

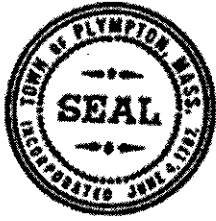
Plympton Multi-Hazard Mitigation Plan



September 2021

PREPARED FOR:
Town of Plympton
5 Palmer Road
Plympton, MA 02367

PREPARED BY:
Woods Hole Group, Inc.
A CLS Company
107 Waterhouse Road
Bourne, MA 02532 USA



TOWN OF PLYMPTON
Commonwealth of Massachusetts

CERTIFICATE OF ADOPTION
Board of Selectmen

TOWN OF PLYMPTON, MASSACHUSETTS

A RESOLUTION ADOPTING THE
TOWN OF PLYMPTON MULTI-HAZARD MITIGATION PLAN (2021)

WHEREAS, the Town of Plympton recognizes the threat that natural hazards pose to people and property within our community; and

WHEREAS, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

WHEREAS, the Town of Plympton established a Committee/Local Planning Team to prepare the *Town of Plympton Multi-Hazard Mitigation Plan (2021)*; and

WHEREAS, the *Town of Plympton Multi-Hazard Mitigation Plan (2021)* contains several potential future projects to mitigate potential impacts from natural hazards in the Town of Plympton; and


WHEREAS, duly-noticed public meetings were held by the Local Planning Team on March 10 and June 9, 2021; and

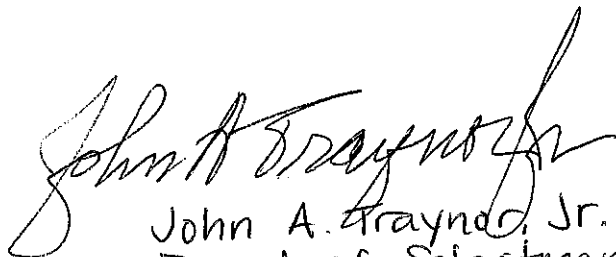
WHEREAS, the Town of Plympton authorizes responsible departments and/or agencies to execute their responsibilities demonstrated in the plan; and

NOW, THEREFORE BE IT RESOLVED that the Town of Plympton BOARD OF SELECTMEN adopts the *Town of Plympton Multi-Hazard Mitigation Plan (2021)*, in accordance with M.G.L. 40 §4 or the charter and bylaws of the Town of Plympton.

ADOPTED AND SIGNED this Date: December 6, 2021

Plympton Board of Selectmen


Mark Russo, Clerk
Board of Selectmen


John A. Grayner, Jr., Vice Chair
Board of Selectmen

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Virtually every type of weather has been and will be experienced within a Massachusetts town. From freezing temperatures and blizzard conditions in the winter to heat and humidity in the summer, Plympton must plan for the worst. The old adage of “if you don’t like the weather, wait a minute” certainly applies.

In addition to potentially severe weather, Plympton’s unique rural character can result in significant damage to trees during a storm, which can block roads, cause power outages, and damage property, while areas where development mixes with vegetative areas can expose the Town to potential wildfires capable of causing property damage to private and public infrastructure, as well as conservation land.

Natural hazards of all kinds can result in injury, loss of life, damage to buildings and infrastructure, which can have significant adverse impacts on the Town’s economic, social, and environmental resources. Through the development and implementation of this Multi-Hazard Mitigation Plan, the Town of Plympton is proactively trying to prepare for and mitigate potential impacts from the various natural hazards.



1.1 PURPOSE OF PLAN

The Federal Emergency Management Agency (FEMA) defines hazard mitigation as “any sustained action taken to reduce or eliminate the long-term risk to human life and property from (natural) hazards”, such as floods, hurricanes, winter storms, tornadoes, earthquakes, etc. Hazard mitigation may include both structural measures, such as flood control structures, and nonstructural measures, such as regulations and bylaws, to prevent flooding. Local planning and mitigation efforts allow communities to reduce or eliminate the loss of life and property damage resulting from natural hazards. The Town of Plympton produced this Multi-Hazard Mitigation Plan for the entire Town with the goal of providing sustained actions to reduce or eliminate risk to human life and property damage from a natural hazard event. Objectives of this plan are as follows:

- Describe the planning process;
- Identify relevant background information about the Town, including geography, climate, land use, and infrastructure;
- Identify natural hazard risks and areas in town most likely to be impacted;
- Complete a risk assessment to profile hazard events, inventory assets, and estimate potential losses;
- Identify existing hazard mitigation measures already in place;
- Develop proposed mitigation measures and a mitigation strategy based on the risk assessment; and
- Design a mechanism to keep the plan updated to reflect current conditions and establish a schedule for monitoring, evaluating, and updating the plan.

What is a Hazard Mitigation Plan?

Natural hazard mitigation planning is the process of reducing or eliminating the loss of life and property damage resulting from natural hazards such as floods, earthquakes, and hurricanes through long-term strategies, including planning, policy changes, programs, projects, and other activities.

Preparation of this Multi-Hazard Mitigation Plan before a major disaster occurs will help the community prevent property damage and loss of life associated with natural hazards, save money by instituting mitigation measures to protect against natural hazards, allow funding through FEMA for pre-disaster remediation, and expedite disaster recovery.

1.2 THE PLANNING PROCESS

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Public participation is a central component of this planning 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. Additionally, the most successful mitigation plans are developed after participation by a wide range of stakeholders who play a role in identifying and implementing mitigation actions. During preparation of this Multi-Hazard Mitigation Plan, the planning process included the following:



- A public survey to assess the community's experience with local natural hazards and perception of the Town's risk to natural hazards;
- An opportunity for the public to comment on the plan during draft stages and prior to final approval;
- An opportunity for local and regional agencies and organizations, neighboring communities, and private industries to be involved in the planning process; and
- A review and incorporation of existing plans, studies, reports and data.

A1.b

This Multi-Hazard Mitigation Plan (MHMP) is an updated and more specific plan than the previous one used by the Town of Plympton, which was developed for the entire Old Colony Region (Natural Hazard Mitigation Plan for the Old Colony Region, 2015). This updated plan was developed through substantial input from the Local Planning Team (LPT), which consisted of various Town officials and who were able to provide critical local knowledge about the community to facilitate the development of this Plan.

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A1.c
A1.d

The LPT was formed by the Town Administrator, and included Chiefs of the Police and Fire Departments, the Fire Captain, the Town Selectman, and representatives from the Highway Department and Board of Health. Additional input was sought and obtained from the Old Colony Planning Council. The LPT met for five (5) working meetings during the Plan development process; agendas for each are provided in Appendix B. The 2021 MHMP was largely funded through a FEMA Pre-Disaster Mitigation (PDM) Grant. In addition to the LPT input, public participation in the hazard mitigation planning process is also important, both for plan development and for 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 about the hazard mitigation process and potentially creates support for future mitigation actions. Although typically, public meetings would be hosted to gather this information and educate residents on hazard mitigation, due to the COVID-19 restrictions in place during the critical development stages of this report, the Town opted to host online presentations instead. The presentations were hosted live on March 10 and June 9 of 2021, and recordings were made available through the local television station for residents to view when they were able.

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A3.a-b

Copies of the announcements from this online webinar, as well as a master list of LPT members are provided in Appendix B. These materials provide a foundation for understanding the planning process and major decisions made along the way and can help provide crucial background information the next time the LPT meets to review and update the MHMP.

A public online survey was also administered to assess the community's experience with local natural hazards and their perception of the risk, and to reach a wider demographic that may not be available to attend public meetings in person. The survey was also distributed as a paper copy through the Council on Aging Monthly Newsletter. A total of 69 responses were received between the online and printed versions of the survey. The results of this online public survey are also included in Appendix B.



The following steps were taken during the planning process:

- 1) Develop an LPT responsible for updating this Plan;
- 2) Define the potential natural hazards that could affect Plympton;
- 3) Determine high hazard locations and critical infrastructure potentially affected;
- 4) Conduct a vulnerability assessment of buildings and infrastructure;
- 5) Outline existing hazard mitigation measures and document progress on the previous Plan's actions;
- 6) Determine gaps in hazard mitigation preparedness;
- 7) Define proposed hazard mitigation measures to fill these gaps; and
- 8) Evaluate the feasibility of and prioritize mitigation measures.

The above steps will allow implementation of proposed mitigation measures with a goal of reducing damage and improving public safety during a natural disaster. To solicit public comment, the draft Plan was posted on the Town of Plympton's website, with a notification on the Town's homepage, a direct link to the plan, and directions for how to submit questions or comments. A screenshot documenting the website posting is provided in Appendix B. The draft Plan was also presented on June 9, 2021 at a public meeting to gather additional public input. Advertising for the public meeting included posting an announcement on the Town website. The draft plan was posted on the website for three weeks prior to finalization. No comments were received during this time.

A2.a
A2.b

The draft Plan was also sent to Town Planners in Pembroke, Middleborough, Carver, Kingston, and Halifax, as well as the Old Colony Planning Council for review and comment. A copy of the email sent to these neighboring towns and regional planning body soliciting their feedback on the Plan is also provided in Appendix B. No comments were received.

A4.a
A4.b

During preparation of this Plan, several existing studies and documents related to Plympton and the surrounding area were reviewed. Preparation of this Plan borrowed from the following plans and documents where appropriate:

- Massachusetts State Hazard Mitigation and Climate Adaptation Plan (2018);
- Old Colony Regional Hazard Mitigation Plan (2015); and
- Local bylaws and regulations.

The 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan (SHMCAP) was developed through a collaborative process that involved numerous state agencies, a large cross-section of stakeholders, members of the public, working groups, and a consulting team. This was the hazard plan's eighth revision from its initial preparation in 1986, but this version is unique in that it is the first-of-its-kind statewide plan that fully integrates a traditional hazard mitigation plan with a climate change adaptation plan.

The Old Colony Regional Hazard Mitigation Plan conducted a vulnerability assessment for each community within the Old Colony region to determine risk of natural hazards. A community profile was developed describing relevant background information on geographic location, land



use, and natural features. Using a town-developed list of critical facilities, natural hazard risk for each facility was then determined. A vulnerability assessment was also conducted, determining the likely frequency and severity of hazards that Plympton is likely to experience.

A2

Various town departments and boards have implemented and updated bylaws and regulations as necessary to control development and ensure safe construction methods that adhere to current best management practices. The Plympton Office of the Town Clerk is the primary town agency responsible for regulating development in the town, through the Zoning Bylaw. The Conservation Commission also regulates development through enforcement of the Massachusetts Wetlands Protection Act to protect wetlands and adjacent upland areas. Feedback from these boards was periodically solicited by the LPT during the planning process. In addition, the OCPC, the regional planning agency for Plympton, works with all agencies that regulate development in its region, including the municipal entities and state agencies, such as the Department of Conservation and Recreation (DCR) and Massachusetts Department of Transportation (MassDOT). This regular involvement ensured that during the development of the Plympton Multi-Hazard Mitigation Plan, the operational policies and any mitigation strategies or identified hazards from these entities were incorporated.

Technical information from the plans, regulations, and bylaws described above was incorporated into the Plympton Multi-Hazard Mitigation Plan in a number of ways, including by:

- 1) Guiding the planning process;
- 2) Helping develop mitigation actions;
- 3) Providing recent data on various hazards and their impacts; and
- 4) Ensuring that mitigation actions in this plan were consistent with current state and local activities and plans.

A1.d

1.3 PLAN DESCRIPTION

FEMA developed a “Local Mitigation Review Guide” (Guide) to ensure Local Hazard Mitigation Plans meet the requirements of the Stafford Act and Title 44 Code of Federal Regulations (CFR) 201.6. This Guide was used as a tool in developing this Plan. For ease of assessment, when the text addresses an element of the Guide, it is identified in a colored bullet in the margin.

1.4 PREVIOUS FEDERAL/STATE DISASTERS

The Town of Plympton has experienced 6 natural hazards that triggered federal or state disaster declarations since 2010 (FEMA 2019). These are listed in Table 1-1 below. The vast majority of these events involved flooding.



Table 1-1. Disaster declarations for the Town of Plympton since 2010.

Disaster Name	Type of Assistance	Declared Areas
Severe Storm and Flooding (Mar 12–Apr 26, 2010)	FEMA Public & Individual Assistance	Counties of Plymouth, Bristol, Essex, Middlesex, Norfolk, Suffolk, and Worcester
Tropical Storm Irene (August 27-29, 2011)	FEMA Public Assistance and Hazard Mitigation Grant Program	Counties of Plymouth, Barnstable, Berkshire, Bristol, Dukes, Franklin, Hampden, Hampshire, and Norfolk
Hurricane Sandy (Oct 27 – Nov 8, 2012)	FEMA Public Assistance and Hazard Mitigation Grant Program	Counties of Plymouth, Barnstable, Bristol, Dukes, Nantucket, and Suffolk
Severe Winter Storm (February 8-10, 2013)	FEMA Public Assistance and Hazard Mitigation Grant Program	All 14 MA Counties
Severe Winter Storm (January 26-28, 2015)	FEMA Public Assistance and Hazard Mitigation Grant Program	Counties of Plymouth, Barnstable, Bristol, Dukes, Essex, Middlesex, Nantucket, Norfolk, Suffolk and Worcester
Severe Winter Storm (March 2-3, 2018)	FEMA Public & Individual Assistance	Counties of Plymouth, Barnstable, Bristol, Nantucket, Norfolk and Essex



One of the first steps in hazard mitigation planning is to identify and define the Town's assets. Without a detailed and accurate understanding of the infrastructural, societal, and environmental resources present within the Town, it is impossible to develop a plan to protect them. The goal of this chapter is to provide a local profile, detailing the community's assets, the Town's geography and climate, an overview of the Town's environmental resources, the Town's land use and demographic patterns, the locations of major infrastructure and critical facilities, and historical locations throughout Town.

Although all community assets may be affected by natural hazards at times, some assets and infrastructure are more vulnerable because of their physical characteristics, location, or socioeconomic uses. This asset inventory will help support the vulnerability analysis conducted in Chapter 4, which will identify specific vulnerable assets within the Town of Plympton.



B1.b

2.1 OVERVIEW

The Town of Plympton is located within the Old Colony Region of Plymouth County, in southeastern Massachusetts. It was incorporated in 1707. As of the 2010 census, the population of Plympton was 2,820. The Town has a traditional New England government structure with a three-member Board of Selectmen, a Town Administrator, and an open Town Meeting. Among the basic services provided to the residents are public safety, schools, recreational facilities, and a public library.

Residents and businesses within the Town of Plympton receive their water supply and wastewater disposal services exclusively from on-site private wells and facilities. This is due to Plympton's primarily rural character and lack of buildable land as a result of tight soils, wetlands, and high water tables. Fire protection is provided exclusively by the Plympton Fire Department, led by a Fire Chief. The Fire Chief is typically included on municipal projects and matters that have a water element, which is the majority of them.

The Town maintains a website at: <https://www.town.plympton.ma.us/>

2.2 GEOGRAPHY

The Town of Plympton is a rural community located in southeastern Massachusetts at the headwaters of the Jones River and Jones River Brook. The Town is primarily forest and wetland, containing numerous ponds and cranberry reservoirs. Commercial development within the Town of Plympton is concentrated downtown along Route 58 and limited to a cafe, convenience store, a gas station, and small shopping plaza. Recently, a Sysco distribution plant was constructed near Route 44.

Plympton is approximately 15 square miles in area. The Town is located approximately 35 miles southeast of Boston and 16 miles south of Brockton. Plympton is bordered by Pembroke, Kingston, Carver, Middleborough, and Halifax (from north to west in a clockwise direction).

2.3 CLIMATE

Plympton averages 51 inches of rain per year, with an additional average annual snowfall of 34 inches. Average temperatures range from highs in the upper 70's (Fahrenheit) during the summer months to lows in the mid 20's during winter months.

2.4 NATURAL ENVIRONMENT

Plympton's natural environment and natural resources are important to the Town's identity and quality of life. In fact, one of the most important factors in why people move to and visit Plympton is its natural environment and rural character. The Town has a varied landscape, with large stretches of open space, forested land, wetlands, and small bodies of water. These natural resources provide a variety of ecosystem services, such as clean air and water. The natural environment also increases resiliency and reduces hazard impacts, through flood attenuation as wetland areas and cranberry bogs absorb flood waters, through stormwater management as



rainwater drains through the soil, and through erosion control as vegetation secures soil along riverbanks.

D1.a

2.5 LAND USE

Early land use in Plympton was primarily agricultural, as early residents lived off the land. After the Industrial Revolution, Plympton's economy and landscape were shaped by cotton and lumber mills, as well as shovel and shoe factories. Cranberry bogs were also present in the area, as early as 1885. Currently, the Town is primarily a rural area, consisting of 41.1% forest, 30.1% wetlands and water, and 12.8% agriculture, according to the Old Colony Regional Hazard Plan as of 2015. Cranberry growing remains active today, with the Mayflower Cranberries company operating a 112-acre farm with 23.6 acres of active cranberry bogs.

Figure 2-1 depicts the 2019 assessor's parcel dataset categorized by land use and Table 2-1 outlines the number of parcels within each land use classification. The largest category by area is residential land use (including single-family homes, multi-family homes, and other residential properties) for a total of 49% of Plympton's total area. The next largest categories by area are mixed use, other open land and agricultural, comprising 17%, 7% and 6% of Plympton's area, respectively. There has been no major development or land use changes within the Town of Plympton since the 2015 regional hazard mitigation plan. In addition, Plympton has Zoning Bylaws, which include a Flood Plain Overlay District that limits certain development activities within designated FEMA flood zones, as well as a Wetlands Protection Bylaw, which upholds the Wetlands Protection Act. These regulations will limit any future development along the river corridors, which represent the majority of the flood hazard prone areas in Plympton. Finally, there is no planned development in Plympton that would affect the Town's flood vulnerability.

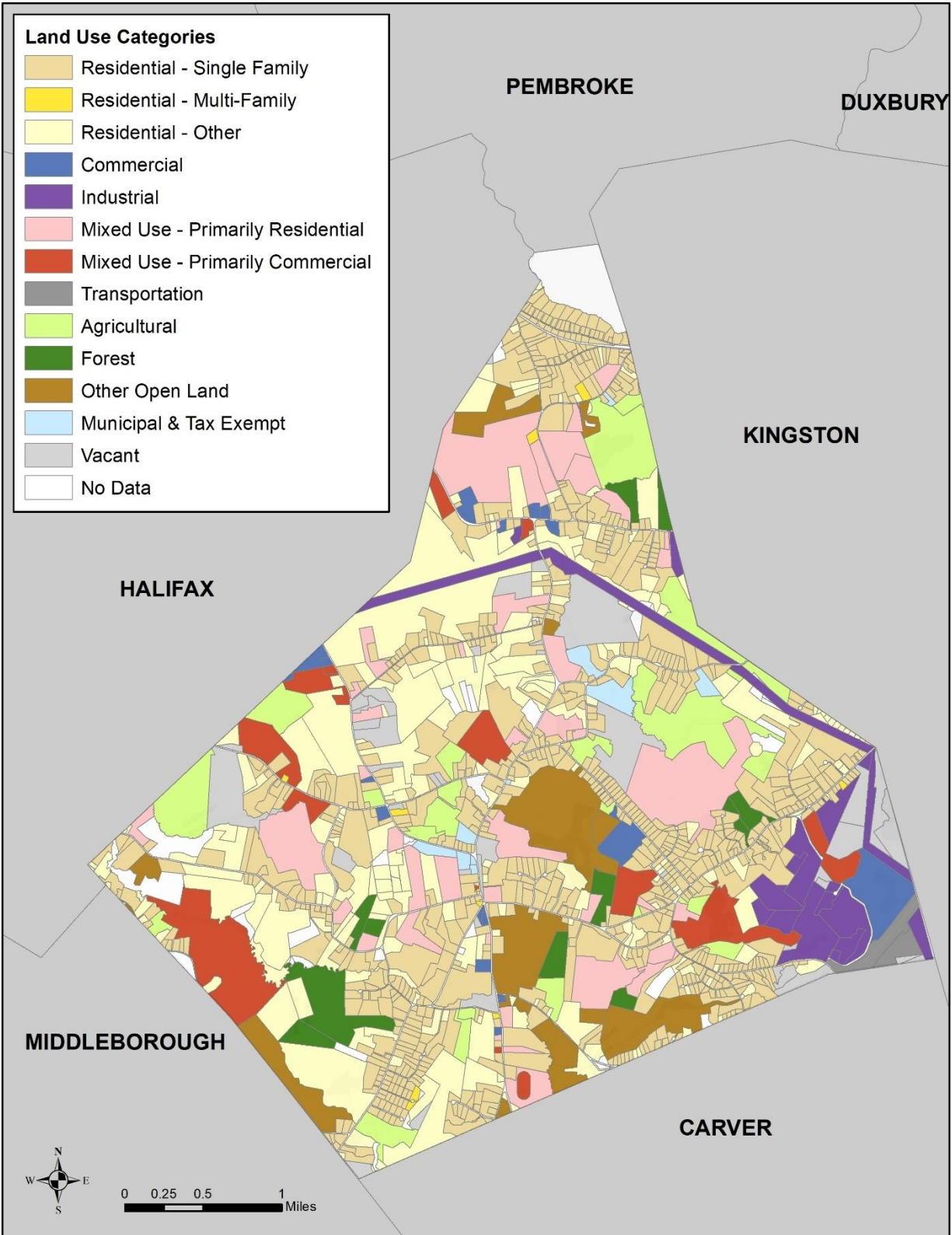


Figure 2-1. Town of Plympton land use categories.



Table 2-1. Number of Parcels in Each Land Use Classification.

Land Use Type	Number of Parcels
Residential – Single Family	914
Residential – Multi-Family	10
Residential – Other	253
Commercial	18
Industrial	17
Mixed Use – Primarily Residential	42
Mixed Use – Primarily Commercial	14
Transportation	2
Agricultural	24
Forest	11
Other Open Land	14
Municipal & Tax Exempt	10
Vacant	39
No Data	54

2.6 TRANSPORTATION

The Town of Plympton includes a number of major transportation corridors, including Routes 44, 58, and 106. Public transportation within Plympton is limited to the Kingston/Plymouth Line of the MBTA Commuter Rail service, which runs through Plympton, although the closest stop is in Halifax.

2.7 CRITICAL FACILITIES

Critical facilities are those that are essential to the health and welfare of the Town and those that are especially important for response and recovery following hazard events. Critical facilities include buildings and infrastructure such as emergency operations centers, critical municipal buildings, water and wastewater facilities, schools, veterinary clinics, etc. The LPT developed a list of critical facilities, which is provided in Appendix C. The critical facilities in Plympton are shown in Figure 2-2; the numbers correspond to the list in Appendix C. A portion of these critical facilities are located within high hazard areas, such as floodplains. Due to the importance of these facilities, special care must be taken to ensure continued operation even during disaster events.

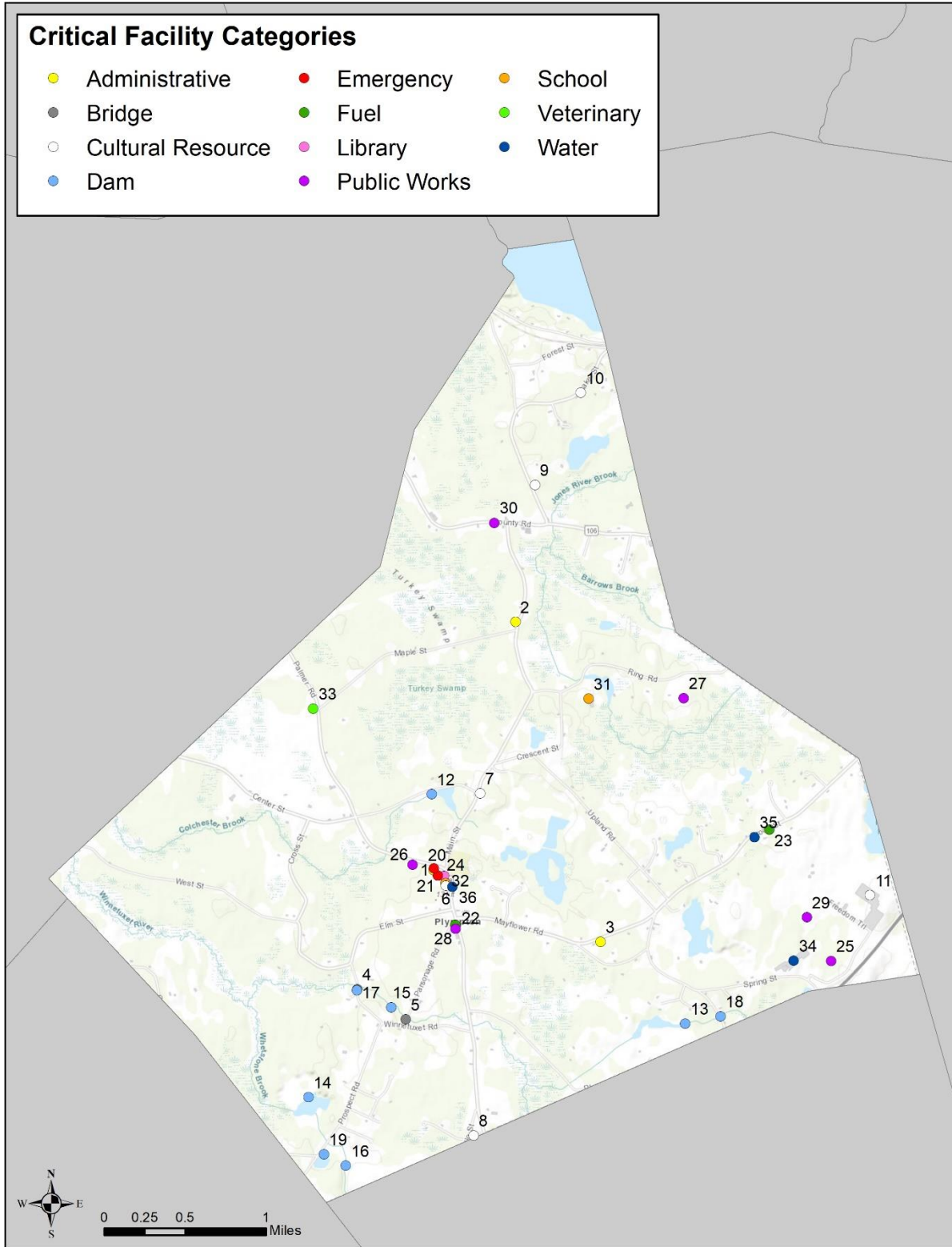


Figure 2-2. Plympton critical facilities map.



2.8 HISTORICAL PROPERTIES

The Plympton Historical Society is the primary organization responsible for maintaining the Town's historical character and significant number of structures. Historical resources within Plympton consists of two historical districts, a variety of privately and publicly owned buildings, and historical landscapes. Significant historical landmarks within Plympton includes the following:

- 1) **Harrub's Corner Local Historic District** – Managed by the Plympton Historic District Commission, this area contains seven properties that form the oldest village in the state. All original dwellings are still standing and the oldest house dates back to 1689, with two other houses dating to before 1725. The district also includes sections of County Road, originally used by Native Americans, and forms an area of archeological importance.
- 2) **Plympton Village Historic District** – Located between Parsonage Road and Palmer Road, this is the only site within the Town listed as a National Register Historic District. The area contains approximately twenty buildings, primarily residential, in addition to the Country Store, Plympton Public Library, The First Congressional Church and Cemetery, the Plympton Town House, and the Hillcrest Cemetery. Structures were built between 1702 and 1935.
- 3) **Old Town House** – Dating back to 1850, this house is currently used by the Plympton Historical Society.
- 4) **Deborah Sampson House and Round House** – Built in 1720 and 1857, respectively, both these houses are privately owned historical structures.

B4.a

2.9 REPETITIVE LOSS PROPERTIES

Repetitive Loss Properties are those for which two or more losses of at least \$1,000 each have been paid under the National Flood Insurance Program (NFIP) within any ten-year period since 1978. As of 2020, the Town of Plympton has no Repetitive Loss Properties.



Plympton is vulnerable to a wide range of natural hazards that can threaten the people, economy, infrastructure, and natural resources of the Town. As suggested under FEMA planning guidance, the Town of Plympton reviewed the full range of natural hazards identified in the most recent Massachusetts State Hazard Mitigation and Climate Adaptation Plan (2018), which included:

- | | |
|---|--|
| <i>1) Inland Flooding</i> | <i>7) Drought</i> |
| <i>2) Coastal Flooding</i> | <i>8) Tornadoes</i> |
| <i>3) Coastal Erosion</i> | <i>9) Average/Extreme Temperatures</i> |
| <i>4) Hurricanes and Tropical Storms</i> | <i>10) Wildfire</i> |
| <i>5) Severe Winter Storms</i> | <i>11) Landslide</i> |
| <i>6) Other Severe Weather (thunder-storms, wind, drought, extreme temperatures, and tornadoes)</i> | <i>12) Earthquake</i> |
| | <i>13) Tsunami</i> |
| | <i>14) Invasive Species</i> |

In addition to the hazards above, the Town of Plympton also included Dam Failure as an additional hazard. This chapter provides a description of each hazard, the location(s) within Plympton that are impacted by each hazard, previous occurrences of each hazard, the possible magnitude of each hazard, the probability of each hazard occurring in a given year, and some of the impacts that can happen in the event that hazard occurs.



B1.a

FEMA defines a hazard as an act or phenomenon that has the potential to produce harm or other undesirable consequences to a person or thing. All natural disasters pose hazards to property, loss of human life, and have the ability to limit access to power, communication services, water, wastewater/collection/treatment, and transportation. Downed trees and limbs also limit emergency access and complicate cleanup efforts. Through the development of this Plan, Plympton is taking steps to protect its infrastructure from natural disasters as much as possible, such that essential utilities and services continue when most needed. Hazards associated with natural disasters typically encountered in Plympton include severe winter weather, hurricanes/tropical storms, and other extreme weather. Natural disasters occurring less frequently, such as tornadoes or earthquakes, pose less frequent, but unique challenges.

The 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan identifies 14 natural hazards that could have an impact on communities in the Commonwealth of Massachusetts. These hazards are:

- | | |
|-----------------------------------|---------------------------------|
| 1) Inland Flooding | 8) Tornadoes |
| 2) Coastal Flooding | 9) Average/Extreme Temperatures |
| 3) Coastal Erosion | 10) Wildfire |
| 4) Hurricanes and Tropical Storms | 11) Landslide |
| 5) Severe Winter Storm | 12) Earthquake |
| 6) Other Severe Weather | 13) Tsunami |
| 7) Drought | 14) Invasive Species |

B1.b

As suggested under FEMA planning guidance (FEMA 2011), the Town of Plympton reviewed the full range of natural hazards identified in the 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan. Also, given the number of dams in the Town, dam failure was also evaluated. The Local Planning Team (LPT) determined coastal hazards, including coastal flooding, coastal erosion, and tsunamis, were not applicable to the inland area of Plympton, and as such, these hazards were not addressed directly in this plan. In addition to the 2018 State Plan, other resources consulted during the drafting of this plan included news articles and other media sources, and local knowledge from LPT members. All resources are referenced in the text of each hazard profile.

Hazards Addressed in Detail in the Plympton Multi-Hazard Mitigation Plan

- | | | |
|--|--------------------------------|---------------------------------|
| 1. Inland Flooding | 5. Tornadoes | 9. Invasive Species |
| 2. Hurricanes & Tropical Storms | 6. Drought | 10. Other Severe Weather |
| 3. Severe Winter Weather | 7. Extreme Temperatures | 11. Dam Failure |
| 4. Wildfire | 8. Earthquakes | 12. Landslides |



3.1 INLAND FLOODING

Overview

Flooding can be caused by extreme weather events such as hurricanes, nor'easters, severe rainstorms, and thunderstorms.

The Town of Plympton is subject to inland flooding, where heavy precipitation overwhelms the capacity of natural and structured drainage systems to convey water away from roads and other areas of concern, causing it to overflow the system. Inland flooding can be caused by major storms, such as nor'easters and hurricanes. 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. Nor'easters tend to cover a larger area than hurricanes and tend to last longer. Large rain storms or snowfalls can also lead to inland flooding. See later sections for more specific details on these other natural hazards.

Flooding due to storm run-off that overwhelms the carrying capacity of storm water infrastructure can be exacerbated by poor design or poor maintenance. Flooding from blocked drainage occurs in flat or depressional areas where runoff or rain collects but cannot drain out. Drainage systems are made up of ditches, storm sewers, retention ponds and other infrastructure designed to transport storm water away from roadways and parking lots, to receiving streams, bays, and/or the ocean. Large storms can overwhelm these systems and blocked or clogged drainage ditches and culverts can inhibit the flow of water, resulting in back-ups and ponding. Water will remain in an area until it infiltrates into the soil, evaporates, the blockage is cleared, or the water is actively pumped out. Plympton contains a relatively high area of natural stormwater storage systems including rivers and wetlands. These natural systems are valuable as they decrease the severity of flooding and the resulting damage experienced by the town.

Hazard Location

B1.c
B2.a

Figure 3-1 shows the Effective 2017 FEMA Flood Insurance Rate Map (FIRM) for Plympton. These areas represent the risk of flooding from a 100-year storm. This map depicts the areas of Plympton in AE and A zones. The different FEMA flood zones are defined as follows:

- AE Zones, within the 100-year flood limits, are defined with base flood elevations (BFEs) that reflect the combined influence of stillwater flood elevations and wave effects less than 3 feet. Depths are mapped from 1 to 3 feet, in whole-foot increments.
- A Zones are subject to inundation by the 1% annual chance flood event but were determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no BFEs or flood depths are shown.

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Study for Plymouth County (revised July 2020), flooding in the Town of Plympton generally originates from the Jones River and its tributaries, as well as the Winnetuxet River. Approximately 31% of the Town's land area is located in FEMA Special Flood Hazard Areas (SFHA).

