MUNICIPAL VULNERABILITY PREPAREDNESS PROGRAM

Community Resilience Building Workshops – Summary of Findings

Maynard, MA

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Overview

Located in Middlesex County, and northeast of Boston, the Town of Maynard ("Maynard") is a welcoming community that offers a rich cultural heritage, significant natural and recreational resources, and many other urban amenities. It is a former mill town, developed around the Assabet River, that is now comprised of a mix of suburban and commercial uses with an established downtown of mixed restaurant, retail, and business services. With a population of 10,560 persons[1] and an area of 5.24 square miles, the town has significant residential density – particularly as compared to some of its neighbors (i.e., the Town of Acton to the north, the Town of Concord to the northeast, the Town of Stow to the west, and the Town of Sudbury to the east and south).

Maynard has historically engaged in various planning efforts, including the current Master Plan Update, as well as various educational initiatives to protect the environment, enhance the town's natural infrastructure and resources, and ensure that its businesses and residents can continue to live, work, and play in the most sustainable manner. Maynard has also participated in regional planning efforts, such as the Minuteman Advisory Group on Interlocal Coordination ("MAGIC")'s *Climate Change Resilience Plan: Vulnerability Assessment & Response Strategies* prepared by the Metropolitan Area Planning Council in 2017.

1 U.S. Census. (2018). *2013-2017 American Community Survey 5- Year Estimates*. Retrieved March 17, 2020, from https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml.

CRB Workshop participants utilized summary data on climate trends and projections to identify vulnerabilities and strengths related to Maynard's critical infrastructural, societal, and environmental assets, as well as to develop a list of potential high-, medium-, and low-priority resiliency actions to implement.

In 2019, Maynard applied for a Planning Grant under the Municipal Vulnerability Preparedness ("MVP") program and was selected by the Commonwealth of Massachusetts to complete the Community Resilience Building ("CRB") Workshop to assess potential climate change impacts, vulnerabilities, and to prioritize actions for enhanced short- and long-term community sustainability and resilience. Upon completion of this Project, Maynard will be eligible to apply for Action Grants under the MVP program to advance priority climate adaptation actions. The MVP program was inaugurated by Massachusetts in 2017 to help the State's towns and cities plan for and adapt to our changing climate.

1.1 Community Resilience Building Workshops

The MVP program leverages the CRB framework to support communities in assessing potential impacts from climate change, identifying communities' vulnerabilities to those impacts, and prioritizing resiliency actions. Under this framework, a community-driven process is designed to foster engagement and collaboration among a diverse group of community stakeholders. For Maynard, the Department of Public Works ("DPW") led the MVP planning efforts and hosted two stakeholder workshops, in partnership with consulting firm VHB ("the Consultant"), a State-certified MVP provider.

Two (2) half-day stakeholder workshops were held on January 28 and February 4, 2020. See **Appendix A** for the CRB Workshop presentations and attendance sign-in sheets. The objectives of the workshops were to:

- Introduce the MVP Program and its processes;
- Define and prioritize local climate-related hazards of concern;

- Identify existing and future vulnerabilities and strengths;
- Develop and prioritize actions to enhance Maynard's future resilience to the top climate-related hazards of concern; and
- Identify short-term opportunities for Maynard to advance priority actions, including through leveraging MVP Action Grants.

1.1.1 Pre-Workshop Coordination

On December 10, 2019, Maynard's MVP Core Team ("the Core Team") convened to kick-off preparations for the stakeholder workshops. The Core Team consisted of the following representatives:

- Justin DeMarco, Director of Public Works/Tree Committee/MVP Project Manager;
- Wayne Amico, Town Engineer/MVP Project Manager;
- Greg Johnson, Town Administrator;
- Lee Caras, Historical Commission Clerk/Tree Committee;
- Bill Nemser, Town Planner;
- Kaitlin Young, Assistant Planner/Conservation Agent;
- Anthony Stowers, Fire Department Chief/Emergency Management Director/Local Emergency Planning Committee;
- Michael Noble, Police Department Chief;
- Megan Zammuto, Assistant Town Administrator/Office of Municipal Services Director; and
- Amy Loveless, Council on Aging Director.

During this pre-workshop meeting, the Core Team discussed workshop logistics and timeline, anticipated workshop goals and outcomes, and how to leverage the MVP process for deeper engagement and climate action activity in Maynard. The Core Team also discoursed the preparation of workshop materials with the Consultant, including a base map to include preliminarily identified critical assets and the future flood projection, along with a map series depicting concentrations of vulnerable populations (e.g., seniors, minority, low-income) in Maynard.

Data Collection: Climate Literature Review and Identification of Critical Assets

To prepare for the stakeholder workshops and develop appropriate materials, the Consultant reviewed and summarized for the Core Team the following resources:

- MA Executive Office of Energy and Environmental Affairs and the Department of Energy Resources' *Massachusetts Climate Change Clearinghouse (resilient MA)*[2] – This website houses data, maps, and other resources relevant to climate change in Massachusetts. As part of this website, the *resilient MA Datagrapher*, prepared by the

2 Massachusetts Executive Office of Energy and Environmental Affairs and Department of Energy Resources. (2017). resilient MA, Climate Change Clearinghouse for the Commonwealth. Retrieved from http://resilientma.org/

Northeast Climate Adaptation Science Center, provides the latest data and summary information on climate projections at state and local levels. For this Project, the Core Team reviewed climate data specifically for the Sudbury-Assabet-Concord ("SuAsCo") Basin, in which Maynard is located.

- Massachusetts Executive Office of Energy and Environmental Affairs' *Massachusetts State Hazard Mitigation and Climate Adaptation Plan (2018)*[3] – Maynard does not have an existing hazard mitigation plan. In lieu of this resource, this Project referred to the State's latest hazard mitigation and climate adaptation plan to identify hazards and related levels of vulnerability for Maynard's region.
- MAGIC's *Climate Change Resilience Plan: Vulnerability Assessment & Response Strategies (2017)* – This multi-jurisdictional effort addressed potential impacts from climate change on regional assets including transportation, economic development, conservation of natural resources, and housing.[4]
- Town of Maynard's *Comprehensive Emergency Plan (2019)* – This document provides information related to emergency management protocols as well as critical assets and facilities for the Town of Maynard.

Utilizing the resources listed above and in consultation with the Core Team, the Consultant developed a summary of historical trends and future climate scenarios and implications for Maynard, as well as the preliminary list of critical assets to be further reviewed/refined with participating stakeholders at the workshops. See **Appendix B** for a summary of the climate data and final list of identified critical assets in Maynard.

Community Resilience Building Risk Matrix

Based on the identified projected climate conditions and potential impacts to critical assets in Maynard, the Consultant collaborated with the Core Team to set up a Risk Matrix to analyze community vulnerabilities and strengths and to prioritize actions to lessen hazard impacts and build resilience. The Risk Matrix was utilized to facilitate group discussions during the stakeholder workshops. See **Appendix C** for the completed Risk Matrix for Maynard.

As per the CRB Workshop Guide,[5] and to assist with the group discussions, the Risk Matrix was divided among three community components – infrastructural, societal, and environmental. With each of these groupings, workshop participants identified vulnerabilities and strengths, as well as prioritized actions.

3 Massachusetts Executive Office of Energy and Environmental Affairs. (2018). *Massachusetts State Hazard Mitigation and Climate Adaptation Plan*. Retrieved March 17, 2020, from http://nescaum-dataservices-assets.s3.amazonaws.com/resources/production/SHMCAP-September2018-Full-Plan-web.pdf

4 MAGIC Regional Council. (2017). *Climate Change Resilience Plan: Vulnerability Assessment & Response Strategies.* Prepared by Metropolitan Area Planning Council. Retrieved March 17, 2020, from https://www.mapc.org/wp-content/uploads/2017/11/MAGIC-Climate-Resilience-Plan_VA-and-Strategies_112017.pdf

5 Community Resilience Building. (Undated). *Community Resilience Building Workshop Guide*. Retrieved from https://www.communityresiliencebuilding.com/crbworkshopguide

Examples for each of the community components include:

Infrastructural	Societal	Environmental
Public facilities – buildings	Housing	Open space and recreation resources
Roads and bridges	Social services and institutions	Water resources and wetlands
Water infrastructure (e.g., water supply and wastewater)	Vulnerable and special needs populations	Vegetated areas
Utilities	Faith-based organizations	Urban tree canopy
Dams	Commercial and business areas	

2

Climate Projections and Top Priority Hazards

Communities across the Commonwealth have experienced changing climate conditions. For instance, between 1900 and 2014, the state's average annual temperatures have increased by approximately 3 degrees Fahrenheit ("°F"). The number of hot days with maximum temperatures above 90°F has been consistently above average since the 1990s. The state has also experienced above-average precipitation in the last 10 years, averaging approximately 51 inches per year (compared to the overall long-term average of 45 inches per year between 1895-2009). Furthermore, since 2005, there have reportedly been about 30 percent more extreme precipitation events (days with rainfall above two inches).[6]

Similar to other communities across Massachusetts, Maynard has been impacted by these changing conditions through flooding from more frequent extreme rainfall and winter storm events, such as heavy rainfalls in March/April 2010 which resulted in a federal disaster declaration for eastern Massachusetts, record-breaking snowfalls in the winter of 2015, and a succession of four Nor'easters in March 2018. In addition, Maynard has been impacted by increased exposure to heat-related illnesses due to more extreme hot days. Unfortunately, these and other impacts will likely intensify as future projections indicate.

Appendix B provides a summary of historical trends and projected changes in weather and climate in Maynard. Baseline information provided in the summary and referenced in this report pertain to observed trends from the years 1971 to 2000, mid-century projections for the years 2040 to 2069, and end of century projections for the years 2080 to 2097.

6 Runkle, J., K. Kunkel, R. Frankson, D. Easterling, A.T. DeGaetano, B. Stewart, and W. Sweet. (2017). *Massachusetts State Summary*. NOAA Technical Report: 149-MA.

Based on the Commonwealth and regional resources, as well as with feedback from the Core Team, the following four hazards have been identified as top priorities for Maynard, and were the focus for more in-depth discussion during the stakeholder workshops:

1. **Extreme Precipitation/Flooding** – More flash and prolonged flooding due to heavy rain and waterbodies (e.g., river, brooks, etc.) overtopping their banks;
2. **Severe Storm Events** – Increased frequency and severity of rain events, as well as an elevated risk of high winds during these storm events (i.e., Nor'easters);
3. **Extreme Heat/Heat Waves** – Increased number and consecutive occurrence (i.e., heat waves) of very hot days over 90°F; and
4. **Wildfires** - Increase in seasonal drought and warmer temperatures will increase the risk for wildfires.[7]

2.1 Extreme Precipitation/Flooding and Vulnerabilities in Maynard

In general, most cities and towns across Massachusetts have already been experiencing increase in both heavy rainfalls and flooding in recent decades, and are projected to expect significant increase in frequency and intensity of rainfall volume.[8] In the SuAsCo Basin, where Maynard is located, there is some uncertainty regarding projected changes in precipitation patterns. Seasonal projections for total precipitation vary, such that summer and fall seasons could see either more or less total precipitation throughout the 21st century. Maynard may potentially experience an increase of up to six inches of total annual average precipitation volume by mid-century, and an increase of up to eight inches by end of the century. It is also projected that the frequency of high-intensity rainfall events will increase over time throughout the 21st century. **Table 2-1** below provides a summary of the projected changes in precipitation patterns.

Table 2-1. Projected Changes in Precipitation Patterns for the SuAsCo Basin

	Timeframes		
Climate Conditions	**Baseline (1971-2000)**	**Mid-Century (2050s)**	**End-of-Century (2090s)**
Average annual temperature (°F)	48.7°F	↑ 3.0 to 6.3°F	↑3.8 to 10.9°F
Days per year > 90°F	8	↑ 10 to 35 days	↑ 14 to 76 days
Days per year > 95°F	1	↑ 3 to 17 days	↑ 6 to 48 days
Days per year > 100°F	<1 day	↑ <1 to 5 days	↑ <1 to 22 days
Days per year < 32°F	143 days	↓ 19 to 40 days	↓ 24 to 65 days
Days per year < 0°F	6 days	↓ 2 to 4 days	↓ 2 to 5 days
Total annual precipitation (inches)	45.4 in.	↑ 0.6 to 6.1 in.	↑ 1.2 to 8.0 in.

7 Massachusetts Executive Office of Energy and Environmental Affairs and Department of Energy Resources. (2017). resilient MA, Climate Change Clearinghouse for the Commonwealth. Retrieved from http://resilientma.org/

8 National Oceanic and Atmospheric Administration. (2017). Massachusetts State Climate Summary. Retrieved March 18, 2020, from https://statesummaries.ncics.org/chapter/ma/

Table 2-1. Projected Changes in Precipitation Patterns for the SuAsCo Basin (Continued)

Climate Conditions	Timeframes		
	Baseline (1971-2000)	**Mid-Century (2050s)**	**End-of-Century (2090s)**
Days per year with over 1" rainfall	7 days	↑ 1 to 3 days	↑ 1 to 4 days
Days per year with over 2" rainfall	1 day	↑ <1 to 1 day	↑ <1 to 1 day
Days per year with over 4" rainfall	< 1 day	↑ by <1 day	↑ by <1 day
Annual consecutive dry days	17 days	↑ 0 to 2 days	↓ 1 to ↑ 3 days

Source: Massachusetts Executive Office of Energy and Environmental Affairs. (2018). *Massachusetts Climate Change Projections*.

Furthermore, using the Federal Emergency Management Agency ("FEMA")'s Flood Insurance Study for Middlesex County[9] and the Boston Research Advisory Group ("BRAG")'s *Climate Change and Sea Level Rise Projections for Boston* (2016),[10] it is projected that by 2085 what is considered the current 0.2-percent flood event (i.e., a 500-year flood) will likely become the one-percent flood event (i.e., a 100-year flood). Maps in **Appendix C** illustrate the future flood projections and how they might impact the identified critical assets in Maynard.

Elevated water levels in the Assabet River (1980)

9 Federal Emergency Management Agency (FEMA). (2014). *Flood Insurance Study: Middlesex County, Massachusetts (All Jurisdictions)*.

10 City of Boston. (2016). *Climate Change and Sea Level Rise Projections for Boston, The Boston Research Advisory Group Report*. Retrieved March 18, 2020, from https://www.boston.gov/sites/default/files/document-file-12-2016/brag_report_-_final.pdf

2.1.1 Potential Impacts of Extreme Precipitation/Flooding and Areas of Concern

Highlighted potential impacts from extreme precipitation and flooding include:

- Increasing stress on stormwater infrastructure;
- Increasing risk of contaminants entering waterbodies;
- Increasing risk of deteriorating soil conditions and erosion of banks;
- Increasing risk and/or damage to envelopes of existing buildings and facilities, particularly those that are older;
- Increasing risk of flooding for low-lying properties; and
- Increasing travel delays along roads that are especially prone to flooding.

During stakeholder workshops, participants noted many concerns related to flooding in Maynard. A major concern is the potential for damages to the critical infrastructure and services that keep the town running. For instance, the Town Hall/Police Department building is located adjacent to the Assabet River. Currently, historical records for the town and other important documents are stored in the lower levels of this building, and accordingly, they are vulnerable to flooding should heavy rain events cause waters to overtop the river bank. Though not related to the river, the Town Hall did experience flooding approximately a decade ago that destroyed many historical documents stored in its basement.

Several workshop participants raised concerns regarding many other critical facilities in town that are currently located in areas prone to flooding and/or in proximity to the current and projected flood plains. These critical facilities include, but may not be limited to:

- Water treatment facilities (Rockland Avenue Filtration Plant - Wells 5G, 6G, and 7G [inactive], Old Marlboro Road Filtration Plant - Wells 1G, 2G, and 3G [inactive], and Well #4 Filtration Plant - Well 4G);
- Water storage tanks (Tank #1 [concrete] and Tank #2 [steel] on Summer Hill);
- DPW Garage on Winter Street;
- Verizon Communication Facility at the corner of Walnut Street and River Street;
- Various bridges (nine in total) spanning the Assabet River;
- Maynard Crossing at 129 Parker Street, an ongoing mixed-use development;
- The solar field at the former Waltham Street Municipal Landfill; and
- Various stretches of designated evacuation routes including:
    - Route 27 North and South of Assabet River
    - Route 117 East through Concord, MA to Route 2
    - Route 62 West of the Assabet River headed West
    - Route 62 East of the Assabet River through Concord, MA to Route 2.

The DPW Garage was specifically mentioned relative to its buried fuel tank, which should be removed. This facility needs and overall clean-up and stormwater treatment system to reduce pollutants going into neighboring waterbodies (i.e., the Assabet River and Taylor Brook).

Several environmental features were also noted to be within the flood plain or otherwise prone to flooding. These include the Assabet River Walk and soccer fields on Rockland Avenue.

Additionally, frequent heavy rainfalls may also lead to dam failure, causing significant downstream flooding. Potential failure of either the Ben Smith Dam or the Millpond Dam (or both) would cause flooding in Maynard's downtown area and result in significant economic impact to the town.

It was also noted that many vulnerable populations (persons aged 65 years and older, special needs and mobility impaired, etc.) are currently living in various residential areas that are prone to flooding. An area of particular concern includes residences north of Summer Street near the Patti & Nick Lane Area.

Based on feedback from participants of the CRB Workshops, some areas of concern in Maynard due to extreme precipitation and flooding are summarized below:

Infrastructural	Societal	Environmental
› Town Hall/Police Department › Water filtration and storage facilities › DPW Garage › Verizon Communication Facility on Walnut Street › Solar field at the former Waltham Street Municipal Landfill › Dams (including Ben Smith and Millpond) › Bridges (nine in total) – particularly those at Mill Street, Walnut Street, Sudbury Street, Great Road, White Pond Road, and Main Street › Various stretches of designated evacuation routes › Routes 27, 62, and 117 (in flood zone)	› Senior population (persons aged 65 years and older) in flood-prone areas › Special needs and mobility impaired population in flood-prone areas › Employees of downtown businesses (including employees at Mill & Main) › Maynard Crossing at 129 Parker Street	› Soccer fields on Rockland Avenue › Assabet River Walk › Assabet River › Mill Pond › Puffer Pond › Durant Pond › White Pond

2.2 Severe Storm Events and Vulnerabilities in Maynard

Similarly, like the rest of cities and towns in the region, Maynard can anticipate an increase in the amount of precipitation, intensity, and duration of storm events. Likely impacts that Maynard may face include more Nor'easters, stronger winds, increased winter cold spells, and heavier snow.

In addition to flooding impacts due to heavy precipitation (as described in **Section 2.1**), high-wind events represent another potential impact of severe storm events. High winds can take down trees, which may obstruct roadways, down power lines, and propel damaging debris. Severe ice storms may also occur more frequently, due to warmer temperatures that likely lead to winter precipitation events in the form of rain or ice. Impacts from these severe storm events can lead to travel and commute delays, injuries, and property damage.

2.2.1 Potential Impacts of Severe Storm Events and Areas of Concern

In Maynard, key concerns associated with severe storm events are the stability of utility infrastructure (i.e., electrical substations [Eversource], gas lines, etc.); blockage of major roadways and bridges, especially those that serve as evacuation routes; and water quality and availability issues should the water filtration plants, particularly Well #4, and the town's wastewater treatment plant, operated by Veolia North America, fail or become damaged. In recent years, Maynard has experienced occasional impacts from severe storm events that caused delay to the town's operations and services. It was recalled that during a storm occurring in the winter of 2015, several major roads in and out of town – including Concord and Acton Streets - became impassible due to down wires and trees. It took the town and its partners up to three days to recover.

Also of importance, town personnel indicated that many of the bridges in town are structurally deficient and located either on or along currently designated evacuation routes. The town's Emergency Communications Tower is noted to be vulnerable to heavy winds and lightning. Potential impacts to the town's existing sewer collection system, which is aging and consists mostly of vitrified clay or asbestos cement pipes from the early to mid-20th century, includes overwhelmed pipes - over 95 percent of town residents are served by municipal sewer services. Staffing capacity during emergency events was also raised as a critical issue, as coordinated response services in town are largely supported by a network of volunteers.

During the stakeholder workshops, participants also raised concerns about the impacts of intense storms on vulnerable populations, particularly for those who are dependent on consistent power supply for things such as medication and heating/cooling, as well as those who may have a harder time evacuating and finding a place to stay during and after extreme storm events. Additionally, the aftermath of these intense storms may pose financial burdens on those who have fewer resources to recover from damages, including businesses (particularly the local "mom and pop" shops) and those who may have a hard time paying bills if their places of work are closed for prolonged periods.

Based on feedback from participants of the CRB Workshops, some areas of concern in Maynard due to severe storms are summarized below:

Infrastructural	Societal	Environmental
› Water filtration and storage facilities › Wastewater treatment plant › Sewer pump stations and collection system › Drainage infrastructure › Bridges (nine in total) › Various stretches of designated evacuation routes › Routes 27, 62, and 117 (in flood zone) › Emergency Communications Tower › Eversource electrical substations › Former town landfill at Waltham Street › Amenity spaces (particularly downtown) › Dams (including Ben Smith and Millpond) › Aging buildings and facilities (that are not up to building code) › Hazardous materials facilities	› Vulnerable populations (including senior population, low-income population, etc.) › In-home child day care facilities (unreported numbers)	› Waterbodies (related to pollutant run-off during storm events) › Fallen trees and debris making roadways and recreation trails impassible › Ice damage to urban forestry

2.3 Extreme Heat/Heat Waves and Vulnerabilities in Maynard

Consistent with other areas across the Commonwealth, average temperatures within the SuAsCo Basin are projected to increase throughout the 21st century. Maynard and surrounding cities and towns in the region may expect to see average annual temperatures increasing by as much as 6°F by mid-century and nearly 10°F by end of the century. The number of extreme heat days (over 90°F) is projected to increase nearly fourfold by mid-century (from the current average of 8 days to potentially 35 days per year) and potentially up to 76 days by end of the century. The winter season will also likely see a decrease in cold

days: approximately 19 to 40 less days with minimum temperatures below 32°F by mid-century and approximately 24 to 65 less days by end of the century. **Table 2-2** below summarizes the projected temperature changes for the SuAsCo Basin by mid- and end-of-century.

Table 2-2. Projected Temperature Changes for the SuAsCo Basin

	Timeframes		
Climate Conditions	**Baseline (1971-2000)**	**Mid-Century (2050s)**	**End-of-Century (2090s)**
Average annual temperature (°F)	48.7°F	↑ 3.0 to 6.3°F	↑3.8 to 10.9°F
Days per year > 90°F	8	↑ 10 to 35 days	↑ 14 to 76 days
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Days per year > 100°F	<1 day	↑ <1 to 5 days	↑ <1 to 22 days
Days per year < 32°F	143 days	↓ 19 to 40 days	↓ 24 to 65 days
Days per year < 0°F	6 days	↓ 2 to 4 days	↓ 2 to 5 days

Source: Massachusetts Executive Office of Energy and Environmental Affairs. (2018). *Massachusetts Climate Change Projections*.

Furthermore, while the average annual precipitation is projected to increase overall, it is anticipated that this increase will come in fewer, more intense storm events (especially in the winter and spring) rather than in lighter events throughout the year. This means that there will be longer periods of time between rain events, which can lead to drought. The most severe drought recently experienced across the state was over several months in 2016.[11]

2.3.1 Potential Impacts of Extreme Heat/Heat Waves and Areas of Concern

Heat is one of the leading weather-related causes of fatalities in the United States and this risk is only expected to grow.[12] Additionally, new temperature patterns have the potential to impact our ecosystems and food supply, as well as lead to increased prevalence of vector-borne diseases and invasive species.[13] Hot weather also causes the demand for air conditioning to rise, which increases energy usage and utility bills.[14] The reduced demand for heat in warmer winters, however, is not expected to offset the increase in energy consumed for cooling in the summer.[15]

11 National Oceanic and Atmospheric Administration. (2018). Drought in Massachusetts. Retrieved March 18, 2020, from https://www.drought.gov/drought/massachusetts

12 National Oceanic and Atmosphere Administration (NOAA). (2017). Weather Related Fatality and Injury Statistics. Retrieved March 18, 2020, from http://www.nws.noaa.gov/om/hazstats.shtml

13 International Union for Conservation of Nature. (2020). Invasive alien species and climate change. Retrieved March 18, 2020, from: https://www.iucn.org/resources/issues-briefs/invasive-alien-species-and-climate-change

14 Massachusetts Executive Office of Energy and Environmental Affairs and Department of Energy Resources. (2017). resilient MA, Climate Change Clearinghouse for the Commonwealth. Retrieved from http://resilientma.org/

15 Clarke et al. (2018). *Effects of long-term climate change on global building energy expenditures*. Energy Economics, 72, 667-677.

