Tighe&Bond
Engineers | Environmental Specialists

COMMUNITY RESILENCE BUILDING WORKSHOPS- SUMMARY OF FINDINGS

TOWN OF WESTFORD
MUNICIPAL VULNERABILITY PREPAREDNESS (MVP) PROGRAM

Source: *https://www.westfordma.gov/*

SUBMITTED TO

Town of Westford

June 2020

Table of Contents

Tables

Figures

Appendices

Section 1
Community Resilience Building Workshops

1.1 Overview

The Town of Westford, like other communities in the Commonwealth of Massachusetts, is already feeling the impacts of climate change. In particular, the Town has experienced severe weather related to extreme winter weather events, flooding, and severe wind. Westford has experienced 20 natural hazard incidents that triggered federal or state disaster declarations since 1991. Most events involved severe storms and flooding, most recently Winter Storm Skylar, Winter Storm Riley, Winter Storm Juno, and "Snowtober". In mid-May 2020, an extreme thunderstorm and microburst left many without power for over 24 hours. These extreme weather events will test Westford's ability to prepare for and respond to emergencies.

FIGURE 1: Images from May 2020 severe thunderstorm and windstorm

In 2017, the Commonwealth of Massachusetts inaugurated the Municipal Vulnerability Preparedness (MVP) program to assist municipalities in planning for and undertaking strategies to adapt to predicted changes in our warming climate. The Executive Office of Energy and Environmental Affairs (EEA) oversees and implements the MVP program. Funds are awarded to municipalities under two categories of work: planning grants and action grants.

To prepare for climate resiliency and begin to consider adaptation strategies, the Town was awarded a grant to complete the MVP planning process. This summary describes the planning process and findings suggested by the community for building a more resilient Westford.

1.1.1 How does the MVP Planning Process Augment Other Hazard Mitigation Planning?

The Federal Disaster Mitigation Act, adopted in 2000, requires that after November 1, 2004, all municipalities that wish to continue to be eligible to receive Federal Emergency Management Agency (FEMA) Hazard Mitigation Grant funding for hazard mitigation activities must adopt a local Hazard Mitigation Plan (HMP) and update the plan every 5-years. Note that this planning requirement does not affect federally authorized disaster assistance funding, which is exempt from the HMP requirement.

Currently, Westford is included in the "Hazard Mitigation Plan for the Northern Middlesex Region", which was approved by FEMA in August 2015. This plan covers Chelmsford, Dracut, Dunstable, Lowell, Pepperell, Tewksbury, Tyngsborough, and Westford and was prepared under the overall direction of the Northern Middlesex Council of Governments (NMCOG). This plan expires in August 2020. Westford's MVP grant awarded by EEA also provided funding to prepare a town-specific HMP plan update.

The MVP effort supplements the HMP process by providing a statewide and major basin-specific climate change data to use in the natural hazard risk assessment and a consistent methodology for public engagement through the Community Resilience Building (CRB) process. Figure 2 demonstrates the overlap between the MVP and HMP development.

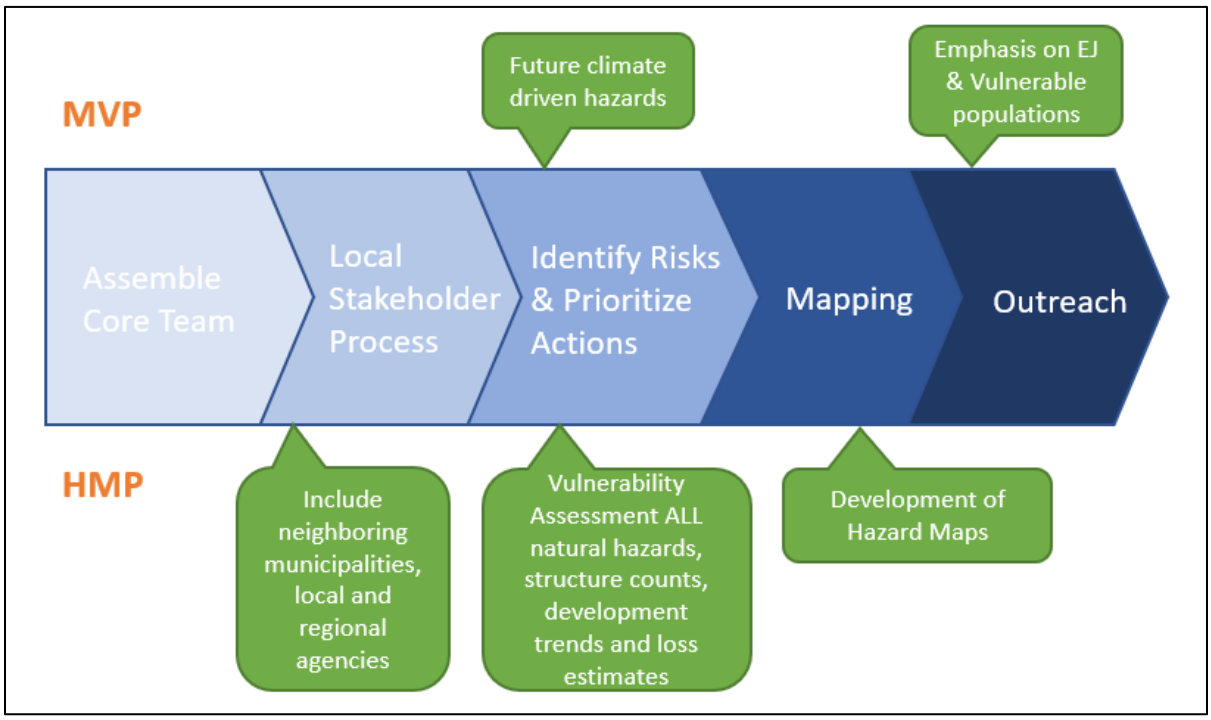


FIGURE 2: Overlap between MVP and HMP Development

1.1.2 Overview of the Community Resilience Building (CRB) Process

The CRB methodology is an "anywhere at any scale" format that draws on stakeholders' wealth of information and experiences to foster a collaborative dialogue about the strengths and vulnerabilities within a community, identify potential resiliency actions, and advance the education, planning, and ultimately implementation of priority actions. Figure 3 provides an overview of this process from the CRB Workshop Guide.

During the workshops, participants interact at both small and large group levels, using an iterative process to gather input, synthesize ideas across groups, and ultimately develop a set of priority resilience and adaptation actions. The workshop's central objectives are to:

- Define the top local natural and climate-related hazards of concern;
- Identify existing and future strengths and vulnerabilities of the Community;
- Develop prioritized actions for the Community; and
- Identify immediate opportunities to collaboratively advance actions to increase resilience.

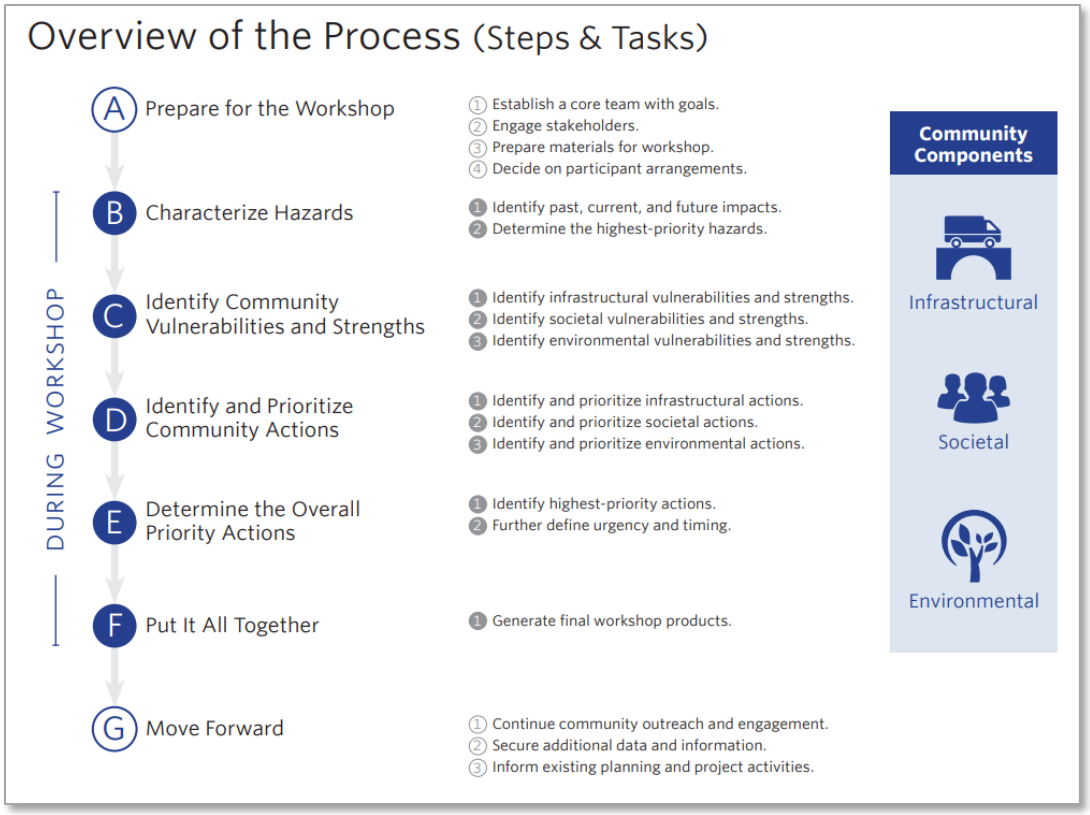


FIGURE 3: Overview of the CRB Process[1]

[1] https://www.communityresiliencebuilding.com/

1.2 Westford's CRB Planning Activities

Rebecca Cheney, Town Planner, served as the Local Project Manager undertaking the integrated MVP and HMP planning process. The Town partnered with Tighe & Bond, a state-certified MVP Provider, to complete the town-specific HMP update and CRB process including holding the CRB workshops.

To complete the first step in the CRB Process, Core Team members for the Town of Westford MVP were identified from multiple departments, boards, and commissions. The Core Team is listed Table 1.

The role of the Core Team was to

- Identify and engage community stakeholders to participate in the CRB workshops and the listening session;
- Review workshop materials and attend workshop session;
- Review the summary of findings report; and
- Attend the final listening session.

TABLE 1: Core Team Members

Name	Title/Department/Affiliation
Carol Gumbart	Conservation/Resource Planner
Henry Fontaine	Building Commissioner & Zoning Enforcement
Jeffrey Stephens	Health Department Director
Jeremy Downs	Assistant Town Engineer
Joe Targ	Co-Emergency Management Director
Matthew Salem	Conservation Commission Assistant Planner
Paul Fox	Director of Facilities
Paul Starratt	Town Engineer
Rae Dick	Director of Environmental Services
Rebecca Cheney	Town Planner
Richard Barrett	Highway Department Superintendent
Stephen Cronin	Water Department Superintendent
Tim Whitcomb	Co-Emergency Management Director

The following provides additional detail on the overcall CRB planning process undertaken by the Town of Westford to obtain MVP Community Designation.

1.2.1 Core Team Meetings

The MVP kickoff meeting, held on September 11, 2019, was coordinated to involve the Core Team at an early stage in the planning process. At this meeting, Tighe & Bond presented an overview of EEA's MVP Program and Goals, reviewed the scope, schedule, and budget, discussed public involvement and outreach, and reviewed the CRB process.

A Core Team Check-In Meeting took place on February 24, 2020. At this meeting, Tighe & Bond provided an update on the MVP process, reviewed hazard mitigation planning goals, discussed the draft community asset inventory, reviewed the 2015 hazard mitigation plan mitigation strategies, and coordinated workshop dates, times, and locations.

Due to COVID-19 and the need to accommodate social distancing and stay-at-home advisories that went into effect in mid-March, additional Core Team review was completed via email. A virtual Core Team Check-In Meeting was held on May 7, 2020. At this meeting, Tighe & Bond provided an MVP status update, reviewed the alternative public engagement approach needed due to COVID-19, and led an open discussion.

A final Core Team Check-In Meeting was held on June 25, 2020. At this meeting, the Core Team discussed the final MVP Summary of Findings Report, the draft Hazard Mitigation Plan, and mitigation actions to be included in both reports.

Materials documenting the various Core Team meetings are provided in Appendix A.

1.2.2 COVID-19 Alternate Public Engagement Strategy

Westford worked with their MVP Provider, Tighe & Bond, to develop a virtual engagement process for the CRB workshops and public listening session following the recommendations made by the EEA MVP staff.

1. **Provide an online space for MVP materials**: A municipal-specific MVP website was designed by Tighe & Bond to provide all necessary materials for completing the MVP process. Reference material including the Massachusetts State Hazard Mitigation and Climate Action Plan, ResilientMA.org, the MVP Workshop Guide, and the municipality's Hazard Mitigation Plan are available for public access on this website. Recorded CRB Workshop Webinars, survey results, and the draft and final MVP Summary of Findings Report are also posted on the website.

2. **Survey to identify strengths and vulnerabilities**: Tighe & Bond used Survey Monkey to create and distribute a survey to members of the Core Team and identified stakeholders. The survey questionnaire results were used to develop an initial list of strengths and vulnerabilities in the community. The survey was distributed via email and linked to the MVP website.

3. **Distribute recorded presentation on background information**: Tighe & Bond developed a pre-workshop video including information on climate change and the MVP process. The short video was posted on the MVP website for viewing or downloads. Stakeholders were encouraged to view the introductory video prior to attending the Virtual CRB Workshop Webinars.

4. **Distribute virtual CRB Workshop webinar materials**: Materials necessary to participate in the workshop were distributed via email, posted on the MVP website or sent by regular mail if requested.

5. **Hold Webinars to meet the CRB Workshop requirement**: Tighe & Bond planned to host four virtual CRB Workshop Webinars featuring each one of the Community Asset Categories: infrastructural, societal, natural environment, and the economy. Due to lack of interest, the economy webinar was cancelled. During

each workshop, attendees brainstormed mitigation actions for specific community assets, addressing top priority hazards. Recordings of these sessions are on YouTube.

   a. People and Society: https://youtu.be/L6-mdFBNamM
   b. Buildings and Infrastructure: https://youtu.be/EesZkK12LUE
   c. Natural Resources and the Environment: https://youtu.be/1PHFmmZytxA

6. **Prioritization Polling**: After the completion of the virtual CRB Workshop webinars, Tighe & Bond developed and distributed a Survey Monkey poll to the Core Team and stakeholders. This poll includes a list of mitigation actions developed during the webinar. Individuals were asked to rank mitigation actions. This developed a draft prioritization.

7. **Distribute Listening Session materials**: Tighe & Bond distributed listening session materials to Core Team members and stakeholders electronically or through mailings if requested. Information about the Listening Session and directions to participate were publicly posted.

8. **Hold Listening Session:** Tighe & Bond and the Town hosted a live, one-hour Listening Session to present the draft MVP Summary of Findings Report and allow time for a Question & Answer session for community input. The Final Draft MVP Summary of Findings Report was available on the MVP website for a public comment period. The session is also available on YouTube.

9. **Core Team Meeting**: Tighe & Bond hosted a final virtual Core Team meeting. The goal of the meeting was to review the results of the prioritization polling and discuss the Draft MVP Summary of Findings Report.

10. **MVP Website:** Tighe & Bond posted the recorded Listening Session and Final Draft MVP Summary of Findings Report on the MVP website.

A memorandum documenting the proposed alternative public engagement strategy is included in Appendix B.

1.2.3 Stakeholder Engagement and Pre-Workshop Survey

Community stakeholders included municipal staff not already a member of the Core Team, elected and appointed officials in Westford, municipal staff and representatives from abutting communities, environmental non-profits, representatives from the local Climate Action Committee, owners and managers of local businesses, and the citizens involved in local planning. The complete stakeholder list is provided in Appendix C.

Pre-workshop stakeholder engagement materials were developed including maps of community assets and hazard areas and an introductory video about the MVP program and community climate change impacts. A pre-workshop survey was created to get input from stakeholders regarding perception of natural hazard risk, future impacts due to climate change, and important community assets in each of the four sectors.

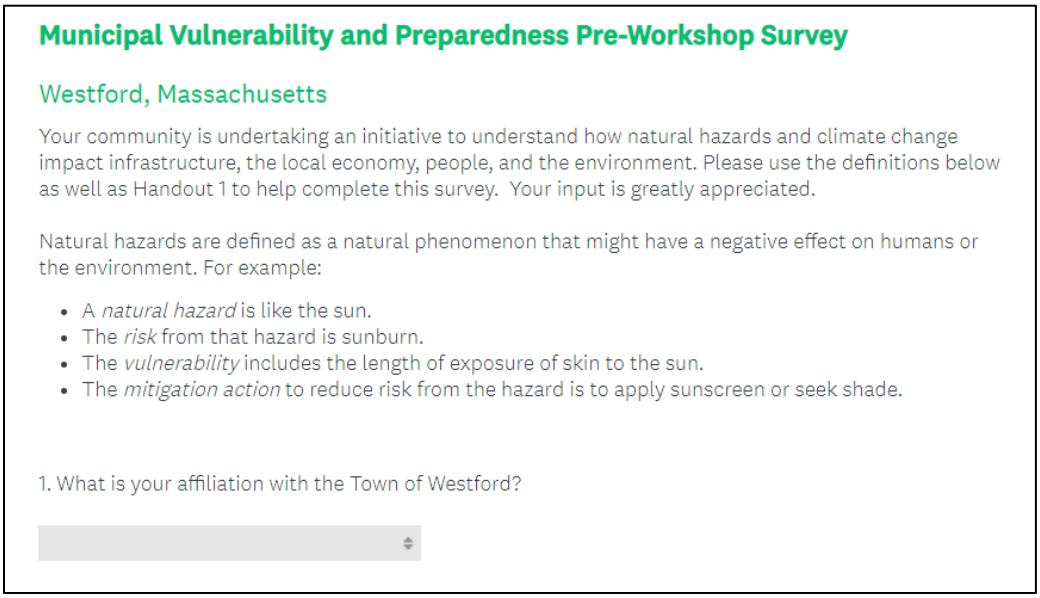


FIGURE 4: Pre-Workshop Survey via SurveyMonkey

Westford MVP lead, Rebecca Cheney, emailed invitations to 60 stakeholders to participate in the MVP CRB workshop process. The email included a link to the MVP website, instructions on how to take the survey, access pre-workshop materials and links to sign up for the four workshops.

1.2.4 Community Resilience Building Workshops

The four workshops focusing on society, infrastructure, economy and the environment were scheduled to be held over a four-week period from May 14 through June 4.

Each workshop followed a similar format with an introduction by Town Planner, Rebecca Cheney, an overview of the MVP planning process, discussion of top natural hazards impacting Westford including future climate change impacts, followed by a discussion of the featured community assets and survey results. The working sessions with stakeholders included an initial session to further discuss specific strengths and vulnerabilities of the community assets and a second session to develop mitigation strategies that addressed the top identified natural hazards.

The virtual workshops used the GoToMeeting platform, which enabled a production team to provide live video and audio, present slides and complete the CRB worksheets based on input from stakeholders. Participants in the workshop provided comment verbally and through the chat function.

As each workshop was completed, a recording of the workshop, documented chat and a draft of the CRB matrix was uploaded to the website. The website address is: https://www.westfordma.gov/1309/Municipal-Vulnerability-Preparedness-Pla. A copy of the final website is included in Appendix D.

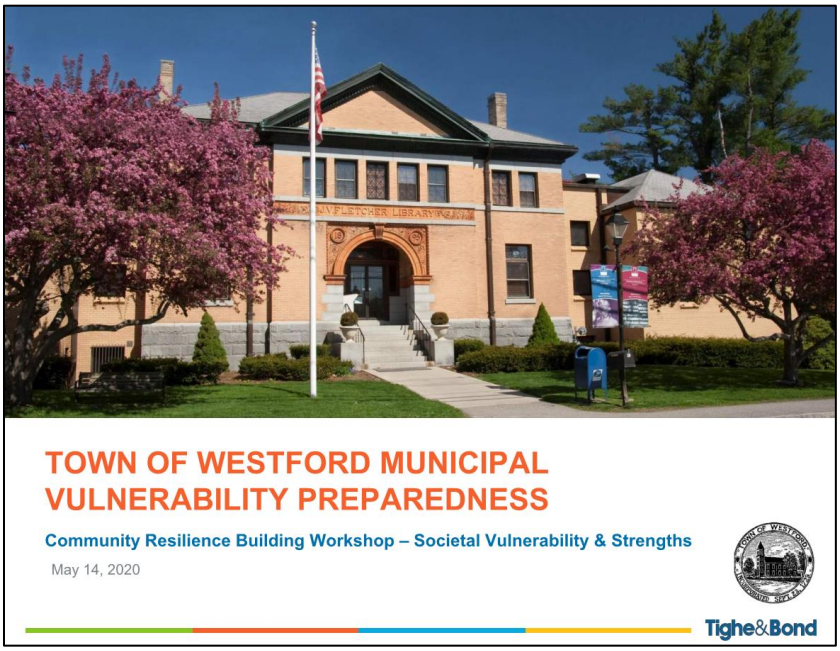


FIGURE 5: Presentation for Westford's Virtual CRB Workshop #1

Appendix D contains the MVP website page, the SurveyMonkey Pre-Webinar Survey, and supplemental workshop materials including PowerPoint Presentations. Natural Hazard Maps and a list of community assets by category are presented in Appendix E. The completed CRB matrix is included in Appendix H.

1.2.5 Listening Session

A listening session to present the final report and review the high priority actions identified through the CRB workshops was held on June 18, 2020, from 10:30 to 11:30 AM, via a GoToMeeting Event. This event was advertised by the Town Manager in her June 9, 2020, report to the Board of Selectmen. The Town Planner invited all stakeholders that had been identified by the Core Team and those that had participated in previous workshops.

Town Staff led the session with support from Tighe & Bond. Seven attendees participated. The group had a lively discussion about climate concerns, additional strengths and vulnerabilities in Westford, and mitigation actions. Highlights of that discussion include:

- The Cameron Senior Center is an excellent resource for the aging community in Westford.
- Ways to encourage use of alternative energy sources to petroleum.
- The impacts on the environment, economy, society, and Town infrastructure may be less significant from a project on a previously developed parcel than on an undeveloped parcel. There are ways to manage this with Zoning bylaw updates, such as a Natural Resource Overlay District, among others.
- Opportunities to educate residents and developers to use sustainable building methods, including LEED Certification, and less wasteful building methods and materials, and make this a requirement of municipal projects.
- Protection of the Town's public water supply is a high priority.

- Recognition that Native American ceremonial sites are a societal asset that should be included in the inventory.
- Reinforcement that the Town's information technology department is a critical service for all municipal staff and the public, and relocating these services to a facility that is safe and has redundancy is critical for Town operations.
- Education of municipal staff, elected and appointed officials, and the public about invasive species, using native species, and best lawn maintenance practices including timing mowing to protect pollinators and nesting for certain species, is important to preserving Westford's natural environment and overall character.
- Reinvigorating awareness of the AM radio station that can be activated during emergencies should be a priority. While the Town has a "reverse 911" system (i.e., CODE RED), which is used strategically and for serious emergencies, there is concern about cell phone service being limited during an extended power outage. The AM radio station could be used to transmit information critical to response and help with recovery to natural hazards.
- Education of students on hazard mitigation, overall sustainability, conservation, and environmental stewardship is a priority.
- Protection of and investment in maintaining Westford's tree cover is important. It might be worth considering allocating more resources towards the Tree Warden role and developing an inventory of trees and tree planting program (that considers power line locations). Ways to require new developments to plant larger and more trees, with specific species requirements and maintain their health for longer than currently required, should be considered. This would help with reduce impacts of heat island effects, and improve overall air quality and public health. On proposed development sites, make assessment of opportunities for tree retention and preservation of tree canopy requirement of permitting review.
- Wildlife corridors are an important natural asset in Westford and should be better mapped and protected, and education on these corridors would help municipal staff and residents make decisions about land use.
- Underground utilities could provide some relief from storm events that cause downed lines, but are very expensive and vulnerable to groundwater and flooding.
- Police in Westford are proactive about protecting vulnerable, including elderly, citizens in Westford.

The presentation for the listening session and a list of attendees is provided in Appendix G.

Section 2
Top Hazards and Vulnerable Areas

This section discusses Steps B and C of the CRB Process to characterize hazards and identify community vulnerabilities and strengths (a.k.a. community assets).

2.1 Natural Hazard Risk

2.1.1 State Identified Hazards

The 2018 Massachusetts Hazard Mitigation and Climate Adaptation Plan (SHMCAP)[2] provides an in-depth overview of natural hazards in Massachusetts. The State Plan identifies 14 natural hazards that have impacted or historically occurred in communities within the Commonwealth of Massachusetts. These hazards are as follows:

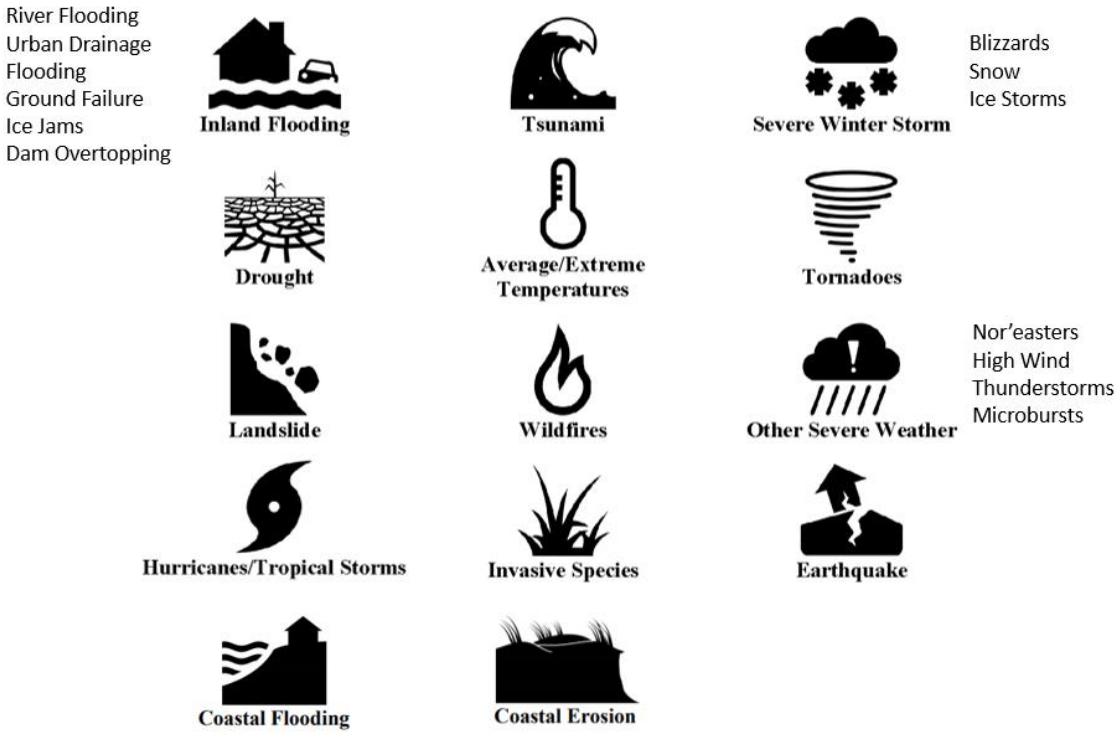


FIGURE 6: Hazards Identified in the SHMCAP

[2] https://www.mass.gov/files/documents/2018/10/26/SHMCAP-September2018-Full-Plan-web.pdf

2.1.2 Hazards that Apply to Westford

The SHMCAP includes coastal flooding, coastal erosion, and tsunamis, however, because Westford is not a coastal community, these hazards are not applicable and therefore are not further discussed or evaluated in this report.

The Core Team reviewed the remaining natural hazards identified in the SHMCAP and identified natural hazards that have impacted Westford in the past or could impact Westford in the future. The hazards selection for Westford was made using local expertise from the Planning Team, information from the 2015 Regional Hazard Mitigation Plan, the SHMCAP, and other sources. All of the natural hazards presented in the SHMCAP except those applicable to coastal communities were included in the ranking process.

The Core Team reviewed each natural hazard and analyzed the history of occurrence in Town, hazard probability, hazard frequency, geographic extent, and severity of impact. Each of these categories were ranked based off of the Hazard Profile Definitions, displayed in Table 2 and taken from the 2018 SHMCAP.

TABLE 2: Hazard Profile Definitions (2018 SHMCAP)

Points	Rank	Description
Hazard Probability (Possible occurrence in the future)		
1	Unlikely	Less than a 1% probability over the next 100 years
2	Possible	1-10% probability in the next year or at least one chance in the next 100 years
3	Likely	10-100% probability in the next year or at least one chance in the next 10 years
4	Highly Likely	Near 100% probability in the next year
Hazard Frequency		
0	Very Low	Events that occur less frequently than once in 1,000 years (less than 0.1% per year)
1	Low	Events that occur from once in 100 years to once in 1,000 years (0.1% - 1% per year).
2	Medium	Events that occur from once in 10 years to once in 100 years (1% - 10% per year).
3	High	Events that occur more frequently than once in 10 years (greater than 10% per year).
Geographical Extent (Area Impacted by a Given Natural Hazard)		
1	Small	Less than 10% of the Town affected
2	Medium	10-50% of the Town affected
3	Large	More than 50% of the Town affected
Severity of Impact from Hazard		
1	Minor	Limited and scattered property damage; no damage to public infrastructure (roads, bridges, trains, airports, public parks, etc.); contained geographic area (i.e. one or two communities); essential services (utilities, hospitals, schools, etc.) not interrupted; no injuries or fatalities.

Points	Rank	Description
2	Serious	Scattered major property damage (more than 10% destroyed); some minor infrastructure damage; wider geographic area (several communities); essential services briefly interrupted up to 1 day; some minor injuries.
3	Extensive	Consistent major property damage (more than 25%); major damage public infrastructure damage (up to several days for repairs); essential services are interrupted from several hours to several days; many injuries and possible fatalities.
4	Catastrophic	Property and public infrastructure destroyed (more than 50%); essential services stopped for 30 days or more, multiple injuries and fatalities.

Table 3 includes list of the hazards selected by Westford for inclusion in this Summary of Findings Report and the HMP update. The HMP Update includes profiles for each natural hazard and documents additional detail about the history of occurrence and potential future occurrence.

TABLE 3: Relevant Natural Hazards for the Town of Westford

Type of Natural Hazard	History of Occurrence in Westford	Hazard Probability	Hazard Frequency	Geographic Extent	Severity of Impact	Hazard Risk Ranking
Inland Flooding	Yes	2	3	1	1	**7**
Severe Winter-Storm/Nor'easter	Yes	4	3	3	2	**12**
Drought	Yes	3	2	3	2	**10**
Extreme Temperature	Yes	4	3	3	2	**12**
Tropical Storms/ Hurricanes	Yes	2	0	3	3	**12**
Severe Weather-Strong Wind and High Precipitation	Yes	4	3	3	2	**12**
Invasive Species	Yes	4	3	3	1	**11**
Microburst	Yes	4	3	1	3	**11**
Earthquake	Yes	2	1	3	4	**10**
Wildfires	Yes	3	2	2	4	**11**
Tornadoes	No	1	0	1	3	**5**
Landslide	No	1	1	1	2	**5**

2.1.3 Top Hazards for Westford from Risk Matrix

Based on the evaluation of natural hazard risk ranking coupled with the history of occurrence, the geographic extent of impact, economic impact, and consideration for climate change, the Core Team determined the highest ranked natural hazards for Westford consist of:

- Severe Winter Storm/Nor'easter
- Extreme Temperature
- Tropical Storms/Hurricanes
- Severe Weather- Strong Wind and High Precipitation (including Thunderstorms)

2.1.4 Top Hazards for Westford from Survey

The pre-workshop survey included polling to identify the top natural hazards currently impacting Westford, and hazards likely to impact Westford in the future with climate change. Figure 7 shows how frequently natural hazards have occurred in the past/present based on survey responses (e.g., just over 60% of respondents stated that blizzards have occurred once every 3 to 5 years, 100% of respondents said that thunderstorms happen once a year or more often, etc.)

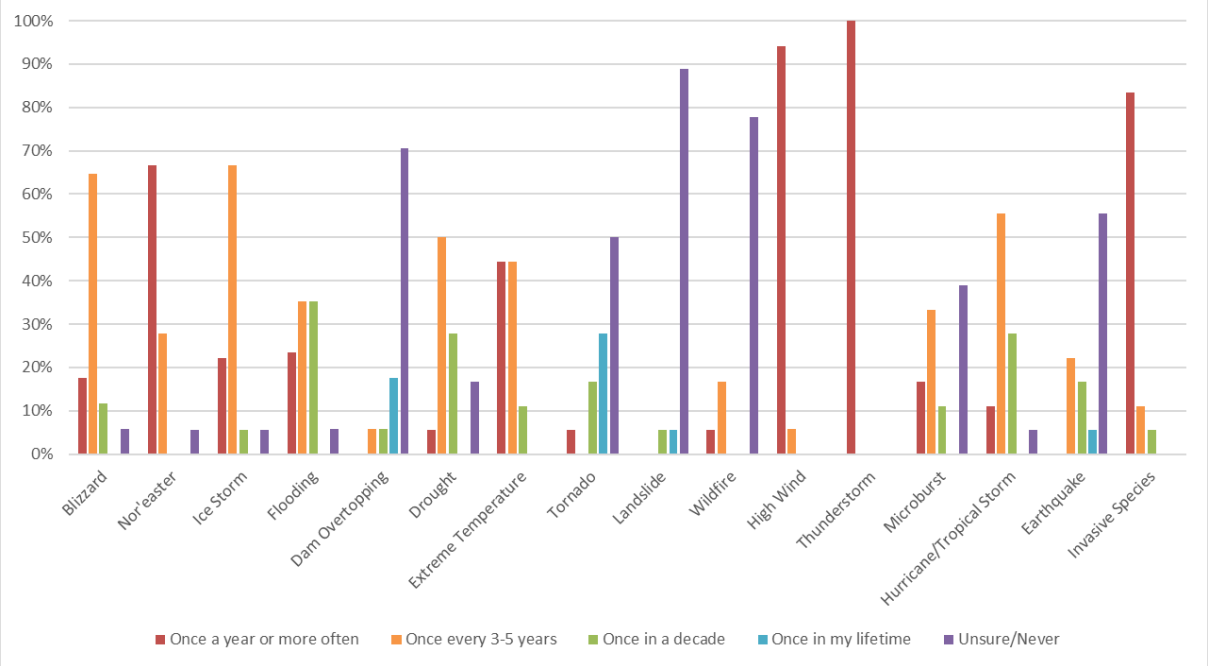


FIGURE 7: Survey Results Showing Perceived Frequency of Past and Present Natural Hazards in Westford

The survey agreed with the findings of the Core Team for natural hazards that are currently impacting Westford or have impacted the Town in the past, however future natural hazard concerns with climate change emphasized invasive species and specifically ice storms.

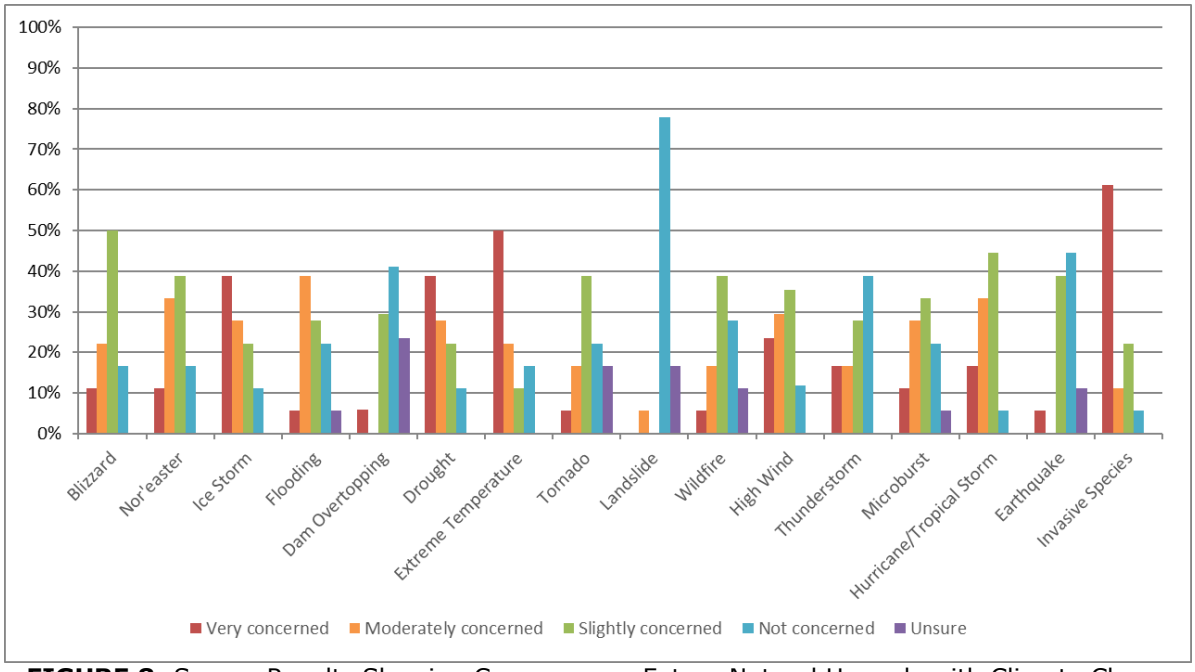


FIGURE 8: Survey Results Showing Concern over Future Natural Hazards with Climate Change

2.1.5 Top Natural Hazards for Westford

The CRB Workshop top natural hazards are based on combining the Core Team evaluation with the stakeholder survey results, resulting in a final list consisting of:

- Severe Weather/Strong Wind/Thunderstorms
- Invasive Species
- Severe Winter Storm/Nor'easter
- Extreme temperatures

2.2 Areas of Concern

During the CRB Workshops, participants outlined areas of concern under three categories of community assets, consistent with the CRB Workshop Guide: infrastructural, societal, environmental. In addition, for consistency with the HMP update, participants included areas of concern in Westford's economic assets. The completed CRB Risk Matrix in Appendix H provides additional information.

2.2.1 Infrastructural (Built Environment)

Critical facilities necessary for a community's response to and recovery from emergencies, infrastructure critical for public health and safety, economic viability, or for critical facilities to operate.

The workshop participants identified the following infrastructure with vulnerabilities or strengths within the community:

- Bridges
- Cell Towers & Antennas
- Highway Department
- Information Technology Center

- Communications Infrastructure
- Culverts
- Dams
- Drinking water wells, treatment, and distribution, including pumping stations
- Electric Grid
- Fire Department
- Gas infrastructure
- Gas stations
- Helicopter landing zones
- Interstates
- Police Central Station
- Railroad
- Roads
- Schools
- Secondary salt storage shed
- Town Hall
- Wastewater facilities

FIGURE 9: Stony Brook Bridge *(Westford Comprehensive Master Plan, 2009)*

FIGURE 10: Forge Village Water Treatment Plant

FIGURE 11: Central Fire Station (*Open House Brochure, photo by Michael Woessner*)

2.2.2 Societal (People/Vulnerable Populations)

The workshop participants identified the following societal sectors with vulnerabilities or strengths within the community:

1. **Buildings or facilities that support community needs**
    - Adult day centers
    - Bridges by EPOC
    - Churches
    - Day cares
    - Elderly housing
    - Senior center
    - Shelters
    - Westford Nursing home
2. **Vulnerable populations**
    - Elderly, particularly living alone
    - Disabled residents
    - Homebound residents
    - Low income residents
    - Veterans
    - Limited or non-English speaking groups
    - Essential workers
3. **Support services**
    - Caregivers
    - Medical Reserve Core
    - Communication network
    - Westford community garden
    - Westford food pantry

Figure 12: Westford's Community Center

2.2.3 Environmental (Natural Environment)

Areas that provide protective function to reduce magnitude of hazard impact and increase resiliency. Areas of sensitive habitat that are vulnerable to hazard events, protection of areas that are important to community objectives, such as the protection of sensitive habitat, provide socio-economic benefits, etc.