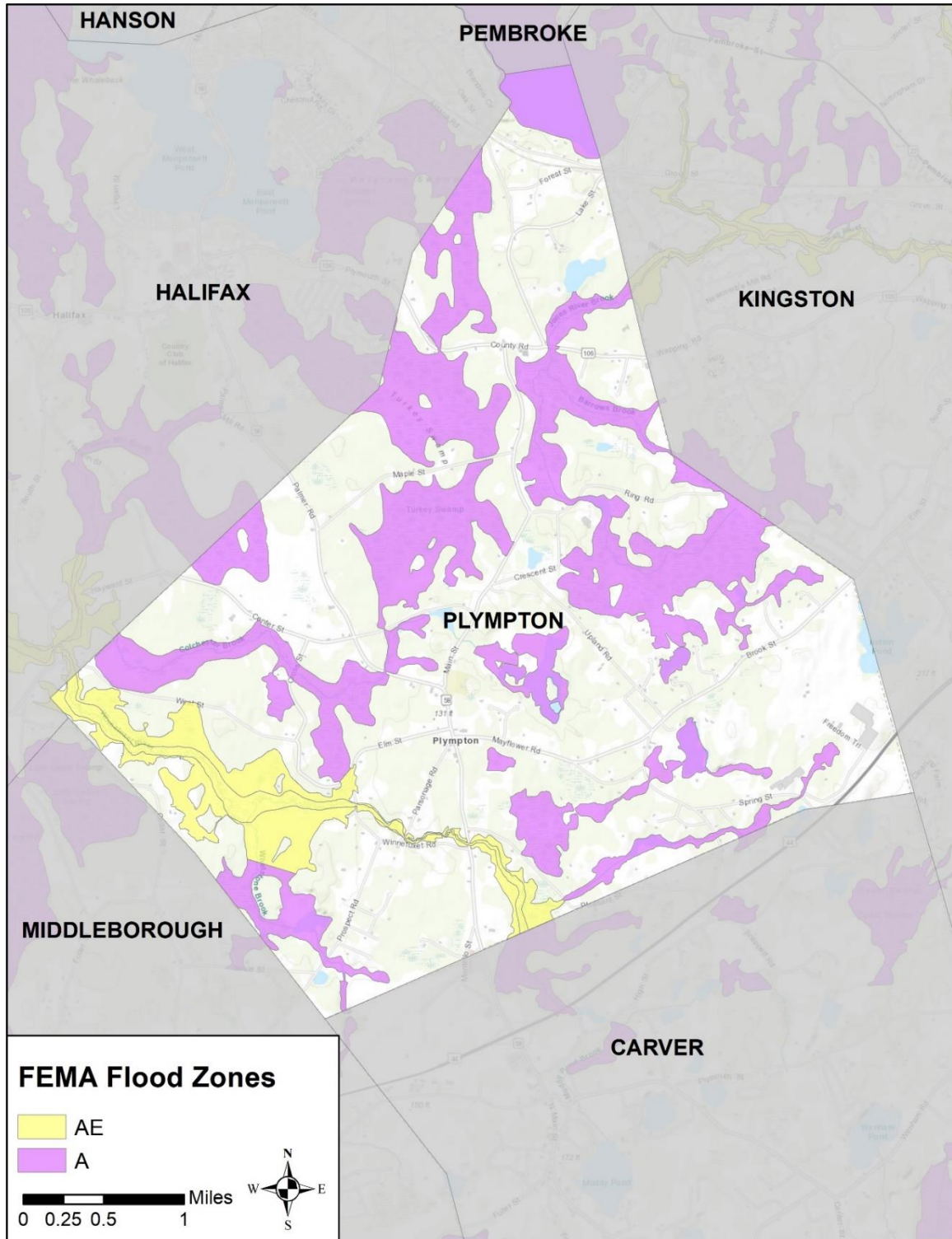


Figure 3-1. FEMA Special Flood Hazard Areas in Plympton (2017).



Previous Occurrences & Extent

B1.c
B2.a,c

According to NOAA's National Centers for Environmental Information Storm Events Database (NOAA 2019a), there have been no major flooding events recorded in Plympton between 2010 and 2020. This is in agreement with the findings of the FEMA Flood Insurance Study for Plymouth County (revised July 2020), which found no major history of flooding within the Town of Plympton. However, the study did report that minor flooding does occasionally occur, although damage is typically minimal. Areas within the Town of Plympton that can experience flooding were identified during the hazard analysis process for the 2015 Old Colony Region Hazard Mitigation Plan and includes:

1. The intersection of Elm Street, West Street, and Winnetuxet Road;
2. Lake Street between County Road and the intersection of Lake Street and Oak Street; and
3. Prospect Road between Winnetuxet Road and Marie Elaine Drive.

The minimal extent and severity of flooding within Plympton is likely explained by the high number of wetlands and bogs, which have the capacity to store flood waters and minimize damage.

B2.b

Probability

Based on the frequency of past flooding occurrences described above, it is likely (between 10 and 100% probability in the next year) that a flooding event will occur in Plympton, although as stated above, the impacts are likely to be minor. However, climate change is projected to increase the frequency and intensity of severe weather events that can lead to major flooding events, such as heavy precipitation events, thunderstorms, or hurricanes. Thus, it is possible that in the future Plympton may experience more severe or more frequent flooding.

B3.a

Impact

Based on Plympton's history of minor flooding events, impacts to natural systems are the most likely to occur, although more consequential impacts are possible as storms become more severe. Below is a list of possible impacts from a flooding event in Plympton:

- **People:** People can be knocked down or washed off their feet while walking in floodwaters. Injury or death can result from people being trapped in their vehicles during a flood event. People can be displaced from their homes due to post-flood safety and health hazards. Also, intrusion of water into households can lead to health and respiratory issues caused by the development of mold and mildew.
- **Emergency Response:** Flooded roadways can inhibit emergency response access.
- **Infrastructure:** Flooding causes debris and sediment deposits on Town infrastructure and roads. Potential loss of potable drinking water in flooded areas due to the need to shut valves to protect the Town's drinking water supply.
- **Buildings:** Moving water associated with floods can damage buildings and other structures. Debris carried by flood waters can act as battering rams and damage buildings.



Buildings can float off their foundations if not anchored properly. Basements can flood or can collapse due to external water pressure.

- **Economy:** Communication and infrastructure systems damaged during floods can disrupt economic activities and close businesses. Roadway disruptions due to flooding can reduce customer base.
- **Natural Systems:** Floods can deposit sediment and debris onto parks and wetlands.
- **Transportation:** Floods can wash out bridges and culverts. Debris lodged in culverts can inhibit flow, causing additional flooding on the upstream side. Major disruptions to transit services can also result from flooding.



3.2 HURRICANES & TROPICAL STORMS

Overview

A tropical cyclone is a rotating, organized system of clouds and thunderstorms that originates over tropical or subtropical waters. The hurricane season for the Atlantic Ocean extends from June 1st to November 30th, with the peak from mid-August to late October. However, deadly hurricanes can occur anytime during the hurricane season. Tropical cyclones are classified as follows (NHC 2016a), depending on their intensity:

- **Tropical Depression:** A tropical cyclone with maximum sustained winds of 38 mph (33 knots) or less.
- **Tropical Storm:** A tropical cyclone with maximum sustained winds of 39 to 73 mph (34 to 63 knots).
- **Hurricane:** A tropical cyclone with maximum sustained winds of 74 mph (64 knots) or higher. In the western North Pacific, hurricanes are called typhoons; similar storms in the Indian Ocean and South Pacific Ocean are called cyclones.
- **Major Hurricane:** A tropical cyclone with maximum sustained winds of 111 mph (96 knots) or higher, corresponding to a Category 3, 4 or 5 on the Saffir-Simpson Hurricane Wind Scale.

Hurricanes are typically fast-moving storms (typically lasting 6 to 12 hours) with high winds in excess of 74 miles per hour and torrential rains averaging 6 to 8 inches, but possibly dropping as much as 15 to 20 inches of rainfall during a single event.

B1.c
B2.a

Hazard Location

Although the Town of Plympton is inland, the Town can still be affected by the flooding, strong winds and heavy rains associated with these events.

B1.c
B2.a,c

Previous Occurrences & Extent

A hurricane has not made landfall in Massachusetts for almost 30 years (Hurricane Bob in 1991), and it has been more than 60 years since a major hurricane (Category 3 or higher) has occurred. The Town of Plympton has only been in the direct path of one hurricane in the past, which occurred in 2004 during Hurricane Hermine. However, by the time the hurricane reached the Town, there was only moderate rainfall. Although most hurricanes do not travel directly through the Town of Plympton, the Town can still experience severe weather associated with these events, most commonly heavy rain and wind. This frequently results in downed trees and electrical outages (Figure 3-2), such as when weather associated with Hurricane Bob impacted the town in 1991. In addition, in 2011 after Tropical Storm Irene, certain parts of the Town experienced electrical outages for up to a week.

Smaller tropical storms and depressions have also affected the area, generally inflicting minor damage, such as downed tree limbs and power outages. Table 3-1 provides a summary of historic hurricanes that have impacted Massachusetts. However, due to the large diameter of many



hurricanes and tropical storms, even storms that don't make landfall in New England can have significant hazard impacts on Massachusetts, and on Plympton. To illustrate the frequency of these storms, Figure 3-3 shows all hurricanes and tropical storms that have passed within 100 miles of Plympton. Note that although major hurricanes (H1 = Category 1, H2 = Category 2, etc.) occur approximately once every ten or twenty years in Massachusetts (Table 3-2), tropical storms, tropical depressions, and extra tropical storms (represented by the green, blue and gray lines in Figure 3-3) are relatively common, occurring every few years.



Figure 3-2. Downed trees and electrical lines as a result of the severe weather associated with hurricanes and tropical storms in Plympton.



Table 3-1. Massachusetts hurricanes since 1938.

Date	Name	Intensity (in MA)
August 19, 1991	Hurricane Bob	Category 2
September 27, 1985	Hurricane Gloria	Category 1
September 12, 1960	Hurricane Donna	Category 2
September 11, 1954	Hurricane Edna	Category 1
August 31, 1954	Hurricane Carol	Category 3
September 15, 1944	Great Atlantic Hurricane	Category 3
September 21, 1938	Great New England Hurricane	Category 3

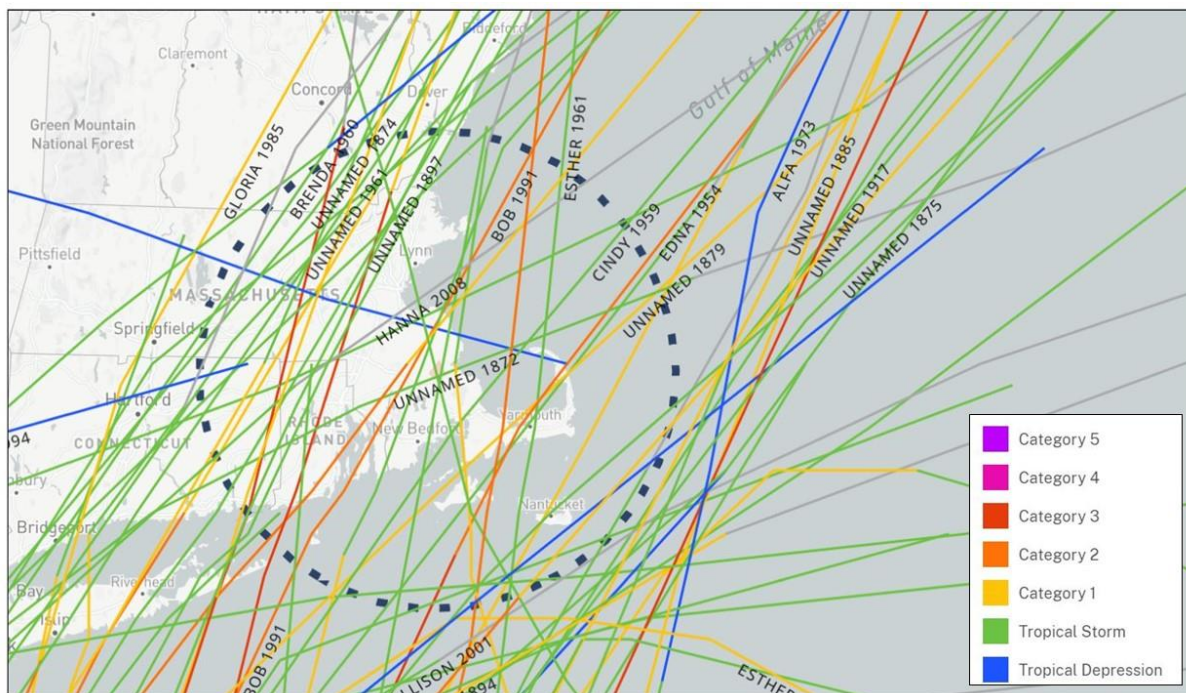


Figure 3-3. Hurricane and tropical storm tracks in the within 100 miles of Plympton (NOAA, 2020b).

The Saffir-Simpson Hurricane Wind Scale is often used to classify tropical cyclones. The Saffir-Simpson Scale, described in Table 3-2, outlines a rating system from 1 to 5 based on the hurricane’s sustained wind speed. This scale is then used to estimate potential property damage. Hurricanes classified as a Category 3 or higher are considered major hurricanes due to their potential for devastating or catastrophic damage and loss of life.



Table 3-2. Saffir-Simpson Hurricane Wind Scale (NHC 2016b).

Category	Sustained Winds	Types of Damage Due to Hurricane Winds
1	75-95 mph 64-82 kt 119-153 km/h	Very dangerous winds will produce some damage: Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days
2	96-110 mph 83-95 kt 154-177 km/h	Extremely dangerous winds will cause extensive damage: Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3 (major)	111-129 mph 96-112 kt 178-208 km/h	Devastating damage will occur: Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4 (major)	130-156 mph 113-136 kt 209-251 km/h	Catastrophic damage will occur: Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5 (major)	157 mph or higher 137 kt or higher 252 km/h or higher	Catastrophic damage will occur: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

B2.b

Probability

Based on the hurricane and tropical storm frequency documented in this section, it is likely (between 10 and 100% probability in the next year) that a hurricane or tropical storm will impact Plympton in the next year. In the future, higher category storms are predicted to increase as a result of climate change, meaning Plympton may experience more of the severe weather associated with these storms.

**Impact**

B3.a

Below is a list of possible impacts that could result from a hurricane or tropical storm:

- **People:** Public safety is jeopardized when buildings and structures collapse due to downed trees and land on buildings or cars.
- **Emergency Response:** Heavy rains and flooding associated with hurricanes and tropical storms, as well as downed trees and branches caused by the high winds, can reduce the response time of emergency vehicles, or block access entirely.
- **Infrastructure:** High winds and heavy rains can cause widespread power outages, limit access to other utilities such as drinking water and communications, and limit transportation. A significant hurricane could also damage wellfields and wells, disrupting drinking water supply.
- **Buildings:** Strong winds can cause substantial damage to homes and businesses.
- **Economy:** Hurricanes and/or tropical storms can adversely impact businesses if a business's building is damaged by the storm, or if utilities or road access are affected.
- **Natural Systems:** The high winds and heavy precipitation often associated with hurricanes and tropical storms can cause damage to the environment including uprooting vegetation, potentially harming the Town's natural ecosystems.
- **Transportation:** Roadways can become impassible due to flooding and/or downed trees.



3.3 SEVERE WINTER WEATHER (SNOW/BLIZZARD/ICE STORM/NOR'EASTER)

Overview

Snowstorms and blizzards are common events in New England. These storms are often high duration events with significant winds and heavy snowfall. The majority of blizzards and ice storms in the region cause more inconvenience than they do serious property damage, injuries, or deaths. Sleet and ice storms result when temperatures are appropriate for precipitation to fall as frozen or mostly frozen raindrops, or liquid rain that freezes upon contact with structures and objects on the ground. Travel is often limited and disruptions to power and other utility delivery are a high potential. However, periodically, a storm will occur which is a true disaster, and necessitates intense large-scale emergency response. On average, Plympton receives 34 inches of snow per year.

In addition to many of the same hazards posed by other natural disasters, winter storms have the added hazard associated with cold weather for prolonged periods of time. Unlike disasters occurring during the summer months such as hurricanes, power outages may result in extended periods of no heat. Prolonged contact with low temperatures can cause pipes to freeze and burst, damaging homes and businesses. Winter storms pose additional health problems with the added strain of exposure to freezing temperatures, especially for the elderly.

A nor'easter is a particular kind of cyclonic winter storm that moves along the east coast of North America, from south to north; once these storms reach New England, they often intensify. It is called a nor'easter because the winds associated with the storm blow from a northeasterly direction. Sustained wind speeds of 20 to 40 mph are common during a nor'easter, with gusting often reaching 50 to 60 mph. In some cases, the wind speed may actually meet or exceed hurricane force. The storm radius of a nor'easter can be as much as 1,000 miles, and the storm is often accompanied with heavy rain and/or snow, depending on temperature. Most nor'easters bring both storm surge and high winds to the coast of Massachusetts, making the coastline particularly vulnerable to erosion and flooding.

B1.c
B2.a

Hazard Location

The entire Town of Plympton is at risk from severe winter weather. The Northeast Regional Climate Center has compiled 30-year annual snow totals in New England and the eastern United States. Based on this data, between 1981 and 2010, the Plympton area averaged 20 to 40 inches of snowfall annually between 1981 and 2010 (Figure 3-4). Despite relatively low average annual snowfall, Plymouth County has still had 9 FEMA Declared Disasters for winter storm events between 1953 and 2017 (Figure 3-5).

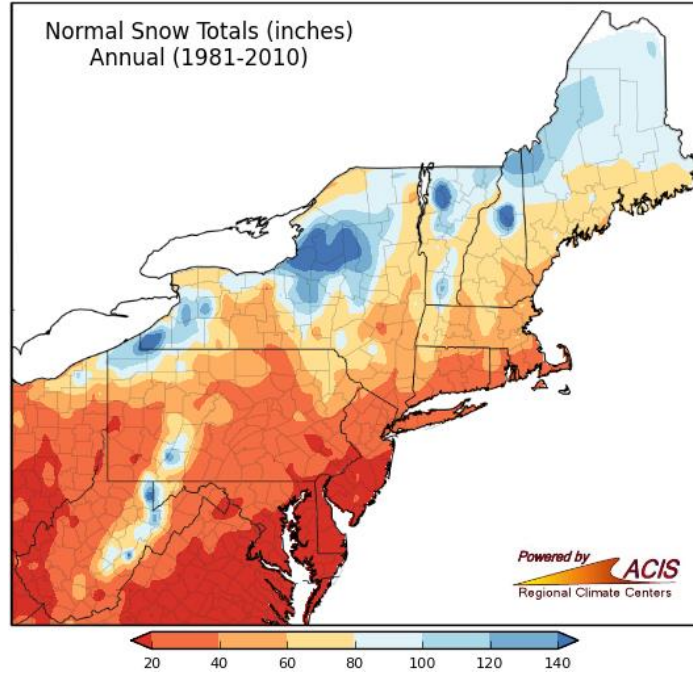


Figure 3-4. Annual average snow totals for New England between 1981 and 2010.

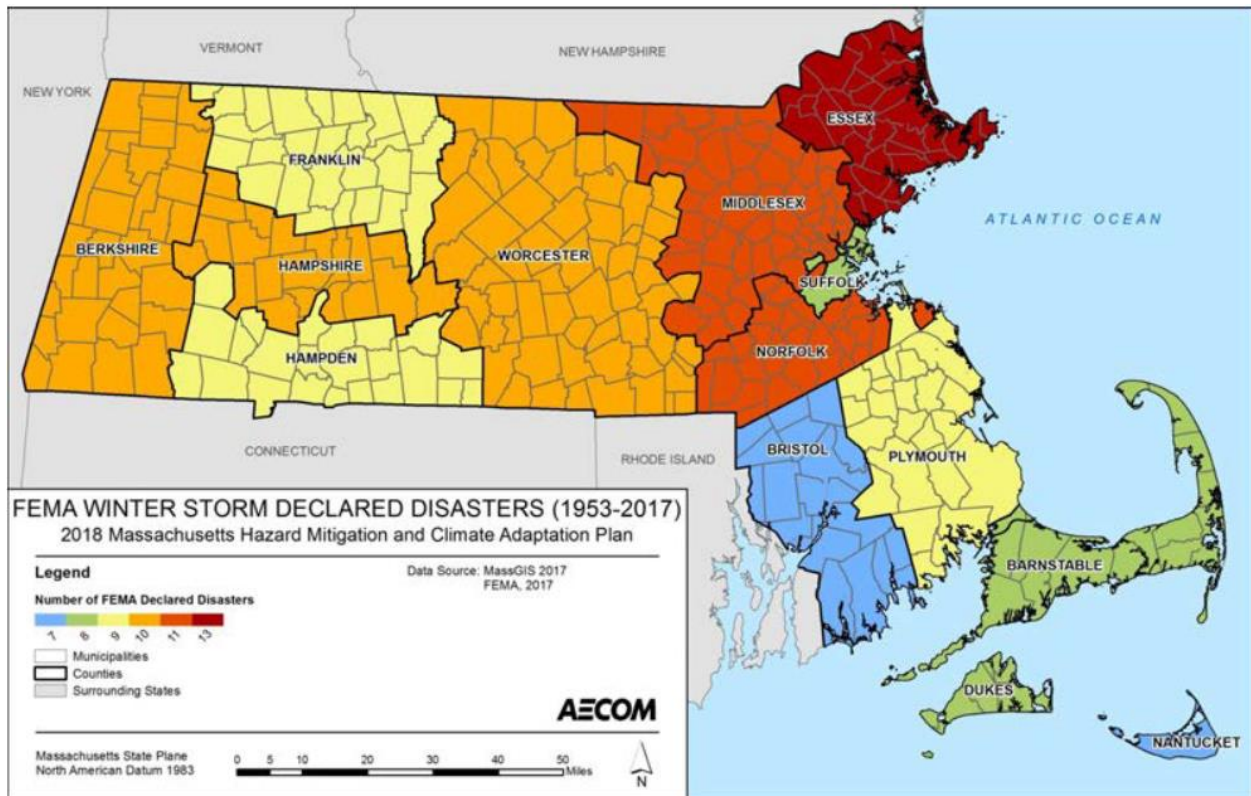


Figure 3-5. FEMA winter storm-related disasters by county (1953-2017) (from 2018 State Hazard Plan).

B1.c
B2.a,c

Previous Occurrences & Extent

The results of the public survey indicate that severe winter storms are the hazard most frequently experienced by residents of Plympton. The most severe winter storm to ever hit New England was the Blizzard of 1888, which occurred in March of that year. Snow accumulations reached 30 to 50 inches where precipitation was entirely snow. Boston received a mix of snow and rain creating up to nine inches of slush. The Blizzard of 1978 resulted in 24 to 38 inches of snow across New England, immobilizing the infrastructure and blocking major highways, and causing thousands of motorists to abandon their cars on the road. Two weeks were required to remove the snow. The Blizzard of 1978 resulted in a federal disaster declaration for many counties in Massachusetts. More recent blizzards and snowstorms occurred in March 1993, February 1996, March 2001, January 2005, February 2013 (Winter Storm Nemo), and January 2015 (Winter Storm Juno).

Winter Storm Juno, in January 2015, was a powerful nor'easter that impacted the northeast. A state of Emergency was declared in Massachusetts and travel bans were issued in preparation for the storm. The storm produced winds that gusted to 75 mph, a rain/snow mix that resulted in 15 to 18 inches of snowfall and multi-day loss of electricity for many properties. This nor'easter resulted in a federal disaster declaration for many counties in Massachusetts, including Plymouth County (FEMA DR-4214). In the Town of Plympton, over 200 trees were downed, requiring an extensive effort to remove debris and clear roadways. Table 3-3 below provides a list of major winter storms in New England from 2009 to 2021.

The Northeast Snowfall Impact Scale (NESIS) was developed by the National Weather Service to characterize and rank high-impact Northeast snowstorms. A "High-impact" snowstorm is one that produces large areas of 10-inch snowfall accumulations or greater. The NESIS has five categories: Notable, Significant, Major, Crippling, and Extreme (Table 3-4). This index differs from other meteorological indices, however, because it uses population information in addition to meteorological measurements; the NESIS gives a ranking to the societal impacts of a storm. NESIS values 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 NESIS values result from storms producing heavy snowfall over large areas that include metropolitan centers. These values are then converted into one of the five NESIS categories (NOAA 2019b).



Figure 3-6. A severe winter storm resulting in heavy snowfall and downed trees in Plympton. Photo courtesy of the Plympton Fire Department.



Table 3-3. Major winter storms in New England (2010 to 2021).

Date	NESIS	Cat	Description
Feb 4-7, 2010	4.38	3	Major
Feb 9-11, 2010	4.1	3	Major
Feb 23-28, 2010	5.46	3	Major
Dec 24-28, 2010	4.92	3	Major
Jan 9-13, 2011	5.31	3	Major
Jan 26-27, 2011	2.17	1	Notable
Feb 1-3, 2011	5.3	3	Major
Oct 29-30, 2011	1.75	1	Notable
Feb 7-10, 2013	4.35	3	Major
Mar 4-9, 2013	3.05	2	Significant
Dec 13-16, 2013	2.95	2	Significant
Dec 30, 2013 - Jan 3, 2014	3.31	2	Significant
Jan 20-24, 2014	1.26	1	Notable
Jan 29-Feb 4, 2014	4.08	3	Major
Feb 11-14, 2014	5.28	3	Major
Nov 26-28, 2014	1.56	1	Notable
Dec 9-14, 2014	1.49	1	Notable
Jan 25-28, 2015	2.62	2	Significant
Jan 29-Feb 3, 2015	5.42	3	Major
Feb 8-10, 2015	1.32	1	Notable
Jan 22-24, 2016	7.66	4	Crippling
Mar 12-15, 2017	5.03	3	Major
Jan 3-5, 2018	1.71	1	Notable
Mar 5-8, 2018	3.45	2	Significant
Mar 11-15, 2018	3.16	2	Significant
Mar 20-22, 2018	1.63	1	Notable
Dec 14-18, 2020	3.21	2	Significant
Jan 30-Feb 3, 2021	4.93	3	Major

Table 3-4. NOAA's Northeast Snowfall Impact Scale (NESIS).

Category	NESIS Value	Description
1	1 – 2.499	Notable
2	2.5 – 3.99	Significant
3	4 – 5.99	Major
4	6 – 9.99	Crippling
5	10+	Extreme



B2.b

Probability

Based on the snow frequency recorded from past events, it is highly likely (near 100% probability in the next year) that snow will occur in Plympton. Climate change is predicted to increase moisture within the air, leading to an increase in the intensity and severity of winter storms in places that experience cold winter temperatures. Therefore, future storms that impact Plympton may result in heavier snowfall.

B3.a

Impact

Below is a list of possible impacts that could result from severe winter weather:

- **People:** Walking and driving can become extremely dangerous due to icy roads and sidewalks, snow accumulation, and low visibility. Poor driving conditions often require people to shelter in place, and loss of utility function can result in dangerous conditions during extreme cold temperatures associated with snow events. Injury is also possible from slipping on ice, overexertion from shoveling, and frostbite.
- **Emergency Response:** Snow, icy roads, and trees felled by storm conditions can reduce emergency vehicle response time.
- **Infrastructure:** Culverts and roads can be washed out during a heavy flow after a snowmelt. Ice and heavy snowfall can impact and cut off utilities, such as heating, power, and communication services, for several hours or days. Water pipes can burst due to extreme cold temperatures. Utility outages can result from nor'easters.
- **Buildings:** Buildings and roofs can experience structural failure as a result of heavy snow loads.
- **Economy:** Poor driving conditions and closed roads prohibit businesses from opening and people from going to work. Heavy snowfalls result in increased cost to the Town for plowing, snow removal, and treatment of roads. Utility outages and damaged buildings can result in loss of business function.
- **Natural Systems:** Snow and ice accumulation can negatively impact vegetation and natural habitat. Trees and tree limbs can be knocked down by the weight of accumulated snow, by high winds, or both.
- **Transportation:** Roadways can become extremely dangerous due to icy conditions, snow accumulation, and low visibility. Public transportation is also occasionally shutdown as a result of heavy snowfall.



3.4 WILDFIRE

Overview

Fire events can be broken into two major categories: urban fires and wildfires. Urban fires are the result of buildings and structures catching fire, with the potential for the fire to spread to neighboring properties. These events have a higher chance of spreading more rapidly in areas where residential and commercial buildings are clustered closely together. Urban fires tend to occur more frequently than wildfires, and often result from everyday activities such as cooking, smoking, or appliance malfunction.

A wildfire is an unplanned, unwanted fire burning in a natural area, such as a forest, scrubland, or grassy area. Wildfires and forest fires are naturally occurring events, and part of a normal, healthy ecosystem. Naturally occurring fires help keep forest floors free of excessive debris, thin crowded trees, encourage growth of new vegetation, and recycle nutrients into the soil. Forest fires may occur at any time of year but typically occur during hot, dry summer months, or during windy conditions during the spring and fall. Natural ignition most frequently occurs as the result of a lightning strike.

In Massachusetts, wildfires are typically caused by lightning or human activity (i.e. discarded cigarettes, unattended camp fires, downed power lines, etc.). The Bureau of Fire Control estimates that nearly 98% of fires in Massachusetts are started by human carelessness.

B1.c
B2.a

Hazard Location

Wildfire has played a role in shaping the Plymouth County landscape for thousands of years. Fortunately, Plympton’s forests are not composed of pitch pine or scrub oak, which are considered by the State fire officials to be forest types at a high risk for wildfires. The Plympton Fire Department responds to very few outside fire events (on average less than 20 per year).

B1.c
B2.a,c

Previous Occurrences & Extent

Forest fires vary in size, however thanks to modern detection and firefighting equipment methods, fires are typically kept to a reasonably small area. The Bureau of Fire Control estimates that the average fire 100 years ago consumed approximately 34 acres, while today the average fire burns only 1.2 acres. However, large fires have occurred nearby in the past, such as the 1957 fire in Myles Standish State Forest which burned over 18,000 acres, stopping only when it reached the ocean. Fortunately, most fires are quickly identified and suppressed, or extinguish themselves naturally due to wet weather conditions. The majority of wildfires occur in the spring, before “green-up”, or in late summer, following periods of drought.

Smaller fires are more common and are generally addressed quickly by the Plympton Fire Department. Between January 1, 2015 and December 31, 2020, the Plympton Fire Department responded to 68 outside fire incidents. Wildfires are typically most common in the densely forested parts of the town, where dead trees and debris create a hazardous fuel source adjacent to housing developments. Figure 3-7 below illustrates the number of fires that occurred within each year from 2015 to 2017.



Once a fire starts, location of the fire and the type of fuel consumed determines how severe the fire will be. There are four types of wildfires (Table 3-5). These fire types range from ground fires, which tend to travel relatively slowly and are easier to control, to canopy fires, in which flames can jump from tree to tree through the canopy relatively quickly. These are the most difficult to control and extinguish.

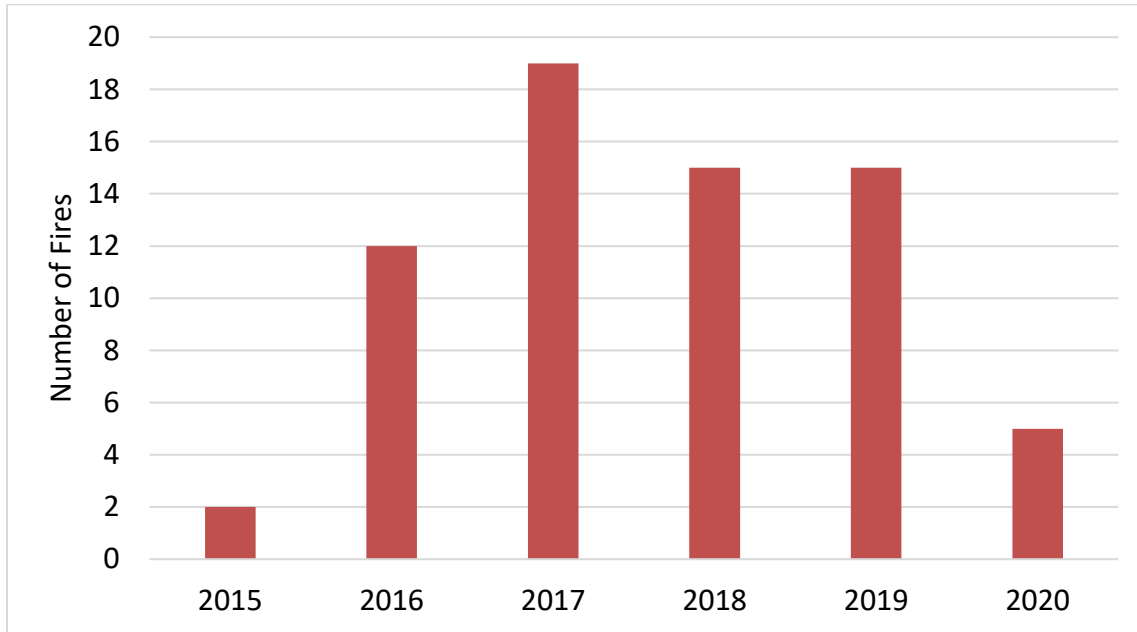


Figure 3-7. Number of wildfires in Plympton from 2015 to 2020.

Table 3-5. Wildfire types.

Type	Location	Typical Fuel
Ground	At or below ground surface	Underground roots, buried leaves or other organic matter
Surface	Ground surface	Surface leaves, grass, low lying vegetation, underbrush
Ladder	Between the surface and canopy	Underbrush, downed logs, vines and small trees
Canopy	In the tree canopy	Tall trees, vines and branches

In the 2015 Old Colony Regional Hazard Mitigation Plan, the Town identified the Town Forest (Figure 3-8), as well as areas where residences are within largely undeveloped areas on the edges of the town, as the areas most vulnerable to wildfire.



Figure 3-8. Wildfire burning a forested area within the Town of Plympton.



B2.b

Probability

Based on the previous occurrence of wildfires, it is possible (1 – 10% probability in the next year) that a wildfire will occur in Plympton. Increasing temperatures caused by climate change lead to dryer soil within forests and a higher flammability of vegetation. In addition, snow may melt earlier, meaning forests will experience drier conditions for a longer period of time. All of these factors contribute to a higher risk of wildfire within the Town of Plympton in the future as a result of climate change.

B3.a

Impact

Below is a list of possible impacts that could result from wildfire:

- **People:** Death or injury can result if people are trapped by urban or wildfires. Smoke inhalation can cause health issues.
- **Infrastructure:** Utility services may be disrupted; a large fire in the wellfield could negatively impact the wellfield itself, while a large enough fire could adversely impact well water quality. Roads may become impassible and transportation may be disrupted.
- **Buildings:** Buildings and structures can be damaged or destroyed, either by the fire directly, or through ignition from flying sparks and embers.
- **Economy:** Indirect economic losses can result from lost tourism due to a major fire. Disrupted utilities may halt businesses and other economic activities.
- **Natural Systems:** Extensive areas of forests and other natural areas can be burned. Wildfires can strip slopes of vegetation, increasing the potential for runoff and erosion.



