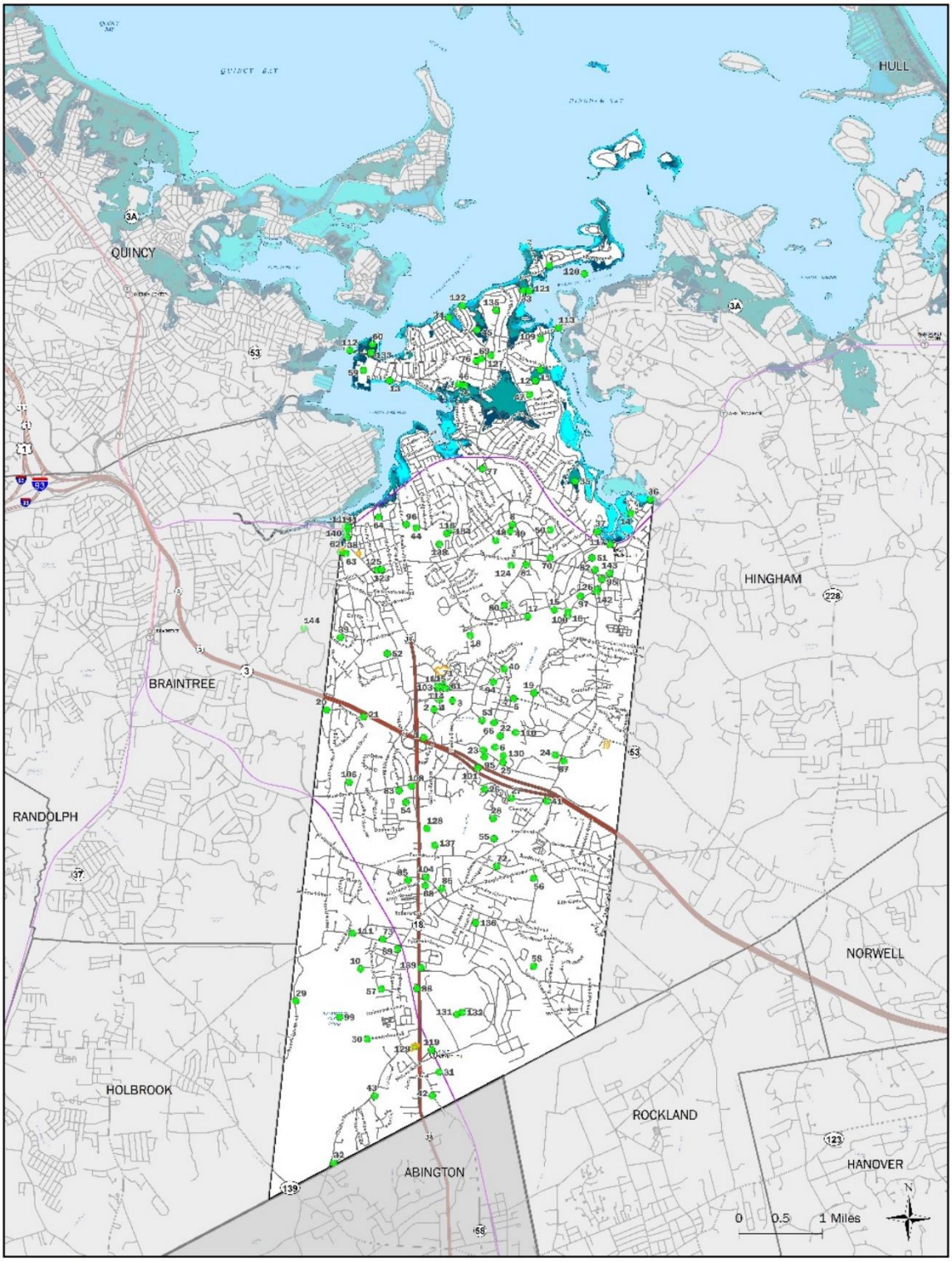
Produced by MAPC Data Services
60 Temple Place, Boston, MA 02111 (617) 451-2770