The workshop participants identified the following environmental sectors with vulnerabilities or strengths within the community:

1. **Hydrologic Resources**
   - Aquifers
   - Floodplain
   - Waterbodies and wetlands (e.g. the many ponds, Stony Brook, etc.)
2. **Open Space and Conservation Lands**
   - All conservation lands, including Stony Brook Conservation Land
   - Connected open space
3. **Parks and Recreational Areas**
   - East Boston Camps
   - Forge Pond and Forge Beach
   - Nabnasset Lake
   - Trails
4. **Environmental Health**
   - Vernal pools
   - Tree cover
   - Invasive species
   - Healthy Lakes and Ponds Committee
   - Stream team
   - Stormwater Management Master Plan
5. **Environmental Education**
   - Conservation Commission
   - Healthy Westford Committee
   - Involvement by scouts to maintain trails
   - Open Space and Recreation Plan
   - Trail mapping
   - Water Department

FIGURE 13: Kayakers on Nabnasset Lake

FIGURE 14: Russell Bird Sanctuary

Section 3
Current Concerns and Challenges Presented by Hazards and Climate Change

3.1 Climate Change Concerns

The pre-workshop survey results indicate that Westford is very concerned about climate change impacts on natural hazard risk. As shown in Figure 15, over half of the survey respondents were very concerned with climate change, approximately one fourth were moderately concerned, and the remainder of the respondents had limited concern. Those that took the survey noted concerns that the community is already experiencing impacts of climate change, with concerns about energy demand, diminishing breathable air, reduced forest cover, and invasion of non-native species.

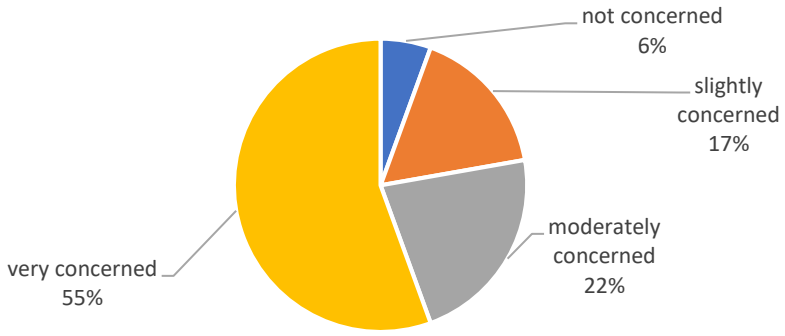


Figure 15: Climate Change Concerns from Survey Results

- Severe storms seem to be more frequent and have a significant impact on the Town.
- The community is feeling the impacts from extreme temperatures, including drought. Atmospheric hazards impact the public water supply and private wells.
- Tropical storms and hurricanes impact Westford, resulting in flooding and power outages.
- Invasive species are located throughout Town and harm local waterbody health and impact habitat for native species.
- Microbursts have occurred a number of times and had significant impacts to localized areas.
- While Westford is not a coastal community, a survey respondent noted that all municipalities will be in some way impact by climate change.

These hazards are anticipated to be amplified by climate change as discussed in Commonwealth's resilient MA Climate Change Clearinghouse website (http://www.resilientma.org/)

Changes in Precipitation: Changes in the amount, frequency, and timing of precipitation—including both rainfall and snowfall—are occurring across the globe as temperatures rise and other climate patterns shift in response.

Rising Temperatures: Average global temperatures have risen steadily in the last 50 years, and scientists warn that the trend will continue unless greenhouse gas emissions are significantly reduced. The 9 warmest years on record all occurred in the last 20 years (2017, 2016, 2015, 2014, 2013, 2010, 2009, 2005, and 1998), according to the U.S. National Oceanographic and Atmospheric Administration (NOAA).

Extreme Weather: Climate change is expected to increase extreme weather events across the globe, as well as right here in Massachusetts. There is strong evidence that storms—from heavy downpours and blizzards to tropical cyclones and hurricanes—are becoming more intense and damaging, and can lead to devastating impacts for residents across the state.

The following table reproduced from the SHMCAP shows how climate change interacts with natural hazards.

TABLE 4: Climate Change Interactions

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

3.2 Massachusetts Climate Change Projections

Researchers from the Northeast Climate Adaptation Science Center (NECASC) at University of Massachusetts Amherst prepared projections for changes in temperature, precipitation, and sea level rise for the entire state, as well as each major watershed in recognition that there are regional differences in weather. EEA is encouraging municipalities, industry, non-government organizations, state government and others to utilize this information as a standard, peer-reviewed set of climate change projections and is recommending these projections be included in MVP planning efforts.

The Town of Westford is located within the Sudbury-Assabet-Concord (SuAsCo) Basin and the Merrimack Basin. The southern part of the Town is within the SuAsCo Basin and the northern half is in the Merrimack Basin. The information specific to the SuAsCo Basin and the Merrimack Basin was excerpted from Massachusetts Climate Change Projections, dated March 2018[3] and is included in Appendix F.

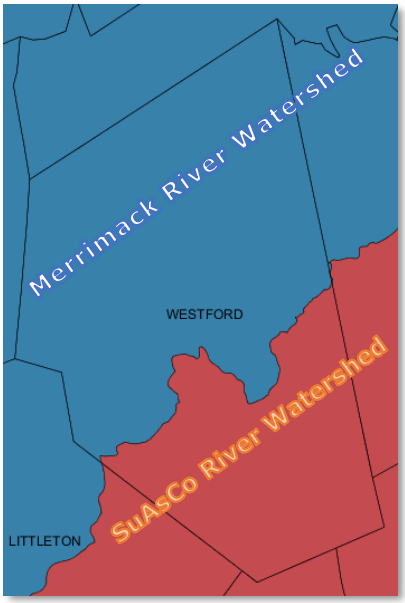


FIGURE 16: Major Watersheds in Westford

3.3 Specific Categories of Concerns and Challenges

Workshop attendees identified community assets that were either vulnerable to the impacts of climate change or strengths to the Town of Westford. The completed matrix is included in Appendix H.

The vast majority of the assets were seen as a strength to the community while a number had specific vulnerabilities noted. Some examples of vulnerabilities are included below.

Societal Vulnerabilities

- The elderly population, particularly those living alone, they may not be able to get out as often, may need assistance to get food or assistance with evacuation. However, this population has the experience of having survived many natural hazard disasters and being creative in up with solutions that are based on those experiences.
- Staffing at nursing homes and care facilities can be limited during natural hazards.
- The Cameron Senior Center is an excellent resource for the aging community in Westford.
- Bridges by EPOC is a 54-bed facility for Alzheimer's patients. While it has a generator, and is required to have individual emergency evacuation plan, this facility is vulnerable to natural hazards, especially those with an extended duration.

[3] https://www.mass.gov/files/ma-statewide-and-majorbasins-climate-projections-final.pdf

Infrastructural Vulnerabilities

- Cell phone communication system is vulnerable to natural hazards that may cause power outages or equipment damage.
- Concerns about impacts to the aquifer for the Town's drinking water supply due to development and redevelopment, and use of chemicals on lawns and for agriculture.
- Town has no authority over private dams, some of which could pose a risk to public safety if they are not inspected and maintained.
- Gas stations are primarily located in two key parts of Town.
- An unknown number of stormwater management and/or treatment structures.
- If certain bridges or culverts fail, they will impede emergency response passage to parts of Town.
- The electric grid is highly vulnerable to storm events.
- High pressure gas line crosses southern border with Carlisle. There may be aging gas infrastructure throughout Westford as well.
- Town record storage space is limited and some of it is located in basements that have concerns about water accrual. Record management is dictated by state requirements, but there may be an option to store more documents electronically.
- The Stony Brook railroad line is a heavily traveled freight route. If there was an accident or spill, Westford would by impacted. There is a emergency response plan the railroad follows.

FIGURE 17: Stony Brook Dam (Left: Upstream View, Right: Downstream View)

Environmental Vulnerabilities

FIGURE 18: Algal Bloom at Nabnasset Lake (*Westford Patch*)

- Invasive species are a huge issue in Westford's many waterbodies, wetlands, and open space areas, and impede growth of native species and hinder habitat and water quality.
- Conservation land has challenges with illegal dumping and off-leash pets.
- Beavers pose a risk to flow of wetlands and waterbodies, as well as roadways and culverts.
- Town has Forest Committee and a Forest Management Plan, however, funding is limited.
- Weak coordination between committees are boards in development effective polices for environmental protection or hazard mitigation.
- The town's zoning bylaw has limited provisions for environmental protection, and there are instances where variances are granted without strong supporting evidence for doing so.

3.4 Current Strengths and Assets

Westford officials and emergency response staff are actively engaged in preparing the community to respond to and adapt to current and future natural hazards. Collaboration, communication, and responsiveness of these staff is viewed as a strength in Westford. In addition, Westford has an active and engaged resident base that helps facilitate outreach and education and provide input on ongoing planning processes. Westford's public works staff are viewed as a strength in terms of their operation and management of the water and wastewater systems and assistance with emergency response. The Town also completes thoughtful planning exercises, such as currently updating its Master Plan, and has begun the process of preparing a Town-specific HMP update.

Numerous community assets were identified as a strength to mitigate impacts of climate. Some examples are included below:

Societal Strengths

- Westford has a special population registry used for communication and emergency response.
- Community garden can provide food during recovery from a natural hazard event, depending on time of year.
- Medical Reserve Core is made up of 520 volunteers that serves both medical and non-medical needs.
- Town emergency response staff help private care facilities exercise emergency response plans periodically.
- Native American ceremonial sites are located in Westford.

- Police in Westford are proactive about protecting vulnerable, including elderly, citizens in Westford.
- Churches provide individual families with resources for recovery to natural hazards.

Infrastructural Strengths

- Westford undertakes proactive planning for drinking water (e.g. water system master plan) and stormwater work (e.g. stormwater management master plan, culvert inventory and assessment, stormwater utility, etc.)
- Westford has numerous shelter options and warming/cooling center capabilities.
- Town has a second salt shed for winter deicing, which helps improve response during hazard events and maintain public safety and emergency response capabilities.
- Senior center has a backup generator.
- Certain bridges provide critical emergency access routes.
- Electric company provides a strong response to restoring power after storm events.
- Fire stations, especially new station, provide quality and timely emergency response to town.
- May town buildings have backup power.
- Westford has a quality public water supply system.
- There are a number of mapped helicopter landing zones in Westford. The one at the Highway Facility and the one at the cul-de-sac at Robins Road are maintained throughout the winter and therefore accessibility is preserved.

FIGURE 19: Westford Highway Garage

Environmental Strengths

- Water quality is tested at 14 locations for beaches and the stream team has historically measured water quality in stream at various locations throughout Westford.
- Town has extensive trails that are well mapped. Trails are well maintained by various groups including scouts.
- Certain areas of Town are now mowed at specific time that considers species nesting.

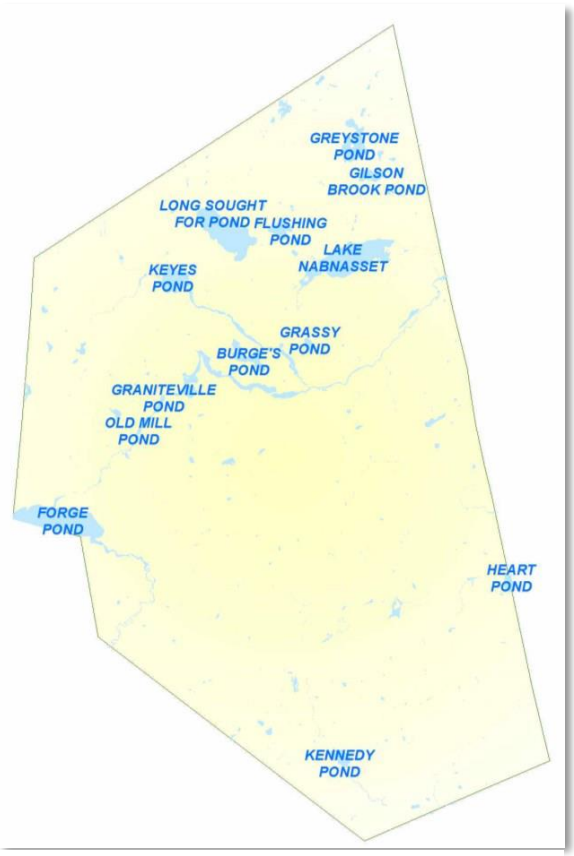


FIGURE 20: Westford's Lakes and Ponds

- Town's standard Order of Conditions from Conservation Commission requires clean fill to avoid invasive species and contamination.
- Conservation Commission also restricts storage of fuels and undesirable liquids in buffer zones.
- The Town's Open Space and Recreation Plan, which has been conditionally approved as of the data of this report, lays out preservation of open space, conservation plan, and commitment to recreation facilities.

3.5 Hazard Mitigation Measures

According the FEMA's Local Multi-Hazard Mitigation Planning Guidance, hazard mitigation measures can generally be sorted into six categories:

1. **Prevention**: Government administrative or regulatory actions or processes that influence the way land and buildings are developed and built, and direct public activities to reduce hazard losses. Examples include planning and zoning, building codes, capital improvement programs, open space preservation, and stormwater management regulations.

   Projects that were recommended for prevention include:

   - Amend zoning bylaws to address heat island effects and increase resiliency by adjusting planting and parking requirements (e.g., require native plants, limit monoculture, reduce impervious areas, etc.).
   - Update local code for historic properties that would apply if building was renovated or damaged to include natural hazard resiliency considerations.
   - For bridges, assessment of MassDOT inspections and initiation of maintenance and repair/replacement program.
   - Develop a strategic vegetation program that considers locations of power lines.
   - Continue to require inspections of dams (both public and private).
   - Create a "Ranger" position that will support management and maintenance of conservation lands, trails, and open space.
   - Map lands that are critical for climate resiliency.
   - Develop a Natural Resource Overlay District in Zoning code to mitigate impacts on the environment, economy, society, and Town infrastructure from development on undisturbed sites.
   - Consider code changes to require Town projects, residents and developers to use sustainable building methods, including LEED Certification, and less wasteful building methods and materials.
   - Change code to require developers to plant larger and more trees with species requirements, and to maintain their health for longer than currently required.
   - Amend wetland bylaw to provide more detail on climate resiliency and improve clarity regarding buffer zone protection.
   - Consider code changes to require consideration of watershed-based management when making development discussions.

2. **Property Protection**: Modification or removal of existing buildings or infrastructure to protect them from a hazard. Examples include acquisition, elevation, relocation, structural retrofits, flood proofing, storm shutters, and shatter resistant glass.

   Projects that were recommended for property protection include:

   - Evaluate Highway Department Building lightning suppression system.
   - The Town's information technology department is a critical service for all municipal staff and the public, and relocating these services to a facility that is safe and has redundancy is critical for Town operations.
   - Continue to comply with the Office of Dam Safety regulations and continue to monitor the condition of dams.

3. **Public Education and Awareness**: Actions to inform and educate citizens, elected officials, and property owners about the potential risks from hazards and ways to mitigation them. Such actions include outreach projects, real estate disclosure requirements, hazard information centers, and school-age and adult education programs.

   Projects that were recommended for public education and awareness include:

   - Educate residents and developers to use sustainable building methods, including LEED Certification, and less wasteful building methods and materials.
   - Educate municipal staff, elected and appointed officials, and the public about invasive species, using native species, and best lawn maintenance practices including timing mowing to protect pollinators and nesting for certain species.
   - Educate municipal staff, elected and appointed officials, and the public about the connection between development, land use patterns and hazard mitigation. Promote education on connecting climate change with land use decisions.
   - Educate residents about the AM radio station (1630 AM) that can be activated during emergencies.
   - Enhance existing education program to include hazard mitigation, coupled with overall sustainability, conservation, and environmental stewardship, in public schools.
   - Provide information to caregivers of special needs, the elderly, and other vulnerable populations about what to do, and how to access resources during natural hazards. Provide that information in multiple languages.
   - Develop education materials on using non-phosphorous fertilizers that may create eutrophication and other nutrient impairments and impact the public water supply.
   - The Healthy Lakes and Ponds Collaborative and Healthy Westford Committee are two organizations that could be used to present educational materials on healthy lawns, water conservation, and watershed/water supply protection. Revisit using these groups to distribute education.
   - Educate private entities that rely on drinking water wells on routinely testing their drinking water.

- Provide signage/education on erosion on conservation land – such as restricting vehicular usage.
- Educate private dam owners on inspection and maintenance, along with responsibility they have of the dam on their property.

4. **Natural Resource Protection and Green Infrastructure**: Actions that, in addition to minimizing hazard losses, preserve or restore the functions of natural systems. These actions include low impact development, sediment and erosion control, stream corridor restoration, watershed management, urban forest and vegetation management, and wetland restoration and preservation.

   Projects that were recommended for natural resource protection and green infrastructure include:

   - Protect and invest in keeping Westford populated with trees. Allocate more resources towards the Tree Warden role. Develop an inventory of trees and a tree planting program (that considers power line locations).
   - For higher density areas (e.g., villages), add trees and stormwater improvements.
   - Map invasive species.
   - To protect watersheds, waterbodies, and aquifers, continue to undertake stormwater management master plan recommendations including non-structural and structural improvements.
   - Use the Town Forest Committee and the Water Department to improve management of forested areas.
   - Implement a "Green Roof Project" through new construction or infrastructure rehabilitation. Buildings such as the library, apartments, and municipal centers could be candidates for green roof installation.
   - Assess and map wildlife corridors and stream corridors, then consider acquisition for flood storage, wildlife habitat, water quality protection, and climate resiliency.
   - Map lands that are most suitable for climate change resiliency through a partnership with Massachusetts Audubon and The Nature Conservancy.
   - Protect land for pollinators by implementing a Pollinator Project to acquire land and/or restrict mowing in known pollinator areas. Additionally, pollinator gardens could be installed.

5. **Structural Projects**: Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include storm water controls (e.g., culverts), floodwalls, seawalls, retaining walls, and safe rooms.

   Projects that were recommended for structural actions include:

   - Initiate maintenance and repair program for culverts.
   - Proactively maintain roadways and replace / upgrade drainage as needed to manage water quality and water quantity.
   - Implement stormwater best management practices as feasible on both public and private projects.

- Retrofit Stony Brook Dam to allow for low flow releases.
- For conservation land with known erosion issues (e.g. Forge Pond, Burges Pond, Kennedy Pond), use a combination of education and restoration to redirect water flow (e.g., plantings, structural controls).
- Replace stormwater systems within roadways with known flooding concerns.
- Extend Town's water distribution system to neighborhoods on private wells with poor water quality to improve public health and reduce susceptibility to climate change impacts.
- The Highway Department facility was constructed with only one entrance. If the adjacent property became available, could purchase and add second access. It would be beneficial to increase fuel storage for redundancy for all Town vehicles. Currently only fueling station located at Highway Facility and some other vehicles uses. Fuel will not deliver to facility if there is snow on the ground or predicted for that day, and will not deliver fuel if there are thunderstorms.
- Review specific remedial repairs and improvements for dams as outlined in Phase II Reports.

6. **Emergency Services Protection**: Actions that will protect emergency services before, during, and immediately after an occurrence. Examples of these actions include protection of warning system capability, protection of critical facilities, and protection of emergency response infrastructure.

   Projects that were recommended for emergency services protection include:

   - For elderly population, especially those living alone, providing transportation to support people getting to food pantry and other social services.
   - For elderly care and nursing home facilities, keep inventory of facilities updated, enhance communication on planning, provide assistance with planning. Consider methods to strengthen planning for these facilities and coordination with Town. In addition to communication, understand what services they use related to emergency response.
   - Fine tune communication plan related to social media and homeowner/subdivision networks to be strategic for natural hazards.
   - Enhance security for water facilities by installing security cameras, additional fencing, etc.
   - Develop an Emergency Equipment Storage, Inventory, and Maintenance Plan to keep emergency supplies accessible, in adequate supply, and usable (i.e., avoid expired supplies).
   - Obtain MassDOT emergency response plans for roadways through Westford (e.g., Interstate 495, Route 3, etc.)

3.6 Top Recommendations to Improve Resilience for the Town of Westford

All Mitigation Projects identified in the CRB workshops are a priority for the Town. The list prepared below is subject to change based on evolving conditions in the Town and will be updated annually as part of the annual reporting on the MVP program to EEA. Capacity of Town staff needs to be considered in implementation of all projects. Volunteers should be leveraged if at all feasible.

HIGHEST PRIORITY

- Continue to require inspections of dams (both public and private)
- Develop a Natural Resource Overlay District in Zoning code to mitigation impacts on the environment, economy, society, and Town infrastructure from development on a previously undeveloped parcel
- The Town's information technology department is a critical service for all municipal staff and the public, and relocating these services to a facility that is safe and has redundancy is critical for Town operations.
- Educate residents about the AM radio station that can be activated during emergencies.
- To protect watersheds, waterbodies, and aquifers, continue to undertake stormwater management master plan recommendations including non-structural and structural improvements.
- Obtain MassDOT emergency response plans for roadways through Westford (e.g., Interstate 495, Route 3, etc.)
- Initiate maintenance and repair program for culverts
- Proactively maintain roadways and replace / upgrade drainage as needed to manage water quality and water quantity
- Implement stormwater best management practices as feasible on both public and private projects
- Retrofit Stony Brook Dam to allow for low flow releases
- Replace stormwater systems within roadways with known flooding concerns
- Extend Town's water distribution system to neighborhoods on private wells with poor water quality to improve public health and reduce susceptibility to climate change impacts

MODERATE PRIORITY

- Amend zoning bylaws to address heat island effects and increase resiliency by adjusting planting requirements (e.g., native plants, less grass, etc.)
- For bridges, assessment of MassDOT inspections and initiation of maintenance and repair/replacement program
- Develop a strategic vegetation program that considers locations of power lines

- Consider code changes to require Town projects, residents and developers to use sustainable building methods, including LEED Certification, and less wasteful building methods and materials
- Change code to require development to plant larger and more trees, and maintain their health for longer than currently required
- Educate residents and developers to use sustainable building methods, including LEED Certification, and less wasteful building methods and materials.
- Educate municipal staff, elected and appointed officials, and the public about invasive species, using native species, and best lawn maintenance practices including timing mowing to protect pollinators and nesting for certain species.
- Provide information to caregivers of special needs, elderly, other vulnerable populations about what to do, resources during natural hazards. Provide that information in multiple languages.
- Educate private dam owners on inspection, maintenance.
- Protect and invest in keeping Westford populated with trees. Allocate more resources towards the Tree Warden role. Develop an inventory of trees and tree planting program (that considers power line locations).
- Improve mapping and protection of wildlife corridors in Westford.
- Undertake a tree inventory and management program.
- For higher density areas (e.g., villages), add trees and stormwater improvements.
- For elderly population, especially those living alone, providing transportation to support people getting to food pantry.
- For elderly care and nursing home facilities, keep inventory of facilities updated, enhance communication on planning, provide assistance with planning. Consider methods to strengthen planning for these facilities and coordination with Town. In addition to communication, understand what services they use related to emergency response.
- Fine tune communication plan related to social media and homeowner/subdivision networks to be strategic for natural hazards.
- For conservation land with known erosion issues (e.g. Forge Pond, Burges Pond, Kennedy Pond), use a combination of education and restoration to redirect water flow (e.g., plantings, structural controls)
- Review specific remedial repairs and improvements for dams as outlined in Phase II Reports

LOWER PRIORITY

- Update local code for historic properties that would apply if building was renovated or damaged to include natural hazard resiliency considerations
- Create a "Ranger" position that will support management and maintenance of conservation lands, trails, and open space
- Evaluate Highway Department Building lightening suppression system.

- Enhance existing education program to include hazard mitigation, coupled with overall sustainability, conservation, and environmental stewardship, in public schools.
- Map invasive species.
- Consider watershed-based management program
- The Highway Department facility was constructed with only one entrance. If the adjacent property became available, could purchase and add second access. It would be beneficial to increase fuel storage for redundancy for all Town vehicles. Currently only fueling station located at Highway Facility and some other vehicles uses. Fuel will not deliver to facility if there is snow on the ground or predicted for that day, and will not deliver fuel if there are thunderstorms

Section 4
Workshop Details

4.1 Workshop Participants

A list of those invited to participate in the workshops and who attended is included in Appendix C. Members of the core team that had a role are also documented.

4.1.1 Workshop #1 (Societal) Attendance

Workshop Date: May 14, 2020: 10:30 AM
Workshop Host: Rebecca Cheney, Town Planner
Workshop Facilitator: Gabrielle Belfit, CFM, MVP Certified Provider – Tighe & Bond
Workshop Presentation: Jennie Moonan, PE, MVP Certified Provider - Tighe & Bond

4.1.2 Workshop #2 (Infrastructural) Attendance

Workshop Date: May 21, 2020: 10:30 AM
Workshop Host: Rebecca Cheney, Town Planner
Workshop Facilitator: Gabrielle Belfit, CFM, MVP Certified Provider – Tighe & Bond
Workshop Presentation: Jennie Moonan, PE, MVP Certified Provider - Tighe & Bond

4.1.3 Workshop #3 (Environmental) Attendance

Workshop Date: June 4, 2020: 10:30 AM
Workshop Host: Rebecca Cheney, Town Planner
Workshop Facilitator: Gabrielle Belfit, CFM, MVP Certified Provider – Tighe & Bond
Workshop Presentation: Jennie Moonan, PE, MVP Certified Provider - Tighe & Bond

4.2 Acknowledgements

Funding for the CRB workshop was provided through a Massachusetts Executive Office of Energy and Environmental Affairs (EEA) Municipal Vulnerability and Preparedness Planning Grant during Fiscal Year 20.

Many thanks to Rebecca Cheney for serving as the lead for the MVP Planning Process. A special thanks to all MVP Core Team members and everyone who participated in the CRB workshops as presenters, facilitators, scribes and stakeholders.

4.3 Report Citation

Tighe & Bond (2020). *Community Resilience Building Workshop Summary of Findings*, Town of Westford, Massachusetts.

J:\W\W5005 Westford MA\015 MVP Planning Grant\8 - MVP Report\02 - Westford MVP Findings Report_DRAFT.docx

Tighe&Bond

APPENDIX A

Westford MVP / HMP Core Team Kickoff Meeting Agenda

TO: Attendees (See sign-in sheet)
LOCATION: Westford Town Hall – Conference Room
DATE: September 11, 2019
TIME: 10:00 to 11:30 AM

10:00 AM **Welcome & Introductions**

10:05 AM **Presentation**

Background
MVP / HMP Grant and Workshop Goals
MVP / HMP Grant and CRB Process
Overlap with Local Planning
Guidelines/Guidance
More about the workshops…
Deliverables
What does Westford get from this process?
Roles & Responsibilities
Schedule

10:30 AM **Discussion Item: Natural Hazard Risks**

Matrix to be presented

10:50 AM **Discussion Item: HMP Goals**

See handout

11:10 AM **Discussion Item: Open Input on Vulnerabilities and Mitigation Actions**

11:25 AM **Next Steps**

11:30 AM **Conclude**

Westford MVP / HMP Core Team Kickoff Meeting Summary

TO: Attendees (See sign-in sheet)

LOCATION: Westford Town Hall – Conference Room

DATE: September 11, 2019

TIME: 10:00 to 11:30 AM

10:10 AM **Welcome & Introductions**

10:15 AM **Presentation & Discussion – see copy attached**

Group discussion about the following topics

Background
MVP / HMP Grant and Workshop Goals
MVP / HMP Grant and CRB Process
Overlap with Local Planning
Guidelines/Guidance
More about the workshops…
Deliverables
What does Westford get from this process?
Roles & Responsibilities
Schedule

11:00 AM **Discussion Item: Natural Hazard Risks**

Matrix presented and draft attached

Added beavers, algal blooms, microbursts, tsunamis, and separated dams from culverts

Initial rating by MVP Core Team is likely to be modified after T&B completes natural hazard risk assessment research

11:25 AM **Next Steps & Action Items**

Set up DropBox
Send Rebecca information for Chris to complete asset inventory
Send Rebecca capabilities assessment information
Provide examples of MVP reports
Send group schedule
Obtain reports on dams from Jeremy

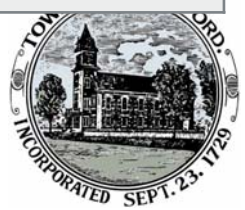
11:30 AM **Conclude**

Town of Westford
MVP / HMP Grant Core Team Workshop
September 11, 2019
Westford Town Hall Conference Room
10:00 am -11:30 am

Name	Signature
Carol Gumbart- Conservation/Resource Planner	
Gabrielle Belfit- Senior Environmental Scientist	
Henry Fontaine- Assistant Building Commissioner	
Jeffrey Morrissette- Director of Land Use Management	absent
Jeffrey Stephens- Health Director	
Jennie Moonan- Project Manager	
Jeremy Downs- Assistant Town Engineer	
Joe Targ- Fire Chief	
Matthew Hakala- Building Commissioner	
Matthew Salem- Assistant Planner	absent
Paul Fox- Director of Facilities	
Paul Starratt- Town Engineer	
Rebecca Cheney- Town Planner	
Richard Barrett- Highway Superintendent	absent
Stephen Cronin- Water Superintendent	
Tom Mahanna- Vice President	

SCHEDULE

Task	Date
1. Kickoff Meeting	September 2019
2. Characterize and Prioritize Hazards	September/October 2019
3. Community Asset Inventory	September/October 2019
4. Multi-Hazard Vulnerability Assessment	November 2019
5. Capabilities Assessment	October/November 2019
6. Development of Adaptation Strategies	January 2020
7. MVP workshops	April 2020
8. Draft and Final MVP Report	April - June 2020
9. Draft HMP Update Report	May 2020
10. Public Community Listening Session	May 2020
11. Ongoing Coordination	



Tighe&Bond

HMP / MVP PLANNING GRANT

Core Team Kickoff Meeting

September 11, 2019

Tighe&Bond

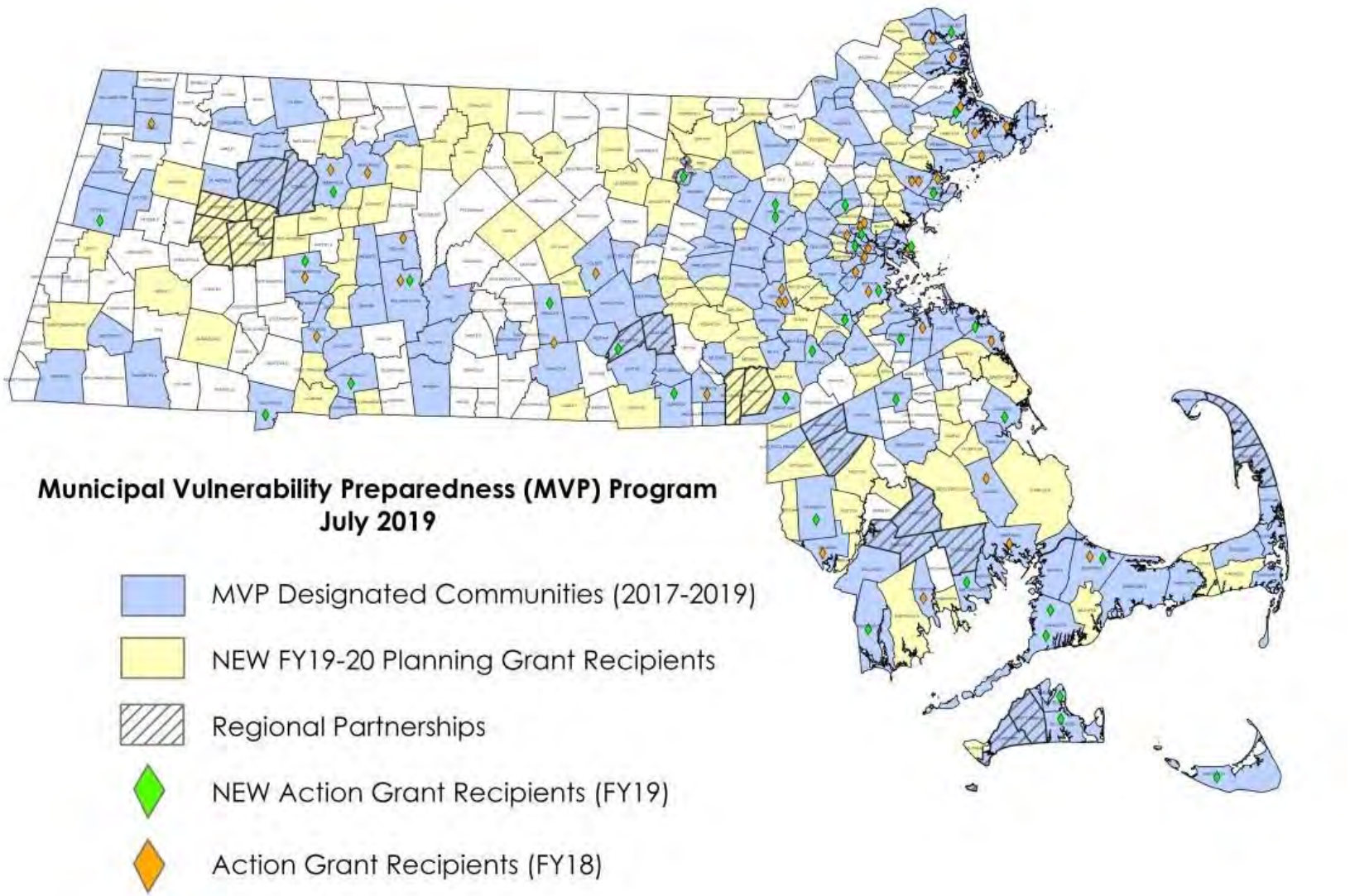
INTRODUCTIONS

BACKGROUND

- Executive Order 569: An Integrated Climate Change Strategy for the Commonwealth
- Town awarded a planning grant through Commonwealth's Executive Office of Energy and Environment
- Grant is to complete **Municipal Vulnerability Preparedness (MVP)** Community Resilience Building (CRB) Workshop Process and prepare a **draft Hazard Mitigation Plan (HMP) Update**

Tighe&Bond

BACKGROUND



TOWN OF WESTFORD
INCORPORATED SEPT. 23, 1729

Tighe&Bond

Legal Pad TOPS

TODAY'S AGENDA

1. Review MVP / HMP grant and CRB process

2. Discuss Roles and Responsibilities

3. Briefly update natural hazard risk priorities and goals of Westford's past HMP planning

4. Opportunity for your input

5. Define next steps

MVP/HMP GRANT AND WORKSHOP PROCESS GOALS

Build Resilience and Preparedness:

- Understand community assets and vulnerabilities
- Plan for more frequent and intense weather events
- Improve pre-event planning, response & recovery, and identify long-term mitigation actions

A prepared and resilient Westford will be able to maintain functions, protect its residents, and be ready for future storm events and a changing climate

MVP/HMP GRANT AND CRB PROCESS

1. Establish Core Team
2. Complete MVP/HMP Evaluation/Assessment
   - Natural Hazard Risks
   - Community Assets
   - Multi-Hazard Vulnerability Assessment
   - Capabilities Assessment
   - Mitigation Strategies
3. Hold two Workshops
4. Draft MVP Report
5. Hold Listening Session
6. Final MVP Report & Draft HMP Report

See handout: *Attachment A – Scope of Services: Integrating MVP and Hazard Mitigation Planning*

Tighe&Bond

THERE IS AN OVERLAP WITH LOCAL PLANNING

- Stormwater Management Master Plan / MS4
- Comprehensive Emergency Management Plan?
- Water System Master Plan
- Open Space and Recreation Plan

Copies available

Community Resilience Building

WORKSHOP GUIDE

www.**CommunityResilienceBuilding**.org

Overview of the Process (Steps & Tasks)

DURING WORKSHOP

A Prepare for the Workshop
1. Establish a core team with goals.
2. Engage stakeholders.
3. Prepare materials for workshop.
4. Decide on participant arrangements.

B Characterize Hazards
1. Identify past, current, and future impacts.
2. Determine the highest-priority hazards.

C Identify Community Vulnerabilities and Strengths
1. Identify infrastructural vulnerabilities and strengths.
2. Identify societal vulnerabilities and strengths.
3. Identify environmental vulnerabilities and strengths.

D Identify and Prioritize Community Actions
1. Identify and prioritize infrastructural actions.
2. Identify and prioritize societal actions.
3. Identify and prioritize environmental actions.

E Determine the Overall Priority Actions
1. Identify highest-priority actions.
2. Further define urgency and timing.

F Put It All Together
1. Generate final workshop products.

G Move Forward
1. Continue community outreach and engagement.
2. Secure additional data and information.
3. Inform existing planning and project activities.

Community Components

Infrastructural

Societal

Environmental

MULTI-HAZARD MITIGATION PLAN GUIDANCE

- **Disaster Mitigation Act of 2000, 44 CRF Part 201.6**
- **Commonwealth of Massachusetts State Hazard Mitigation Plan 2013**
- ***FEMA Local Mitigation Plan Review Guidance, October 2011***
- ***FEMA Local Mitigation Planning Handbook, March 2013***

1. Document the Planning Process
2. Document Methodologies Used
3. Involve Larger Community
4. Address FEMA concerns from 2013

FEMA

Tighe&Bond

WHAT ARE THESE WORKSHOPS…?

TOWN OF WESTFORD
INCORPORATED SEPT. 23, 1729

Tighe&Bond

DELIVERABLES

- **MVP Report**
- **Hazard Mitigation Plan**

y Resilience Building Risk Matrix — www.CommunityResilienceBuilding.org

Quincy's Top Priority Hazards

Assets	Location	Ownership (City, State, Federal, Private)	V or S	Inland Flooding	Coastal Flooding & Erosion	Nor'easter	Severe Winter Weather	Priority H - M - L	Time Short Long Ongoing
	Complete for New Assets Only								
ral									
portation Corridors	Citywide	City/State	V	Improve access during emergencies and severe weather events; Establish alternative routes and emergency alternative means of transportation; Increase culvert size at main corridors throughout City				H	O/S
				Improve Stormwater Management	Install Pump Stations				
et	East Squantum Street	City	V		Ongoing maintenance and repairs to seawall; Ongoing clearing of debris from road			M	L
	Sea Street	City	V	Backup Generator; MWRA Sewer Easement Access, develop hydraulic model, Sea Street Seawall Rehab and Enhancement for greater protection				H	S
	Terne Road	City	V		Analysis for Construction of Pump Station; Assessment of Tide gates			H	S
	Quincy Shore Drive	DCR	V/S	Storm Drain Maintenance	Salt Marsh restoration; Ongoing tide gate repair and maintenance; ongoing seawall repair and maintenance; Increase seawall height; Blacks Creek Tide Gate project; Sand Removal			H	O
				Alternative Route Planning; Ongoing maintenance and clearing of debris along road; Allocate funding to maintenance and improvements of Quincy Shore Drive; Conduct Analysis of Local Code and Feasibility study for elevating residential homes on Quincy Shore Drive; Mosquito spraying; control of invasive species; Sand Removal;					
ighborhood	Post Island Road	City/Private	V/S	Emergency Backup Generators; Georges Island Seawall Analysis; Pump Station Analysis; Construct new seawall; Evaluate living shoreline; Increase capacity of culverts on Sea Street; Perform dike assessment				H/M	O/S
	Neponset Ave	City	V		Salt Marsh Restoration; Saganoce Creek Tide Gate; Division Street Pump Station Repairs			H	L
ry Pier	552 Victory Road	City	V/S		Breakwater			L	O
	Squantum Neighborhood	City/Private	V	Increase culvert size				H	O
cess	Citywide	State	S	Improve Stormwater management and Construction of Stormwater Pumping Stations				H	L
	Hancock Street	State	V/S	Maintain up to date SPCC Plan; Maintain fleet for use in case of emergencies				M	O
				Retrofit Bus Barn for flooding and elevate roads			Retrofit site to sustain severe winter weather		
vacuation Routes	Citywide	N/A	V	Provide emergency power to light evacuation routes				H	S
y Services	Citywide	N/A	V	Maintain Comprehensive Emergency Management Plan; Provide additional Public Education; Establish an Emergency Notification and Warning System to Resident's Cell Phones; Improve Stormwater Management				H	O
ment Office	1 Merrymount Pkway	City	S	Maintain Equipment in case of emergency; Generator upgrades; Maintenance of Vehicles/Fleet, Site Floodproofing				H	O/S
ngine 5	182 Copeland Street	City	S	Maintenance of Equipment; Adequate Staffing; Ongoing Public Education and Emergency Alert System				H	O

TOWN OF WESTFORD INCORPORATED SEPT. 23, 1729

Tighe&Bond

WHAT DOES WESTFORD GET FROM THIS PROCESS?