3.5 TORNADO

Overview

Tornadoes are a vortex of rapidly rotating air moving along the ground. Tornadoes typically occur during the spring, summer and fall months, usually during the afternoon. Tornadoes may occur in unusually severe thunderstorms, bringing hazards such as very high wind speeds (typically anywhere from 100 to 300 miles per hour) along a localized area, localized heavy rainfall and flooding, frequent lightning and damaging hail.

Tornadoes may be anywhere from less than 250 feet to over two miles in diameter. Typically, tornadoes dissipate after no more than a couple miles on the ground; however they have been known to stay on the ground for dozens of miles, causing substantial damage along the way. Although not common in the northeast, tornadoes have occurred in every state of the U.S. In Massachusetts, tornadoes occur most frequently in and around Worcester County, however they may occur wherever conditions are right. According to NOAA, Plymouth County is located in an area of very low probability of occurrence, with less than one tornado expected to occur every five years.

B1.c
B2.a

Hazard Location

NOAA’s National Weather Service maintains a database of tornado information in the United States. The data include information on date, start and end location, number of injuries and fatalities, and categories of property loss values from each storm. There have been 181 tornadoes documented in Massachusetts from 1950 to 2020 (Figure 3-9); of these, none have occurred in Plympton, and only 9 have occurred within all of Plymouth County (Table 3-6).

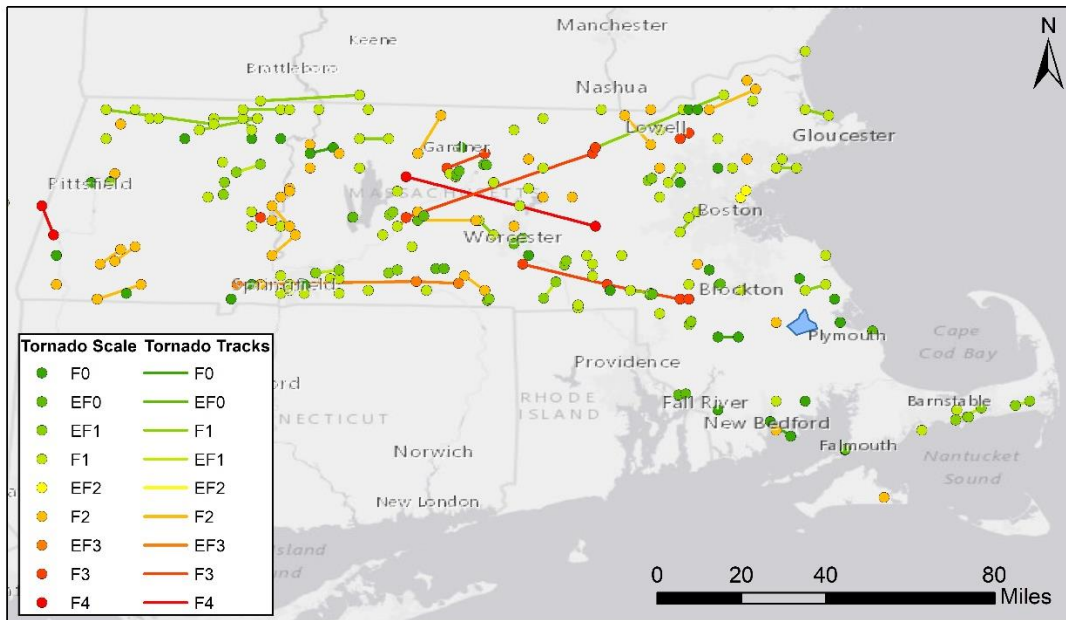


Figure 3-9. Massachusetts tornadoes between 1950 and 2020 (refer to Tables 3-7 and 3-8 for F and EF Scale descriptions). Plympton town boundary is illustrated in blue.



Table 3-6. Plymouth County tornadoes between 1950 and 2020.

Date	Scale	Town	Death/Injury	Length/Width
9/7/1958	F0	Duxbury	1/1	0.1 mi / 33 yds
7/4/1964	F1	Pembroke/Duxbury/Marshfield	0/0	2.3 mi / 33 yds
6/9/1965	F0	Marion	0/0	0.1 mi / 33 yds
11/18/1967	F2	Halifax	0/0	0.1 mi / 17 yds
9/16/1986	F1	Scituate	0/0	0.1 mi / 50 yds
7/10/1989	F1	Brockton	0/1	0.1 mi / 23 yds
7/10/1989	F0	Hanover	0/0	0.1 mi / 23 yds
8/20/1997	F0	Plymouth	0/0	0.1 mi / 5 yds
7/24/2012	EF0	Plymouth	0/0	0.1 mi / 15 yds

B1.c
B2.a,c

Previous Occurrences & Extent

Although no tornado has touched down directly in Plympton since at least 1950, as noted above, 9 tornadoes have occurred within Plymouth County during the same time period. Table 3-6 documents the characteristics of the 9 Plymouth County tornadoes; this table documents the F-scale (see description of the Fujita Tornado Damage Scale below) or EF-scale (see description of the Enhanced Fujita Scale below), number of injuries and fatalities, and the size of each tornado, as measured by the length and width of its track. Table 3-7 describes the Fujita Tornado Damage Scale developed by Dr. T. Theodore Fujita for winds, including tornadoes, which relates the degree of damage to the intensity of the wind, as well as the number of injuries and fatalities, and the value of any property loss associated with the event.

Recently, the National Weather Service has switch to using a revised rating system for tornadoes. The Enhanced Fujita Scale (EF-Scale) became operational in February 2007, and is similarly used to assign a tornado’s rating based on estimated wind speeds and related damage. The EF-Scale was revised from the original Fujita Scale to better reflect the results of tornado damage surveys so as to align wind speeds more closely with associated storm damage. The new scale has to do with how most structures are currently designed. A summary of the EF-Scale ratings is provided in Table 3-8.

B2.b

Probability

Although tornadoes have not been recorded in Plympton since NOAA’s records began in 1950, relatively small scale tornadoes do occur throughout Massachusetts on a regular basis. As such, it is possible (between 1 and 10% probability in the next year) that a tornado will occur in Plympton. The effect of climate change on tornados is less clear than in the case of other hazards. Climate change is predicted to increase moisture within the air, an essential ingredient for tornadoes, however, another essential ingredient of wind shear may decrease. As a result, the exact effect of climate change on tornadoes is still being determined.



Table 3-7. Fujita tornado damage scale.

Scale	Wind Estimate (mph)	Typical Damage
F0	< 73	Light damage: some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged
F1	73-112	Moderate damage: peels surface off roads; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	113-157	Considerable damage: roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground
F3	158-206	Severe damage: roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4	207-260	Devastating damage: well-constructed houses level; structures with weak foundations moved; cars thrown; large missiles generated.
F5	261-318	Incredible damage: strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters; trees debarked; incredible phenomena will occur.

Table 3-8. Enhanced Fujita (EF) scale.

Scale	3 Second Wind Gust (mph)
EF0	65-85
EF1	86-110
EF2	111-135
EF3	136-165
EF4	166-200
EF5	Over 200

Impact

B3.a

Below is a list of possible impacts that could result from tornadoes:

- **People:** Airborne debris can cause injury or death. Hazardous driving conditions can result from blocked roadways. Tornadoes can cause water contamination, which can affect drinking water quality and human health.
- **Infrastructure:** Tornadoes can damage power lines and other utility infrastructure, and can damage roads. Downed power lines can also cause electrical hazards.
- **Buildings:** Tornadoes that pass through highly developed areas can cause significant property damage, blowing off roofs, and in severe cases, leveling houses.
- **Economy:** Tornadoes can destroy farms and agricultural fields.
- **Natural Systems:** High winds associated with a tornado can break branches and snap or uproot trees. Wildlife can be killed or injured.



3.6 DROUGHT

Overview

Drought is an extended period of time where a region experiences a notable reduction in available water supply typically caused by a lack of precipitation. Drought can affect either surface water or groundwater sources. Though most droughts in Massachusetts last only a matter of months, it is possible for drought conditions to extend over a period of years due to reduced rainfall and snowfall accumulations contributing to lower groundwater and surface water levels.

B1.c
B2.a

Hazard Location

The entire Town of Plympton is equally vulnerable to drought.

B1.c
B2.a,c

Previous Occurrences & Extent

Significant periods of drought have occurred in Plymouth County, and Plympton specifically, in the past. The Massachusetts Department of Conservation and Recreation (DCR) compiles monthly water conditions reports, summarizing the rainfall and its diversion from average conditions for each of the 6 regions in the state (Cape Cod and Islands, Central, Connecticut River, Northeast, Southeast, and Western). Data for the Southeast region from a recent eleven (11) month period (DCR 2020) is summarized in Table 3-9.

Table 3-9. Summary of the Southeast Region rainfall from DCR Hydrologic Conditions Reports (2020).

Month-Year	Total Rainfall (inches)	Departure from normal (inches)
Jan 2020	1.63	-2.33
Feb 2020	3.10	-0.52
Mar 2020	4.03	-0.59
Apr 2020	7.14	2.84
May 2020	2.74	-0.92
Jun 2020	3.96	0.03
Jul 2020	1.67	-1.84
Aug 2020	2.68	-1.23
Sep 2020	1.26	-2.59
Oct 2020	5.39	0.87
Nov 2020	4.74	0.24
Total	38.34	-6.04

Based on the total rainfall from the eleven (11) months in Table 3-9, which is 6.04 inches below the average, Plympton is currently experiencing a drought and droughts are likely to occur again



in the future. In fact, during 2020, the entire state of Massachusetts, as well as Plympton, experienced more severe drought conditions than in the past.

There are five levels of drought that have been developed to characterize the severity of the event:

- 1) Normal
- 2) Mild Drought (formerly Advisory prior to 2019)
- 3) Significant Drought (formerly Watch prior to 2019)
- 4) Critical Drought (formerly Warning prior to 2019)
- 5) Emergency Drought

These levels are based on the regional conditions and are designed to provide information about the current status of water resources. A drought advisory calls for a heightened level of vigilance and increased data collection as conditions begin to deviate from normal. During a drought watch, increased assessment would continue, in addition to proactive public education about water conservation. Water restrictions might become necessary during the watch or warning stage, depending on the capacity and condition of each water supply system. A drought warning is issued during a severe situation and the possibility of a drought emergency may be issued. Finally, a drought emergency often requires mandatory water restrictions and/or the use of emergency water supplies (EOEEA 2013). These categories and their associated characteristics are summarized in Table 3-10.

Based on the categories outlined in Table 3-10, the Massachusetts Executive Office of Energy and Environmental Affairs has compiled information about past drought declarations at a regional level. Drought declarations from 2015 to 2020 for the Southeast Region are detailed in Table 3-11. Most recently, there was a drought from July 2020 to December 2020, ranging in severity from significant to critical (Table 3-11).



Table 3-10. Drought indices from the Massachusetts Drought Management Plan (EOEEA 2013).

Drought Level	Precipitation	Groundwater	Streamflow	Reservoir
Normal	1 month below normal	2 consecutive months below normal**	1 month below normal**	Reservoir levels at or near normal for time of year
Advisory	2 month cumulative total below 65% of normal	3 consecutive months below normal**	At least 2 out of 3 consecutive months below normal**	Small index reservoirs below normal
Watch	1 of the following: 3 month cum. <65%; or 6 month cum. <70%; or 12 month cum. <70%	4-5 consecutive months below normal**	At least 4 out of 5 consecutive months below normal**	Medium index reservoirs below normal
Warning	1 of the following: 3 month cum. <65% and 6 month cum <65%; or 6 month cum. <65% and 12 month cum. <65%; or 3 month cum. <65% and 12 month cum. <65%	6-7 consecutive months below normal**	At least 6 out of 7 consecutive months below normal**	Large index reservoirs below normal
Emergency	Same Warning and previous month was Warning or Emergency	>8 months below normal**	>7 months below normal**	Continuation of previous month's conditions

Table 3-11. Drought dates and levels from Massachusetts DCR for the Southeast Region between 2015 and 2020.

Year	Begin Date	End Date	Southeast Status
2016	7/1/2016	7/31/2016	Advisory
2016	8/1/2016	8/31/2016	Watch
2016-2017	9/1/2016	2/28/2017	Warning
2017	3/1/2017	3/31/2017	Watch
2017	4/1/2017	5/31/2017	Advisory
2020	7/1/2020	8/31/2020	Significant
2020	9/1/2020	9/30/2020	Critical
2020	10/1/2020	12/31/2020	Significant



B2.b

Probability

Based on the data summarized above about past drought conditions in Plympton, the probability that a drought will occur in Plympton in the future is likely (between 10% and 100% probability in the next year). Although climate change is predicted to increase precipitation in the Northeast, such as through snowfall, more frequent and severe droughts are still predicted to occur as a result of increased temperature and evaporation.

B3.a

Impact

Below is a list of possible impacts that could result from a drought:

- **People:** Drought conditions can increase conflicts between water users. Water conservation actions may impact users' activities. Reduction in drinking water supply. Health related issues may arise due to dust inhalation.
- **Infrastructure:** Droughts can result in lower water levels in reservoirs. Drought can cause well water quality, and potentially quantity, to worsen. Drought can cause sanitary issues in the water distribution system, as well as increase water demand. Drought can also result in private residential wells to dry up, increasing requests to be connected to the municipal water supply system. In addition, droughts decrease the water supply available to firefighters, further threatening infrastructure.
- **Economy:** Farmers experience financial losses if a drought destroys their crops. Finances may need to be diverted to provide additional irrigation or drill new wells. Businesses that depend on farming may lose business. Food costs may increase.
- **Natural Systems:** Loss of fish habitat as streams, rivers, and ponds dry up. Lack of food and drinking water for wildlife. Wildlife may be forced to migrate to find adequate resources. Wildfires may become more common.



3.7 EXTREME TEMPERATURE

Overview

There is no defined cut-off for what defines extreme temperatures. Instead, extreme temperatures are considered relative to the usual weather in a region based on long-term climatic averages. According to the Massachusetts State Hazard Mitigation and Climate Adaptation Plan (2018), extreme heat for this region is usually defined as a period of three or more consecutive days with temperatures above 90°F. However, more generally it can be thought of as a prolonged period of excessively hot weather, which is often accompanied by high humidity. Similarly, extreme cold is also relative to normal climatic lows in the region. Temperatures that drop well below normal, especially when accompanied by high winds can produce dangerous wind-chill factors. The wind-chill is the perceived decrease in air temperature felt by the body on exposed skin due to the flow of air.

Since extreme temperatures are defined relative to normal conditions, it is important to know the average temperatures for the region for a particular season. The average low winter temperature (January) for Massachusetts is 22°F, while the average high summer temperature (July) is 81°F.

B1.c
B2.a

Hazard Location

The entire Town of Plympton is equally vulnerable to extreme temperature hazards.

B1.c
B2.a,c

Previous Occurrences & Extent

NOAA's National Centers for Environmental Information houses a Storm Events Database (NOAA 2018), which includes accounts of Cold/Wind Chill, Extreme Cold/Wind Chill, Heat, and Excessive Heat. Querying the data for these types of events for the past 10 years returned five occurrences of extreme temperature:

- 1) July 6, 2010: Temperatures neared 100°F with a high percent of relative humidity. Heat index values ranged from 100 to 106 for most of Southern New England. Heat index values at the Plymouth Municipal Airport ranged between 100 and 104.
- 2) July 22, 2011: High temperatures and high humidity levels brought the heat index above 105 for several hours. Heat index values at the Plymouth Municipal Airport ranged between 105 and 108.
- 3) February 16, 2015: A winter storm brought significant snowfall, as well as frigid temperatures. The Automated Surface Observation Station at the Plymouth Municipal Airport recorded wind chill values as low as -28°F.
- 4) February 14, 2016: An arctic high-pressure system brought strong northwest winds and extremely cold wind chills to southern New England. Wind chills as low as -36°F were reported in Plymouth.
- 5) July 3, 2018: An area of high pressure brought high temperatures and humidity to southern New England. The Automated Surface Observation Station at the Plymouth Municipal Airport reported a heat index of 107.



NOAA’s National Weather Service (NWS) has developed a Heat Index (NWS 2016a), which measures how hot it feels when relative humidity is considered along with the actual air temperature (Figure 3-10). Relative humidity is the amount of atmospheric moisture present relative to the amount that would be present if the air were fully saturated. For example, a 90°F day with 80% humidity would have a heat index of 113°F, and there is a dangerous likelihood of heat disorders with prolonged exposure or strenuous activity. The NWS issues alerts when the Heat Index is expected to exceed 105-110°F (depending on local climate) for at least 2 consecutive days. Wind chill temperature indicates how cold it feels outside, based on the rate of heat loss from exposed skin caused by the combination of wind and cold. Because wind draws heat from the body, reducing skin temperature, as well as internal body temperature, the wind actually makes it feel colder than the absolute temperature would indicate. Frostbite is the result of body tissue (i.e. skin) freezing. The most vulnerable parts of the body are the fingers, toes, ears and nose. The National Weather Service’s Wind Chill Temperature Index (NWS 2016b) provides a useful method for calculating the dangers from extreme cold temperatures and winter winds, and the amount of time exposed skin will take to get frostbite (Figure 3-11). According to the chart in Figure 3-11, if it is 0°F with a 15 mph, the wind chill temperature would be -19°F and it would take exposed skin 30 minutes to get frostbite. The index calculates wind speed at an average height of 5 feet above the ground’s surface, the typical height of a person’s face, from the measured wind data collected from standard 33-foot high anemometers.

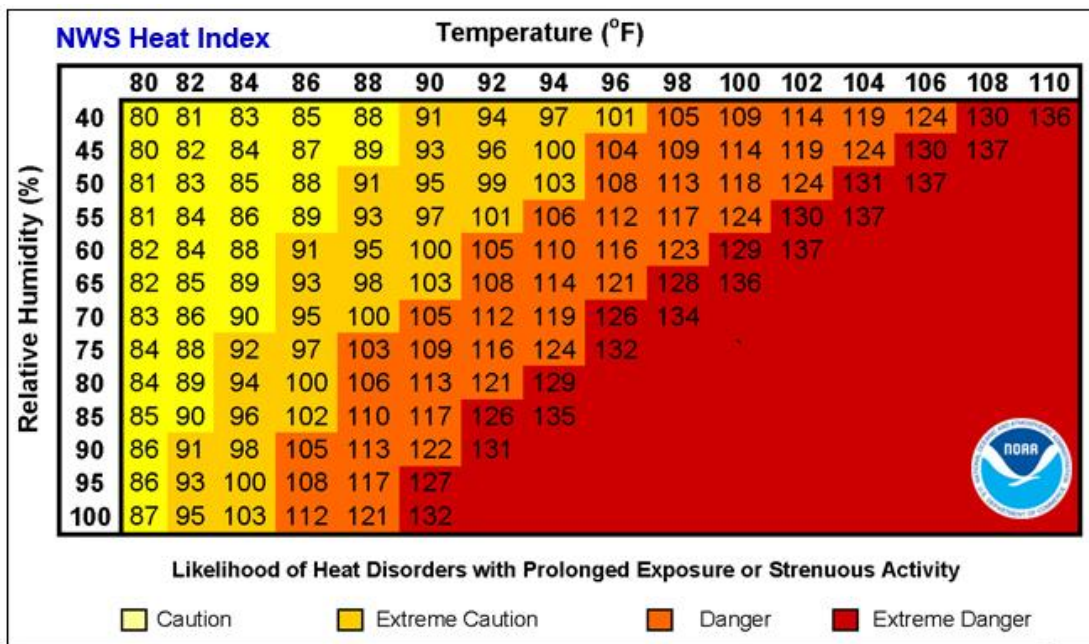


Figure 3-10. NWS’s Heat Index.

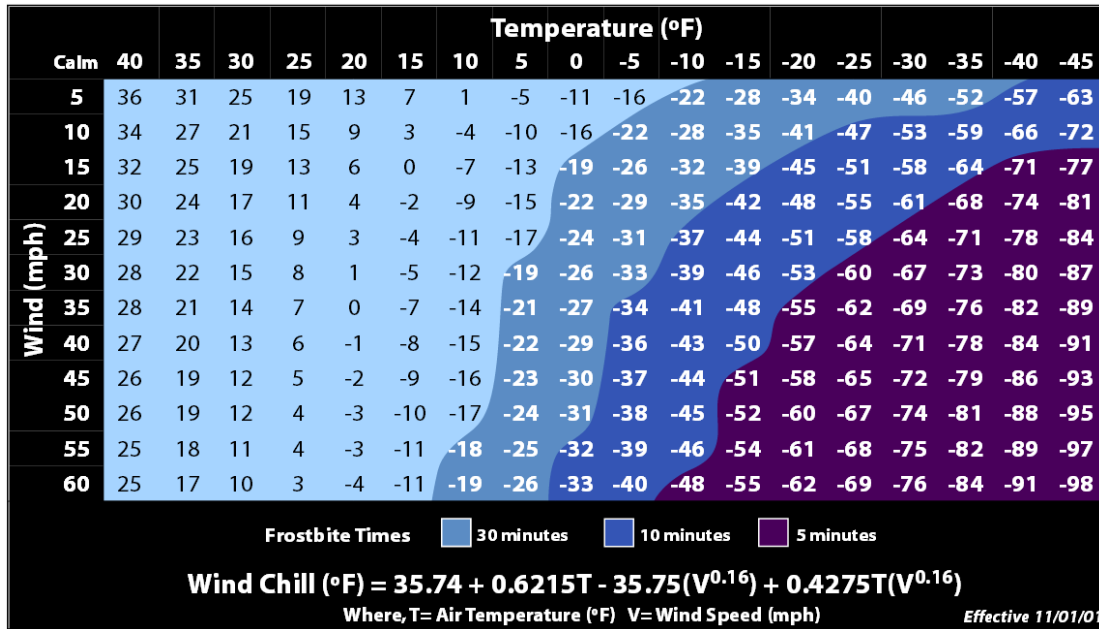


Figure 3-11. NOAA’s Wind Chill Chart.

B2.b

Probability

Based on the data summarized above about past extreme temperature conditions in Plymouth County, the probability that extreme temperatures will occur in Plympton in the future is likely (between 10% and 100% probability in the next year). Overall, Massachusetts has been experincing an increase in tempaure as a result of climate change, meaning extreme summer temperatures are becoming more intense, while winter tempatures are becoming less severe.

B3.a

Impact

Below is a list of possible impacts that could result from extreme hot or cold temperatures:

- **People:** Excessive heat or extreme cold poses serious health risks, including death.
- **Emergency Response:** Stress will be placed on the cooling/warming systems of emergency vehicles.
- **Infrastructure:** Highways and roads can be damaged by excessive heat as asphalt softens. Both extreme heat and extreme cold can put significant strain on power utilities, as users’ energy needs increase to run air conditioners or heaters. Extreme heat can cause well water quality, and potentially quantity, to worsen. Extreme heat can cause sanitary issues in the water distribution system as the water in tanks and the groundwater heat up, as well as increase water demand.
- **Economy:** Transported refrigerated goods experience a higher degree of spoilage during excessive heat conditions. Agriculture and livestock can be adversely impacted by extreme heat.
- **Natural Systems:** Extreme heat can reduce water levels in natural ponds and reservoirs, as well as increase surface water temperatures to dangerous levels. Both excessive heat and extreme cold can have an adverse impact on fish and wildlife.



3.8 EARTHQUAKE

Overview

An earthquake is a sudden, intense shaking of the Earth's surface caused by the movement of large portions of the Earth's crust. These movements tend to occur along faults, which are fractures in the Earth's crust along which two plates of crust can move against each other. Earthquakes can occur suddenly at any time, with virtually no warning.

The depth at which an earthquake occurs is called a focal depth. A focal depth of less than 43.5 miles is considered to be a shallow earthquake; the majority of earthquakes fall into this category. Earthquakes originating at focal depths of 43.5 to 186 miles are considered intermediate. However, focal depths of earthquakes can reach depths of more than 435 miles. The epicenter of an earthquake is the location on the Earth's surface directly above the focal point of an earthquake.

New England is located in the middle of the North American tectonic plate; the western edge of this plate is along the west coast where it is pushing up against the Pacific Ocean Plate, and the eastern edge is in the middle of the Atlantic Ocean where it is spreading away from the European and African plates. Because New England is located a considerable distance from either edge of the North American plate, most earthquakes that occur here are due to the cracking of crustal rocks due to compression as the plate is slowly squeezed by the global movement of other plates.

B1.c
B2.a

Hazard Location

Due to the configuration of the tectonic plates, the greatest threat from earthquakes in the United States occurs along the fault lines on the west coast. While earthquakes do occur in the eastern United States, they tend to be less frequent and less intense. Figure 3-12 shows earthquakes within 100 miles of the Town of Plympton since the 1970s as reported by USGS; this includes 91 earthquakes ranging in magnitude from 2.0 to 3.7.

B1.c
B2.a,c

Previous Occurrences & Extent

Although there are no recorded earthquakes within Plympton itself, there have been 91 occurrences of earthquakes since 1970 within 100 miles of Plympton. The epicenter locations of these earthquakes are shown in Figure 3-12; the range in magnitude of each event is indicated by color. The Richter magnitude of these 90 events ranged from 2.0 to 3.7, which as described below, can often be felt, but generally cause little to no damage.

The Richter Scale (Table 3-12) is frequently used to measure the magnitude of earthquakes. It measures the maximum recorded amplitude of a seismic wave, which quantifies the ground motion and the energy released at the source of an earthquake.

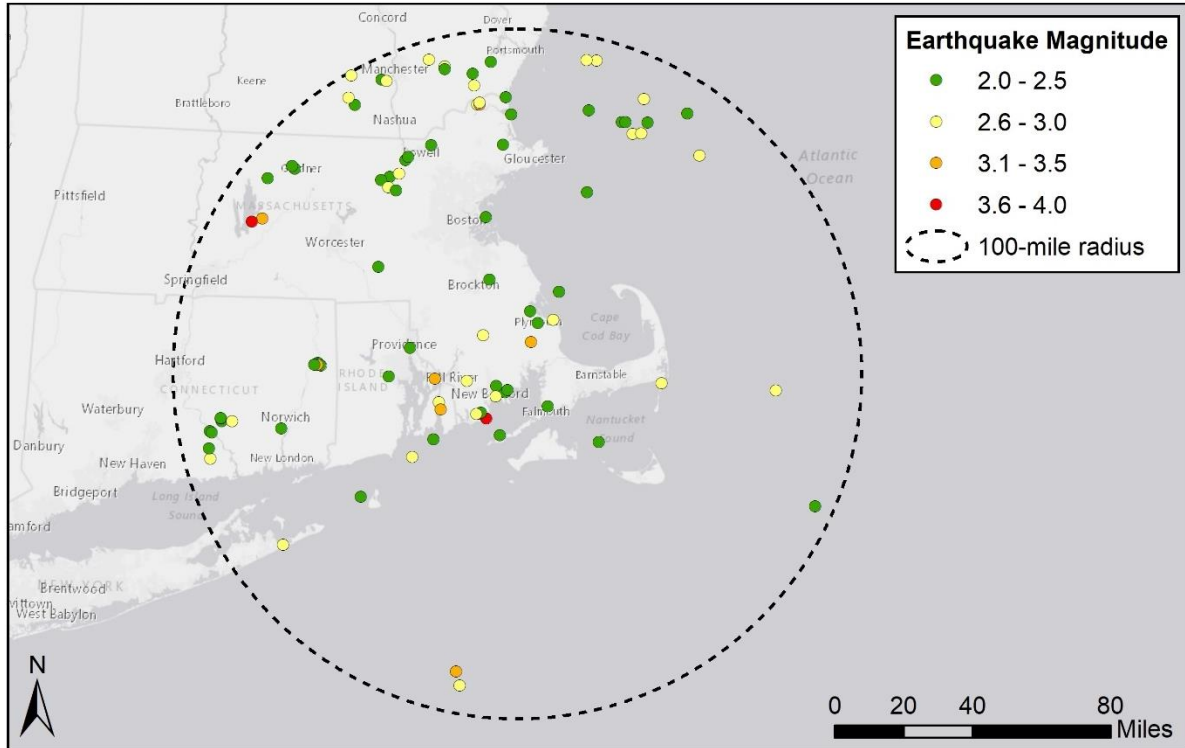


Figure 3-12. Earthquakes that have occurred within 100 miles of Plympton since 1970.

Table 3-12. Richter scale.

Richter Magnitude	Earthquake Effects
2.5 or less	Not felt or felt mildly near the epicenter; can be recorded by seismographs
2.5 to 5.4	Often felt, but only causes minor damage
5.5 to 6.0	Slight damage to buildings and other structures
6.1 to 6.9	May cause a lot of damage in very populated areas
7.0 to 7.9	Major earthquake; serious damage
8.0 or greater	Great earthquake; can totally destroy communities near the epicenter

B2.b

Probability

Given that earthquakes have occurred in Massachusetts and in Plymouth County specifically in recent years, it is possible (1-10% probability in the next year) that an earthquake could occur in Plympton. Any possible effects of climate change on earthquakes are still being determined and are not clear at this time.



B3.a

Impact

Below is a list of possible impacts that could result from an earthquake:

- **People:** Damage caused to buildings and other structures during an earthquake can lead to injury or loss of life.
- **Emergency Response:** Downed trees and power lines, as well as damaged roads caused by an earthquake can impede emergency vehicles.
- **Infrastructure:** Earthquakes can cause utility poles to fall and live wires to become exposed or to start fires. The shaking caused by an earthquake can also rupture gas lines and cause the release of flammable substances and can break or separate sewer collection and water distribution pipes, resulting in loss of service.
- **Economy:** Earthquakes can damage foundations and buildings; most property damage is caused by the failure and collapse of structures during ground shaking. Concrete and masonry structures are brittle and thus more susceptible to damage and collapse.
- **Natural Systems:** Earthquakes can cause landslides and slope failure; this could have hazardous impacts on areas with steep slopes.



3.9 INVASIVE SPECIES

Overview

Invasive species are defined as non-native species that cause or are likely to cause harm to ecosystems, economies, and/or public health. Although invasive species can be any type of organism, the 2018 Massachusetts State Hazard and Climate Adaptation Plan focuses specifically on invasive terrestrial plants, as these are the most studied and managed type of invasive species. However, other categories of invasive species, such as insects and fungi, can cause significant damage to native flora, increasingly the likelihood for downed trees and limbs during many other natural hazard events.

B1.c
B2.a

Hazard Location

Although the entire Town of Plympton is potentially vulnerable to the introduction and establishment of invasive species, they pose the biggest threat to native or minimally managed ecosystems. In addition, the ability of invasive species to travel far distances (either via natural means or accidental human interference) allows these species to propagate rapidly over large geographic areas.

B1.c
B2.a,c

Previous Occurrences & Extent

The Massachusetts Invasive Plant Advisory Group (MIPAG) recognizes 69 plant species as “Invasive”, “Likely Invasive”, or “Potentially Invasive.” In addition, the 2018 State Plan also lists a number of other invasive species, including gypsy moths (*Lymantria dispar*) and the Dutch elm disease fungus (*Ophiostoma sp.*).

According to the Plympton Tree Warden, William Hayes, trees are affected by invasive species, including winter moths (*Operophtera brumata*) and gypsy moths (*Lymantria dispar*), although less so than by drought and severe storms. In recent years, populations of both these species have remained manageable. Winter moth populations have been kept in check by releasing parasitic flies (*Cyzenis albicans*). Release of this control species has been coordinated with Dr. Joseph Elkinton at University of Massachusetts and has been an ongoing management technique. In the case of the gypsy moth, ample populations of the fungus *Entomophaga maimaiga* resulted in notable mortality of gypsy moths in recent years. The Tree Warden has seen no evidence of the Asian long-horned beetle or the emerald ash borer in the Town of Plympton.

B2.b

Probability

There are known invasive species within the Town of Plympton, so it is 100% likely that invasive species occur in Town. However, the likelihood that a significant negative impact would occur due to the presence of these species is possible, but not as high. In the future, the Town of Plympton may become more susceptible to additional invasive species as climate change facilitates the spread and establishment of invasive species.



B3.a

Impact

Below is a list of possible impacts that could result from invasive species:

- **People:** Those who rely on natural systems for their livelihood or well-being are more likely to experience negative repercussions from the expansion of invasive species.
- **Economy:** The agricultural sector is vulnerable to increased invasive species associated with increased temperatures. More pest pressure from insects, diseases, and weeds may harm crops and cause farms to increase pesticide use.
- **Natural Systems:** Biodiversity and ecosystem health may be impacted by invasive species. Aquatic invasive species pose a particular threat to water bodies. Impacts of aquatic invasive species include impairment of recreational uses, such as swimming, boating and fishing, degradation of water quality and wildlife habitat, and diminished property values.



3.10 OTHER SEVERE WEATHER (HEAVY PRECIPITATION, HIGH WIND, THUNDER/LIGHTNING)

Overview

Heavy Precipitation: The Massachusetts State Hazard Mitigation and Climate Adaptation Plan notes that the Fourth National Climate Assessment published by the U.S. Global Change Research Program shows that heavy precipitation events have increased in both intensity and frequency over the past century across much of the country, with the largest increases occurring in the Northeast. Annual precipitation in Massachusetts is projected to increase by as much as 7.3 inches by the end of this century. Furthermore, increased precipitation will likely occur during more intense periods of precipitation coupled with more frequent episodic drought, causing more stormwater runoff and higher surface water levels.

High Wind: Major wind events in Massachusetts include hurricanes and nor'easters. Tornadoes are extremely rare, although they do occur. Thunderstorms, especially in the summer months, do occur and can bring localized damage due to wind, especially to buildings of poorer construction and old or rotted tree limbs.