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

WEYMOUTH, MA

Date: 9/2/2021



MAPC dcr

FEMA Hazard Mitigation Planning Grant

WEYMOUTH, MA

Map 10: Sea Level Rise

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

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

- Train Stations
- Commuter Rail Lines
- Trains

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

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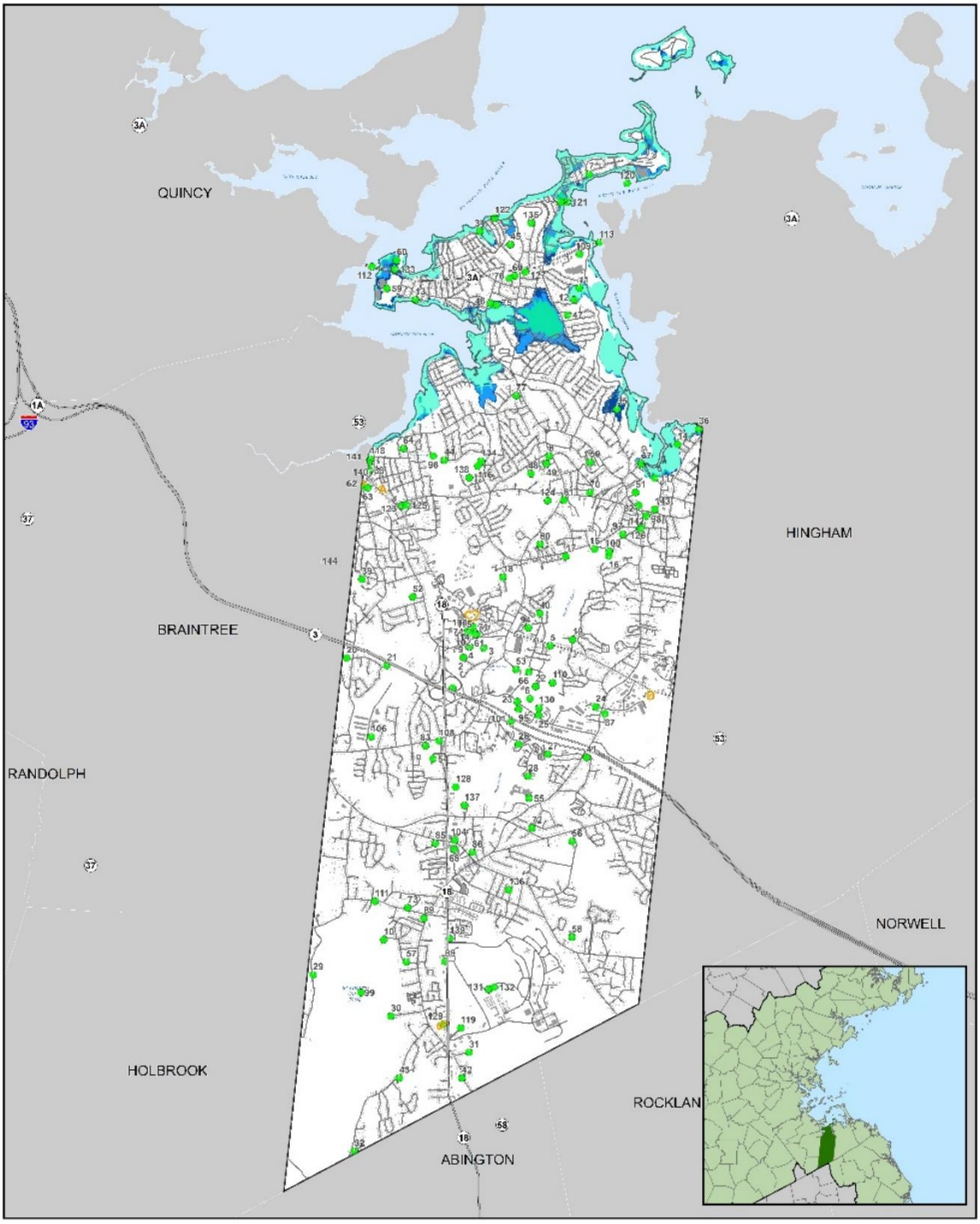
60 Temple Place, Boston, MA 02111 (617) 451-2770