MVP Community Designation =
Eligibility for MVP Action Grants

Once approved, HMP =
Eligibility for FEMA/MEMA Grants

Tighe&Bond

WHY ARE YOU HERE?

See roles & responsibilities handout

- Kickoff Meeting
- Two interim meetings to review / provide input on work products
- Each attend at least 1 MVP Workshop
- Review draft reports & provide comments

Tighe&Bond

SCHEDULE

Task	Date
1. Kickoff Meeting	September 2019
2. Characterize and Prioritize Hazards	September/October 2019
3. Community Asset Inventory	September/October 2019
4. Multi-Hazard Vulnerability Assessment	November 2019
5. Capabilities Assessment	October/November 2019
6. Development of Adaptation Strategies	January 2020
7. MVP workshops	April 2020
8. Draft and Final MVP Report	April - June 2020
9. Draft HMP Update Report	May 2020
10. Public Community Listening Session	May 2020
11. Ongoing Coordination	

Tighe&Bond

DISCUSSION ITEM: NATURAL HAZARD RISKS

See Handout & Spreadsheet

DISCUSSION ITEM: UPDATE HMP GOALS

See Handout

DISCUSSION ITEM (IF TIME ALLOWS): VULNERABILITIES AND MITIGATION ACTIONS

Open discussion

YOUR CHANCE FOR INPUT TODAY ON LOGISTICS…

- **Plan for communication & workshops**
  - Key stakeholders
  - Public notification
  - Approach to staffing workshops (need a facilitator per table)

Tighe&Bond

NEXT STEPS

- Town GIS Coordinator to prepare Asset Inventory
- Proceed with Evaluation/Assessment
- Meeting later this Fall/early Winter to review draft deliverables
- Individual input, provided separately, welcome

OPEN DISCUSSION & QUESTIONS

Contact Information

- **Jennie Moonan, PE, Project Manager**
  - JSMoonan@tighebond.com
  - 781-708-9826

Westford MVP / HMP Core Team Kickoff Meeting Agenda

TO: Attendees (See sign-in sheet)

LOCATION: Westford Town Hall – Conference Room

DATE: February 24, 2020

TIME: 1:00 – 3:00 PM

1:00 PM Welcome and Update

- Please sign in
- Update on project progress

1:10 PM Discussion on HMP Goals

- See handout, will present on screen

1:30 PM Discussion About Draft Asset Inventory

- See handout, will present details on screen

2:00 PM Mitigation Strategies – Update from 2015 HMP

- See handouts, will present live on screen

2:30 PM Meeting and Workshop Planning

- 4/6/2020 – Public Hearing
- Discussion on MVP Workshop
    - 4/9/2020 – Library Meeting Room (1:00 -5:00 PM)?
    - 4/28/2020 – Millennium School Conference Room B (5:00 – 9:00 PM)?
    - 4/30/2020 – Library Meeting Room (9:00 AM – 5:00 PM)?
- 5/12/2020 – Listening Session
- _____ - Board of Selectmen vote to approve to send to MEMA for review (prior to June 30, 2020)

2:50 PM Next Steps, Questions & Acton Items

- Town staff to provide edits to Asset Inventory by _____
- Tighe & Bond to provide Chapters 1 through 5 of draft HMP by _____

3:00 PM Adjourn

Town of Westford, MA
MVP/HMP Planning Grant
Sign-in Sheet

Date: Monday, February 24, 2020 **Time:** 1:00 – 3:00 PM

Location: Westford Town Hall, Conference Room

RE: MVP Planning Grant

Attendees:

Name	Title/Department	Signature
Carol Gumbart	Conservation/Resource Planner	
Henry Fontaine	Building Commissioner	
Jeffery Morrissette	Director of Land Use Management	
Jeffery Stephens	Health Director	
Jennie Moonan	Tighe & Bond	
Jeremy Downs	Assistant Town Engineer	
Joe Targ	Fire Chief	
Matthew Salem	Assistant Planner	
Paul Fox	Director of Facilities	
Paul Starratt	Town Engineer	
Rebecca Cheney	Town Planner	
Richard Barrett	Highway Superintendent	
Stephen Cronin	Water Superintendent	
Tom Mahanna	Tighe & Bond	
Tim Whitcomb	Public Safety Communications	

Westford MVP / HMP Core Team Check In Meeting Agenda

TO: Attendees

LOCATION: Webinar (see email for instructions)

DATE: May 7, 2020

TIME: 10:30 to 11:30 AM

10:30 AM **Brief Update on Grant Information from EEA**

Extensions available, Westford has elected to maintain June 30, 2020 deadline

Alternative public engagement guidance must be followed

Action Grant $ - some changes for FY21 and beyond

10:40 AM **HMP/MVP Project Status Update**

Completed:

- Natural Hazard Identification and Ranking
- Community Asset Inventory

In progress:

- Draft HMP Report sections
- Community Capabilities Assessment

Scheduled:

- Public Meeting: Monday May 18, 2020, Planning Board Meeting
- Workshops (see below)

10:50 AM **Review of Alternative Public Engagement Approach**

Pre-workshop survey & materials

Four separate workshops, Thursdays at 10:30 AM. Goal is 1 hour, allocating 1.5 hours to address EEA desired total of 8 hours of workshops.

Post-workshop survey

Ability for folks to receive hardcopies if desired

11:10 AM **Open Discussion and Questions**

11:30 AM **Conclude**

WESTFORD HAZARD MITIGATION AND MUNICIPAL VULNERABILITY PREPAREDNESS PLANNING

Public Meeting

April 18, 2020 7:30 to 8 PM

Tighe&Bond

WELCOME

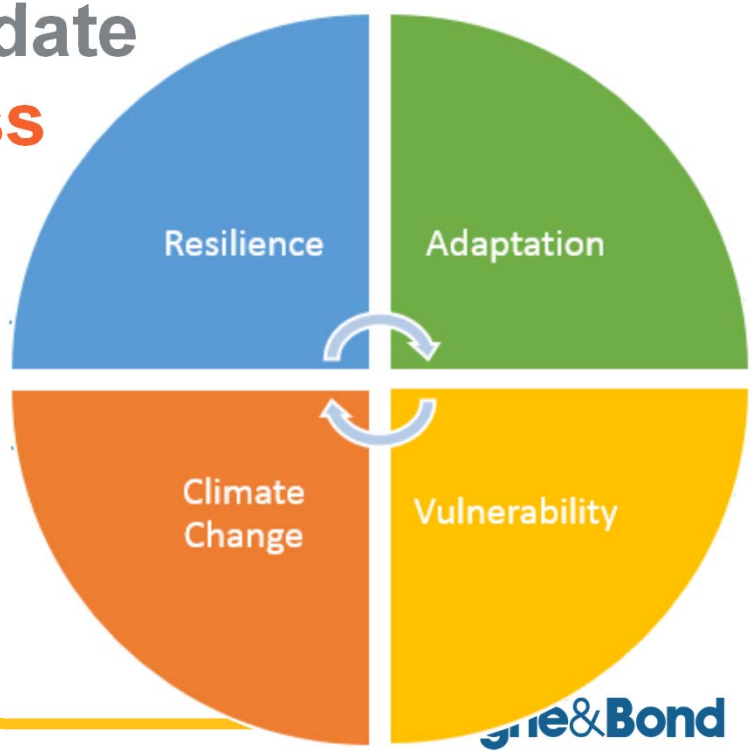
Westford awarded $36K grant for

- Municipal Vulnerability Preparedness (MVP) Community Resilience Building (CRB) Workshop Process; and
- Draft Hazard Mitigation Plan (HMP) Update

First step in unlocking additional funding opportunities for Westford from FEMA/MEMA and Commonwealth of Massachusetts

MVP/HMP GRANT AND CRB PROCESS

1. Establish Core Team
2. Complete Evaluation/Assessment
   - Natural Hazard Risks
   - Community Assets
   - Multi-Hazard Vulnerability Assessment
   - Capabilities Assessment
   - Mitigation Strategies
3. Draft Hazard Mitigation Plan Update
4. **Hold Public Meeting mid-process**
5. Hold MVP Workshops
6. Draft MVP Report
7. Hold Listening Session
8. Final MVP Report



PURPOSE OF PUBLIC MEETING

- **Required** to comply with Federal HMP guidance and contract with EEA
- **Introduce Hazard Mitigation and Municipal Vulnerability Planning** and **provide an update** on work completed to date
- Provide opportunity for **Q&A**

A brief thanks to Westford's MVP Core Team

CORE TEAM

- Carol Gumbart
- Henry Fontaine
- Jeffrey Stephens
- Jeremy Downs
- Joe Targ
- Paul Fox
- Paul Starratt
- Rae Dick
- Rebecca Cheney
- Richard Barrett
- Stephen Cronin
- Tim Whitcomb

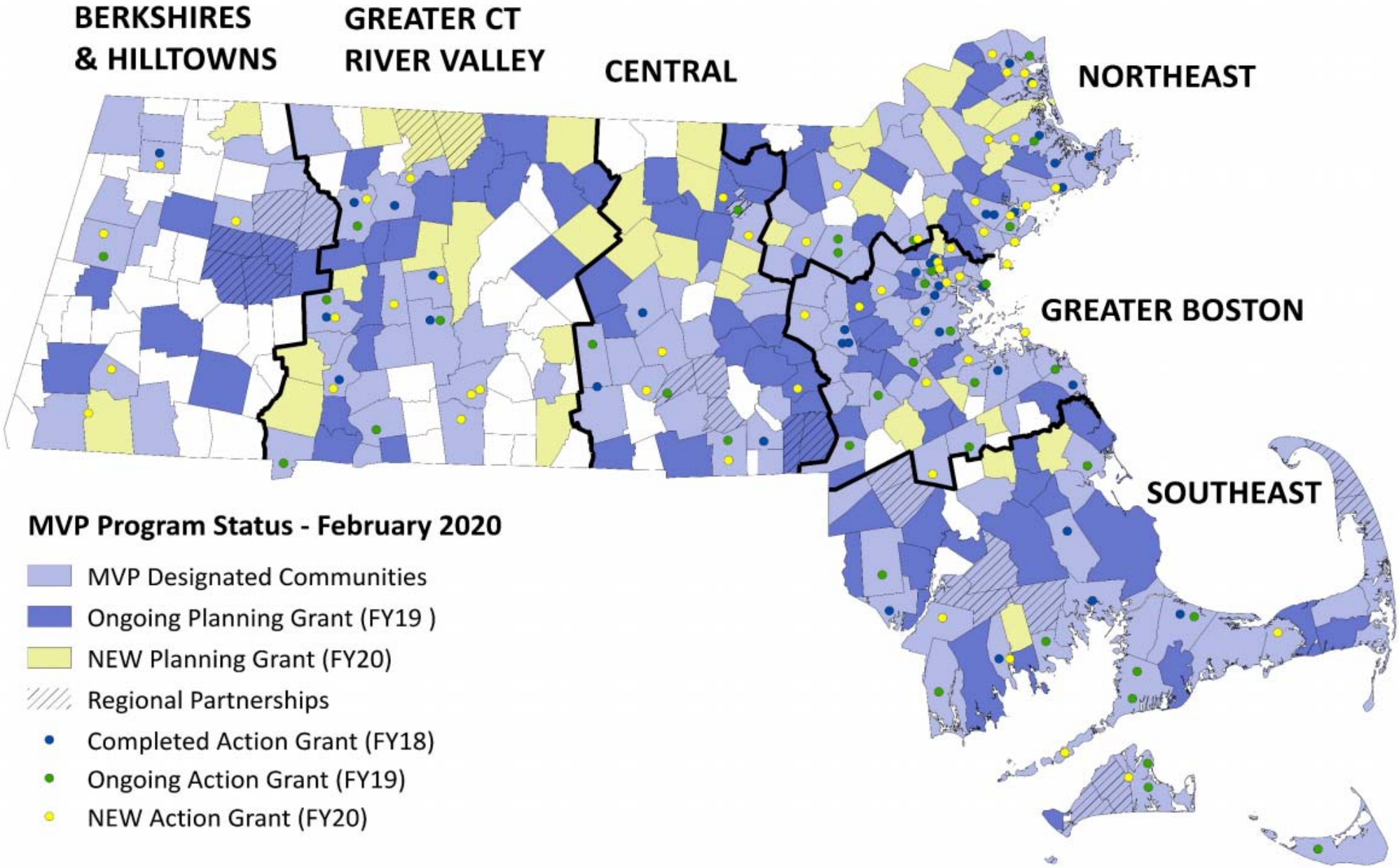
BACKGROUND

EXECUTIVE ORDER 569 9.16.16

ENVIRONMENTAL BOND BILL 8.21.18

- $2.4 billion bond bill with focus on climate change resiliency
- Over $200 million authorized for climate change adaptation
- **Codifies EO 569, including the MVP Program**

BACKGROUND

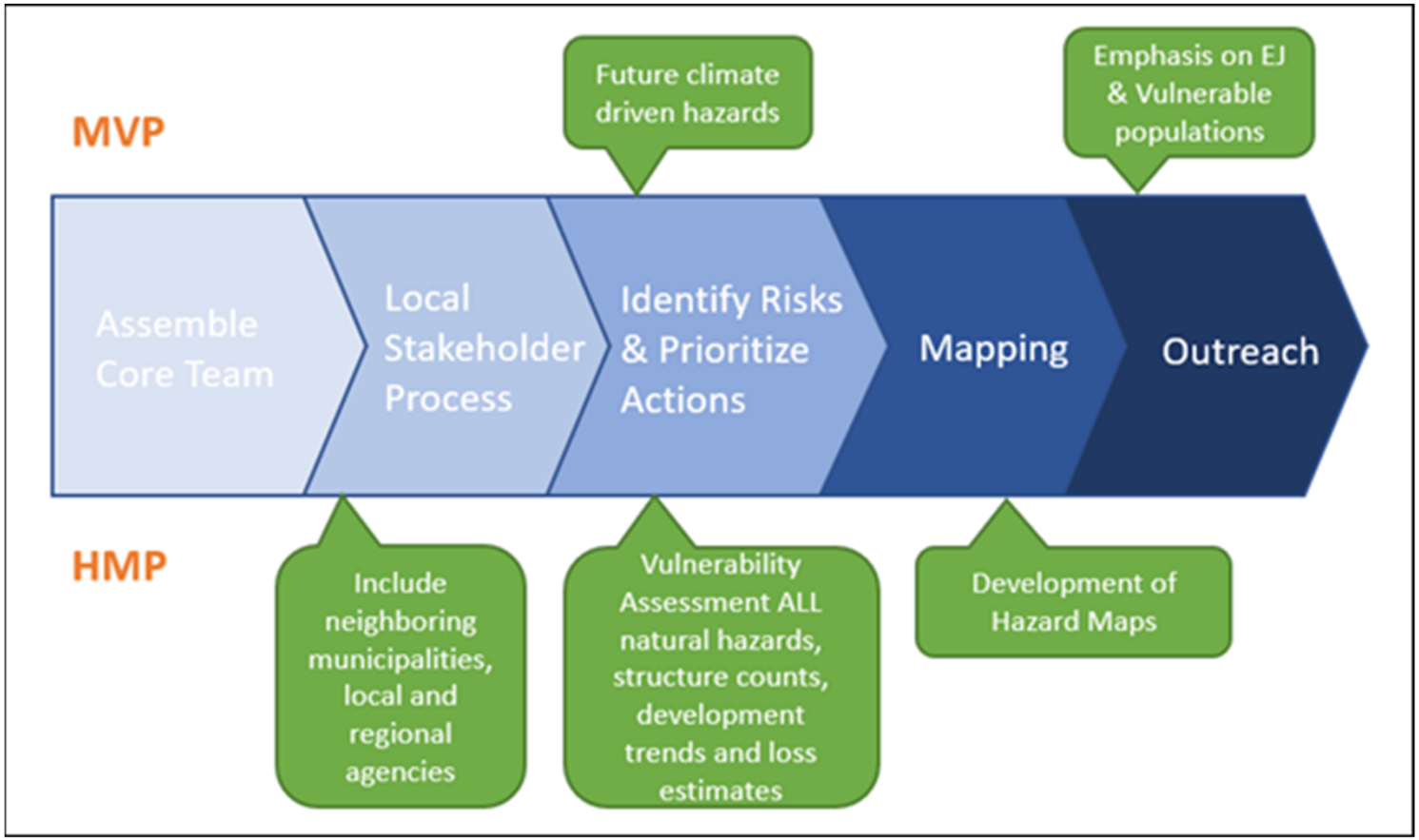

BERKSHIRES & HILLTOWNS
GREATER CT RIVER VALLEY
CENTRAL
NORTHEAST
GREATER BOSTON
SOUTHEAST
MVP Program Status - February 2020
MVP Designated Communities
Ongoing Planning Grant (FY19)
NEW Planning Grant (FY20)
Regional Partnerships
Completed Action Grant (FY18)
Ongoing Action Grant (FY19)
NEW Action Grant (FY20)

BACKGROUND ON HAZARD MITIGATION PLANNING

- **FEMA Requirements:**
  - Disaster Mitigation Act of 2000, 44 CRF Part 201.6
  - *FEMA Local Mitigation Plan Review Guidance, October 2011*
  - *FEMA Local Mitigation Planning Handbook, March 2013*
- **Westford included in Northern Middlesex Regional Hazard Mitigation Plan, approved August 2015.**
  http://www.nmcog.org/Websites/nmcog/images/Hazard_Mitigation_Plan_FEMA_approved_8_15.pdf
- **To maintain eligibility for FEMA/MEMA funding, must update plan every 5 years**
- **Commonwealth of Massachusetts State Hazard Mitigation & Climate Adaptation Plan 2018 must be considered in update**

HOW DO THE MVP AND HMP PROCESSES OVERLAP?

The MVP effort supplements the HMP process by providing a statewide and major watershed specific climate change data to use in the natural hazard risk assessment and a consistent methodology for public engagement through the Community Resilience Building (CRB) workshops.



WHY DO THIS PLANNING?

Help Westford Build Resilience and Preparedness:

- Build on the Town's existing emergency management capabilities
- Plan for more frequent and intense weather events that are linked to climate change
- Engage multiple stakeholders in the planning process
- Improve access to funding for mitigation and adaptation

COMMUNITY ASSET INVENTORY

Tighe&Bond

COMMUNITY ASSET CATEGORIES

FEMA defines a community asset as anything that is important to the character and function of a community.

FEMA Community Asset Categories	Critical Sectors	Characteristics of Community Assets
People	Schools, Vulnerable Populations, Cultural Facilities	Areas of greater population density, or population with unique vulnerabilities or less able to respond and recover during a disaster.
Built Environment	Critical Municipal Facilities, Water, Wastewater, Energy, Stormwater, Transportation, Cultural Resources	Critical facilities necessary for a community's response to and recovery from emergencies, infrastructure critical for public health and safety, economic viability, or needed for critical facilities to operate.
Economy	Marinas, Business and Industry	Major employers, primary economic sectors and commercial centers where loss or inoperability would have severe impact on the community and ability to recover from a disaster.
Natural Environment	Natural Resources	Areas that provide protective function to reduce magnitude of hazard impact and increase resiliency. Areas of sensitive habitat that are vulnerable to hazard events, protection of areas that are important to community objectives, such as the protection of sensitive habitat, provide socio-economic benefits, etc.

PEOPLE – SOCIETAL ASSETS

- Child Care (e.g. Roudenbush Children's Center, Westford KinderCare, etc.)
- Places of worship
- Cemeteries
- Emergency shelters
- Westford Food Pantry
- Historical Places
- Nursing Homes/elderly housing/elderly care
- Cameron Senior Center and Roudenbush Community Center
- J.V. Fletcher Library
- Schools
- Village at Mystery Spring
- Westford Museum
- Parish Center for the Arts

WESTFORD
FOOD PANTRY

BUILT ENVIRONMENT – INFRASTRUCTURE ASSETS

- Fire and Police facilities
- Water treatment and distribution
- Culverts (town-wide) and bridges
- Dams (private and town-owned) and bridges
- Town Hall and other municipal buildings
- Medical facilities (e.g., CVS Minute Clinic, Westford Counseling Center)
- Power grid
- Public safety communications
- Schools/town shelters

ECONOMIC ASSETS

- Banks
- Funeral Homes (Main Street, Pleasant Street)
- Gas Stations
- Supermarkets (Whole Foods, Market Basket)
- Hardware Store (ACE Hardware)
- Kimball Farm
- Nashoba Valley Ski Area
- Oil Delivery (e.g. JA Healy & Sons)
- Pharmacies (CVS, Walgreens)
- Major employers (e.g., Juniper Networks, Netscout system, etc.)
- Tree removal services
- Veterinary hospitals

ENVIRONMENTAL ASSETS

- Conservation lands and open space
- Wetlands and Waterbodies throughout town (e.g., Stony Brook, Nabnasset Lake, Forge Pond, Beaver Brook, etc.)
- Habitat (including vernal pools)
- Trails (Nashua River Trail)
- Well contribution areas
- Parks, fields (e.g. VFW softball field)
- East Boston Camps
- Beaches (Edwards and Forge Pond)

NATURAL HAZARD RISK AND VULNERABILITY ASSESSMENT

Tighe&Bond

WHAT ARE NATURAL HAZARDS?


Inland Flooding


Tsunami


Severe Winter Storm

Blizzards
Snow
Ice Storms


Drought


Average/Extreme Temperatures


Tornadoes


Landslide


Wildfires


Other Severe Weather

Nor'easters
High Wind
Heavy Precipitation
Microbursts


Hurricanes/Tropical Storms


Invasive Species


Earthquake

HISTORICAL EVENTS

- October 1963 Earthquake
  - Magnitude 4.5 earthquake
- October 1970 Tornado
  - Killed one person and caused between $50,000 and $500,000 in damages
- Winter of 1995
  - Snowfall reached over 126 inches
- May 2007 Brush/Wildland Fire
  - Spread across several acres and to a home
- December 2008 Ice Storm
  - Brought down trees and power lines
- August 2011 Hurricane Irene
  - Widespread power outage
- October 2011 Halloween Storm
  - Power out for six days

- March 2018 Nor'easter
  - Westford received over 20 inches of snow from a winter nor'easter

NATURAL HAZARD RISK INDEX

Type of Natural Hazard	History of Occurrence in Westford	Hazard Probability	Hazard Frequency	Geographic Extent	Severity of Impact	Hazard Risk Ranking
Hydrological Hazards						
Inland Flooding	Yes	2	3	1	1	7
Drought	Yes	3	2	3	2	10
Atmospheric Hazards						
Extreme Temperatures	Yes	4	3	3	2	12
Hurricanes/ Tropical Storms	Yes	2	0	3	2	7
Nor'easters	Yes	4	3	3	3	13
Other Sever Weather – High Winds and Thunder storms	Yes	4	3	3	2	12
Severe Winter Storm – Snow, Ice, and Blizzard	Yes	4	3	3	2	12
Tornadoes	Yes	1	0	1	3	5
Microburst	Yes	4	3	1	3	11
Geologic Hazards						
Earthquake	Yes	2	1	3	4	10
Other Hazards						
Wildfires	Yes	3	2	2	4	11
Invasive Species (including algae)	Yes	4	3	3	1	11

WESTFORD'S TOP HAZARDS

- **Input on past, present, and future hazards based on public perception being provided via survey:**
  - https://www.surveymonkey.com/r/8BZDR87

- **Top hazard risk ranking by Core Team:**
  - Nor'easters
  - Severe Weather (e.g. thunderstorms, high wind) & Winter storms (e.g., ice and blizzards)
  - Extreme Temperature
  - Invasive Species

AMPLIFIED RISKS

CLIMATE CHANGE

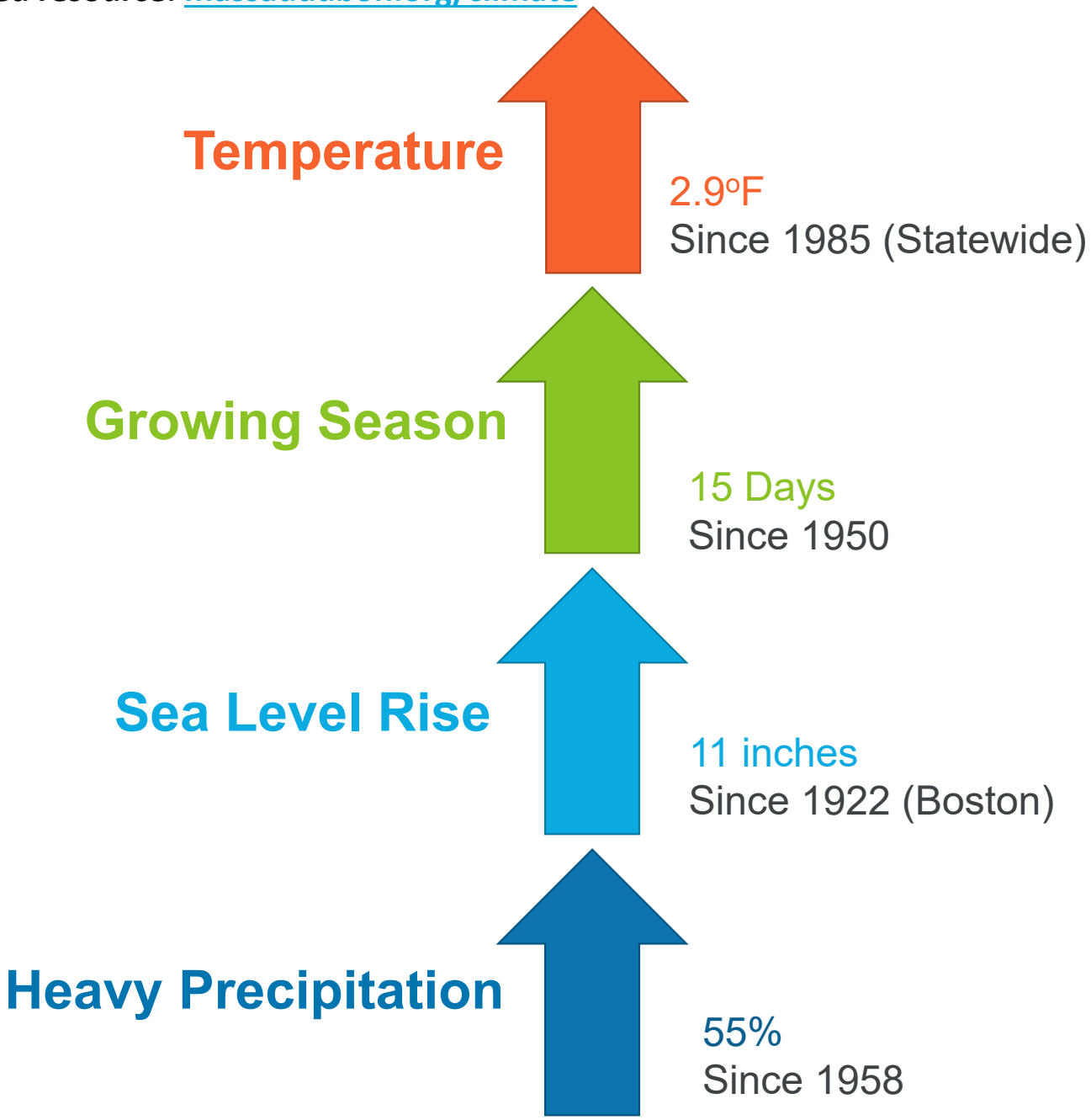
Tighe&Bond

CLIMATE CHANGE REFERENCES FOR MVP PROCESS

- **Massachusetts Integrated State Hazard Mitigation and Climate Adaptation Plan, September 2018**
  - https://www.mass.gov/service-details/massachusetts-integrated-state-hazard-mitigation-and-climate-adaptation-plan
- **Massachusetts Climate Clearinghouse**
  - https://resilientma.org/
- **Statewide and Major Watershed (Basin) Climate Change Projections**
  - https://www.mass.gov/files/ma-statewide-and-majorbasins-climate-projections-final.pdf

MASSACHUSETTS OBSERVED CLIMATE CHANGES

Recommended resource: massaudubon.org/climate



MASSACHUSETTS CLIMATE PROJECTIONS

By end of century:

Changes in precipitation

- 18% increase in consecutive dry days
- 57% increase in days with > 1 in. rainfall
- 7.3 inches additional annual rainfall

Rising temperatures

- 10.8°F increase in average annual temperature
- 42% decrease in days/year with min. temperatures < 32* F
- 1,280% increase in 90-degree days/year

Sea level rise

- 4-10.5 feet along the MA coast

Extreme weather

- Increase in frequency and magnitude

CHANGES IN PRECIPITATION

Nashua Basin		Observed Baseline 1971-2000 (Inches)	Projected Change in 2030s (Inches)	Mid-Century Projected Change in 2050s (Inches)	Projected Change in 2070s (Inches)	End of Century Projected Change in 2090s (Inches)
Total Precipitation	Annual	45.9	+0.4 to +4.9	+1.2 to +6.3	+2.3 to +7.9	+1.3 to +8.4
	Winter	11.0	-0.3 to +1.9	+0.2 to +2.5	+0.4 to +3.3	+0.6 to +4.3
	Spring	11.8	-0.0 to +2.2	+0.1 to +2.0	+0.5 to +3.0	+0.1 to +2.9
	Summer	11.3	-0.3 to +1.5	-0.3 to +2.2	-0.6 to +2.2	-1.1 to +2.2
	Fall	11.8	-1.1 to +1.1	-1.2 to +1.8	-1.6 to +1.7	-1.4 to +1.5

IMPACTS OF CHANGING PRECIPITATION

- Episodic droughts
- Concerns over food production and drinking water supply
- Stress on ecosystems
- Flooding

EXTREME STORMS

Blizzards

- There have been more than 5 in Massachusetts since 2011

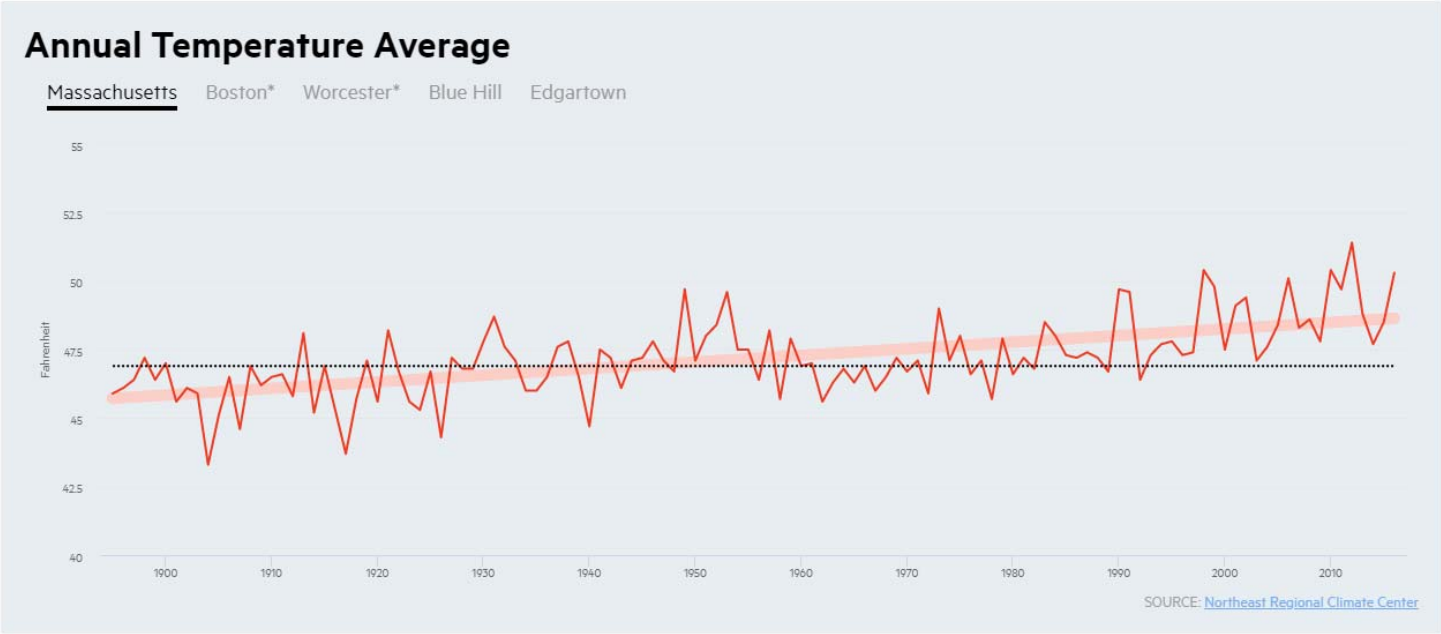
Nor'easters and Hurricanes

- Upward trend since the 1970s

IMPACTS OF EXTREME STORMS:

- **Public safety concerns, including increased injuries and mortality**
- **Economic damages and business disruption**
- **Property and infrastructure damage**
- **Natural resources**

RISING TEMPERATURE



IMPACTS OF RISING TEMPERATURE:

- Heat-related illnesses
- Vector borne-diseases
- Health of plants, animals, ecosystems
- Reduced crop production
- Larger energy demand
- Droughts and wildfires

MITIGATION STRATEGIES FOR VULNERABLE ASSETS

Tighe&Bond

TYPES OF MITIGATION ACTIONS

1. Prevention
2. Property Protection
3. Public Education and Awareness
4. Natural Resource Protection and Green Infrastructure
5. Structural Projects
6. Emergency Services Protection

MVP WORKSHOPS

In progress now

THURSDAYS AT 10:30 AM

1. Workshop #1: 5/14/2020 on Societal Assets and People

2. Workshop #2: 5/21/2020 on Infrastructure

3. Workshop #3: 5/28/2020 on Economy

4. Workshop #4: 6/4/2020 on Environment and Natural Resources

Sign up on Town website or contact Rebecca Cheney
https://www.westfordma.gov/1309/Municiple-Vulnerability-Preparedness-Pla

WORKSHOP OBJECTIVES

- Hear from stakeholders who can help evaluate our community's strengths and vulnerabilities of residents, infrastructure, and natural resources
- Understand connections between natural hazards and local planning/mitigation efforts
- Develop and prioritize resiliency actions for the municipality, organizations, businesses, neighborhoods, and community groups
- Identify opportunities to advance actions that reduce the impact of hazards and increase resiliency in the community

Community Resilience Building
WORKSHOP GUIDE

www.CommunityResilienceBuilding.org

resilient **MA**

Climate Change Clearinghouse for the Commonwealth

ResilientMA.org

Tighe&Bond

NEXT STEPS BEFORE JUNE 30, 2020

- Complete draft Hazard Mitigation Plan for Town staff and public review
- Hold listening session
- Selectmen vote to submit Hazard Mitigation Plan to FEMA
- Submit documents to EEA and FEMA

GRANT OPPORTUNITIES

HOW DOES THIS PROCESS BENEFIT WESTFORD?

MVP Community Designation = Eligibility for MVP Action Grants

Once approved, HMP = Eligibility for FEMA Hazard Mitigation Grants

OPEN DISCUSSION & QUESTIONS

Contact Information:

- **Rebecca Cheney, Town Planner**
  - Rcheney@westfordma.gov
  - (978) 399-2577
- **Janet Moonan, PE, Project Manager**
  - JSMoonan@tighebond.com
  - (781) 708-9826

Information on Town's website at:

- https://www.westfordma.gov/1309/Municiple-Vulnerability-Preparedness-Pla

Tighe&Bond

APPENDIX B

Town of Westford MVP Grant – Virtual Public Engagement During COVID-19

TO: Michelle Rowden, MVP Northeast Regional Coordinator, Executive Office of Energy and Environmental Affairs (EEA)

FROM: Janet S. Moonan, PE, Project Manager, Tighe & Bond

COPY: Rebecca Cheney, Town Planner, Westford

DATE: April 17, 2020

Westford is in receipt of EEA's April 7, 2020, email that contained recommendations for adjusting the public engagement strategies to accommodate social distancing and stay-at-home advisories due to the ongoing COVID-19 crisis, while still accomplishing the Fiscal Year Municipal Vulnerability Preparedness (MVP) grant program requirements.

We understand that a key component of the MVP program is public engagement; however, during this time, meeting the various requirements for public engagement within the MVP program will require a multi-modal approach. To meet the requirements of the program, it is necessary that Westford's community is informed and engaged. The virtual public engagement plan proposed below recognizes equitable engagement within the MVP process as a top priority. The engagement methods proposed below allow participation from key stakeholders as well as vulnerable populations.

The MVP Planning Grant process typically includes a minimum of three in-person, group meetings: Core Team Meeting, the Community Resilience Building (CRB) Workshop, and Public Listening Session. In addition, Westford was awarded funds to complete a Hazard Mitigation Plan (HMP) Update which requires a Public Meeting. Westford has completed two in-person Core Team meetings, and prepared for the workshops.

The sections below outline Westford's proposed strategy to virtually meet the goals of the MVP engagement process. **Westford is seeking confirmation from EEA as soon as possible that the proposed virtual engagement strategy meets the requirements of the MVP contract so we may proceed.**

Overview of Proposed Virtual MVP Engagement Process

To meet the requirements of the in-person meetings outlined above, Westford will work with their MVP Provider, Tighe & Bond, to complete the following virtual engagement process:

1. **Provide an online space for MVP materials**: A municipal-specific MVP website will be designed and hosted to provide all necessary materials for completing the MVP process. Reference material such as the Massachusetts State Hazard Mitigation and Climate Action Plan, ResilientMA.org, the MVP Workshop Guide, and the Regional Hazard Mitigation Plan that covers Westford will be available for public access on this website. Municipal-specific information such as maps and the workshop matrix will also be provided via the online website or through email. Recorded meetings and Virtual CRB Workshop Webinars and the draft and final MVP Summary of Findings Report will be posted to the website.