Thunder and Lightning: A thunderstorm is a storm that produces lightning and thunder and is usually accompanied by gusty winds, heavy rain, and sometimes hail. The National Weather Service defines a severe thunderstorm as one that produces a tornado, winds of at least 58 mph (50 knots or ~93 km/h), and/or hail at least 1 inch in diameter. Structural wind damage may imply the occurrence of a severe thunderstorm. A thunderstorm wind equal to or greater than 40 mph (35 knots or ~64 km/h) and/or hail of at least ½ inch is defined as approaching severe. Lightning is one of the most dangerous aspects of a thunderstorm, and it can strike up to 10 miles away from the main thunderstorm location; however, because lightning occurs during every thunderstorm, its presence does not indicate a “severe” thunderstorm.

Three basic ingredients are required for a thunderstorm to form: moisture, rising unstable air (air that keeps rising when given a nudge), and a lifting mechanism. The sun heats the surface of the earth, which warms the air above it. If this warm surface air is forced to rise—by hills or mountains, or areas where warm/cold or wet/dry air bump together—it will continue to rise as long as it weighs less and stays warmer than the air around it. As the air rises, it transfers heat from the surface of the earth to the upper levels of the atmosphere (the process of convection). The water vapor it contains begins to cool, releasing the heat; and it condenses into a cloud. The cloud eventually grows upward into areas where the temperature is below freezing. Some of the water vapor turns to ice, and some of it turns into water droplets. Both have electrical charges. Ice particles usually have positive charges, and rain droplets usually have negative charges. When the charges build up enough, they are discharged in a bolt of lightning, which causes the sound waves we hear as thunder.

B1.c
B2.a

Hazard Location

Heavy Precipitation: Heavy precipitation can affect all portions of the Town of Plympton. Based on recent studies, New England has already experienced an increase in heavy precipitation

events in the last 50 years. This is due to increased sea surface temperatures in the Atlantic Ocean that cause air moving north over the water to hold more moisture. As a result, when these warm fronts meet cold air systems from the north, an even greater amount of precipitation than normal can be anticipated to fall on Massachusetts. As shown in Figure 3-13, the percent change in the precipitation amount occurring as very heavy precipitation has increased by 38% in the northeast. This data compares a reference period from 1901-1960 with a more recent period: 1986-2016. The threshold used to define a heavy precipitation event is the top 1 percent of all days with precipitation.

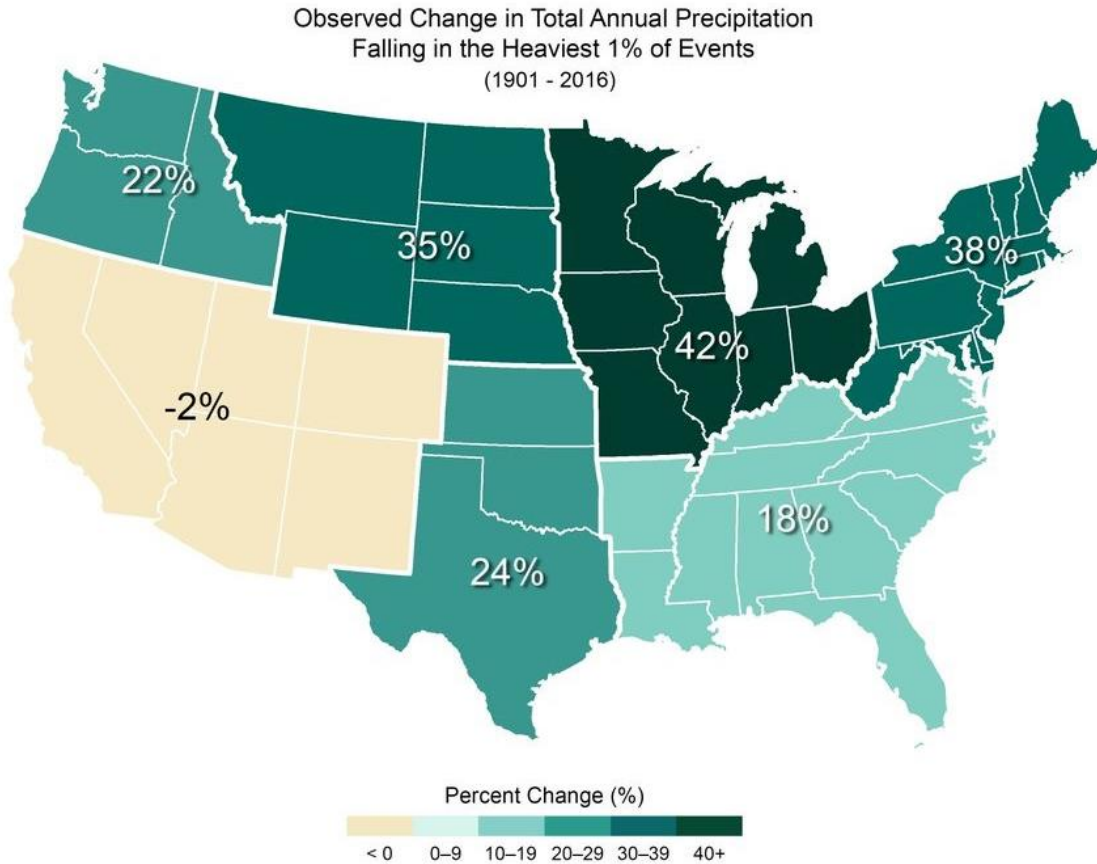


Figure 3-13. Observed changes in heavy precipitation (GlobalChange.gov, 2020).

High Wind: In their effort to research potential sites for wind energy facilities, the Executive Office of Energy and Environmental Affairs (EOEEA) put considerable effort into measuring wind velocities in Massachusetts. These efforts produced four sets of data, representing mean wind speed at different elevations above the land’s surface: 30, 50, 70 and 100 meters. The mean wind speed, in miles per hour, at 30 meters above the land’s surface is shown for Plympton in Figure 3-14.

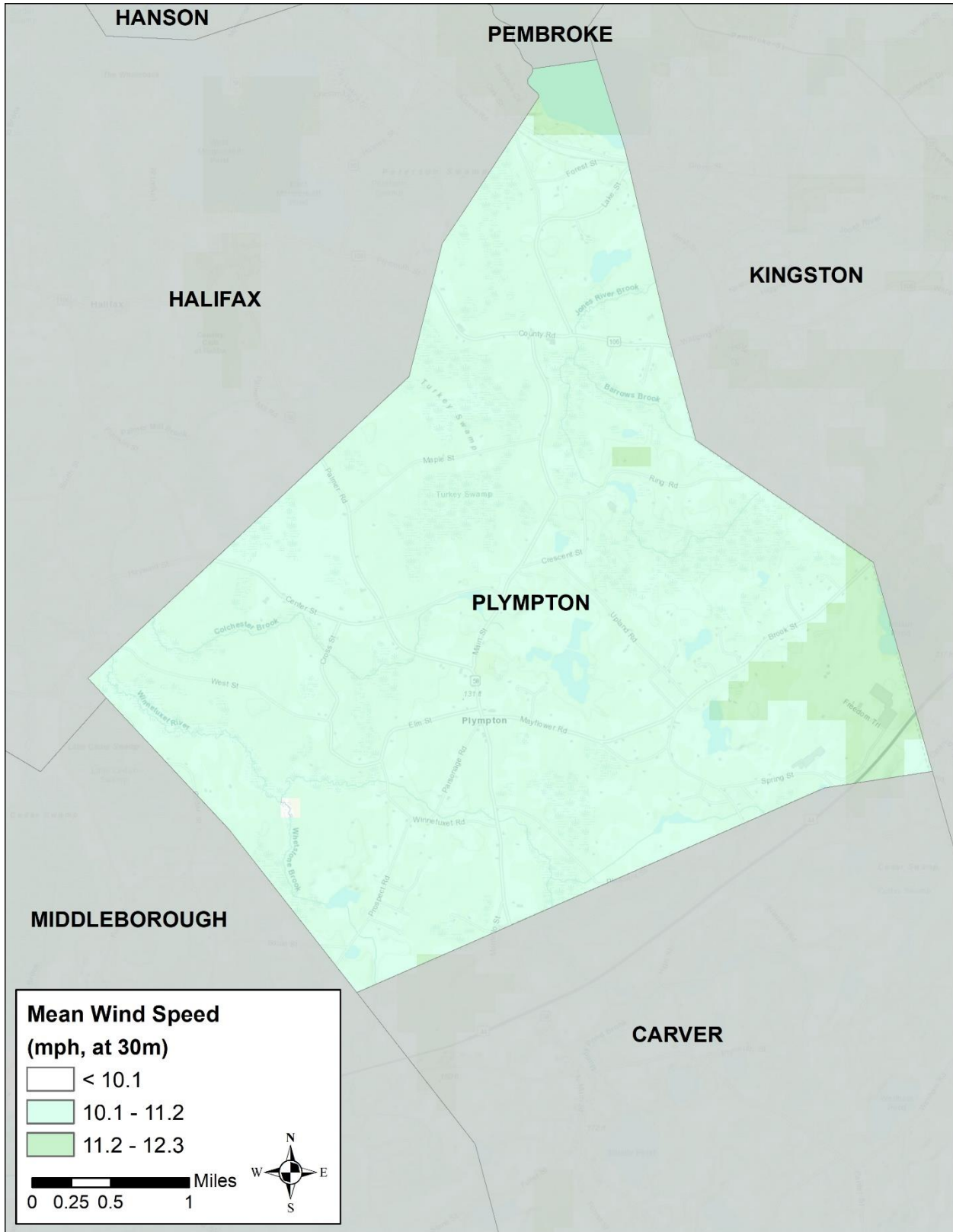


Figure 3-14. Mean wind speed (mph) at 30 meters above the surface.

Thunder and Lightning: The entire Town of Plympton is at risk from thunderstorms. NOAA has compiled data about the annual number of thunderstorms across the United States. Figure 3-15 shows the annual number of thunderstorms in the northeastern United States. The arrow shows that all of eastern Massachusetts, including Plympton, falls in the darker blue area, which receives, on average, 10-20 thunderstorms per year.



Figure 3-15. Annual number of thunderstorms.

B1.c
B2.a,c

Previous Occurrences & Extent

Heavy Precipitation: Because heavy rain is often associated with other major weather events (e.g., tropical storms, nor'easters, etc.), the list of heavy rain events from the NOAA NCDC Storm Events (NOAA 2019a) does not have many entries from the past 10 years:

- 1) July 4, 2014: Torrential rain produced significant flash flooding in southeast Massachusetts where storm totals of 4 to 8 inches were reported.
- 2) September 18, 2018: Heavy downpours and damaging thunderstorms occurred throughout Massachusetts. Storm total rainfall amounts reached 2 to 5 inches across Plymouth County. Numerous roads were flooded and impassable.
- 3) July 12, 2019: A warm front moving northward across southern New England brought heavy rain and thunderstorms, causing significant flooding. Plymouth airport recorded 5.3 inches of rain in just 6 hours.
- 4) June 28, 2020: A cold front met with a high humidity conditions to produce a severe thunderstorm and flashfloods throughout Massachusetts and within Plymouth County.

Given the tendency for heavy precipitation to occur during other weather events, it is likely that the frequency of these events is underestimated by this database.

High Wind: A summary of the high wind events from the NOAA NCDC Storm Events database (NOAA 2019a) from the last five years shows that high wind events are relatively common in Plympton (more than once per year):

- 1) March 17, 2015: An arctic cold front moving into southern New England brought rain and snow showers to the region, followed by strong, damaging winds. The event resulted in significant downed trees and power lines across the southern portion of Plymouth County.
- 2) April 4, 2015: A cold front moved across Southern New England creating strong gusty northwest winds. The Automated Surface Observation System at Plymouth Airport recorded sustained winds of 37 mph and gusts to 47 mph.



- 3) January 10, 2016: A strong low pressure system brought heavy rain, thunderstorms, and gusty winds to southern New England, resulting in scattered tree and power line damage across southern New England.
- 4) February 24-25, 2016: A low pressure system brought showers, thunderstorms, and strong winds.
- 5) September 5, 2016: The remnants of Hurricane Hermine, classified as a tropical system by the time it reached New England, resulted in moderate rainfall and high winds, although they were generally below tropical storm force. Because trees were still fully leaved and there were higher wind gusts, there was some wind damage.
- 6) October 9, 2016: The remnants of Hurricane Matthew merged with a cold front off the coast and moved past Cape Cod during the night of October 9th-10th. This caused wind damage in parts of Eastern Massachusetts.
- 7) December 18, 2016: A low pressure system brought strong gusty southwest winds to Southern New England, causing scattered tree and wire damage in Massachusetts.
- 8) March 14, 2017: A major winter storm moved up the east coast, producing significant snow amounts and high winds. It is estimated that winds gusted to 58 mph in southern Plymouth County during the storm.
- 9) October 29-30, 2017: The remnants of Tropical Storm Phillipe generated strong to damaging winds in eastern Massachusetts.
- 10) December 25, 2017: A fast-moving low-pressure system brought a several inches of snow to much of Southern New England, along with damaging west to northwest winds.
- 11) January 12-13, 2018: A slow-moving cold front with strong southerly winds produced maximum wind gusts between 45 to 65 mph.
- 12) March 2-3, 2018: The storm brought heavy rain and strong winds to central and eastern Massachusetts.
- 13) October 15-16, 2018: A cold front brought wind gusts of 40 to 60 mph to southeastern Massachusetts.
- 14) November 3, 2018: A low pressure brought heavy rain, severe thunderstorms, and strong to damaging westerly winds. Winds in the area were gusting to 50 to 60 mph.
- 15) December 21, 2018: A storm brought strong to damaging south winds and one to four inches of rain to Eastern Massachusetts.
- 16) January 24, 2019: A low pressure system brought high south winds and heavy rain to the area.
- 17) January 30, 2019: A low pressure system brought a mix of snow and rain, as well as damaging west winds.
- 18) February 25, 2019: A storm moving through the great lakes Region redeveloped over the Mid-Atlantic coast on the 24th before bringing severe west-northwest winds to Massachusetts and southern New England.
- 19) October 17, 2019: A powerful storm developed over New Jersey, which then moved northeast into New England. The vent resulted in heavy rain and damaging winds. Wind gusts of 61 mph were recorded at the Plymouth Airport.
- 20) November 1, 2019: A cold front moved through the region causing showers, isolated thunderstorms, and strong winds that downed trees and powerlines.



- 21) January 12, 2020: A high pressure system from offshore and a weather system from the Midwest combined, bringing southwest winds leading to minor damage. Wind gusts of 58 mph were recorded at the Plymouth Airport.
- 22) February 7, 2020: A low-pressure system moved across Massachusetts resulting in wind damage to much of western Massachusetts and some parts of western Massachusetts, resulting in power outages. Southern Plymouth County experienced wind gusts of 65 mph.
- 23) April 9, 2020: A strong cold front combined with an upper level disturbance system to bring isolated thunderstorms and damaging winds across Massachusetts.
- 24) April 13, 2020: A low-pressure system originating in the Great Lakes region caused powerful wind conditions to all of Massachusetts. In Plympton, the event resulted in a tree and wires down on a house on Soule St.

The National Weather Service issues a variety of warnings related to wind hazards. They are:

- High Wind Watch: Issued when the following conditions are possible – sustained winds of 40 mph or higher for one hour or more, or wind gusts of 58 mph for one hour or more.
- High Wind Warning: Issued when the following conditions are occurring or imminent – sustained winds of 40 mph or higher for one hour or more, or wind gusts of 58 mph for one hour or more.
- Hurricane Watch: Issued when a tropical cyclone containing winds of 74 mph or higher poses a possible threat, generally within 48 hours.
- Hurricane Warning: Issued when sustained winds of 74 mph or higher associated with a tropical cyclone are expected in 36 hours or less.
- Wind Advisory: Issued when the following conditions are expected for 3 hours or longer – sustained winds of 31 to 39 mph and/or wind gusts of 46 to 57 mph.
- Extreme Wind Warning: Issued for surface winds of 115 mph or greater associated with non-convective, downslope, derecho (not associated with tornado), or sustained hurricane winds are expected to occur within one hour.
- Small Craft Advisory: Issued when one or all of the following conditions are expected to occur within 36 hours – sustained winds of 18 to 33 knots or frequent gusts (with a duration of 2 hours or more) between 18 to 33 knots or waves of 4 feet or higher.
- Gale Warning: Issued when one or both of the following conditions are expected to occur within 36 hours and is not directly associated with a tropical cyclone – sustained winds of 34 to 47 knots or frequent gusts (with a duration of 2 hours or more) between 34 to 47 knots.
- Storm Warning: Issued when one or both of the following conditions are expected to occur within 36 hours and is not directly associated with a tropical cyclone – sustained winds of 48 to 63 knots or frequent gusts (with a duration of 2 hours or more) between 48 to 63 knots.
- Hurricane Force Wind Warning: Issued when one or both of the following conditions are expected to occur within 36 hours and is not directly associated with a tropical cyclone –



sustained winds of 64 knots or greater or frequent gusts (with a duration of 2 hours or more) between 64 knots or greater.

Thunder and Lightning: The NOAA NCDC Storm Events database lists 26 lightning and/or thunderstorm wind events for Plymouth County within the last 5 years (NOAA 2019a). None of the recorded events listed Plympton as a specific location but may simply be because these events went unrecorded.

There are a variety of types of thunderstorms:

- Single-cell thunderstorms, which are small, brief, weak storms that can develop and then dissipate within an hour. They are typically produced by heating on a summer afternoon. Single-cell storms produce brief, heavy rain and lightning.
- Multi-cell storms form along the leading edge of rain-cooled air. Although individual cells that comprise the multi-cell storm can only last 30-60 minutes, the entire multi-cell storm system can persist for many hours. Multi-cell storms may produce hail, strong winds, brief tornadoes and flooding.
- A squall line is a group of storms arranged in line, often associated with “squalls” of heavy wind and rain. These storms tend to pass quickly and are less likely to produce tornadoes than supercells. A squall line can be hundreds of miles long but tend to only be 10-20 miles wide.
- A supercell is a highly organized, long-lived storm fueled by an updraft that is tilting and rotating. These tilting and rotating updrafts can produce severe tornadoes.

B2.b

Probability

Based on the data presented above, it is highly likely (near 100% probability in the next year) that other severe weather (heavy precipitation, high wind, and thunder/lightning) will occur in Plympton. As mentioned with prior hazards, climate change is predicted to increase the frequency and intensity of storms and severe weather events, which includes heavy precipitation, high winds, and thunder/lightning storms.

B3.a

Impact

Below is a list of possible impacts that could result from other severe weather:

- **People:** Thunderstorms and high winds can result in power outages, leaving people without heat or other utilities. Lightning may cause injury or death to people who are outdoors during the onset of a thunderstorm if they are unable to seek shelter.
- **Emergency Response:** Trees and power lines felled by high winds and/or lightning can impede emergency vehicles.



- **Infrastructure:** Lightning and high winds can result in downed power lines. Heavy rains associated with thunderstorms can result in flooded roads and overwhelm drainage systems.
- **Buildings:** Wind and wind-born debris can damage roofs, windows and other portions of houses and buildings. Heavy rains and flooding can damage properties. Lightning strikes can start fires, which can threaten buildings and structures.
- **Economy:** Power outages can force businesses to close temporarily.
- **Natural Systems:** Heavy winds can bring down trees and branches.



3.11 DAM FAILURE

Overview

A dam is any artificial barrier and/or any controlling structure that can or does impound or divert water. There are 2,901 public and privately owned dams in Massachusetts. Nine (9) of these are located in Plympton (Figure 3-16).

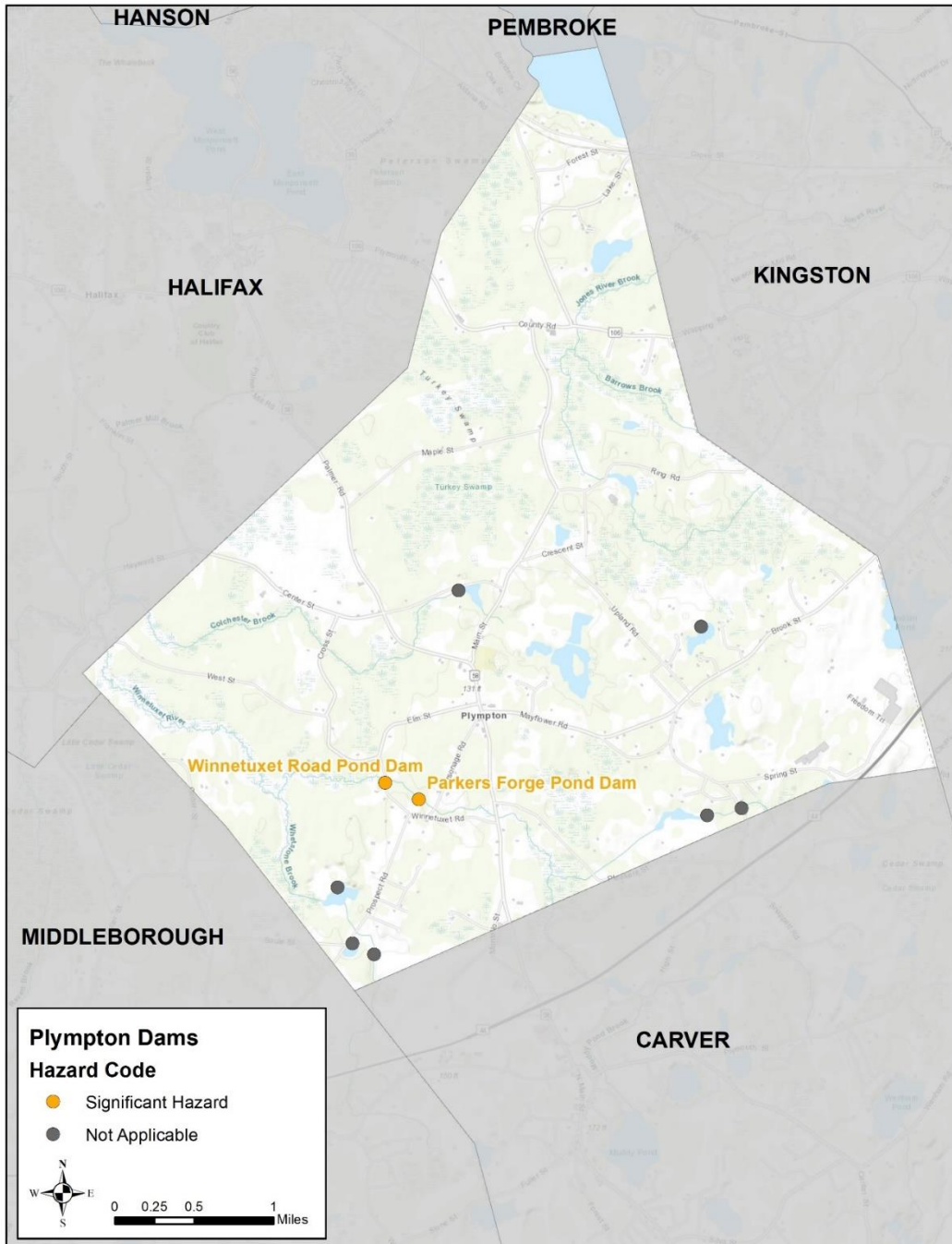


Figure 3-16. Locations of dams within Plympton.



Dam failure is any sudden, uncontrolled release of impounded water due to structural deficiencies in a dam. Dams can fail for a variety of reasons, including the dam being overtopped by floods that exceed its capacity, structural failure of the dam construction materials or the foundation supporting the dam, and inadequate maintenance and repair.

B1.c
B2.a

Hazard Location

Hazards associated with dam failure are confined to the areas around existing dams. There are two (2) dams that are classified by the Office of Dam Safety as Significant Hazard dams located within Plympton: 1) the Winnetuxet Road Pond Dam (owned by the Town) and 2) the Parkers Forge Pond Dam (privately owned). The remaining 7 dams within the Town of Plympton have not been given a hazard code by the Office of Dam Safety.

There is an Emergency Action Plan for one of the two Significant Hazard dams, the Winnetuxet Road Pond Dam. This plan defines departmental responsibilities in the event of an emergency and provides procedures for identifying unusual and unlikely conditions, which may result in a dam failure. Action plans are laid out for both Dam Safety Watch (potential dam failure situation rapidly developing) and Dam Failure Warning (dam failure is imminent or in progress) incidents. Information about the Winnetuxet Road Pond Dam and the potential infrastructure at risk during a dam failure is described below:

The Winnetuxet Road Pond Dam supports Winnetuxet Road, which runs over the Winnetuxet River, and impounds a pond used for recreational activities. The dam consists of an earthen embankment and is classified as “small”, running approximately 12 feet long and 8 feet high. Potential hazards downstream of the dam include three dwellings, one immediately downstream of the dam on Popes Farm Road and two additional dwellings farther downstream. In the event of dam failure, the predicted inundation area is primarily swamp and cranberry bogs. The dam is classified as a significant hazard because failure may result in “loss of life and damage to home(s), industrial or commercial facilities, secondary highways(s) or railroad(s), or cause interruption of the use or service of relatively important facilities” (Commonwealth of Massachusetts, 302 CMR 10.00 *Dam Safety*).

B1.c
B2.a,c

Previous Occurrences & Extent

According to the Association of State Dam Safety Officials (ASDSO) Dam Incident Database, there have been no previous occurrences of dam failure in the Town of Plympton. However, aging infrastructure, increased storm intensity and rising sea levels may produce such incidents in the future.

The Massachusetts Office of Dam Safety, within the Department of Conservation and Recreation, maintains a database of all the dams in Massachusetts, classified by their hazard potential. This database divides dams into three categories:

- 1) High Hazard Potential Dam: A dam location where failure will likely cause loss of life and serious damage to homes, industrial or commercial facilities, important public utilities, main highways or railroads.



- 2) Significant Hazard Potential Dam: A dam located where failure may cause loss of life and damage to homes, industrial or commercial facilities, secondary highways, or railroads, or cause interruption of use or service of relatively important facilities.
- 3) Low Hazard Potential Dam: A dam located where failure may cause minimal property damage to other, and loss of life is not expected.

B2.b

Probability

As a dam failure has never occurred in the Town of Plympton, the probability of it occurring is low, but possible (1-10% probability in the next year). The 2018 Massachusetts Hazard Mitigation and Climate Adaptation Plan describes two primary types of dam failure: catastrophic failure, characterized by the sudden, rapid, and uncontrolled release of impounded water, and design failure, which occurs as a result of minor overflow events. Dam overtopping is caused by floods that exceed the capacity of the dam, and it can occur as a result of inadequate spillway design, settlement of the dam crest, blockage of spillways, and other factors. Overtopping accounts for 34 percent of all dam failures in the U.S. More extreme precipitation events could increase the frequency of overtopping events. So, although climate change will not increase the probability of catastrophic failure, it may increase the probability of design failure.

B3.a

Impact

Below is a list of possible impacts that could result from dam failure:

- **People**: Could become trapped or blocked by flooded roads resulting from overtopped dams.
- **Infrastructure**: Utilities may be disrupted due to damaged pipes or power lines near the dam or culvert.
- **Buildings**: May be damaged by flooding caused by a failed dam or blocked culvert.
- **Economy**: Businesses could experience economic losses due to flooded or blocked roads prohibiting employees and/or customers from accessing certain areas of Town.
- **Natural Systems**: Dam and culvert failures can result in bank erosion. Debris and other materials can be deposited in natural systems.



3.12 LANDSLIDES

Overview

Landslides are a form of mass wasting in which there is a mass movement of rock, debris, or earth down a slope under the direct influence of gravity. There are five different types of slope movement that are considered landslides including falls, topples, slides, spreads, and flows. These categories can be further divided up by the type of material composing the landslide including bedrock, debris, or earth. The most common types of landslides are mudflows or mudslides, otherwise known as debris flows. Depending on the severity of the event, landslides can be a threat to human life, buildings, infrastructure, and the natural environment.

Landslides occur when down-slope forces exceed the strength of the earthen material on the slope. Landslides are often the result of a combination of factors increasing down-slope forces and decreasing strength of material. These factors can be brought on by heavy precipitation, snowmelt, stream erosion, earthquakes, and/or human disturbance. Landslides can travel as slow as millimeters per year, or in the case of severe debris flows, as fast as 200 mph, but more commonly 30 to 50 mph. Landslide speed is dependent on steepness of the slope, water composition, and debris volume and type. Generally, landslides are not common in Massachusetts. The coastal and mountainous areas of the west coast, as well as the Appalachian Mountains, Rocky Mountains, Alaska, and Hawaii all have more severe and frequent landslide events.

B1.c
B2.a

Hazard Location

In 2013, the Massachusetts Geologic Survey mapped potential landslide hazards for the entire state of Massachusetts. Maps were specifically produced for use in the upcoming 2015 Massachusetts Statewide Hazard Mitigation Plan and shows where past slope movement has occurred and/or may occur in the future under heavy precipitation events. Figure 3-17 shows the slope stability map for Plympton. As the topography of Plympton is relatively uniform and there have been no past landslide events within the Town in since 1900, most of the Town is relatively stable and not very vulnerable to landslides. However, Figure 3-17 identifies small areas of steeper topography where the landslide risks are slightly higher (i.e., low stability or moderately unstable).

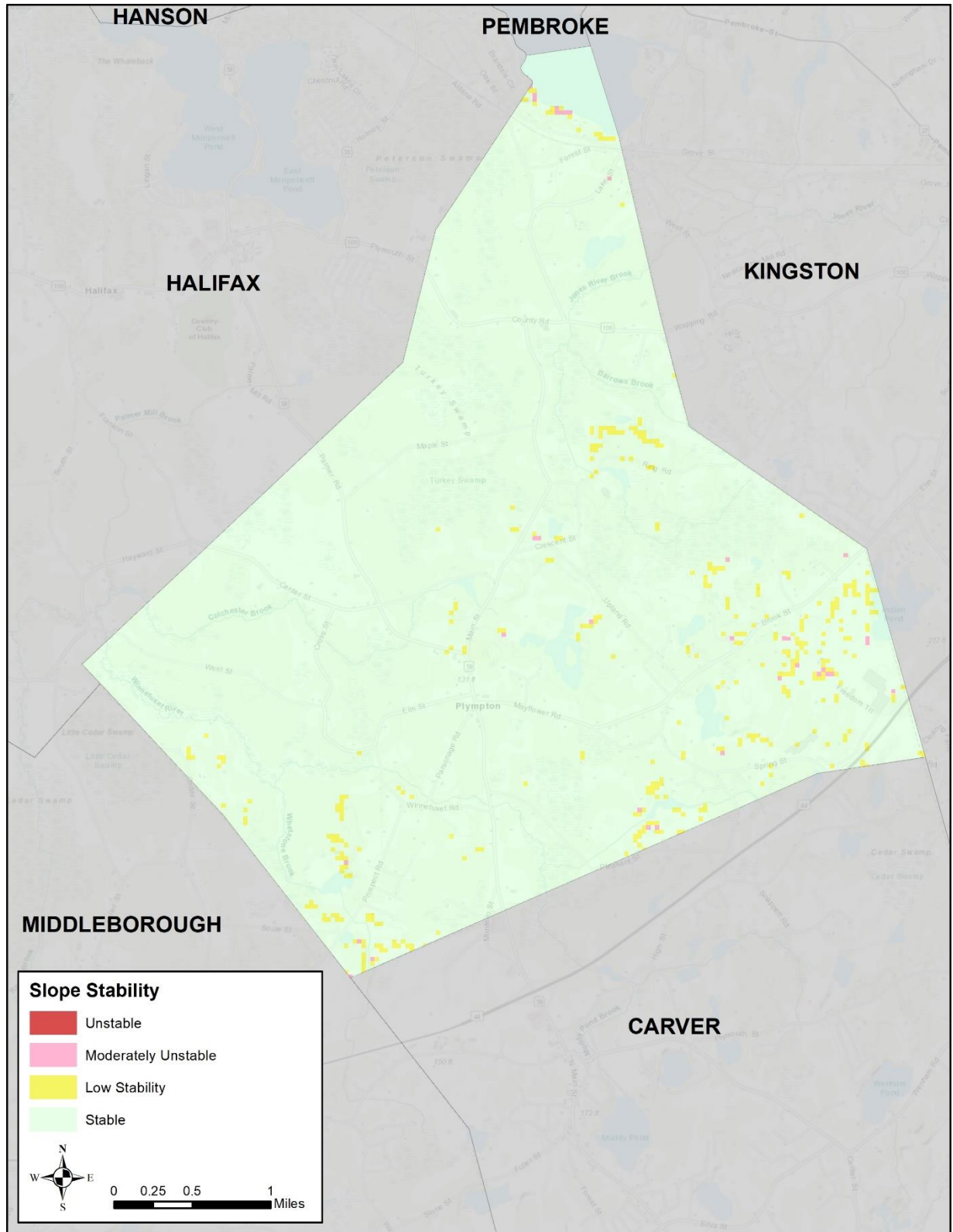


Figure 3-17. Slope stability of southeast Massachusetts (Massachusetts Geological Survey 2013).

B1.c
B2.a,c

Previous Occurrences & Extent

Although there have been no reported landslides within the Town of Plympton since 1900, there have been eight (8) reported landslides within 100 miles of Plympton. These events are shown in Figure 3-18 and listed in Table 3-13. The U.S. Geological Survey, in cooperation with NASA, maintains a database of landslides across the U.S. from 1900 through 2019. The database includes landslides from a variety of sources, and thus, each landslide is reported with a confidence in the ground failure event and location. Landslide confidence categories and the number of landslides within 100 miles of Plympton in each category are listed below:

- High confidence in extent or nature of the landslide (0);
- Confident consequential landslide at this location (1);
- Likely landslide at or near this location (5);
- Probable landslide in the area (2); and
- Possible landslide in the area (0).