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)
Imagery © Google

WEYMOUTH, MA

Date: 9/2/2021



WEYMOUTH, MA

Map 11

Coastal Flooding 1% Storm Floodplains
Comparison of Future Predictions

Building

Development

Critical

Annual Chance of Coastal Flooding

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

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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)
Imagery © Google
MC-FRM: MassDOT, UMass Boston, Woods Hole Group (2021)

0 0.25 0.5
Miles

N

Date: 8/2/2021

APPENDIX C: PUBLIC MEETINGS

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

CALENDAR LISTING / MEDIA ADVISORY

WEYMOUTH'S DRAFT HAZARD MITIGATION PLAN TO BE PRESENTED AT JULY 29 PUBLIC MEETING

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

Who: Weymouth 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 Thursday, July 29, 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 Weymouth 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, Weymouth will be eligible for hazard mitigation grants.

When: Thursday, July 29, 2021, at 7:00 PM

Where: The meeting will be held virtually on Zoom.
Register in advance with this link:
https://zoom.us/meeting/register/tJcvd-2oqzotGded4DxzZxyi4OLq2FX-2Y7U
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.

##

The Department of Planning and Community Development invites you to a

Climate Change and Natural Hazards Public Meeting

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

The Town of Weymouth 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:	**Thursday, July 29, 2021**
Time:	**7:00 PM**
Location:	**Virtual Meeting on Zoom**

Register in advance with this link:
https://zoom.us/meeting/register/tJcvd-2ogzotGded4DxzZxyi4OLg2FX-2Y7U
After registering, you will receive a confirmation email containing information about joining the meeting.

For more information, please contact MAPC Environmental Planner Anne Herbst 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

WEYMOUTH'S DRAFT HAZARD MITIGATION PLAN TO BE PRESENTED AT SEPTEMBER 14 PUBLIC MEETING

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

Who: Weymouth 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: At a public meeting on Tuesday, September 14 at 7:00 PM, a presentation on the *Weymouth Draft Hazard Mitigation Plan, 2021* will be hosted by the Planning Board. The 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 draft plan will be posted on the Planning Board website until September 28 and public comments will be accepted during that time.

The Town of Weymouth has prepared the draft Hazard Mitigation plan to document natural hazards that affect the Town, such as floods, hurricanes, and severe winter storms, and to recommend actions that the Town can take to reduce its vulnerability to these hazards. Once completed and approved by the Federal Emergency Management Agency (FEMA), the Town will be eligible for federal Hazard Mitigation Grants from FEMA.

When: Tuesday, September 14, 2021, at 7 PM

Where: McCulloch Building
182 Green Street
Mary McElroy Room

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 have serious impacts on the Town of Weymouth and its residents

The Town of Weymouth 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. Please join us for a presentation on the final draft of the Plan hosted by the Planning Board. The Plan will also available for public comment until September 28, 2021; it will be posted on the Planning Department website.

Date:	**Tuesday, September 14, 2021**
Time:	**7:00 PM**
Location:	**McCulloch Building**
	182 Green Street
	Mary McElroy Room

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

Department of Planning and
Community Development

Robert J. Luongo
Planning Director

(781) 340-5015

Town of Weymouth
Massachusetts

Robert L. Hedlund
Mayor

75 Middle Street
Weymouth, MA 02189

www.weymouth.ma.us

Planning Board Agenda
Tuesday, September 14, 2021
7:00 P.M.
McCulloch Building – Mary McElroy Room
182 Green Street, Weymouth, MA 02191

1. Call to Order
2. Presentation by Anne Herbst from MAPC to present the draft Hazard Mitigation Plan to the public.
3. Discussion and action to be taken on recommendations to Town Council on Measure 21 107 - Proposed Amendments to the Town's Commercial Corridor Overlay Zoning Ordinance
4. Street Naming

    a) Change proposed Cicchese Circle to Spencer Court at 958 Commercial St.
    b) Name access road to 3 lot subdivision at 163 Front St. to Lisa Circle

5. Upcoming Meeting October 12, 2021
6. Adjournment

APPENDIX D: PLAN ADOPTION

Town of Weymouth
Massachusetts

Robert L. Hedlund
Mayor

75 Middle Street
Weymouth, MA 02189

Office: 781.340.5012
Fax: 781.335.8184

www.weymouth.ma.us

CERTIFICATE OF ADOPTION
CHIEF EXECUTIVE OFFICER
TOWN OF WEYMOUTH, MASSACHUSETTS

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

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

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

WHEREAS, duly noticed public meetings were held by the LOCAL HAZARD MITIGATION PLANNING Team on July 29, 2021, and September 14, 2021; and

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

NOW, THEREFORE BE IT RESOLVED that I, Robert L. Hedlund, Mayor of the Town of Weymouth adopt the Town of Weymouth Hazard Mitigation Plan 2021 Update, in accordance with M.G.L. 40, s. 4, or the Charter and Ordinances of the Town of Weymouth.