2. **Survey to identify strengths and vulnerabilities**: Tighe & Bond will use Survey Monkey to create and distribute a survey to members of the Core Team and identified stakeholders. The survey questionnaire results will be used to develop a master list of

Tighe&Bond

APPENDIX C

Westford MVP Stakeholder list - 2020

Name	Contact	Affiliation
Alemeida, Elizabeth	ealmeida@westfordma.gov	Select Board
Amiro, Tom	tomamiro@comcast.net	Climate Action Committee
Barrett, Chris	cbarrett@westfordma.gov	Pedestrian Safety and Capital Planning Committees
Bartl, Roland	planning@acton-ma.gov	Acton PLanner
Berenson, Margie	meberenson@comcast.net	Climate Action Committee
Berlinski, Mike	michaelberlinski@yahoo.com	Energy Committee
Brem, Jeff	jabrem@meisnerbrem.com	Meisner Brem Engineers, principal, green building advocate
Cataldo, Zac	zcataldo@westfordma.gov	Chair, Board of Health
Christopher, Alison	achristopher@westfordma.gov	COA social worker
Claro, Jennifer	jclaro@westfordma.gov	COA director
Clay, Tom	tclay@westfordma.gov	Select Board
Clery, Kerry	kclery@westfordk12.us	School Department
Cohen, Lynn	Lynnlcohen@gmail.com	Climate Action Committee
Coleman, Richard	Rjcoleman2020@gmail.com	Climate Action Committee
Collins, Christine	ccollins@westfordma.gov	Town Tax Collector
Cook, Nancy	Noakescook01886@yahoo.com	Affordable housing advocate
Dibello, Gerry	Gdbmail900@gmail.com	Climate Action Committee
Drake, Jonathan MD	Jonathan.Drake@lowellgeneral.org	Lowell General Doctor
Duane, Jim	jduane@westfordma.gov	Parks and Rec Dept director
Dumont, Ed	edumont@kimballfarm.com	Kimball Farm, Director of Operations
Field-Juma, Alison	afieldjuma@oars3rivers.org	Executive Director, OARS: For the Assabet, Sudbury, and Concord Rivers
Flaherty, Joe	jflaherty1955@gmail.com	Contractor, green building advocate
Gemma, Ron	rgemma@westfordconservationtrust.org	President, Westford Conservation Trust
Gozzo, Jim	jgozzo@mitre.org	ConsComm, Town Forest Committee
Greene, Kristina	kdfgreene@msn.com	Climate Action Committee
Hannaford, Jeff	nds@verizon.net	Designer, resident
Harde, Ellen	eharde@westfordma.gov	Recycling Committee,
Hazelton, Scott	shazelton@westfordma.gov	Select Board
Heideman, Eric	eheideman@westfordma.gov	Asst Town Manager
Hudson, Karen		Affordable Housing & Ped Safety Committees
Jeffries, Ann	annrjefferies@gmail.com	ConsComm
Kazeniac, Jim	jkazeniac@comcast.net	ZBA member

Kelly, Sean	skelly@westfordk12.us	School Committee member
Kosicki, Bern	kosicki@verizon.net	Climate Action Committee
Kost, mark	mkost@westfordma.gov	Select Board
Lauber, Diane	dianelauber@comcast.net	resident
Lewis, Marcus	marcus@marcuslewisenterprises.com	Owner, Marcus Lewis Day Camp
Lorrain, Chris	clorrain@landtechinc.com	LandTech Consultants
Lynch, Kathy	kathy.lynch@me.com	Healthy Westford Committee, state rep candidate
MacKay, Scott	sdmackay@aol.com	ZBA member, business owner (hardware)
Minska, Walter	westfordrotarypres@gmail.com	Westford Rotary Club
Morrison, Beth	bethoshaffer@hotmail.com	Climate Action Committee
Morse, Carol	carolgmorse@yahoo.com	Climate Action Committee
O'Connor, Dylan	Dylanoconnor71@gmail.com	Planning Board
O'Donnell, Rose	rose.odonnell@gmail.com	Friend of East Boston Camps
O'Lalor, Mark	molalor@westfordma.gov	Ag Committee
Peraner-Sweet, Andrea	asweet@westfordma.gov	Select Board
Perkins, Beth	beth@middlesexdesign.com	Climate Action Committee
Ross, Jodi	jross@westfordma.gov	Town Manager
Rowden, Michelle	Michelle.rowden@state.ma.us	EEA Coordinator, Northeast Region
Salerno, Eric	esalerno@tyngsboroughma.gov	Tyngsborough Planner
Salowsky, Steven	salowskyenterprise@gmail.com	Climate Action Committee
Sleger, Mark	msleger@verizon.net	Sleger Engineering, owner
Teller, Emily	eteller@earthlink.net	Climate Action Committee
Theriault, Barbara	barbrayt@aol.com	Climate Action Committee
Thomas, Susan	susanlavignethomas@gmail.com	Climate Action Committee
Tyndall, Lynn	lynntyndall@gmail.com	Healthy Westford Committee
Warren, Mark	mwarren@westfordma.gov	Water department
Waterman, Matt	mwaterman@landtechinc.com	LandTech Consultants Principal
Woods, Bev	bwoods@nmcog.org	NMCOG, director

Tighe&Bond

APPENDIX D

Municipal Vulnerability Preparedness Plan 2020

Public Listening Session to review draft report: June 18 - 10:30-11:30 AM. Click here to review the draft report

- Register to join the Listening Session through the GoToWebinar website at: https://attendee.gotowebinar.com/register/2356028425679663118 .
- After registering, you will receive a confirmation email.
- There are basic instructions on how to use GoToWebinar available at: **https://www.youtube.com/watch?v=lQ3Xwwgbd8Y**
- You may call in and listen on any phone (landline or cellphone) by dialing +1 (415) 655-0052 and using meeting code 307-796-139

Municipal Vulnerability and Preparedness Planning for the Town of Westford Public Engagement Information

The Town of Westford was recently awarded a $36,000 grant by the Executive Office of Energy and Environmental Affairs (EEA) Municipal Vulnerability and Preparedness (MVP) Planning Grant program to complete a public engagement and climate resilience planning process before June 30, 2020. Westford's Town Planner is taking the lead on the MVP program, with participation of a Core Team of Town Staff to plan for ways to better prepare and protect the Town from natural and climate-related hazards. Once the plan is completed and approved by EEA, the Town of Westford will be designated as an MVP Community, joining 287 communities across Massachusetts that have been designated since the MVP program began in 2017. This work also includes preparing a Town-specific Hazard Mitigation Plan (HMP) 5-year update to help Westford continue to be eligible to receive certain types of non-emergency disaster assistance, including funding for mitigation projects.

Why plan for climate resilience? Resilience is the ability of a community to address the needs of its built, social and natural environment to anticipate, cope with, and rebound stronger from events and trends related to climate change hazards. Planning for climate resilience allows Westford to build capacity to reduce the impacts from future climate events rather than just react to events as they occur.

How will the public engage? MVP is a Community Driven Process to understand climate vulnerabilities and identify priority actions. MVP provides structured opportunities for public engagement through review of community specific mapping and climate data, participation in unique Community Resilience Building Workshops, and developing priority action plans to improve their community's resilience with an emphasis on nature-based solutions. There will be a public meeting to review the HMP update, as well.

Due to COVID-19, previously planned public meetings and workshops will be held online.

The Town is utilizing a number of public engagement methods including:

- Posting online resources that will be used in the workshops
- Conducting pre- and post- workshop surveys
- Hosting virtual workshops focusing on climate resilience within the context of Westford's societal, built infrastructure, natural resources and economic community assets.
- Hosting a public meeting and a community listening session

Please watch the introductory video, take the survey, and sign up for a meeting to share your thoughts.

1. **Step 1:** Take the pre-workshop survey asap. Click here for HANDOUT 1 ***This should take 10 mins or less.***

2. **Step 2: Sign up for one or more of the workshops**. The 1 to 1.5 hour workshops will consist of four separate live webinars discussing climate risks and adaptation related to the following categories:

- **People and Society**: May 14 – 10:30-12:00 PM Workshop completed. Click here to watch video of the workshop
- **Buildings and Infrastructure**: May 21 – 10:30-12:00 PM Workshop completed. Click here to watch this video of the workshop
- **Economy:** May 28 – *This workshop has been **cancelled**. You may provide feedback on Westford's economy and climate resiliency by emailing Jennie Moonan at JSMoonan@tighebond.com*
- **Natural Resources and the Environment:** June 4 – 10:30-12:00 PM Click here to watch video of the workshop
- **Public Listening Session to review draft report:** June 18 - 10:30-11:30 AM. Click here to review the draft report
  - Register to join the Listening Session through the GoToWebinar website at: https://attendee.gotowebinar.com/register/2356028425679663118 .
  - After registering, you will receive a confirmation email.
  - There are basic instructions on how to use GoToWebinar available at: **https://www.youtube.com/watch?v=lQ3Xwwgbd8Y**
  - You may call in and listen on any phone (landline or cellphone) by dialing +1 (415) 655-0052 and using meeting code 307-796-139

You are encouraged to join all of the webinars, although, you may opt to only attend one.

Please contact Jennie Moonan at JSMoonan@tighebond.com with any questions or concerns about access. Thank you for your consideration and participation!

Planning Resources

- Westford's current Hazard Mitigation Plan, prepared in 2015: https://www.nmcog.org/s/Hazard_Mitigation_Plan_FEMA_approved_8_15.pdf
- Massachusetts' Climate Change Clearinghouse http://www.resilientma.org/
- State Hazard Mitigation and Climate Adaptation Plan (SHMCAP) https://www.mass.gov/service-details/massachusetts-integrated-state-hazard-mitigation-and-climate-adaptation-plan
- Westford's Emergency Management Department: https://westfordma.gov/440/Emergency-Management
- Westford's flood plain maps: https://westfordma.gov/170/Flood-Plain-Information

Frequently Asked Questions:

Q: How much time will it take to participate?
A: You should plan on spending up to 6 hours over a 6-week period, responding to surveys, previewing planning resources and participating in one or more workshops

Q: Do I have to commit to participating in all of the virtual workshops, or can I choose which ones I want to participate in?
A: You are welcome to join each virtual workshop, but may opt to only attend one. You will be able to view and provide input on all of the recorded workshops, which will each be posted on the municipal MVP website after they are completed.

Q: What if I have special circumstances that prohibit participating in an online format?
A: You can still participate using alternate format materials. Please send an email to Rebecca Cheney, Town Planner, to discuss your needs.

Q: What online meeting platform will be used? Is it easy to join?
A: Skype for Business will be used for the meeting platform. Full instructions will be provided.

Q: I am not very tech savvy. Is there anyone that can help if I have issues with connecting?
A: Yes, we can arrange a test connection in advance of the meeting to make sure that you are all set to access the workshop online portion of the program.

Municipal Vulnerability and Preparedness Pre-Workshop Survey

Westford, Massachusetts

Your community is undertaking an initiative to understand how natural hazards and climate change impact infrastructure, the local economy, people, and the environment. Please use the definitions below as well as Handout 1 to help complete this survey. Your input is greatly appreciated.

Natural hazards are defined as a natural phenomenon that might have a negative effect on humans or the environment. For example:

- A *natural hazard* is like the sun.
- The *risk* from that hazard is sunburn.
- The *vulnerability* includes the length of exposure of skin to the sun.
- The *mitigation action* to reduce risk from the hazard is to apply sunscreen or seek shade.

1. What is your affiliation with the Town of Westford?

2. How often have each of these natural hazards occurred in your community?

	Once a year or more often	Once every 3-5 years	Once in a decade	Once in my lifetime	Unsure/Never
Blizzard	○	○	○	○	○
Nor'easter	○	○	○	○	○
Ice Storm	○	○	○	○	○
Flooding	○	○	○	○	○
Dam Overtopping	○	○	○	○	○
Drought	○	○	○	○	○
Extreme Temperature	○	○	○	○	○
Tornado	○	○	○	○	○
Landslide	○	○	○	○	○
Wildfire	○	○	○	○	○
High Wind	○	○	○	○	○
Thunderstorm	○	○	○	○	○
Microburst	○	○	○	○	○
Hurricane/Tropical Storm	○	○	○	○	○
Earthquake	○	○	○	○	○
Invasive Species	○	○	○	○	○

3. What natural hazards are you concerned about experiencing in the future?

	Very concerned	Moderately concerned	Slightly concerned	Not concerned	Unsure
Blizzard	○	○	○	○	○
Nor'easter	○	○	○	○	○
Ice Storm	○	○	○	○	○
Flooding	○	○	○	○	○
Dam Overtopping	○	○	○	○	○
Drought	○	○	○	○	○
Extreme Temperature	○	○	○	○	○
Tornado	○	○	○	○	○
Landslide	○	○	○	○	○
Wildfire	○	○	○	○	○
High Wind	○	○	○	○	○
Thunderstorm	○	○	○	○	○
Microburst	○	○	○	○	○
Hurricane/Tropical Storm	○	○	○	○	○
Earthquake	○	○	○	○	○
Invasive Species	○	○	○	○	○

4. How concerned are you about climate change impacting your community in the future and exacerbating these existing natural hazards?

- ○ Not concerned
- ○ Slightly concerned
- ○ Moderately concerned
- ○ Very Concerned

Provide additional detail if desired

5. Which of the following categories are most susceptible to natural hazards in your community? Please rank the community assets in order of vulnerability, 1 being the most vulnerable and 5 being the least vulnerable.

	1	2	3	4	5
People: Loss of life and/or injuries	○	○	○	○	○
Economic: Business interruptions/closures, job losses, etc.	○	○	○	○	○
Infrastructure: Damage/loss of roads, bridges, utilities, schools, etc.	○	○	○	○	○
Cultural/Historic: Damage or loss of libraries, museums, historic properties, etc.	○	○	○	○	○
Environment: Damage, contamination or loss of forests, wetlands, waterways, etc.	○	○	○	○	○
Governance: Ability to maintain order and/or provide public amenities and services	○	○	○	○	○

6. Natural hazards can have a significant impact on a community. Please tell us how important each statement is to you by checking the appropriate box for each.

	Very Important	Somewhat Important	Neutral	Not Very Important	Not Important
Protecting private property	○	○	○	○	○
Protecting critical facilities (transportation networks, hospitals, fire stations, etc)	○	○	○	○	○
Preventing development in hazard areas	○	○	○	○	○
Enhancing function off natural assets (streams, wetlands, beaches, etc)	○	○	○	○	○
Protecting historic and cultural landmarks	○	○	○	○	○
Protecting and reducing damage to utilities	○	○	○	○	○
Strengthening emergency services (police, fire, ambulance, etc)	○	○	○	○	○
Promoting cooperation among public agencies, citizens, non-profits, academia, and businesses	○	○	○	○	○

7. What specific community assets have helped you get through storm events and aided in recovery after storm events such as blizzards, flooding, extreme heat? Please be specific and list name, location, and owner of the three most important. (Examples include: Gas stations, pharmacies, supermarkets, towing services, etc) You may find it helpful to reference the community asset list included in Handout 1 to answer this question.

Name/Location/Owner

Name/Location/Owner

Name/Location/Owner

8. What infrastructure (examples include: roadways, community buildings, churches, schools, open space, dams, etc) have been impacted by storm events? Please list 3 specific things in Town that you have seen impacts to in the past. You may find it helpful to reference the community asset list included in Handout 1 to answer this question.

Name/Location/Owner

Name/Location/Owner

Name/Location/Owner

9. If there were a loss or inoperability, what major employers, primary economic sectors, and commercial centers would have a severe impact on the community and its ability to recover from a disaster? You may find it helpful to reference the community asset list included in Handout 1 to answer this question.

Name/Location/Owner

Name/Location/Owner

Name/Location/Owner

10. Which populations, groups of people, or communities are less able to respond and recover during a disaster? (examples include: elderly populations, environmental justice populations, special needs schooling, child care, shelters, homeless, etc.) You may find it helpful to reference the community asset list included in Handout 1 to answer this question.

Name/Location/Owner

Name/Location/Owner

Name/Location/Owner

11. Please list the top 3 natural environments in town that the community values and provides protective function to reduce the magnitude of hazard impact and increase resiliency? (examples include: open space, wetlands and waterbodies, trails, recreation areas, etc.) You may find it helpful to reference the community asset list included in Handout 1 to answer this question.

Name/Location/Owner

Name/Location/Owner

Name/Location/Owner

12. Is there any other input or questions you would like to have discussed during the Town's MVP planning process?

Done

TOWN OF WESTFORD MUNICIPAL VULNERABILITY PREPAREDNESS

Community Resilience Building Workshop – Societal Vulnerability & Strengths

May 14, 2020

Tighe&Bond

TODAY'S AGENDA

1:00 *Introduction & Workshop Goals*

1:10-1:20 *Natural Hazard Risks and Identified Community Assets -Survey Summary*

1:20-1:30 *Confirm Societal Assets List and Strengths and Vulnerabilities (via Q&A)*

1:30-1:45 *Mitigation Action Definitions and Examples*

1:45-2:15 *Discussion on Mitigation Actions (via Q&A)*

2:15-2:30 *Wrap up and Participant Homework (post workshop survey)*

WHY DO THIS PLANNING?

Help Westford Build Resilience and Preparedness:

- Build on the Town's existing emergency management capabilities
- Plan for more frequent and intense weather events that are linked to climate change
- Engage multiple stakeholders in the planning process
- Improve access to funding for mitigation and adaptation

TOWN OF WESTFORD, INCORPORATED SEPT. 23, 1729

Tighe&Bond

A brief thanks to Westford's MVP Core Team

CORE TEAM

- Carol Gumbart
- Henry Fontaine
- Jeffrey Stephens
- Jeremy Downs
- Joe Targ
- Paul Fox
- Paul Starratt
- Rae Dick
- Rebecca Cheney
- Richard Barrett
- Stephen Cronin
- Tim Whitcomb

Session #1 Presentation

Identify Natural Hazards, Risk Areas and Community Strengths

1:10 PM

WHAT ARE NATURAL HAZARDS?

Poor Urban Drainage
Regional Flooding
Culvert Failure

Inland Flooding

Tsunami

Severe Winter Storm

Blizzards
Snow
Ice Storms

Drought

Average/Extreme Temperatures

Tornadoes

Landslide

Wildfires

Other Severe Weather

Nor'easters
High Wind
Heavy Precipitation
Microbursts

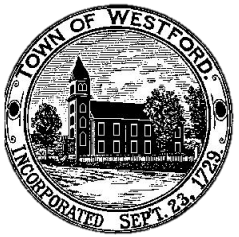
Coastal Flooding

Invasive Species

Earthquake

Coastal Erosion

Hurricanes/Tropical Storms



Tighe&Bond

TOP NATURAL HAZARDS – PAST & PRESENT

- Thunderstorms
- High Wind
- Invasive species
- Nor’easter

TOP NATURAL HAZARDS – FUTURE

Invasive Species

Extreme Temperature/Drought

Ice storm

Hurricane/Tropical Storm

Tighe&Bond

WESTFORD'S TOP NATURAL HAZARDS
THE SURVEY SAYS….

Nor'easters

Extreme temperatures

Other severe weather (High winds, thunderstorms, Ice storms, hurricanes/tropical storms, Blizzard, microburst)

Invasive Species

Wildfires

+ **CLIMATE CHANGE**

=

AMPLIFIED RISKS

- Community and regional infrastructure
- Local and regional economies
- Public Health
- Natural resources and our environment

Tighe&Bond

WHAT ARE COMMUNITY ASSETS?

Societal

Infrastructure

Economy

Natural Resources

TOWN OF WESTFORD
INCORPORATED SEPT. 23, 1729

Tighe&Bond

PEOPLE – SOCIETAL ASSETS

- Child Care
- Nursing Homes/ Elderly Housing
- Churches
- Emergency Shelters
- Food Pantry
- Historical Places
- Senior Centers
- Schools
- Libraries
- Veterinary Hospitals
- Boys & Girls Club
- Cemeteries

WESTFORD
FOOD PANTRY

Session #1 Discussion

Societal Assets: Strengths and Vulnerabilities

1:20 PM

Switch to Community Resilience Building Workshop Risk Matrix to review societal assets and their strengths and vulnerabilities

Session #2 Presentation

Identify Actions to Address Vulnerabilities and Protect Strengths

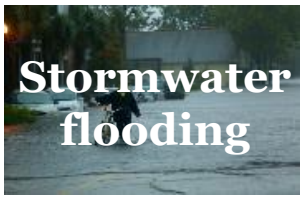
1:30 PM

TYPES OF MITIGATION ACTIONS

1. Prevention
2. Property Protection
3. Public Education and Awareness
4. Natural Resource Protection and Green Infrastructure (nature-based solutions)
5. Structural Projects
6. Emergency Services Protection

DISCUSSION ITEM: Mitigation Strategies

Hazards



Nature-based solutions

- Open space preservation
- Ecosystem restoration
- Low Impact Development

Municipal benefits

Avoided Costs

Enhanced Safety

Environmental Services

Switch to Community Resilience Building Workshop Risk Matrix to populate mitigation strategies

Session #3

Wrap up and Assignments

2:15 PM

PARTICIPANT ASSIGNMENTS

- **Take the Post Workshop Survey!**
  - https://www.westfordma.gov/1309/Municipal-Vulnerability-Preparedness-Pla
- **Sign up for Additional Workshops**
  - Infrastructural assets: May 21st 10:30-12:00 PM
  - Economic assets: May 28th, 10:30-12:00 PM
  - Environmental assets: June 4th, 10:30-12:00 PM
- **Review the Draft Findings CRB Report**
  - Available on the website in mid-June
- **Attend the Listening Session**

Tighe&Bond

STILL HAVE QUESTIONS OR COMMENTS?

Contact Information:

- **Gabrielle Belfit, CFM, Senior Environmental Scientist**
  - GCBelfit@tighebond.com
  - 508.304.6362

- **Jennie Moonan, PE, Project Manager**
  - JSMoonan@tighebond.com
  - 781.708.9826

TOWN OF WESTFORD MUNICIPAL VULNERABILITY PREPAREDNESS

Community Resilience Building Workshop
Built Environment/ Infrastructure Vulnerability & Strengths

May 21, 2020

Tighe&Bond

TODAY'S AGENDA

10:30 *Introduction & Workshop Goals*

10:40-10:50 *Natural Hazard Risks and Identified Community Assets -Survey Summary*

10:50-11:10 *Confirm Infrastructure Assets List and Strengths and Vulnerabilities (via Q&A)*

11:10-11:15 *Mitigation Action Definitions and Examples*

11:15-11:45 *Discussion on Mitigation Actions (via Q&A)*

11:45-12:00 *Wrap up and Participant Homework (post workshop survey)*

WHY DO THIS PLANNING?

Help Westford Build Resilience and Preparedness:

- Build on the Town's existing emergency management capabilities
- Plan for more frequent and intense weather events that are linked to climate change
- Engage multiple stakeholders in the planning process
- Improve access to funding for mitigation and adaptation

TOWN OF WESTFORD, INCORPORATED SEPT. 23, 1729

Tighe&Bond

A brief thanks to Westford's MVP Core Team

CORE TEAM

- Carol Gumbart
- Henry Fontaine
- Jeffery Morrissette
- Jeffery Stephens
- Jeremy Downs
- Joe Targ
- Matthew Hakala
- Matthew Salem
- Paul Fox
- Paul Starratt
- Rebecca Cheney
- Richard Barrett
- Stephen Cronin

WESTFORD'S MVP WEBSITE

https://www.westfordma.gov/1309/Municiple-Vulnerability-Preparedness-Pla

Session #1 Presentation

Identify Natural Hazards, Risk Areas and Community Strengths

1:10 PM

WHAT ARE NATURAL HAZARDS?

Poor Urban Drainage
Regional Flooding
Culvert Failure

Inland Flooding

Tsunami

Severe Winter Storm

Blizzards
Snow
Ice Storms

Drought

Average/Extreme Temperatures

Tornadoes

Landslide

Wildfires

Other Severe Weather

Nor'easters
High Wind
Heavy Precipitation
Microbursts

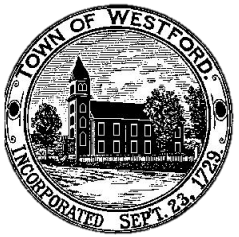
Coastal Flooding

Invasive Species

Earthquake

Coastal Erosion

Hurricanes/Tropical Storms



Tighe&Bond

TOP NATURAL HAZARDS – PAST & PRESENT

- Thunderstorms
- High Wind
- Invasive Species
- Nor’easter

Tighe&Bond

TOP NATURAL HAZARDS – FUTURE

Invasive Species

Extreme Temperature/Drought

Ice storm

Hurricane/Tropical Storm

Tighe&Bond

WESTFORD'S TOP NATURAL HAZARDS
THE SURVEY SAYS….

Severe Storms (Thunderstorms, Ice storms, hurricanes/tropical storms)

High Wind

Drought/ Extreme temperatures

Invasive Species

+ **CLIMATE CHANGE**

=

AMPLIFIED RISKS

- Community and regional infrastructure
- Local and regional economies
- Public Health
- Natural resources and our environment

Tighe&Bond

WHAT ARE COMMUNITY ASSETS?

Societal

Infrastructure

Economy

Natural Resources

BUILT ENVIRONMENT – INFRASTRUCTURAL ASSETS

- Emergency Management
- Westford Fire Department Stations
- Westford Police Department Stations
- Cell Towers
- Town Hall
- Electrical substations
- Evacuation Routes
- Roadways
- Culverts
- Bridges
- Stormwater Infrastructure
- Communications Infrastructure
- Gas stations
- Medical facilities
- Supermarkets
- Post office
- Drinking water treatment and distrubtion

Tighe&Bond

Session #1 Discussion

Infrastructure Assets: Strengths and Vulnerabilities

Switch to Community Resilience Building Workshop Risk Matrix to review societal assets and their strengths and vulnerabilities

Session #2 Presentation

Identify Actions to Address Vulnerabilities and Protect Strengths

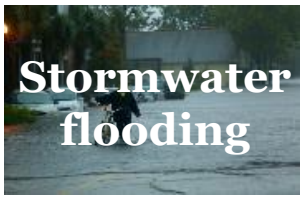
Tighe&Bond

TYPES OF MITIGATION ACTIONS

1. Prevention
2. Property Protection
3. Public Education and Awareness
4. Natural Resource Protection and Green Infrastructure (nature-based solutions)
5. Structural Projects
6. Emergency Services Protection

DISCUSSION ITEM: Mitigation Strategies

Hazards



Nature-based solutions

- Open space preservation
- Ecosystem restoration
- Low Impact Development

Municipal benefits

Avoided Costs

Enhanced Safety

Environmental Services

Switch to Community Resilience Building Workshop Risk Matrix to populate mitigation strategies

Session #3

Wrap up and Assignments

PARTICIPANT ASSIGNMENTS

- **Take the Post Workshop Survey!**
  - https://www.westfordma.gov/1309/Municipal-Vulnerability-Preparedness-Pla
- **Sign up for Additional Workshops**
  - Economic assets: May 28th, 10:30-12:00 PM
  - Environmental assets: June 4th, 10:30-12:00 PM
- **Review the Draft Findings CRB Report**
  - Available on the website in mid-June
- **Attend the Listening Session**

Tighe&Bond

STILL HAVE QUESTIONS OR COMMENTS?

Contact Information:

- **Gabrielle Belfit, CFM, Senior Environmental Scientist**
  - GCBelfit@tighebond.com
  - 508.304.6362

- **Jennie Moonan, PE, Project Manager**
  - JSMoonan@tighebond.com
  - 781.708.9826

TOWN OF WESTFORD
MUNICIPAL VULNERABILITY PREPAREDNESS

Community Resilience Building Workshop
Environmental Vulnerability & Strengths

June 4, 2020

Tighe&Bond

TODAY'S AGENDA

10:30 *Introduction & Workshop Goals*

10:35-10:45 *Natural Hazard Risks and Identified Community Assets -Survey Summary*

10:45-11:00 *Confirm Environmental Assets List and Strengths and Vulnerabilities (via Q&A)*

11:00-11:05 *Mitigation Action Definitions and Examples*

11:05-11:25 *Discussion on Mitigation Actions (via Q&A)*

11:25-11:30 *Wrap up and Participant Homework (post workshop survey)*

WHY DO THIS PLANNING?

Help Westford Build Resilience and Preparedness:

- Build on the Town's existing emergency management capabilities
- Plan for more frequent and intense weather events that are linked to climate change
- Engage multiple stakeholders in the planning process
- Improve access to funding for mitigation and adaptation

TOWN OF WESTFORD, INCORPORATED SEPT. 23, 1729

Tighe&Bond

A brief thanks to Westford's MVP Core Team

CORE TEAM

- Carol Gumbart
- Henry Fontaine
- Jeffery Morrissette
- Jeffery Stephens
- Jeremy Downs
- Joe Targ
- Matthew Hakala
- Matthew Salem
- Paul Fox
- Paul Starratt
- Rebecca Cheney
- Richard Barrett
- Stephen Cronin

WESTFORD'S MVP WEBSITE

https://www.westfordma.gov/1309/Municiple-Vulnerability-Preparedness-Pla

Session #1 Presentation

Identify Natural Hazards, Risk Areas and Community Strengths

WHAT ARE NATURAL HAZARDS?

Poor Urban Drainage
Regional Flooding
Culvert Failure

Inland Flooding

Tsunami

Severe Winter Storm

Blizzards
Snow
Ice Storms

Drought

Average/Extreme Temperatures

Tornadoes

Landslide

Wildfires

Other Severe Weather

Nor'easters
High Wind
Heavy Precipitation
Microbursts

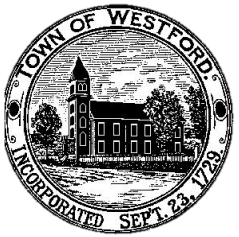
Coastal Flooding

Invasive Species

Earthquake

Coastal Erosion

Hurricanes/Tropical Storms



Tighe&Bond

TOP NATURAL HAZARDS – PAST & PRESENT

- Thunderstorms
- Invasive Species
- High wind
- Nor’easter

TOP NATURAL HAZARDS – FUTURE

Invasive Species

Extreme Temperature / Drought (tied)

Ice storm

Hurricane/Tropical Storm/Thunderstorm/High wind (4 way tie)

Tighe&Bond

WESTFORD'S TOP NATURAL HAZARDS
THE SURVEY SAYS….

Severe Storms (Thunderstorms, Ice storms, hurricanes/tropical storms)

High Wind

Drought/ Extreme temperatures

Invasive Species

+ **CLIMATE CHANGE**

=

AMPLIFIED RISKS

- Community and regional infrastructure
- Local and regional economies
- Public Health
- Natural resources and our environment

Tighe&Bond

WHAT ARE COMMUNITY ASSETS?

Societal

Infrastructure

Economy

Natural Resources

NATURAL RESOURCE ASSETS

- Open Space
- Conservation Lands
- Recreation Areas
- Playing Fields
- Rivers
- Ponds/Lakes
- Wetlands
- Floodplains
- Aquifers
- Vernal Pools
- Trees/Tree Cover

Session #1 Discussion

Infrastructure Assets: Strengths and Vulnerabilities

Switch to Community Resilience Building Workshop Risk Matrix to review environmental assets and their strengths and vulnerabilities

Session #2 Presentation

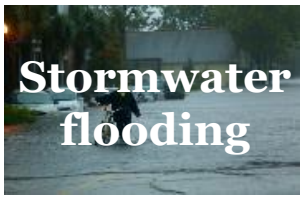
Identify Actions to Address Vulnerabilities and Protect Strengths

TYPES OF MITIGATION ACTIONS

1. Prevention
2. Property Protection
3. Public Education and Awareness
4. Natural Resource Protection and Green Infrastructure (nature-based solutions)
5. Structural Projects
6. Emergency Services Protection

DISCUSSION ITEM: Mitigation Strategies

Hazards



Nature-based solutions

- Open space preservation
- Ecosystem restoration
- Low Impact Development

Municipal benefits

Avoided Costs

Enhanced Safety

Environmental Services

Switch to Community Resilience Building Workshop Risk Matrix to populate mitigation strategies

Session #3

Wrap up and Assignments

PARTICIPANT ASSIGNMENTS

- **Take the Post Workshop Survey!**
  - https://www.westfordma.gov/1309/Municiple-Vulnerability-Preparedness-Pla
  - Distributing to attendees and stakeholders on Monday
- **Review the Draft Findings CRB Report**
  - Available on the website next week
  - https://www.westfordma.gov/1309/Municiple-Vulnerability-Preparedness-Pla
- **Attend the Listening Session**
  - 10:30 to 11:30 AM on Thursday June 18, 2020

Tighe&Bond

STILL HAVE QUESTIONS OR COMMENTS?

Contact Information:

- **Gabrielle Belfit, CFM, Senior Environmental Scientist**
  - GCBelfit@tighebond.com
  - 508.304.6362

- **Jennie Moonan, PE, Project Manager**
  - JSMoonan@tighebond.com
  - 781.708.9826

Name	Affiliation
Morse, Carol	Climate Action Committee
O'Connor, Dylan	Planning Board
O'Donnell, Rose	Friend of East Boston Camps
O'Lalor, Mark	Ag Committee
Peraner-Sweet, Andrea	Select Board
Perkins, Beth	Climate Action Committee
Ross, Jodi	Town Manager
Rowden, Michelle	EEA Coordinator, Northeast Region
Salerno, Eric	Tyngsborough Planner
Salowsky, Steven	Climate Action Committee
Sleger, Mark	Sleger Engineering, owner
Teller, Emily	Climate Action Committee
Theriault, Barbara	Climate Action Committee
Thomas, Susan	Climate Action Committee
Tyndall, Lynn	Healthy Westford Committee
Warren, Mark	Water Department
Waterman, Matt	LandTech Consultants Principal
Woods, Bev	NMCOG, director

strengths and vulnerabilities in the community. The survey will be distributed via email, the MVP website, and/or regular mail if requested.

3. **Distribute recorded presentation on background information**: Tighe & Bond will develop a pre-workshop video including information on climate change and the MVP process. The short video will be recorded and posted on the MVP website for viewing or downloads. This presentation will be made available to workshop participants for independent viewing prior to attending the Virtual CRB Workshop Webinars.

4. **Distribute Virtual CRB Workshop Webinar materials**: Tighe & Bond will develop all materials necessary to participate in the workshop. Materials will be distributed via email, posted on the MVP website, and/or sent by regular mail if requested. Materials will include: (1) a partially, pre-populated CRB Matrix according to the Strengths and Vulnerabilities survey, (2) applicable slides to discuss natural hazard risk for the specific community asset sector featured in the workshop, and (3) a map of the municipality and featured community assets.

5. **Hold Webinars to meet the CRB Workshop requirement**: Tighe & Bond will develop and host 4 separate Virtual CRB Workshop Webinars using Skype. Each meeting will feature one of the Community Asset Categories: infrastructural, societal, natural environment, and economic. During the workshop, attendees will brainstorm mitigation actions for specific community assets, addressing top priority hazards.

6. **Prioritization Polling**: After the completion of all four Virtual CRB Workshop Webinars, Tighe & Bond will develop and distribute a Survey Monkey poll to the Core Team and stakeholders. This poll will include a list of mitigation actions developed during the webinar. Individuals will be asked to rank actions one through five in each of the four categories. This will develop a draft prioritization.

7. **Core Team Meeting**: Tighe & Bond will host a final Core Team meeting via Skype. The goal of the meeting will be to review the results of the prioritization polling and discuss the first Draft MVP Summary of Findings Report.

8. **Distribute Public Meeting materials**: Tighe & Bond will distribute public meeting materials to Core Team members and stakeholders electronically or through mailings if requested. Information about the Public Meeting and directions to participate will also be publicly posted. Materials will include an agenda and copy of the Draft HMP report.

9. **Hold Public Meeting:** Tighe & Bond and the Local Project Manager will host a live, 30-minute public meeting to present the draft HMP report and allow time for a Question & Answer session for community input. The Final Draft HMP report will be available on the MVP website for a 14-day public comment period. This is planned to be completed at a regularly scheduled Planning Board meeting.

10. **Distribute Listening Session materials**: Tighe & Bond will distribute listening session materials to Core Team members and stakeholders electronically or through mailings if requested. Information about the Listening Session and directions to participate will also be publicly posted. Materials will include an agenda and copy of the Draft MVP Summary of Findings Report.

11. **Hold Listening Session:** Tighe & Bond and the Core Team will host a live, one-hour Listening Session on Skype to present the draft MVP Summary of Findings Report and allow time for a Question & Answer session for community input. The Final Draft MVP

Summary of Findings Report will be available on the MVP website for a 14-day public comment period.

12. **MVP Website:** Tighe & Bond will post the recorded Listening Session, Question & Answer dialog, and Final MVP Summary of Findings Report on the MVP website.

The following tables describe the typical format for each meeting and a summary of the proposed format for comparison.

Core Team Meeting

Typical Format	Proposed Format
In-person meeting at Town Hall with representatives from municipal departments and any other core stakeholders.	Use Skype virtual meeting software to conduct meetings with representatives from the Core Team. Pre-meeting materials will be distributed electronically via email.

CRB Workshop

Typical Format	Proposed Format
One 8-hour, or two 4-hour, in person workshops with representatives from municipal departments, local organizations, State agencies, surrounding communities, and other stakeholders	Westford's MVP provider will host four 1 to 1.5 hour Virtual CRB Workshop Webinars using Skype with identified stakeholders and the Core Team. These virtual workshops will address four categories: infrastructural, societal, natural environment, and economic. The Skype webinars will include question and answer periods, live polling and be recorded for later viewing. Workshop preparation materials will be distributed to participants prior to the webinar including instructions as to how to access the webinar. Material distribution is via email, regular mail if requested and posted for downloading on a dedicated Community MVP website. After the webinar, the recorded meetings will be posted on the website. A post-workshop survey will be distributed to participants via email and regular mail if requested. The survey may be completed online, via email, or completed surveys may be mailed in. The total time required for participants will be approximately 8 hours between the pre-meeting work, attending the 4 workshops, and completing the follow up surveys and rankings.

Public Meeting

Typical Format	Proposed Format
Daytime or evening meeting open to all members of the public	Provide meeting materials to stakeholders and the Core Team via email and post on the MVP community website including agenda, draft HMP report, and instructions to access the Listening Session. Hold one, 30-minute meeting as part of a regularly scheduled Planning Board meeting. The final draft HMP report will be available post-meeting for a 14-day review period to allow for additional comment from members of the community. The Town will organize comments received, respond, and post to the MVP community website.

Public Listening Session

Typical Format	Proposed Format
Daytime or evening meeting open to all members of the public	Provide listening session meeting materials to stakeholders and the Core Team via email and post on the MVP community website including agenda, draft MVP report and instructions to access the Listening Session. Hold one, hour long meeting using Skype. The final draft MVP Summary of Findings Report will be available post-meeting for a 14-day review period to allow for additional comment from members of the community. The Town will organize comments received, respond, and post to the MVP community website.