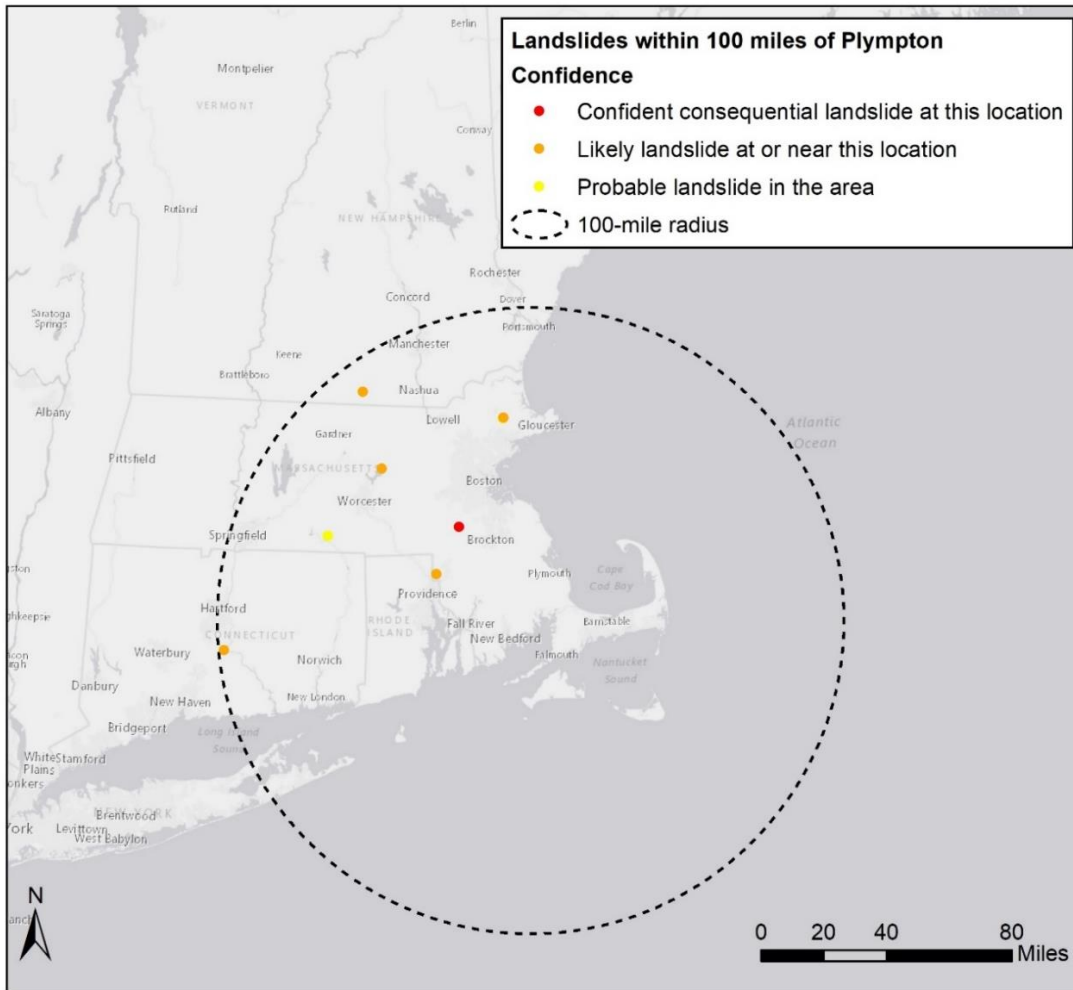


Figure 3-18. Landslides that have occurred within 100 miles of Plympton from 1900 to 2019 (USGS 2020).

**Table 3-13.** Landslide inventory from 1900 to 2019 within 100 miles of Plympton.

Date	Location	Confidence
3/14/2010	Topsfield, MA	Probable landslide in the area
3/15/2010	Clinton, MA	Likely landslide at or near this location
3/15/2010	Walpole, MA	Confident consequential landslide at this location
3/30/2010	Middletown, CT	Likely landslide at or near this location
3/31/2010	Greenville, NH	Likely landslide at or near this location
9/30/2013	Southbridge, MA	Probable landslide in the area
11/4/2014	Attleboro, MA	Likely landslide at or near this location
12/9/2014	Topsfield, MA	Likely landslide at or near this location

B2.b

Probability

Considering the low occurrence of landslides within the vicinity of the Town of Plympton, as well as the relatively flat topography and lack of major hills, the likelihood of a landslide occurring within The Town of Plympton is unlikely (less than 1% probability in the next year). Similar to hazards previously discussed, climate change is predicted to increase heavy precipitation events, which may result in destabilization of slopes and a higher frequency of landslides in some areas.

B3.a

Impact

Below is a list of possible impacts that could result from a landslide:

- **People:** Could become trapped or blocked by obstructed roads resulting from displaced sediment, vegetation, tree limbs, etc. In severe cases, landslide events can also lead to injury or death.
- **Infrastructure:** Could be damaged leading to an interruption in utilities such as electricity or water, due to damaged pipes or power lines near landslide.
- **Buildings:** Major landslides could lead to property and/or building damage.
- **Economy:** Businesses could experience economic losses due to obstructed roads prohibiting employees and/or customers from accessing certain areas of Town.
- **Natural Systems:** Landslides can result in the loss of habitat areas and vegetation. Debris and sediment can also accumulate in rivers or streams negatively affecting fish habitat and water quality.



3.13 SUMMARY OF HAZARDS

As suggested by the FEMA planning guidance, the Local Planning Team (LPT) reviewed the full range of natural hazards identified in the 2018 Massachusetts State Hazards and Climate Adaptation Plan and identified natural hazards that could impact Plympton in the future, or that have impacted the Town in the past (Chapter 3). The 12 individual hazards discussed in Chapter 3 are evaluated below in Table 3-14 based on the likelihood of occurrence, severity and area effected. Likelihoods for each hazard, as described in Chapter 3, are scored from 1 (unlikely) to 4 (highly likely). The severity of the hazard was scored on a scale of 1 to 4, with 1 being minor and 4 being catastrophic. Finally, whether the hazard was likely to have isolated impacts or a town-wide effect was scored as 1 or 2 respectively. For both severity and area, an “X” was used in Table 3-14 to indicate the most likely severity, while a “P” indicates the anticipated severity of a worst-case scenario (i.e., a “potential” scenario). The value associated with the “X”, rather than the “P”, was used to calculate the estimated cumulative risk from that hazard. These determinations were made using local expertise from LPT members, data from the 2018 Massachusetts State Hazard and Climate Mitigation Plan, and other resources.

The LPT selected only a subset of hazards from Table 3-14 to consider during the location-specific vulnerability analysis in Chapter 4. This selection was based on:

- Area of influence: If a hazard is expected to impact the entire Town equally, all properties and critical facilities are equally vulnerable to this hazard and no quantitative vulnerability assessment is needed. Examples of this include severe winter weather, extreme temperature, and earthquake.
- Lack of data: If spatial information about the likelihood of a hazard is not available, conducting a site-specific vulnerability assessment is not possible. Examples of this include thunderstorm, tornado, and invasive species.
- Low estimated cumulative risk: If the estimated cumulative risk from a particular hazard is low, fully developing a vulnerability assessment to address it may be un-necessary. An example of this is the landslide hazard.

The hazards that were selected for a quantitative or qualitative vulnerability assessment are indicated in Table 3-14 in bold font. Additional detail as to what data will be used to evaluate these selected hazards in the vulnerability assessment is provided in Section 4.1.



Table 3-14. Relative risk of hazards in Plympton.

	Likelihood				Severity				Area		Estimated Cumulative Risk†
	Unlikely	Possible	Likely	Highly Likely	Minor	Serious	Extensive	Catastrophic	Isolated	Town Wide	
Score	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	
Severe Winter Weather*				X		X		P		X	16
Hurricane/Tropical Storm*			X			X	P			X	12
Other Severe Weather*				X		X		P	X	P	8
Drought*			X			X				X	8
Inland Flooding*			X			X			X		6
Extreme Temperature			X		X					X	6
Tornado		X				X		P	X		4
Wildfire*		X				X	P		X		4
Dam Failure		X				X			X		4
Earthquake		X			X		P			X	4
Invasive Species				X	X				X	P	4
Landslide	X				X	P			X		1

X indicates the believed value, while P indicates an extreme potential.

*This **bolded** hazard was selected for specific vulnerability analyses in Chapter 4.

† This value is based on the formula Likelihood*Severity*Area. The Likelihood of the hazard is based on a scale of 1 to 4, with 1 being unlikely and 4 being highly likely. The Severity of the hazard was based on a scale from 1 to 4, with 1 being minor and 4 being catastrophic. Area was given a value of 1 for isolated and 2 for town-wide. The “P”s were not incorporated into the Estimated Cumulative Risk value.



Risk analyses involve evaluating vulnerable assets, describing potential impacts, and estimating the loss from each hazard. Chapter 2 of the Plympton Multi-Hazard Mitigation Plan profiled the local assets and amenities, such as the natural resources, demographics, infrastructure, and critical facilities, to document assets within the Town. Chapter 3 detailed the various natural hazards that have impacted or could impact the Town in the future. Chapter 4 combines the hazard descriptions and asset inventories to conduct an exposure analysis, that quantifies the number, type, and value of properties and critical facilities located in identified hazard areas.

This vulnerability assessment provides a foundation for the rest of the mitigation planning process, which is focused on identifying and prioritizing actions to reduce risks to hazards. In addition to informing the mitigation strategy, the vulnerability assessment also facilitates the establishment of emergency preparedness and response priorities, land use and comprehensive planning, and decision making by elected officials, city and county departments, businesses, and organizations in the community.



4.1 METHODOLOGY

This report includes three separate vulnerability assessments:

- 1) Vulnerability assessment of parcels and buildings;
- 2) Exposure assessment of critical facilities; and
- 3) Evaluation of evacuation routes

To estimate the total number of parcels, as well as both the value of the buildings on the property and the total property value (total property value is the sum of the value of the buildings, other structures, and the land itself within a given parcel), the planning team utilized the most current Assessor’s Parcel dataset for the Town of Plympton (2019). The dataset provides information about parcel size, land use type, assessed value, and building characteristics.

This parcel dataset was first classified into various land use types, similar to those used in the Plympton Open Space and Recreation Plan, presented in Figure 2-1. The outcome of this classification was presented in Table 2-1 where the number of parcels within each land use category was quantified. Table 4-1 details the parcels Land Use Codes that are encompassed by each land use type used in this report. Note that in the case a Land Use Code was described as vacant, but was still classified within a specific category, the Land Use Code was placed in that specific category. For instance, the “Residential Vacant” Land Use Code was placed within the “Residential – Other” land use type below.

Table 4-1. Plympton Land Use Classifications Based on Property Land Use Codes

Land Use Type	Land Use Codes
Residential – Single Family	0101, 1010, 101A, 104D
Residential – Multi-Family	1040, 1050
Residential – Other	1020, 1060, 1090, 1120, 1210, 1250, 1300, 1320
Commercial	3160, 316I, 3220, 330I, 3320, 332I, 3330, 3370, 3400, 343U, 3530, 3900
Industrial	4000, 4030, 4230, 424I 4310, 431I, 440V, 4520
Mixed Use – Primarily Residential	0130, 0160, 0170, 0180
Mixed Use – Primarily Commercial	0310, 0370, 0382
Transportation	9240
Agricultural	7100, 710A, 710C, 7120, 713A, 7160, 7170, 7180
Forest	6010, 6100
Other Open Land	8030, 8060, 995, 7200, 7220, 9320, 9500,
Municipal & Tax Exempt	9030, 903C, 903V, 9310, 9033, 9600, 9610
Vacant	4410, 4420, 930V, 9800
No Data	<null>

To determine each parcel’s vulnerability, a GIS analysis was conducted by overlaying flood extent maps with the parcel data. FEMA Hazard Maps (Effective 2017) (see Figure 3-1) were selected for this vulnerability analysis. Once the parcels affected by inland flooding were identified, the number of parcels in each land use category was totaled, as well as the value of the buildings and



total property value associated with each parcel. In this way, the percent of the Town's parcels and the percent of the Town's property value potentially affected by each hazard type was quantified. These parcel totals and property values also represent the potential impact from secondary issues associated with flooding (e.g., mold, mildew and other water damage impacts). These results are summarized in Tables 4-2 to 4-3.

To assess the vulnerabilities of Plympton's critical facilities, as discussed in Chapter 2, the planning team first developed a list of the critical facilities and structures and each location was then mapped in GIS (Figure 2-2). The same flood hazard extents that were mapped and applied to the parcel vulnerability assessment were again overlaid on the map of critical infrastructure. If a critical facility was located in a hazard area, that particular facility was considered to be exposed, and therefore vulnerable, to that particular hazard. Results from the vulnerability analysis for critical facilities are summarized in Table 4-4.

Finally, an evaluation of the Town's evacuation routes was conducted to determine whether any of the current evacuation pathways are susceptible to inundation due to flooding. To address this, the extents of inland flooding hazard areas were overlain on the existing evacuation routes, and vulnerable areas were identified. Impacts to evacuation routes are shown in Figure 4-1 and are listed in Table 4-5.



4.2 RESULTS

Table 4-2. Parcels and buildings vulnerable to flooding in the A Zone.

Land Use	Number of Parcels			Value of Buildings			Value of Total Property		
	Total	Total in Hazard	% in Hazard	Total Value	Total Value in Hazard	% Value in Hazard	Total Value	Total Value in Hazard	% Value in Hazard
Residential – Single Family	914	140	15%	\$189,968,400	\$32,157,100	17%	\$312,650,510	\$54,078,700	17%
Residential – Multi-Family	10	0	0%	\$2,465,100	\$0	0%	\$3,660,700	\$0	0%
Residential – Other	253	94	37%	\$9,724,300	\$1,313,700	14%	\$26,987,610	\$10,086,910	37%
Commercial	18	4	22%	\$48,378,600	\$1,793,900	4%	\$60,343,400	\$2,844,600	5%
Industrial	17	5	29%	\$4,278,500	\$3,865,100	90%	\$13,489,100	\$7,599,800	56%
Mixed Use – Primarily Residential	42	22	52%	\$9,635,300	\$5,188,300	54%	\$17,331,880	\$9,035,280	52%
Mixed Use – Primarily Commercial	14	6	43%	\$2,493,600	\$968,000	39%	\$5,066,410	\$1,662,180	33%
Transportation	2	0	0%	\$0	\$0	-	\$321,500	\$0	0%
Agricultural	24	17	71%	\$316,500	\$0	0%	\$1,031,830	\$535,560	52%
Forest	11	9	82%	\$226,100	\$0	0%	\$557,550	\$184,270	33%
Other Open Land	14	10	71%	\$0	\$0	-	\$1,241,640	\$1,024,260	82%
Municipal & Tax Exempt	10	4	40%	\$12,354,400	\$8,040,300	65%	\$14,223,500	\$8,995,000	63%
Vacant	39	12	31%	\$0	\$0	-	\$3,849,000	\$2,076,900	54%
No Data	54	21	39%	\$-	\$-	-	\$-	\$-	\$-
Total	1422	344	24%	\$279,840,800	\$53,326,400	19%	\$460,754,630	\$98,123,460	21%



Table 4-3. Parcels and buildings vulnerable to flooding in the AE Zone.

Land Use	Number of Parcels			Value of Buildings			Value of Total Property		
	Total	Total in Hazard	% in Hazard	Total Value	Total Value in Hazard	% Value in Hazard	Total Value	Total Value in Hazard	% Value in Hazard
Residential – Single Family	914	36	4%	\$189,968,400	\$8,494,100	4%	\$312,650,510	\$13,957,110	4%
Residential – Multi-Family	10	0	0%	\$2,465,100	\$0	0%	\$3,660,700	\$0	0%
Residential – Other	253	20	8%	\$9,724,300	\$793,900	8%	\$26,987,610	\$2,243,200	8%
Commercial	18	1	6%	\$48,378,600	\$0	0%	\$60,343,400	\$32,200	0%
Industrial	17	0	0%	\$4,278,500	\$0	0%	\$13,489,100	\$0	0%
Mixed Use – Primarily Residential	42	2	5%	\$9,635,300	\$542,500	6%	\$17,331,880	\$831,300	5%
Mixed Use – Primarily Commercial	14	1	7%	\$2,493,600	\$179,900	7%	\$5,066,410	\$319,150	6%
Transportation	2	0	0%	\$0	\$0	-	\$321,500	\$0	0%
Agricultural	24	1	4%	\$316,500	\$0	0%	\$1,031,830	\$16,150	2%
Forest	11	0	0%	\$226,100	\$0	0%	\$557,550	\$0	0%
Other Open Land	14	1	7%	\$0	\$0	-	\$1,241,640	\$209,500	17%
Municipal & Tax Exempt	10		0%	\$12,354,400	\$0	0%	\$14,223,500	\$0	0%
Vacant	39	1	3%	\$0	\$0	-	\$3,849,000	\$189,900	5%
No Data	54	7	13%	\$-	\$-	-	\$-	\$-	-
Total	1422	70	5%	\$279,840,800	\$10,010,400	4%	\$460,754,630	\$17,795,510	4%

**Table 4-4. Critical Facility Vulnerability Assessment**

Category	Facility #	Name	Address	FEMA Flood Zone
Administrative	1	Town Hall & Council on Aging	5 Palmer Rd.	
	2	Community Systems	68 Main St.	
	3	Brockton Area Multi- Services Inc.	14 Colchester St.	
Bridge	4	Winnetuxet Road Bridge (Winnetuxet River)	N/A	
	5	Parsonage Road Bridge (Winnetuxet River)	N/A	AE
Cultural Resource	6	First Congregational Church of Plympton	254 Main St.	
	7	Plympton Historical Society/Old Town House	189 Main St.	
	8	Tractor Supply Co.	406 Main St.	
	9	New Covenant Fellowship Church	129 Lake St.	
	10	Silver Lake Chapel	33 Lake St.	
	11	Sysco	Spring St.	
Dam	12	Bonney Pond Dam	N/A	
	13	Annasnappet Brook Dam	N/A	A
	14	B & B Atwood Bog Dam	N/A	A
	15	Parkers Forge Pond Dam	N/A	AE
	16	Johnson Pond Dam	N/A	A
	17	Winnetuxet Road Pond Dam	N/A	
	18	Annasnappet Brook Reservoir	N/A	A
	19	Upper Winnetuxet Dam	N/A	
Emergency	20	Police Station	7 Palmer Rd.	
	21	Fire Station	3 Palmer Rd.	
Fuel	22	Shell	280 Main St.	
	23	Plympton Sand & Gravel	190 Brook St.	
Library	24	Plympton Public Library	248 Main St.	
Public Works	25	Lawrence Ready Mix Concrete	71 Spring Street	
	26	Highway Department	23 Palmer Rd.	
	27	Transfer Station	Ring Rd.	
	28	USPS Plympton Office	284 Main St.	
	29	Industrial Comm. & Electronics, Inc.	7 Joey Cir.	
	30	Industrial Comm. & Electronics, Inc.	County Rd.	
School	31	Dennett Elementary School	80 Crescent St.	
	32	Puddle Jumpers Learning Center-LLC	256 Main St.	
Veterinary	33	South Shore Equine Clinic	151 Palmer Rd.	
Water	34	Hubbell	65 Spring St.	
	35	Rocky Harvest, LLC	182 Brook St.	
	36	Town Cistern	Across from 254 Main St.	



Route 58 is a Massachusetts Department of Transportation (MassDOT) owned roadway, which would be utilized during an evacuation. The results of the evacuation route evaluation identified two sections of Route 58 vulnerable to flooding during a 100-year flood event (i.e., the evacuation routes overlap with FEMA’s mapped 100-year floodplain) (Figure 4-1). However, both of these areas correspond to where the evacuation route crosses Colchester Brook and the Winnetuxet River. It is possible that these bridges are high enough that while the land around and under the roadway would flood, the roadway itself would remain dry and passable. Additional site-specific elevation data would be required to assess this further.

Given the proportion of the Town vulnerable to flooding during a major event, as well as a history of previous flooding events impacting the Town, it may be important to assess the elevation of bridges along the evacuation route vulnerable to flooding. In the event bridges are not of adequate height to avoid flooding during a 100-year event, further elevating the roadway surfaces of the bridges may be warranted to ensure continued safe travel along this route during a flood event.

Table 4-5. Sections of the Plympton evacuation route vulnerable to flooding.

Road Name	Applicable Location	FEMA Flood Zone
Route 58	Over Colchester Brook	AE
Route 58	Over Winnetuxet River	A

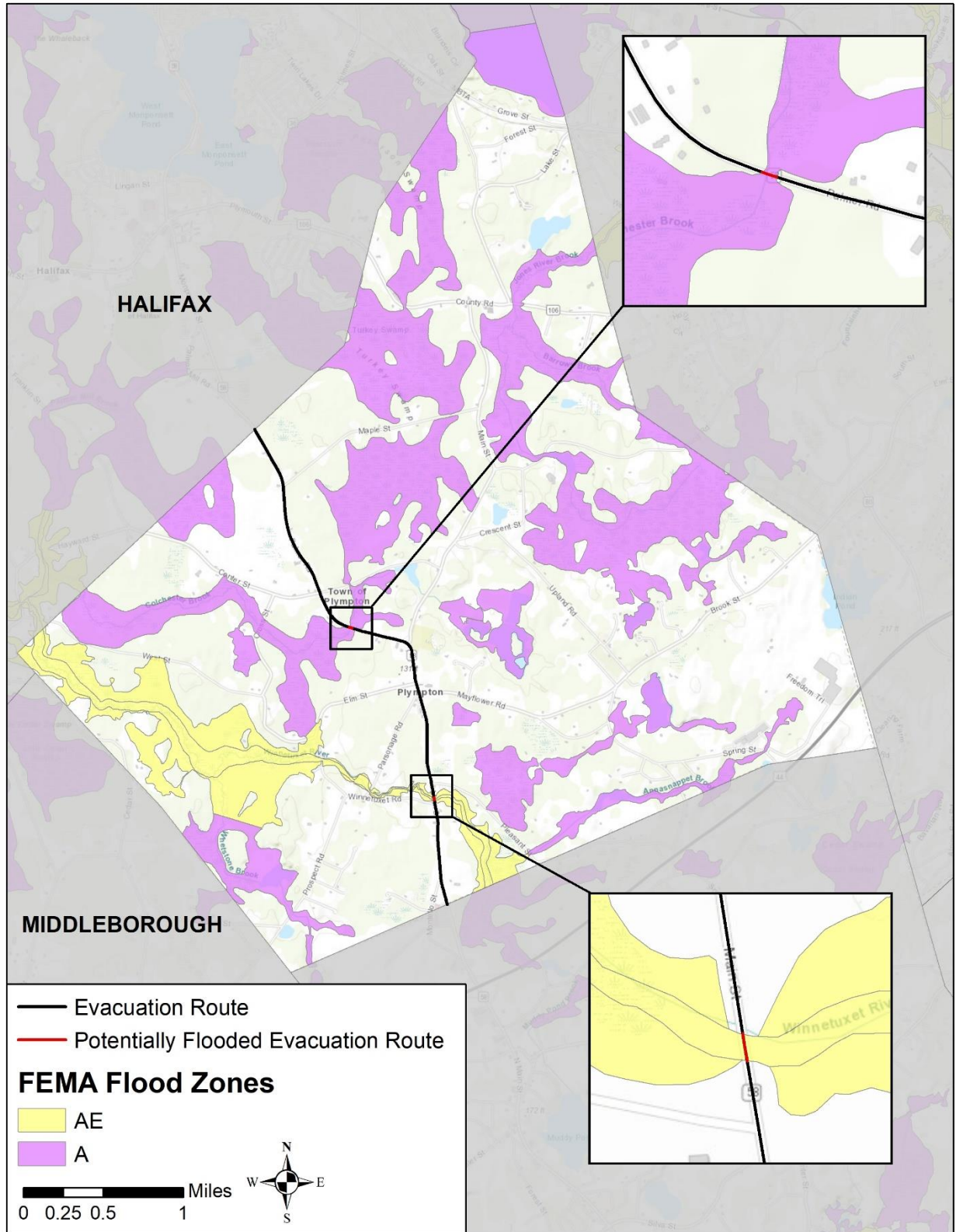


Figure 4-1. Potentially inundated evacuation routes due to the 100-year storm event.



The Local Planning Team (LPT) decided not to quantitatively evaluate the vulnerability from the remainder of the natural hazards listed in Table 3-14, for the following reasons:

1. **Severe Winter Weather, Other Severe Weather, Drought, Extreme Temperature, Tornado, Wildfire, Earthquake, Invasive Species:** Location specific data within Plympton is not available meaning a detailed vulnerability assessment could not be completed.
2. **Dam Failure:** Although the locations of potentially problematic dams are known, location specific data for areas that would be impacted by a failure of any of these structures is not available. Therefore, a detailed vulnerability assessment could not be completed.
3. **Landslide:** This hazard is unlikely to occur (i.e. less than 1% chance), meaning a vulnerability assessment for this hazard would not have a high value to the Town.

However, the impacts from hazards ranked highly in Table 3-14, including Severe Winter Weather, Hurricane/Tropical Storm, Other Severe Weather, Drought, and Wildfire on critical facilities were qualitatively discussed with the LPT and are summarized below in Table 4-6.

Table 4-6. Results of the qualitative vulnerability assessment of critical facilities.

Vulnerability	Applicable Critical Facilities
Roof leaks and basement floods during heavy precipitation events	Town House & Council on Aging
Located near a forested area resulting in vulnerability to high wind and wildfire	Community Systems (Administrative Building) Brockton Area Multi-Services Inc. Plympton Historical Society / Old Town House Silver Lake Chapel Fire Station Industrial Comm. & Electronics, Inc. (antennas) Puddle Jumpers Learning Center South Shore Equine Clinic Hubbell (water) Rocky Harvest, LLC (water)
Building roof at risk from heavy snow during severe winter weather and flooding during heavy precipitation events	Highway Department
Difficult to access during severe winter weather and located near a forested area resulting in vulnerability to high wind and wildfire	Transfer Station Dennett Elementary School



B3.b

4.3 VULNERABLE PROPERTIES AND CRITICAL FACILITIES

Although the tables in Section 4.2 provide a detailed summary of the potential impacts of inland flooding, this section will summarize the main risks identified from this analysis. The discussion below will focus on hazards that have the potential to harm the most properties or cost the most economic damage, critical facilities that are impacted by the most hazards, and vulnerabilities of the highest concern to the Town. This summary was also used to guide the development of mitigation actions.

Tables 4-2 and 4-3 summarize the number of parcels that overlap with the A and AE flood zones, respectively. Although individual parcels may overlap with more than one flood zone, because the risk to each parcel was noted as the highest hazard flood type, the values in Tables 4-2 and 4-3 are additive. For example, a single property can contain both an AE and an A zone but would only be listed in the AE zone risk table. Therefore, by summing the total values from those two tables, the total value of all structures and property at risk from flooding is approximately \$116 million. Additionally, because flooding often causes more permanent damage to structures than to the land itself, it is worth noting that the total value of buildings at risk from flooding in Plympton is approximately \$63 million.

It is also worth acknowledging the breakdown of land use types impacted by these hazards. The inundation projected within the A and AE flood zones will impact primarily residential properties (234 and 56 parcels, respectively, out of a total of 1,177 residential parcels), which cumulatively represents 25% of the residential land use category. In addition, although only ten or less parcels within other land use categories, such as Forest, Agriculture, and Other Open Land are projected to be inundated within the A flood zone, these counts represent between 71% to 82% of those land use categories. However, the consequences of inundation within natural areas are generally much less severe than in developed areas containing buildings and infrastructure.

The critical facilities likely to be impacted by flooding include a bridge, a reservoir, and four dams (Table 4-4) located within both A and AE flood zones. These facilities are likely threatened due to their proximity to rivers, the main source of inland flooding within the Town of Plympton. Notably, however, all non-water dependent critical facilities in the Town of Plympton are outside FEMA flood zones and have little risk from flooding during a natural hazard event.

In order to assess the vulnerability of critical facilities to hazards other than inland flooding, the LPT qualitatively evaluated the vulnerability of each critical facility to additional hazards including Severe Winter Weather, Hurricanes/Tropical Storms, Other Severe Weather, Drought, and Wildfire. The results of this assessment, presented in Table 4-6, indicate facilities are vulnerable to a variety of events including heavy precipitation, high wind, wildfire, and winter weather. However, the highest number of critical facilities are vulnerable to high wind and wildfire, a result of the Town's rural character and proximity of these facilities to densely forested areas.

**4.4 VULNERABLE POPULATIONS**

B3.b Plympton has several vulnerable populations, including an area with a high concentration of elderly residents and several locations with high concentrations of young children.

Concentrations of Elderly or Disabled People

Plympton has one senior living community, known as the Woodlands and located off County Road. This location will need special attention during emergencies or if evacuations become necessary, as residents may need additional help to exit buildings during an emergency. The location of the Woodlands is shown in Figure 4-2 in green and listed in Table 4-7. The Woodlands is not located within any FEMA Flood Zones.

Concentrations of Young Children

The Town of Plympton has multiple areas with a high concentration of young children including Dennett Elementary School and Puddle Jumpers Learning Center (shown in Figure 4-2 in green and listed in Table 4-7). Additionally, there are three churches within the Town of Plympton, which periodically may have a high number of young children in their childcare centers (shown in Figure 4-2 in green and listed in Table 4-7). During a natural hazard emergency, these locations may need additional assistance evacuating children and coordinating a safe pick-up system for parents. None of these facilities are located within any FEMA Flood Zones.

Table 4-7. List of vulnerable populations in Plympton.

#	Name	Address
Elderly Communities		
1	The Woodlands	165 County Rd.
Schools		
2	Dennett Elementary School	80 Crescent St.
3	Puddle Jumpers Learning Center	256 Main St.
Childcare Centers		
4	First Congregational Church of Plympton	254 Main St.
5	New Covenant Fellowship Church	129 Lake St.
6	Silver Lake Chapel	33 Lake St.

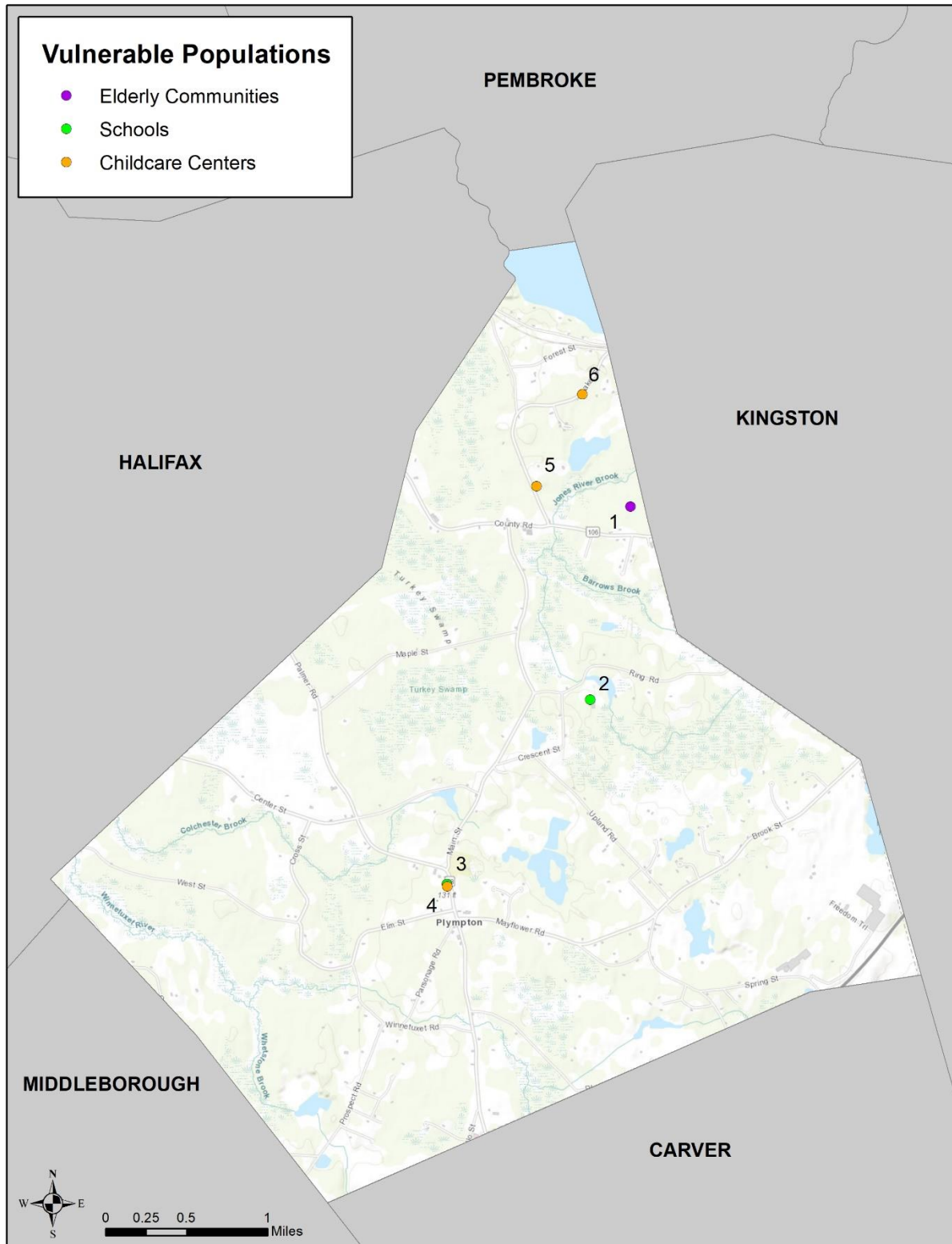


Figure 4-2. Locations of vulnerable populations in Plympton.



The first sections of this plan discuss the potential hazards that could occur in Plympton and some of the potential losses and vulnerabilities associated with each of these hazards. An important next step in hazard mitigation planning is to develop specific strategies and actions that will help mitigate or minimize the risk to these natural hazards. A mitigation action is a specific action, project, activity, or process taken to reduce or eliminate short- or long-term risks to people and property from hazards and their impacts. Implementing mitigation actions helps achieve the plan's mission and goals. These mitigation strategies are the heart of the mitigation plan. They describe how Plympton will accomplish their mitigation goals.

This chapter documents Plympton's mitigation goals and existing and ongoing mitigation actions, as well as its proposed mitigation actions. The purpose, responsibility, priority, and timeline are detailed for each of the proposed mitigation actions.



The central component of a hazard mitigation plan is the strategy for reducing the community's vulnerability to natural hazard events. Responding to the analysis of risk, vulnerabilities, potential impacts, and anticipated future development, the process for developing this strategy is one of setting goals, understanding what actions the community is already taking that contribute to mitigating the effects of natural hazards and assessing where more action is needed to complement or modify existing measures. The following sections include descriptions of the Town's mitigation goals, existing capabilities and ongoing mitigation actions, a status update on mitigation measures identified in previous plans, and descriptions of proposed new mitigation measures. All mitigation measures are evaluated by their benefits and potential costs to arrive at a prioritized list of action items.