Other potential impacts from rising temperatures and extreme heat days include:

- Poor air quality from increases in primary sources of pollutants and secondary pollutants, as well as high atmospheric pressures that capture air pollutants and increase pollutant densities;
- Increasing stress on transmission lines, electric substations, roads, bridges, and other critical infrastructure;
- Weakening tree root systems due to drought, which may make trees less stable during extreme precipitation and high wind events; and
- Increasing risk of wildfires.

During the stakeholder workshops, participants expressed concern for heat-related and respiratory illnesses during extreme hot days and heat waves, particularly pertaining to young children, seniors, persons with pre-existing respiratory conditions, and persons working outside for extended periods of time without shelter. Given the lack of trees and shading areas, particularly in Maynard's downtown area and in the various large parking lots located around town, the urban heat island effect is another concern. It was also noted that not all school facilities are adequately equipped with air conditioning. For instance, all of the Green Meadow School (1 Tiger Drive) and part of the Fowler School (3 Tiger Drive) do not have air conditioning; the Fowler School is designated as an emergency shelter and may be activated during times of emergency. Additionally, the town only has one designated cooling center: Town Hall. Other locations within the town are available on an as needed basis as well.

Workshop participants also raised concerns about related public health issues including more poor air quality days, an increase in the prevalence of vector borne diseases and invasive species, as well as implications to both the availability and quality of drinking water. Drought conditions may cause waterbodies, such as the Assabet River, to become more stagnant and concentrated with pollutants due to reduced stream flow. Stagnant water can be detrimental to existing aquatic life and can also create more breeding ground for mosquitoes and insects carrying vector borne diseases (such as West Nile Virus). It was also noted that toxic algae and algal blooms are already an issue in some waterbodies (such as Puffer Pond, Durant Pond, Taylor Brook, the School Wood wetlands, and the canal parallel to Winter Street). Most critically, the town's water filtration plant at Old Marlboro Road currently has limited water supply from the existing wells, both for fire suppression and other water-related services.

Based on feedback from participants of the CRB Workshops, some areas of concern in Maynard due to extreme heat and heat waves are summarized below:

Infrastructural	Societal	Environmental
› Water filtration facilities (particularly at Old Marlboro Road) › Areas downtown	› Vulnerable populations (including senior population, low-income population, etc.)	› Vernal pools, wetlands, and endangered species (elderberry longhorn beetle; Blanding's turtles in Cemetery Pond and School Woods)

› Large parking lots › Roads and bridges › Electrical infrastructure (i.e., transmission/ distribution lines, substations)	› Populations with pre-existing respiratory conditions › School buildings - Fowler School lacking full-facility air conditioning; Green Meadow School does not have air conditioning › Lack of redundancy in designated cooling facilities	› Maple Brook Park › Assabet River › Mill Pond › Reservoir behind Ben Smith Dam › Durant, Puffer, and Thanksgiving Pond (algae and algal blooms, invasive species) › Availability and quality of drinking water

2.4 Wildfires and Vulnerabilities in Maynard

Wildfires are commonly perceived as hazards in the western part of the country; however, wildfires are a growing problem in the wildland/urban interface of the eastern United States. As periods of extreme heat or drought conditions increase, this is a long-term concern for the forest environments in Maynard. An estimated one-quarter of land area in Maynard is federally-protected open space (i.e., the Assabet River Wildlife Refuge). This area is also heavily wooded and has limited ability to allow access for large quantities of water.

2.4.1 Potential Impacts of Wildfires and Areas of Concern

There are a few locations in Maynard that could potentially be impacted by wildfires given the projected climate change conditions, and participants of the stakeholder workshops noted that wildfires are generally not an immediate threat to the town. However, some critical assets are more susceptible to wildfires than others due to their proximity to forested areas such as the School Woods or themselves containing heavily wooded areas. These include school facilities, Maynard Crossing at 129 Parker Street, Well #4 Filtration Plant, the Tennessee Gas Pipeline transmission line (along the Town of Sudbury border- valve site just north of Waltham Street), the Assabet River National Wildlife Refuge, and various conservation lands (e.g., Summer Hill Conservation Area).

Based on feedback from participants of the CRB Workshops, some areas of concern in Maynard due to wildfires are summarized below:

Infrastructural	Societal	Environmental
› Well #4 Filtration Plant › Tennessee Gas transmission line › Maynard Crossing at 129 Parker Street	› School facilities	› Assabet River National Wildlife Refuge › Other heavily wooded areas such as conservation lands

3

Current Strengths and Assets

This section highlights Maynard's current strengths and assets identified for the three resource areas: infrastructural, social, and environmental. Refer to **Appendix B** for maps of identified critical assets in Maynard. Based on feedback from the Core Team and stakeholders at the CRB Workshops, these assets have been assessed for their vulnerabilities and strengths in response to the identified top priority hazards (described in **Section 2.0**). Maynard's ability to address and/or expand upon these existing resources and programs will strengthen its capacity to plan for and bounce back from future climate change impacts.

3.1 Infrastructural

Through the MVP process, the following systems were identified as Maynard's greatest infrastructural strengths and assets:

- System redundancies & communications network;
- Flood control measures (flood storage capacity, etc.); and
- Emergency management.

3.1.1 System Redundancy & Communications Network

Maynard has several strong system redundancies in place. For instance, a majority of municipal facilities are equipped with back-up power systems, which are tested weekly and participated in maintenance program annually. Relatedly, the town is conducting a feasibility study to install energy storage systems or back-up power systems from renewable energy sources, and any new municipal buildings to be built moving forward will also consider

and/or incorporate design and construction details to make them solar-ready, where feasible - for example, the town's high school is currently being renovated and designed to be solar-ready and prepared for emergency operations.

Additionally, a representative of Eversource (a workshop participant), along with the town, indicated that there are general measures in place for determining priority areas, facilities, and buildings with the greatest need for rapid power restoration. Water treatment facilities/filtration plants also have on-site generators in the event of power outage.

While the town's main emergency communications towers at the Police Station on Riverbank Drive and at the Water Storage Tanks on Tower Road, may be susceptible to severe storms and lighting, back-up communication channels are available. Portable communication units are available and shared with the surrounding communities.

3.1.2 Flood control measures

Many of the town's open space and natural areas (such as the soccer fields on Rockland Avenue, vernal pools, wetlands, etc.) are in flood-prone locations, though they have yet to experience flooding issues. Furthermore, they can potentially serve as natural flood control and storage to relieve and protect other surrounding areas, especially the surrounding residential areas.

According to the most recent mapping data, there are three dams in Maynard. Two of these dams, the Ben Smith Dam and the Millpond Dam, are labeled as significant hazards. The Cuttings Pond Dam, located on the town's border with Sudbury at the north end of Cutting Pond, is labeled as a low hazard.

3.1.3 Emergency Management

Maynard has recently developed a Comprehensive Emergency Management Plan ("CEMP"). This plan establishes a community-wide framework and protocols for operations and communications to ensure continuity during emergency events. The plan also identifies designated shelters, roles, and responsibilities of town departments and personnel to support functions, as necessary.

The town also has K-911/Hyperlink, a community-wide communication system to alert residents of emergency issues. It was noted during the stakeholder workshops that this system should expand to include private businesses.

In addition, given that two FEMA offices/facilities are located in Maynard, additional support in terms of federal resources and services in event of a regional emergency will likely be prioritized for the town.

3.2 Social and Economic Features

The health and safety of residents and all others who work in Maynard are critical to the town's social and economic strengths. As such, the town established formal groups such as the Local Emergency Planning Committee ("LEPC") to ensure sufficient community-wide

support and services during the event of an emergency. The town has also been coordinating with neighboring towns to collaborate and secure shared resources and services.

3.2.1 Businesses in Maynard

The town's commercial and industrial properties are concentrated almost exclusively in and around its downtown area, including the Mill & Main campus along Main Street, though other nodes (such as Maynard Crossing at 129 Parker Street) are located throughout the town. With the Mill & Main campus, which is home to major employers such as Stratus Technologies and Acacia Communications, downtown has one of the highest employment densities in the region. It was noted during the stakeholder workshops, that the town's major employers should support emergency communications by educating their employees on local emergency management protocols.

3.2.2 Emergency Shelters

Maynard has identified in its CEMP primary and secondary emergency shelters throughout the town. In addition to the Fowler School, the primary emergency shelter, the Town Hall/Police Station (195 Main Street), clubhouses at Powder Mill Circle and at Concord Street Circle, Council on Aging at the Maynard Country Club (50 Brown Street), Maynard Lodge of Elks (34 Powder Mill Road), and Maynard Rod and Gun (45 Old Mill Road) serve as secondary emergency shelters.

Workshop participants listed many landmarks that are currently and will serve as potential go-to space for residents to gather or seek information and resources in case of an emergency, such as the town's other schools, the public library, and the food pantry. There are also many faith-based institutions and groups in town that may also service as crucial resources for responding to a hazard-related event that provokes resource scarcity and/or compounds the challenges that low-income or vulnerable populations might already face.

3.3 Environmental Features

Maynard is home to many regional and local natural resources including open spaces, wetlands, waterways, and recreation areas. There are approximately 1,700 acres of open space and recreation lands in Maynard; most of these lands, however, are not owned or managed by the town but by federal, state, and private entities. Included in this total is approximately 815 acres of the Assabet River National Wildlife Refuge, a 2,250-acre asset shared among the surrounding communities of Hudson, Stow, and Sudbury.[16] During the stakeholder workshops, stakeholders repeatedly underscored the value and importance of these resources to the community, and were determined to identify measures to enhance and protect them in the face of climate change.

16 Town of Maynard. 2004. Open Space and Recreation Plan.

Workshop participants also noted the efforts already in place to protect the town's natural resources. Accordingly, most of the identified solutions were focused on maintaining and bolstering the good work that is already happening and educating the public on the true value that these natural resources bring to the town, particularly as it relates to their contributions to building the town's resilience.

3.3.1 Open Space and Tree Canopy

As discussed above in **Section 3.1.2**, participants of the stakeholder workshops recognized that many of existing natural resources and open space areas in town can (and should be allowed to) serve as flood storage during heavy rainfalls in order to relieve potential flood risk to surrounding residential neighborhoods. They also recognized the value that their open space and recreation areas, as well as both the town's urban and rural tree canopy, provide for stormwater management, shading/cooling, and promoting active and passive recreational opportunities.

It should be noted that the town has experienced increased challenges in managing pests/invasive species in its urban trees and it recognizes the need to maintain and enhance the town's urban tree planting and maintenance, as well as invasive species management. The town recently established a Tree Committee, chaired by the Director of the DPW and the Conservation Agent, with a mission to "promote the growth of a healthy and diverse population of trees on public and private property throughout the town."[17] In 2019, the town received an Urban Forestry Grant from the Department of Conservation and Recreation to perform a tree inventory and management plan, which is anticipated to be completed by the summer of 2020.

17 Town of Maynard. (2020). Tree Committee. Retrieved March 18, 2020, from https://www.townofmaynard-ma.gov/gov/committees/tree/

4

Recommendations to Improve Resilience

Based on a discussion around existing vulnerabilities and strengths in terms of Maynard's critical assets, the Core Team worked with the CRB Workshop participants to develop a list of recommendations to help Maynard prioritize its planning efforts for improved resiliency. This section highlights some of the actions presented in the CRB Risk Matrix (see **Appendix C**).

Top Overall Priority Actions:

One outcome of the stakeholder workshops was a set of overall priority actions. At the end of the second workshop day, participants voted on what they would consider as their top priority actions within the three community components – infrastructural, social, and environmental. Presented below are the actions that received the most votes (actions are listed in no particular order):

Infrastructural

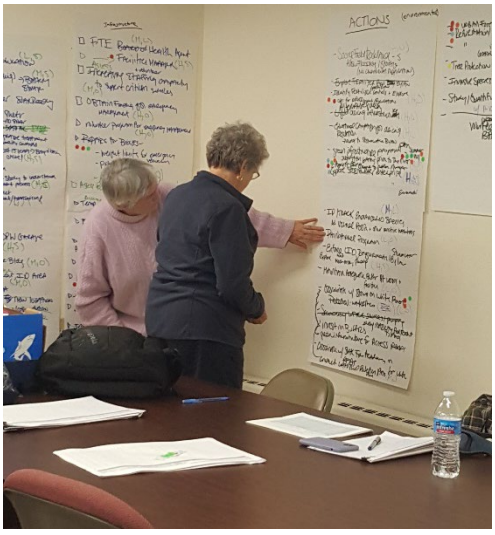
- Upgrade treatment facilities and processes to adapt to changes in water quality and quantity.
- Perform upgrades at sewer pump stations, including acquiring back-up parts and equipment; redesign such infrastructure for redundancy.
- Conduct condition assessments and perform repairs for existing bridges.
- Build a new DPW Garage facility; re-locate it away from the Assabet River and Taylor Brook.
- Secure funding for sewer collection system improvements (infiltration and inflow repairs)

Social

- Prepare a performance assessment of the town's outreach and resources available to address language and speech needs/mobility needs for town residents.
- Apply for funding to complete a hazard mitigation plan.
- Update the American with Disabilities Act ("ADA") Plan with a self-assessment.
- Promote social connections within neighborhoods to support emergency communications.
- Assess the potential to repair existing and/or install new publicly-accessible drinking water fountains (i.e., water bubblers).
- Explore opportunities and potential sites for a publicly-accessible splash pad.

Environmental features

- Explore a stormwater enterprise fund.
- Develop an urban forestry management plan.
- Coordinate with the Town of Stow on White Pond watershed protection.
- Implement reforestation in urban areas for heat mitigation.
- Identify and track endangered species at vernal pools and other sensitive habitats.
- Introduce tree protection bylaws.



CRB Workshop participants identified their overall priority actions.

4.1 Identified Priority Actions

The following sections summarize and highlight key priority actions that came out of the stakeholder workshops. The actions are categorized as high, moderate, and lower priority. Participants also discussed the implementation timeframe for each of the priority actions,

categorized as short-term, long-term, and/or ongoing. See **Appendix C** for the complete CRB Risk Matrix that details all actions identified at the CRB Workshops.

4.1.1 High Priority Actions

Identified Action	Timeframe
Infrastructural	
Obtain funding to support the town's emergency management activities; which is currently unfunded	Ongoing
Improve the volunteer program for emergency management	Ongoing
Elevate/relocate fuel tanks at the DPW Garage	Short-term
Formalize FEMA partnership/support	Short-term
Upgrade treatment facilities and processes to adapt to changes in water quality and quantity	Short-term
Prepare a climate action and resilience plan	Short-term
Install sprinklers at the existing Fire Station or ensure installation at a new facility	Short-term
Assess temporary flood control measures for the Town Hall/Police Department	Short-term
Identify and pursue a potential new storage location(s) for the town's critical/historical records	Short-term
Complete a drainage study and ensure adequate drainage at evacuation routes	Short-term
Consider green infrastructure improvements in the downtown area	Short-term
Consider a shading program in the downtown area	Short-term
Perform upgrades at sewer pump stations, including acquiring back-up parts and equipment; redesign such infrastructure for redundancy	Short-term
Hire a full-time Health Agent and a Facilities Manager	Short-term
Design/construct a treatment and transmission system to bring White Pond supply online, as appropriate	Long-term
Social	
Encourage private employees to sign up for Hyperlink	Ongoing
Update the ADA Plan with a self-assessment	Short-term
Promote and maintain the emergency registry	Short-term
Prepare a performance assessment of the town's outreach and resources available to address language and speech needs/mobility needs for town residents	Short-term
Develop building- specific emergency plans (i.e., senior housing facilities)	Short-term
Apply for funding to complete a hazard mitigation plan	Short-term
Promote social connections within neighborhoods to support emergency communications	Short-term
Assess the potential to repair existing and/or install new publicly-accessible drinking water fountains (i.e., water bubblers)	Short-term

Identified Action	Timeframe
Environmental	
Identify fertilizer/pesticide controls and explore opportunities for enforcement/education	Ongoing
Investigate alternative green deicing infrastructure	Ongoing
Conduct an educational campaign for deicing; add protective measures to the town's stormwater bylaw	Ongoing
Develop a town-wide green infrastructure plan, including a potential detention basin prior to the river (Summer Hill)	Ongoing
Expand educational resources and continue promoting information about invasive species	Ongoing
Explore enforcement mechanisms for low-impact development ("LID") requirements as part of the town's stormwater bylaw	Short-term
Develop an urban forestry management plan	Short-term
Explore a stormwater enterprise fund	Short-term

4.1.2 Medium Priority Actions

Identified Action	Timeframe
Infrastructural	
Assess Well #4 (in School Woods) for susceptibility to wildfire	Ongoing
Indicate weight limits for emergency vehicles on bridges	Ongoing
Provide protection for utilities in flood zones or flood-prone areas	Ongoing
Conduct condition assessments and perform repairs for existing bridges; assess for flood risk	Ongoing
Assess staffing capacity to support critical services	Ongoing
Plan for staging equipment in designated areas (in the event of flooding at the DPW garage facility)	Ongoing
Assess school facilities for susceptibility to wildfires	Ongoing
Secure funding for sewer collection system improvements (infiltration and inflow repairs)	Ongoing
Conduct a solar photovoltaic feasibility/opportunity study for all municipal facilities and properties; consider the incorporation of battery storage (interactive/hybrid or off-grid) with any potential installation	Short-term
Provide emergency response trailer and signage resources	Long-term
Build a new DPW Garage facility; re-locate it away from the Assabet River and Taylor Brook	Long-term
Social	
Identify potential community farming areas in town	Short-term
Create subsidies to encourage the use of bike share facilities and other alternative transportation options	Short-term
Make free town-wide Wi-Fi available	Long-term

Identified Action	Timeframe
Expand methods and efforts for educating the public on the town's CEMP	Long-term
Explore opportunities and potential sites for a publicly-accessible splash pad	Long-term
Environmental	
Introduce tree protection bylaws	Short-term
Invest in expanding buffers adjacent to White Pond	Long-term
Consider installing green infrastructure around the access roads at White Pond	Long-term
Coordinate with the State Fire Academy on PFAS	Long-term
Complete a watershed protection plan for White Pond	Long-term
Implement reforestation in urban areas for heat mitigation	Long-term
Implement reforestation of native species in rural areas for monoculture management	Long-term
Identify and track endangered species at vernal pools and other sensitive habitats	Long-term

4.1.3 Low Priority Actions

Identified Action	Timeframe
Infrastructural	
Communicate with utility and telecommunication companies (i.e. Verizon, Eversource, etc.) on mutual aid	Ongoing
Promote to expand solar photovoltaic installations with battery storage in residential areas and the private sector	Short-term
Assess potential erosion control measures for capped landfill	Long-term
Environmental	
Allow the soccer fields on Rockland Avenue to flood and serve as flood storage; prevent chemical applications to fields	Ongoing
Institute a rain barrel incentive program	Ongoing
Coordinate with the Town of Stow on White Pond watershed protection efforts	Ongoing
Study and quantify algae/algal blooms, leveraging volunteers	Long-term

5

Conclusion and Next Steps

As demonstrated in this report, Maynard has and shall continue take advantage of its strengths while tackling its vulnerabilities as they relate to the potential impacts of its identified top priority hazards: extreme precipitation/flooding, severe storm events, extreme heat/heat waves, and wildfires. The CRB Workshops, including preliminary planning and the participation of a diverse range of stakeholders, represents strong momentum for the town to continue its pursuit of a more resilient community.

Following the stakeholder workshops, and acceptance of this Summary of Findings by the Massachusetts Executive Office of Energy and Environmental Affairs, the town plans to broaden the conversation with the larger community, secure additional data and information from existing and new partners where necessary, and integrate the contents of this document and follow-on efforts into its existing and future planning and project activities. Evidence of the latter is already present in the town's most recent Master Plan Update; for example, the Master Plan calls for several similar recommended actions such as "investigate creating a municipal storm drain utility and enhance relevant bylaws" and "incorporate the implications of climate change into the long-term planning of the town's capital assets and infrastructure through a resiliency checklist."[18]

Additionally, Maynard plans to pursue MVP Action Grant funding, as well as other available funding mechanisms, to advance the implementation of high-priority actions identified through this MVP planning process.

18 Town of Maynard. (2020). *Town of Maynard Master Plan*.

6

Acknowledgments

The Town of Maynard would like to thank its MVP Core Team and Consultant (VHB, a State-certified MVP Provider) for guiding and supporting this planning process. As previously noted, the Core Team consisted of the following representatives:

- Justin DeMarco, Director of Public Works/Tree Committee/MVP Project Manager;
- Wayne Amico, Town Engineer/MVP Project Manager;
- Greg Johnson, Town Administrator;
- Lee Caras, Historical Commission Clerk/Tree Committee;
- Bill Nemser, Town Planner;
- Kaitlin Young, Assistant Planner/Conservation Agent;
- Anthony Stowers, Fire Department Chief/Emergency Management Director/Local Emergency Planning Committee;
- Michael Noble, Police Department Chief;
- Megan Zammuto, Assistant Town Administrator/Office of Municipal Services Director; and
- Amy Loveless, Council on Aging Director.

Appreciation is also extended to the stakeholders who participated in the two, four-hour CRB Workshops in January and February 2020. These individuals spent their valuable time and effort to promote community resilience in Maynard.

CITATION: Town of Maynard. (2020). Municipal Vulnerability Preparedness (MVP) Program: Community Resilience Building Workshops – Summary of Findings. Maynard, Massachusetts.