Tighe&Bond

APPENDIX E

Town of Westford Community Assets - Infrastructure

Category	Name	Address
Bridge	I 495 NB - Bridge (NBI)	42.55571583, -71.449554
Bridge	I 495 SB - Bridge (NBI)	42.556046, -71.449911
Bridge	I 495 - Short Span Bridge	42.56366667, -71.43373611
Bridge	I 495 NB - Bridge (NBI)	42.569043, -71.4257
Bridge	I 495 SB - Bridge (NBI)	42.569425, -71.42592883
Bridge	HWY BEAVER BK RD - Bridge (NBI)	42.57248583, -71.478739
Bridge	I 495 NB - Bridge (NBI)	42.577457, -71.41154297
Bridge	I 495 SB - Bridge (NBI)	42.577727, -71.412081
Bridge	ST225 PLEASANT ST - Short Span Bridge	42.58, -71.486569
Bridge	ST225 PLEASANT ST - Bridge (NBI)	42.58032097, -71.486911
Bridge	I 495 - Short Span Bridge	42.58077778, -71.4035
Bridge	HWY TOWN FARM RD - Bridge (NBI)	42.584474, -71.478806
Bridge	HWY MILOT RD - Culvert	42.587459, -71.47697597
Bridge	HWY GRANITEVILLE - Bridge (NBI)	42.592173, -71.45981783
Bridge	HWY BRIDGE ST - Bridge (NBI)	42.592787, -71.46866197
Bridge	HWY BROADWAY ST - Bridge (NBI)	42.59589297, -71.466148
Bridge	HWY RIVER ST - Bridge (NBI)	42.596145, -71.46304997
Bridge	HWY DEPOT RD - Bridge (NBI)	42.597033, -71.435066
Bridge	HWY STONY BRK RD - Bridge (NBI)	42.60269797, -71.41991
Bridge	HWY BROOKSIDE RD - Bridge (NBI)	42.609664, -71.410784
Bridge	ST 40 GROTON RD - Short Span Bridge	42.61032983, -71.45981089
Bridge	HWY RUSSELLS WAY - Bridge (NBI)	42.62800097, -71.42490497
Bridge	HWY RUSSELLS WAY - Bridge (NBI)	42.629693, -71.428126
Bridge	ST 3 SB - Bridge (NBI)	42.64380583, -71.416132
Bridge	ST 3 NB - Bridge (NBI)	42.64393483, -71.41574583
Communication Utilities	Water Tank	
Communication Utilities	Milestone Hill	
Communication Utilities	Nextel	
Communication Utilities	Antennas/Private	
Communication Utilities	Cellular One	
Communication Utilities	MIT/Haystack Obs	
Communication Utilities	Antennas	
Communication Utilities	Nashoba Sky	
Culverts	Townwide	Townwide
Dams	Murray Printing Company Dam	42.58006, -71.487663
Dams	Stony Brook Dam At Graniteville	42.59591, -71.46619
Dams	Westford Depot Dam	42.59704, -71.43495
Dams	Commodore Foods Company Dam	42.60961049, -71.41100633
Dams	Nabnasset Lake Dam	42.619927, -71.41744
Dams	Flushing Pond Dam	42.62325152, -71.44160436
Dams	Long-Sought-for Pond Dam	42.625003, -71.458275
Dams	Fletcher Pond Dam	42.63288357, -71.42519448
Funeral Homes	JA Healy Sons Funeral Home	57 N. Main Street
Gas Station	Cumberland Farms Gas	188 Littleton Rd
Gas Station	Gulf	179 Littleton Rd
Gas Station	Mobil	185 Littleton Rd
Gas Station	United	215 Groton Road
Gas Station	Getty (BP)	262 Groton Road
Gas Station	Shell	498 Groton Road
Gas Station	Citgo	169 Plain Road
Gas Station	Getty (BP)	1 Oak Hill Road
Helicopter Landing Zone	Nashoba Tech HS - Rear	100 Littleton Rd
Helicopter Landing Zone	Papillion Park - Parking lot	102 Tyngsboro Rd
Helicopter Landing Zone	Hamilton Field	170 Plain Street
Helicopter Landing Zone	Blanchard School - Open Area	20 West St
Helicopter Landing Zone	Abbott School - Open Area	25 Depot St
Helicopter Landing Zone	Westford Highway Garage	28 North St
Helicopter Landing Zone	Westford Academy - Open Field	30 Patten Rd
Helicopter Landing Zone	Forge Village - Ball Field	52 W Prescott St
Helicopter Landing Zone	Stony Brook School - Open area	9 Farmers Way
Helicopter Landing Zone	Jack Walsh Field	Carlisle Road
Helicopter Landing Zone	Robins Road - Cul de Sac - 100'x100'	Robins Road

Town of Westford Community Assets - Infrastructure

Category	Name	Address
Medical Facilities	Westford Internal Medicine, PC	133 Littleton Road
Medical Facilities	CVS MinuteClinic	174 Littleton Road
Medical Facilities	Circle Health Westford	198 Littleton Road
Medical Facilities	Westford Counseling Center	319 Littleton Road
Medical Facilities	Greater Lowell Pediatrics of Westford	506 Groton Road
Medical Facilities	Floating Hospital Pediatric Specialty Center	198 Littleton Road
Medical Facilities	China Acupuncture Health Center	175 Littleton Road
Municipal Facilities	Town Hall	55 Main Street
Municipal Facilities	IT Department (Forge Village Fire Station)	E Prescott Street
Municipal Facilities	Parkerville Schoolhouse	Carlisle Road
Municipal Facilities	Recreation Dept Storage (Graniteville Fire Station)	54 Broadway Street
Municipal Facilities	Recreation Department	35 Town Farm Road
Municipal Facilities	School Maintenance Garage (Old Highway Garage)	30 Beacon Street
Post Offices	United States Postal Service - Rt 110/225	301 Littleton Road
Post Offices	United States Postal Service - Forge Village	5 W. Prescott Street
Post Offices	United States Postal Service - Nabnasset	62 Brookside Road
Power Utilities	Electric Substation	24 Toen Farm Road
Power Utilities	Electric Substation	55 Boston Road
Power Utilities	Electric Substation	74 Concord Road
Power Utilities	Power Transmission Line	
Power Utilities	Power Line	
Power Utilities	Power Line	
Power Utilities	Natural Gas Pipeline	
Private Water Facility	Hitchin Post Greens	Chicory Road/Rosebud Lane
Private Water Facility	Graniteville Woods Development	North Main Street
Private Water Facility	Honeysuckle Road Booster Station	Honeysuckle Road
Public Safety	Rogers Fire Station	39 Town Farm Road
Public Safety	Police Central Station & Public Safety Communications	53 Main Street
Public Safety	Fire Department	65 Boston Road
Public Safety	Nabnasset Fire Station	Oak Hill Road
Public Works Facilities	Highway Garage	28 North St
PWS Facility	Nutting Road Water Treatment Plan	17 Nutting Road
PWS Facility	Perchlorate Treatment Facility (inactive)	17 Nutting Rd
PWS Facility	Highway Garage Booster Station	28 North St
PWS Facility	Howard Road Pumping Station	Howard Road
PWS Facility	Forge Village Water Treatment Plant	60 Forge Village Road
PWS Facility	Booster Station No. 3 (Forge Village)	60 Forge Village Road
PWS Facility	Cote Pumping Station	Beacon Street
PWS Facility	Stepinski Pumping Station	Beacon Street
PWS Facility	Boston Road Booster Station	Boston Road
PWS Facility	Fletcher Pumping Station	Concord Road
PWS Facility	Country Road 2 Pumping Station	15 Country Road
PWS Facility	Twin Peaks Tank	Russells Way
PWS Facility	Depot Road Pumping Station	Depot Road
PWS Facility	Forge Village 1 Pumping Station	65 Forge Village Road
PWS Facility	Forge Village 2 Pumping Station	Forge Village Road
PWS Facility	Francis Hill Tank	FRANCIS HILL
PWS Facility	Prospect Hill Tank	Main Street
PWS Facility	Hildreth Hills Booster Station	Monadnock Drive
PWS Facility	Hildreth Hills Tank	Monadnock Drive
PWS Facility	Nutting Road Pumping Station	19 Nutting Road
PWS Facility	Town Farm Road Tank	East Prescott Road
PWS Well	Howard Road Wellfield	
PWS Well	Fletcher Well	
PWS Well	Country Rd. 2 Well	
PWS Well	Forge Village No 1. Wellfield	
PWS Well	Forge Village No. 2 Well	
PWS Well	Stepinski Well	
PWS Well	Cote Well	
PWS Well	Depot Road Well	
PWS Well	Nutting Rd Satellite Wells	
Transportation	IBM Littleton Extension Bus Route	
Transportation	LRTA Route 15 Bus Route	
Transportation	Railroad	

Town of Westford Community Assets - Economic

Category	Company Name	Address
Hardware Stores	Westford ACE Hardware	527 Groton Road
Hardware Stores	MacKay ACE Hardware & Rentals	224 Littleton Road
Major Employers (100+)	Juniper Networks	10 Technology Drive
Major Employers (100+)	Nashoba Valley Technical High School	100 Littleton Road
Major Employers (100+)	Sanborn Head & Assoc. Inc.	1 Technology Park Drive
Major Employers (100+)	Whole Foods Market	160 Littleton Road
Major Employers (100+)	Cynosure	5 Carlisle Road
Major Employers (100+)	Sentry Insurance	3 Carlisle Road
Major Employers (100+)	Market Basket	6A Cornerstone Square
Major Employers (100+)	Mack Technologies	27 Carlisle Road
Major Employers (100+)	Marshalls	11 Cornerstone Square
Major Employers (100+)	Materion Precision Optics	2 Lyberty Way
Major Employers (100+)	Westford Regency Inn	219 Littleton Road
Major Employers (100+)	Keller Williams Realty	3 Lan Drive
Major Employers (100+)	Pediatria	238 Littleton Road
Major Employers (100+)	Westford House	3 Park Drive
Major Employers (100+)	Westford Academy School	30 Patten Road
Major Employers (100+)	Dee Bus Services Inc.	30 Town Farm Road
Major Employers (100+)	Netscout Systems Inc.	310 Littleton Road
Major Employers (100+)	Nashoba Valley Ski Area	79 Powers Road
Major Employers (100+)	Kimball Farm	400 Littleton Road
Oil Delivery Services	J.A. Healy & Sons Oil Company	5 2nd Street
Pharmacies	Walgreens Pharmacy	145 Littleton Road
Pharmacies	CVS Pharmacy	174 Littleton Road
Specialty Grocer	British Delights	63 Powers Road
Supermarkets	Whole Foods Market	160 Littleton Road
Supermarkets	Market Basket	6A Cornerstone Square
Towing Services	Joe's Auto & Towing LLC	496 Groton Road
Towing Services	Whitney Service	107 Main Street
Towing Services	Bob's Auto Services	290 Littleton Road
Tree Removal Services	Scott's Tree & Landscape, Inc.	8 Elliot Road

Town of Westford Community Assets - Societal

Category	Name	Address
Adult Day Care	Millennium Home Adult Day Care	5 Lyberty Way
Affordable Housing	Hawk Ridge	Kestrel Lane
Affordable Housing	Stone Ridge Condos	Stone Ridge Road
Affordable Housing	Brookside Mill	12 Brookside Road
Affordable Housing	Alder Point	354 Groton Road
Affordable Housing	Line Road	14 Line Road
Affordable Housing	Princeton Westford Apartment Homes	16 Littleton Road
Affordable Housing	Tadmuck Meadows	1 Bandon Circle
Affordable Housing	65 Tadmuck Road	65 Tadmuck Road
Affordable Housing	Tadmuck Housing	65 Tadmuck Road
Affordable Housing	Orion Way (1)	14 Orion Way
Affordable Housing	Keyes Corner	100 Nutting Road
Affordable Housing	Rosegate	99 Main Street
Affordable Housing	Residences at Stony Brook	3, 5 and 6 Farmer Way
Affordable Housing	Southgate	5 Southgate Road
Affordable Housing	Cottages in the Woods	Joes Way
Affordable Housing	Juniper Hill Road	Juniper Hill Road
Affordable Housing	Elderberry Estates	1 Silo Path
Affordable Housing	77 Graniteville Road	77 Graniteville Road
Affordable Housing	7 Cross Street	7 Cross Street
Affordable Housing	School Lane	2 School Lane
Affordable Housing	7 Church Street	7 Church Street
Affordable Housing	CHOICE Housing	173 Carlisle Road
Affordable Housing	Graniteville Woods	2 Indian Ridge Terrace
Affordable Housing	Haystack	10 Groton Road
Affordable Housing	Stoneview	6 Stoneview Drive
Affordable Housing	Hanover Westford Hills	2 Robbins Road
Affordable Housing	Hanover Westford Valley	312 Littleton Road
Affordable Housing	Beaver Brook Village	2 Consetvation Lane
Affordable Housing	Concord Place	135 Concord Road
Affordable Housing	Woodlands at Laurel Hills	2 Consetvation Lane
Art and Culture	Parish Center for the Arts	10 Lincoln Street
Cemetery	Hillside Cemetery	Nutting Road
Cemetery	Fairview Cemetery	Main Street
Cemetery	Picking-Wright Cemetery	Groton Road
Cemetery	St. Catherine's Cemetery	Pine Ridge Road
Cemetery	Pine Grove Cemetery	68 Forge Village Road
Cemetery	Russian Brotherhood Cemetery	Patten Road
Cemetery	Westlawn Cemetery	Concord Road
Cemetery	Keyes Cemetery	Jonas Road
Child Care	Westford Children's Learning Center	508 Groton Road
Child Care	Roudenbush Children's Center	65 Main Street
Child Care	Tracy's Tiny Tots Daycare	37 North Street
Child Care	Right at Home Daycare	33 River Street
Child Care	Westford Preschool at St. Mark's	75 Cold Spring Road
Child Care	Westford KinderCare	26 Carlisle Road
Child Care	The Kid's League of Westford	10 Church Street
Child Care	Next Generation Children's Centers	9 Powers Road
Child Care	The Goddard School of Westford	162 Concord Road
Child Care	Acorn Child Care Center	439 Littleton Road
Community Centers	Cameron Senior Center	20 Pleasant Street
Community Centers	Roudenbush Community Center	65 Main Street
Elderly Care	Senior Helpers of Westford	66 Tadmuck Road
Elderly Care	Bridges by EPOCH at Westford	108 Littleton Road
Elderly Care	Samaritan Home Care	234 Littleton Road
Elderly Care	Westford House	3 Park Drive
Elderly Housing	Tadmuck Road Senior Housing	65 Tadmuck Road
Elderly Housing	Village at Mystery Spring	67 Tadmuck Road
Elderly Housing	Graniteville Senior Housing	7 Cross Street

Town of Westford Community Assets - Societal

Category	Name	Address
Food Pantries	Westford Food Pantry	20 Pleasant Street
Libraries	J.V. Fletcher Library	50 Main Street
Museum	Westford Museum	2 Boston Road
Place of Worship	Chabad of Nashoba Valley	26 Tadmuck Road
Place of Worship	Grace Community Church	130 Littleton Road
Place of Worship	First Parish Church United	48 Main Street
Place of Worship	St. Mark's Episcopal Church	75 Cold Spring Road
Place of Worship	Cornerstone Congregational Church	32 Graniteville Road
Place of Worship	United Methodist Church	10 Church Street
Place of Worship	St. Catherine of Alexandria	107 N. Main Street
Place of Worship	Wat Buddhabhavana	25 Milot Road
School	Rita Edwards Miller School	1 Mitchell Way
School	Nabnasset School	99 Plain Road
School	Abbot and Millenium Elementary School	25 Depot Street
School	Stony Brook School	9 Farmers Way
School	Nashoba Valley Technical High School	100 Littleton Road
School	Blanchard Middle School	14 West Street
School	Norman E. Day School	75 East Prescott Street
School	Westford Academy School	30 Patten Road
School	Robinson and Crisafulli Elementary School	13 Robinson Road
School	Col. John Robinson School	60 Concord Road
Special Needs Schools	Westford Integrated Preschool	23 Depot Street
Vulnerable Population	Village at Mystery Spring	67 Tadmuck Road
Environmental Justice Area	Minority Population	North-east corner of Town

Town of Westford Community Assets - Environment

Category	Name	Address
Ball Fields	Jack Walsh Field	Carlisle Road
Beach	Edwards Beach	Williams Avenue
Beach	Forge Pond Town Beach	Pleasant Street
Camp	East Boston Camps at Stony Brook Conservation Lan	Depot Street
Conservation Land	Stony Brook Conservation Land - Recreation Commis	Nutting Road
Field	Graniteville Ballfield/American Legion Field	15 River Street
Field	Greystone Playing Fields (Lot Q)	Russell's Way
Habitat	Certified and potential vernal pools	Town-wide
Open Space	Acton Road Tax Title Parcel 1	Acton Road
Open Space	Acton Road Tax Title Parcel 2	Acton Road
Open Space	Acton Road Tax Title Parcel 3 (Vose Parcel)	Acton Road
Open Space	Acton Road Tax Title Parcel 4	Acton Road
Open Space	Allie Lane Parcel	Allie Lane
Open Space	Anderson Conservation Land 1	Baldwin Road
Open Space	Anderson Conservation Land 2	Hunt Road
Open Space	Arch Bridge 1	Milot Roat
Open Space	Arch Bridge 2	Milot Road
Open Space	B&M Stony Brook Conservation Parcel	Milot Road
Open Space	Balas Conservation Land	Carolina Lane
Open Space	Banbury Drive Conservation Parcel	Banbury Drive
Open Space	Beacon St. Water Department Land	Beacon Street
Open Space	Beaver Brook Conservation Land	Southwick Circle
Open Space	Beaver Brook Village Conservation Land	Conservation Way
Open Space	Beaver Brook/Concord Rd Conservation Land	33 Beaver Brook Road
Open Space	Beers Conservation Land 1	Oakdale Street
Open Space	Beers Conservation Land 2	Sand Beach Road
Open Space	Blue Brook Conservation Land	Flushing Pond Road
Open Space	Boston Rd Drew Orchard	Boston Road
Open Space	Briarwood Drive Tax Title Parcel	Briarwood Drive
Open Space	Brookside Mill Conservation Parcel 1	Brookside Road
Open Space	Brookside Mill Conservation Parcel 2	Brookside Road
Open Space	Brookside Mill Conservation Parcel 3	Brookside Road
Open Space	Brookside Mill Conservation Parcel 4	Brookside Road
Open Space	Brookside Mill Tax Title Parcel 1	Depot Street
Open Space	Byrne Ave Gibbons Land Donation	31 Byrne Avenue
Open Space	Catalog Realty Trust Conservation Land	Old Lowell Road
Open Space	Cider Mill Pond Conservation Land 1 (Taylor Parcel)	Stony Brook Road
Open Space	Cider Mill Pond Conservation Land 2 (MacDougall Parcel)	Lowell Road
Open Space	Cider Mill Pond Conservation Land 3 (Agnew Parcel)	Lowell Road
Open Space	Cline Conservation Land	Littleton Road
Open Space	Cold Spring Rd Municipal Land - West	Cold Spring Road
Open Space	Cold Spring Road Municipal Land - East	Cold Spring Road
Open Space	Coolidge Street Land	Coolidge Street
Open Space	Cote Well Land	North Street
Open Space	Country Rd Well Land	Country Road
Open Space	Country Rd West Future Well Site 1	Country Road
Open Space	Country Rd West Future Well Site 2	Country Road
Open Space	Crescent St. Tax Title Parcel - East	Crescent Street
Open Space	Crescent St. Tax Title Parcel - West	Crescent Street
Open Space	Crest Haven Parcel	Acton Road
Open Space	Dana Drive Conservation Land 1	Dana Drive
Open Space	Dana Drive Conservation Land 2	Dana Drive
Open Space	Dana Drive Conservation Land 3	Dana Drive
Open Space	Day Agricultural and Conservation Land (a.k.a. "The Pumpkin Field")	Graniteville Road
Open Space	Depot St Well Parcel 2	Depot Street
Open Space	Depot St. Well - Parcel 1	Depot Street
Open Space	Drew Boston Road Land	Boston Road

Town of Westford Community Assets - Environment

Category	Name	Address
Open Space	Drew Boston Road Land Access ROW	Boston Road
Open Space	Drew Court Road Parcel 1	Crown Road
Open Space	Drew Court Road Parcel 2	Court Road
Open Space	Drew Crossing Conservation Land	Drew Crossing
Open Space	Drew Ramp Parcel	Boston Road
Open Space	Duffy and Doucette Conservation Land	Keyes Road
Open Space	Edward and Louise Dean Conservation land	Dean Drive
Open Space	Edwards Parcel	Tyngsboro Road
Open Space	Emmet Conservation Land - Durkee Rd. Eminent Domain Taking	Durkee Road
Open Space	Emmet Conservation Land - Gage Parcel (Hapgood and Tuttle Lots 2)	Texas Road
Open Space	Emmet Conservation Land - Gage Parcel (Hapgood and Tuttle Lots)	Durkee Road
Open Space	Emmet Conservation Land - Gage Parcel (Sheperd Lot Part 1)	Texas Road
Open Space	Emmet Conservation Land - Gage Parcel (Sheperd Lot Part 2)	Texas Road
Open Space	Emmet Conservation Land - Gage Parcel (White Lot 1)	Durkee Road
Open Space	Emmet Conservation Land - Gage Parcel (White Lot 2)	Texas Road
Open Space	Emmet Conservation Land - Gage/Kennedy Parcels 1	Powers Road
Open Space	Emmet Conservation Land - Gage/Kennedy Parcels 2	Powers Road
Open Space	Emmet Conservation Land - Gage/Kennedy Parcels 3	Concord Road
Open Space	Emmet Conservation Land - Guidoboni/Masse Parcel	Powers Road
Open Space	Emmet Conservation Land - Harriet Hill Tax Title Parcel 1	Durkee Road
Open Space	Emmet Conservation Land - Harriet Hill Tax Title Parcel 2	Durkee Road
Open Space	Emmet Conservation Land - J. F. White Parcel 1	Texas Road
Open Space	Emmet Conservation Land - J.F. White Parcel 2	Texas Road
Open Space	Emmet Conservation Land - J.F. White Parcel 3	Texas Road
Open Space	Emmet Conservation Land - Kennedy Parcel 1	Texas Road
Open Space	Emmet Conservation Land - Kennedy Parcel 2	Texas Road
Open Space	Emmet Conservation Land - Mahoney and Jansky Parcel 1	Powers Road
Open Space	Emmet Conservation Land - Mahoney and Jansky Parcel 2	Powers Road
Open Space	Emmet Conservation Land - Martin and Mitchell Parcel	Powers Road
Open Space	Emmet Conservation Land - R.S. Realty Trust Parcel	Powers Road
Open Space	Endmoor Road Tax Title Land	Endmoor Road
Open Space	Ennion Tyngsboro Rd. Tax Title Parcel	Tyngsboro Road
Open Space	Fieldstone Drive Conservation Land 1	Fieldstone Drive
Open Space	Fieldstone Drive Conservation Land 2	Fieldstone Drive
Open Space	Flagg Road Conservation Land	Flagg Road
Open Space	Fletcher Well Land 1	Concord Road
Open Space	Fletcher Well Land 2	Concord Road
Open Space	Fletcher Well Land 3	Concord Road
Open Space	Forge Village Rd. Conservation Area	Forge Village Road
Open Space	Forrest Road Land	Forrest Road
Open Space	Genova Conservation Land	Stony Brook Road
Open Space	Georges Tadmuck Ln Conservation Land 1	5 Tadmuck Lane
Open Space	Georges Tadmuck Ln Conservation Land 2	Tadmuck Lane
Open Space	Gifford Drive Tax Title Parcel	Gifford Drive
Open Space	Granite Hill Est. Conservation Parcel 1	Cowdry Hill Road
Open Space	Granite Hill Est. Conservation Parcel 2	Cowdry Hill Road
Open Space	Grassy Pond Conservation Area	Depot Street
Open Space	Great Elm Parcel	Carlisle Road

Town of Westford Community Assets - Environment

Category	Name	Address
Open Space	Grey Fox Lane Conservation Land	Grey Fox Lane
Open Space	Greystone Groton Rd Land (Lot A)	Groton Road
Open Space	Greystone Lot B Conservation Land	Russell's Way
Open Space	Greystone Lot C Conservation Land	Russell's Way
Open Space	Greystone Lot D Municipal Land (Drainage Basin)	Curren Drive
Open Space	Greystone Lot E Municipal Land (Water Tower Road Entrance)	Russell's Way
Open Space	Greystone Lot G Conservation Land	Caldwell Drive
Open Space	Greystone Lot H Conservation Land	Russell's Way
Open Space	Greystone Lot J Municipal Land	Russell's Way
Open Space	Greystone Lot K Conservation Land	Russell's Way
Open Space	Greystone Lot L Conservation Land	Chandler Road
Open Space	Greystone Lot M Conservation Land	Morrison Lane
Open Space	Greystone Lot P Conservation Land	Morrison Lane
Open Space	Groton Rd Gage Land	Groton Road
Open Space	Hassan Conservation Land	Littleton Road
Open Space	Hildreth St. Tax Title Parcel	Hildreth Street
Open Space	Horsehead Conservation Land 1	Beaver Brook Road
Open Space	Horsehead Conservation Land 2	Southwick Circle
Open Space	Horsehead Conservation Land 3	True Bean Way
Open Space	Howard Rd. Well Site 1	Howard Road
Open Space	Howard Rd. Well Site 2	Howard Road
Open Space	Howard Rd. Well Site 3	Howard Road
Open Space	Indian Meeting Ground	Bradford Street
Open Space	Irwin Conservation Land	Howard Road
Open Space	J.P. McKenna Conservation Land	Hyacinth Drive
Open Space	Kate Rose Way Conservation Land	Kate Rose Way
Open Space	Keyes Pond Conservation Land	Keyes Road
Open Space	Keyes Road Tax Title Parcel 1	Keyes Road
Open Space	Keyes Road Tax Title Parcel 2	Keyes Road
Open Space	Kiberd Conservation Land	Monadnock Drive
Open Space	Kloppenburg Conservation Land	Hartford Road
Open Space	Knoll Rd Tax Title Parcel	1 Knoll Road
Open Space	Lakeview St. Tax Title Parcel 1	Lakeview Street
Open Space	Lakeview St. Tax Title Parcel 2	Lakeview Street
Open Space	Lakeview St. Tax Title Parcel 3	Lakeview Street
Open Space	Lakeview St. Tax Title Parcel 4	Lakeview Street
Open Space	Lakeview St. Tax Title Parcel 5	Lakeview Street
Open Space	LaSallette Rd. Land	Lasalleette Road
Open Space	LaSallette Rd. Land	Lasalleette Road
Open Space	LaSallette Rd. land	Lasalleette Road
Open Space	LaSallette Rd. Land	Lasalleette Road
Open Space	Lawton Ave. Conservation Land 1	Lawton Avenue
Open Space	Lawton Ave. Conservation Land 2	Lawton Avenue
Open Space	Leighton Way Conservation Parcel 1	Leighton Way
Open Space	Leighton Way Conservation Parcel 2	Leighton Way
Open Space	LePage Conservation Land	Forge Village Road
Open Space	Littleton Road Conservation Parcel	Littleton Road
Open Space	Lorain Realty Trust Conservation Land	Rome Drive Ext.
Open Space	MacDonald Sawmill Rd Tax Title Parcel	Sawmill Road
Open Space	MacDonald Tyngsboro Rd. Tax Title Parcel	Tyngsboro Road
Open Space	Mark Vincent Drive Tax Title Land	Mark Vincent Drive
Open Space	Martina Gage Town Forest	Gage Road
Open Space	Mass. Electric Conservation Land	Rome Drive
Open Space	Michael Joseph "Joe" and Yvonne Rose Sullivan Land	Blakes Hill Road
Open Space	Mill Pond/Charles G. Sargent Playground	North Main Street
Open Space	Milot Conservation Land	Milot Road
Open Space	Minot's Corner Parcel	Littleton Road
Open Space	Moulton Conservation Land 1	Cold Spring Road

Town of Westford Community Assets - Environment

Category	Name	Address
Open Space	Moulton Conservation Land 2	Old Homestead Road
Open Space	Moulton Conservation Land 3	Longmeadow Road
Open Space	Mystery Spring Woods Conservation Land	Tadmuck Road
Open Space	Nabnasset St. Water Dept. Land 1	Nabnasset Street
Open Space	Nabnasset St. Water Dept. Land 2	25 Nabnasset Street
Open Space	Nabnasset St. Water Dept. Land 3	Nabnasset Street
Open Space	Nutting Rd Well Parcel 1	Nutting Road
Open Space	Nutting Rd Well Parcel 2	Nutting Road
Open Space	Odell W. Prescott St. Land Donation	W Prescott Street
Open Space	Original Academy Site-Boston Rd	Boston Road
Open Space	O'Soro Conservation Land	Moore Avenue
Open Space	Parcel Z, Lakeside Meadows	Muriel Drive
Open Space	Patten Road Tax Title Parcel	Patten Road
Open Space	Picking Conservation Land - East	Gould Road
Open Space	Picking Conservation Land - West	Gould Road
Open Space	Picking Selectmen Land - East	Groton Road
Open Space	Picking Selectmen Land - West	Gould Road
Open Space	Pine Tree Trail Tax Title Parcel 1	20 Pine Tree Trail
Open Space	Pine Tree Trail Tax Title Parcel 2	1 Pine Tree Trail
Open Space	Pond St. Conservation Land - Freedom Park	8 Pond Street
Open Space	Randolph Circle Tax Title Parcel	Randolph Circle
Open Space	Red Line North Parcel	West Street
Open Space	Red Line South Parcel	Forge Village Road
Open Space	River St. Canoe Ramp	River Street
Open Space	Rolling Meadows Conservation Land	Rolling Meadow Lane
Open Space	Rome Drive Tax Title Parcel 1	Rome Drive
Open Space	Rome Drive Tax Title Parcel 2	Rome Drive
Open Space	Russell Bird Sanctuary	65 Forge Village Road
Open Space	Sargent's Town Forest Gift	Groton Road
Open Space	Schlusemeyer Lake Shore Dr S Land	Lake Shore Drive S
Open Space	Schlusemeyer Sycamore Rd Parcel 1	Sycamore Road
Open Space	Schlusemeyer Sycamore Rd Parcel 2	Sycamore Road
Open Space	Schwab Conservation Parcel 1	Rome Drive Ext.
Open Space	Schwab Conservation Parcel 2	Rome Drive Ext.
Open Space	Scott Conservation Land	Cold Spring Road
Open Space	Shelly Lane Conservation Land	Shelly Lane
Open Space	Shipley Swamp Conservation Area	Nutting Road
Open Space	Skating Pond Conservation Land	Hearthstone Road
Open Space	Slifer Conservation Land	Keyes Road
Open Space	Snake Meadow Hill Conservation Parcel 1	Groton Road
Open Space	Snake Meadow Hill Conservation Parcel 2	Groton Road
Open Space	So. Chelmsford Rd 1	S Chelmsford Road
Open Space	So. Chelmsford Rd 2	S Chelmsford Road
Open Space	Socha Shore	Pleasant Street
Open Space	Spalding Town Forest 1	Cold Spring Road
Open Space	Spalding Town Forest 2	Forge Village Road
Open Space	Stony Brook Conservation Land - Conservation Commission Parcel 2	Depot Road
Open Space	Stony Brook Conservation Land - Conservation Commission Parcel 3	River Street
Open Space	Stony Brook Conservation Land - Recreation Commission Parcel 2	River Street
Open Space	Stony Brook Conservation Land - Water Dept. Parcel	River Street
Open Space	Stony Brook Road Conservation Land	Stony Brook Road
Open Space	Sullivan Conservation Land	Rome Drive
Open Space	Swanson Conservation Land	14 Hunt Road
Open Space	Switzer Conservation Land	Lowell Road
Open Space	Tadmuck Swamp North 1	Tadmuck Road
Open Space	Tadmuck Swamp North 2	Chippewa Road
Open Space	Tadmuck Swamp South	Littleton Road

Town of Westford Community Assets - Environment

Category	Name	Address
Open Space	TBG Conservation Land 1	43 Almeria Circle
Open Space	TBG Conservation Land 2	Almeria Circle
Open Space	TBG Conservation Land 3	Almeria Circle
Open Space	Tenney Road Conservation Land (Avalon Real Estate Land)	Tenney Road
Open Space	Tenney Road Conservation Parcel 1	Tenney Road
Open Space	Tenney Road Conservation Parcel 2	Tenney Road
Open Space	Texas Rd Conservation Land	Texas Road
Open Space	Timberlake	Tenney Road
Open Space	Town Farm Rd. Water Dept. Land	Town Farm Road
Open Space	Trailside Way Parcel A Conservation Land	Trailside Way
Open Space	Trailside Way Parcel B Conservation Land	Trailside Way
Open Space	Trailside Way Parcel C Conservation Land	Trailside Way
Open Space	Trailside Way Parcel D Conservation Land	Trailside Way
Open Space	Trailside Way Parcel E Conservation Land	Trailside Way
Open Space	Twin Peaks	Tyngsboro Road
Open Space	Twin Peaks Water Tower Land	Russell's Way
Open Space	Tyngsboro Town Line Gage Parcel-East	Sawmill Road
Open Space	Tyngsboro Town Line Gage Parcel-West	Tenney Road
Open Space	Uncompleted Tax Taking - Cold Spring Road	Cols Spring Lane
Open Space	Varnum Conservation Land	Forge Village Road
Open Space	Verna Williamson Parcel	Acton Road
Open Space	Veterans Memorial Complex Conservation Land 1	Farmer Way
Open Space	Veterans Memorial Complex Conservation Land 2	Nutting Road
Open Space	Veterans Memorial Complex Conservation Land 3	Farmer Way
Open Space	Veterans Memorial Complex Water Department Land	Beacon Street
Open Space	Village View Parcel A-2	Village View Road
Open Space	Vine Brook Road Conservation Parcel	Vine Brook Road
Open Space	Vineyard Rd Ext School Land - North	Vineyard Road Ext
Open Space	Vineyard Rd Ext School Land - South 1	Vineyard Road Ext
Open Space	Vineyard Rd Ext School Land - South 2	Vineyard Road Ext
Open Space	Vineyard Road Conservation Land	Vineyard Road
Open Space	William C. O'Connell Wildlife Sanctuary	Timberlee Lane
Open Space	Williams Ave Conservation Land	Williams Avenue
Open Space	Wilson Parcel	Boston Road
Open Space	Winnek Water Dept Land 1	17 Main Street
Open Space	Winnek Water Dept. Land 2	Main Street
Orchard	Hill Orchard Farm Stand	Hunt Road
Orchard	Hill Orchard West 1	Chamberlin Road
Orchard	Hill Orchard West 2	Chamberlin Road
Park	Captain Stephen Hamilton Ballfield	Plain Road
Park	VFW Softball Field	52 W Prescott Street
Undeveloped Land	Minot's Corner Parcel	Littleton Road
Undeveloped Land	Old Landfill/New Meadow	Cold Spring Road
Waterbody	Stony Brook	MA84B-03 and 04
Waterbody	Tadmuck Brook	MA84B-07
Waterbody	Beaver Brook	MA84B-02
Waterbody	Deep Brook	MA84A-21
Waterbody	Nabnasset Lake	MA84044
Waterbody	Forge Pond	MA84015
Waterbody	Reed Brook (Coldwater Fishery Resource)	MA84B-08
Waterbody	Heart Pond	MA82059
Waterbody	Nashoba Brook	MA82B-14
Waterbody	Burges Pond	
Waterbody	Graniteville Pond	
Waterbody	Kennedys Pond	
Waterbody	Blue Brook	
Waterbody	Boutwell Brook	

Town of Westford Community Assets - Environment

Category	Name	Address
Waterbody	Butter Brook	
Waterbody	Coldspring Brook	
Waterbody	Flushing Pond	
Waterbody	Gilson Brook	
Waterbody	Greystone Pond	
Waterbody	Keyes Pond	
Waterbody	Long Sought For Pond	
Waterbody	Nonset Brook	
Waterbody	Pond Brook	
Waterbody	Snake Meadow Brook	
Waterbody	Tadmuck Swamp	
Waterbody	Vine Brook	
Waterbody	Wetlands	Town-wide

DUNSTABLE

TYNGSBOROUGH

LOWELL

GROTON

CHELMSFORD

LITTLETON

CARLISLE

ACTON

40

110

495

225

27

Legend

- Affordable Housing
- Cemetery
- Child Care
- Community Center
- Elderly Care/ Housing
- Food Pantries
- Libraries
- Place of Worship
- School
- Special Needs Schools
- Vulnerable Population
- Limited Access Highway
- Interstate Highway
- Major Road - Collector
- Municipal Properties and Facilities

Tighe&Bond

Based on datalayers provider by MassGIS and Town of Westford, MA

DRAFT

N

0 1,800 3,600

Feet

FIGURE 3
SOCIETAL ASSETS

Community Assets
Municipal Vulnerability Preparedness (MVP)
Planning Grant
Westford, Massachusetts
February 2020

G:\GIS\MA\WestfordMA\avproj\MVP_SocietalAssets_22x34.mxd [Exported By: ABC, 2/20/2020, 12:32:42 PM]

W-5005

DUNSTABLE

TYNGSBOROUGH

LOWELL

GROTON

CHELMSFORD

LITTLETON

ACTON

CARLISLE

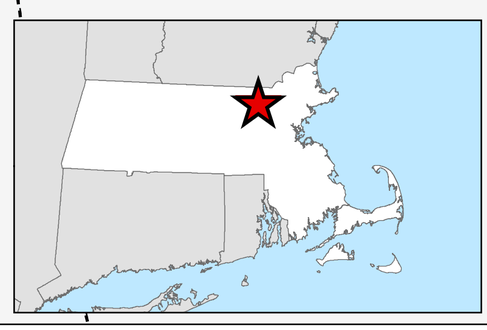
40

110

495

225

27



Legend

- Bridge
- Communication Utilities
- Dams
- Funeral Homes
- Helicopter Landing Zone
- Medical Facilities
- PWS Facility
- Post Offices
- Power Utilities
- Emergency Generator
- Power Utilities
- Transportation Route
- Limited Access Highway
- Interstate Highway
- Major Road - Collector
- Municipal Properties and Facilities

Tighe&Bond

Based on datalayers provider by MassGIS and Town of Westford, MA

DRAFT

N

0 1,800 3,600

Feet

FIGURE 1
BUILT ENVIRONMENT

Community Assets
Municipal Vulnerability Preparedness (MVP)
Planning Grant
Westford, Massachusetts
February 2020

DUNSTABLE

TYNGSBOROUGH

LOWELL

GROTON

CHELMSFORD

LITTLETON

CARLISLE

ACTON

40

110

225

27

495

HW

OIL

Rx

Legend

SubCategory

- HW Hardware Stores
- Major Employers (100+)
- OIL Oil Delivery Services
- Pharmacies
- Supermarkets
- Towing Services
- Tree Services
- Limited Access Highway
- Interstate Highway
- Major Road - Collector
- Municipal Properties and Facilities

DRAFT

N

0 1,800 3,600

Feet

Tighe&Bond

Based on datalayers provider by MassGIS and Town of Westford, MA

FIGURE 2
ECONOMIC ASSETS

Community Assets
Municipal Vulnerability Preparedness (MVP)
Planning Grant
Westford, Massachusetts
February 2020

DUNSTABLE

TYNGSBOROUGH

LOWELL

GROTON

CHELMSFORD

LITTLETON

ACTON

CARLISLE

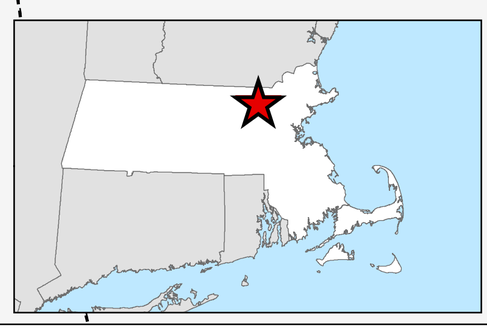
40

110

495

225

27



Legend

- Bridge
- Communication Utilities
- Dams
- Funeral Homes
- Helicopter Landing Zone
- Medical Facilities
- PWS Facility
- Post Offices
- Power Utilities
- Emergency Generator
- Power Utilities
- Transportation Route
- Limited Access Highway
- Interstate Highway
- Major Road - Collector
- Municipal Properties and Facilities

Tighe&Bond

Based on datalayers provider by MassGIS and Town of Westford, MA

DRAFT

N

0 1,800 3,600

Feet

FIGURE 1
BUILT ENVIRONMENT

Community Assets
Municipal Vulnerability Preparedness (MVP)
Planning Grant
Westford, Massachusetts
February 2020

Tighe&Bond

APPENDIX F

Basin Specific Climate Change Data

Sudbury-Assabet-Concord (SuAsCo) Basin

Increased Average Temperature

The SuAsCo basin is expected to experience increased average temperatures throughout the 21st century. Maximum and minimum temperatures are also expected to increase throughout the end of the century. These increased temperature trends are expected for annual and seasonal projections. The table below demonstrates how temperature will change over the course of the century.

TABLE 1
Increased Average Temperature

SuAsCo Basin		Observed Baseline 1971-2000 (°F)	Projected Change in 2030s (°F)	Mid-Century Projected Change in 2050s (°F)	Projected Change in 2070s (°F)	End of Century Projected Change in 2090s (°F)
Average Temperature	Annual	48.7	+2.2 to +4.4	+2.9 to +6.3	+3.5 to +9.0	+3.8 to +10.9
	Winter	27.4	+2.2 to +4.9	+2.8 to +7.3	+3.6 to +8.9	+4.0 to +10.2
	Spring	46.8	+1.7 to +3.5	+2.5 to +5.7	+2.7 to +7.9	+3.2 to +9.6
	Summer	69.5	+2.1 to +4.4	+2.7 to +6.9	+3.2 to +10.2	+3.7 to +12.7
	Fall	50.8	+2.2 to +5.0	+3.7 to +6.6	+3.5 to +9.5	+4.0 to +11.7
Maximum Temperature	Annual	59.6	+2.0 to +4.1	+2.7 to +6.3	+3.2 to +9.1	+3.4 to +10.9
	Winter	37.3	+1.9 to +4.4	+2.5 to +6.7	+3.0 to +8.1	+3.4 to +9.4
	Spring	57.9	+1.6 to +3.4	+2.3 to +5.6	+2.6 to +8.0	+3.2 to +9.7
	Summer	80.7	+1.9 to +4.5	+2.6 to +7.1	+3.1 to +10.5	+3.6 to +13.0
	Fall	62.1	+2.4 to +4.8	+3.6 to +6.8	+3.3 to +9.6	+3.8 to +12.1
Minimum Temperature	Annual	37.9	+2.3 to +4.6	+3.1 to +6.4	+3.8 to +9.0	+4.1 to +11.0
	Winter	17.5	+2.5 to +5.5	+3.3 to +7.8	+4.1 to +9.6	+4.6 to +10.9
	Spring	35.8	+1.8 to +3.7	+2.7 to +6.0	+2.8 to +7.7	+3.3 to +9.5
	Summer	58.3	+2.1 to +4.5	+2.9 to +7.2	+3.3 to +9.9	+3.9 to +12.4
	Fall	39.6	+2.1 to +5.2	+3.6 to +6.6	+3.6 to +9.3	+4.1 to +11.6

Seasonally, maximum summer and fall temperatures are expected to see the highest projected increase throughout the 21st century. o Summer mid-century increase of 2.6 °F to 7.1 °F (3-9% increase); end of century increases of 3.6 °F to 13 °F (4-16% increase). o Fall mid-century increase of 3.6 °F to 6.8 °F (6-11% increase); end of century increases by and 3.8 °F to 12.1 °F (6-20% increase).