5.1 MITIGATION GOALS AND OBJECTIVES

C3.a
C3.b
D3.a

During planning team meetings for this update of the plan, the LPT developed a series of hazard mitigation goals. These goals are meant to reduce impacts and losses due to hazards associated with natural disasters, and to minimize the impacts of natural disasters on residents, businesses, and infrastructure. The following five (5) goals were adapted from the 2015 Natural Hazard Mitigation Plan for the Old Colony Region, which were revised to reflect changes in the Town's priorities, and were endorsed by the LPT for this Multi-Hazard Mitigation Plan:

1. Investigate, design, and implement structural projects that will reduce and minimize the risks and impacts from natural hazards.
2. Reduce the loss of life, property, infrastructure, and environmental and cultural resources from natural disaster by maintaining accessibility for emergency responders during and after natural hazard events.
3. Improve pre-disaster planning, communication, and coordination between federal, state, county, community, private and non-profit entities so that they can plan for and mitigate natural hazards in a clear and comprehensive manner.
4. Increase the awareness of the public and communities to the risks presented by the multiple natural hazards that affect the region as well as to the mitigation activities and grant opportunities available to minimize the impacts of these hazards.
5. Improve existing policies and programs to further reduce or eliminate the impacts of natural hazards.

C1.a
C6

5.2 EXISTING CAPABILITES

Plympton has a unique set of capabilities, including Town plans, policies, staff, funding, and other resources available to accomplish mitigation actions and reduce short- and long-term vulnerability. These capabilities are summarized in this section.

Town Plans and Policies

Plympton has a series of planning documents that address natural hazards. These documents include measures associated with the Town's mitigation strategy and could be useful when implementing mitigation actions. Through the implementation of these plans, Plympton can



guide and manage growth and development within the Town, with the goal of reducing hazard vulnerability. These plans include:

1. Capital Improvement Plan (FY2017 – FY2021): Emphasizes the use of funds for Town improvements including a server upgrade, construction of a new police station, and highway-related projects.
2. Open Space and Recreation Plan (updated 2020): Addresses topics such as inventory of open spaces, community goals, a long-term action plan, and balance of growth and development.
3. MVP Community Resilience Program Summary (2020): Summarizes Plympton residents' current concerns and challenges presented by natural hazards and climate change.

The Town of Plympton has taken steps to implement findings from the 2015 Natural Hazard Mitigation Plan for the Old Colony Region into the Open Space and Recreation Plan (e.g., increasing wetlands protection, particularly riparian corridors, which can help reduce flooding, and limit future development in floodplains) and the MVP Community Resilience Program Summary (e.g., incorporation of hazard data, need for assessment and maintenance of culverts and dams, etc.) noted above. Many of the existing Town policies and ordinances also provide an effective means of mitigating hazards. Plympton has Zoning, Subdivision, and Floodplain ordinances.

Town Staff

Although the Town of Plympton has a small municipal staff, those that are there comprise a very capable staff that includes an Emergency Manager, Police and Fire Chiefs, a Highway Superintendent, and a Chief Building Official. The Town also has plans to hire or train a Floodplain Administrator soon. Together these staff allow the Town to effectively plan for and implement specific mitigation actions. In addition, the Town has a Local Planning Board and a Mitigation Planning Committee, which are instrumental in developing and coordinating mitigation actions.

Financial Capabilities

Financial capabilities are the resources that a Town has to fund mitigation actions. The costs to implement mitigation activities vary from relatively low-cost to relatively high-cost activities. Low-cost actions include building assessment or outreach efforts, which require little to no costs other than staff time and existing operating budgets. Alternatively, higher cost actions, such as infrastructure repairs and/or installations, could require a substantial monetary commitment from local, state, and federal funding sources.

The Town of Plympton has the following potential sources of funding to implement hazard mitigation activities:

1. Capital improvements funding;
2. Authority to levy taxes for specific purposes (via Town Meeting); and
3. Incurring debt through general obligation bonds and/or special tax bonds (via Town Meeting).



The Town's annual revenue from taxes can be used to fund some mitigation actions, but other larger actions may need additional outside funding, such as from state and federal grant programs.

C1.a

Existing Mitigation Measures

The following are existing and ongoing mitigation measure performed by the Town of Plympton:

1. **Emergency Response Plans:** The highway department maintains a comprehensive emergency action plan for the Winnetuxet Road Pond Dam. This plan addresses notification procedure, responsibilities, and contains maps of areas predicted to be impacted by inundation.
2. **Communications System:** The Town has an array of communications equipment that would assist public safety efforts during a natural hazard event. The Town continues to upgrade this system, which includes multiple communications towers.
3. **Emergency Power Generators:** Emergency power generators can be found in a number of Town buildings. These generators serve to protect government functionality during and immediately after a natural hazard event.
4. **Massachusetts State Building Code:** The Massachusetts State Building Code contains many detailed regulations regarding wind loads, earthquake resistant design, flood-proofing, and snow loads.
5. **Public Information and Outreach:** The Town provides information to residents and business owners relating to a range of potential natural hazards. Many departments have an active social media presence through which important hazard mitigation information can be disseminated to the public.
6. **Highway Department:** This department maintains the Town's dams and roads. Specific activities include street sweeping, catch basin cleaning and roadway treatments.
7. **Tree Trimming Program:** The electric and telephone utilities trim branches near the electric lines while the Town staff maintains trees in other areas.
8. **Snow Disposal:** The Town conducts general snow removal operations using its own equipment and has adequate space for equipment storage as needed.
9. **Flood Plain District Zoning:** Zoning is intended to protect the public health and safety through the regulation of land use. The Plympton Zoning Bylaws include a Flood Plain Overlay District (Article 4). This zoning district limits certain development activities within designated FEMA flood zones.
10. **Wetlands Protection Bylaw:** Plympton adheres to the Massachusetts Wetlands Protection Act (310 CMR) to protect the wetlands and adjoining land areas.

C2.a

Participation in the National Flood Insurance Program (NFIP)

Plympton currently participates in FEMA's National Flood Insurance Program (NFIP). Per FEMA's Local Multi-Hazard Mitigation Planning Guidance document, the NFIP has three basic aspects:

1. Floodplain identification and mapping – Adopt flood maps depicting hazards;
2. Floodplain management – Adopt and enforce floodplain management regulations; and
3. Flood insurance – Require property owners to purchase insurance in exchange for floodplain management regulations that reduce future flood damages.



Flood Hazard Boundary Maps (FHBMs) were first established in 1979, with flood insurance rate maps (FIRMs) following in 1981. The most recent FEMA Flood Insurance Study became effective on July 17, 2012.

Loss statistics as of April 2, 2021 for the Town of Plympton include a total of 6 closed cases, of which the total payments amounted to \$50,164 (FEMA 2021).

As part of ongoing NFIP requirements, Plympton regulates new development within the Special Flood Hazard Area (SFHA). The Town follows NFIP regulations and guidelines for all new construction, as well as substantial improvements to existing structures, within the flood plain.

D2.a

5.3 PROGRESS ON MITIGATION ACTIONS SINCE 2015

Before identifying new mitigation actions for the 2021 Plympton Multi-Hazard Mitigation Plan, the LPC discussed the status of the mitigation actions identified in the 2015 Natural Hazard Mitigation Plan for the Old Colony Region. One of the following status determinations was given to each mitigation action identified from the 2015 plan:

- **Complete:** The project was implemented and completed in 2015-2021.
- **Existing Capability:** The project was implemented and completed in 2015-2021, and it will continue to be implemented on an annual basis.
- **In Progress:** The project was started in the 2015-2021 timeframe and is still in progress.
- **Deferred:** The project is important, but it was deferred because there was no funding available, or it was not feasible to complete the project in this timeframe.
- **Deleted:** The project is no longer relevant to the community.

In 2015, the LPC identified 8 new actions. During this plan update, the LPC assessed the Town's progress on all 8 actions.



Table 5-1. Status of 2015 proposed mitigation actions.

Hazard Addressed	Action and Description	Current Status
Inland Flooding	Dam Management Program: Implement a plan that includes the inspection, maintenance, and necessary upgrades for all dams in town.	Deleted: MassDOT is responsible for dam inspections.
Inland Flooding	Replace and Enlarge the Culvert on Lake Street: Infrastructure project to mitigate flooding.	Deferred: Funding was not available during the 2015-2021 timeframe. Action has been re-incorporated into this 2021 Plympton MHMP.
Inland Flooding	Upgrade Drainage Infrastructure on Prospect Road: Mitigate flooding in a heavily impacted area.	Complete: Prospect Road drainage was completed in 2019.
Wildfire	Provide Informational Material to Residents: Educate residents about Defensible Space techniques and the dangers of wildfires.	Existing Capability: Action is currently being practiced and has been re-incorporated into this 2021 Plympton MHMP.
Inland Flooding	Adopt a Stormwater Management Bylaw: Diminish impacts of polluted stormwater and prevent flooding.	Deferred: Action was not completed during the 2015-2021 timeframe. Action has been re-incorporated into the 2021 Plympton MHMP actions.
Inland Flooding	Remove Dennett's Pond Dam: Work with the owner of the dam and DCR to upgrade or remove the dam.	Complete: Dennett's Pond Dam was removed in approximately 2011.
Inland Flooding	Develop a Program to Lower the Elevation of The Winnetuxet Road Pond Dam Before A Storm: Eliminate flooding at the intersection of Elm Street, West Street, and Winnetuxet Road.	Deleted: Water no longer at a height that requires intervention.
Inland Flooding	Examine/Implement a Local or Regional Flood-Mitigation Dam Management Program: Coordinate with other interested towns to inspect, maintain, and upgrade dams for stormwater management potential.	Deleted: MassDOT is responsible for dam inspections.



5.4 PROPOSED MITIGATION

C4.a
C5.a
C5.b

Planning Process

To identify, evaluate and prioritize specific mitigation actions and projects to reduce the effects of a natural disaster, the LPT used a prioritization method focusing on four key themes as follows, and as provided in Appendix C:

- **Benefits:** Determine whether the proposed mitigation measure will improve property protection, natural resource protection, technical capacity, public awareness, or post-hazard emergency response;
- **Feasibility:** Determine whether the proposed mitigation measure is feasible in terms of Town staffing, public and Town support, and whether it is technically feasible;
- **Economic:** Evaluate each mitigation measure in terms of estimated cost and potential funding sources; and
- **Regulatory:** Evaluate each mitigation measure for consistency with local, state, and federal permitting/ regulatory requirements and goals.

Each proposed mitigation action presented in this section was given a score based on 13 subcategories within these four larger categories documented above (i.e., Benefits, Feasibility, Economic, Regulatory). For each of these subcategories, the proposed action was given a score of 3 if the action was thought to be a “good” fit with a particular category (likely to provide the benefit under consideration, required little additional training or funding, feasible, etc.), 2 if it was “average”, or 1 if it was “poor” (did not provide the benefit under consideration, difficult to permit, costly, etc.). For a detailed overview of how actions were scored, please see Appendix C.

When evaluating estimated costs for proposed mitigation actions, the following general cost categories were used:

- High:** Estimated costs greater than \$250,000
- Medium:** Estimated costs between \$50,000 and \$250,000
- Low:** Estimated costs less than \$50,000 and/or staff time only

C4.a
C4.b
C4.c
C5.c

Proposed Mitigation Actions

The final proposed mitigation actions developed during the planning process are summarized in this section. A total of 14 actions were developed. These actions address risks due to inland flooding, wildfire, extreme temperature, and dam failure, as well as multi-hazard mitigation actions. Specific actions range from increasing public education and awareness to modification of existing buildings or infrastructure to protect them from a hazard.

For each action identified below, a brief description is provided, as well as the responsible department(s), potential funding sources, priority, and anticipated timeline. To help tie the recommended actions to the Town’s hazard mitigation goals listed in Section 5.1, the numbers associated with the goal(s) each action addresses are also listed.



Mitigation Action #1: Provide educational resources for property owners on flood hazard mitigation strategies (target demographic between kids and seniors)	
HAZARD ADDRESSED	Inland Flooding
PURPOSE	Better prepare residents for flood events and promote vulnerability reduction actions
RESPONSIBILITY	Conservation Commission
ESTIMATED COST	Low
POTENTIAL FUNDING SOURCES	MVP Action Grant
PRIORITY	High
TIMELINE	Short-Term (Design/update educational materials and programs in 2021; Implementation: Ongoing)
GOAL(S) ADDRESSED	4

Mitigation Action #2: Develop initial steps in reducing flooding along vulnerable sections of Route 106 and Main Street	
HAZARD ADDRESSED	Inland Flooding
PURPOSE	Maintain use of major transportation ways during heavy precipitation events
RESPONSIBILITY	Highway Department
ESTIMATED COST	Medium
POTENTIAL FUNDING SOURCES	Highway Department Operating Budget
PRIORITY	Low
TIMELINE	Long-Term (Begin discussions with the Highway Department and other applicable departments in 2023; Obtain preliminary design plans by 2025)
GOAL(S) ADDRESSED	1,5

Mitigation Action #3: Replace and enlarge the culvert on Lake Street	
HAZARD ADDRESSED	Inland Flooding
PURPOSE	Eliminate flooding on a high-trafficked transportation way
RESPONSIBILITY	Highway Department
ESTIMATED COST	High
POTENTIAL FUNDING SOURCES	General Fund, Bond, PDM Grant Program
PRIORITY	Low
TIMELINE	Long-Term (Create and approve removal plan by 2025; Complete construction for enlargement by 2030)
GOAL(S) ADDRESSED	1



Mitigation Action #4: Adopt a stormwater management bylaw	
HAZARD ADDRESSED	Inland Flooding
PURPOSE	Diminish impacts of polluted stormwater and prevent flooding
RESPONSIBILITY	Conservation Commission
ESTIMATED COST	Medium
POTENTIAL FUNDING SOURCES	General Fund
PRIORITY	Medium
TIMELINE	Short-Term (Conservation Commission begins discussions in 2021; Form and adopt bylaw by 2022; Implementation: Ongoing)
GOAL(S) ADDRESSED	5

Mitigation Action #5: Improve regional fire communication (new cell tower in development to improve public safety communication)	
HAZARD ADDRESSED	Wildfire
PURPOSE	Improving communication expedites emergency response time
RESPONSIBILITY	Fire Department
ESTIMATED COST	Medium
POTENTIAL FUNDING SOURCES	Fire Department Operating Budget, Assistance to Firefighters Grant (AFG), Emergency Management Performance Grant (EMPG)
PRIORITY	Medium
TIMELINE	Long-Term (Approve final design plans by 2023; Apply for grants by 2025; Complete construction by 2027)
GOAL(S) ADDRESSED	3

Mitigation Action #6: Obtain a UTV with 50-gallon water tank	
HAZARD ADDRESSED	Wildfire
PURPOSE	Access areas surrounding solar fields vulnerable to wildfire
RESPONSIBILITY	Fire Department
ESTIMATED COST	Medium
POTENTIAL FUNDING SOURCES	Solar Companies
PRIORITY	Medium
TIMELINE	Short-Term (Continue discussions with solar companies through 2022; Purchase and utilize UTV by 2023)
GOAL(S) ADDRESSED	2



Mitigation Action #7: Replace Town water cistern and install two additional cisterns	
HAZARD ADDRESSED	Wildfire
PURPOSE	Maintain back-up water source to fight fires during periods of drought
RESPONSIBILITY	Fire Department
ESTIMATED COST	Medium
POTENTIAL FUNDING SOURCES	Massachusetts Works Funding
PRIORITY	High
TIMELINE	Short-Term (Finalize location of two additional cisterns by 2022; Complete all construction by 2024)
GOAL(S) ADDRESSED	1

Mitigation Action #8: Provide information and educational materials to residents about Defensible Space techniques and the dangers of wildfires	
HAZARD ADDRESSED	Wildfire
PURPOSE	Decrease likelihood and severity of wildfire hazard in residential areas
RESPONSIBILITY	Fire Department
ESTIMATED COST	Medium
POTENTIAL FUNDING SOURCES	Fire Department Operating Budget, Assistance to Firefighters Grant (AFG), Emergency Management Performance Grant (EMPG)
PRIORITY	High
TIMELINE	Ongoing (Update educational materials in 2021; Implementation: Ongoing)
GOAL(S) ADDRESSED	4

Mitigation Action #9: Finalize and run through Emergency Action Plan for ammonia release from Sysco	
HAZARD ADDRESSED	Extreme Temperature (extreme temperature conditions can affect/worsen the consequences of accidental ammonia release)
PURPOSE	Improving communication and practicing the action plan expedites emergency response time
RESPONSIBILITY	Fire Department
ESTIMATED COST	Low
POTENTIAL FUNDING SOURCES	Fire Department Operating Budget
PRIORITY	Medium
TIMELINE	Long-Term (Finalize plan by 2022; Coordinate and schedule run through with neighboring towns by 2024)
GOAL(S) ADDRESSED	3



Mitigation Action #10: Initial steps in creating a new community center/warming and cooling shelter	
HAZARD ADDRESSED	Extreme Temperature
PURPOSE	Provide an improved designated facility for residents without adequate access to sufficient heating and/or cooling systems
RESPONSIBILITY	Town Properties Committee
ESTIMATED COST	Medium
POTENTIAL FUNDING SOURCES	Town Operating Budget
PRIORITY	Medium
TIMELINE	Long-Term (Conduct feasibility study by 2024; Obtain preliminary designs by 2026)
GOAL(S) ADDRESSED	1

Mitigation Action #11: Develop an emergency action plan for the Parkers Forge Pond Dam	
HAZARD ADDRESSED	Dam Failure
PURPOSE	Improve emergency response and coordination, reducing damage to infrastructure and the natural environment
RESPONSIBILITY	Highway Department
ESTIMATED COST	Medium
POTENTIAL FUNDING SOURCES	Highway Department Operating Budget, FEMA Dam Safety Grants
PRIORITY	Low
TIMELINE	Long-Term (Hire subcontractors to complete a final plan by 2025; Formally adopt plan by 2026)
GOAL(S) ADDRESSED	3, 5

Mitigation Action #12: Conduct a town-wide driveway assessment (focus on trees or debris that may obstruct access)	
HAZARD ADDRESSED	Multi-Hazard
PURPOSE	Maintain adequate access for emergency responders
RESPONSIBILITY	Fire Department
ESTIMATED COST	Medium
POTENTIAL FUNDING SOURCES	Fire Department Operating Budget
PRIORITY	High
TIMELINE	Ongoing (Complete assessment by 2022)
GOAL(S) ADDRESSED	2, 4



Mitigation Action #13: Conduct a roof assessment of all Town-owned buildings	
HAZARD ADDRESSED	Multi-Hazard
PURPOSE	Decrease vulnerability of Town buildings that provide a variety of essential services
RESPONSIBILITY	Town Properties Committee
ESTIMATED COST	Low
POTENTIAL FUNDING SOURCES	Operating Budget, Town Meeting Articles
PRIORITY	Medium
TIMELINE	Ongoing (Complete assessment by 2022)
GOAL(S) ADDRESSED	1

Mitigation Action #14: Purchase additional emergency response vehicles with four-wheel drive and repair old engine for use	
HAZARD ADDRESSED	Multi-Hazard
PURPOSE	Improve access capabilities for emergency responders, especially in severe winter weather
RESPONSIBILITY	Fire Department
ESTIMATED COST	Medium
POTENTIAL FUNDING SOURCES	Town Budget, USDA Community Facilities Direct Loan & Grant Program
PRIORITY	Medium
TIMELINE	Short-Term/Ongoing (Repair old engine by 2022; Apply for Grants for additional vehicles by 2023; Purchase and utilize additional vehicles by 2024)
GOAL(S) ADDRESSED	2



The Plympton Multi-Hazard Mitigation Plan is not meant to be a static document. As conditions change, new information becomes available, or mitigation actions progress or are completed over the life of the plan, adjustments and updates may be necessary to maintain its relevance. This chapter describes how the Plan will be tracked, updated, and enhanced in the coming years. The plan must be fully reviewed and revised as necessary at least once every five years. Keeping the plan up-to-date also means continuing to provide opportunities for public involvement and comment on the plan and its implementation.



As required by FEMA, this Plan must outline a maintenance process to ensure the Plan remains active and relevant to the current conditions of the Town. The process must identify the following items:

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

This section details how Plympton will meet these Plan maintenance requirements.

6.1 PLAN MONITORING, EVALUATION AND UPDATES

A6.a-d

As required by FEMA, the written plan will be evaluated and updated at least once every five years by relevant Town departments, boards, and agencies. In the interim, select members of the LPT will conduct annual reviews of the progress of mitigation actions and update as necessary. If a major disaster occurs in the interim, the plan may be evaluated or updated if Town personnel feel that the plan failed in some way, or imminent changes are required to better respond to future disasters. As necessary, LPT members and/or departments may be added or removed from the LPT to obtain the most accurate and applicable information possible.

Evaluations and updates will take place in much the same way this updated plan was developed. The process will include meetings of the LPT, review of goals and objectives, updating the community profile, review and modification of potential hazards and hazard related data, review of existing hazard-prone areas and the addition of any new areas, updating existing and planned hazard mitigation measures, and an evaluation as to the effectiveness of the plan to date. The next update will begin in year 4 of this plan, to ensure that the subsequent update is ready within the required 5-year window.

6.2 INCORPORATION OF MITIGATION STRATEGIES

Mitigation strategies outlined in this Plan will be incorporated into existing plans, bylaws and regulations as feasible. During Plan updates, existing and proposed mitigation actions will be evaluated for effectiveness, level of completion, and continued appropriateness.

Upon approval of this plan, the LPT 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:

- Emergency Management Team
- Fire Department



- Police Department
- Highway Department

C6.e

After this plan has been approved by both FEMA and the local government, links to the final plan will be emailed to all Town staff, boards, and committees, with a reminder to review the plan periodically and work to incorporate its contents, especially the proposed mitigation actions presented in Chapter 5, into other planning processes, documents, and plans. In addition, during annual review meetings for the Multi-Hazard Mitigation Plan implementation process, the Local Planning Team (LPT) will review whether any of these plans are in the process of being updated. If so, the LPT will remind staff working on these plans, policies, etc., of the Multi-Hazard Mitigation plan, and urge them to incorporate the Multi-Hazard Mitigation Plan data, findings, and actions into their respective efforts.

6.3 CONTINUED PUBLIC INVOLVEMENT

A5.a

During the periodic five-year update process, the LPT will hold at least one public workshop or similar meeting to solicit feedback from the general public on the progress made to date. Concerned citizens will also be invited to review the revised Plan and submit any additional comments or recommendations for improving the Plan. All events will be publicly advertised in the local newspaper and/or similar method. Copies of the Plan will be provided in public places such as the Town House and/or the Library. The Plan will also be made available to the general public via the Town's website.

6.4 PLAN ADOPTION

E1.a

At the conclusion of planning efforts conducted by the LPT, the draft of the Plympton Multi-Hazard Mitigation Plan was reviewed by the LPT, stakeholders and the general public, and informally approved by all applicable Town departments, boards, and other agencies identified as members of the LPT. The plan was then submitted to the State Hazard Mitigation Officer (SHMO) of the Massachusetts Department of Resource Conservation, the Massachusetts Emergency Management Agency (MEMA) and the Federal Emergency Management Agency (FEMA) for review and approval. If approved by MEMA and FEMA, the plan will be brought before the Plympton Board of Selectmen for adoption, and the Plan will enter the five year "maintenance" phase. A draft of the certificate of adoption is provided on the following page. Proof of plan adoption will also be included at the front of this report.



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Appendix A: Local Mitigation Plan Review Guide

1. Local Mitigation Plan Review Guide
2. CRS Scoring Checklist

Local Mitigation Plan Review Guide

October 1, 2011



FEMA

SECTION 4:

REGULATION CHECKLIST

This section provides detailed guidance on how FEMA interprets the various requirements of the regulation for all Local Mitigation Plan reviews through a Regulatory Checklist. The guidance is limited only to the minimum requirements of *what* must be in a Local Mitigation Plan, and does not provide guidance on *how* the community should develop a plan. The Regulation Checklist includes the following Elements:

- 4.1 ELEMENT A: Planning Process
- 4.2 ELEMENT B: Hazard Identification and Risk Assessment
- 4.3 ELEMENT C: Mitigation Strategy
- 4.4 ELEMENT D: Plan Review, Evaluation, and Implementation
- 4.5 ELEMENT E: Plan Adoption
- 4.6 ELEMENT F: Additional State Requirements

Many requirements in the Checklist call for the plan to “document” or “describe” information. FEMA does not require specific formats for the plan or its content. Required information to “document” can be provided in the plan through a variety of formats, such as narrative, tables, lists, maps, etc. Examples provided in this *Guide* are samples of one or more approaches to meeting that particular requirement. Examples are not inclusive of all possible solutions to meet a requirement, and they are not necessarily considered “best practices” or exemplary. FEMA will recognize that there are many formats and types of documentation that may meet a particular requirement.

Terms from the regulation are defined in this *Guide*, where necessary. For example, many of the plan requirements ask for a “discussion” or “description.” FEMA considers the plan as the written record, or documentation, of the planning process. Therefore, many of these terms have the same meaning to document *what* was done. In addition, this *Guide* uses the terms “jurisdiction” and “community” interchangeably. For purposes of this *Guide*, these terms are equal to any local government developing a Local Mitigation Plan. This is defined at 44 CFR §201.2 as:

“any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity.”

Finally, an important distinction must be made between the words “shall” and “should” in the Mitigation Planning regulation at 44 CFR Part 201. The Regulation Checklist only includes the requirements where the regulation uses the words “shall” and “must,” and does not include the “should.” When the word “should” is used, the item is strongly recommended to be included in the plan, but its absence will not cause FEMA to disapprove the plan.

4.1 ELEMENT A: PLANNING PROCESS

Requirement §201.6(b)	An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:
§201.6(b)(1)	(1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
§201.6(b)(2)	(2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and
§201.6(b)(3)	(3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.
§201.6(c)(1)	[The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.
§201.6(c)(4)(i)	[The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.
§201.6(c)(4)(iii)	[The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.

Overall Intent. The planning process is as important as the plan itself. Any successful planning activity, such as developing a comprehensive plan or local land use plan, involves a cross-section of stakeholders and the public to reach consensus on desired outcomes or to resolve a community problem. The result is a common set of community values and widespread support for directing financial, technical, and human resources to an agreed upon course of action, usually identified in a plan. The same is true for mitigation planning. An effective and open planning process helps ensure that citizens understand risks and vulnerability, and they can work with the jurisdiction to support policies, actions, and tools that over the long-term will lead to a reduction in future losses.

Leadership, staffing, and in-house knowledge in local government may fluctuate over time. Therefore, the description of the planning process serves as a permanent record that explains how decisions were reached and who involved. FEMA will accept the planning process as defined by the community, as long as the mitigation plan includes a narrative

description of the process used to develop the mitigation plan—a systematic account about how the mitigation plan evolved from the formation of a planning team, to how the public participated, to how each section of the plan was developed, to what plans or studies were incorporated into the plan, to how it will be implemented. Documentation of a current planning process is required for both new and updated plans.

ELEMENT	REQUIREMENTS
<p>A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? 44 CFR 201.6(c)(1)</p> <p><i>Intent: To inform the public and other readers about the overall approach to the plan’s development and serve as a permanent record of how decisions were made and who was involved. This record also is useful for the next plan update.</i></p>	<p>a. Documentation of how the plan was prepared must include the schedule or timeframe and activities that made up the plan’s development as well as who was involved. Documentation typically is met with a narrative description, but may also include, for example, other documentation such as copies of meeting minutes, sign-in sheets, or newspaper articles.</p> <p><i>Document means provide the factual evidence for how the jurisdictions developed the plan.</i></p> <p>b. The plan must list the jurisdiction(s) participating in the plan that seek approval.</p> <p>c. The plan must identify who represented each jurisdiction. The Plan must provide, at a minimum, the jurisdiction represented and the person’s position or title and agency within the jurisdiction.</p> <p>d. For each jurisdiction seeking plan approval, the plan must document how they were involved in the planning process. For example, the plan may document meetings attended, data provided, or stakeholder and public involvement activities offered. Jurisdictions that adopt the plan without documenting how they participated in the planning process will not be approved.</p> <p><i>Involved in the process means engaged as participants and given the chance to provide input to affect the plan’s content. This is more than simply being invited (See “opportunity to be involved in the planning process” in A2 below) or only adopting the plan.</i></p> <p>e. Plan updates must include documentation of the current planning process undertaken to update the plan.</p>
<p>A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? 44 CFR 201.6(b)(2)</p>	<p>a. The plan must identify all stakeholders involved or given an opportunity to be involved in the planning process. At a minimum, stakeholders must include:</p> <ol style="list-style-type: none"> 1) Local and regional agencies involved in hazard mitigation activities; 2) Agencies that have the authority to regulate development; and 3) Neighboring communities. <p><i>An opportunity to be involved in the planning process means that the stakeholders are engaged or invited as participants and given the chance to provide input to affect the plan’s content.</i></p>

ELEMENT	REQUIREMENTS
<p><i>Intent:</i> To demonstrate a deliberative planning process that involves stakeholders with the data and expertise needed to develop the plan, with responsibility or authority to implement hazard mitigation activities, and who will be most affected by the plan's outcomes.</p>	<p>b. The Plan must provide the agency or organization represented and the person's position or title within the agency.</p> <p>c. The plan must identify how the stakeholders were invited to participate in the process.</p> <p>Examples of stakeholders include, but are not limited to:</p> <ul style="list-style-type: none"> • Local and regional agencies involved in hazard mitigation include public works, zoning, emergency management, local floodplain administrators, special districts, and GIS departments. • Agencies that have the authority to regulate development include planning and community development departments, building officials, planning commissions, or other elected officials. • Neighboring communities include adjacent counties and municipalities, such as those that are affected by similar hazard events or may be partners in hazard mitigation and response activities. • Other interests may be defined by each jurisdiction and will vary with each one. These include, but are not limited to, business, academia, and other private and non-profit interests depending on the unique characteristics of the community.
<p>A3. Does the Plan document how the public was involved in the planning process during the drafting stage? 44 CFR 201.6(b)(1) and 201.6(c)(1)</p> <p><i>Intent:</i> To ensure citizens understand what the community is doing on their behalf, and to provide a chance for input on community vulnerabilities and mitigation activities that will inform the plan's content. Public involvement is also an opportunity to educate the public about hazards and risks in the community, types of activities to mitigate those risks, and how these impact them.</p>	<p>a. The plan must document how the public was given the opportunity to be involved in the planning process and how their feedback was incorporated into the plan. Examples include, but are not limited to, sign-in sheets from open meetings, interactive websites with drafts for public review and comment, questionnaires or surveys, or booths at popular community events.</p> <p>b. The opportunity for participation must occur during the plan development, which is prior to the comment period on the final plan and prior to the plan approval / adoption.</p>

ELEMENT	REQUIREMENTS
<p>A4. Does the Plan document the review and incorporation of existing plans, studies, reports, and technical information? 44 CFR 201.6(b)(3)</p> <p><i>Intent: To identify existing data and information, shared objectives, and past and ongoing activities that can help inform the mitigation plan. It also helps identify the existing capabilities and planning mechanisms to implement the mitigation strategy.</i></p>	<p>a. The plan must document <i>what</i> existing plans, studies, reports, and technical information were reviewed. Examples of the types of existing sources reviewed include, but are not limited to, the state hazard mitigation plan, local comprehensive plans, hazard specific reports, and flood insurance studies.</p> <p>b. The plan must document <i>how</i> relevant information was incorporated into the mitigation plan.</p> <p><i>Incorporate means to reference or include information from other existing sources to form the content of the mitigation plan.</i></p>
<p>A5. Is there discussion on how the community(ies) will continue public participation in the plan maintenance process? 44 CFR 201.6(c)(4)(iii)</p> <p><i>Intent: To identify how the public will continue to have an opportunity to participate in the plan's maintenance and implementation over time.</i></p>	<p>a. The plan must describe how the jurisdiction(s) will continue to seek public participation after the plan has been approved and during the plan's implementation, monitoring and evaluation.</p> <p><i>Participation means engaged and given the chance to provide feedback. Examples include, but are not limited to, periodic presentations on the plan's progress to elected officials, schools or other community groups, annual questionnaires or surveys, public meetings, postings on social media and interactive websites.</i></p>
<p>A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? 44 CFR 201.6(c)(4)(i)</p> <p><i>Intent: To establish a process for jurisdictions to track the progress of the plan's implementation. This also serves as the basis of the next plan update.</i></p>	<p>a. The plan must identify how, when, and by whom the plan will be monitored. <i>Monitoring means tracking the implementation of the plan over time. For example, monitoring may include a system for tracking the status of the identified hazard mitigation actions.</i></p> <p>b. The plan must identify how, when, and by whom the plan will be evaluated. <i>Evaluating means assessing the effectiveness of the plan at achieving its stated purpose and goals.</i></p> <p>c. The plan must identify how, when, and by whom the plan will be updated. <i>Updating means reviewing and revising the plan at least once every five years.</i></p> <p>d. The plan must include the title of the individual or name of the department/ agency responsible for leading each of these efforts.</p>

4.2 ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT

Requirement	[The risk assessment shall include a] description of the type, location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.
§201.6(c)(2)(i)	
§201.6(c)(2)(ii)	[The risk assessment shall include a] description of the jurisdiction’s vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. All plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods. The plan should describe vulnerability in terms of:
§201.6(c)(2)(ii)(A)	(A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;
§201.6(c)(2)(ii)(B)	(B) An estimate of the potential dollar losses to vulnerable structures identified in ... this section and a description of the methodology used to prepare the estimate.
§201.6(c)(2)(ii)(C)	(C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.
§201.6(c)(2)(iii)	For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction’s risks where they vary from the risks facing the entire planning area.

Overall Intent. The risk assessment provides the factual basis for activities proposed in the strategy that will reduce losses from identified hazards. A quality risk assessments makes a clear connection between the community’s vulnerability and the hazard mitigation actions. In other words, it provides sufficient information to enable the jurisdiction(s) to identify and prioritize appropriate hazard mitigation actions.

Local risk assessments do not need to be based on the most sophisticated technology, but do need to be accurate, current, and relevant. During a plan update, local jurisdictions assess current and expected future vulnerability to all hazards and integrate new hazard data such as recent hazard events and new flood studies. In the mitigation plan review, FEMA looks at the quality of the information in the risk assessment, not the quantity of information in the risk assessment.