Appendix A

CRB Workshop Presentations

CRB Workshop Attendance Sign-in Sheets

Municipal Vulnerability Preparedness

Maynard, MA | Workshop #1 | January 28, 2019

Meeting Agenda

1:10 – 1:30	**Welcome, Introductions, and Workshop Overview**
1:30 – 1:40	**Summary of the MVP Program**
1:40 – 2:00	**Climate Trends, Projections, and Potential Impacts**
2:00 – 2:10	**Overview of Critical Assets**
2:10 – 4:10	**Small Group Break-Out Discussions**
4:10 – 4:50	**Report Back**
4:50 – 5:00	**Workshop #1 Wrap-Up and Workshop #2 Introduction**

Welcome, Introductions, and Workshop Overview

Welcome, Introductions, and Workshop Overview

- Objectives of the Workshop
  - Introduce the MVP planning process
  - Define regional climate-related hazards
  - Identify Maynard's critical assets and discuss them in the context of prioritized climate hazards
- Core Team Introduction - Thank you!
- Facilitation Team Introductions
- Participant Introductions
  - Name
  - Role/Affiliation
  - One Personal Experience with Climate Change

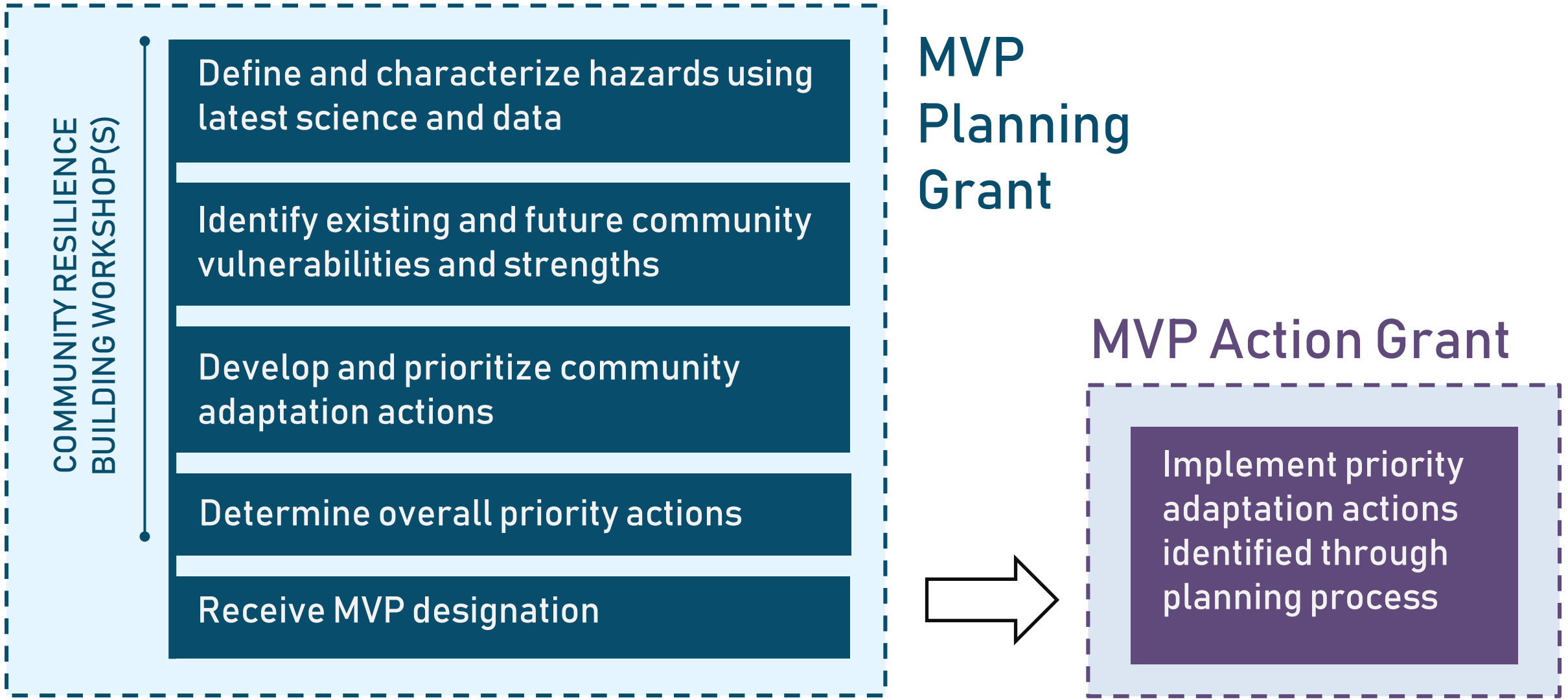
Community Resilience Building Framework

DURING WORKSHOP

1	Prepare for the Workshop	1. Establish a core team with goals. 2. Engage stakeholders. 3. Prepare materials for workshop. 4. Decide on participant arrangements
2	Characterize Hazards	1. Identify past, current, and future impacts. 2. Determine the highest-priority hazards.
3	Identify Community Vulnerabilities and Strengths	1. Identify infrastructural vulnerabilities and strengths. 2. Identify societal vulnerabilities and strengths. 3. Identify environmental vulnerabilities and srengths.
4	Identify and Prioritize Community Actions	1. Identify and prioritize infrastructural actions. 2. Identify and prioritize societal actions. 3. Identify and prioritize environmental actions.
5	Determine the Overall Priority Actions	1. Identify highest-priority actions. 2. Further define urgency and timing.
6	Put It All Together	1. Generate final workshop products.
7	Move Forward	1. Continue community outreach and engagement. 2. Secure additional data and information. 3. Inform existing planning and project activities.

Summary of the MVP Program

MVP Process/ Grant Types

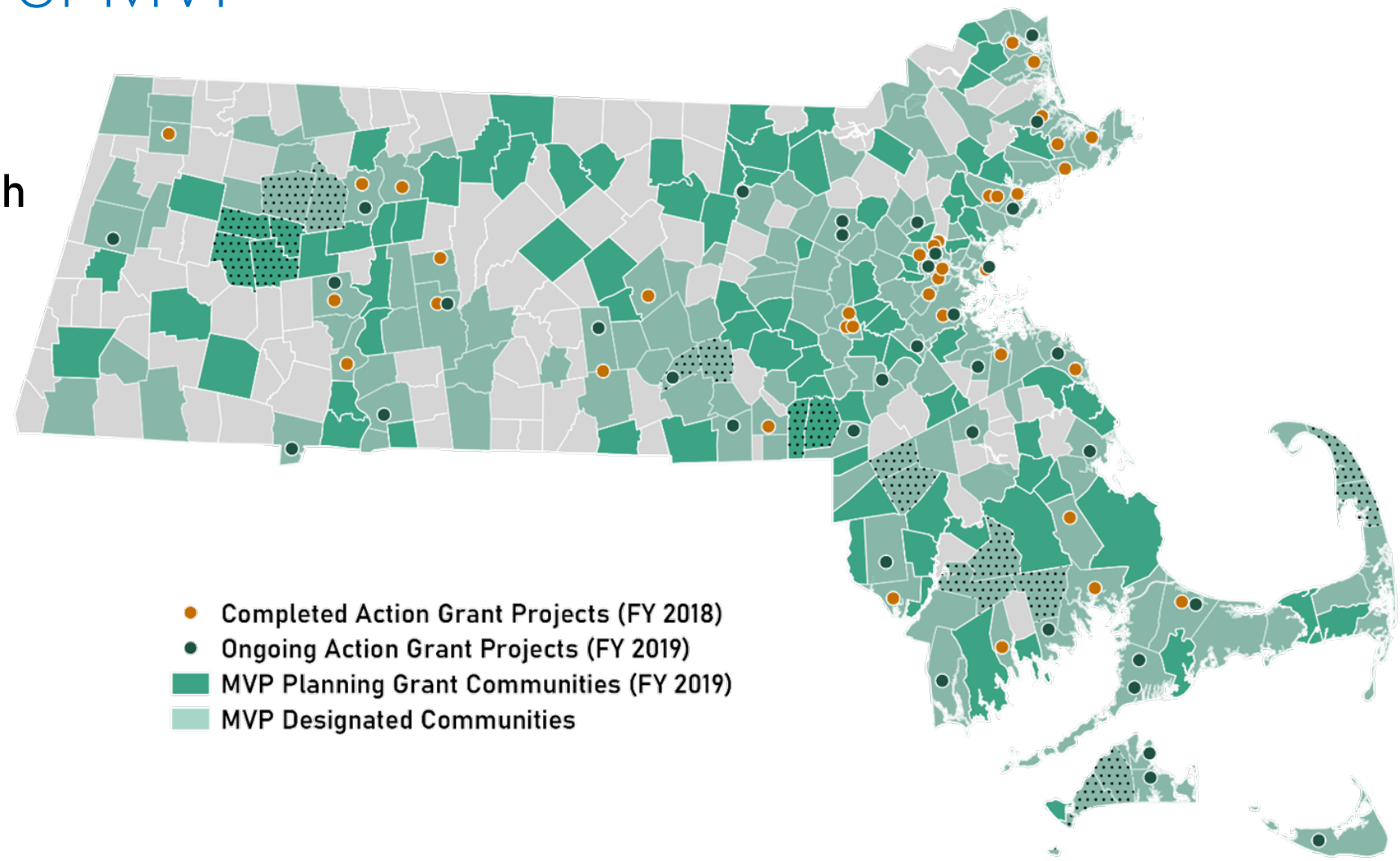


Three Years of MVP

MVP Designations
71% of the Commonwealth
249 communities

Action Grant Projects
FY 18: 37
FY 19: 36

Total Awards
$17M+ in planning and action grants to date



MVP Action Grants: Project Types

- Detailed Vulnerability and Risk Assessment*
- Community Outreach and Education
- Local Bylaws, Ordinances, Plans, and Other Management Measures
- Redesigns and Retrofits***
- Nature-Based Flood Protection, Drought Mitigation, Water Quality, and Water Infiltration Techniques**
- Nature-Based, Infrastructure and Technology Solutions to Reduce Vulnerability to Extreme Heat and Poor Air Quality
- Ecological Restoration and Habitat Management to Increase Resiliency

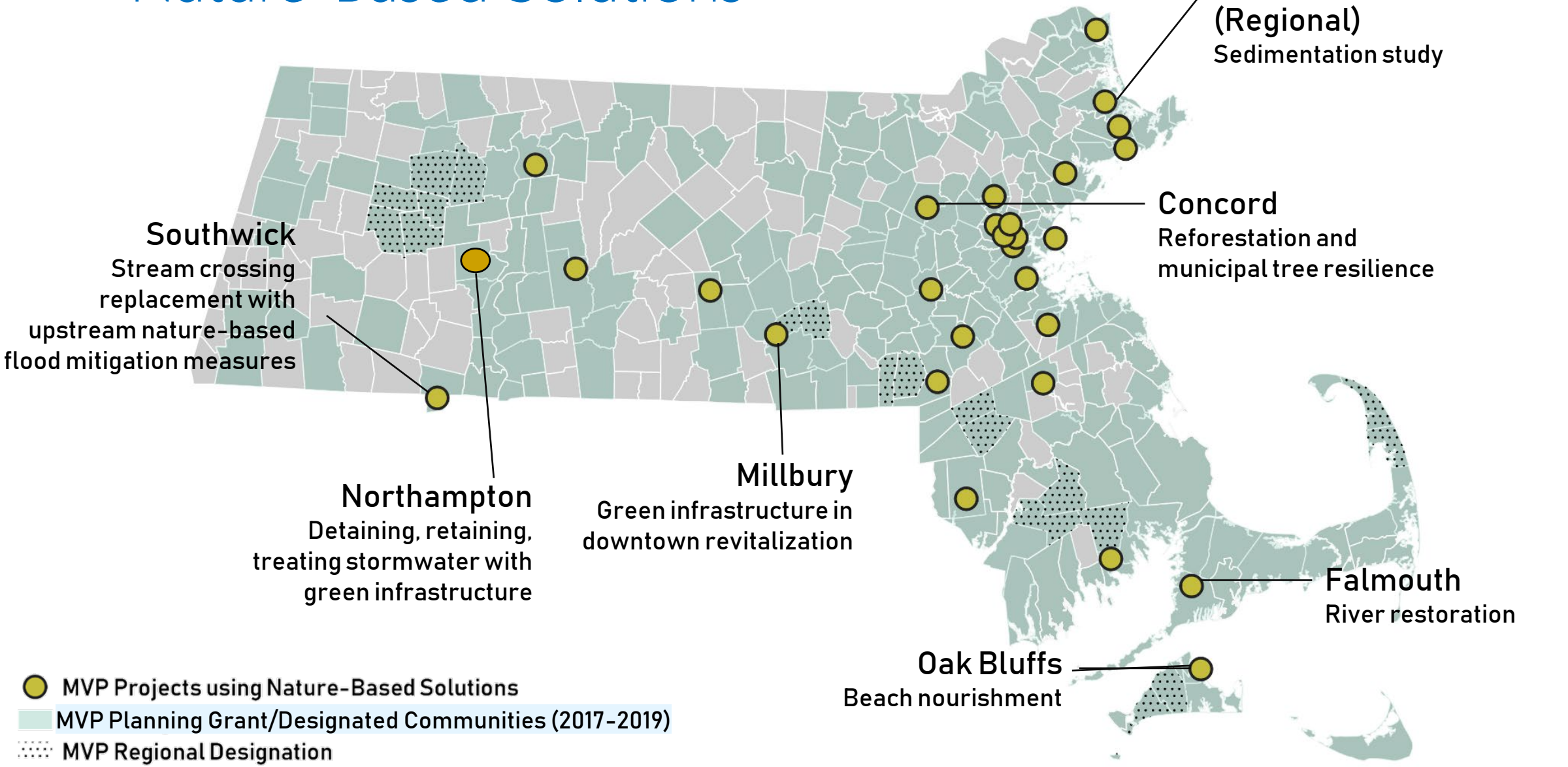
New for 2019

- Energy Resilience
- Chemical Safety
- Land Acquisition for Resilience
- Subsidized Low-Income Housing Resilience Strategies
- Mosquito Control Districts

+ Expanded eligibility of project location

* Most common project type
** Second-most common project type
***Third-most common project type

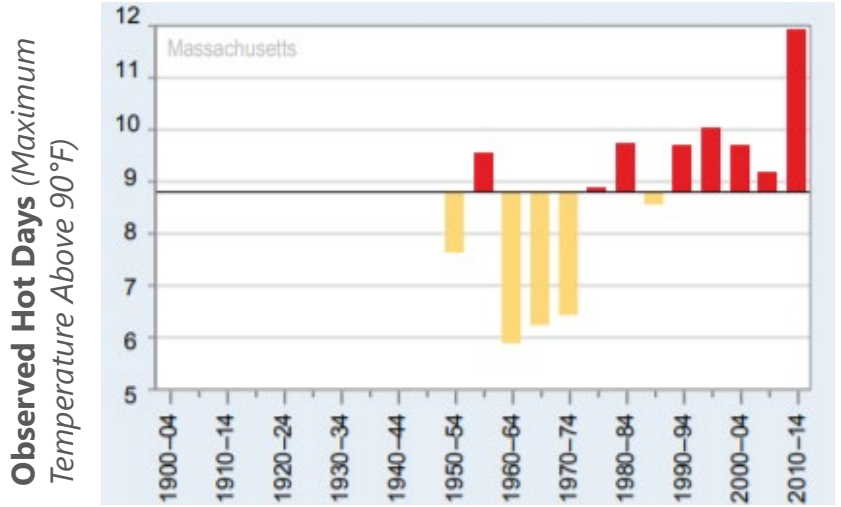
Nature-Based Solutions



Climate Trends, Projections, and Potential Impacts

MA Climate Trends and Observed Conditions

- Between 1900 and 2014, average annual temperatures have increased by approximately 3°F
- The number of extreme heat days (max. temperature over 90°F) has been consistently above average since the 1990s
- The state has experienced above-average precipitation in the last 10 years
- More extreme weather events have been reported since 2005

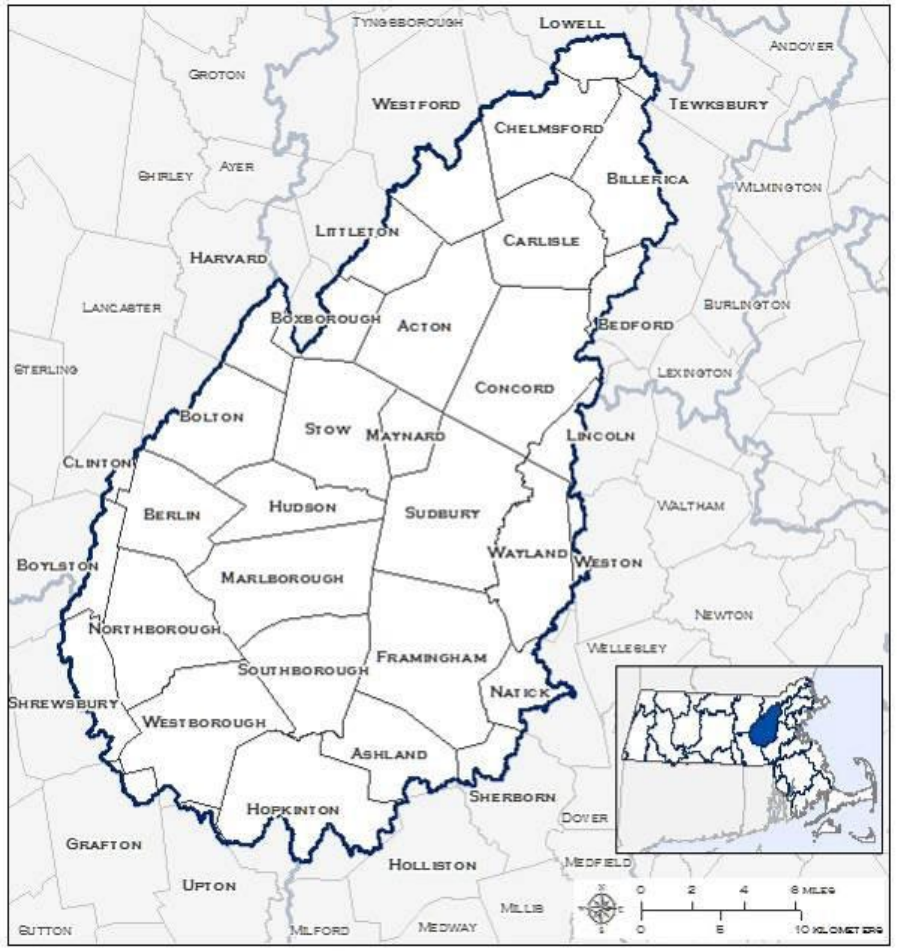


Source: NOAA NCEI State Climate Summary, 2014

Climate Projections for Sudbury-Assabet-Concord Basin

Increased Temperatures

- Average temperatures in the winter are likely to increase more than in the summer
- More extreme heat days are expected.
- More frequent droughts are expected, due to less rainfall and higher projected temperatures.



Source: Massachusetts Climate Change Projections – Statewide and for Major Drainage Basins, EEA, 2018.

Climate Projections for Sudbury-Assabet-Concord Basin

Increased Temperatures

	Baseline (1971 – 2000)	Mid-Century (2050s)	End-of-Century (2090s)
Average annual temperature (°F)	48.7°F	↑ 3.0 to 6.3°F	↑3.8 to 10.9°F
Days per year > 90°F	8	↑ 10 to 35 days	↑ 14 to 76 days
Days per year > 95°F	1	↑ 3 to 17 days	↑ 6 to 48 days
Days per year > 100°F	< 1 day	↑ <1 to 5 days	↑ <1 to 22 days
Days per year < 32°F	143 days	↓ 19 to 40 days	↓ 24 to 65 days
Days per year < 0°F	6 days	↓ 2 to 4 days	↓ 2 to 5 days

Source: Massachusetts Climate Change Projections – Statewide and for Major Drainage Basins, EEA, 2018.

Climate Projections for Sudbury-Assabet-Concord Basin

Changes in Precipitation Patterns

- More precipitation may be expected during winter and spring seasons
- Increasing consecutive dry days may be expected during summer and fall seasons
- Winter precipitation could fall more often as snow by mid-century, but is most likely to be rainfall by the end of the century
- Increased frequency of high-intensity rainfall events is expected through mid- and end of century

Photo credit: Town of Maynard

***Note: Seasonal projections for total precipitation vary, and there is less certainty specifically in the SuAsCo Basin*

Climate Projections for Sudbury-Assabet-Concord Basin

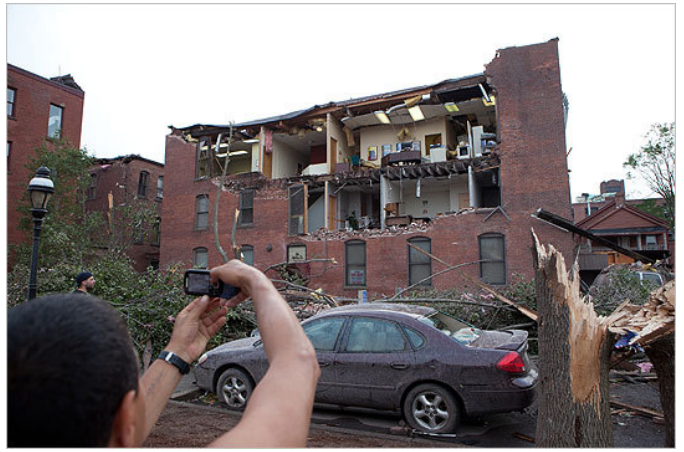
Changes in Precipitation Patterns

	Baseline (1971 – 2000)	Mid-Century (2050s)	End-of-Century (2090s)
Total annual precipitation (inches)	45.4 inches	↑ 0.6 to 6.1 inches	↑ 1.2 to 8.0 inches
Days per year with over 1” rainfall	7 days	↑ 1 to 3 days	↑ 1 to 4 days
Days per year with over 2” rainfall	1 day	↑ <1 to 1 day	↑ <1 to 1 day
Days per year with over 4” rainfall	< 1 day	↑ by <1 day	↑ by <1 day
Annual consecutive dry days	17 days	↑ 0 to 2 days	↓ 1 to ↑ 3 days

Source: Massachusetts Climate Change Projections – Statewide and for Major Drainage Basins, EEA, 2018.

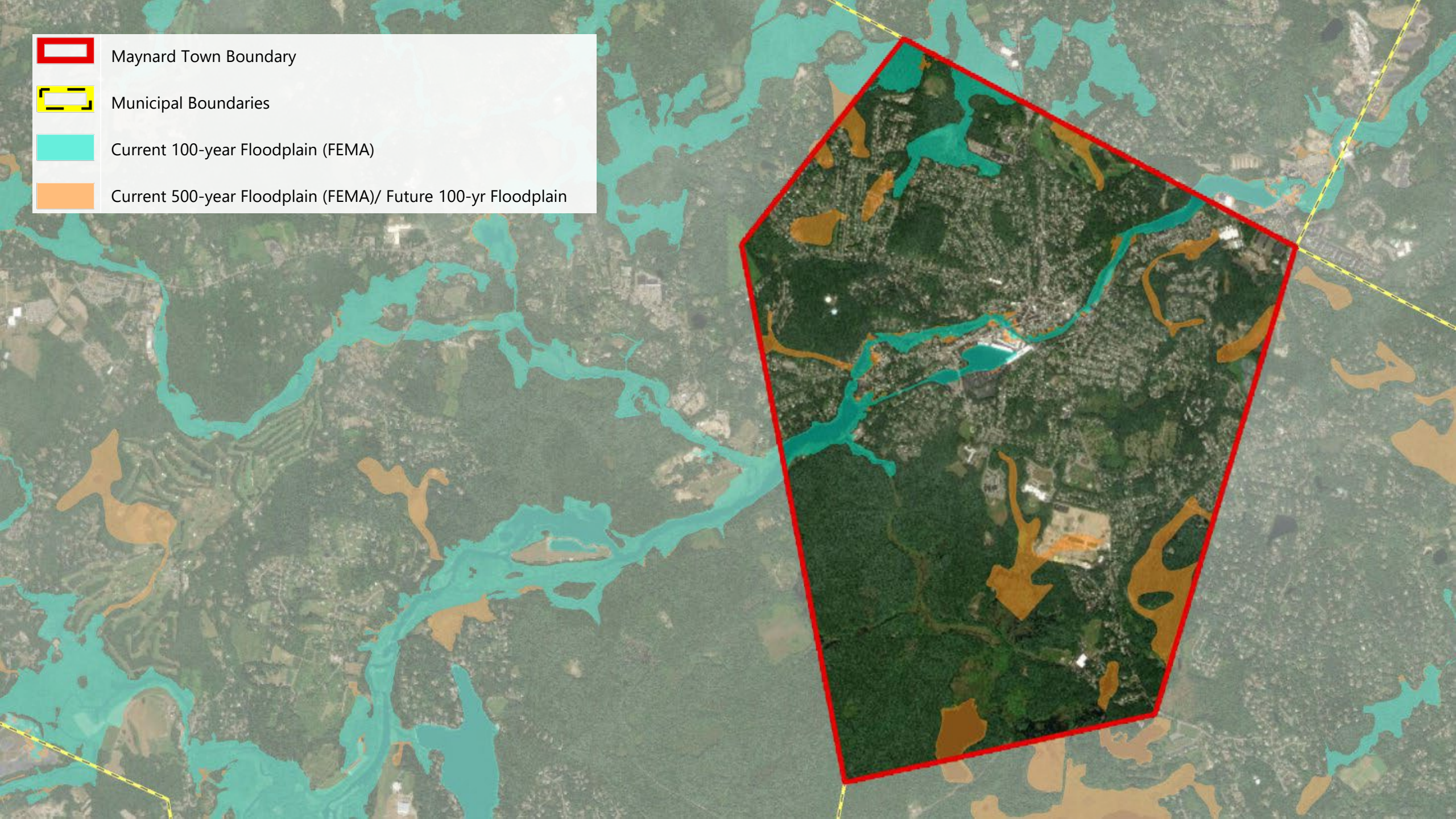
Extreme Storms: Trends & Projections in Massachusetts

- Observed Conditions:
  - Several major winter coastal storms with flooding between 2010 and 2018, including two in 2018.
- Anticipated Conditions:
  - Risk of increased riverine flooding;
    - Mean increase of ~43 percent in flood flows for one-percent flood by 2085
  - More frequent and intense strong hurricanes in the northeast U.S. by 2100
  - Increases in hurricane activity could yield annual property losses of $11-$17 billion



Sources:
Dupigny-Giroux, L.A., et al. 2018. Northeast. In Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II.
The Boston Research Advisory Group Report. 2016. Climate Change and Sea Level Rise Projections for Boston. Retrieved: https://www.boston.gov/sites/default/files/document-file-12-2016/brag_report_-_final.pdf.