Seasonally, minimum winter and fall temperatures are expected to see increases throughout the 21st century. o Winter mid-century increase of 3.3 °F to 7.8 °F (19-44% increase); end of century increases by 4.6 °F to 10.9 °F (26-63% increase). o Fall mid-century of 3.6 °F to 6.6 °F (9-17% increase); end of century increases of 4.1°F to 11.6 °F (10-29% increase).

Days with Maximum Temperatures

Due to projected increases in average and maximum temperatures throughout the end of the century, the SuAsCo basin is also expected to experience an increase in days with daily maximum temperatures over 90°F, 95°F, and 100°F. The table below demonstrates this.

TABLE 2
Days with Maximum Temperatures

SuAsCo Basin		Observed Baseline 1971-2000 (Days)	Projected Change in 2030s (Days)	Mid-Century Projected Change in 2050s (Days)	Projected Change in 2070s (Days)	End of Century Projected Change in 2090s (Days)
Days with Maximum Temperature Over 90°F	Annual	8	+7 to +20	+10 to +35	+12 to +56	+14 to +76
	Winter	0	+0 to +0	+0 to +0	+0 to +0	+0 to +0
	Spring	1	+<1[87] to +1	+<1[87] to +2	+<1[87] to +3	+<1[87] to +5
	Summer	7	+7 to +17	+9 to +30	+11 to +46	+13 to +60
	Fall	<1[87]	+<1[87] to +2	+1 to +5	+1 to +9	+1 to +12
Days with Maximum Temperature Over 95°F	Annual	1	+2 to +8	+3 to +17	+4 to +32	+6 to +48
	Winter	0	+0 to +0	+0 to +0	+0 to +0	+0 to +0
	Spring	<1[87]	+<1[87] to +<1[87]	+<1[87] to +<1[87]	+<1[87] to +1	+<1[87] to +2
	Summer	1	+2 to +8	+3 to +15	+3 to +28	+5 to +42
	Fall	<1[87]	+<1[87] to +1	+<1[87] to +1	+<1[87] to +3	+<1[87] to +5
Days with Maximum Temperature Over 100°F	Annual	<1[87]	+<1[87] to +2	+<1[87] to +5	+1 to +12	+1 to +22
	Winter	0	+0 to +0	+0 to +0	+0 to +0	+0 to +0
	Spring	0	+0 to +<1[87]	+0 to +<1[87]	+0 to +<1[87]	+0 to +<1[87]
	Summer	<1[87]	+<1[87] to +2	+<1[87] to +5	+1 to +11	+1 to +20
	Fall	0	+0 to +<1[87]	+0 to +<1[87]	+0 to +1	+0 to +1

Annually, the SuAsCo basin is expected to see days with daily maximum temperatures over 90°F increase by 10 to 35 more days by mid-century, and 14 to 76 more days by the end of the century. Seasonally, summer is expected to see an increase of 9 to 30 more days with daily maximums over 90°F by mid-century. By end of century, the SuAsCo basin is expected to have 13 to 60 more days

Days with Minimum Temperatures

Due to projected increases in average and minimum temperatures throughout the end of the century, the SuAsCo basin is expected to experience a decrease in days with daily minimum temperatures below 32°F and 0°F. The table below demonstrates this.

TABLE 3
Days with Minimum Temperatures

SuAsCo Basin		Observed Baseline 1971-2000 (Days)	Projected Change in 2030s (Days)	Mid-Century Projected Change in 2050s (Days)	Projected Change in 2070s (Days)	End of Century Projected Change in 2090s (Days)
Days with Minimum Temperature Below 0°F	Annual	6	-2 to -4	-2 to -4	-2 to -5	-2 to -5
	Winter	6	-2 to -3	-2 to -4	-2 to -4	-2 to -5
	Spring	<1[88]	-0 to +<1[88]	-0 to -0	-0 to -0	-0 to -0
	Summer	0	-0 to -0	-0 to -0	-0 to -0	-0 to -0
	Fall	0	-0 to -0	-0 to -0	-0 to -0	-0 to -0
Days with Minimum Temperature Below 32°F	Annual	143	-12 to -28	-19 to -40	-22 to -55	-24 to -65
	Winter	83	-2 to -7	-3 to -11	-5 to -20	-6 to -25
	Spring	34	-3 to -11	-7 to -15	-8 to -19	-9 to -20
	Summer	0	-0 to -0	-0 to -0	-0 to -0	-0 to -0
	Fall	26	-5 to -11	-8 to -14	-9 to -18	-8 to -20

Seasonally, winter, spring and fall are expected to see the largest decreases in days with daily minimum temperatures below 32°F. Winter is expected to have 3 to 11 fewer days by mid-century, and 6 to 25 fewer days by end of century. Spring is expected to have 7 to 15 fewer days by mid-century, and 9 to 20 fewer days by end of century. Fall is expected to have 8 to 14 fewer days by mid-century, and 8 to 20 fewer days by end of century.

Heating Degree-Days and Cooling Degree-Days

Due to projected increases in average, maximum, and minimum temperatures throughout the end of the century, the SuAsCo basin is expected to experience a decrease in heating degree days and increases in both cooling degree-days and growing degree-days. The table below demonstrates this.

TABLE 4
Heating and Cooling Degree-Days

SuAsCo Basin		Observed Baseline 1971-2000 (Degree-Days)	Projected Change in 2030s (Degree-Days)	Mid-Century Projected Change in 2050s (Degree-Days)	Projected Change in 2070s (Degree-Days)	End of Century Projected Change in 2090s (Degree-Days)
Heating Degree-Days (Base 65°F)	Annual	6535	-544 to -1137	-750 to -1587	-873 to -2094	-984 to -2460
	Winter	3406	-194 to -454	-251 to -669	-316 to -807	-369 to -942
	Spring	1695	-137 to -293	-207 to -473	-225 to -619	-284 to -726
	Summer	90	-29 to -56	-40 to -72	-47 to -81	-48 to -84
	Fall	1340	-166 to -374	-279 to -461	-262 to -639	-276 to -731
Cooling Degree-Days (Base 65°F)	Annual	585	+216 to +456	+285 to +771	+343 to +1197	+398 to +158
	Winter	0	-1 to +2	+0 to +2	+1 to +3	+2 to +4
	Spring	25	+12 to +31	+20 to +62	+24 to +105	+22 to +143
	Summer	505	+158 to +350	+197 to +569	+238 to +860	+282 to +1086
	Fall	49	+30 to +95	+44 to +159	+52 to +254	+77 to +341
Growing Degree-Days (Base 50°F)	Annual	2592	+408 to +822	+546 to +1274	+642 to +1976	+729 to +2475
	Winter	6	-1 to +11	+0 to +15	+4 to +23	+3 to +29
	Spring	314	+66 to +145	+92 to +251	+108 to +398	+120 to +500
	Summer	1795	+192 to +404	+251 to +636	+293 to +934	+342 to +1167
	Fall	469	+113 to +302	+180 to +412	+170 to +621	+217 to +792

Seasonally, winter historically exhibits the highest number of heating degree-days and is expected to see the largest decrease of any season, but spring and fall are also expected to see significant change. The winter season is expected to see a decrease of 7-20% (251 -669 degree-days) by mid-century, and a decrease of 11-28% (369 -942 degree-days) by the end of century. The spring season is expected to decrease in heating degree-days by 12-28% (207 -473 degree-days) by mid-century, and by 17-43% (284 -726 degree-days) by the end of century. The fall season is expected to decrease in heating degree-days by 21-34% (279 -461 degree-days) by mid-century, and by 21-55% (276 -731 degree-days) by the end of century.

Conversely, due to projected increasing temperatures, summer cooling degree-days are expected to increase by 39-113% (197 -569 degree-days) by mid-century, and by 56-215% (282 - 1086 degree-days) by end of century.

Seasonally, summer historically exhibits the highest number of growing degree-days and is expected to see the largest decrease of any season, but the shoulder seasons of spring and fall are also expected to see an increase in growing degree-days. The summer season is projected to increase by 14-35% (251 -636 degree-days) by midcentury, and by 19-65% (342 -1167 degree-days) by end of century. Spring is expected to see an increase by 29-80% (92 -251 degree-days) by mid-century and 38-159% (120 -500 degree-days) by end of century. Fall is expected to see an increase by 38-88% (180 -412 degree-days) by mid-century and 46-169% (217 -792 degree-days) by end of century.

Days with Precipitation Over 1", 2", and 4"

The projections for expected number of days receiving precipitation over one inch are variable for the SuAsCo basin, fluctuating between loss and gain of days. This is demonstrated in the table below.

TABLE 5
Days with Precipitation Over 1", 2", and 4"

SuAsCo Basin		Observed Baseline 1971-2000 (Days)	Projected Change in 2030s (Days)	Mid-Century: Projected Change in 2050s (Days)	Projected Change in 2070s (Days)	End of Century: Projected Change in 2090s (Days)
Days with Precipitation Over 1"	Annual	7	+<1[89] to +2	+1 to +3	+1 to +3	+1 to +4
	Winter	2	-0 to +1	+<1[89] to +1	+<1[89] to +2	+<1[89] to +2
	Spring	1	-0 to +1	-0 to +1	+<1[89] to +1	+<1[89] to +1
	Summer	2	-0 to +1	-0 to +1	-0 to +1	-0 to +1
	Fall	2	-0 to +1	-0 to +1	-0 to +1	-0 to +1
Days with Precipitation Over 2"	Annual	1	-0 to +<1[89]	+<1[89] to +1	+<1[89] to +<1[89]	+<1[89] to +1
	Winter	<1[89]	-0 to +<1[89]	-0 to +<1[89]	-0 to +<1[89]	-0 to +<1[89]
	Spring	<1[89]	-0 to +<1[89]	+<1[89] to +<1[89]	-0 to +<1[89]	-0 to +<1[89]
	Summer	<1[89]	-0 to +<1[89]	-0 to +<1[89]	-0 to +<1[89]	-0 to +<1[89]
	Fall	<1[89]	-0 to +<1[89]	-0 to +<1[89]	-0 to +<1[89]	-0 to +<1[89]
Days with Precipitation Over 4"	Annual	<1[89]	-0 to +<1[89]	-0 to +<1[89]	-0 to +<1[89]	-0 to +<1[89]
	Winter	0	-0 to +0	+0 to +0	-0 to +0	-0 to +0
	Spring	0	-0 to +0	+0 to +<1[89]	-0 to +0	-0 to +<1[89]
	Summer	<1[89]	-0 to +<1[89]	-0 to +<1[89]	-0 to +<1[89]	-0 to +<1[89]
	Fall	<1[89]	-0 to +<1[89]	-0 to +<1[89]	-0 to +<1[89]	-0 to +<1[89]

Seasonally, the winter season is generally expected to see the highest projected increase. The winter season is expected to see an increase in days with precipitation over one inch of 0-1 days by mid-century, and an increase of 0-2 days by the end of century. The spring season is expected to see an increase in days with precipitation over one inch of -0-1 days by mid-century, and of an increase of 0-1 days by the end of century.

Total Precipitation

Similar to projections for number of days receiving precipitation over a specified threshold, seasonal projections for total precipitation are also variable for the SuAsCo basin. The table below shows total precipitation projections in the SuAsCo Basin.

TABLE 6
Total Precipitation

SuAsCo Basin		Observed Baseline 1971-2000 (Inches)	Projected Change in 2030s (Inches)	Mid-Century: Projected Change in 2050s (Inches)	Projected Change in 2070s (Inches)	End of Century: Projected Change in 2090s (Inches)
Total Precipitation	Annual	45.4	+0.2 to +4.8	+0.6 to +6.1	+1.5 to +7.8	+1.2 to +8.0
	Winter	11.2	-0.4 to +2.1	+0.1 to +2.6	+0.5 to +3.2	+0.4 to +4.1
	Spring	11.6	-0.1 to +2.4	+0.0 to +2.1	+0.3 to +2.6	+0.2 to +2.6
	Summer	10.8	-0.2 to +1.5	-0.5 to +2.2	-0.6 to +2.4	-1.1 to +2.2
	Fall	12.0	-1.2 to +1.1	-1.3 to +1.7	-1.8 to +1.6	-1.5 to +1.4

The winter season is expected to experience the greatest change with an increase of 1-23% by mid-century, and of 3-36% by end of century. Projections for the summer and fall seasons are more variable, and could see either a drop or increase in total precipitation throughout the 21st century. The summer season projections for the SuAsCo or basin could see a decrease of 0.5 to an increase of 2.2 inches by mid-century (decrease of 4 to increase of 20%) and a decrease of 1.1 to an increase of 2.2 inches by the end of the century (decrease of 11% to increase of 20%). The fall season projections for the SuAsCo basin could see a decrease of 1.3 to an increase of 1.7 inches by mid-century (decrease of 11% to increase of 14%) and a decrease of 1.5 to an increase of 1.4 inches by the end of the century (decrease of 13% to increase of 11%).

Consecutive Dry Days

Annual and seasonal projections for consecutive dry days, or for a given period, the largest number of consecutive days with precipitation less than 1 mm (~0.04 inches), are variable throughout the 21st century.

TABLE 7
Consecutive Dry Days

SuAsCo Basin		Observed Baseline 1971-2000 (Days)	Projected Change in 2030s (Days)	Mid-Century Projected Change in 2050s (Days)	Projected Change in 2070s (Days)	End of Century Projected Change in 2090s (Days)
Consecutive Dry Days	Annual	17	-1 to +1	-0 to +2	-1 to +2	-1 to +3
	Winter	12	-1 to +1	-1 to +1	-1 to +2	-1 to +2
	Spring	11	-1 to +1	-1 to +1	-1 to +1	-1 to +1
	Summer	12	-1 to +2	-1 to +2	-1 to +3	-1 to +2
	Fall	12	-0 to +2	-0 to +3	-0 to +3	-0 to +3

For all the temporal parameters, the SuAsCo basin is expected to see a slight decrease to an increase in consecutive dry days throughout this century. Seasonally, the fall and summer seasons are expected to continue to experience the highest number of consecutive dry days. The fall season is expected to an increase of 0-3 days in consecutive dry days by the end of the century.

Merrimack Basin

Increased Average Temperature

The Merrimack basin is expected to experience increased average temperatures throughout the 21st century. Maximum and minimum temperatures are also expected to increase throughout the end of the century. These increased temperature trends are expected for annual and seasonal projections. Table 8 below shows how temperature will change over the course of the century.

TABLE 8
Average Temperature

Merrimack Basin		Observed Baseline 1971-2000 (°F)	Projected Change in 2030s (°F)	Mid-Century Projected Change in 2050s (°F)	Projected Change in 2070s (°F)	End of Century Projected Change in 2090s (°F)
Average Temperature	Annual	48.1	+2.2 to +4.4	+3.0 to +6.4	+3.6 to +9.1	+3.9 to +10.9
	Winter	26.8	+2.5 to +5.3	+3.2 to +7.8	+4.0 to +9.5	+4.3 to +10.8
	Spring	46.1	+1.7 to +3.5	+2.6 to +5.4	+2.7 to +7.7	+3.3 to +9.4
	Summer	68.8	+2.1 to +4.3	+2.8 to +6.7	+3.2 to +9.9	+3.8 to +12.5
	Fall	50.3	+2.3 to +5.0	+3.3 to +6.7	+3.5 to +9.6	+4.0 to +11.8
Maximum Temperature	Annual	59.1	+2.1 to +4.2	+2.7 to +6.3	+3.3 to +9.1	+3.6 to +10.9
	Winter	36.7	+2.1 to +4.8	+2.8 to +7.3	+3.4 to +8.8	+3.8 to +10.0
	Spring	57.5	+1.6 to +3.4	+2.2 to +5.5	+2.6 to +7.9	+3.2 to +9.4
	Summer	80.5	+1.9 to +4.4	+2.7 to +6.7	+3.1 to +10.2	+3.6 to +12.8
	Fall	61.5	+2.4 to +4.9	+3.5 to +6.9	+3.4 to +9.9	+3.9 to +12.2
Minimum Temperature	Annual	37.0	+2.3 to +4.8	+3.2 to +6.5	+3.9 to +9.1	+4.2 to +11.0
	Winter	16.9	+2.7 to +5.8	+3.6 to +8.3	+4.6 to +10.2	+4.8 to +11.6
	Spring	34.7	+1.9 to +3.8	+2.7 to +5.7	+2.9 to +7.5	+3.4 to +9.3
	Summer	57.1	+2.2 to +4.5	+3.0 to +7.1	+3.4 to +9.7	+4.0 to +12.2
	Fall	39.1	+2.2 to +5.2	+3.5 to +6.6	+3.6 to +9.4	+4.1 to +11.6

Seasonally, maximum summer and fall temperatures are expected to see the highest projected increase throughout the 21st century. Summer mid-century increase of 2.7°F to 6.7°F (3-8% increase); end of century increases of 3.6°F to 12.8°F (4-16% increase). Fall mid-century increase of 3.5°F to 6.9°F (6-11% increase); end of century increases by and 3.9°F to 12.2°F (6-20% increase). Seasonally, minimum winter and fall temperatures are expected to see increases throughout the 21st century. Winter mid-century increase of 3.6°F to 8.3°F (21-49% increase); end of century increases by 4.8°F to 11.6°F (28-68% increase). Fall mid-century of 3.5°F to 6.6°F (9-17% increase); end of century increases of 4.1°F to 11.6°F (11-30% increase).

Days with Maximum Temperatures

Due to projected increases in average and maximum temperatures throughout the end of the century, the Merrimack basin is also expected to experience an increase in days with daily maximum temperatures over 90°F, 95°F, and 100°F, Table 9 below demonstrates this change.

TABLE 9
Average Temperature

Merrimack Basin		Observed Baseline 1971-2000 (Days)	Projected Change in 2030s (Days)	Mid-Century Projected Change in 2050s (Days)	Projected Change in 2070s (Days)	End of Century Projected Change in 2090s (Days)
Days with Maximum Temperature Over 90°F	Annual	7	+7 to +20	+11 to +33	+13 to +55	+15 to +74
	Winter	0	+0 to +0	+0 to +0	+0 to +0	+0 to +0
	Spring	<1[63]	+<1[63] to +1	+<1[63] to +2	+<1[63] to +3	+<1[63] to +5
	Summer	7	+6 to +17	+9 to +28	+11 to +44	+13 to +58
	Fall	<1[63]	+1 to +3	+1 to +5	+1 to +9	+1 to +13
Days with Maximum Temperature Over 95°F	Annual	1	+2 to +8	+3 to +16	+4 to +31	+6 to +49
	Winter	0	+0 to +0	+0 to +0	+0 to +0	+0 to +0
	Spring	0	+<1[63] to +<1[63]	+<1[63] to +<1[63]	+<1[63] to +1	+<1[63] to +2
	Summer	1	+2 to +8	+3 to +14	+4 to +27	+5 to +42
	Fall	0	+<1[63] to +1	+<1[63] to +2	+<1[63] to +4	+<1[63] to +6
Days with Maximum Temperature Over 100°F	Annual	<1[63]	+<1[63] to +2	+<1[63] to +5	+1 to +11	+1 to +22
	Winter	0	+0 to +0	+0 to +0	+0 to +0	+0 to +0
	Spring	0	+0 to +<1[63]	+0 to +<1[63]	+0 to +<1[63]	+0 to +1
	Summer	<1[63]	+<1[63] to +2	+<1[63] to +5	+1 to +10	+1 to +20
	Fall	0	+0 to +<1[63]	+<1[63] to +<1[63]	+0 to +1	+0 to +2

Annually, the Merrimack basin is expected to see days with daily maximum temperatures over 90°F increase by 11 to 33 more days by mid-century, and 15 to 74 more days by the end of the century. Seasonally, summer is expected to see an increase of 9 to 28 more days with daily maximums over 90°F by mid-century. By end of century, the Merrimack basin is expected to have 13 to 58 more days.

0.0.0.1 Days with Minimum Temperatures

Due to projected increases in average and minimum temperatures throughout the end of the century, the Merrimack basin is expected to experience a decrease in days with daily minimum temperatures below 32°F and 0°F. This is demonstrated in Table 10 below.

TABLE 10
Days with Minimum Temperatures

Merrimack Basin		Observed Baseline 1971-2000 (Days)	Projected Change in 2030s (Days)	Mid-Century Projected Change in 2050s (Days)	Projected Change in 2070s (Days)	End of Century Projected Change in 2090s (Days)
Days with Minimum Temperature Below 0°F	Annual	7	-2 to -4	-2 to -5	-3 to -5	-3 to -5
	Winter	7	-2 to -4	-2 to -4	-2 to -5	-2 to -5
	Spring	<1/64	-0 to +<1/64	-0 to -0	-0 to -0	-0 to -0
	Summer	0	-0 to -0	-0 to -0	-0 to -0	-0 to -0
	Fall	<1/64	-0 to -0	-0 to -0	-0 to -0	-0 to -0
Days with Minimum Temperature Below 32°F	Annual	148	-12 to -30	-19 to -43	-23 to -56	-25 to -66
	Winter	83	-2 to -7	-3 to -12	-5 to -20	-6 to -25
	Spring	37	-4 to -12	-7 to -15	-8 to -19	-9 to -21
	Summer	0	-0 to -0	-0 to -0	-0 to -0	-0 to -0
	Fall	27	-5 to -11	-9 to -15	-9 to -18	-9 to -20

Seasonally, winter, spring and fall are expected to see the largest decreases in days with daily minimum temperatures below 32 °F. Winter is expected to have 3 to 12 fewer days by mid-century, and 6 to 25 fewer days by end of century. Spring is expected to have 7 to 15 fewer days by mid-century, and 9 to 21 fewer by end of century. Fall is expected to have 9 to 15 fewer days by mid-century, and 9 to 20 fewer days by end of century.

Heating Degree-Days and Cooling Degree-Days

Due to projected increases in average, maximum, and minimum temperatures throughout the end of the century, the Merrimack basin is expected to experience a decrease in heating degree days and increases in both cooling degree-days and growing degree-days. This is demonstrated in Table 11 below.

TABLE 11
Heating and Cooling Degree-Days

Merrimack Basin		Observed Baseline 1971-2000 (Degree-Days)	Projected Change in 2030s (Degree-Days)	Mid-Century Projected Change in 2050s (Degree-Days)	Projected Change in 2070s (Degree-Days)	End of Century Projected Change in 2090s (Degree-Days)
Heating Degree-Days (Base 65°F)	Annual	6693	-572 to -1185	-769 to -1621	-914 to -2135	-1032 to -2503
	Winter	3450	-217 to -492	-282 to -714	-353 to -865	-395 to -997
	Spring	1762	-144 to -291	-213 to -449	-225 to -613	-290 to -720
	Summer	106	-34 to -62	-43 to -79	-54 to -90	-54 to -92
	Fall	1381	-160 to -374	-279 to -463	-266 to -649	-285 to -735
Cooling Degree-Days (Base 65°F)	Annual	526	+209 to +444	+283 to +737	+341 to +1154	+399 to +1518
	Winter	0	+1 to +2	+0 to +4	+1 to +4	+2 to +3
	Spring	20	+10 to +30	+19 to +51	+20 to +90	+16 to +126
	Summer	455	+156 to +337	+199 to +542	+236 to +828	+278 to +1057
	Fall	43	+31 to +94	+48 to +167	+55 to +258	+78 to +335
Growing Degree-Days (Base 50°F)	Annual	2466	+406 to +812	+549 to +1226	+641 to +1923	+730 to +2413
	Winter	6	-1 to +11	+2 to +15	+5 to +24	+3 to +32
	Spring	276	+63 to +136	+89 to +239	+110 to +362	+116 to +471
	Summer	1729	+191 to +398	+258 to +614	+297 to +912	+344 to +1147
	Fall	442	+109 to +296	+179 to +416	+169 to +622	+214 to +779

Seasonally, winter historically exhibits the highest number of heating degree-days and is expected to see the largest decrease of any season, but spring and fall are also expected to see significant change. The winter season is expected to see a decrease of 8-21% (282 -714 degree-days) by mid-century, and a decrease of 11-29% (395 -997 degree-days) by the end of century. The spring season is expected to decrease in heating degree-days by 12-25% (213-449 degree-days) by mid-century, and by 16-41% (290 -720 degree-days) by the end of century. The fall season is expected to decrease in heating degree-days by 20-34% (279 -463 degree-days) by mid-century, and by 21-53% (285 -1518 degree-days) by the end of century. Conversely, due to projected increasing temperatures, summer cooling degree-days are expected to increase by 44-119% (199 -542 degree-days) by mid-century, and by 61-233% (278- 1027 degree-days) by end of century.

Seasonally, summer historically exhibits the highest number of growing degree-days and is expected to see the largest decrease of any season, but the shoulder seasons of spring and fall are also expected to see an increase in growing degree-days. The summer season is projected to increase by 15-36% (258 -614 degree-days) by midcentury, and by 20-66% (344 -1147 degree-days) by end of century. Spring is expected to see an increase by 32-86% (89 -239 degree-days) by mid-century and 42-171% (116 -471 degree-days) by end of century. Fall is expected to see an increase by 41-94% (179 -415 degree-days) by mid-century and 49-176% (214 -779 degree-days) by end of century.

Days with Precipitation Over 1", 2", and 4"

The projections for expected number of days receiving precipitation over one inch are variable for the Merrimack basin, fluctuating between loss and gain of days. Precipitation data is shown in Table 12 below.

TABLE 12
Precipitation Over 1", 2", and 4"

Merrimack Basin		Observed Baseline 1971-2000 (Days)	Projected Change in 2030s (Days)	Mid-Century Projected Change in 2050s (Days)	Projected Change in 2070s (Days)	End of Century Projected Change in 2090s (Days)
Days with Precipitation Over 1"	Annual	7	+<1[65] to +2	+<1[65] to +3	+1 to +3	+1 to +4
	Winter	2	-0 to +1	+<1[65] to +1	+<1[65] to +1	+<1[65] to +2
	Spring	2	-0 to +1	-0 to +1	+<1[65] to +1	+<1[65] to +1
	Summer	1	-0 to +<1[65]	-0 to +1	-0 to +1	+0 to +1
	Fall	2	-0 to +1	-0 to +1	-0 to +1	+0 to +1
Days with Precipitation Over 2"	Annual	1	+<1[65] to +<1[65]	+0 to +1	+<1[65] to +1	+<1[65] to +1
	Winter	<1[65]	-0 to +<1[65]	-0 to +1	-0 to +<1[65]	+0 to +<1[65]
	Spring	<1[65]	-0 to +<1[65]	-0 to +<1[65]	-0 to +<1[65]	+0 to +<1[65]
	Summer	<1[65]	-0 to +<1[65]	-0 to +<1[65]	-0 to +<1[65]	+0 to +<1[65]
	Fall	<1[65]	-0 to +<1[65]	-0 to +<1[65]	-0 to +<1[65]	+0 to +<1[65]
Days with Precipitation Over 4"	Annual	<1[65]	-0 to +<1[65]	-0 to +<1[65]	-0 to +<1[65]	+0 to +<1[65]
	Winter	0	+0 to +0	+0 to +0	+0 to +0	+0 to +<1[65]
	Spring	0	-0 to +<1[65]	+0 to +<1[65]	-0 to +<1[65]	+0 to +<1[65]
	Summer	<1[65]	-0 to +<1[65]	-0 to +<1[65]	-0 to +<1[65]	+0 to +<1[65]
	Fall	<1[65]	-0 to +<1[65]	-0 to +<1[65]	-0 to +<1[65]	+0 to +<1[65]

Seasonally, the winter season is generally expected to see the highest projected increase. The winter season is expected to see an increase in days with precipitation over one inch of 0-1 days by mid-century, and of 0-2 days by the end of century. The spring season is expected to see an increase in days with precipitation over one inch of 0-1 days by mid-century, and of an increase of 0-1 days by the end of century.

Total Precipitation

Similar to projections for number of days receiving precipitation over a specific threshold, seasonal projections for total precipitation are also variable for the Marrimack basin. Total Precipitation is shown in Table 13 below.

TABLE 13
Total Precipitation

Merrimack Basin		Observed Baseline 1971-2000 (Inches)	Projected Change in 2030s (Inches)	Mid-Century Projected Change in 2050s (Inches)	Projected Change in 2070s (Inches)	End of Century Projected Change in 2090s (Inches)
Total Precipitation	Annual	44.2	+0.1 to +4.5	-0.0 to +5.8	+0.9 to +6.9	+0.9 to +7.6
	Winter	10.8	-0.5 to +1.9	-0.0 to +2.4	+0.4 to +3.0	+0.4 to +3.8
	Spring	11.3	-0.1 to +2.2	-0.1 to +2.1	+0.1 to +2.6	+0.2 to +2.5
	Summer	10.3	-0.2 to +1.3	-0.6 to +2.0	-0.8 to +1.8	-1.1 to +1.8
	Fall	11.9	-1.1 to +1.1	-1.1 to +1.5	-1.6 to +1.4	-1.4 to +1.3

The winter season is expected to experience the greatest change with an increase of 0-22% by mid-century, and of 4-35% by end of century. Projections for the summer and fall seasons are more variable and could see either a drop or increase in total precipitation throughout the 21st century. The summer season projections for the Merrimack or basin could see a decrease of 0.6 to an increase of 2.0 inches by mid-century (decrease of 6% to increase of 20%) and a decrease of 1.1 to an increase of 1.8 inches by the end of the century (decrease of 10% to increase of 17%). The fall season projections for the Merrimack basin could see a decrease of 1.1 to an increase of 1.5 inches by mid-century (decrease of 10% to increase of 13% and a decrease of 1.4 to an increase of 1.3 inches by the end of the century (decrease of 12% to increase of 11%).

Consecutive Dry Days

Annual and seasonal projections for consecutive dry days, or for a given period, the largest number of consecutive days with precipitation less than 1 mm (~0.04 inches), are variable throughout the 21st century.

TABLE 14
Consecutive Dry Days

Merrimack Basin		Observed Baseline 1971-2000 (Days)	Projected Change in 2030s (Days)	Mid-Century Projected Change in 2050s (Days)	Projected Change in 2070s (Days)	End of Century Projected Change in 2090s (Days)
Consecutive Dry Days	Annual	17	-1 to +1	-0 to +2	-1 to +2	-0 to +3
	Winter	12	-1 to +1	-1 to +2	-1 to +2	-1 to +2
	Spring	12	-1 to +1	-1 to +1	-2 to +1	-1 to +1
	Summer	13	-1 to +1	-1 to +2	-1 to +2	-1 to +2
	Fall	12	-0 to +2	-0 to +2	-0 to +3	-0 to +3

For all the temporal parameters, the Merrimack basin is expected to see a slight decrease to an increase in consecutive dry days throughout this century. Seasonally, the fall and summer seasons are expected to continue to experience the highest number of consecutive dry days. The summer season is expected to experience a decrease of 1 day to an increase of 2 days in consecutive dry days by the end of the century.

Tighe&Bond

APPENDIX G

TOWN OF WESTFORD MUNICIPAL VULNERABILITY PREPAREDNESS PLANNING

Listening Session

June 18, 2020

Tighe&Bond

WELCOME

Westford awarded a $36K grant for Municipal Vulnerability (MVP) Community Resilience Building (CRB) Workshop Process

First step in unlocking additional funding opportunities for Westford from FEMA/MEMA and Commonwealth of Massachusetts

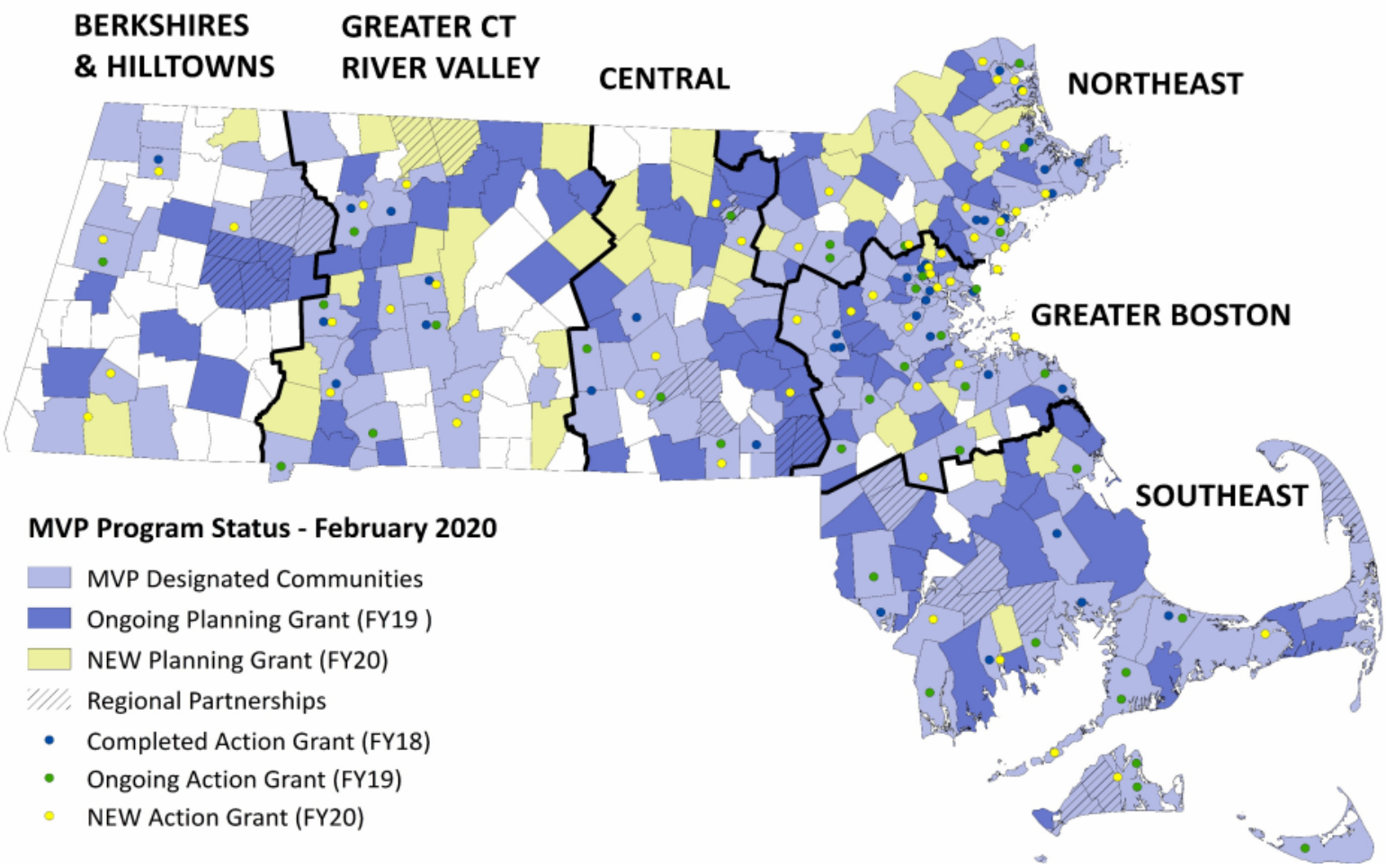
Tighe&Bond

BACKGROUND ON MVP PROGRAM

MVP Designations
82% of the Commonwealth
287 communities

Action Grant Projects
FY 18: 37
FY 19: 36
FY 20: 54

Total Awards
$33M+ in planning and action grants to date

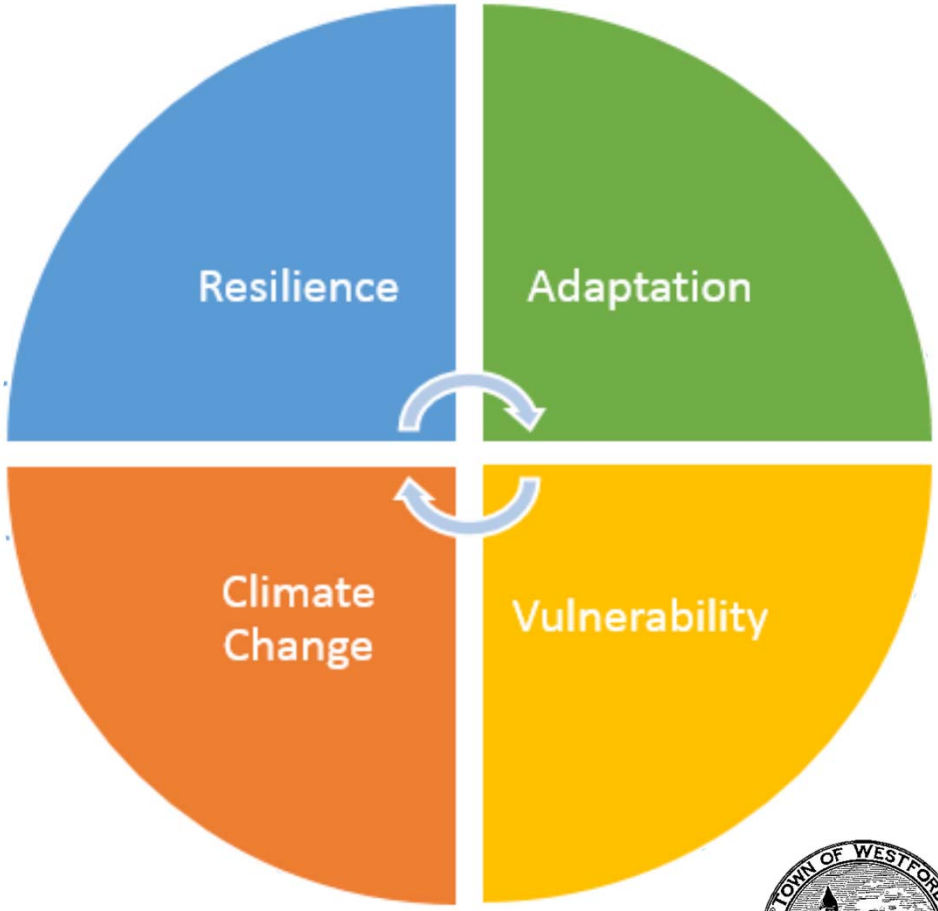


TOWN OF WESTFORD · INCORPORATED SEPT. 23, 1729 ·

Tighe&Bond

MVP GRANT AND CRB PROCESS

1. Establish Core Team
2. Complete Evaluation/Assessment
3. Hold Workshops
4. Draft MVP Report
5. **Hold Listening Session**
6. Final MVP Report



A brief thanks to Westford's MVP Core Team

Carol Gumbart
Henry Fontaine
Jeffrey Stephens
Jeremy Downs
Joe Targ
Matthew Salem
Paul Fox
Paul Starratt
Rae Dick
Rebecca Cheney
Richard Barrett
Stephen Cronin
Tim Whitcomb

NATURAL HAZARDS AND CLIMATE CHANGE

Tighe&Bond

WHAT ARE NATURAL HAZARDS?