ADOPTED AND SIGNED this Date: *November 19, 2021*

Robert L. Hedlund
Mayor

APPENDIX E: MVP WORKSHOP RESULTS

Top recommendations from the 2018 Municipal Vulnerability Preparedness workshop that focused on preparing for climate impacts in Weymouth.

1. Build sea walls. Restoring and expanding Weymouth's aging sea walls is the highest priority. An area identified with immediate need is along Fort Point Road. The participants brought up issues related to sea walls, including trade-offs related to height, level of protection, residents' views, ownership, funding sources, and drainage. Furthermore, while sea walls are a priority in the near- to mid-term, participants were interested in long-term land use change as coastal flooding risks increase, such as elevating homes and retreat from flood-prone areas. With so many issues to consider, consensus is that further sea wall study is warranted.

2. Conduct an infrastructural assessment study. Weymouth's infrastructure serves local and regional communities. Potential infrastructural risks due to natural hazards in Weymouth include flooded sewage pump stations, impacts on evacuation routes, decaying storm gates, flooded critical and low-lying roadways, and insufficient drainage systems. A specific concern is accessibility to Weymouth Neck on low-lying roads during flood events. These systems and others will be affected by sea level rise. Therefore, a top recommendation is to conduct a thorough assessment of the infrastructure's quality and resilience to climate change.

3. Improve stormwater management. Projected increases in rainfall amounts pose threats to Weymouth, including inland flooding in areas with poor drainage and sodium intrusion from road salt into drinking water aquifers. The workshop participants felt strongly that watershed groups and the water department should identify how to implement a stormwater utility to fund projects and manage changes, such as addressing poor drainage, sodium intrusion, use of best management practices, additional open space and parks, and green infrastructure. State and federal requirements for municipal stormwater management are increasing and town will need enhanced tools and funding to meet these requirements.

4. Create a communications plan for raising awareness about hazards. Communication was identified as a top priority. Tools such as a communication packet are recommended to increase awareness of hazard mitigation and vulnerabilities at the sub-community level, as the threats from climate change are often hyperlocal. A communication packet could contain pertinent information regarding the sub-area's hazards, adaptation measures, supportive services, and other opportunities for land owners and tenants. Communications about the threats should have graphic representations of the hazard areas under future scenarios. A community communication plan could include public education and provide practical information and answers, such as how to adapt to sea level rise and where emergency shelters are. Town wide emergency communications could be improved with measures such as Reverse 911, maintaining a database of vulnerable populations in conjunction with the health department, maintaining email lists, evacuation route signs, and strengthened coordination amongst community organizations and institutions. Raising

awareness about the nature of future hazards for public education can also create "buy in" for the planning and actions the town will need to take to address the concerns.

5. Protect the public water supply and critical environmental resources. Weymouth needs to secure its water supply by balancing supply and competing demands. The use of conservation tools was identified as a priority. Of the many conservation tools available, workshop participants focused on expanding the ACEC to include herring run and Whitman's Pond to capture more of the area associated with public drinking water supply. An ACEC receives special recognition because of the quality, uniqueness, and significance of its resources to be preserved and enhanced. Extending the ACEC could, among other benefits, improve resilience to extreme precipitation, drought, and high temperatures by guarding the area's vegetated areas from additional impervious surfaces. Other conservation efforts relating to open space protection and water conservation measures could also be used to build resilience in this manner, such as developing protocols to balance and optimize pumping schedules and river flows for the South Cove/Whitman's Pond water supply and the Back River herring run and altering water conservation triggers, so they reflect water levels in more rivers and ponds than Great Pond alone.