Photo credit:
Boston.com


Maynard Town Boundary
Municipal Boundaries
Current 100-year Floodplain (FEMA)
Current 500-year Floodplain (FEMA)/ Future 100-yr Floodplain

Potential Climate Change Impacts

Increased Temperatures

- Poor air quality and risk of heat-related illness due to warmer temperatures and heatwaves
- More winter precipitation falls as rain instead of snow
- Stress on energy, transportation, and communications infrastructure
- More power outages due to high summer cooling demand

Changing Precipitation

- Increases in extent and frequency of flooding
- Increasing rainfall during spring and winter months; longer consecutive dry days in summer and fall and increasing water demand
- Risk/damages to culverts, roadways/bridges and other critical infrastructure

Extreme Storms

- Risk/damage to building envelopes due to high winds and thunderstorms
- Increased risk of pollutant runoff into water bodies
- Fallen trees and debris during severe storms, leading to power outages and threat to community safety

Key Hazards to Consider for Maynard

Extreme Precipitation Events/Flooding

Severe Storm Events

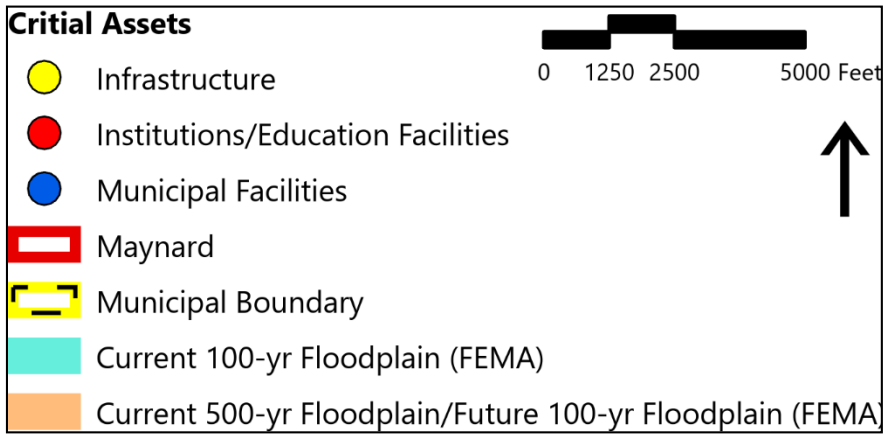
Extreme Heat / Heat Waves

Wildfire

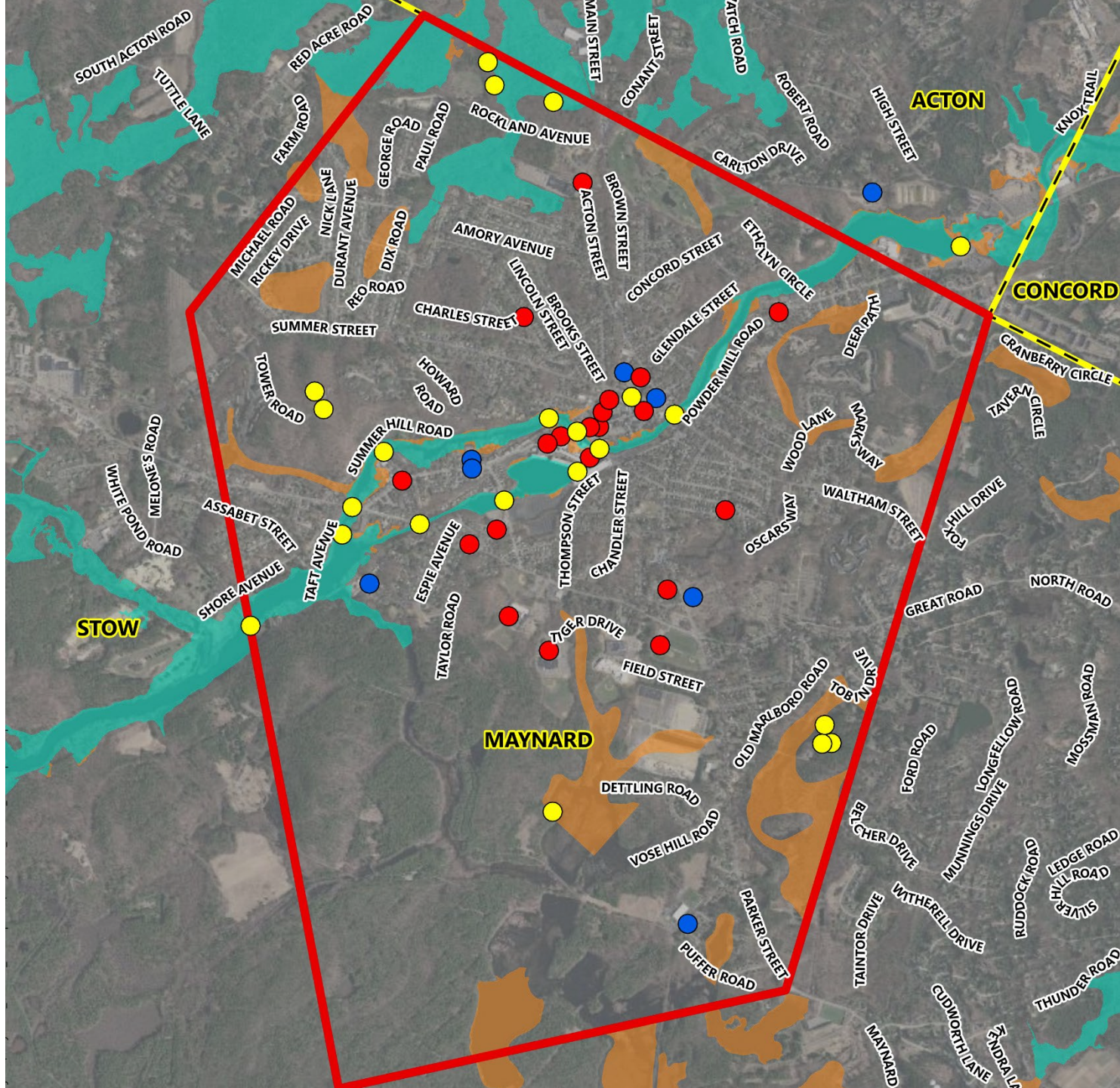
Review of Critical Assets

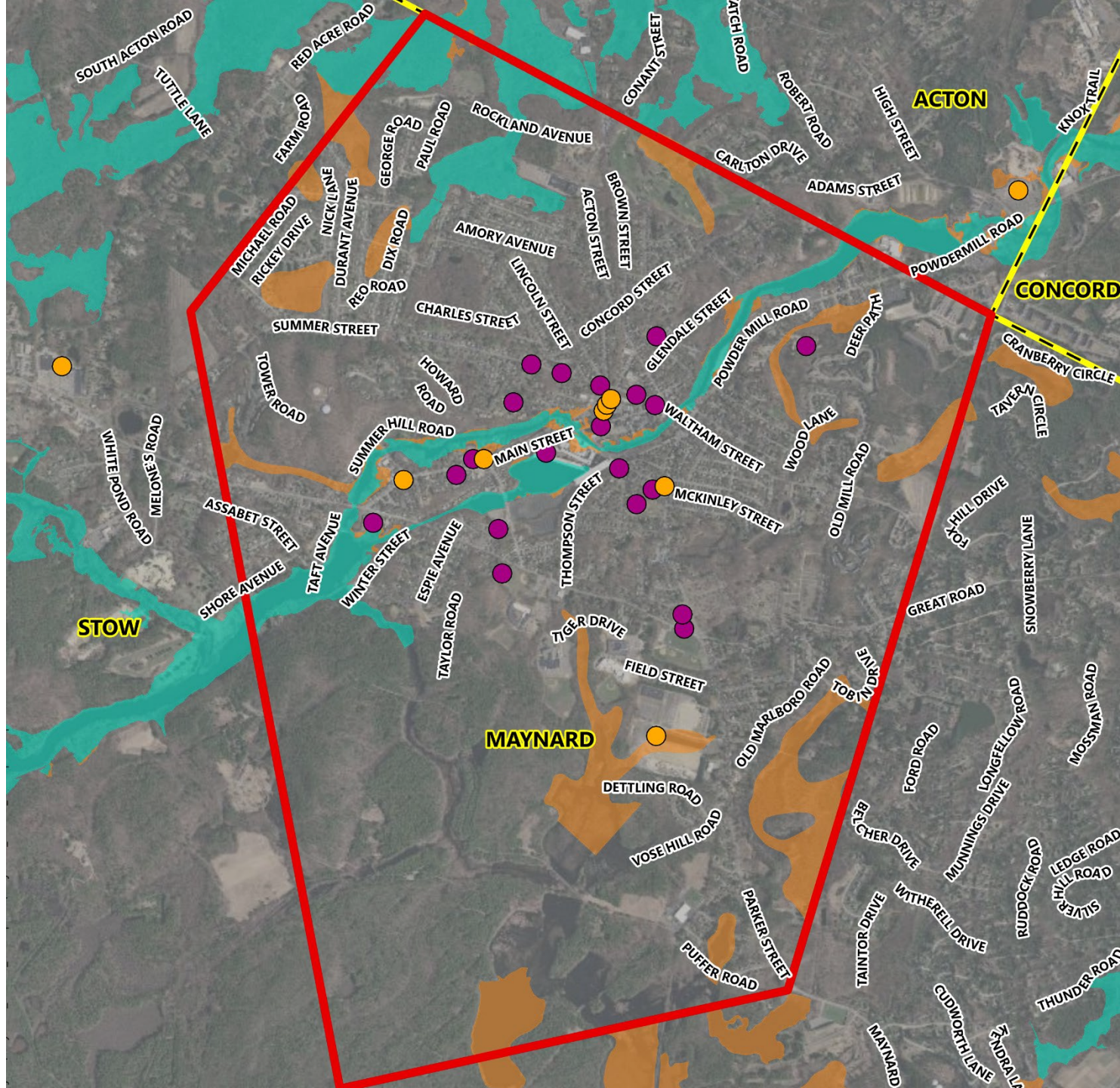
Maynard's Critical Assets and Infrastructure

- Infrastructural
  - Schools, Businesses, Transportation System, Utilities
- Societal
  - Housing, At-Risk Populations, Public Health Resources, Social Services, Faith-Based Organizations
- Environmental
  - Natural Features, Open Space and Recreation Resources
- Other Critical Facilities?

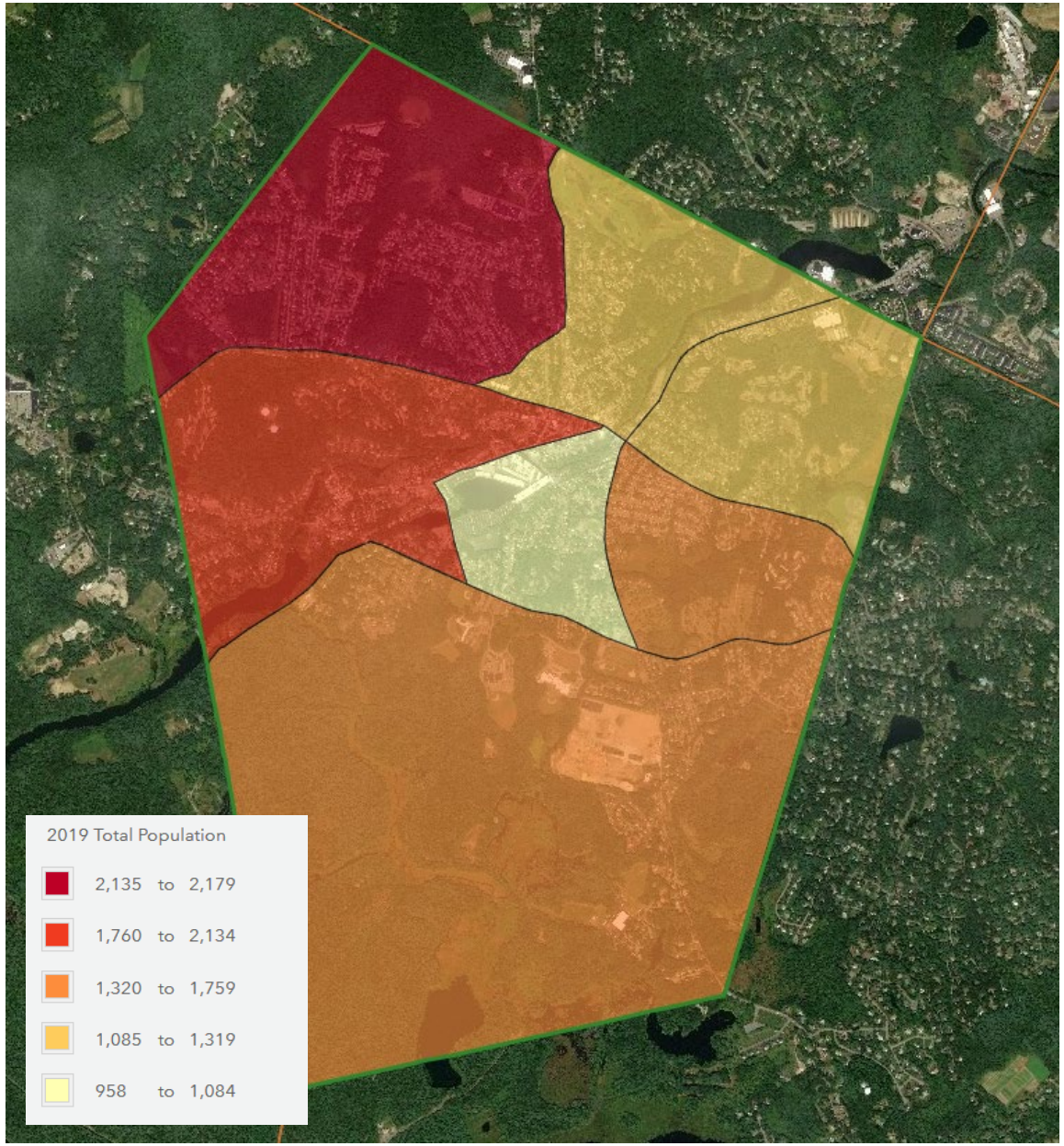


Critical Infrastructure Assets

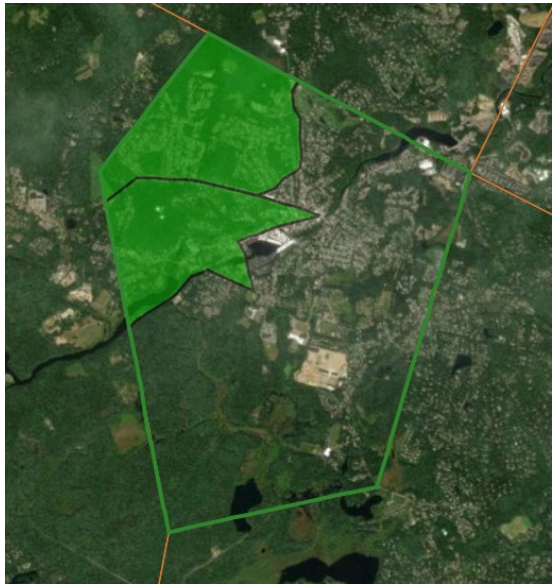




Critical Societal Assets



Population Distribution

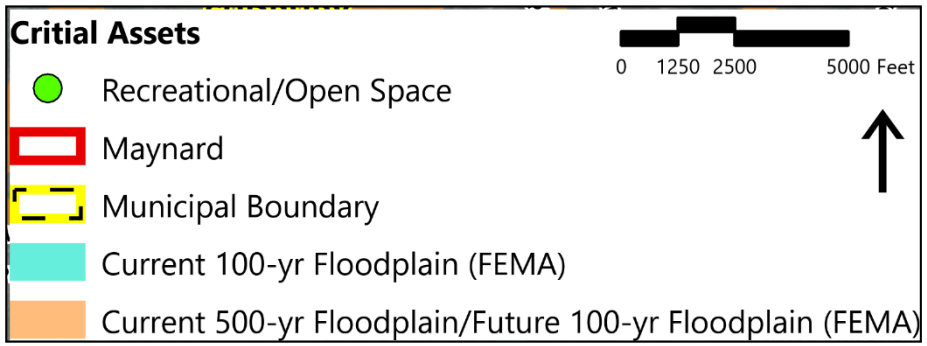


Senior Population (65+)

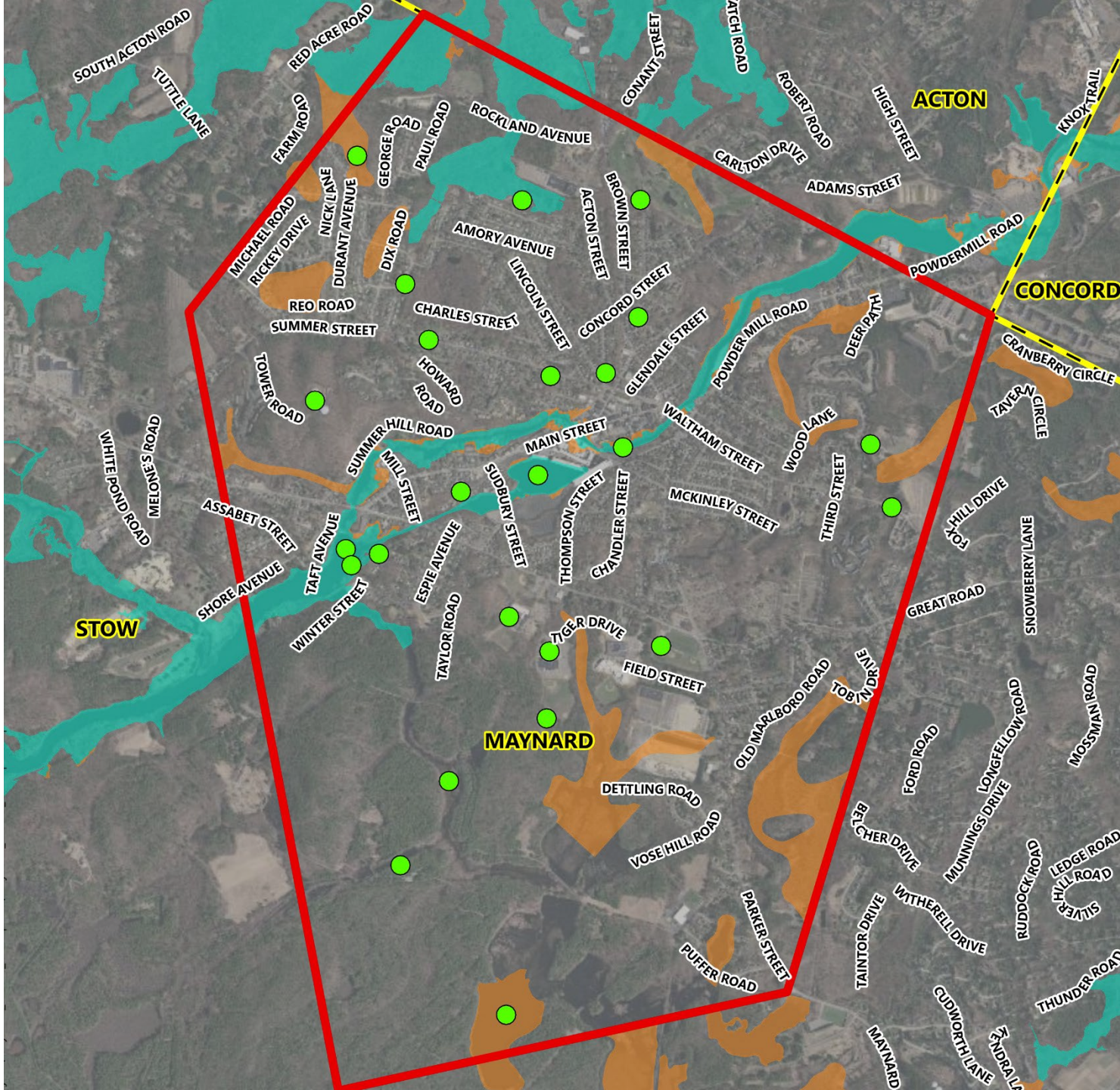
Households in Poverty

Minority Population

Employee Concentration



Critical Environmental Assets



Community Resiliency Building Risk Matrix

Break-Out Session

Community Resilience Building Risk Matrix

Step 1: Identify Top Priority Hazards

Community Resilience Building Risk Matrix www.CommunityResilienceBuilding.org

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Features	Location	Ownership	V or S					Priority H - M - L	Time S hort L ong O ngoing
Infrastructural									
Societal									
Environmental									

Community Resilience Building Risk Matrix

Step 2: Identify Community Vulnerabilities and Strengths

Community Resilience Building Risk Matrix

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V = Vulnerability **S** = Strength

Features	Location	Ownership	V or S
Infrastructural			
Societal			
Environmental			

1. List critical assets applicable to each category
2. Describe their location(s)
3. Identify their ownership
4. Determine whether they represent a vulnerability (V) or a strength (S), or both

Community Resilience Building Risk Matrix

Step 3: Assessing Level of Urgency, Actions, and Priorities

Community Resilience Building Risk Matrix

www.CommunityResilienceBuilding.org

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

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Infrastructural									
Societal									
Environmental									

Community Resilience Building Risk Matrix (Example)

Community Resilience Building Workshop Risk Matrix

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top 4 Hazards (tornado, floods, wildfire, hurricanes, snow/ice, drought, sea level rise, heat wave, etc.)

Features	Location	Ownership	V or S	Coastal Flooding SLR/Storm Surge	Inland Flooding and Rain Events	Ice and Snow	Wind	Priority H - M - L	Time Short Long Ongoing
Infrastructural									
Town Campus	Specific	Town	V	Verify risk from flooding events; Identify alternative locations during peak flooding; Verify maintenance plan annually				H	S
Evacuation Routes - Roads	Town-wide	Town/State	V	Install highly visible signage for evacuation routes; Develop and implement communication program				H	S
Electrical Distribution System	Multiple	CL&P/Town	V	Within floodplain area, establish plan to address protection and long-term relocation of equipment		Upgrade transformers; Maintain power line protection zone (tree trimming)		H	O-L
Dams (inland and coastal)	Multiple	Private	V	Prevent possibility of catastrophic dam failure; Identify and remove dams to minimize downstream flooding due to failure				H	L
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State Roads/Intersections	Town-wide	State/Town	V	Coordinate with DOT, volunteers, public works to improve response; Need signage to warn of flooding risk in critical intersections				M	L
Wharves and Shore Infrastructure	Shore	Town-State-Private	V	Pursue comprehensive shoreline management plan; Establish community dialogue on retaining/relocating infrastructure				L	S
Waste Water Treatment Facility	Specific	Town	V	Conduct alternative siting feasibility study; Relocate to low risk area within next 25 years.				L	L
New Ambulance Center	Specific	Town	S	Continue to support services in budget; Add additional staff and vehicle in next annual cycle					Ongoing
Zoning Regulations (maintain large lot size)	Multiple	Town	S	Current building codes control development in risky areas; Consider additional zoning incentives (TDRs) to reduce risk to residential units					Ongoing

In Small Groups…

1. Team introductions; identify a spokesperson (not the facilitator)

2. Review the hazards we are focusing on:

Extreme Precipitation Events / Flooding	Severe Storm Events	Extreme Heat / Heatwaves	Wildfire

3. Confirm infrastructural, societal, and environmental critical assets/features and identify their vulnerabilities and strengths

4. Report Back

Workshop Wrap Up

Workshop Wrap-up

- What have we heard today?
  - What didn't you know, what surprised you?
- Workshop #2 - February 4, 1:00 to 5:00pm, Soup Cambell Room
  - Continuing to develop and prioritize actions that:
    - Reduce Maynard's vulnerabilities
    - Reinforce/enhance Maynard's strengths
  - Determine the overall priority actions and determine timing
  - Identify opportunities to advance priority actions
- Post Workshops: Finalize the workshop products and develop the report

Thank you for your hard work!