The Mitigation Planning regulation includes several “optional” requirements for the vulnerability assessment. These are easily recognizable with the use of the term “should” in the requirement (See §201.6(c)(2)(ii)(A-C)). Although not required, these are strongly recommended to be included in the plan. However, their absence will not cause FEMA to disapprove the plan. These “optional” requirements were originally intended to meet the overall vulnerability assessment, and this analysis can assist with identifying mitigation actions.

<u>ELEMENT</u>	<u>REQUIREMENTS</u>
<p>B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction? 44 CFR 201.6(c)(2)(i) and 44 CFR 201.6(c)(2)(iii)</p> <p><i>Intent: To understand the potential and chronic hazards affecting the planning area in order to identify which hazard risks are most significant and which jurisdictions or locations are most adversely affected.</i></p>	<p>a. The plan must include a description of the natural hazards that can affect the jurisdiction(s) in the planning area.</p> <p><i>A natural hazard is a source of harm or difficulty created by a meteorological, environmental, or geological event³. The plan must address natural hazards. Manmade or human-caused hazards may be included in the document, but these are not required and will not be reviewed to meet the requirements for natural hazards. In addition, FEMA will not require the removal of this extra information prior to plan approval.</i></p> <p>b. The plan must provide the rationale for the omission of any natural hazards that are commonly recognized to affect the jurisdiction(s) in the planning area.</p> <p>c. The description, or profile, must include information on location, extent, previous occurrences, and future probability for each hazard. Previous occurrences and future probability are addressed in sub-element B2.</p> <p>The information does not necessarily need to be described or presented separately for location, extent, previous occurrences, and future probability. For example, for some hazards, one map with explanatory text could provide information on location, extent, and future probability.</p> <p><i>Location means the geographic areas in the planning area that are affected by the hazard. For many hazards, maps are the best way to illustrate location. However, location may be described in other formats. For example, if a geographically-specific location cannot be identified for a hazard, such as tornados, the plan may state that the entire planning area is equally at risk to that hazard.</i></p> <p><i>Extent means the strength or magnitude of the hazard. For example, extent could be described in terms of the specific measurement of an occurrence on a scientific scale (for example, Enhanced Fujita Scale, Saffir-Simpson Hurricane Scale, Richter Scale, flood depth grids) and/or other hazard factors, such as duration and speed of onset. Extent is not the same as impacts, which are described in sub-element B3.</i></p>

³ DHS Risk Lexicon, 2010 Edition. <http://www.dhs.gov/xlibrary/assets/dhs-risk-lexicon-2010.pdf>

<u>ELEMENT</u>	<u>REQUIREMENTS</u>
	<p>d. For participating jurisdictions in a multi-jurisdictional plan, the plan must describe any hazards that are unique and/or varied from those affecting the overall planning area.</p>
<p>B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? 44 CFR 201.6(c)(2)(i)</p> <p><i>Intent: To understand potential impacts to the community based on information on the hazard events that have occurred in the past and the likelihood they will occur in the future.</i></p>	<p>a. The plan must include the history of previous hazard events for each of the identified hazards.</p> <p>b. The plan must include the probability of future events for each identified hazard.</p> <p><i>Probability means the likelihood of the hazard occurring and may be defined in terms of general descriptors (for example, unlikely, likely, highly likely), historical frequencies, statistical probabilities (for example: 1% chance of occurrence in any given year), and/or hazard probability maps. If general descriptors are used, then they must be defined in the plan. For example, “highly likely” could be defined as equals near 100% chance of occurrence next year or happens every year.</i></p> <p>c. Plan updates must include hazard events that have occurred since the last plan was developed.</p>
<p>B3. Is there a description of each identified hazard’s impact on the community as well as an overall summary of the community’s vulnerability for each jurisdiction? 44 CFR 201.6(c)(2)(ii)</p> <p><i>Intent: For each jurisdiction to consider their community as a whole and analyze the potential impacts of future hazard events and the vulnerabilities that could be reduced through hazard mitigation actions.</i></p>	<p>a. For each participating jurisdiction, the plan must describe the potential impacts of each of the identified hazards on the community.</p> <p><i>Impact means the consequence or effect of the hazard on the community and its assets. Assets are determined by the community and include, for example, people, structures, facilities, systems, capabilities, and/or activities that have value to the community. For example, impacts could be described by referencing historical disaster impacts and/or an estimate of potential future losses (such as percent damage of total exposure).</i></p> <p>b. The plan must provide an overall summary of each jurisdiction’s vulnerability to the identified hazards. The overall summary of vulnerability identifies structures, systems, populations or other community assets as defined by the community that are susceptible to damage and loss from hazard events. A plan will meet this sub-element by addressing the requirements described in §201.6(c)(2)(ii)(A-C).</p> <p>Vulnerable assets and potential losses is more than a list of the total exposure of population, structures, and critical facilities in the planning area. An example of an overall summary is a list of key issues or problem statements that clearly describes the community’s greatest vulnerabilities and that will be addressed in the mitigation strategy.</p>

ELEMENT	REQUIREMENTS
<p>B4. Does the Plan address NFIP insured structures within each jurisdiction that have been repetitively damaged by floods? 44 CFR 201.6(c)(2)(ii)</p> <p><i>Intent: To inform hazard mitigation actions for properties that have suffered repetitive damage due to flooding, particularly problem areas that may not be apparent on floodplain maps. Information on repetitive loss properties helps inform FEMA hazard mitigation assistance programs under the National Flood Insurance Act.</i></p>	<p>a. The plan must describe the types (residential, commercial, institutional, etc.) and estimate the numbers of repetitive loss properties located in identified flood hazard areas.</p> <p><i>Repetitive loss properties are those for which two or more losses of at least \$1,000 each have been paid under the National Flood Insurance Program (NFIP) within any 10-year period since 1978.</i></p> <p><i>Severe repetitive loss properties are residential properties that have at least four NFIP payments over \$5,000 each and the cumulative amount of such claims exceeds \$20,000, or at least two separate claims payments with the cumulative amount exceeding the market value of the building.</i></p> <p>Use of flood insurance claim and disaster assistance information is subject to The Privacy Act of 1974, as amended, which prohibits public release of the names of policy holders or recipients of financial assistance and the amount of the claim payment or assistance. However, maps showing general areas where claims have been paid can be made public. If a plan includes the names of policy holders or recipients of financial assistance and the amount of the claim payment or assistance, the plan cannot be approved until this Privacy Act covered information is removed from the plan.</p>

4.3 ELEMENT C. MITIGATION STRATEGY

Requirement §201.6(c)(3)	[The plan shall include the following:] A <i>mitigation strategy</i> that provides the jurisdiction’s blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs, and resources, and its ability to expand on and improve these existing tools.
§201.6(c)(3)(i)	[The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.
§201.6(c)(3)(ii)	[The hazard mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction’s participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.
§201.6(c)(3)(iii)	[The hazard mitigation strategy shall include an] action plan, describing how the action identified in paragraph (c)(3)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.
§201.6(c)(3)(iv)	For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.
§201.6(c)(4)(ii)	[The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvements, when appropriate.

Overall Intent. The mitigation strategy serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The Stafford Act directs Local Mitigation Plans to describe hazard mitigation actions and establish a strategy to implement those actions.⁴ Therefore, all other requirements for a Local Mitigation Plan lead to and support the mitigation strategy.

⁴ Section 322(b), Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended, 42 U.S.C. 5165.

The mitigation strategy includes the development of goals and prioritized hazard mitigation actions. Goals are long-term policy statements and global visions that support the mitigation strategy. A critical step in the development of specific hazard mitigation actions and projects is assessing the community’s existing authorities, policies, programs, and resources and its capability to use or modify local tools to reduce losses and vulnerability from profiled hazards.

In the plan update, goals and actions are either reaffirmed or updated based on current conditions, including the completion of hazard mitigation initiatives, an updated or new risk assessment, or changes in State or local priorities.

<u>ELEMENT</u>	<u>REQUIREMENTS</u>
<p>C1. Does the plan document each jurisdiction’s existing authorities, policies, programs and resources, and its ability to expand on and improve these existing policies and programs? 44 CFR 201.6(c)(3)</p> <p><i>Intent: To ensure that each jurisdiction evaluates its capabilities to accomplish hazard mitigation actions, through existing mechanisms. This is especially useful for multi-jurisdictional plans where local capability varies widely.</i></p>	<p>a. The plan must describe each jurisdiction’s existing authorities, policies, programs and resources available to accomplish hazard mitigation.</p> <p>Examples include, but are not limited to: staff involved in local planning activities, public works, and emergency management; funding through taxing authority, and annual budgets; or regulatory authorities for comprehensive planning, building codes, and ordinances.</p>
<p>C2. Does the Plan address each jurisdiction’s participation in the NFIP and continued compliance with NFIP requirements, as appropriate? 44 CFR 201.6(c)(3)(ii)</p> <p><i>Intent: To demonstrate flood hazard mitigation efforts by the community through NFIP activities. Where FEMA is the official administering Federal agency of the NFIP, participation in the program is a basic community capability and resource for flood hazard mitigation activities.</i></p>	<p>a. The plan must describe each jurisdiction’s participation in the NFIP and describe their floodplain management program for continued compliance. Simply stating “The community will continue to comply with NFIP,” will <u>not</u> meet this requirement. The description could include, but is not limited to:</p> <ul style="list-style-type: none"> • Adoption and enforcement of floodplain management requirements, including regulating new construction in Special Flood Hazard Areas (SFHAs); • Floodplain identification and mapping, including any local requests for map updates; or • Description of community assistance and monitoring activities. <p>Jurisdictions that are currently not participating in the NFIP and where an FHBM or FIRM has been issued may meet this requirement by describing the reasons why the community does not participate.</p>

ELEMENT	REQUIREMENTS
<p>C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? 44 CFR 201.6(c)(3)(i)</p> <p><i>Intent: To guide the development and implementation of hazard mitigation actions for the community(ies). Goals are statements of the community's visions for the future.</i></p>	<p>a. The plan must include general hazard mitigation goals that represent what the jurisdiction(s) seeks to accomplish through mitigation plan implementation.</p> <p><i>Goals are broad policy statements that explain what is to be achieved.</i></p> <p>b. The goals must be consistent with the hazards identified in the plan.</p>
<p>C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? 44 CFR 201.6(c)(3)(ii) and 44 CFR 201.6(c)(3)(iv)</p> <p><i>Intent: To ensure the hazard mitigation actions are based on the identified hazard vulnerabilities, are within the capability of each jurisdiction, and reduce or avoid future losses. This is the heart of the mitigation plan, and is essential to leading communities to reduce their risk. Communities, not FEMA, "own" the hazard mitigation actions in the strategy.</i></p>	<p>a. The plan must include a mitigation strategy that 1) analyzes actions and/or projects that the jurisdiction considered to reduce the impacts of hazards identified in the risk assessment, and 2) identifies the actions and/or projects that the jurisdiction intends to implement.</p> <p><i>Mitigation actions and projects means a hazard mitigation action, activity or process (for example, adopting a building code) or it can be a physical project (for example, elevating structures or retrofitting critical infrastructure) designed to reduce or eliminate the long term risks from hazards. This sub-element can be met with either actions or projects, or a combination of actions and projects.</i></p> <p>The mitigation plan may include non-mitigation actions, such as actions that are emergency response or operational preparedness in nature. These will not be accepted as hazard mitigation actions, but neither will FEMA require these to be removed from the plan prior to approval.</p> <p><i>A comprehensive range consists of different hazard mitigation alternatives that address the vulnerabilities to the hazards that the jurisdiction(s) determine are most important.</i></p> <p>b. Each jurisdiction participating in the plan must have mitigation actions specific to that jurisdiction that are based on the community's risk and vulnerabilities, as well as community priorities.</p> <p>c. The action plan must reduce risk to existing buildings and infrastructure as well as limit any risk to new development and redevelopment. <i>With emphasis on new and existing building and infrastructure means that the action plan includes a consideration of actions that address the built environment.</i></p>

<u>ELEMENT</u>	<u>REQUIREMENTS</u>
<p>C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? 44 CFR 201.6(c)(3)(iii) and 44 CFR (c)(3)(iv)</p> <p><i>Intent: To identify how the plan will directly lead to implementation of the hazard mitigation actions. As opportunities arise for actions or projects to be implemented, the responsible entity will be able to take action towards completion of the activities.</i></p>	<ul style="list-style-type: none"> a. The plan must describe the criteria used for prioritizing implementation of the actions. b. The plan must demonstrate when prioritizing hazard mitigation actions that the local jurisdictions considered the benefits that would result from the hazard mitigation actions versus the cost of those actions. The requirement is met as long as the economic considerations are summarized in the plan as part of the community’s analysis. A complete benefit-cost analysis is not required. Qualitative benefits (<i>for example</i>, quality of life, natural and beneficial values, or other “benefits”) can also be included in how actions will be prioritized. c. The plan must identify the position, office, department, or agency responsible for implementing and administering the action (for each jurisdiction), and identify potential funding sources and expected timeframes for completion.
<p>C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? 44 CFR 201.6(c)(4)(ii)</p> <p><i>Intent: To assist communities in capitalizing on all available mechanisms that they have at their disposal to accomplish hazard mitigation and reduce risk.</i></p>	<ul style="list-style-type: none"> a. The plan must describe the community’s process to integrate the data, information, and hazard mitigation goals and actions into other planning mechanisms. b. The plan must identify the local planning mechanisms where hazard mitigation information and/or actions may be incorporated. <p><i>Planning mechanisms means governance structures that are used to manage local land use development and community decision-making, such as comprehensive plans, capital improvement plans, or other long-range plans.</i></p> <ul style="list-style-type: none"> c. A multi-jurisdictional plan must describe each participating jurisdiction’s individual process for integrating hazard mitigation actions applicable to their community into other planning mechanisms. d. The updated plan must explain how the jurisdiction(s) incorporated the mitigation plan, when appropriate, into other planning mechanisms as a demonstration of progress in local hazard mitigation efforts. e. The updated plan must continue to describe how the mitigation strategy, including the goals and hazard mitigation actions will be incorporated into other planning mechanisms.

4.4 ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (Plan Updates Only)

Requirement §201.6(d)(3)	A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit if for approval within 5 years in order to continue to be eligible for mitigation project grant funding.
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Overall Intent. In order to continue to be an effective representation of the jurisdiction’s overall strategy for reducing its risks from natural hazards, the mitigation plan must reflect current conditions. This will require an assessment of the current development patterns and development pressures as well as an evaluation of any new hazard or risk information. The plan update is an opportunity for the jurisdiction to assess its previous goals and action plan, evaluate progress in implementing hazard mitigation actions, and adjust its actions to address the current realities.

Where conditions of growth and revisions in priorities may have changed very little in a community, much of the text in the updated plan may be unchanged. This is acceptable as long as it still fits the priorities of their community, and it reflects current conditions. The key for plan readers to recognize a good plan update is documentation of the community’s progress or changes in their hazard mitigation program, along with the community’s continued engagement in the mitigation planning process.

<u>ELEMENT</u>	<u>REQUIREMENTS</u>
<p>D1. Was the plan revised to reflect changes in development? 44 CFR 201.6(d)(3)</p> <p>Intent: <i>To ensure that the mitigation strategy continues to address the risk and vulnerabilities to existing and potential development, and takes into consideration possible future conditions that can impact the vulnerability of the community.</i></p>	<p>a. The plan must describe changes in development that have occurred in hazard prone areas and increased or decreased the vulnerability of each jurisdiction since the last plan was approved. If no changes in development impacted the jurisdiction’s overall vulnerability, plan updates may validate the information in the previously approved plan.</p> <p>Changes in development means recent development (<i>for example</i>, construction completed since the last plan was approved), potential development (<i>for example</i>, development planned or under consideration by the jurisdiction), or conditions that may affect the risks and vulnerabilities of the jurisdictions (<i>for example</i>, climate variability, declining populations or projected increases in population, or foreclosures). Not all development will affect a jurisdiction’s vulnerability.</p>

<u>ELEMENT</u>	<u>REQUIREMENTS</u>
<p>D2. Was the plan revised to reflect progress in local mitigation efforts? 44 CFR 201.6(d)(3)</p> <p><i>Intent: To evaluate and demonstrate progress made in the past five years in achieving goals and implementing actions outlined in their mitigation strategy.</i></p>	<p>a. The plan must describe the status of hazard mitigation actions in the previous plan by identifying those that have been completed or not completed. For actions that have not been completed, the plan must either describe whether the action is no longer relevant or be included as part of the updated action plan.</p>
<p>D3. Was the plan revised to reflect changes in priorities? 44 CFR 201.6(d)(3)</p> <p><i>Intent: To ensure the plan reflects current conditions, including financial, legal, and political realities as well as post-disaster conditions.</i></p>	<p>a. The plan must describe if and how any priorities changed since the plan was previously approved.</p> <p>If no changes in priorities are necessary, plan updates may validate the information in the previously approved plan.</p>

4.5 ELEMENT E. PLAN ADOPTION

Requirement §201.6(c)(5)	[The plan shall include...] Documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County commissioner, Tribal Council). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.
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Overall Intent. Adoption by the local governing body demonstrates the jurisdiction’s commitment to fulfilling the hazard mitigation goals and actions outlined in the plan. Adoption legitimizes the plan and authorizes responsible agencies to execute their responsibilities. Updated plans also are adopted anew to demonstrate community recognition of the current planning process, changes that have occurred within the previous five years, and validate community priorities for hazard mitigation actions.

<u>ELEMENT</u>	<u>REQUIREMENTS</u>
<p>E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? 44 CFR 201.6(c)(5)</p> <p><i>Intent: To demonstrate the jurisdiction’s commitment to fulfilling the hazard mitigation goals outlined in the plan, and to authorize responsible agencies to execute their responsibilities.</i></p>	<p>a. The plan must include documentation of plan adoption, usually a resolution by the governing body or other authority.</p> <p>If the local jurisdiction has not passed a formal resolution, or used some other documentation of adoption, the clerk or city attorney must provide written confirmation that the action meets their community’s legal requirements for official adoption and/or the highest elected official or their designee must submit written proof of the adoption. The signature of one of these officials is required with the explanation or other proof of adoption.</p> <p>Minutes of a council or other meeting during which the plan is adopted will be sufficient if local law allows meeting records to be submitted as documentation of adoption. The clerk of the governing body, or city attorney, must provide a copy of the law and a brief, written explanation such as, “in accordance with section ___ of the city code/ordinance, this constitutes formal adoption of the measure,” with an official signature.</p> <p>If adopted after FEMA review, adoption must take place within one calendar year of receipt of FEMA’s “Approval Pending Adoption.” See Section 5, <i>Plan Review Procedure</i> for more information on “Approvable Pending Adoption.”</p>

<u>ELEMENT</u>	<u>REQUIREMENTS</u>
<p>E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? 44 CFR 201.6(c)(5)</p> <p><i>Intent: To demonstrate the jurisdiction’s commitment to fulfilling the hazard mitigation goals outlined in the plan, and to authorize responsible agencies to execute their responsibilities.</i></p>	<p>a. Each jurisdiction that is included in the plan must have its governing body adopt the plan prior to FEMA approval, even when a regional agency has the authority to prepare such plans.</p> <p>As with single jurisdictional plans, in order for FEMA to give approval to a multi-jurisdictional plan, at least one participating jurisdiction must formally adopt the plan within one calendar year of FEMA’s designation of the plan as “Approvable Pending Adoption.” See Section 5, <i>Plan Review Procedure</i> for more information on “Approvable Pending Adoption.”</p>

APPENDIX A:

LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA’s evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan’s strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

Jurisdiction: Town of Plympton, Massachusetts	Title of Plan: Plympton Multi-Hazard Mitigation Plan	Date of Plan: July 2021
Local Point of Contact: Elizabeth Dennehy	Address: Plympton Town House 5 Palmer Road Plympton, MA 02367	
Title: Town Administrator		
Agency: Selectmen’s Office		
Phone Number: 781.585.2700	E-Mail: TownAdmin@plymptontown.org	

State Reviewer:	Title:	Date:

FEMA Reviewer:	Title:	Date:
Date Received in FEMA Region (insert #)		
Plan Not Approved		
Plan Approvable Pending Adoption		
Plan Approved		

**SECTION 1:
REGULATION CHECKLIST**

INSTRUCTIONS: The Regulation Checklist must be completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been ‘Met’ or ‘Not Met.’ The ‘Required Revisions’ summary at the bottom of each Element must be completed by FEMA to provide a clear explanation of the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is ‘Not Met.’ Sub-elements should be referenced in each summary by using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each Element and sub-element are described in detail in this *Plan Review Guide* in Section 4, Regulation Checklist.

1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
ELEMENT A. PLANNING PROCESS				
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Sections 1.2 & 1.3 (pages 1-2 to 1-4, 1-5)			
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	Sections 1.2 & 1.3 (pages 1-3 to 1-5)			
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Section 1.2 (pages 1-2 to 1-4)			
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Section 1.2 (pages 1-4 to 1-5)			
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Section 6.3 (page 6-3)			
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Section 6.1 (page 6-2)			
<u>ELEMENT A: REQUIRED REVISIONS</u>				

1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT				
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Section 3 (throughout)			
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Section 3 (throughout)			
B3. Is there a description of each identified hazard’s impact on the community as well as an overall summary of the community’s vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Section 3 (throughout); Sections 4.3 & 4.4 (pages 4-10 to 4-12)			
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Section 2.9 (page 2-7)			
<u>ELEMENT B: REQUIRED REVISIONS</u>				
ELEMENT C. MITIGATION STRATEGY				
C1. Does the plan document each jurisdiction’s existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Section 5.2 (pages 5-2 to 5-4)			
C2. Does the Plan address each jurisdiction’s participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Section 5.2 (pages 5-4 to 5-5)			
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Section 5.1 (page 5-2)			
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Section 5.4 (pages 5-7 to 5-12)			
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Section 5.4 (pages 5-7 to 5-12)			
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Section 5.2 (page 5-2 to 5-3)			
<u>ELEMENT C: REQUIRED REVISIONS</u>				

1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)				
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	Section 2.5 (page 2-3)			
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Section 5.3 (pages 5-5 to 5-6)			
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Section 5.1 (page 5-2)			
<u>ELEMENT D: REQUIRED REVISIONS</u>				
ELEMENT E. PLAN ADOPTION				
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	Section 6.4 (page 6-3)			
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	N/A			
<u>ELEMENT E: REQUIRED REVISIONS</u>				
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)				
F1.				
F2.				
<u>ELEMENT F: REQUIRED REVISIONS</u>				



Appendix B: Planning Process and Public Outreach

1. Local Hazard Mitigation Planning Committee Member List
2. Online Public Survey Results
3. Meeting Agendas
4. Copy of Announcements for Public Webinar
5. Screenshot of Town Homepage with Link to Draft Report
6. Email Sent to Neighboring Towns and Regional Planning Agency

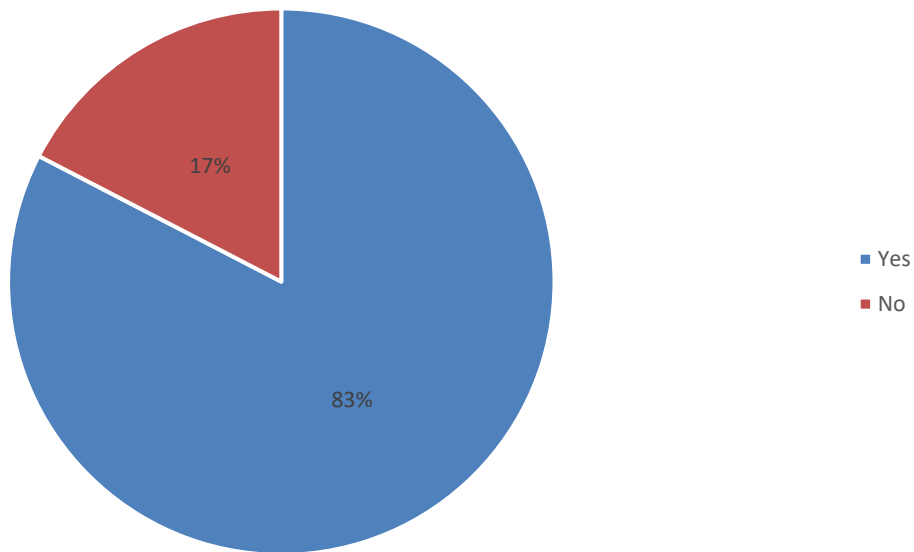
Local Planning Team Members:

Name	Title	Department
Elizabeth Dennehy	Town Administrator	Selectmen's Office
John Traynor	Town Selectman	Selectmen's Office
Stephen Silva	Fire Chief	Fire Department
John Sjostedt	Captain	Fire Department
Matt Clancy	Police Chief	Police Department
Rob Firlotte	Highway Superintendent	Highway Department
Art Morin	Chairperson	Board of Health

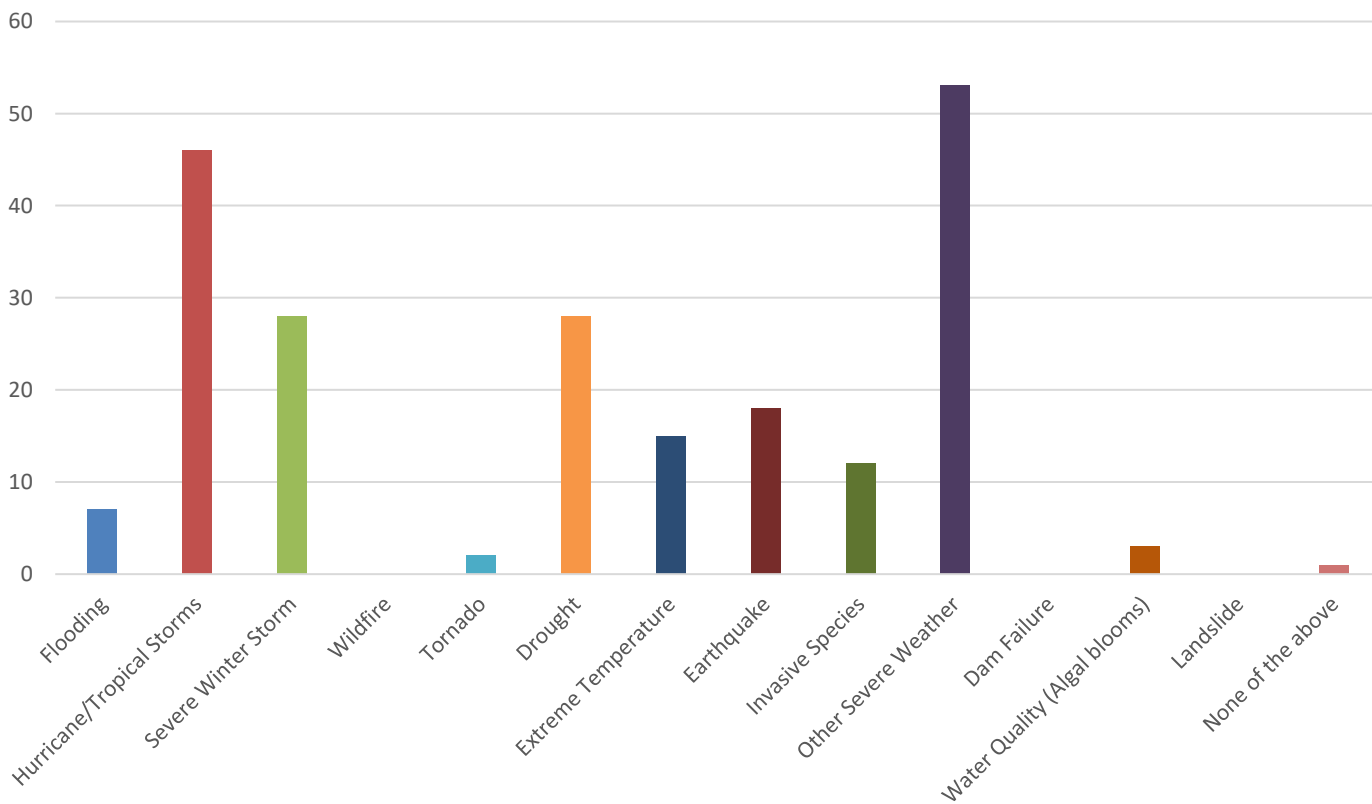
Plympton Multi-Hazard Mitigation Plan Public Survey Results

Total Responses: 69

1. Have you experienced a weather-related disaster while living, working, or visiting Plympton?



2. Which of the following natural hazards have you experienced while in Plympton?



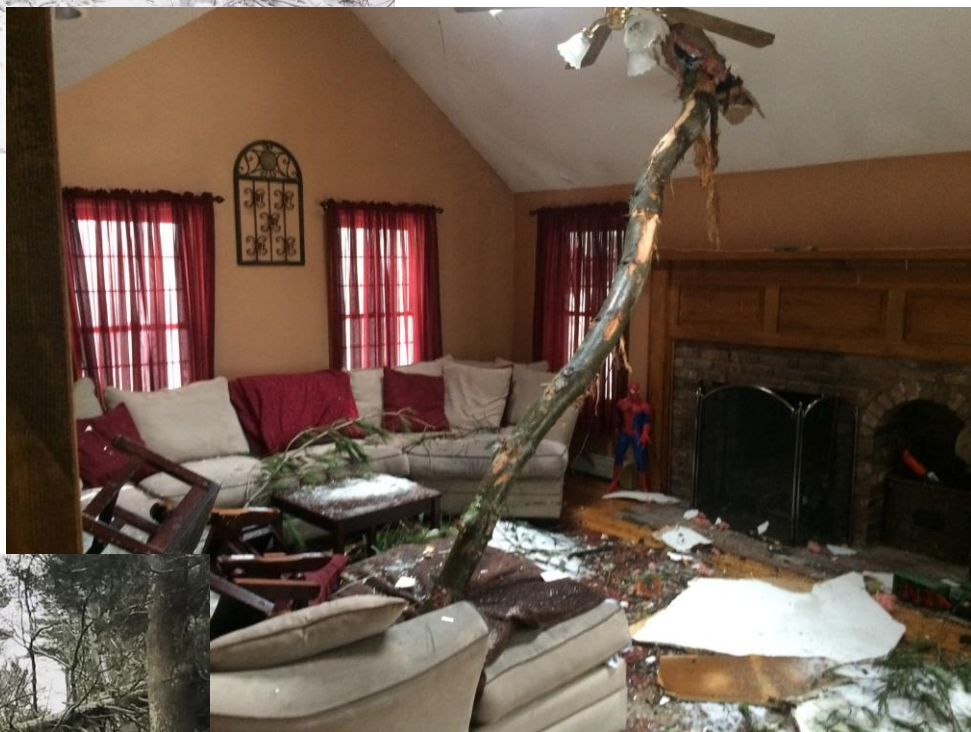
3. a) Do you have pictures documenting natural hazards (flooding, severe weather events, wildfires, etc.) in Plympton that you would like to share for possible use in the Plympton Multi-Hazard Mitigation Plan? If so, please upload them here.