Poor Urban Drainage
Regional Flooding
Culvert Failure

Inland Flooding

Tsunami

Severe Winter Storm

Blizzards
Snow
Ice Storms

Drought

Average/Extreme Temperatures

Tornadoes

Landslide

Wildfires

Other Severe Weather

Nor'easters
High Wind
Heavy Precipitation
Microbursts

Coastal Flooding

Invasive Species

Earthquake

Coastal Erosion

Hurricanes/Tropical Storms

TOP NATURAL HAZARDS – PAST & PRESENT

Thunderstorms

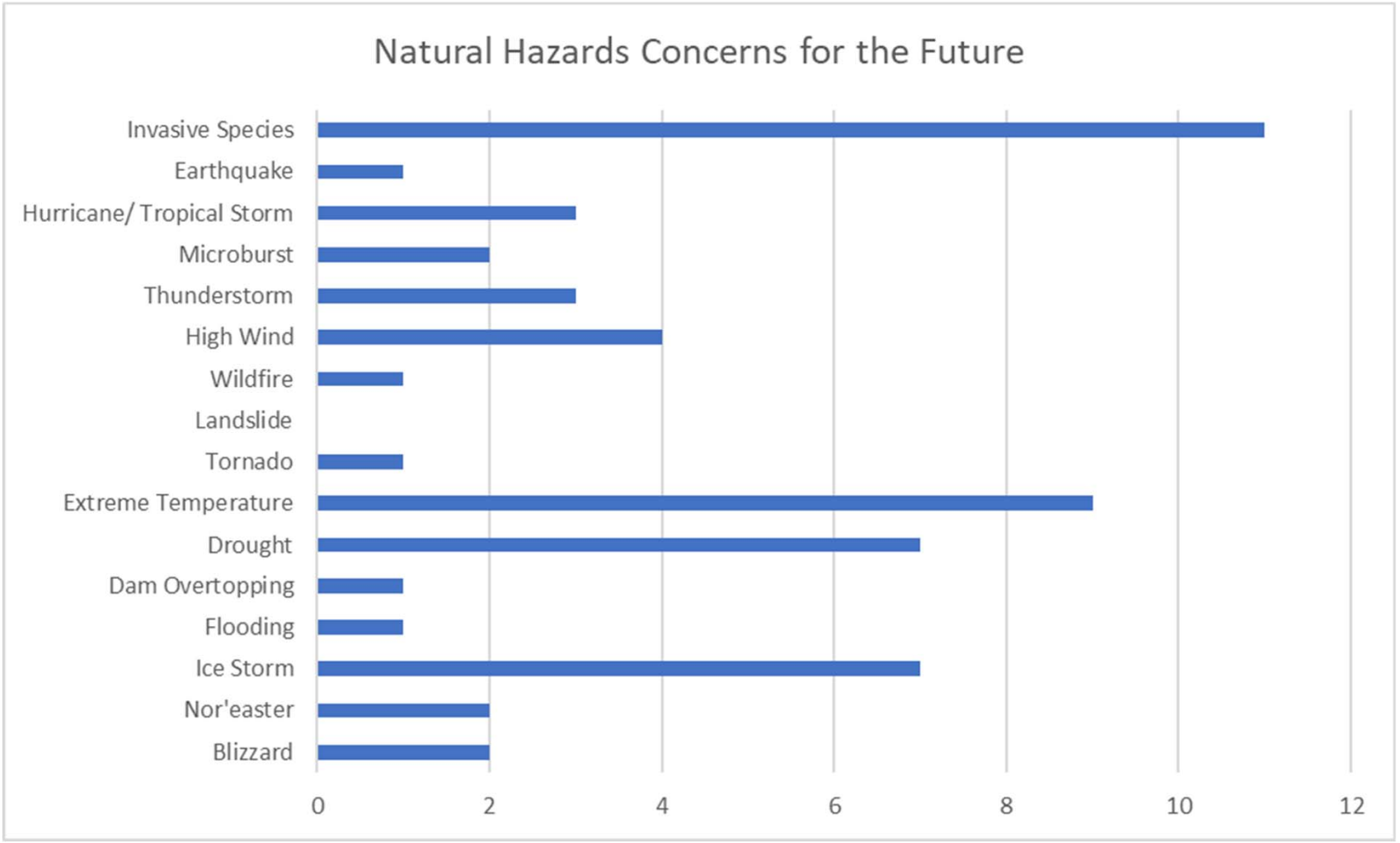
Invasive Species

High wind

Nor’easter

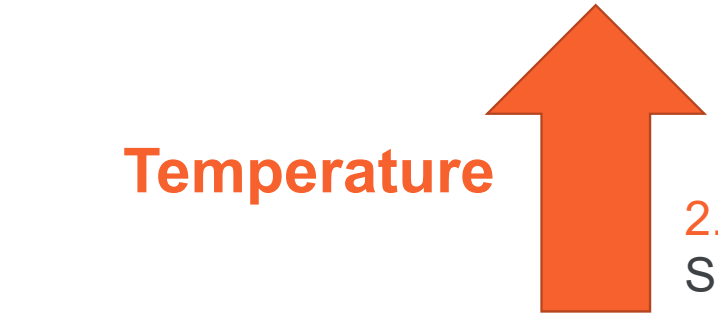
Tighe&Bond

TOP NATURAL HAZARDS – FUTURE



Tighe&Bond

MASSACHUSETTS OBSERVED CLIMATE CHANGES



Temperature

2.9°F
Since 1985 (Statewide)

Growing Season

15 Days
Since 1950

Sea Level Rise

11 inches
Since 1922 (Boston)

Heavy Precipitation

55%
Since 1958

resilientma.org

Tighe&Bond

CHANGES IN PRECIPITATION

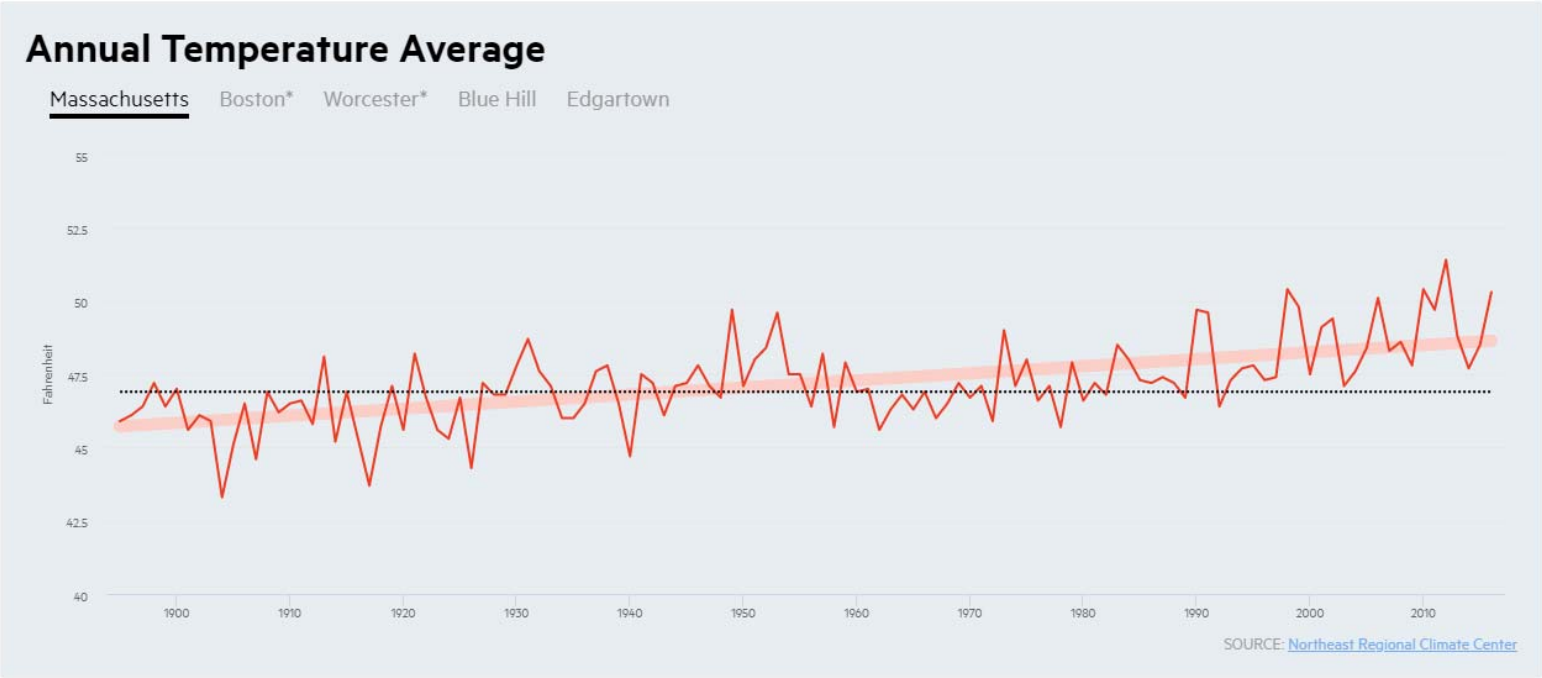
SuAsCo Basin		Observed Baseline 1971-2000 (Inches)	Projected Change in 2030s (Inches)	Mid-Century Projected Change in 2050s (Inches)	Projected Change in 2070s (Inches)	End of Century Projected Change in 2090s (Inches)
Total Precipitation	Annual	45.4	+0.2 to +4.8	+0.6 to +6.1	+1.5 to +7.8	+1.2 to +8.0
	Winter	11.2	-0.4 to +2.1	+0.1 to +2.6	+0.5 to +3.2	+0.4 to +4.1
	Spring	11.6	-0.1 to +2.4	+0.0 to +2.1	+0.3 to +2.6	+0.2 to +2.6
	Summer	10.8	-0.2 to +1.5	-0.5 to +2.2	-0.6 to +2.4	-1.1 to +2.2
	Fall	12.0	-1.2 to +1.1	-1.3 to +1.7	-1.8 to +1.6	-1.5 to +1.4

Merrimack Basin		Observed Baseline 1971-2000 (Inches)	Projected Change in 2030s (Inches)	Mid-Century Projected Change in 2050s (Inches)	Projected Change in 2070s (Inches)	End of Century Projected Change in 2090s (Inches)
Total Precipitation	Annual	44.2	+0.1 to +4.5	-0.0 to +5.8	+0.9 to +6.9	+0.9 to +7.6
	Winter	10.8	-0.5 to +1.9	-0.0 to +2.4	+0.4 to +3.0	+0.4 to +3.8
	Spring	11.3	-0.1 to +2.2	-0.1 to +2.1	+0.1 to +2.6	+0.2 to +2.5
	Summer	10.3	-0.2 to +1.3	-0.6 to +2.0	-0.8 to +1.8	-1.1 to +1.8
	Fall	11.9	-1.1 to +1.1	-1.1 to +1.5	-1.6 to +1.4	-1.4 to +1.3

IMPACTS:

- Episodic droughts
- Concerns over food production and drinking water supply
- Stress on ecosystems
- Flooding

RISING TEMPERATURE



IMPACTS:

- Heat-related illnesses
- Vector borne-diseases
- Health of plants, animals, ecosystems
- Reduced crop production
- Larger energy demand
- Droughts and wildfires

Tighe&Bond

EXTREME STORMS

Blizzards

- More than 5 in MA since 2011

Nor'easters and Hurricanes

- Upward trend since the 1970s

IMPACTS:

- **Public safety concerns, including increased injuries and mortality**
- **Economic damages and business disruption**
- **Property and infrastructure damage**
- **Impacts on natural resources**

Tighe&Bond

CLIMATE CHANGES	RELATED NATURAL HAZARDS	PROJECTIONS BY THE END OF THIS CENTURY
Changes in precipitation 	– Inland flooding – Drought – Landslide	– Annual precipitation: Increase up to 16% (+7.3 inches) – Days with rainfall accumulation 1+ inch: Increase up to 57% (+4 days) – Consecutive dry days: Increase 18% (+3 days) – Summer precipitation: Decrease
Sea level rise 	– Coastal flooding – Coastal erosion – Tsunami	– Sea level: Increase 4.0 to 10.5 feet along the Massachusetts coast
Rising temperatures 	– Average/extreme temperatures – Wildfires – Invasive species	– Average annual temperature: Increase up to 23% (+10.8 degrees Fahrenheit) – Days/year with daily minimum temperatures below freezing: Decrease up to 42% (-62 days) – Winter temperatures: Increase at a greater rate than spring, summer, or fall – Long-term average minimum winter temperature: Increase up to 66% (+11.4 degrees Fahrenheit) – Days/year with daily maximum temperatures over 90 degrees Fahrenheit: Increase by up to 1,280% (+64 days) – Growing degree days: Increase by 23% to 52%
Extreme weather 	– Hurricanes/tropical storms – Severe winter storms/nor'easters – Tornadoes – Other severe weather	– Frequency and magnitude: Increase

Note: This plan also assesses earthquakes, but there is no established correlation between climate change and earthquakes.
Source of Climate Change Projections: Northeast Climate Adaptation Science Center at the University of Massachusetts, Amherst.

CLIMATE CHANGE + NATURAL HAZARDS = AMPLIFIED RISK

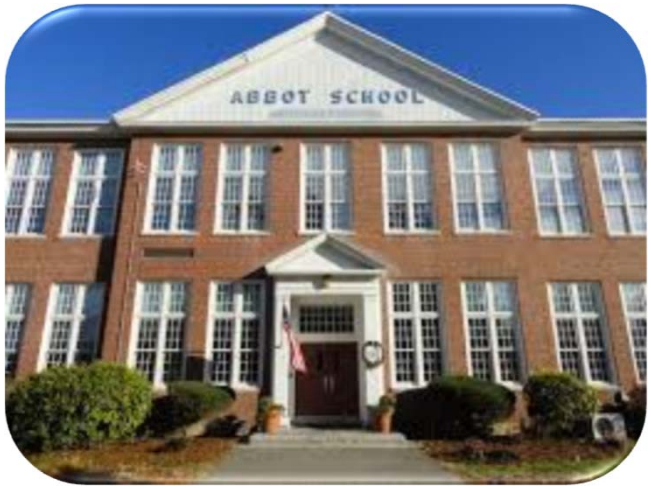
https://www.mass.gov/service-details/massachusetts-integrated-state-hazard-mitigation-and-climate-adaptation-plan

COMMUNITY ASSET INVENTORY

TOWN OF WESTFORD
INCORPORATED SEPT. 23, 1729

Tighe&Bond

WHAT ARE COMMUNITY ASSETS?



Societal

Infrastructure

Natural Resources

Economy

Tighe&Bond

PEOPLE – SOCIETAL ASSETS

- **Public Education Facilities and Resources**
- **Buildings that Support Community Needs**
- **Vulnerable Populations**
- **Support Services**

INFRASTRUCTURAL ASSETS

- **Flood Control Infrastructure**
- **Transportation Corridors**
- **Critical Facilities**
- **Communication and Energy**

ECONOMIC ASSETS

- **Essential Goods – Large Retail**
- **Essential Service – Small Business**
- **Large Employers**
- **Other Essential Services – Lodging, Transportation and Utilities**

ENVIRONMENTAL ASSETS

- Hydrologic Resources
- Open Space and Conservation Lands
- Parks and Recreation Areas
- Forestry and Agriculture
- Environmental Health
- Environmental Education

MVP WORKSHOPS

Tighe&Bond

Overview of the Process (Steps & Tasks)

DURING WORKSHOP

A Prepare for the Workshop
1. Establish a core team with goals.
2. Engage stakeholders.
3. Prepare materials for workshop.
4. Decide on participant arrangements.

B Characterize Hazards
1. Identify past, current, and future impacts.
2. Determine the highest-priority hazards.

C Identify Community Vulnerabilities and Strengths
1. Identify infrastructural vulnerabilities and strengths.
2. Identify societal vulnerabilities and strengths.
3. Identify environmental vulnerabilities and strengths.

D Identify and Prioritize Community Actions
1. Identify and prioritize infrastructural actions.
2. Identify and prioritize societal actions.
3. Identify and prioritize environmental actions.

E Determine the Overall Priority Actions
1. Identify highest-priority actions.
2. Further define urgency and timing.

F Put It All Together
1. Generate final workshop products.

G Move Forward
1. Continue community outreach and engagement.
2. Secure additional data and information.
3. Inform existing planning and project activities.

Community Components

Infrastructural

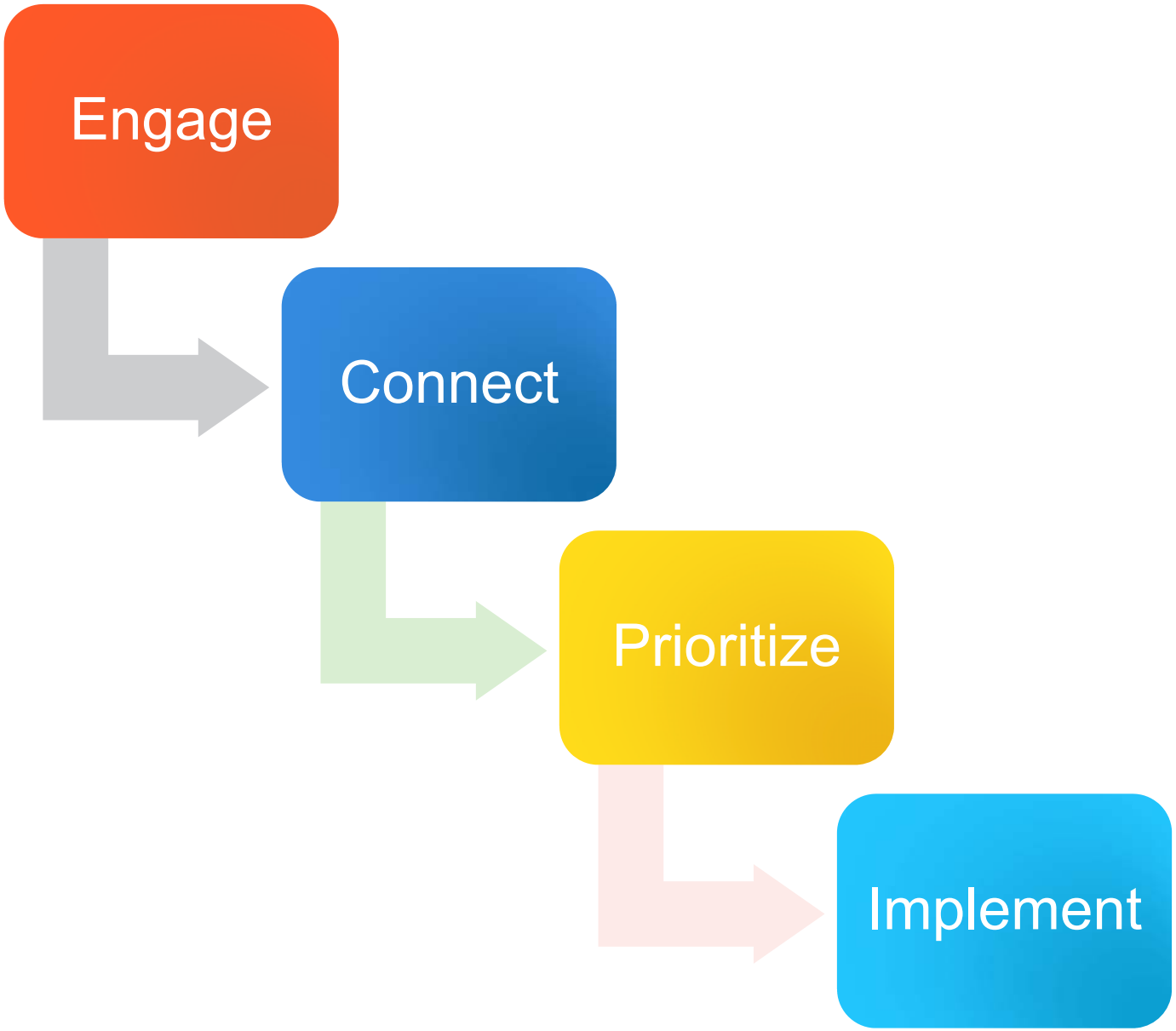
Societal

Environmental

https://www.communityresiliencebuilding.com/

Tighe&Bond

WORKSHOP OBJECTIVES



CRB MATRIX

Community Resilience Building Risk Matrix

www.CommunityResilienceBuilding.org

H-M-L priority for action over the Short or Long term (and Ongoing)

V = Vulnerability S = Strength

Westford's Top Natural Hazards

Nor'easters
Extreme temperatures
Other severe weather (High winds, thunderstorms, Ice storms, hurricanes/tropical storms, Blizzard, microburst)
Invasive Species

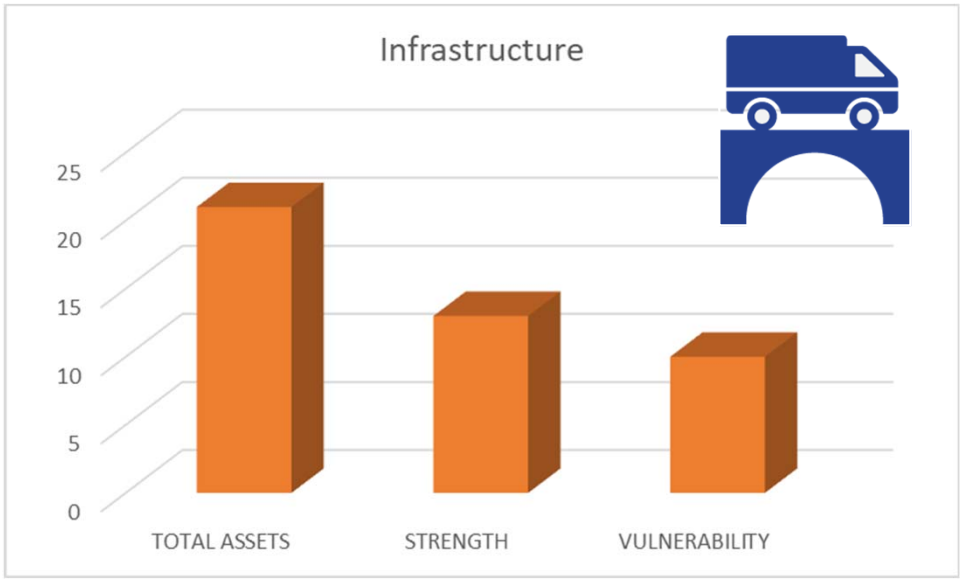
Westford's Priority Assets

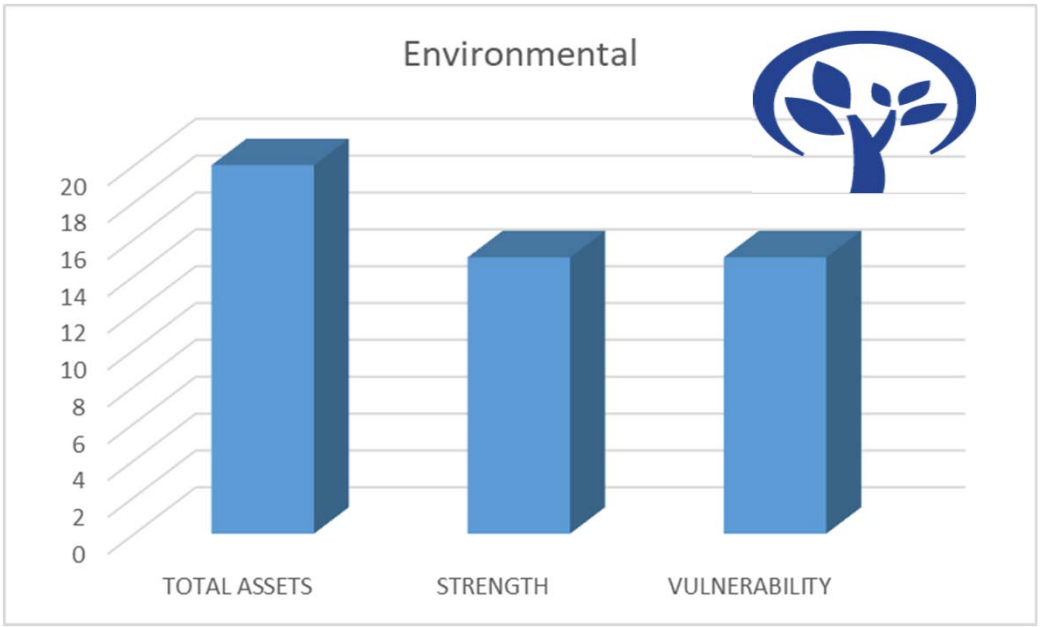
Name	Location	Ownership (Town, State,	Vulnerability (V) or Strength (S)	Actions to Address Westford's Top Hazards
Infrastructural				
Bridges	Town Farm Road Bridge, Graniteville Bridge, Bridge Street Bridge (full list in culvert project including ownership	Mixed	V - if these structures fail, inhibit passage across key locations in Town. S - provide critical emergency access routes	Assessment of DOT inspections and initiation of maintienance and repair/replacement program.
Electric Grid & National Grid	Town-wide	Private	V - when power goes out, serious impact to residences, business, emergency response. S - National Grid response	Continue their trimming programs and emergency resposne. Strategic vegetation program that considers locations of power lines. Just did plantings at Route 110 .. Right under power lines ... fast growing. Also have the high tension wires across town and this is a different system and department within national grid.
Culverts	Keyes Brook Culvert, Vine Brook Culvert, Town wide	Town	S - allow water to travel through Town and reduce flooding. V - when fail, impede transportation	Initiatiation of miantenance /repair replalcemnet program
Roads		Town	V - if fail, environmental impacts and potential for property damage (more for culverts than roads)	Proactive maintenance of roadways.
Gas infrastructure, Tennesee Pipeline goes through section of Town	Town-wide, high pressure gas transmission line - crosses on southern border on Carlisle	Private		Lot of agingging gas infrastructure in Town that needs updating. Many leaks. Sometimes gets coordinated. You may have road that needs to be resurfaced in 2 years, and they have it in a 10 year plan. Typically reach out to gas company before do Town project. Make every attempt while road is open to accomodat If its just resurfacing, they don't often take advtange.
Dams	Murray Printing Company Dam, Nabnasset Lake Dam, additional public and private dams (list in SWMMP)	Mixed	V - overtopping	In March 2010, Nab Dam almost overtopped, and town had to address. Continue required DCR inspections. Implement recommended mitigation/maintenance. Couple years ago WSE did assessment of all dams. Nothing immenent, but do have some deficiencies. These need to get addressed Talk about climate change. ONly three public dams, none of the private dams. Private dams - are these liabilities to Town? This is a risk (move to V). Town has limited ability to control the private locations (greystone doesn't meet state's criteria). Dam located wtihin Mill itself that controls the canal (Penstock (SP)) in Abbot Mill complex. Has a direct effect - if fails, dam is overwhelmed, that water is going to drain the lake and upstream watershed. Education and outreach - need to make sure private dam owners are complying, coordination with state agencies. Follow up with dam group (jennie) about funding. EAPs developed recently for three dams.
Schools	Multiple locations		S - some schools provide shelter space	(Education about hazards and vulerabilities falls under first workshop)

TOWN OF WESTFORD · INCORPORATED SEPT. 23, 1729 ·

Tighe&Bond

IDENTIFIED STRENGTHS AND VULNERABILITIES





Tighe&Bond

MITIGATION STRATEGIES

Tighe&Bond

TYPES OF MITIGATION ACTIONS

Prevention

Property Protection

Public Education and Awareness

Natural Resource Protection and Green Infrastructure

Structural Projects

Emergency Services Protection

EXAMPLE MITIGATION ACTIONS IN WESTFORD

- **Prevention**
  - Perform preventative maintenance on roadways, bridges, and culverts
- **Public Education and Awareness**
  - Use public access channels, focus on what residents can do to mitigate hazards on their property and be prepared for hazards that cannot be mitigated
- **Natural Resource Protection**
  - Land acquisition for flood mitigation
  - Implement a tree inventory and planting program
- **Structural Projects**
  - Update aging/leaking gas infrastructure
- **Emergency Services Protection**
  - Install generators to increase shelters/warming centers

Full list available in draft MVP Report on website

WHAT'S NEXT?

Tighe&Bond

NEXT STEPS BEFORE JUNE 30, 2020

- **Complete** MVP Post-Webinar Survey
- **DRAFT** MVP Summary of Findings Report online for public review
- Submit comments to Rebecca Cheney by **June 26th**
- **Final** MVP Summary of Findings Report
- Submit documents to EEA

Tighe&Bond

MVP ACTION GRANT OPPORTUNITIES

Tighe&Bond

MVP ACTION GRANTS

- 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

* Most common project type

** Second-most common project type

***Third-most common project type

Tighe&Bond

MVP ACTION GRANTS (CONT)

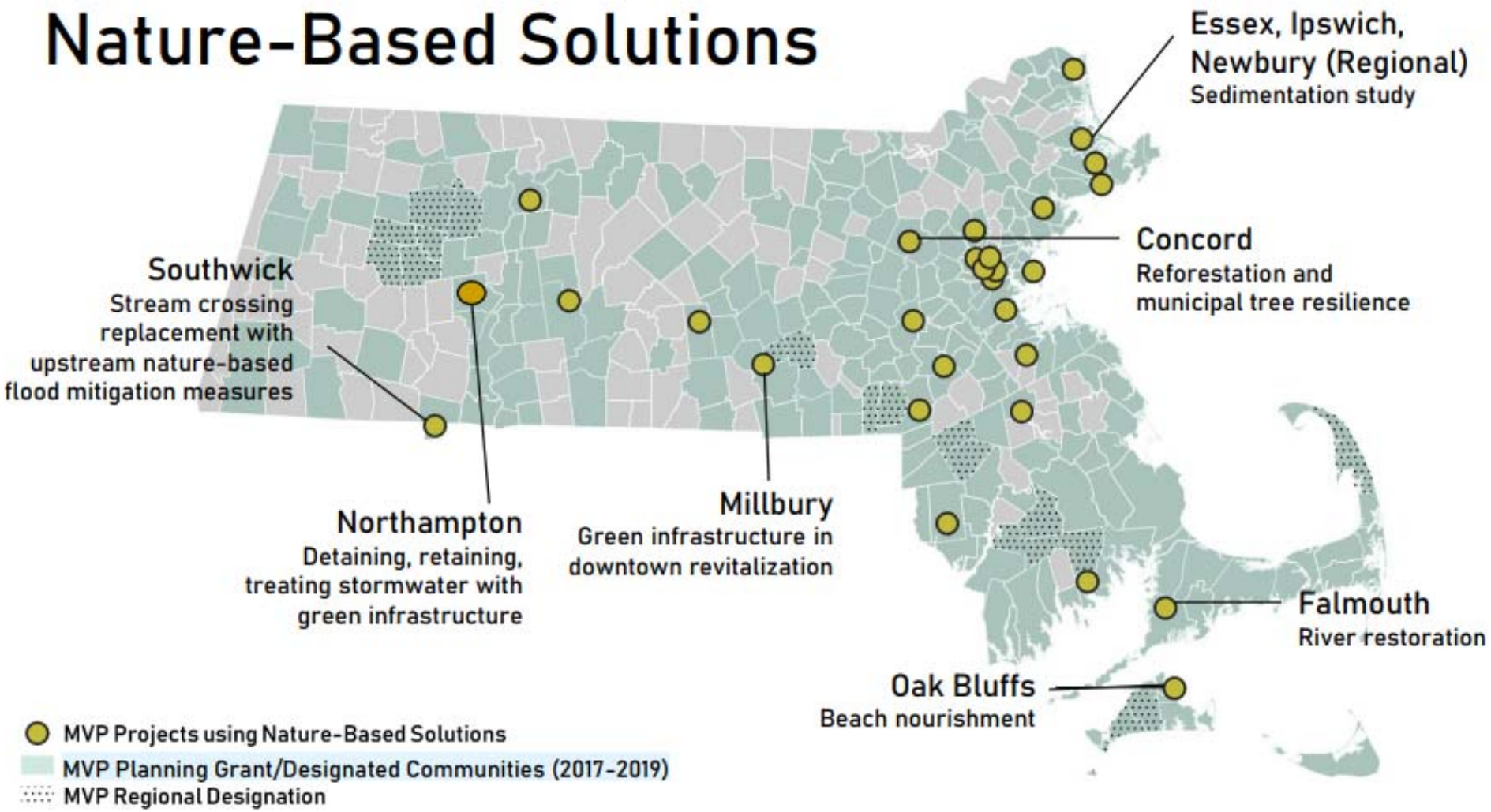
- Nature-Based Solutions to Reduce Vulnerability to other Climate Change Impacts
- Ecological Restoration and Habitat Management to Increase Resiliency

NEW IN 2019

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

\+ Expanded eligibility of project location

Nature-Based Solutions



Tighe&Bond

FOR MORE INFORMATION

- **Rebecca Cheney, City Planner**
  - rcheney@westfordma.gov
  - 978.399.2577
- **Gabrielle Belfit, CFM, Senior Environmental Scientist Scientist**
  - GCBelfit@tighebond.com
  - 508.304.6362
- **Jennie Moonan, PE, Project Manager**
  - JSMoonan@tighebond.com
  - 781.708.9826

- **https://www.westfordma.gov/1309/Municiple-Vulnerability-Preparedness-Pla**

Tighe&Bond

AND NOW FOR QUESTIONS AND ANSWERS

Westford Listening Session Notes

Attendees

Henry Fontaine

Jennie Moonan, Tighe & Bond

Kristin Dippold, Tighe & Bond

Paul Starratt

Rebecca Cheney, Westford Town Planner

Kathy Lynch

Matthew Salem

Emily Teller

Susan Thomas

Additional Matrix Information

- Cameron Senior Center – Great resource that called everyone over 65 regarding COVID-19 – They provide communication, meals once a month to celebrate birthdays

Mitigation Action Discussion

Prevention:

- Some towns are banning new gas hook ups and are switching to electric only – which is largely in communities that are fully built out. Minimize infrastructure barriers to non-petroleum sources, in Westford may be other options instead of electrical only – maybe heat pumps, which would take you off natural gas/oil. State program provides loans for heat pumps, apply through MassSave.
- Zoning Board of Appeals Meeting – there is new development in Westford, including large apartments by ski area and the 99. One development was approved (21 units) in previously undeveloped area but are struggling to approve 4 units within a previously developed site.
    - The Town should prioritize places to develop – prioritize development in previously developed sites – would require huge education effort for ZBA members and Planning and Conservation.
- They have an Open Space bylaw, but it is outdated and could be improved. They would like to create Natural Resource Overlay Districts. There would be metrics within the zoning bylaws that categories the developability of land, which relates to the number of units a developer may be able to put on a property.
- Westford Climate Action Committee – Talk about requiring LEED Certification/use of solar panels/less destructive or wasteful building materials in new development and municipal buildings. Introduce a code that enhances the town's sustainability efforts
- Water Department/Water Commissioner have jurisdiction over wells through Water Protection Overlay District – They have land rights and development rights – jurisdiction over

wells/aquifers/IWPAs/Zone IIs. Septic is defined by state standards and are some of the most restrictive in the country.

- Map Native American sites in Westford – map and put in Town's GIS – there are some ceremonial sites in Westford. Get on Planning Board's radar for future projects and mapping. There is a site off of Route 40 (these lands may be private). There is also a Native American Women's Fertility Site (stone circle) that was revealed when Grassy Pond went dry. This is something to add to the asset inventory, but make sure that location detail is not expressed.

Property Protection

- Looking to move the IT department to the new Center Building. Currently, the IT Department is in an inadequate building.

Education:

- Partner with local nurseries to provide education on invasive species and push for a focus on native species. There is a huge gap on education here – even the gardeners in town do not have a clear understanding of native versus invasive
    - Lawn maintenance should also be discussed in education – organic lawn design/maintenance, the impacts of fertilizer, mowing education to protect pollinators (This could also be a workshop through the Middlesex Conservation District).
    - A conservation trust parcel was getting mowed and it was not the appropriate time to be mowing that land.
    - Water Department (Mark Warren/Chip Osborne) has hosted organic lawncare education in the past – reach out to him again.
- Provide education to ZBA members, developers, planning, and conservation on how the Town can better prioritize areas of development
- Cameron Senior Center had called residents over 65 and educated them on the COVID-19 crisis – maintaining this chain of communication is vital for the future. They should not be the only agency in town that is connecting with the elderly population.
- Educate the public on the AM station that is activated during emergencies. The frequency is not well known, and there are residents that do not have computers/tablets/cell phones/etc
    - The radio does not need to be charged, in an elongated power outage, devises would have to be charged in a car or accessing the library which is challenging for less mobile residents. The radio is universal.
- Reverse 911 is not widely used, but the Town has the capability to use it. The Town only likes to use this in true emergencies. Using this function regularly is expensive. Its beneficial to restrict use so that people really pay attention to it when it is used.
- Provide sustainability education, conservation and environmental stewardship to students

Natural Resource Protection:

- Allocate more resources towards the Tree Warden position and Tree Planting Program.
- There was recently a tree harvesting study – Fund a program. Revisit this with Susan Thomas.
- Require developers to plant more and bigger trees. Require trees to be replaced if they fail/fall.
- Identify and protect wildlife corridors and map them. These corridors should be protected. Wildlife corridor in culverts and the Town has followed the Stream Crossing Guidelines (for example – they replaced a 30" pipe with a 12' bridge)

- Some people have installed homemade signs regarding turtle crossing

Structural Projects:

- Placing utilities underground would be beneficial on multiple fronts – It is very expensive and underground utilities also have their own maintenance issues – pros and cons to overhead and underground utilities

Emergency Services Protection:

- Police in Westford are proactive about protecting vulnerability citizens and have a system in place for brining home safety with minimal communication
- Have a cooperative agreement with abutting communities regarding firefighters, ambulance, and EMTs

Town of Westford MVP

Mitigation Actions from Workshops

Listening Session Notes

Prevention: Prevention actions are intended to address future development and guide development away from natural hazards. Many of the hazards that impact the region can be reduced by addressing them upfront through code enforcement and regulatory measures. Prevention activities include planning, zoning, building ordinances, subdivision regulations, and requirements to bury utilities.

- Amend zoning bylaws to address heat island effects and increase resiliency by adjusting planting requirements (e.g., native plants, less grass, etc.).
- Update local code for historic properties that would apply if building was renovated or damaged to include natural hazard resiliency considerations.
- For bridges, assessment of MassDOT inspections and initiation of maintenance and repair/replacement program.
- Develop a strategic vegetation program that considers locations of power lines.
- Continue to require inspections of dams (both public and private).
- Create a "Ranger" position that will support management and maintenance of conservation lands, trails, and open space.
    - Discussion items:
        - Banning gas hookups for new construction?
        - Minimize infrastructure barriers to switch to non-petroleum sources, in Westford may be other options instead of electrical only. Heat pumps. Challenges with older houses and cooling.
        - State program provides loans for heat pumps, apply through MassSave
        - Zoning Board of appeals meeting – new development in Westford, not to mention large apartments just constructed by upper
        - One development for 21 houses was approved in previously undeveloped area, many units, and struggling to approve 4 units on previous site – create prioritization across Town about better places to develop (i.e., previously developed sites). Would require huge educational effort for ZBA members and developers, and planning and conservation.
            - Do have an open space residential bylaw, may be outdated, and could be updated like other communities have (Mass Audubon), create natural resource overlay district. It's not the same as prioritizing, but there are metrics in zoning bylaw that would categorize the buildability / developability of land.
            - Talk about requiring LEED Certification or use of solar, or less destructive/wasteful materials… codify if become more sustainable (Was Westford Climate Action group)
        - Juniper Hill project – water dept & commissioners have jurisdiction over wells and aquifers/IWPAs/Zone IIs. Septic is defined by state standards. Town has review processes, including Engineering review.
        - Ceremonial Native American sites in Westford? Map and put in Town's GIS? Get in Planning Boards radar for future projects. Historical committee, Jeff Hall. Some of these lands may be private. Stone circle revealed when Grassy Pond when dry may be a Native American fertility circle.

Property Protection: Property protection actions address individual buildings and reduce risk through modification. Activities include acquisition, building relocation, building elevation, retrofitting, barriers, flood-proofing, utility relocation or flood-proofing, and insurance.