See you at Workshop #2, February 4th, 1:00 PM

Donny Goris-Kolb | dgoris-kolb@vhb.com | 617.607.2140

Van H. Du | vdu@vhb.com | 617.607.1834

Carissa Mills | cmills@vhb.com | 401.457.7808

Municipal Vulnerability Preparedness

Maynard, MA | Workshop #2 | February 4, 2020

Meeting Agenda

- **Welcome, Introductions, and Workshop Overview**
- **Recap of Workshop #1**
  - **Summary of MVP Program**
  - **Climate Trends, Projections, and Potential Impacts**
  - **Overview of Critical Assets**
- **Break-Out Discussion**
- **Report Back**
- **Workshop #2 Wrap-Up and Next Steps**

Welcome, Introductions, and Workshop Overview

Welcome, Introductions, and Workshop Overview

- Facilitation Team Introductions
- Participant Introductions
  - Name
  - Role/Affiliation
- Objectives of the Workshop
  - Identify Maynard's societal and environmental critical assets and discuss them in the context of prioritized climate hazards
  - Identify Overall Priority Actions

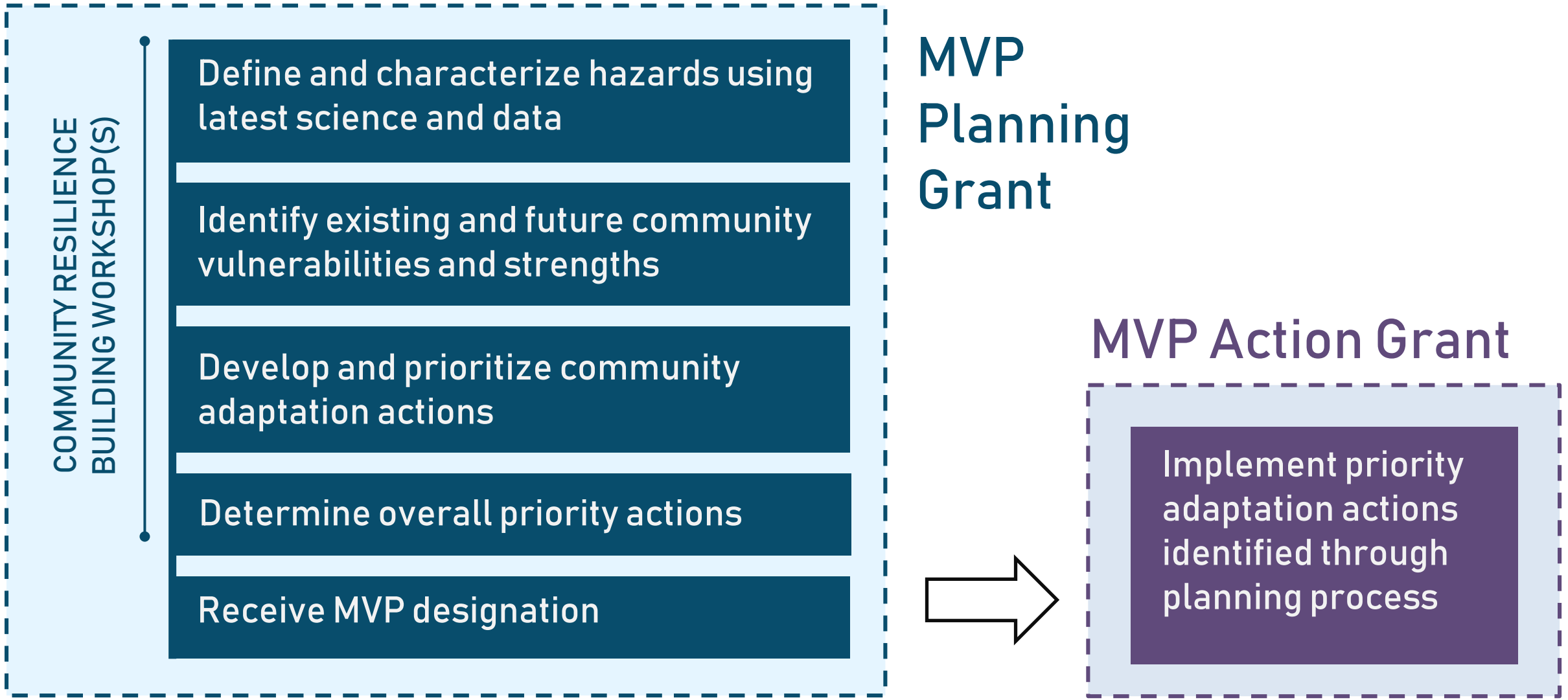
Community Resilience Building Framework

DURING WORKSHOP

1	Prepare for the Workshop	1. Establish a core team with goals. 2. Engage stakeholders. 3. Prepare materials for workshop. 4. Decide on participant arrangements
2	Characterize Hazards	1. Identify past, current, and future impacts. 2. Determine the highest-priority hazards.
3	Identify Community Vulnerabilities and Strengths	1. Identify infrastructural vulnerabilities and strengths. 2. Identify societal vulnerabilities and strengths. 3. Identify environmental vulnerabilities and srengths.
4	Identify and Prioritize Community Actions	1. Identify and prioritize infrastructural actions. 2. Identify and prioritize societal actions. 3. Identify and prioritize environmental actions.
5	Determine the Overall Priority Actions	1. Identify highest-priority actions. 2. Further define urgency and timing.
6	Put It All Together	1. Generate final workshop products.
7	Move Forward	1. Continue community outreach and engagement. 2. Secure additional data and information. 3. Inform existing planning and project activities.

Summary of the MVP Program

MVP Process/ Grant Types

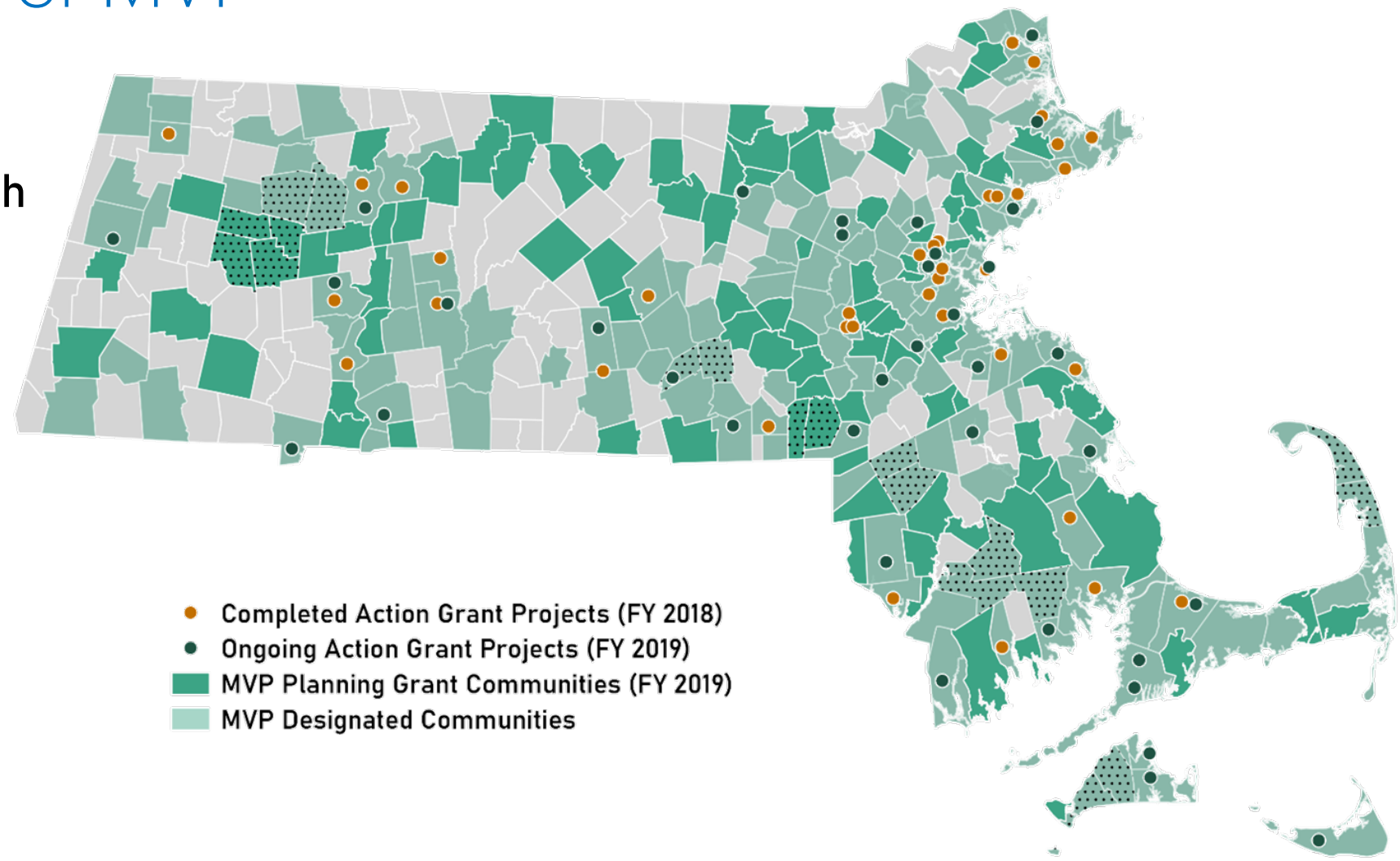


Three Years of MVP

MVP Designations
71% of the Commonwealth
249 communities

Action Grant Projects
FY 18: 37
FY 19: 36

Total Awards
$17M+ in planning and action grants to date



MVP Action Grants: Project Types

- Detailed Vulnerability and Risk Assessment*
- Community Outreach and Education
- Local Bylaws, Ordinances, Plans, and Other Management Measures
- Redesigns and Retrofits***
- Nature-Based Flood Protection, Drought Mitigation, Water Quality, and Water Infiltration Techniques**
- Nature-Based, Infrastructure and Technology Solutions to Reduce Vulnerability to Extreme Heat and Poor Air Quality
- Ecological Restoration and Habitat Management to Increase Resiliency

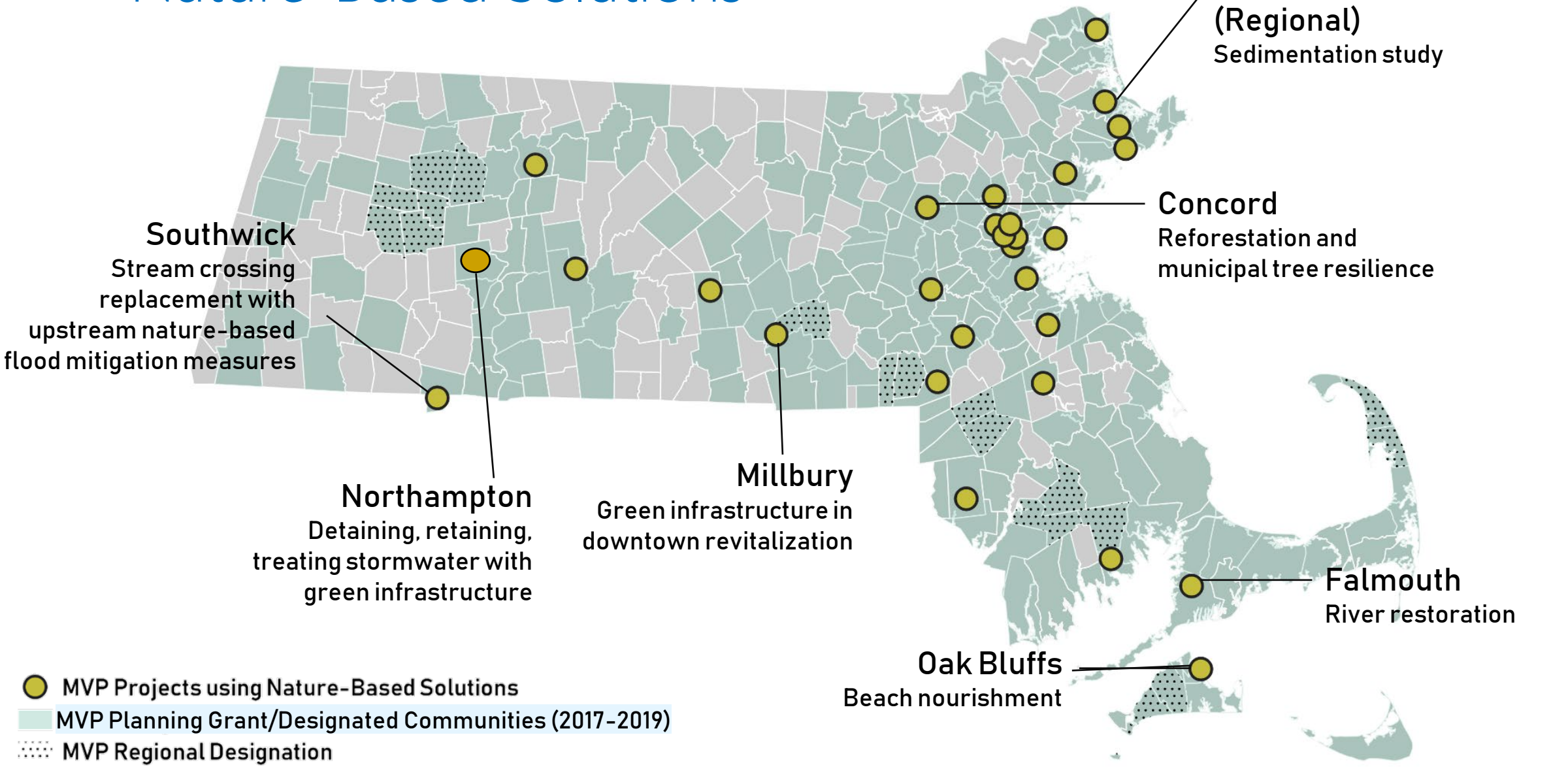
New for 2019

- Energy Resilience
- Chemical Safety
- Land Acquisition for Resilience
- Subsidized Low-Income Housing Resilience Strategies
- Mosquito Control Districts

+ Expanded eligibility of project location

* Most common project type
** Second-most common project type
***Third-most common project type

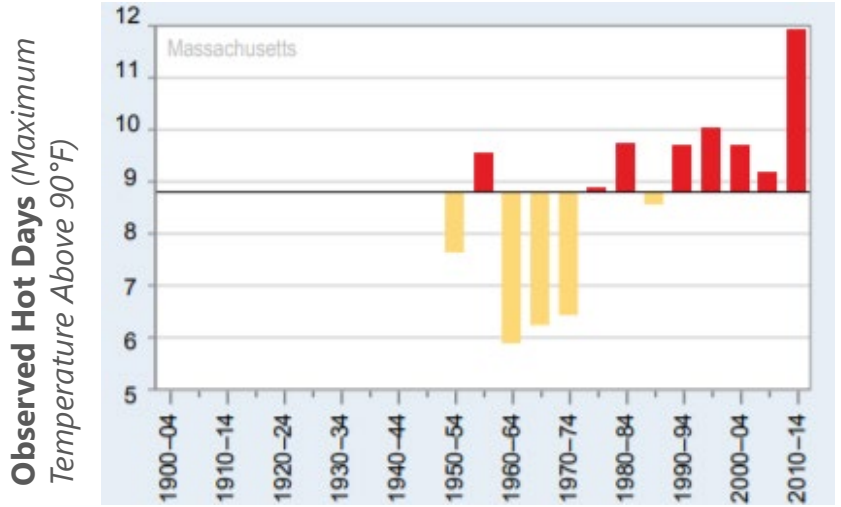
Nature-Based Solutions



Climate Trends, Projections, and Potential Impacts

MA Climate Trends and Observed Conditions

- Between 1900 and 2014, average annual temperatures have increased by approximately 3°F
- The number of extreme heat days (max. temperature over 90°F) has been consistently above average since the 1990s
- The state has experienced above-average precipitation in the last 10 years
- More extreme weather events have been reported since 2005

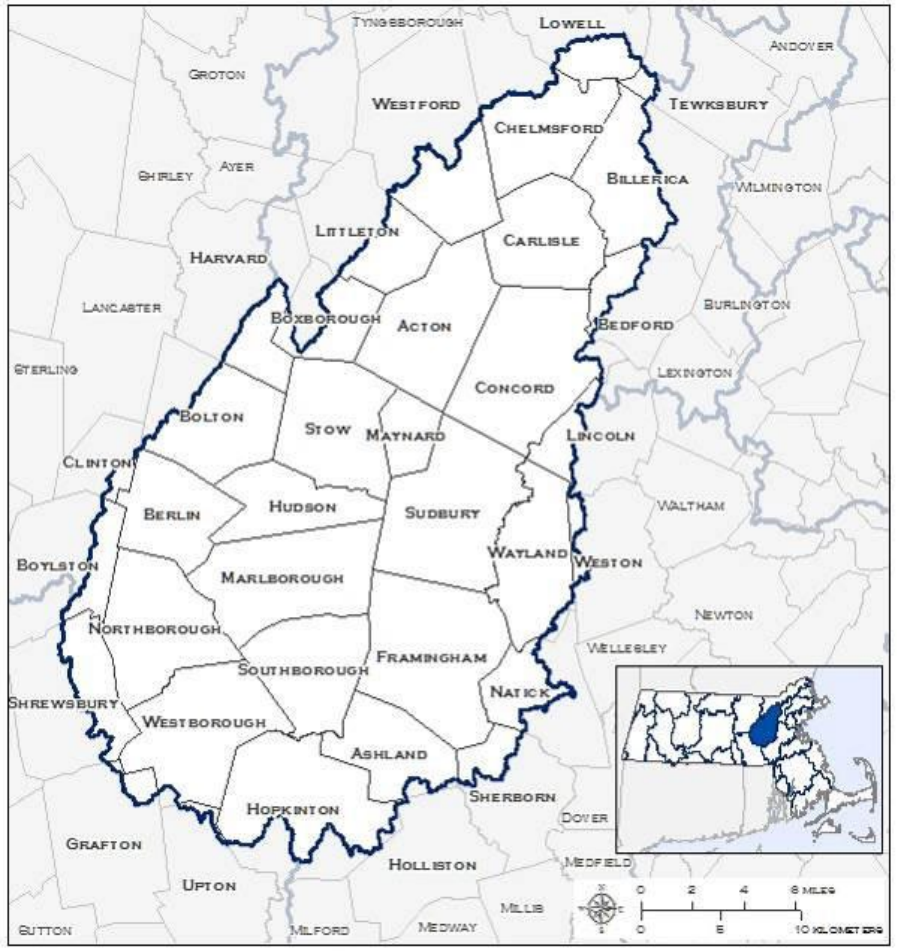


Source: NOAA NCEI State Climate Summary, 2014

Climate Projections for Sudbury-Assabet-Concord Basin

Increased Temperatures

- Average temperatures in the winter are likely to increase more than in the summer
- More extreme heat days are expected.
- More frequent droughts are expected, due to less rainfall and higher projected temperatures.



Source: Massachusetts Climate Change Projections – Statewide and for Major Drainage Basins, EEA, 2018.

Climate Projections for Sudbury-Assabet-Concord Basin

Increased Temperatures

	Baseline (1971 – 2000)	Mid-Century (2050s)	End-of-Century (2090s)
Average annual temperature (°F)	48.7°F	↑ 3.0 to 6.3°F	↑3.8 to 10.9°F
Days per year > 90°F	8	↑ 10 to 35 days	↑ 14 to 76 days
Days per year > 95°F	1	↑ 3 to 17 days	↑ 6 to 48 days
Days per year > 100°F	< 1 day	↑ <1 to 5 days	↑ <1 to 22 days
Days per year < 32°F	143 days	↓ 19 to 40 days	↓ 24 to 65 days
Days per year < 0°F	6 days	↓ 2 to 4 days	↓ 2 to 5 days

Source: Massachusetts Climate Change Projections – Statewide and for Major Drainage Basins, EEA, 2018.

Climate Projections for Sudbury-Assabet-Concord Basin

Changes in Precipitation Patterns

- More precipitation may be expected during winter and spring seasons
- Increasing consecutive dry days may be expected during summer and fall seasons
- Winter precipitation could fall more often as snow by mid-century, but is most likely to be rainfall by the end of the century
- Increased frequency of high-intensity rainfall events is expected through mid- and end of century

Photo credit: Town of Maynard

***Note: Seasonal projections for total precipitation vary, and there is less certainty specifically in the SuAsCo Basin*

Climate Projections for Sudbury-Assabet-Concord Basin

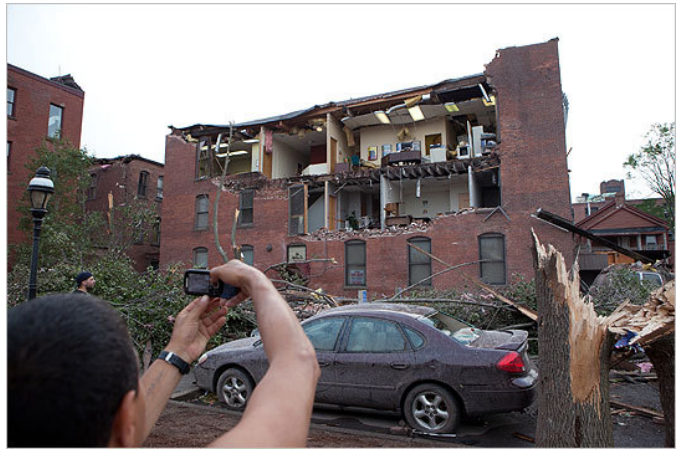
Changes in Precipitation Patterns

	Baseline (1971 – 2000)	Mid-Century (2050s)	End-of-Century (2090s)
Total annual precipitation (inches)	45.4 inches	↑ 0.6 to 6.1 inches	↑ 1.2 to 8.0 inches
Days per year with over 1” rainfall	7 days	↑ 1 to 3 days	↑ 1 to 4 days
Days per year with over 2” rainfall	1 day	↑ <1 to 1 day	↑ <1 to 1 day
Days per year with over 4” rainfall	< 1 day	↑ by <1 day	↑ by <1 day
Annual consecutive dry days	17 days	↑ 0 to 2 days	↓ 1 to ↑ 3 days

Source: Massachusetts Climate Change Projections – Statewide and for Major Drainage Basins, EEA, 2018.