Online survey question only

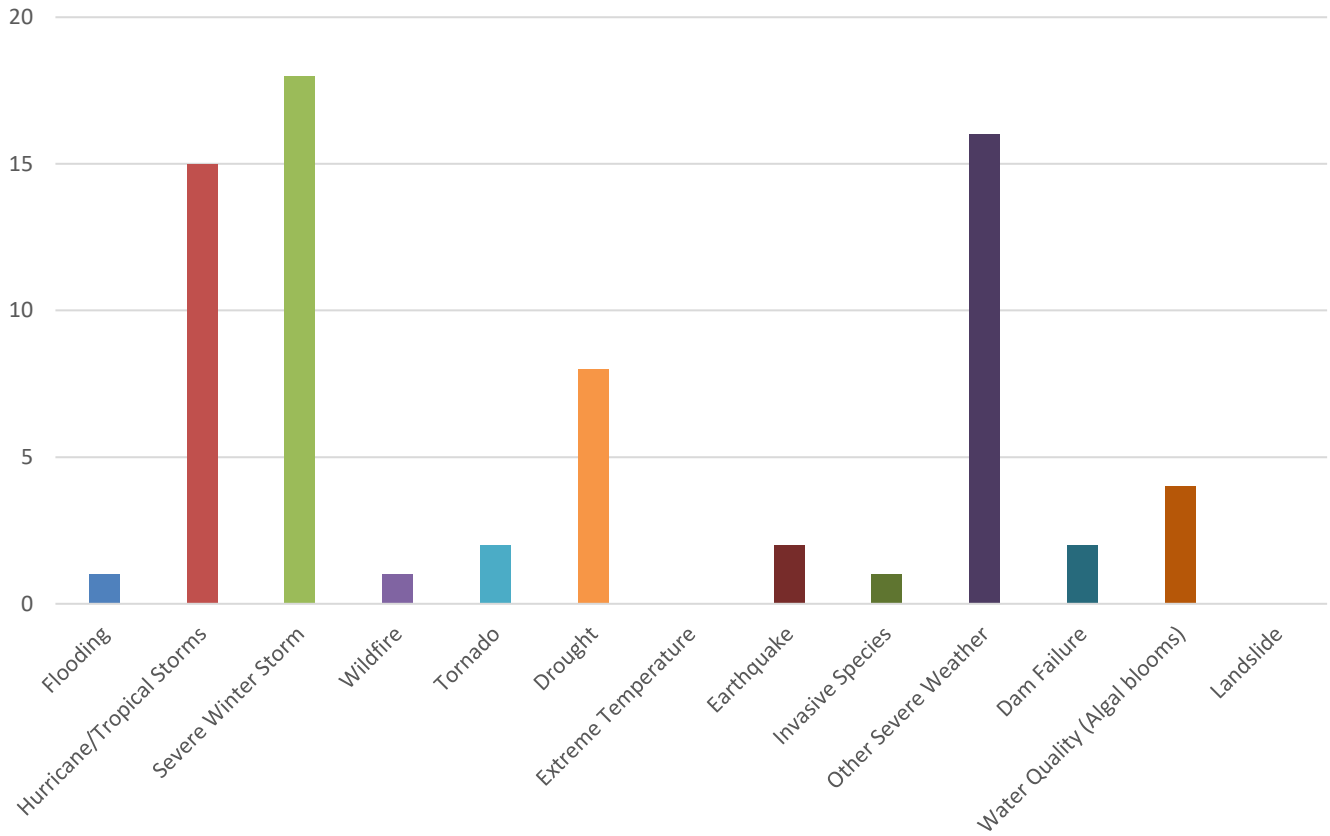


Hazard Type: Severe winter storm, other severe weather

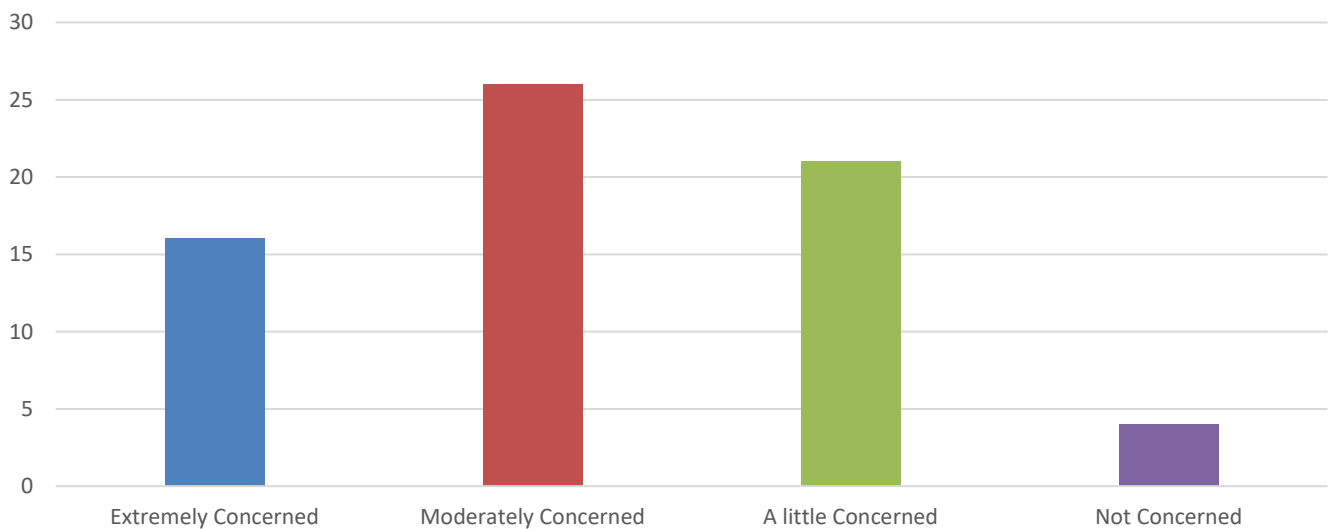
Date: March 2018



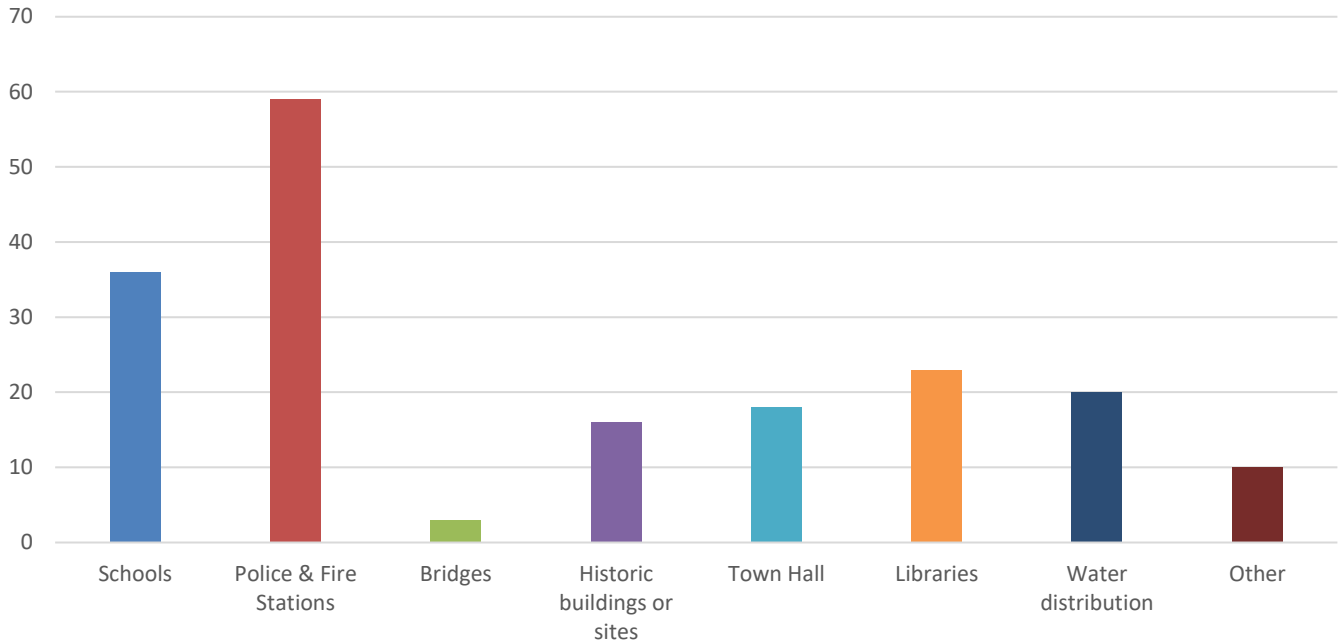
4. Which of the following natural hazards are you most concerned about?



5. How concerned are you about the possibility of any natural hazards impacting Plympton?

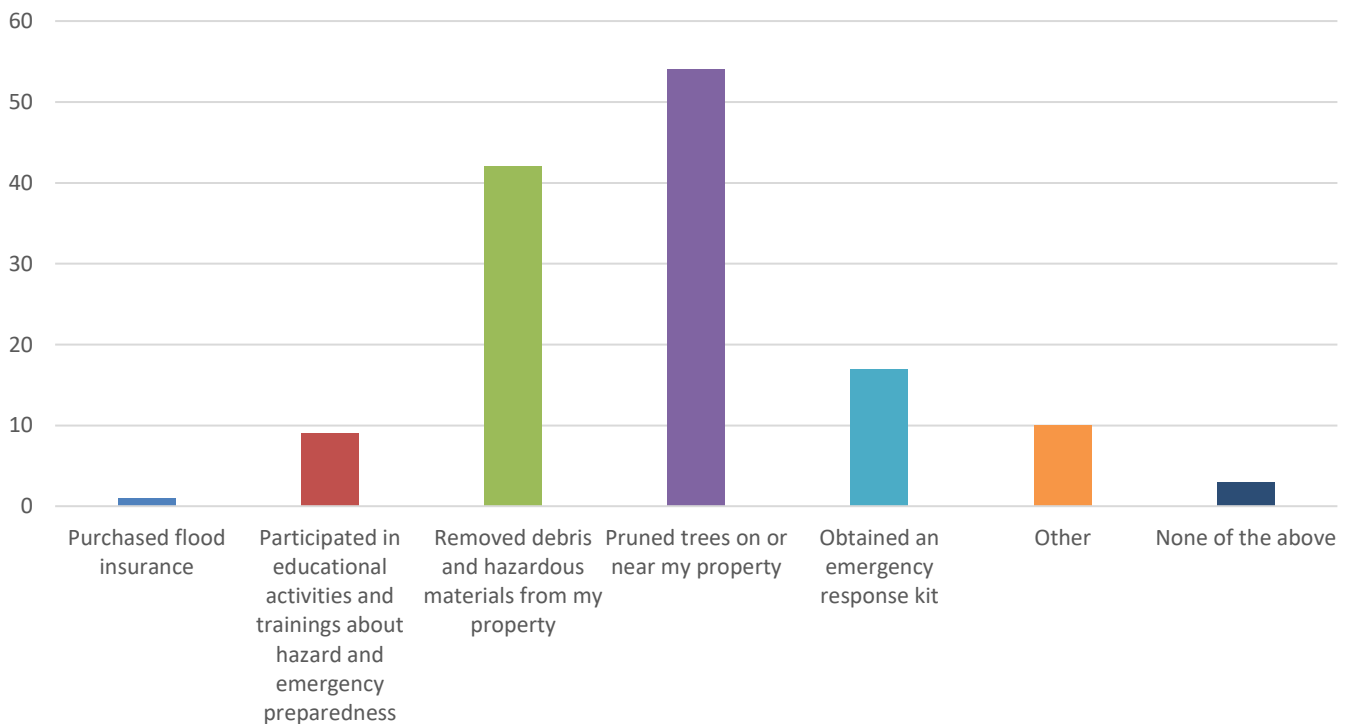


6. What specific community assets are most important to you?



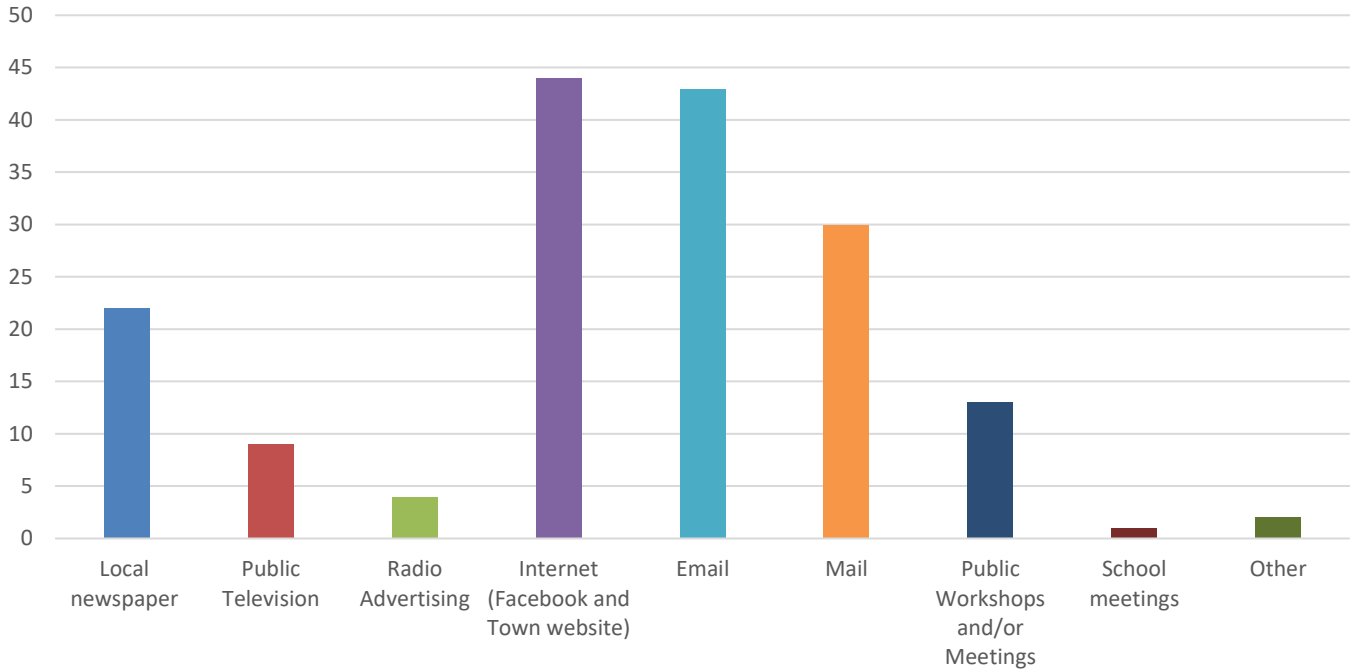
Specific bridges/historical sites included the Winnetuxet Bridge, Old Town House, and the graveyard. “Other” responses included roadways, electrical services, internet/cellular services, elder services/housing, and the dump.

7. Which of the following actions have you taken to be more hazard resistant?



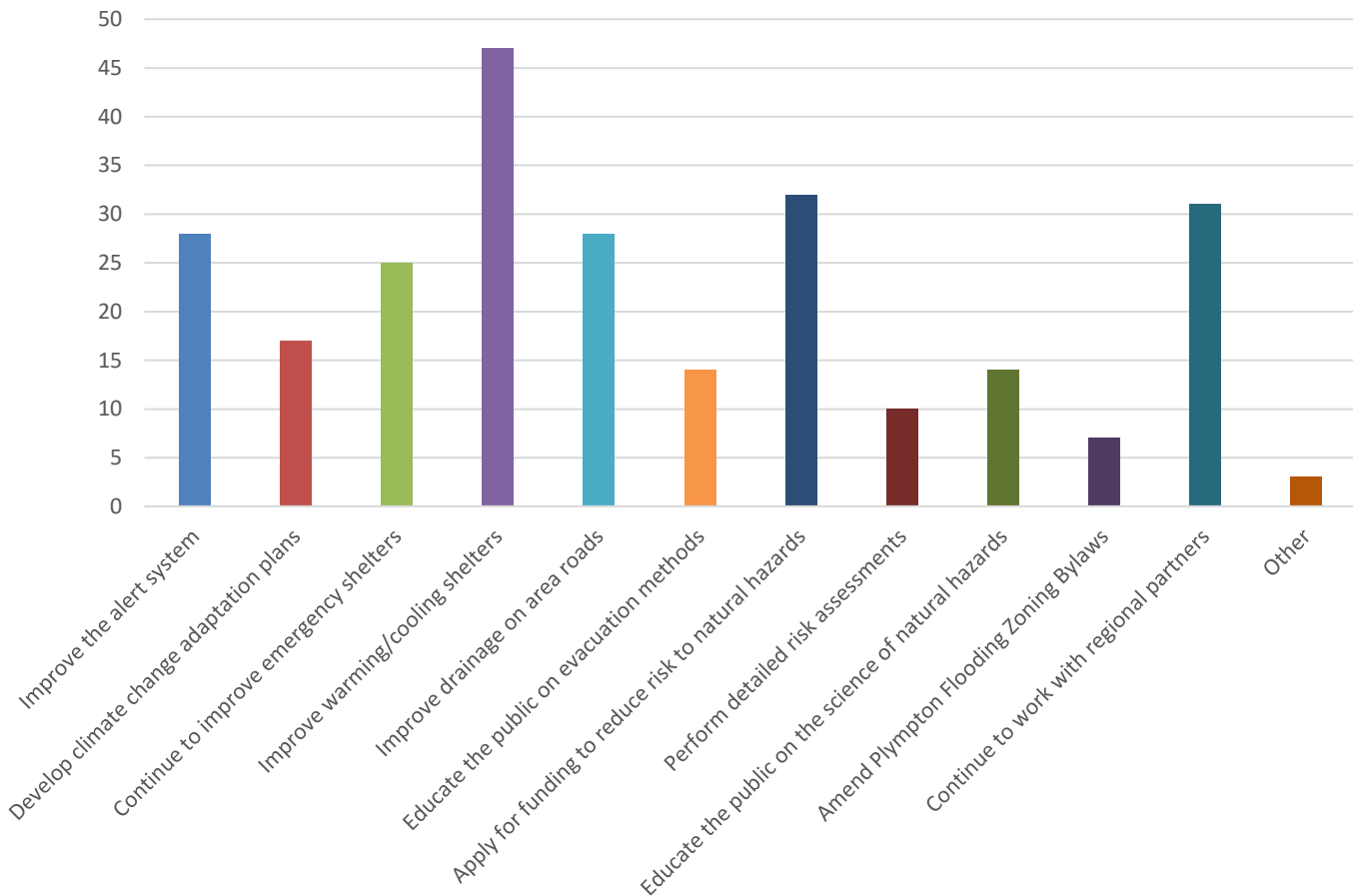
“Other” responses included purchasing a generator and/or woodburning stove.

8. What is the most effective way to engage you in hazard planning and emergency preparedness activities?

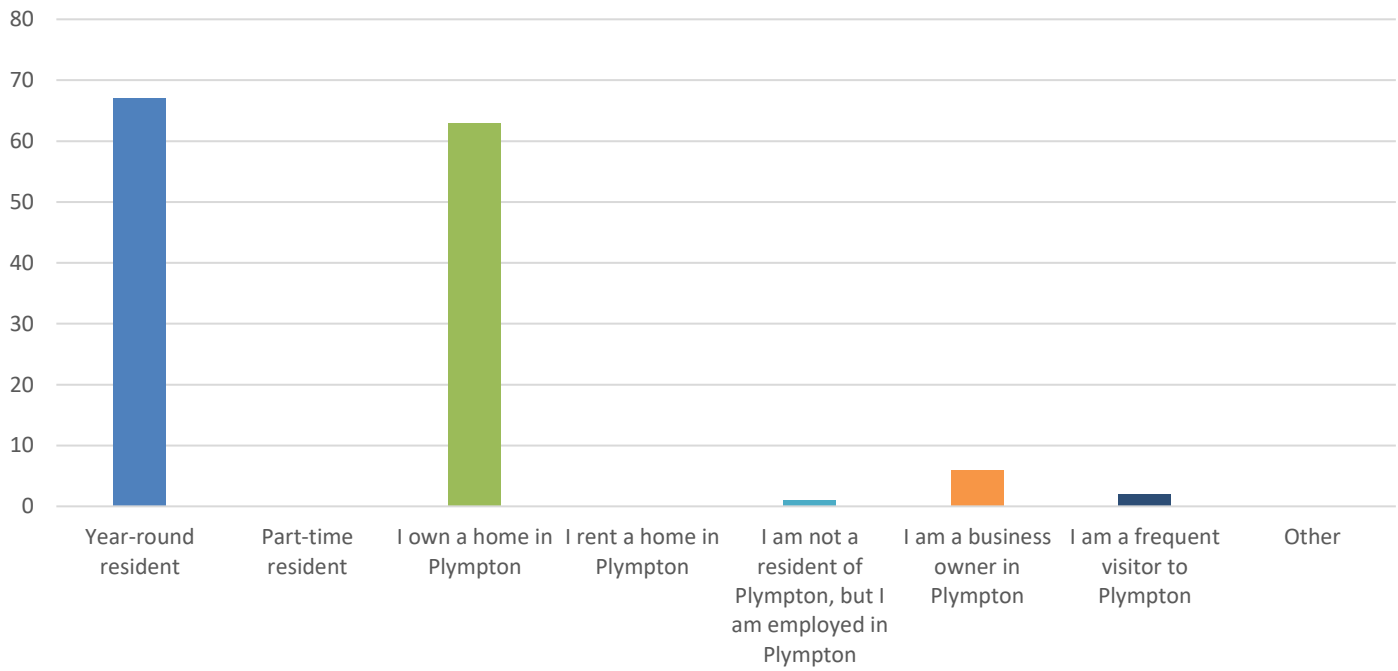


“Other” responses included upgrade infrastructure like potable water, tree trimming, and decrease export of Plympton’s natural spring water before residents can no longer rely on it for their personal wells.

9. What steps can your local government take to reduce its risk from natural hazards and protect the buildings and people of Plympton?



10. Please tell us about yourself.



11. If you would like to be more involved in the hazard planning process, please provide your name, email, and/or alternate contact information.

Contact information of those interested was given to Town Administrator.

**Town of Plympton
Multi-Hazard Mitigation Plan
Kick-off Meeting**

Time 10:00 AM

August 26, 2020

Agenda Items:

1. Welcome and Introductions

2. Overview of the MHMP Process

- a. What is a Multi-Hazard Mitigation Plan and why should Plympton have one?
 - Previous MHMP Plan → update plan rather than start from scratch
- b. Review Scope of Work (see attached file: [Scope_of_Work.pdf](#))
- c. Discussion of Public Outreach Strategy
- d. Review State Hazard List (see page 2)

3. Data Requirements

- a. Plympton Data:
 - Any newly available hazard related data?
 - Recent records/photos (storms, flooding, major repairs, wildfire incidents, etc.)
 - Selection of critical facilities (see attached file: [Critical_Facilities.pdf](#))
 - Current assessor's parcel database – ArcGIS format
 - Repetitive loss data
 - Mitigation measures completed since 2015
- b. State issued climate change projections/modeling
- c. Relevant Town plans/reports:
 - Natural Hazard Mitigation Plan for the Old Colony Region (May 2015) ✓
 - MVP Community Resilience Program Summary of Findings (February 2020) ✓
 - Capital Improvement Plan (October 2017) ✓
 - Plympton Open Space and Recreation Plan (May 2009 Draft) ✓
 - Others?

4. Timeline/Schedule for MHMP Completion – August 20, 2021

**Town of Plympton
Multi-Hazard Mitigation Plan
Working Meeting #1**

Time 10:00 AM

October 27, 2020

Agenda Items:

- 1. Review outstanding tasks from previous meeting (pg. 2)**
- 2. Critical Facilities List (email attachment)**
 - a. Additional facilities to add?
 - b. Any to be removed?
- 3. Hazard Selection (pg. 3)**
 - a. Discuss/approve data to be used
 - b. Additional data sources to consider?
- 4. Land Use Categories (pg. 4)**
- 5. Present Online Public Survey**
 - a. Overview of questions (email attachment)
 - b. Town will host on website? Distribute a hardcopy?
- 6. Town Capabilities Assessment (email attachment)**
 - a. FEMA's Capabilities Assessment Questionnaire will help identify and document Town capabilities

**Town of Plympton
Multi-Hazard Mitigation Plan
Working Meeting #2**

Time 10:00 AM

December 16, 2020

Agenda Items:

- 1. Review Outstanding Tasks (pg. 2)**
- 2. Review Public Outreach Efforts**
 - a. Initial results of online public survey (email attachment)
- 3. Review of Hazard Profiles**
 - a. Data gaps
 - Reports of damage after hurricanes
 - History of dam failure
 - Invasive species data/records
 - Water quality species data/records
 - b. Review hazard maps (pgs. 3-7)
 - c. Review hazard ranking process (pg. 8)
- 4. Develop Hazard Mitigation Plan Goals (pg. 9)**
- 5. WHG Next Steps**
 - a. Vulnerability Assessment
 - b. Preparation of initial chapters for preliminary review

Schedule Next Meeting: Early February of 2021

**Town of Plympton
Multi-Hazard Mitigation Plan
Working Meeting #3**

Time 11:00 AM

February 3, 2021

Agenda Items:

1. Review Outstanding Tasks (pg. 2)

2. Vulnerability Assessment

- a. Review results of inland flooding vulnerability assessment (pgs. 3-5)
- b. Perform qualitative vulnerability assessment of critical facilities to other hazards (pgs. 6-7)

3. Data Gaps

- a. Invasive species data
- b. Water quality species data
- c. Vulnerable populations – what do we want to include?
 - o Elderly populations, childcare centers, equine clinic?
- d. Existing capabilities (FEMA Capabilities Assessment Questionnaire)

4. Mitigation Actions

- a. Review/update mitigation actions from the Old Colony Regional Hazard Mitigation Plan (email attachment)
- b. Develop additional draft hazard mitigation goals (pgs. 8-9)

5. Public Outreach Presentation

- a. Select date
- b. Determine platform

Schedule Next Meeting: Early April of 2021

**Town of Plympton
Multi-Hazard Mitigation Plan
Working Meeting #4**

Time 10:00 AM

April 6, 2021

Agenda Items:

- 1. Review Outstanding Tasks (pg. 2)**
 - a. Comments on qualitative vulnerability assessment

- 2. Review Previous Mitigation Actions (attachment)**

- 3. Review Draft Mitigation Actions (attachment)**
 - a. Discuss additional details for each mitigation action

- 4. Review Initial Prioritization for Mitigation Actions (attachment)**

- 5. Schedule Final Meetings/Events**
 - a. **Last working meeting**
 - Review/discussion of a full draft of the MHMP
 - Schedule for late May 2021
 - b. **Second public outreach presentation**
 - Schedule for mid-June 2021
 - c. **Distribution of plan to neighboring towns and/or regional agencies**
 - Decide on who to distribute plan to and method of sharing
 - d. **Submit MHMP to MEMA/FEMA by late July 2021**

**Town of Plympton
Multi-Hazard Mitigation Plan
Working Meeting #5**

Time 10:00 AM

May 25, 2021

Agenda Items:

- 1. Review Outstanding Tasks (pg. 2)**
- 2. Detailed Timeline for Hazard Mitigation Actions**
- 3. Compliance with FEMA/MEMA Hazard Plan Guidance**
- 4. Review Final Draft**
 - a. Local Planning Team Comments?
 - Review highlighted sections
 - Written comments by Friday (can submit additional comments until June 25)
 - b. We will solicit comments from the public in response to Draft MHMP on website
 - c. We will solicit comments from neighboring Towns, Old Colony Planning Council (OCPC), any others?
 - WHG will provide a pdf of the plan by June 1
- 5. Next Steps**
 - a. Post Draft Plan Online for Comments, Distribute to Neighboring Towns & OCPC
 - b. Virtual Public Presentation – June 9, 2021 at 12:00 pm (need to advertise)
 - c. Plan Submittal to MEMA/FEMA – July 15, 2021
 - d. Plan Adoption by Board of Selectmen – after FEMA approval
 - Adoption letter



Town of Plympton, Massachusetts

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Town of Plympton, Massachusetts

March 5 · 🌐

The Town has been working collaboratively with Woods Hole Group out of Bourne, MA, to update our Hazard Mitigation Plan.

These efforts are being funded through a grant applied for and received by the Town Administrator/Board of Selectmen's Office from the Massachusetts Emergency Management Agency (MEMA) and through the Federal Emergency Management Agency (FEMA).

Woods Hole Group will be hosting a virtual public workshop where you can learn more about what goes into a Hazard Mitigation Plan, the types of natural hazards that Plympton might be especially at risk for, as well as mitigation actions that the Town can implement to better prepare us for future natural hazards.

The workshop is scheduled for Wednesday, March 10 at noon via Zoom. Area 58 will be hosting the workshop on their platform, so not only is it slated to be aired live on local cable, but it will also be available if you want to watch it later at a time more convenient to you.

Below is the Zoom information if you want to join the live session:

Topic: Plympton Public Workshop

Time: Mar 10, 2021 12:00 PM Eastern Time (US and Canada)

Join Zoom Meeting

<https://us02web.zoom.us/j/84921776962>

Meeting ID: 849 2177 6962

One tap mobile

+19292056099,,84921776962# US (New York)

+13017158592,,84921776962# US (Washington DC)

Dial by your location

+1 929 205 6099 US (New York)

+1 301 715 8592 US (Washington DC)

+1 312 626 6799 US (Chicago)

+1 669 900 6833 US (San Jose)

+1 253 215 8782 US (Tacoma)

+1 346 248 7799 US (Houston)



Town of Plympton, Massachusetts

June 7 · 🌐

There is a public workshop scheduled on Wednesday, June 9 at 12:00 p.m. via Zoom related to Plympton's DRAFT Hazard Mitigation Plan. You can access the Zoom information and also the DRAFT Plan by visiting the following link: <https://www.town.plympton.ma.us/.../public-workshop-hazard-mi...>



TOWN.PLYMPTON.MA.US

Public Workshop - Hazard Mitigation Plan | Plympton MA

The Town of Plympton is hosting a public workshop relative to our DRAFT Hazard Mitigation Plan on Wednesday, Jun



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Home



Public Workshop - Hazard Mitigation Plan

POSTED ON: JUNE 7, 2021 - 11:33AM

The Town of Plympton is hosting a public workshop relative to our DRAFT Hazard Mitigation Plan on Wednesday, June 9, 2021 at 12:00 p.m. via Zoom. [CLICK HERE](#) to view the DRAFT Plan.

To participate in the public workshop, please use the following Zoom information:

Topic: Public Workshop – Plympton Hazard Mitigation Plan

Time: Jun 9, 2021 12:00 PM Eastern Time (US and Canada)

Join Zoom Meeting

<https://us02web.zoom.us/j/82472711786>

Meeting ID: 824 7271 1786

One tap mobile

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+19292056099,,82472711786# US (New York)

Dial by your location

+1 312 626 6799 US (Chicago)

+1 929 205 6099 US (New York)

+1 301 715 8592 US (Washington DC)

+1 346 248 7799 US (Houston)

+1 669 900 6833 US (San Jose)

+1 253 215 8782 US (Tacoma)

Meeting ID: 824 7271 1786

From: Liz Dennehy <TownAdmin@plymptontown.org>
Sent: Monday, June 7, 2021 11:33 AM
To: Laurie Muncy; Mary Waldron; Rick LaFond; Charlie Seelig; robert nunes; Keith Hickey
Cc: Jaffe Melissa; Leduc Elise
Subject: Plympton Haz Mitigation Public Workshop

CAUTION: This message comes from an external server, do not click on links or open attachments unless you know the sender and are sure the content is safe.

Good afternoon,

Plympton's public workshop pertaining to the update of our Hazard Mitigation Plan is scheduled for Wednesday, June 9, 2021 at 12:00 p.m. via Zoom. This Email shall serve as notification to abutting communities and the Regional Planning Agency. The public is welcome to join us and the information to access the workshop is contained below in this Email. If you would like to read through Plympton's draft Plan, please use the following

link: https://www.town.plympton.ma.us/sites/g/files/vyhlf1091/f/uploads/plympton_mhmp_wappendices_052621.pdf

Topic: Public Workshop – Plympton Hazard Mitigation Plan
Time: Jun 9, 2021 12:00 PM Eastern Time (US and Canada)

Join Zoom Meeting

<https://us02web.zoom.us/j/82472711786>

Meeting ID: 824 7271 1786

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+1 253 215 8782 US (Tacoma)

Meeting ID: 824 7271 1786

Find your local number: <https://us02web.zoom.us/u/kd5bGEyI6P>

Elizabeth Dennehy, MCPPO
Town Administrator
Town of Plympton
5 Palmer Road



Appendix C: Critical Facilities and Vulnerability

1. Critical Facilities List
2. Mitigation Actions Prioritization



Category	Facility #	Name	Address
Administrative	1	Town Hall & Council on Aging	5 Palmer Rd.
	2	Community Systems	68 Main St.
	3	Brockton Area Multi- Services Inc.	14 Colchester St.
Bridge	4	Winnetuxet Road Bridge (Winnetuxet River)	N/A
	5	Parsonage Road Bridge (Winnetuxet River)	N/A
Cultural Resource	6	First Congregational Church of Plympton	254 Main St.
	7	Plympton Historical Society/Old Town House	189 Main St.
	8	Tractor Supply Co.	406 Main St.
	9	New Covenant Fellowship Church	129 Lake St.
	10	Silver Lake Chapel	33 Lake St.
	11	Sysco	Spring St.
Dam	12	Bonney Pond Dam	N/A
	13	Annasnappet Brook Dam	N/A
	14	B & B Atwood Bog Dam	N/A
	15	Parkers Forge Pond Dam	N/A
	16	Johnson Pond Dam	N/A
	17	Winnetuxet Road Pond Dam	N/A
	18	Annasnappet Brook Reservoir	N/A
	19	Upper Winnetuxet Dam	N/A
Emergency	20	Police Station	7 Palmer Rd.
	21	Fire Station	3 Palmer Rd.
Fuel	22	Shell	280 Main St.
	23	Plympton Sand & Gravel	190 Brook St.
Library	24	Plympton Public Library	248 Main St.
Public Works	25	Lawrence Ready Mix Concrete	71 Spring Street
	26	Highway Department	23 Palmer Rd.
	27	Transfer Station	Ring Rd.
	28	USPS Plympton Office	284 Main St.
	29	Industrial Comm. & Electronics, Inc.	7 Joey Cir.
	30	Industrial Comm. & Electronics, Inc.	County Rd.
School	31	Dennett Elementary School	80 Crescent St.
	32	Puddle Jumpers Learning Center-LLC	256 Main St.
Veterinary	33	South Shore Equine Clinic	151 Palmer Rd.
Water	34	Hubbell	65 Spring St.
	35	Rocky Harvest, LLC	182 Brook St.
	36	Town Cistern	Across from 254 Main St.

3=Best/Most Benefit/Least Cost/Easy or no permitting; 2=Some benefit/Moderate Cost/Some potential permitting complications; 1=Little to no benefit/Expensive/Complicated permitting required

	Hazard Type and Potential Mitigation Actions	Benefits					Feasibility				Economic		Regulatory		Total Score
		Protects Properties and Structures	Protects Natural Resources	Technical/Capacity Improvement (Training, Evaluations, Regulations, etc)	Improves Public Awareness	Improves Emergency Response or Public Protection After an Emergency	Appropriate Staffing Available	Technically Feasible	Public Support	Town/Political Support	Cost	Funding Available / Attainable	Permitting/Regulatory Feasibility	Consistent with Local, State, & Federal Goals	
Inland Flooding															
1	Educational resources for property owners on flood hazard mitigation strategies (target demographic between kids and seniors)	1	1	3	3	2	2	3	3	3	3	3	3	3	33
2	Develop initial steps in reducing flooding along vulnerable sections of Route 106 and Main Street	2	1	1	1	3	2	3	3	2	2	2	3	27	
3	Replace and enlarge the culvert on Lake Street	2	2	1	1	2	2	2	3	1	2	2	3	25	
4	Adopt a stormwater management bylaw	2	2	3	2	1	3	3	2	2	2	2	3	29	
Wildfire															
5	Improve regional fire communication (new cell tower in development to improve public safety communication)	2	2	3	1	3	3	3	3	2	2	2	3	32	
6	Obtain a UTV with 50-gallon water tank (starts with communication with solar companies and grant opportunities)	2	2	2	1	3	3	2	2	2	2	3	2	29	
7	Replace Town water cistern and install two additional cisterns	3	3	2	2	3	2	3	3	2	2	3	3	34	
8	Provide information and educational materials to residents about Defensible Space techniques and the dangers of wildfires	2	2	1	3	2	3	3	3	2	3	3	3	33	
Extreme Temperature															
9	Finalize and run through Emergency Action Plan for ammonia release from Sysco (requires coordination with neighboring towns)	1	1	3	1	3	3	3	3	3	2	3	2	31	
10	Initial steps in creating a new community center/warming and cooling shelter (includes a feasibility study and preliminary designs)	1	1	2	2	3	2	3	2	2	2	3	3	29	
Dam / Culvert Failure															
11	Develop an emergency action plan for the Parkers Forge Pond Dam?	2	2	3	1	3	2	3	2	1	2	1	3	28	
Multi-Hazard / Non-specific															
12	Conduct a town-wide driveway assessment (focus on trees or debris that may obstruct access)	3	1	3	2	3	3	3	3	2	2	3	3	34	
13	Conducting a roof assessment of all Town-owned buildings	3	1	2	1	2	3	3	3	3	2	3	3	32	
14	Purchase additional emergency response vehicles with four-wheel drive and repair old engine for use	2	2	1	1	3	3	2	2	3	2	3	3	29	

Low	<=28
Med	29-32
High	>=33