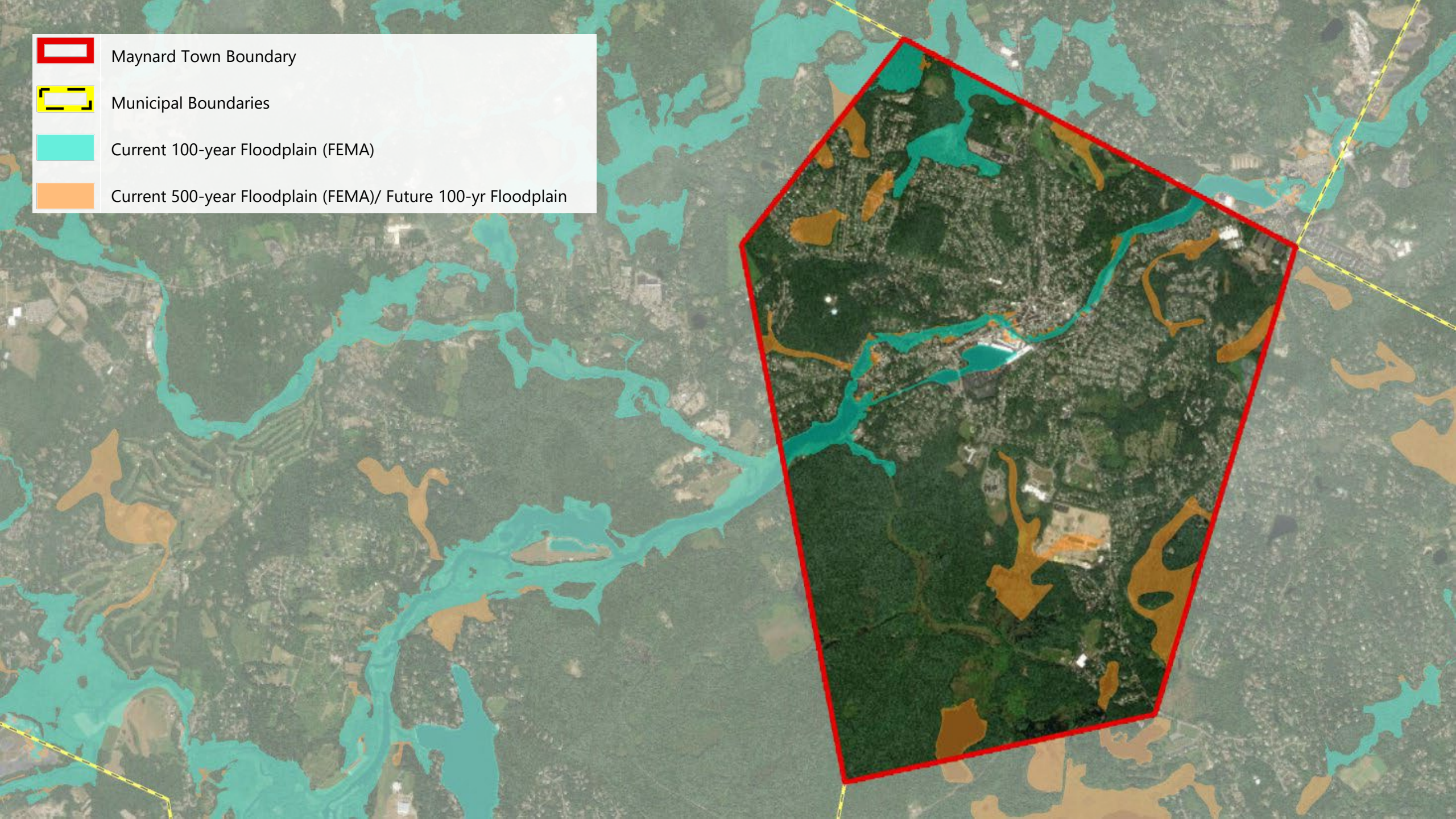
Extreme Storms: Trends & Projections in Massachusetts

- Observed Conditions:
  - Several major winter coastal storms with flooding between 2010 and 2018, including two in 2018.
- Anticipated Conditions:
  - Risk of increased riverine flooding;
    - Mean increase of ~43 percent in flood flows for one-percent flood by 2085
  - More frequent and intense strong hurricanes in the northeast U.S. by 2100
  - Increases in hurricane activity could yield annual property losses of $11-$17 billion



Sources:
Dupigny-Giroux, L.A., et al. 2018. Northeast. In Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II.
The Boston Research Advisory Group Report. 2016. Climate Change and Sea Level Rise Projections for Boston. Retrieved: https://www.boston.gov/sites/default/files/document-file-12-2016/brag_report_-_final.pdf.

Photo credit:
Boston.com


Maynard Town Boundary
Municipal Boundaries
Current 100-year Floodplain (FEMA)
Current 500-year Floodplain (FEMA)/ Future 100-yr Floodplain

Potential Climate Change Impacts

Increased Temperatures

- Poor air quality and risk of heat-related illness due to warmer temperatures and heatwaves
- More winter precipitation falls as rain instead of snow
- Stress on energy, transportation, and communications infrastructure
- More power outages due to high summer cooling demand

Changing Precipitation

- Increases in extent and frequency of flooding
- Increasing rainfall during spring and winter months; longer consecutive dry days in summer and fall and increasing water demand
- Risk/damages to culverts, roadways/bridges and other critical infrastructure

Extreme Storms

- Risk/damage to building envelopes due to high winds and thunderstorms
- Increased risk of pollutant runoff into water bodies
- Fallen trees and debris during severe storms, leading to power outages and threat to community safety

Key Hazards to Consider for Maynard

Extreme Precipitation Events/Flooding

Severe Storm Events

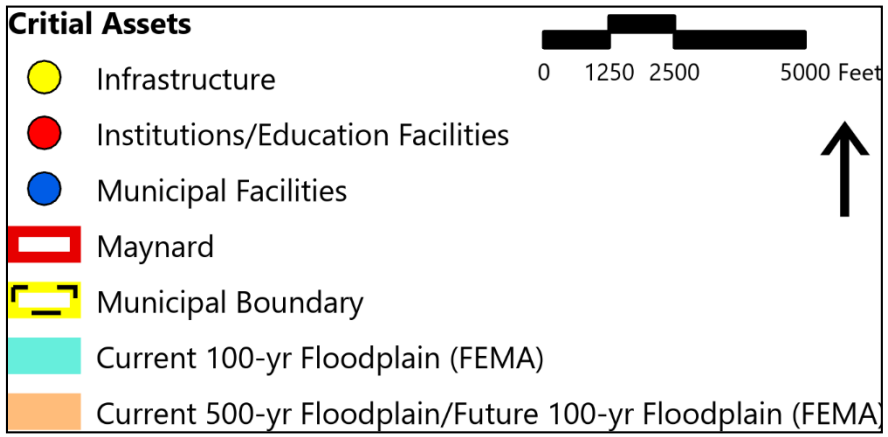
Extreme Heat / Heat Waves

Wildfire

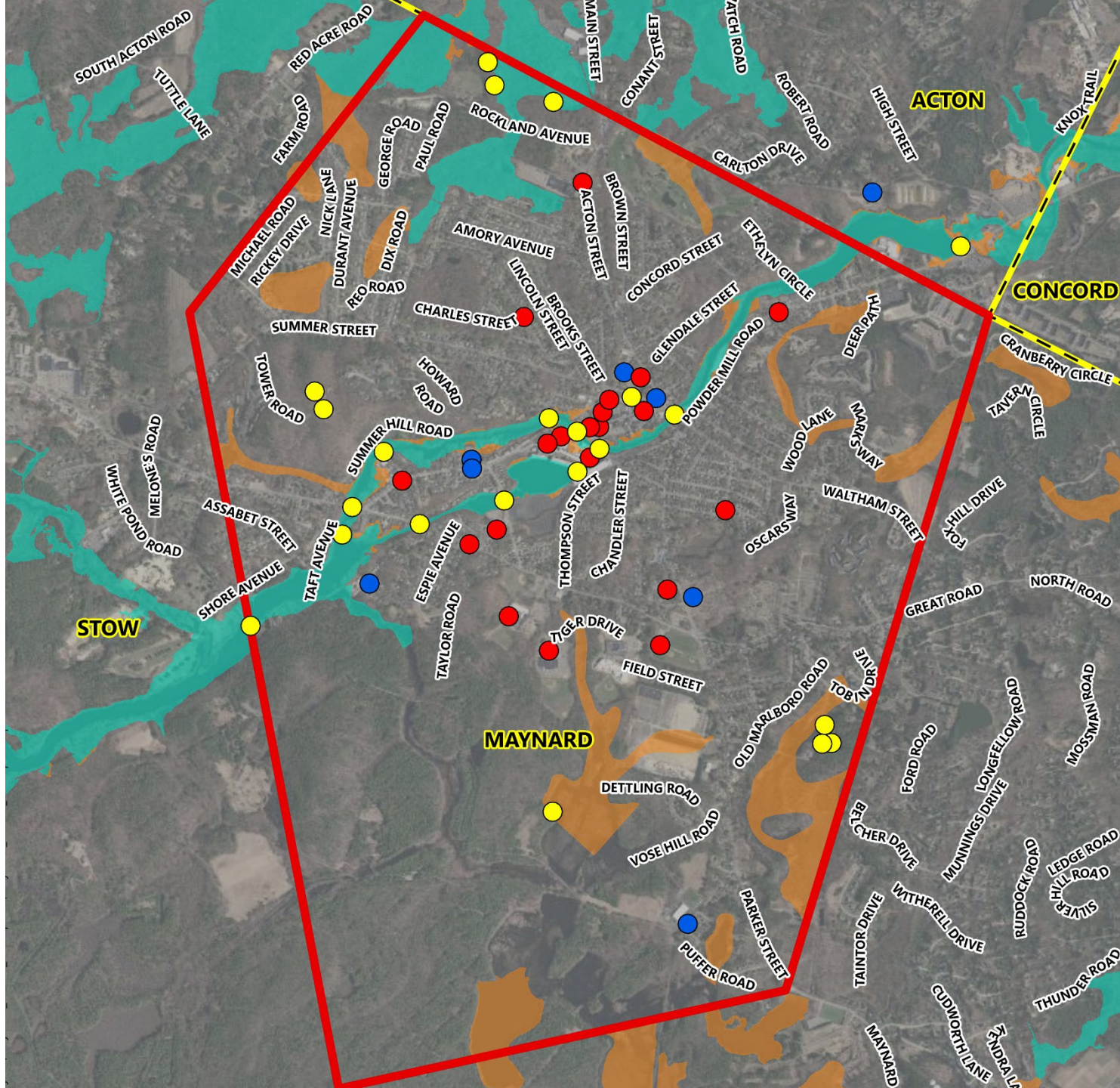
Review of Critical Assets

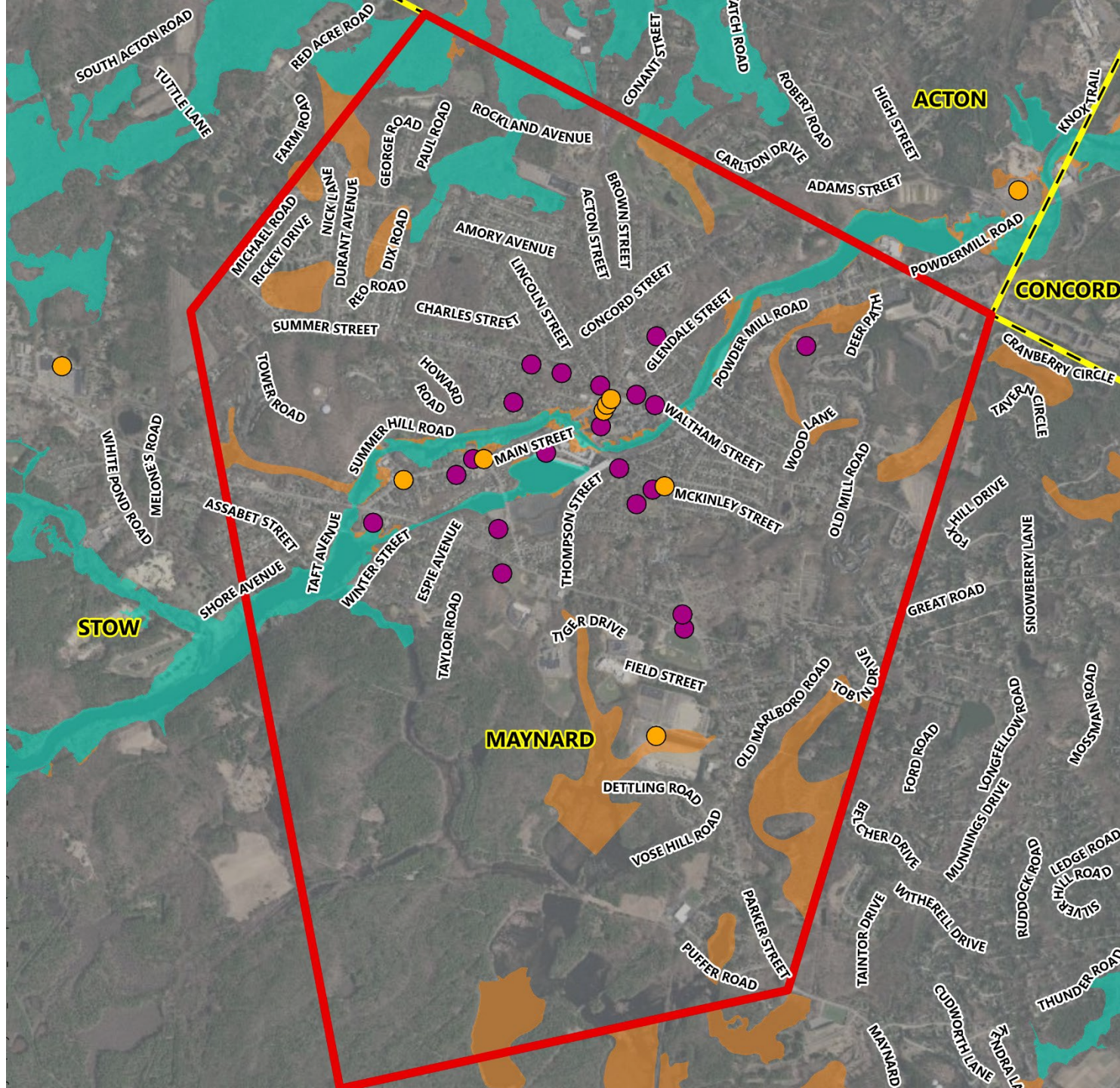
Maynard's Critical Assets and Infrastructure

- Infrastructural
  - Schools, Businesses, Transportation System, Utilities
- Societal
  - Housing, At-Risk Populations, Public Health Resources, Social Services, Faith-Based Organizations
- Environmental
  - Natural Features, Open Space and Recreation Resources
- Other Critical Facilities?

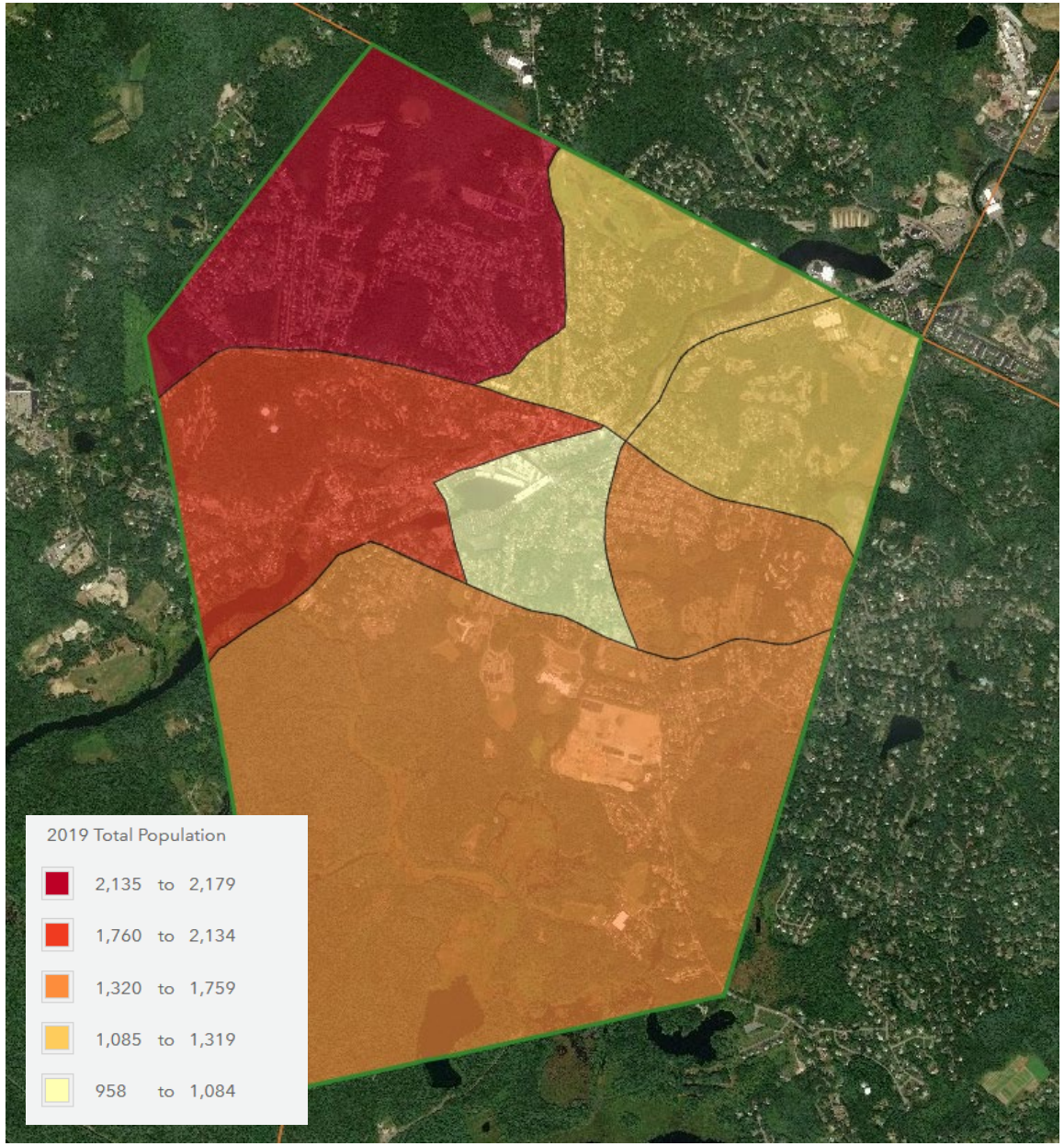


Critical Infrastructure Assets

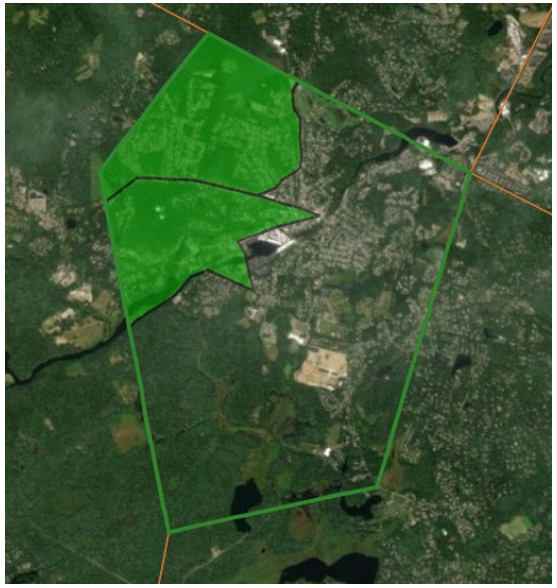




Critical Societal Assets



Population Distribution

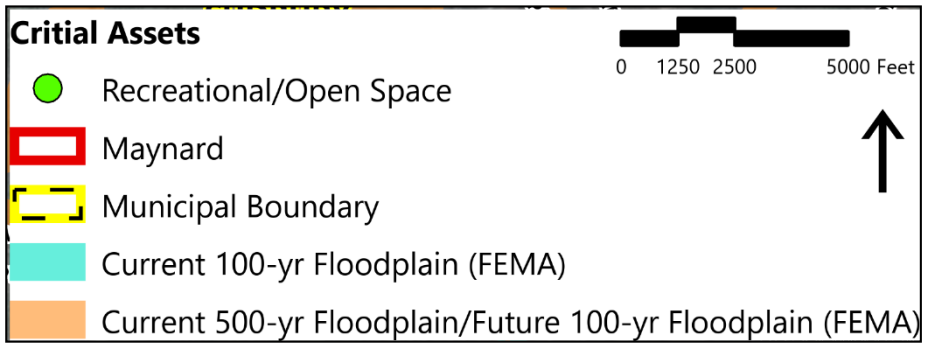


Senior Population (65+)

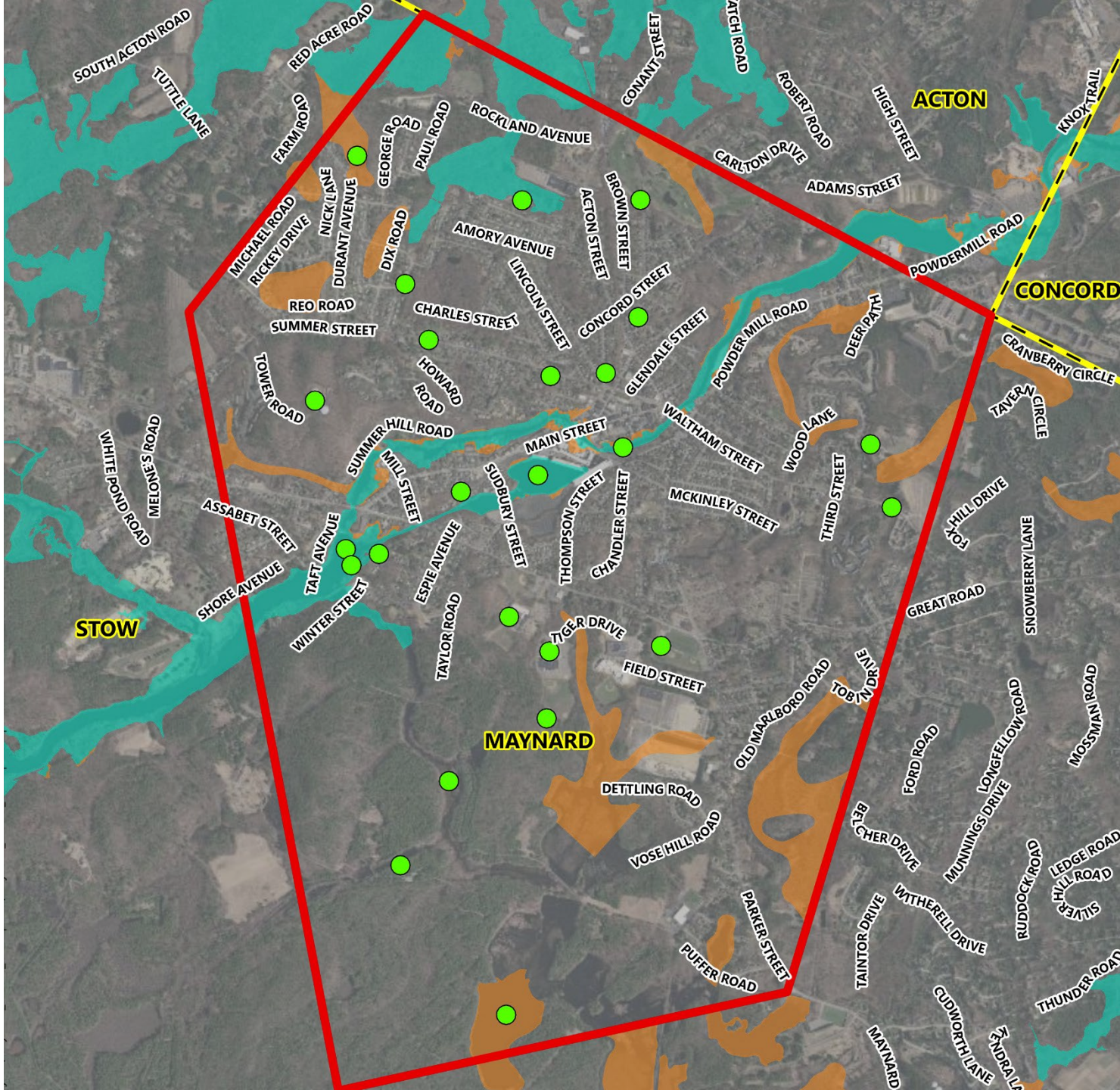
Households in Poverty

Minority Population

Employee Concentration



Critical Environmental Assets



Community Resiliency Building Risk Matrix

Break-Out Session

Community Resilience Building Risk Matrix

Step 1: Identify Top Priority Hazards

Community Resilience Building Risk Matrix www.CommunityResilienceBuilding.org

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Community Resilience Building Risk Matrix

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Community Resilience Building Risk Matrix

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Community Resilience Building Risk Matrix

www.CommunityResilienceBuilding.org

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Community Resilience Building Risk Matrix (Example)

Community Resilience Building Workshop Risk Matrix

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New Ambulance Center	Specific	Town	S	Continue to support services in budget; Add additional staff and vehicle in next annual cycle					Ongoing
Zoning Regulations (maintain large lot size)	Multiple	Town	S	Current building codes control development in risky areas; Consider additional zoning incentives (TDRs) to reduce risk to residential units					Ongoing

In Small Groups…

1. Team introductions; identify a spokesperson (not the facilitator)

2. Review the hazards we are focusing on:

Extreme Precipitation Events / Flooding	Severe Storm Events	Extreme Heat / Heatwaves	Wildfire

3. Confirm infrastructural, societal, and environmental critical assets/features and identify their vulnerabilities and strengths

4. Report Back

Workshop Wrap Up

Workshop Wrap-up

- What have we heard today?
  - What didn't you know, what surprised you?
- Post Workshop
  - Finalize the workshop products and develop/deliver a Summary of Findings

Thank you for your hard work!

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Lee Carar	Historical Commission,	clerk	lee.carar@gmail.com
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Justin DeMarco	DPW/Director	DPW/Town of Maynard	Jdemarco@townofmaynard.net
WAYNE AMICO	TOWN ENGINEER	DPW	WAMICO@TOWNOFMAYNARD.NET
Michael Noble	Police Chief	Police	mnoble@maynardpolice.com
Kane Young	CC + Assistant Planner	OMS	Kyoung@townofmaynard.net
Megan Zammuto	Assistant Town Administrator	TA/OMS	mzammuto@townofmaynard.net
Bill Nemser	Town Hall	OMS	BNemser@townofmaynard.net
Lori Kennedy	VHB - MS4 Program	VHB	lkennedy@vhb.com

Maynard Municipal Vulnerability Preparedness (MVP): Workshop #2

~~January 28, 2020~~ FEB 4, 2020

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Tina Woolston	maynard citizen		twoolston@tufts.edu
Lee Caras	Historical Commission		lee.caras@gmail.com
Orian Greene	Green Maynard —		Orian3737@gmail.com
Jan Rosenberg	Maynard Conm. Gardeners		janrosenberg708@gmail.com
Jen Beese	Assoc. of Energy Engr.		jedi.beese@gmail.com
Kate Wheeler	Maynard Town Tree Co.	skillymarno@gmail	skillymarno@gmail.com
Bill Nemsick	Maynard town Hall	OMS	on file
Alison Field-Juma	Exec. Director	OARS	afieldjuma@oars3rivers.org
RICHARD ASMANN	BUILDING COMMISSIONER	OMS	RASMANN@TOWNOFMAYNARD.NET
Carissa Mills	VHB		
GARRY MCCARTHY	STANTEC		GARRY.MCCARTHY@STANTEC.COM
Lori Kennedy	VHB/Maynard MS4		lkennedy@vhb.com
		Send map	

Appendix B

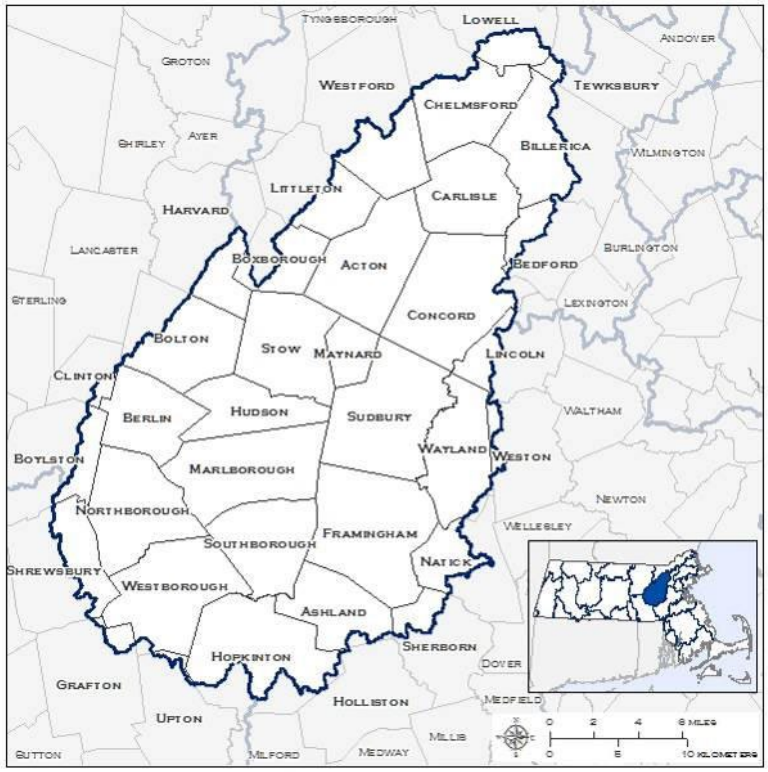
Climate Summary – Historic Trends and Projected Changes

List of Identified Critical Assets

Summary of Climate Change Trends & Projections for Maynard, MA

The following summary provides key climate change trends and projections for the U.S. Northeast, and more specifically for Massachusetts, the Sudbury-Assabet-Concord (SuAsCo) Basin, and Maynard, MA where possible, based on existing climate data and reports. This information, along with preliminary critical assets and systems identified using several pre-existing plans and studies for the Town of Maynard, will help evaluate the potential climate change impacts on the built, natural, and social environments of Maynard in near- and long-term. **Figure 1** shows the location of the SuAsCo basin. Maynard is located at the center of the basin.

Figure 1 – SuAsCo Basin, Massachusetts



Source: Massachusetts Executive Office of Energy and Environmental Affairs. (2018). Massachusetts Climate Change Projections.

CLIMATE TRENDS & OBSERVED CONDITIONS

According to the National Oceanic and Atmospheric Administration's (NOAA's) State Climate Summary for Massachusetts,[1] the state has already experienced the following changing climate conditions:

- The average annual temperature for Massachusetts ranges between 46°F (inland) to 50°F (along coastal areas; averages can vary from place to place depending on elevation, topography and other

1 Runkle, J., K. Kunkel, R. Frankson, D. Easterling, A.T. DeGaetano, B. Stewart, and W. Sweet. (2017). *Massachusetts State Summary*. NOAA Technical Report: 149-MA.

environmental factors including urbanization. Between 1900 and 2014, the state's average annual temperatures have increased by approximately 3°F.

- The long-term average number of days with maximum temperature above 90°F in Massachusetts was approximately 9 days between 1900-2014. The number of hot days with maximum temperature above 90°F has been consistently above average since the 1990s. It should also be noted the state experienced the highest number of days with maximum temperature above 90°F in the most recent period between 2010-2014.
- The Commonwealth of Massachusetts has experienced above-average precipitation in the last 10 years, averaging approximately 51 inches per year (compared to the overall long-term average of 45 inches per year between 1895-2009). Furthermore, since 2005, Massachusetts has reportedly been experiencing more extreme precipitation events (days with 2+ inches of rainfall), approximately 30 percent above the overall long-term average.

CLIMATE PROJECTIONS FOR MASSACHUSETTS AND THE SUDBURY-ASSABET-CONCORD BASIN

The Massachusetts Climate Change Projections, published by the Executive Office of Energy and Environmental Affairs (EEA), provides a standard, peer-reviewed set of temperature and precipitation projections to help municipal officials, state agency staff, land managers, and others to identify potential impacts due to changing climate conditions. Climate projections are based on the latest information from the International Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) in 2013. AR5 uses four Representative Concentration Pathways (RCP) as basis for the report's climate projections; each RCP represents a different trajectory of potential greenhouse gas (GHG) concentration levels by the year 2100. In the EEA's statewide climate projections, two specific scenarios—RCP 4.5 (medium GHG concentration scenario) and RCP 8.5 (high GHG concentration scenario)—were chosen for analysis. These RCPs are commonly utilized to display a range of GHG concentration that is most likely to occur based on current global trends and policies.

In addition to statewide projections, this data is also extrapolated to the state's major watershed basins. Due to regional differences, the MVP program recommends focusing on the basin data for more locally specific data rather than statewide data. The Sudbury-Assabet-Concord (SuAsCo) Basin, located in north-central Massachusetts encompasses 36 municipalities either partially or entirely, and Maynard, bordered by Stow, Sudbury, and Acton, is located in the center of this watershed basin. **Table 1** presents a summary of climate change conditions projected for the SuAsCo Basin in Massachusetts. These are also the most locally specific climate projections available for Maynard.

Table 1 - Summary of Climate Change Projections for the SuAsCo Basin

Climate Conditions	Timeframes		
	Baseline (1971-2000)	**Mid-Century (2050s)**	**End-of-Century (2090s)**
Average annual temperature (°F)	48.7°F	↑ 3.0 to 6.3°F	↑3.8 to 10.9°F
Days per year > 90°F	8	↑ 10 to 35 days	↑ 14 to 76 days
Days per year > 95°F	1	↑ 3 to 17 days	↑ 6 to 48 days
Days per year > 100°F	<1 day	↑ <1 to 5 days	↑ <1 to 22 days
Days per year < 32°F	143 days	↓ 19 to 40 days	↓ 24 to 65 days
Days per year < 0°F	6 days	↓ 2 to 4 days	↓ 2 to 5 days
Total annual precipitation (inches)	45.4 in.	↑ 0.6 to 6.1 in.	↑ 1.2 to 8.0 in.

Table 1 - Summary of Climate Change Projections for the SuAsCo Basin (Continued)

Days per year with over 1" rainfall	7 days	↑ 1 to 3 days	↑ 1 to 4 days
Days per year with over 2" rainfall	1 day	↑ <1 to 1 day	↑ <1 to 1 day
Days per year with over 4" rainfall	< 1 day	↑ by <1 day	↑ by <1 day
Annual consecutive dry days	17 days	↑ 0 to 2 days	↓ 1 to ↑ 3 days

Source: Massachusetts Executive Office of Energy and Environmental Affairs. (2018). Massachusetts Climate Change Projections.

Rising Temperatures

Temperatures across the state are projected to increase significantly over the next century. Winter average temperatures are likely to increase more than those in summer. During the warmer months, residents can expect more extreme heats days (over 90°F). And overall, with less rain in the summer and generally higher temperatures, regions across Massachusetts could see more frequent droughts.

Similarly, average temperatures within the SuAsCo Basin are projected to increase throughout the 21st century, such that Maynard may expect to see:

- Maximum summer temperatures increase: approximately 3°F to 7°F by mid-century, and 4°F to 13°F by end of century;
- Maximum fall temperatures increase: approximately 4°F to 7°F by mid-century, and 4°F to 12°F by end of century;
- Minimum winter temperatures increase: approximately 3°F to 8°F by mid-century, and 4°F to 11°F by end of century;
- Minimum fall temperatures increase: approximately 4°F to 7°F by mid-century, and 4°F to 12°F by end of century;
- Increase in the number of days with maximum temperatures over 95°F: approximately 3 to 17 more days by mid-century, and 6 to 48 days by end of century; and
- Decrease in cold weather days: approximately 19 to 40 less days with minimum temperature below 32°F and 2 to 4 less days with minimum temperatures below 0°F by mid-century, and approximately 24 to 65 less days with minimum temperature below 32°F and 2 to 5 days with minimum temperatures below 0°F by end of century.

Changes in Precipitation Patterns

The spring and winter months in Massachusetts are expected to see more precipitation while the summer and fall days are expected to continue to experience the highest number of consecutive dry days. By mid-century (2040-2069), increases in winter precipitation will fall as snow, but by the end of the century, most of this precipitation will likely fall as rain.

In the SuAsCo Basin specifically, there is some uncertainty. Seasonal projections for total precipitation vary, such that summer and fall seasons could see either more or less total precipitation throughout the 21st century. Overall, based on the projections for precipitation, Maynard may see:

- Total annual average precipitation increases up to 6 inches by mid-century, and up to 8 inches by end of the century;
- Slight increase in days with precipitation over 1" during winter and spring seasons, but either a slight increase or decrease in days with precipitation over 1" during summer and fall seasons by mid- and end of century;

- Either a decrease or increase in the number of consecutive dry days in summer, with the highest increase of up to two additional days during fall season by the end of the century; and
- Increase in number of consecutive dry days during fall, with highest increase of up to three additional days during fall season by the end of the century.

Climate models examined in the EEA report also indicate that the frequency of high-intensity rainfall events will increase over time throughout the 21st century.

Increase in extreme weather events

The MA statewide climate projections in the EEA report did not include data on extreme weather events. Therefore, climate data from the National Climate Assessment's Northeast Region Report was used for this section. Climatologists are predicting that North Atlantic hurricane intensity and rainfall are likely to increase as the climate continues to warm.[2] Warming local sea surface temperature is one of the many factors that may influence the frequency, intensity and duration of hurricane activities in North Atlantic. Although the projection of hurricanes and coastal storm events reaching Massachusetts is not as certain, it should be noted that the state was impacted by two major winter coastal storms in 2018 that required FEMA assistance.[3]

Regional and Local Flood Projections

The Boston Research Advisory Group (BRAG)'s *2016 Climate Change and Sea Level Rise Projections for Boston Report* was considered as the basis for future flood projections. The Report uses four (4) regional studies and projections to estimate the magnitude of future flooding events. **Table 2** highlights the best available estimates for changes in river floods.

Table 2 – Estimates for Changes in River Floods

Flood Type	2055	2085
Small floods (e.g., 2-year recurrence interval)	0 to 20%	20% to 50%
Design floods (e.g., 100-year)	-10% to 35%	15% to 70%

Source: City of Boston. (2016). Climate Change and Sea Level Rise Projections for Boston, The Boston Research Advisory Group Report.

Based on available data from this Report, it shows that the approximate mean forecasted "design flood" (one-percent flood) has an approximate mean increase of 43 percent in flood flows for the year 2085.

It should be noted that, based on some climate models, design floods may decrease as a result of climate change. Some projections for springtime flooding in New England show a significant decrease in the

2 Dupigny-Giroux, L.A., E.L. Mecray, M.D. Lemcke-Stampone, G.A. Hodgkins, E.E. Lentz, K.E. Mills, E.D. Lane, R. Miller, D.Y. Hollinger, W.D. Solecki, G.A. Wellenius, P.E. Sheffield, A.B. MacDonald, and C. Caldwell, 2018: Northeast. In Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 669–742. Accessed December 4, 2019, from https://nca2018.globalchange.gov/chapter/18/

3 Massachusetts Executive Office of Energy and Environmental Affairs. (2018). *Massachusetts State Hazard Mitigation and Climate Adaptation Plan*. Retrieved December 12, 2019, from http://nescaum-dataservices-assets.s3.amazonaws.com/resources/production/SHMCAP-September2018-Full-Plan-web.pdf

amount of snowpack, which could reduce springtime flooding. This accounts for the -10 percent possible change in flooding presented in Table 3.

Additionally, some of the studies used by BRAG to develop the flood flow estimates have known methodological shortcomings, which are detailed in their reports. Further, the future amounts of emissions, and potential future legislation effecting those totals is not known, and will have a large influence over the amount of warming anticipated over the next century. Such uncertainty is inherent in the prediction of future climate, and the range of events analyzed herein seeks to alleviate some of this concern. Given these shortcomings and uncertainty, the mean increase of 43 percent should be interpreted as a broad approximation of the increase in flood flows in the year 2085 using best available information.

FEMA Flood Insurance Study

The Federal Emergency Management Agency (FEMA) has completed a Flood Insurance Study (FIS), Number 25017CV001C revised July 6, 2016, for Middlesex County to investigate the existence and severity of flood hazards. The FIS was used in development of the FEMA Flood Insurance Rate MAP (FIRM) Map Number 25017C0362F, dated July 7, 2014, which delineates the Special Flood Hazard Area's (SFHA's) within Maynard, MA. The Assabet River represents the main waterway that contribute to flooding within Maynard. **Table 3** represents the FIS flood flows at the referenced locations: Assabet River (about 10 feet downstream of Acton Street) and Assabet River (about 190 feet downstream of Great Road).

Table 3 - FEMA FIS Flood Flows and Elevations for Standard Design Storm Events

Assabet River (about 10 feet downstream of Acton Street)

Percent-Annual-Chance Flood	Flow (Cubic feet per second)
10-Percent	2,240
2-Percent	3,400
1-Percent	3,950
0.2-Percent	5,380

Assabet River (about 190 feet downstream of Great Road)

Percent-Annual-Chance Flood	Flow (Cubic feet per second)
10-Percent	2,230
2-Percent	3,380
1-Percent	3,930
0.2-Percent	5,350

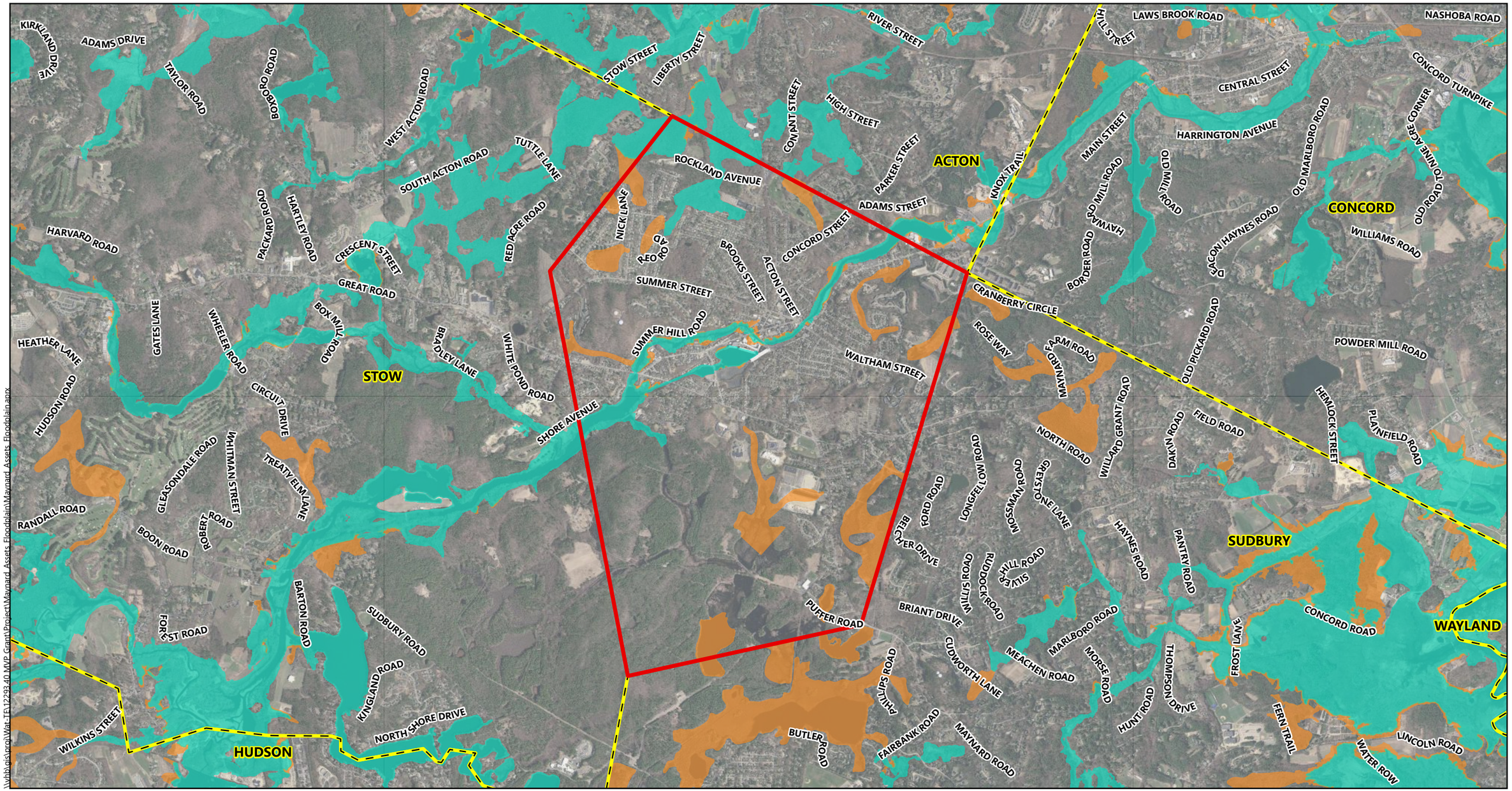
It should be noted that the FIS presents several flood flows within Maynard. However, to simplify this analysis, the above two locations were selected as a general representation of the current flood flows within Maynard.

Flood Projection

FEMA FIS flows were used as a basis to develop forecasted flood projections. The current ten-percent annual chance (i.e. 10-year flood) in comparison to the current 0.2-percent flood (i.e. 500-year flood)

represents an approximate 42 percent increase in flood flows. This approximate 42 percent increase is comparable to the BRAG projection for flood flows (43 percent increase) for the mean projection for 2085. Therefore, the current 0.2-percent flood (i.e. 500-year flood) is approximately equal to the BRAG forecasted 2085 mean projection for the one-percent flood (i.e. 100-year flood event).

Figure 2 illustrates the extents of the current 0.2-percent flood (500-year flood) and forecasted approximate ten-percent flood (100-year flood) within Maynard. The projected increase in flood flows and flooding extents is approximate and is for preliminary planning purposes only. A detailed hydrologic/ hydraulic analysis and further study on projected increases in flood flows is necessary to refine forecasted flood limits.



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0 1500 3000 6000 Feet

Legend

- Maynard
- Municipal Boundary
- Current 100-yr Floodplain (FEMA)
- Current 500-yr Floodplain/Future 100-yr Floodplain (FEMA)

Maynard MVP | Maynard, MA

Approximate 100 and 500 Year Floodplain Key Assets

Note: This map is an approximate representation of the forecasted limits of flooding. The map does not provide information regarding changes in base flood elevations that may occur over time.

Source: FEMA, MassGIS, VHB

Potential Impacts from Projected Climate Change Conditions

The following section highlights some of the potential impacts as a result of the projected changes in climate conditions described above. This high-level list presents a broad range of possible impacts, including possible damages to environmental resources, existing buildings and infrastructure, limitations of future development, as well as health-related risks that may compromise the well-being of all workers, residents, and visitors.

Impacts from rising temperatures

- Poor air quality and increasing risk of heat-related illnesses due to increase in warmer temperature days and extended heat waves.
- Precipitation during winter months will more likely be rainfall and ice rather than snowfall due to warmer winters.
- Increasing stress on transmission lines, substations, train tracks, roads, bridges, and other critical infrastructure due to more intense heat.
- Increasing frequency of power outages due to larger demand for cooling during summer days.
- Increasing risk of wildland fires.

Impacts from changing precipitation conditions

- Increasing rainfall during spring and winter months and longer consecutive dry days in summer and fall months.
- Increases in depth, duration, extent, and frequency of flooding.
- Increasing stress on stormwater infrastructure.
- Increasing risk and/or damages to bridges, culverts, roadways, and other critical infrastructure due to flooding.
- Increasing risk of deteriorating soil conditions due to increasing flooding events and heavy downpours.
- Increasing water demand due to more frequent droughts.

Impacts from increasing frequency and intensity of rainfall, flood-inducing weather events, and storms

- Increasing risk and/or damages to building envelopes of existing buildings and facilities due to extreme weather events, particularly during thunderstorms and high wind conditions.
- Increasing risk of pollutant runoff into water bodies due to increasing flash floods and heavy downpours.
- Weakening tree root systems due to droughts, becoming more susceptible to toppling during high wind events.
- Fallen trees and debris during severe storm events that may damage power lines and result in power outages, as well as pose threats to community safety.

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Municipal Vulnerability Preparedness Program – Town of Maynard

Workshops #1 and #2 – Infrastructural Assets

Map ID	Name	Street Address
1	Maynard Public Library	77 Nason St
2	Maynard Fire Station	1 Summer St
3	Town Hall	195 Main St
4	Maynard Police Department	197 Main St
5	Green Meadow Elementary School (K-3)	1 Tiger Dr
6	Fowler Middle School (4-8)	3 Tiger Dr
7	Water/Sewer Department Garage	38 Winter St
9	Wastewater Treatment Plant	20 Adams St
20	Massachusetts State Police Forensic and Technology Center	124 Acton St
22	Middlesex Savings Bank (Nason Street)	17 Nason St
24	Middlesex Savings Bank (Powder Mill Road)	72 Powder Mill Rd
26	Citizens Bank	47 Nason St
27	United States Post Office	143 Main St
28	Santander Bank ATM	105 Main St
32	Electric Vehicle Charging Station	2-18 Summer St
40	FEMA Office (1)	65 Old Marlboro Rd
51	42 Summer Street – Proposed Multi-Family Development	42 Summer St
54	129 Parker Street – Maynard Crossing (Commercial, 55+ Residential)	129 Parker St
55	Clock Tower Place (“The Mill” or “Mill and Main”)	Mill & Main Place
57	Maynard Famer’s Market	Mill & Main Place
58	Art’s Specialties	43 Nason St
59	Corner Store	49 Walnut St
60	Russell’s Convenience	193 Main St
62	Stop & Shop (Acton)	100 Powder Mill Rd
77	Bridge at Florida Road (Town Owned) (25T) and Utilities	
78	Bridge at Mill Street (Town Owned) (25U) and Utilities	
79	Bridge at Walnut Street (Town Owned) (24N) and Utilities	
80	Bridge at Sudbury Street (Town Owned) (24P) and Utilities	
81	Bridge at Great Road (Town Owned) (7PR) and Utilities	
82	Bridge at White Pond Road (Town Owned) (APJ) and Utilities	
83	Bridge at Great Road (DOT Owned) (28M) and Utilities	
84	Bridge at Main Street (DOT Owned) (28T) and Utilities	
85	Bridge at Waltham Street (DOT Owned) (B5F) and Utilities	
87	Glenwood Cemetery	Parker Street
104	Ben Smith Dam	
105	Assabet River at High Street (Acton)	
106	Mill Pond Dam	
107	Water Storage Tank #1 (concrete)	
108	Water Storage Tank #2 (steel)	
109	State Police Crime Lab	124 Acton St
110	Council on Aging/Shuttle	50 Brown St
111	FEMA Office (2)	65 Old Marlboro Rd
112	Highway Department Garage	38 Winter St
113	Salt Storage Building	38 Winter St
114	Old Marlboro Road Filtration Plant: Wells 1G and 2G (3G lost 15 years ago)	
115	Rockland Avenue Filtration Plant: Wells 5G, 6G, 7G	
116	Well #4 Filtration Plant: Well 4G	

Not shown on the map (added during the CRB Workshops):

- Eversource substations – Acton Street, between Concord Street and Everett Street
- Private gas stations – Various
- Leaf compost pile – Summer Street
- Former Waltham Street Municipal Landfill/Solar Field – Waltham Street
- Sewer pump stations (nine in total) – Various
- Fueling Station – DPW Garage, 38 Winter Street
- Parker Hardware – 239 Main Street
- Butler Lumber – 67 Parker Street
- Emergency Communications Station – Police Station and Tower Road

Municipal Vulnerability Preparedness Program – Town of Maynard

Workshops #1 and #2 - Societal Assets

Map ID	Name	Street Address
10	Imago School (K-8 Private School)	3 Percival St
11	Imago School (K-8 Private School)	3 Dineen Cir
12	Danielles' Little Darlings Daycare	26 Hayes St
13	Massachusetts Mayflower Academy (The Virtual High School)	4 Mill & Main Place
14	Nice's Daycare	112 Great Rd
15	Little Green Apples Child Care	00 Randall Rd
16	Mister Sun Family Daycare	
17	Mary Jo's Daycare	12 Glendale St
18	Emerson Medical at Maynard	21 Main St
19	The Community School	82 Main St
21	Minute Clinic, CVS	105 Main St
23	Emerson Hospital	133 Old Rd to 9 Acre Corner
25	Maynard Knowledge Beginnings	4 Mill and Main St
29	Assabet Wool Mill	Mill & Main Campus
30	Homes of Amory and Lorenzo Maynard	
31	Coolidge School	12 Bancroft Street
33	Clock Tower	Clock Tower Place
34	Maynard Historical Society	195 Main St
35	St. Mary's Indian Orthodox Church of Boston	65 Great Rd
36	St. Stephen's Knanaya Church	182 Main St
37	St. Bridget's Church	1 Percival St
38	Mission Evangelical Congregational Church	19 Walnut St
39	Holy Annunciation Orthodox Church	15 Prospect St
41	ArtSpace	63 Summer St
42	Acme Theater	61 Summer St
43	Kingdom Hall of Jehovah's Witnesses	2 School St
44	Fine Arts Theatre	19 Summer St
45	Boys & Girls Club - Assabet Valley	212 Great Rd
46	Maynard Food Pantry	82 Main St
47	Summerhill Glen Apartments	121 Summer Hill Glen
48	Old Mill Glen	401 Dawn Rd
49	Great Road Apartments	208 Great Rd
50	Powder Mill Place Project	Powder Mille Road
52	Camellia Gardens Gracious Retirement	16 Digital Way
53	Concord Street Circle Apartments	1 Concord St
88	New Hope Fellowship	54 Main Street

Not shown on the map (added during the CRB Workshops):

- Powder Mill Road elderly housing – Powder Mill Road
- Open Table – 33 Main Street
- Jam Time (day care) – 86 Powder Mill Road
- Cultural District – Maynard's downtown area
- Shaws – 155 Great Road, Stow, MA
- Excelsior Comics and Game – 8 Waltham Street
- Assabet Valley Little League – Various
- OARS (river cleanup) – 23 Bradford Street, Concord, MA

Municipal Vulnerability Preparedness Program – Town of Maynard

Workshops #1 and #2 - Environmental Assets

Map ID	Name	Street Address
8	Maynard High School Fields (9-12)	1 Tiger Dr
61	Maplebrook Park	13 Maple St
63	Veteran's Memorial Park	Summer St
64	Crowe Park	143 Great Rd
65	Alumni Field	
66	Rockland Avenue Ball Fields	
67	Maynard High School Field	1 Tiger Dr
68	Fowler School Field	3 Tiger Dr
69	Green Meadow School Field	5 Tiger Dr
70	Rockland Woods/Silver Hill	Silver Hill Rd
71	Waltham Street Ball Field	
72	Maynard Golf Course/Country Club	50 Brown St
73	Maynard Dog Park	128 Waltham St
74	South Acton Swamp	
75	Blue Jay Woods/Reo Road Tot Lot	Reo Road
76	Rod and Gun Club	45 Old Mill Rd
89	Assabet River	
90	Assabet River Reservoir/Ben Smith Impondment Dam	
91	Mill Pond	
92	Assabet River Walk	
93	Summer Hill	
94	Ice House Landing	
95	Puffer Pond	
96	Taylor Brook	
97	Assabet River Rail Trail	
98	Assabet River National Wildlife Refuge	
99	Durant Pond	
100	School Woods	
101	Carbone Park	
102	Walcott Woods/Walcott Street Lot	
103	White Pond (in Stow/Hudson)	

Not shown on the map (added during the CRB Workshops):

- Urban/rural forestry – Various
- Wetlands (unnamed) – Various
- Cemetery Woods/Vernal Pool Complex – Proximate to Glenwood Cemetery
- Coolidge School Park - 41-45 Parker Street
- Open Space District – Winter Street
- Thomas Street River Walk – Thomas Street
- Endangered Species (Blanding's Turtle, elderberry longhorn beetle) – Various
- Water Protection Overlay District (Zone 1)

Maynard MVP

Maynard, MA

Critical Assets

Source: FEMA, MassGIS, VHB

Appendix C

Final Community Resilience Building Risk Matrix for Maynard

Maynard Community Resilience Building Workshop Matrix

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength
Bold = Action
Italics = Note on V or S
(#) = Number of votes during workshop

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Features	Location	Ownership	V or S	Extreme Precipitation / Flooding	Severe Storm Events	Extreme Heat / Heat Waves	Wildfire		Priority H - M - L	Time Short Long Ongoing
Infrastructural										
Sewer Pump Stations	Various locations Critical: Powder Mill Road	Town	V/S	***1. Perform upgrades at sewer pump stations, including acquiring back-up parts and equipment; redesign such infrastructure for redundancy (6)*** *S: Majority of facilities have backup power (natural gas fired); regular maintenance program for backup system s*					1- H	1- S
Water treatment facilities/filtration plants	Various locations Critical: Powder Mill Road	Town	V/S	***1. Redesign water treatment process to adapt to changes in water quality (3)*** *V: Located in flood zone; autofill vulnerability* *S: have on-site generators and portable propane*			***2. Assess Well #4 (in School Woods) for susceptibility to wildfire*** *V: Vulnerable to wildfire*		1- H 2- M	1- S 2- O
Verizon Communication Facility	River Street at Walnut Street	Private	V	***1. Communicate with Verizon on mutual aid*** *V: Located along river*					1- L	1- O
Bridges	Bridges (nine in total) – particularly those at Mill Street, Walnut Street, Sudbury Street, Great Road, White Pond Road, and Main Street	Town	V	***1. Indicate weight limits for emergency vehicles*** ***2. Provide protection for utilities*** ***3. Conduct condition assessments and perform repairs (3)*** ***4. Assess bridges for flood risk*** *V: Some are structurally deficient and/or along evacuation routes*					1- M 2- M 3- M 4- M	1- O 2- O 3- O 4- O
DPW Garage	38 Winter Street	Town	V	***1. Elevate/relocate fuel tanks at garage*** ***2. New DPW garage facility (1)*** ***3. Plan for staging equipment in designated areas*** *V: Located in floodplain; houses main fuel source*					1- H 2- M 3- M	1- S 2- O 3- O
Emergency Communications Tower	Police Station and Tower Road	Town-owned equipment; privately-own facility	V		*V: Vulnerable to lightning, wind* *S: Backup communications at Town Hall and/or Police/Fire channel*					
Council on Aging/Golf Function Hall	50 Brown Street	Town	S	*S: Use to shelter*						

Maynard Community Resilience Building Workshop Matrix

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength
Bold = Action
Italics = Note on V or S
(#) = Number of votes during workshop

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Features	Location	Ownership	V or S	Extreme Precipitation / Flooding	Severe Storm Events	Extreme Heat / Heat Waves	Wildfire		Priority H - M - L	Time Short Long Ongoing
Schools (Green Meadow Elementary School, Fowler Middle School, Maynard High School)	Tiger Drive - Various locations	Town	V/S	***1. Assess schools for susceptibility to wildfires*** ***2. High School: Identify opportunities for rooftop solar or within parking areas. Incorporate battery storage*** ***3. Fowler Middle School: Prepare to be solar ready*** ***4. Conduct a Solar PV feasibility/opportunity study*** *S: Use to shelter; some facilities solar ready* *V: Some facilities need A/C upgrades*					1- M 2- M 3- L 4- L	1- O 2- S 3- S 4- O
Wastewater Treatment Plant / Sewer System	20 Adams Street/Various	Town	V	***1. Funding for sewer collection system - I/I repairs (2)*** *V: Infiltration to road, river, homes with failure*					1- M	1- O
FEMA Office/Facilities (2)	38 Winter Street	Federal	S	***1. Formalize FEMA partnership/support*** *S: Communications and resources in event of emergency*					1- H	1- S
Water storage tanks (2)	Summer Hill	Town	V	*V: vulnerability to flood and/or storms*						
Solar PV field at the Former Waltham Street Municipal Landfill	Waltham Street	Private	N/A	***1. Explore potential to add battery storage (not currently equipped)***						
Rooftop solar on municipal facilities/residential dwellings	Various	Private	S	***1. Solar PV/battery storage community education*** ***2. Conduct a solar photovoltaic feasibility/opportunity study for all municipal facilities and properties; consider the incorporation of battery storage (interactive/hybrid or off-grid) with any potential installation***					1- L	1- S
Old Marlboro Road Filtration Plant (Wells 1G, 2G, 3G, 4G)	Old Marlboro Road	Town	V			***1. Upgrade treatment facilities and processes to adapt to changes in water quality and quantity (7)*** *V: Limited supply from wells for fire suppression and other needs*			1- H	1- S
White Pond	Town of Stow/Town of Hudson	Town	V	***1. Upgrade treatment facilities and processes to adapt to changes in water quality and quantity (7)*** ***2. Design/construct a treatment and transmission system to bring White Pond supply online, as appropriate*** *V: Water quality impacts due to development and changing climate conditions*					1- H 2- H	1- S 2- L
Fire Station	1 Summer Street	Town	V				***1. Need sprinklers at Fire Station OR new fire station*** *V: All apparatus in one building in event of disaster*		1- H	1- S

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Features	Location	Ownership	V or S	Extreme Precipitation / Flooding	Severe Storm Events	Extreme Heat / Heat Waves	Wildfire		Priority H - M - L	Time Short Long Ongoing
Town Hall/Police Office	195 Main Street	Town	S	***1. Assess temporary flood control measures for the Town Hall/Police Department*** ***2. Identify and pursue a potential new storage location(s) for the town's critical/historical records*** ***3. Conduct a climate action and resilience plan*** *V: Flood vulnerability for Town Hall* *S: Communication resources; shelter*					1- H 2- H	1- S 2- S
Evacuation Routes	o Route 27 North and South of Assabet River o Route 117 East through Concord, MA to Route 2 o Route 62 West of the Assabet River headed West o Route 62 East of the Assabet River through Concord, MA to Route 2	Town/State	V/S	***1. Complete a drainage study and ensure adequate drainage at evacuation routes*** *S: Evacuation method in the event of floods, storm events* *V: Downed trees and powerlines are a threat to clear evacuation routes*					1- H	1- S
Eversource Electrical Substations	Acton Street, between Concord Street and Everett Street	Private	S		***1. Communicate with Eversource on mutual aid*** *S: Energy infrastructure*				1- L	1- O
Former Town Landfill	Waltham Street	Town	V	***1. Assess potential erosion control measures for capped landfill*** *V: Vulnerability to extreme events*			*V: Vulnerability to extreme events*		1- L	1- L
Tennessee Gas Pipeline Co. Transmission Line	Along the Town of Sudbury border; Valve site just north of Waltham Street	Private	V	*V: Vulnerability to extreme events*			*V: Vulnerability to extreme events*			
Ben Smith Dam/Mill & Main Dam	Assabet River at Great Road/Mill & Main Campus	Private	V	*V: Flood vulnerability* *S: Potential storage capacity*						
Downtown spaces/amenities	Maynard's downtown	Public	V	***1. Consider green infrastructure improvements in the downtown area*** *V: Facility shutdowns during blizzard*		***2. Consider a shading program in the downtown area*** *V: Exposures due to heat island effect*			1- H 2- H	1- S 2- S
Facilities not up to building code	Various	Town/Private	V	***1. Assess zoning bylaws for resiliency (1)*** *V: Building integrity and condition may be vulnerable to extremes*					1- H	1- S

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Drainage Infrastructure	Various	Town	V	***1. Study nature-based solutions for run-off drainage*** *V: Infrastructure within EM corridors is most critical*					1- M	1- L
Acton and Sudbury Water Districts	Town of Acton/Town of Sudbury	Public	S	*S: Regional partners to help mitigate extreme events/conditions*						
Emergency Management Program	NA	Town	V	***1. Emergency response trailer and provide signage resources*** ***2. Assess staffing capacity to support critical services*** ***3. Obtain funding for emergency management*** ***4. Improve the volunteer program for emergency management*** *V: EM staff and resources (i.e., related to signage, road closures) are lacking*					1- M 2- M 3- H 4- H	1- L 2- O 3- O 4- O
Volunteer Medical Response Team	NA	Town	S	***1. Improve the volunteer program for emergency management*** *V/S: Volunteer resources during extreme events - capacity and engagement concerns*					1- H	1- S
Societal										
Senior population (ages 65 years+) in flood zones	Various	NA	V	***1. Prepare a performance assessment of the Town's outreach and resources available to address language and speech needs/mobility needs for town residents (7)*** *V: Vulnerable populations in flood zones*					1- H	1- S
Special needs and mobility impaired population in flood zones and emergency management awareness	Various	NA	V	***1. Update ADA Plan with a self-assessment (4)*** ***2. Prepare a performance assessment of the Town's outreach and resources available to address language and speech needs/mobility needs for town residents (7)*** *V: Vulnerable populations in flood zones*					1- H 2- H	1- S 2- S
Emergency management registry	NA	Town	S	***1. Promote and maintain the emergency registry*** *S: Registry for emergency management and communications*					1- H	1- S
K-911/Hyperlink	NA - Remotely controlled through vendor	Town	S	***1. Encourage private employees to sign up for Hyperlink*** *S: Emergency management and communications*					1- H	1- O

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Features	Location	Ownership	V or S	Extreme Precipitation / Flooding	Severe Storm Events	Extreme Heat / Heat Waves	Wildfire		Priority **H** - **M** - **L**	Time **S**hort **L**ong **O**ngoing
Communication with low-income populations	NA	NA	V	***1. Make free town-wide Wi-Fi available*** *V: Low-income populations that are isolated from certain communication methods during emergency*					1- M	1- L
Minority groups, ESL populations, and underserved populations	Various	NA	V	***1. Prepare a performance assessment of the Town's outreach and resources available to address language and speech needs/mobility needs for town residents (7)*** *V: Groups potentially requiring specialized services*					1- H	1- S
In-home child day care (unreported numbers)	Various	Private	V	*V: Unreported numbers of users may lead to inaccurate understanding of needs and less available resources to address such needs in an emergency*						
Emergency Management Plan	NA	Town	S	***1. Expand methods and efforts for educating public on the Emergency Management Plan*** ***2. Develop building- specific emergency plans (i.e., senior housing facilities)*** *S: Plan established to coordinate/communicate in the event of an emergency*					1- M 2- H	1- L 2- S
Local Emergency Planning Committee (LEPC)	NA	Town	S	*S: Committee established to address emergency planning*						
Hazard Identification Risk Assessment	NA	Town	V	***1. Apply for funding to complete a hazard mitigation plan (4)*** *V: Town currently does not have a Hazard Identification Risk Assessment procedure*					1- H	1- S
CrossTown Connect	Stored at Council on Aging/Maynard Country Club/Brown Street	Private	S	*S: Town has shuttle transportation resources available*						
Schools (Green Meadow Elementary School, Fowler Middle School, Maynard High School)	Tiger Drive - Various locations	Town	V/S	*V: Regional resources not readily available in the event of an emergency affecting schools* *V: Part of Fowler School does not have central air* *V: All schools abut the town forest (though low danger, no immediate threat)* *S: Except for Green Meadow, all schools have back-up power in place* *S: Schools acting locally can address more specific needs of community as it relates to school support during an emergency event* *S: The high school is designed to be solar ready (goal is to make the facility self-sufficient); also consider as one of the primary shelters for emergency events.*						
Health agents shared among neighboring towns	NA	Town/Public	S	***1. Hire a FTE Health Agent, as well as a Facilities Manager (1)*** *S: Town can share resources and knowledge across neighboring communities when public health issues arise*						

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Mutual aid agreements	NA	Town/Public	S	*S: Maynard Police participates in mutual aid agreements within the Northeastern Massachusetts Law Enforcement Council (NEMLEC), and benefits from shared resources and communications within consortium of police departments and county sheriffs*						
Maynard Fest	Maynard's downtown	NA	V/S	***1. Promote social connections within neighborhoods to support emergency communications (3)*** *V: Crowds may be vulnerable to exposure to extreme weather events* *S: Town has community cohesion and engagement, allowing for increased resilience in the event of emergency events*					1- H	1 - S
Downtown employees (especially Mill employees)	Maynard's downtown/ Mill & Main Campus	Private	V/S	*V: Vulnerable to floods; lack of emergency communication channels*						
Recreation amenities	Various	Town/Private	V			***1. Explore opportunities and potential sites for a publicly accessible splash pad (1)*** *V: No public facilities to mitigate heat impacts for residents (particularly low-income residents)*			1- M	1- L
Pedestrians during heat waves	Various/Maynard's downtown	NA	V			***1. Assess the potential to repair existing and/or install new publicly-accessible drinking water fountains (i.e., water bubblers) (2)*** *V: Walking commuters and regular walkers vulnerable to heat impacts*			1- H	1- S
Food pantry/Open Table	82 Main Street/ 33 Main Street	Private	V/S	*S: Food supplies available to residents*						
Maynard Community Gardeners	NA	Town	V	***1. Identify potential community farming areas in Town*** *V: Limited locally grown food sources* *S: Some locally grown food sources*					1- M	1- S

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Features	Location	Ownership	V or S	Extreme Precipitation / Flooding	Severe Storm Events	Extreme Heat / Heat Waves	Wildfire		Priority **H** - **M** - **L**	Time **S**hort **L**ong **O**ngoing
Active agricultural properties/uses	Various	Private	V	*V: Climate impacts are changing the harvest yield in some cases, which could affect available supplies of different foods for residents*						
Library services and associated education resources/materials	77 Nason Street	Town	S	*S: Community programming to support increased awareness of climate hazards*						
Bike share resources	Various	Private - Zagster	S	***1. Create subsidies to encourage use of bike share facilities and other alternative transportation options*** *S: Diversity of transportation options to support vehicle owner and non-drivers*					1- M	1- S
Green Maynard	NA	Town	S	*S: Town supporting programs towards climate mitigation strategies to reduce future impacts*						
Sanctuary/Union Church	82 Main Street	Private	S	*S: Venue is a community hub and aims to increase social cohesion among residents*						
Youth recreation programs/facilities (i.e., soccer, football, baseball, basketball)	Various	Town	S	*S: Programs promote youth well-being and community connectedness among younger populations*						
Farmer's Market (Mill parking lot)	Mill parking lot	Town	S	*S: Makes local food sources available to residents*						
Garden Club (downtown plantings)	Maynard's downtown	Town	S	*S: Heat mitigation; stormwater runoff capture*						
Elk's Lodge	Powder Mill Road	Private	S	*S: Community space for residents to socialize and strengthen community relationships*						

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Features	Location	Ownership	V or S	Extreme Precipitation / Flooding	Severe Storm Events	Extreme Heat / Heat Waves	Wildfire		Priority H - M - L	Time Short Long Ongoing
Health Fair	Nason Street	Town	S	*S: Educates public and shares resources with residents about emerging issues*						
Galleries	Maynard's downtown	Private	S	*S: Local space for residents to socialize and strengthen community relationships*						
Radio Station	Maynard High School	Town	S	*S: Emergency communication medium*						
Environmental										
Soccer Fields on Rockland Avenue	Rockland Avenue	Town	S/V	***1. Allow flooding and flood storage. Prevent chemical applications to fields*** ***2. Identify fertilizer/pesticide controls and explore opportunities for enforcement/education (2)*** *S: Flood storage* *V: Flood vulnerability to 3 active wells*					1- L 2- H	1- O 2- O
Maple Brook Park	Maple Street	Town	S/V		*V: Susceptible to drought effects*				1- H	1- O
Assabet River	Various	Various	S/V	***1. Investigate alternative green deicing infrastructure*** ***2. Conduct an educational campaign for deicing; add protective measures to the town's stormwater bylaw*** ***3. Develop a town-wide green infrastructure plan/proposal, including a detention basin prior to the river (Summer Hill) (7)*** ***4. Explore stormwater enterprise fund (5)*** *S: Flood storage* *V: Flood vulnerability*	*V: Susceptible to drought effects*				1- H 2- H 3- H 4- H	1- O 2- O 3- O 4- S
Mill Pond	Mill & Main Campus	Private- the Mill Complex	S/V	***1. Explore stormwater enterprise fund (5)***	*V: Susceptible to drought effects*				1- H	1- S

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Reservoir behind Ben Smith Dam	Assabet River at Great Road	Town	S/V	***1. Explore stormwater enterprise fund (5)***		*V: Susceptible to drought effects*			1- H	1- S
Vernal pools, wetlands, and endangered species	Various	Public/Private	S/V	***1. Identify and track endangered species at vernal pools and other sensitive habitats (1)*** *S: Flood storage* *S: Improve groundwater recharge* *V: Susceptible to drought effects*					1- M 2- L 3- H	1- L 2- O 3- S
Wildlife Refuge	Southwest Maynard	Federal	S/V				***1. Maintain adequate buffer between woods and facilities*** *S: Designated area for wildlife refuge* *V: Susceptible to wildfire damage*		1- L	1- O
Whites Pond	Town of Stow	Town/Town of Stow	S/V	***1. Coordinate with the Town of Stow on White Pond watershed protection (3)*** ***2. Invest in expanding buffers adjacent to the pond*** ***3. Consider installing green infrastructure around the access roads*** ***4. Coordinate with State Fire Academy on PFAS*** ***5. Complete watershed protection plan for White Pond*** *S: Watershed programs to manage water quality, quantity issues into the future* *V: Flood vulnerability; water quality impacts*					1- L 2- M 3- M 4- M 5- M	1- O 2- L 3- L 4- L 5- L
Urban/rural tree canopy	Various, Maynard's downtown	Town	S/V	***1. Urban forestry management plan (5)*** ***2. Reforestation in urban areas for heat mitigation (2)*** ***3. Reforestation of native species in rural areas for monoculture management*** ***4. Tree protection bylaws (1)*** *S: Absorbs intense storm precipitation runoff and potential pollutants* *S: Mitigates heat island effect* *V: Wind effects to trees during intense storms*					1- H 2- M 3- M 4- M	1- S 2- L 3- L 4- S

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Invasive species, algae/algal blooms	Durant Pond, Thanksgiving Pond	Town	V			***1. Invasive species education*** ***2. Study/quantify algae/algal blooms with volunteers*** *V: Temperature increases can influence algal blooms*			1- H 2- L	1- O 2- L
Water quality	Various, White Pond	Town	V	***1. Institute a rain barrel incentive program*** ***2. Explore enforcement mechanisms for LID requirements as part of stormwater bylaw*** *V: Water quality is influenced by quantity and temperature* *V: Flood vulnerability; water quality impacts*						