- The Highway Department facility was constructed with only one entrance. If the adjacent property became available, could purchase and add second access. It would be beneficial to increase fuel storage for redundancy for all Town vehicles. Currently only fueling station located at Highway Facility and some other vehicles uses. Fuel will not deliver to facility if there is snow on the ground or predicted for that day, and will not deliver fuel if there are thunderstorms.
- Evaluate Highway Department Building lightening suppression system.
    - Discussion:
        - Proposed new center building – looking to move IT Department

Public Education and Awareness: Public education and awareness actions will inform and remind the public about natural hazards and actions that can be taken to avoid potential damage and injury resulting from a hazard. Activities include providing informational mailings or workshops, community outreach, real estate disclosure of hazards, environmental education, and technical assistance provided on disaster management issues.

- For elderly population, especially those living alone, improve contact and communication if sheltering is required with an extended power outage. Provide or communicate meal service.
    - Discussion:
        - Cameron senior center staff (town had called residents over 65 at start of COVID.
        - The staff are on top of period meal service.
- For all population, especially vulnerable populations, provide education about alternative communication methods (e.g. radio).
    - Discussion:
        - Is there a local station? Yes, there is an AM station that is activated during emergencies. What is frequency?
        - We all assume we can charge devices, but could be out of power for many days. Leaves you with driving your car to devices or accessing library. Less mobile people would find this challenging… radio becomes universal.
        - There are residents that don't have great computer access.
        - Reverse 911 – Town has it (CODE RED), but not heavily used. This is expensive and Westford is strategic about use. Value in restricting use of this and people then pay attention to it.

- Provide information to caregivers of special needs, elderly, other vulnerable populations about what to do, resources during natural hazards. Provide that information in multiple languages.
- Coordinate with schools to provide education to students on natural hazards, vulnerabilities, and resiliency.
    - Discussion:
        - Sustainability education, environmental stewardship.
- Educate private dam owners on inspection, maintenance.
    - Discussion items:
        - Lawn maintenance education (organic lawn design and maintenance). Enhancing education on impacts of fertilizer.
        - Education on mowing schedules and other alternatives on private

property to protect pollinators and species. Consider doing a workshop in Town.
        - Re-reach out to Mark Warren – water department has hosted organic lawncare (Chip Osborne).
    - Discussion items:
        - One development for 21 houses was approved in previously undeveloped area, many units, and struggling to approve 4 units on previous site – create prioritization across Town about better places to develop (i.e., previously developed sites). Would require huge educational effort for ZBA members and developers, and planning and conservation.
        - Native plants & educational efforts. Partner with local nurseries to provide education on non-natives and invasive, there is still a huge gap in people's understanding about species in their yard or at greenhouses.

Natural Resource Protection: Natural resource protection reduces the intensity of hazard effects and improves the quality of the environment. Activities include preservation or restoration of natural systems, open space preservation, state and local floodplain and wetland regulations, stormwater management, watershed protection measures and best management practices, and soil erosion and sediment control.

- For higher density areas (e.g., villages), add trees and stormwater improvements.
    - Discussion:
        - Town has a tree warden already. Allocate more resources to the Tree Warden and planting program.
        - Study about tree harvesting that was released recently. Change carbon sequestration, but if more resources, could do something more. Revisit this with susan.
        - Require developers to plant more and bigger trees and ensure replacement if trees fail.
        - Identify and protect wildlife corridors. Map them. Not encouraging them to interact with people or roads. Buying land? Protecting them.
        - Wildlife corridor in culverts. Critter crossings are used sometimes. ACE Hardware on Groton Road, replaced culvert 30" pipe now 12' bridge, meet stream crossing guidelines.

Structural Projects: Structural projects are actions that control the hazard and directly protect people and property. Such activities include construction and maintenance of berms, dams, floodwalls, channel improvements, drainage improvements, and detention/retention basins.

- Initiate maintenance and repair program for culverts.
- Proactively maintain roadways.
- Implement recommendations of stormwater management master plan, including installation of stormwater best management practices.
    - Discussion:
        - Putting utilities underground to address issues due to downed wires. Extremely expensive to retrofit. Underground utilities can be impacted by wet conditions (pros and cons either way).

Emergency Services Protection: Emergency services protection actions are aimed at protecting emergency services before, during and immediately after an occurrence. Activities include hazard recognition, emergency warning systems, emergency response training, evacuation planning, protection of critical facilities, protection of public facilities, and health and safety maintenance.

- For elderly population, especially those living alone, providing transportation to support people getting to food pantry.
- For elderly care and nursing home facilities, keep inventory of facilities updated, enhance communication on planning, provide assistance with planning. Consider methods to strengthen planning for these facilities and coordination with Town. In addition to communication, understand what services they use related to emergency response.
- Fine tune communication plan related to social media and homeowner/subdivision networks to be strategic for natural hazards.
    - Discussion:
        - Asset: Police in Westford are very proactive about protecting vulnerable citizens (e.g. Alzheimer's), have a system in place for bringing home safety with minimal communication.
        - Does Town have own ambulance and EMTs? All firefighters are EMTs. Have cooperative agreement with abutting communities.

Last input

Town of Westford
PLANNING BOARD
Town Hall, 55 Main Street
Westford, Massachusetts 01886
(978) 692-5524 · Fax: (978) 399-2732

MEETING AGENDA
May 18, 2020
7:30 PM Meeting
Via webinar
Please see instructions for participation below

Open Forum

General Business

A. 2020 Hazard Mitigation Plan Update Presentation – Tighe & Bond
The Town of Westford is pleased to share a brief presentation on our community's commitment to creating local resiliency to weather events such as extreme precipitation and flooding, blizzards, drought, and other natural hazards coupled with climate change. Westford was awarded grant funding by the Executive Office of Energy and Environmental Affairs to complete a Community Resilience Building workshop process and prepare a Town-specific Hazard Mitigation Plan update. This presentation will explain the scope of the grant work, review natural hazards that impact Westford and the risk and vulnerability of our facilities, infrastructure, vulnerable populations, and natural resources, and provide an opportunity for your input and questions.

Public Hearing Items

1. PB 1923 DEF SUB SP OSRD SWM – 73 Nutting Road "Wendell Place"
*Public hearing to consider the application of **Kathleen Coyle and William Perry** for approval of a **Definitive Subdivision Plan** in accordance with **Section 218-11 of the Subdivision Rules and Regulations**, a **Special Permit** for an **Open Space Residential Development** in accordance with **Section 7.1 of the Zoning Bylaw**, and a **Stormwater Management Permit** in accordance with **Chapter 147 of the Town of Westford General Bylaws** and any other permit or relief as may be required under the Town of Westford Subdivision and/or Zoning Bylaws in order to create a twenty-three (23) lot subdivision (Wendell Place). The subject property includes five parcels and is located at **73 Nutting Road** and are identified as Assessor's Map 036 Parcels 0024, 0026, 0027, 0028, and 0029 and lies within the Residence A Zoning District.*

Continued from:
July 15, 2019
September 9, 2019
October 7, 2019 (No discussion)
October 21, 2019 (No discussion)
November 4, 2019 (No discussion)
November 18, 2019 (No discussion)
December 2, 2019 (No discussion)
December 16, 2019 (No discussion)
January 6, 2020 (No discussion)
February 3, 2020 (No discussion)
March 2, 2020 (No discussion)

March 16, 2020 (No discussion – meeting canceled)
May 4, 2020

2. **PB 2017 MOD DEF SUB – St. Augustine Drive**
*Public hearing to consider the application of **Connell Real Estate Trust** for a **Modification to a Definitive Subdivision Plan** in accordance with Section 218-11 of the Subdivision Rules and Regulations to modify a previously approved definitive subdivision to upgrade a portion of the St. Augustine roadway from a minor street to a secondary street to provide improved access to an adjoining subdivision, and to request additional waivers from the construction standards including slopes, tree planting and sidewalks (and any other waivers as may be required under the Town of Westford Subdivision Rules and Regulations). The subject property is identified as **St. Augustine Drive** and lies within the Residence A (RA) zoning district.*

Continued from: *April 6, 2020*
May 4, 2020

The Applicant has requested postponement without discussion to June 1, 2020

3. **PB 2014 PRE SP OSRD – 0, 19, 33 & 35 Hartford Road**
*Public hearing to consider the application of **KMR Real Estate, LLC** for a for a **Preliminary Subdivision Plan Review** in accordance with **Section 218-11 of the Subdivision Rules and Regulations, and** a **Special Permit** for an **Open Space Residential Development** in accordance with **Section 7.2 of the Westford Zoning Bylaw** in order to create a subdivision with up to nine (9) lots (and any other permit or relief as may be required under the Town of Westford Zoning or General Bylaws). The subject properties are located at 0, 19, 33 & 35 Hartford Road and identified as Assessor's Map 020 Parcel 0076 Lot 0000, Map 020 Parcel 0075 Lot 0001, Map 020 Parcel 0074 Lot 0007 and Map 020 Parcel 0074 Lot 0008 and located in the Residence A (RA) zoning district.*

Continued from: *March 16, 2020 (No discussion – meeting canceled)*
April 6, 2020
May 4, 2020 (No discussion)

General Business continued

B. **41 & 43 Lowell Road (DHD Adams Realty Trust) – Lots 2 and 3 on Plan Book 245 Plan 143**
Discuss proposal to sell and convert two lots subject to M.G.L. Chapter 61A to residential use and possible recommendation regarding the Town's right of first refusal to purchase

C. **BOA 2010 VAR – 0 & 37 Carlisle Road**
Non-binding discussion regarding an application to the Board of Appeals by SMurph, LLC for a Variance to allow more than one principal structure per lot (23 dwellings on 2 lots). The property is located at 0 & 37 Carlisle Road in the Residence A Zoning District

Correspondence, Reports and Updates

Instructions for participation:

Options available to access the Planning Board meeting remotely:

1. Register to watch the meeting through the GotoWebinar website at: https://attendee.gotowebinar.com/register/971738887793286157 After registering, you will receive a confirmation email. There are basic instructions on how to use GoToWebinar available at: **https://www.youtube.com/watch?v=IQ3Xwwgbd8Y**

2. You may call in and listen on any phone (landline or cellphone) by dialing +1 (415) 655-0060 and using meeting code 209-554-447.

3. WCAT will record the meeting and it will be available within a few days of the meeting date. Please see their website for more details: **https://www.westfordcat.org/**

If you do not have access to one of these methods of participation, please submit written comments to Rebecca Cheney, Town Planner, rcheney@westfordma.gov by 3 pm on May 18, 2020.

If any member of the public wishing to attend this meeting seeks special accommodations in accordance with the Americans with Disabilities Act, please contact the Permitting Department at (978) 692-5524 or email etoothaker@westfordma.gov

WESTFORD HAZARD MITIGATION AND MUNICIPAL VULNERABILITY PREPAREDNESS PLANNING

Public Meeting

May 18, 2020 7:30 to 8 PM

Tighe&Bond

WELCOME

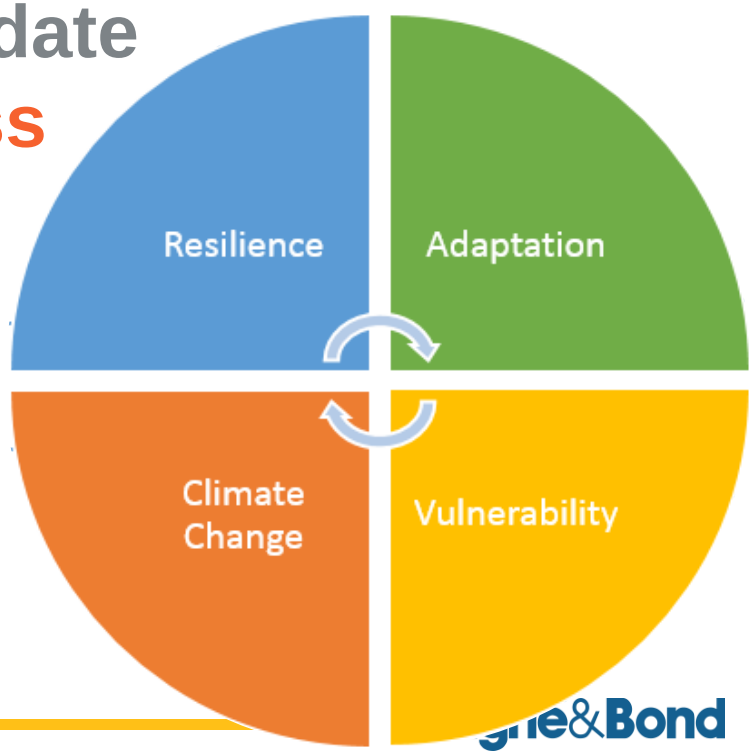
Westford awarded $36K grant for

- Municipal Vulnerability Preparedness (MVP) Community Resilience Building (CRB) Workshop Process; and
- Draft Hazard Mitigation Plan (HMP) Update

First step in unlocking additional funding opportunities for Westford from FEMA/MEMA and Commonwealth of Massachusetts

MVP/HMP GRANT AND CRB PROCESS

1. Establish Core Team
2. Complete Evaluation/Assessment
   - Natural Hazard Risks
   - Community Assets
   - Multi-Hazard Vulnerability Assessment
   - Capabilities Assessment
   - Mitigation Strategies
3. Draft Hazard Mitigation Plan Update
4. Hold Public Meeting mid-process
5. Hold MVP Workshops
6. Draft MVP Report
7. Hold Listening Session
8. Final MVP Report



PURPOSE OF PUBLIC MEETING

- **Required** to comply with Federal HMP guidance and contract with EEA
- **Introduce Hazard Mitigation and Municipal Vulnerability Planning** and **provide an update** on work completed to date
- Provide opportunity for **Q&A**

A brief thanks to Westford's MVP Core Team

CORE TEAM

- Carol Gumbart
- Henry Fontaine
- Jeffrey Stephens
- Jeremy Downs
- Joe Targ
- Paul Fox
- Paul Starratt
- Rae Dick
- Rebecca Cheney
- Richard Barrett
- Stephen Cronin
- Tim Whitcomb

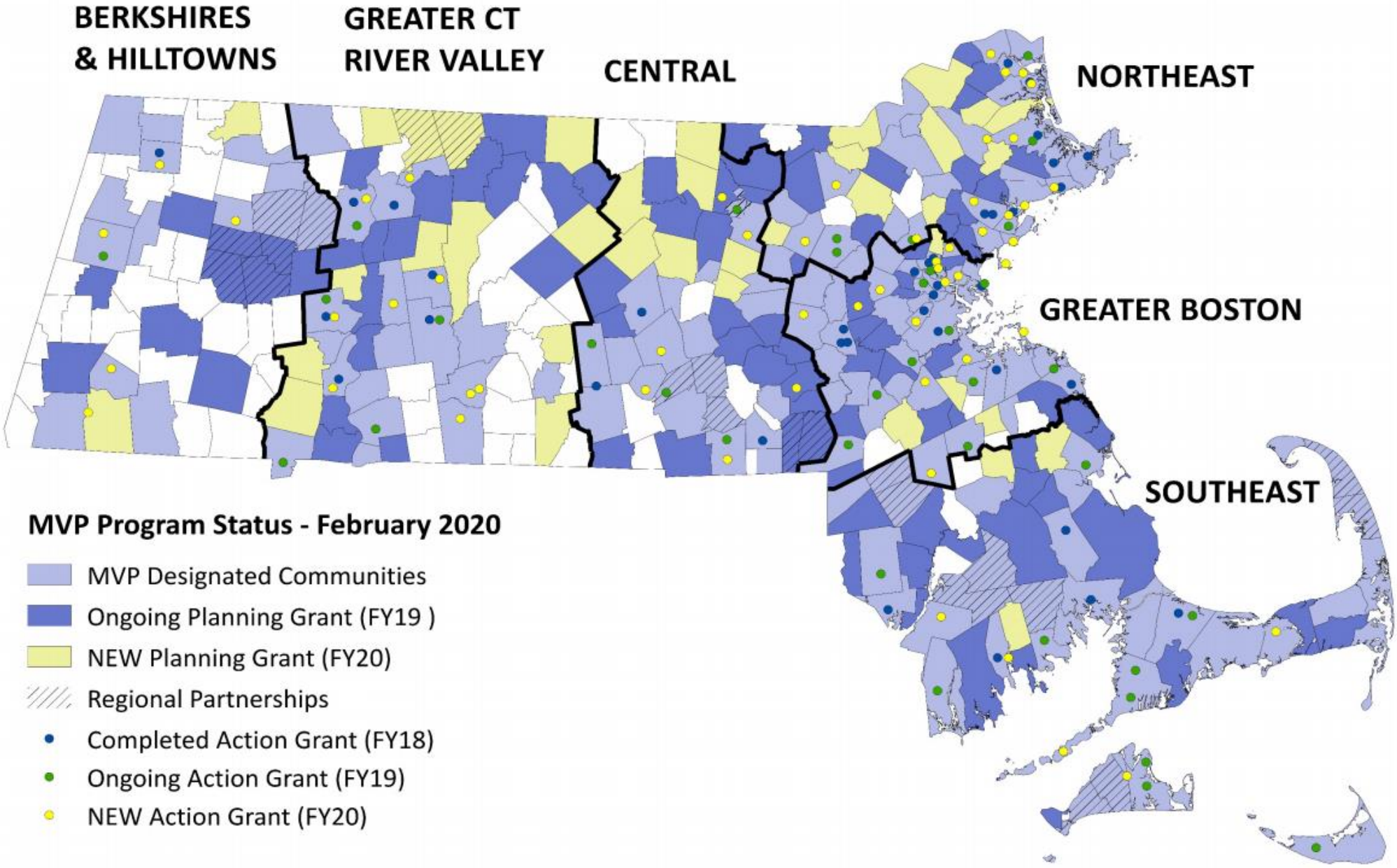
BACKGROUND

EXECUTIVE ORDER 569 9.16.16

ENVIRONMENTAL BOND BILL 8.21.18

- $2.4 billion bond bill with focus on climate change resiliency
- Over $200 million authorized for climate change adaptation
- **Codifies EO 569, including the MVP Program**

BACKGROUND

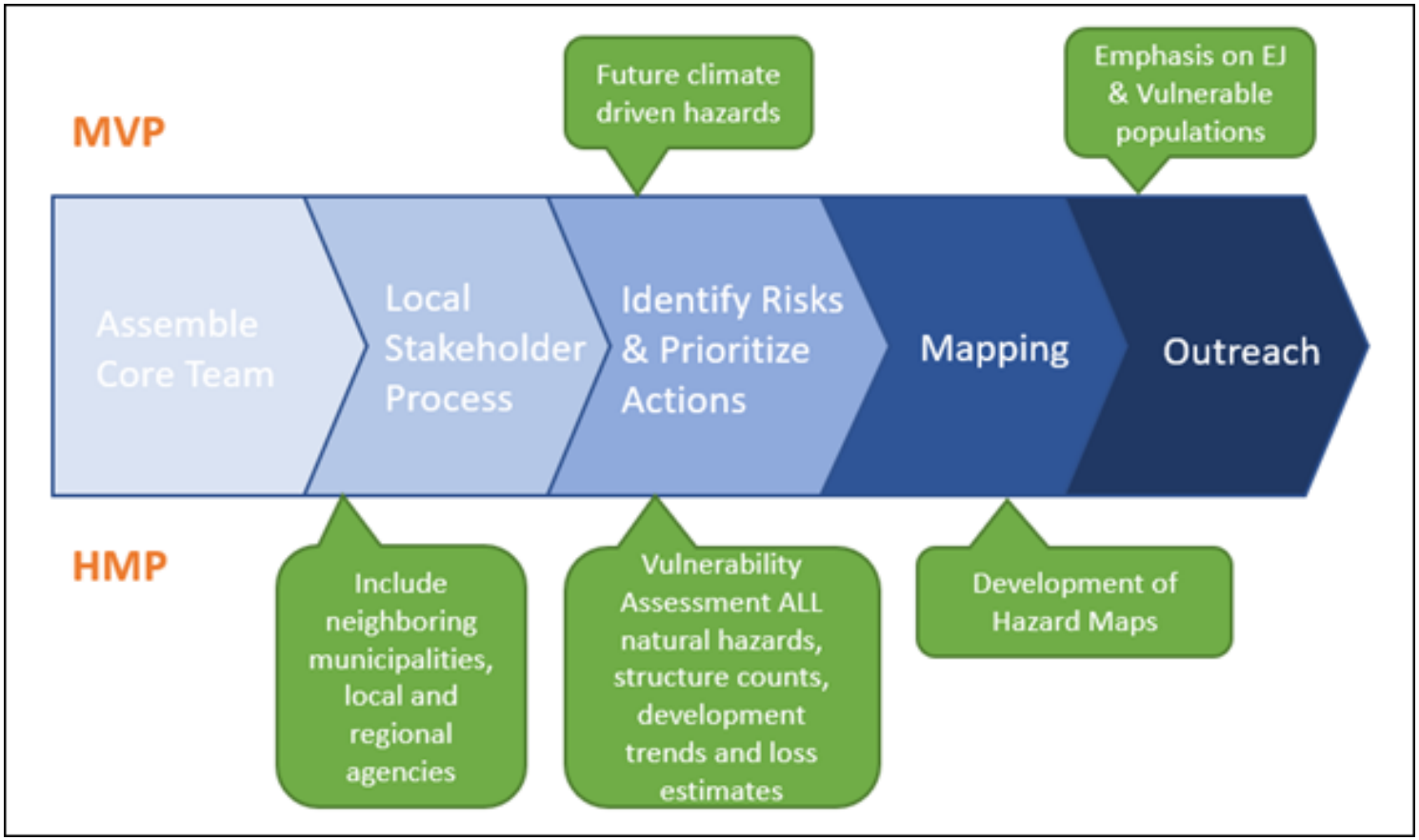

BERKSHIRES & HILLTOWNS
GREATER CT RIVER VALLEY
CENTRAL
NORTHEAST
GREATER BOSTON
SOUTHEAST
MVP Program Status - February 2020
MVP Designated Communities
Ongoing Planning Grant (FY19)
NEW Planning Grant (FY20)
Regional Partnerships
Completed Action Grant (FY18)
Ongoing Action Grant (FY19)
NEW Action Grant (FY20)

BACKGROUND ON HAZARD MITIGATION PLANNING

- **FEMA Requirements:**
  - Disaster Mitigation Act of 2000, 44 CRF Part 201.6
  - *FEMA Local Mitigation Plan Review Guidance, October 2011*
  - *FEMA Local Mitigation Planning Handbook, March 2013*
- **Westford included in Northern Middlesex Regional Hazard Mitigation Plan, approved August 2015.**
  http://www.nmcog.org/Websites/nmcog/images/Hazard_Mitigation_Plan_FEMA_approved_8_15.pdf
- **To maintain eligibility for FEMA/MEMA funding, must update plan every 5 years**
- **Commonwealth of Massachusetts State Hazard Mitigation & Climate Adaptation Plan 2018 must be considered in update**

HOW DO THE MVP AND HMP PROCESSES OVERLAP?

The MVP effort supplements the HMP process by providing a statewide and major watershed specific climate change data to use in the natural hazard risk assessment and a consistent methodology for public engagement through the Community Resilience Building (CRB) workshops.



WHY DO THIS PLANNING?

Help Westford Build Resilience and Preparedness:

- Build on the Town's existing emergency management capabilities
- Plan for more frequent and intense weather events that are linked to climate change
- Engage multiple stakeholders in the planning process
- Improve access to funding for mitigation and adaptation

COMMUNITY ASSET INVENTORY

Tighe&Bond

COMMUNITY ASSET CATEGORIES

FEMA defines a community asset as anything that is important to the character and function of a community.

FEMA Community Asset Categories	Critical Sectors	Characteristics of Community Assets
People	Schools, Vulnerable Populations, Cultural Facilities	Areas of greater population density, or population with unique vulnerabilities or less able to respond and recover during a disaster.
Built Environment	Critical Municipal Facilities, Water, Wastewater, Energy, Stormwater, Transportation, Cultural Resources	Critical facilities necessary for a community's response to and recovery from emergencies, infrastructure critical for public health and safety, economic viability, or needed for critical facilities to operate.
Economy	Marinas, Business and Industry	Major employers, primary economic sectors and commercial centers where loss or inoperability would have severe impact on the community and ability to recover from a disaster.
Natural Environment	Natural Resources	Areas that provide protective function to reduce magnitude of hazard impact and increase resiliency. Areas of sensitive habitat that are vulnerable to hazard events, protection of areas that are important to community objectives, such as the protection of sensitive habitat, provide socio-economic benefits, etc.

PEOPLE – SOCIETAL ASSETS

- Child Care (e.g. Roudenbush Children's Center, Westford KinderCare, etc.)
- Places of worship
- Cemeteries
- Emergency shelters
- Westford Food Pantry
- Historical Places
- Nursing Homes/elderly housing/elderly care
- Cameron Senior Center and Roudenbush Community Center
- J.V. Fletcher Library
- Schools
- Village at Mystery Spring
- Westford Museum
- Parish Center for the Arts

WESTFORD
FOOD PANTRY

BUILT ENVIRONMENT – INFRASTRUCTURE ASSETS

- Fire and Police facilities
- Water treatment and distribution
- Culverts (town-wide) and bridges
- Dams (private and town-owned) and bridges
- Town Hall and other municipal buildings
- Medical facilities (e.g., CVS Minute Clinic, Westford Counseling Center)
- Power grid
- Public safety communications
- Schools/town shelters

ECONOMIC ASSETS

- Banks
- Funeral Homes (Main Street, Pleasant Street)
- Gas Stations
- Supermarkets (Whole Foods, Market Basket)
- Hardware Store (ACE Hardware)
- Kimball Farm
- Nashoba Valley Ski Area
- Oil Delivery (e.g. JA Healy & Sons)
- Pharmacies (CVS, Walgreens)
- Major employers (e.g., Juniper Networks, Netscout system, etc.)
- Tree removal services
- Veterinary hospitals

ENVIRONMENTAL ASSETS

- Conservation lands and open space
- Wetlands and Waterbodies throughout town (e.g., Stony Brook, Nabnasset Lake, Forge Pond, Beaver Brook, etc.)
- Habitat (including vernal pools)
- Trails (Nashua River Trail)
- Well contribution areas
- Parks, fields (e.g. VFW softball field)
- East Boston Camps
- Beaches (Edwards and Forge Pond)

NATURAL HAZARD RISK AND VULNERABILITY ASSESSMENT

Tighe&Bond

WHAT ARE NATURAL HAZARDS?


Inland Flooding


Tsunami


Severe Winter Storm

Blizzards
Snow
Ice Storms


Drought


Average/Extreme Temperatures


Tornadoes


Landslide


Wildfires


Other Severe Weather

Nor’easters
High Wind
Heavy Precipitation
Microbursts


Hurricanes/Tropical Storms


Invasive Species


Earthquake

HISTORICAL EVENTS

- October 1963 Earthquake
  - Magnitude 4.5 earthquake
- October 1970 Tornado
  - Killed one person and caused between $50,000 and $500,000 in damages
- Winter of 1995
  - Snowfall reached over 126 inches
- May 2007 Brush/Wildland Fire
  - Spread across several acres and to a home
- December 2008 Ice Storm
  - Brought down trees and power lines
- August 2011 Hurricane Irene
  - Widespread power outage
- October 2011 Halloween Storm
  - Power out for six days

- March 2018 Nor'easter
  - Westford received over 20 inches of snow from a winter nor'easter

NATURAL HAZARD RISK INDEX

Type of Natural Hazard	History of Occurrence in Westford	Hazard Probability	Hazard Frequency	Geographic Extent	Severity of Impact	Hazard Risk Ranking
Hydrological Hazards						
Inland Flooding	Yes	2	3	1	1	7
Drought	Yes	3	2	3	2	10
Atmospheric Hazards						
Extreme Temperatures	Yes	4	3	3	2	12
Hurricanes/ Tropical Storms	Yes	2	0	3	2	7
Nor'easters	Yes	4	3	3	3	13
Other Sever Weather – High Winds and Thunder storms	Yes	4	3	3	2	12
Severe Winter Storm – Snow, Ice, and Blizzard	Yes	4	3	3	2	12
Tornadoes	Yes	1	0	1	3	5
Microburst	Yes	4	3	1	3	11
Geologic Hazards						
Earthquake	Yes	2	1	3	4	10
Other Hazards						
Wildfires	Yes	3	2	2	4	11
Invasive Species (including algae)	Yes	4	3	3	1	11

WESTFORD'S TOP HAZARDS

- **Input on past, present, and future hazards based on public perception being provided via survey:**
  - https://www.surveymonkey.com/r/8BZDR87

- **Top hazard risk ranking by Core Team:**
  - Nor'easters
  - Severe Weather (e.g. thunderstorms, high wind) & Winter storms (e.g., ice and blizzards)
  - Extreme Temperature
  - Invasive Species

AMPLIFIED RISKS

CLIMATE CHANGE

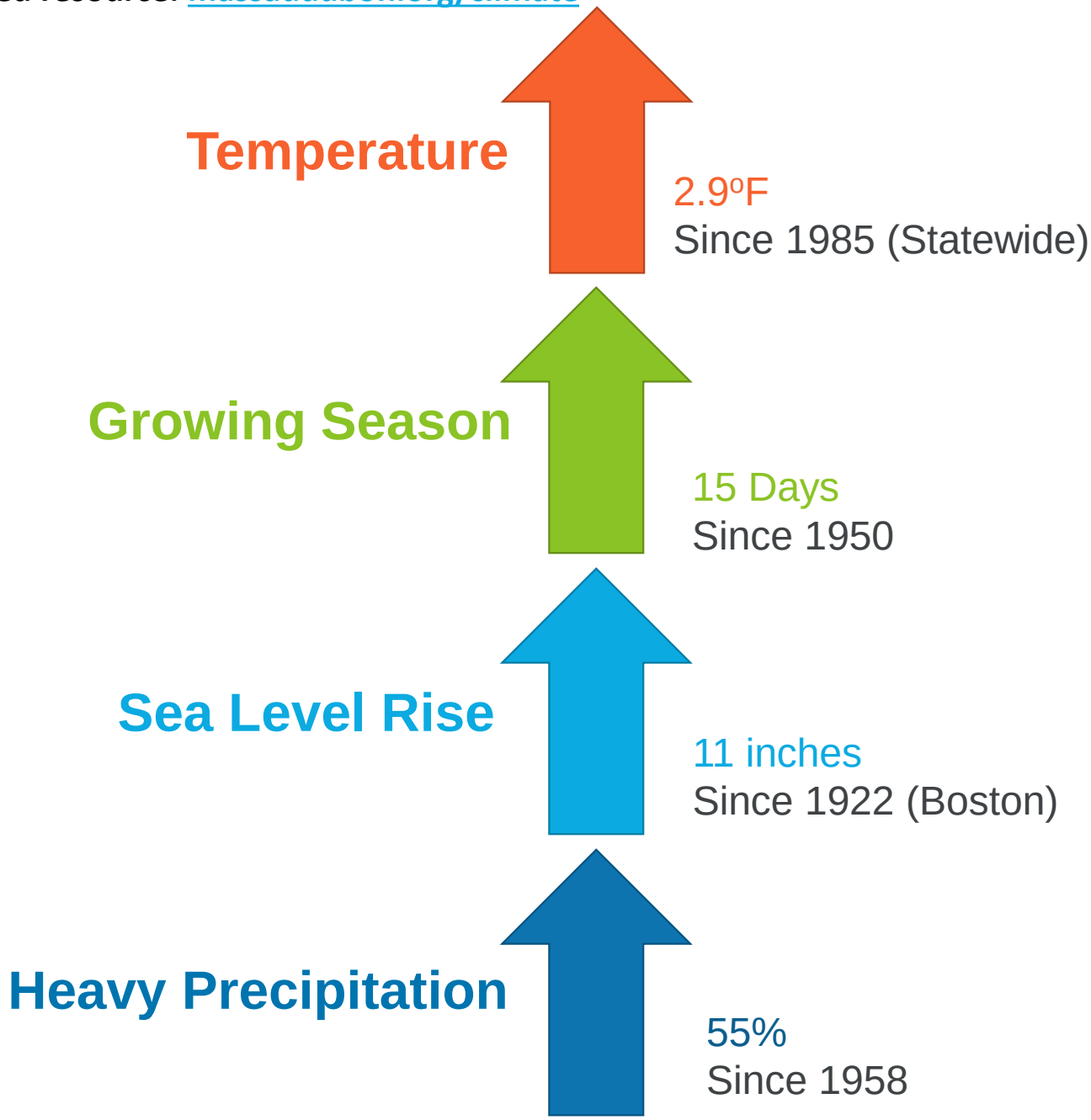
Tighe&Bond

CLIMATE CHANGE REFERENCES FOR MVP PROCESS

- **Massachusetts Integrated State Hazard Mitigation and Climate Adaptation Plan, September 2018**
  - https://www.mass.gov/service-details/massachusetts-integrated-state-hazard-mitigation-and-climate-adaptation-plan
- **Massachusetts Climate Clearinghouse**
  - https://resilientma.org/
- **Statewide and Major Watershed (Basin) Climate Change Projections**
  - https://www.mass.gov/files/ma-statewide-and-majorbasins-climate-projections-final.pdf

MASSACHUSETTS OBSERVED CLIMATE CHANGES

Recommended resource: massaudubon.org/climate



MASSACHUSETTS CLIMATE PROJECTIONS

By end of century:

Changes in precipitation

- 18% increase in consecutive dry days
- 57% increase in days with > 1 in. rainfall
- 7.3 inches additional annual rainfall

Rising temperatures

- 10.8°F increase in average annual temperature
- 42% decrease in days/year with min. temperatures < 32* F
- 1,280% increase in 90-degree days/year

Sea level rise

- 4-10.5 feet along the MA coast

Extreme weather

- Increase in frequency and magnitude

CHANGES IN PRECIPITATION

Nashua Basin		Observed Baseline 1971-2000 (Inches)	Projected Change in 2030s (Inches)	Mid-Century Projected Change in 2050s (Inches)	Projected Change in 2070s (Inches)	End of Century Projected Change in 2090s (Inches)
Total Precipitation	Annual	45.9	+0.4 to +4.9	+1.2 to +6.3	+2.3 to +7.9	+1.3 to +8.4
	Winter	11.0	-0.3 to +1.9	+0.2 to +2.5	+0.4 to +3.3	+0.6 to +4.3
	Spring	11.8	-0.0 to +2.2	+0.1 to +2.0	+0.5 to +3.0	+0.1 to +2.9
	Summer	11.3	-0.3 to +1.5	-0.3 to +2.2	-0.6 to +2.2	-1.1 to +2.2
	Fall	11.8	-1.1 to +1.1	-1.2 to +1.8	-1.6 to +1.7	-1.4 to +1.5

IMPACTS OF CHANGING PRECIPITATION

- Episodic droughts
- Concerns over food production and drinking water supply
- Stress on ecosystems
- Flooding

EXTREME STORMS

Blizzards

- There have been more than 5 in Massachusetts since 2011

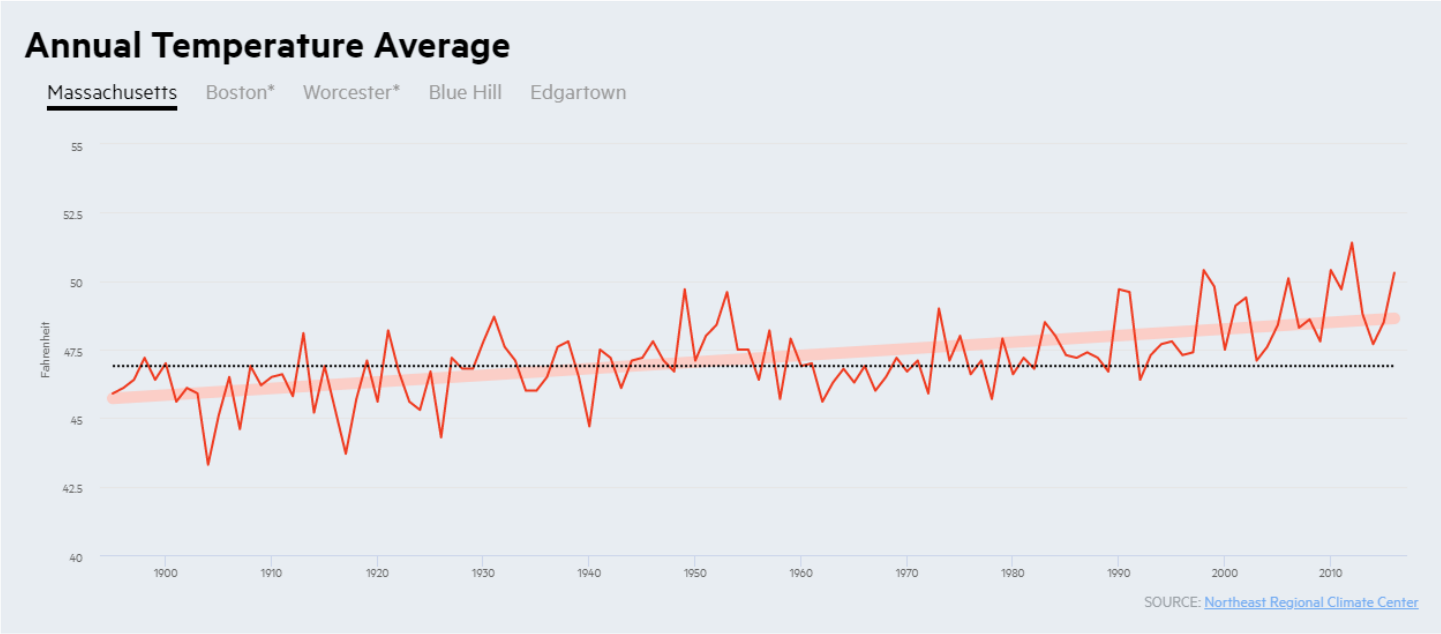
Nor'easters and Hurricanes

- Upward trend since the 1970s

IMPACTS OF EXTREME STORMS:

- **Public safety concerns, including increased injuries and mortality**
- **Economic damages and business disruption**
- **Property and infrastructure damage**
- **Natural resources**

RISING TEMPERATURE



IMPACTS OF RISING TEMPERATURE:

- Heat-related illnesses
- Vector borne-diseases
- Health of plants, animals, ecosystems
- Reduced crop production
- Larger energy demand
- Droughts and wildfires

MITIGATION STRATEGIES FOR VULNERABLE ASSETS

Tighe&Bond

TYPES OF MITIGATION ACTIONS

1. Prevention
2. Property Protection
3. Public Education and Awareness
4. Natural Resource Protection and Green Infrastructure
5. Structural Projects
6. Emergency Services Protection

MVP WORKSHOPS

In progress now

Tighe&Bond

THURSDAYS AT 10:30 AM

1. Workshop #1: 5/14/2020 on Societal Assets and People

2. Workshop #2: 5/21/2020 on Infrastructure

3. Workshop #3: 5/28/2020 on Economy

4. Workshop #4: 6/4/2020 on Environment and Natural Resources

Sign up on Town website or contact Rebecca Cheney
https://www.westfordma.gov/1309/Municiple-Vulnerability-Preparedness-Pla

WORKSHOP OBJECTIVES

- Hear from stakeholders who can help evaluate our community's strengths and vulnerabilities of residents, infrastructure, and natural resources
- Understand connections between natural hazards and local planning/mitigation efforts
- Develop and prioritize resiliency actions for the municipality, organizations, businesses, neighborhoods, and community groups
- Identify opportunities to advance actions that reduce the impact of hazards and increase resiliency in the community

Community Resilience Building
WORKSHOP GUIDE

www.CommunityResilienceBuilding.org

resilient **MA**

Climate Change Clearinghouse for the Commonwealth

ResilientMA.org

Tighe&Bond

NEXT STEPS BEFORE JUNE 30, 2020

- Complete draft Hazard Mitigation Plan for Town staff and public review
- Hold listening session
- Selectmen vote to submit Hazard Mitigation Plan to FEMA
- Submit documents to EEA and FEMA

GRANT OPPORTUNITIES

Tighe&Bond

HOW DOES THIS PROCESS BENEFIT WESTFORD?

MVP Community Designation = Eligibility for MVP Action Grants

Once approved, HMP = Eligibility for FEMA Hazard Mitigation Grants

OPEN DISCUSSION & QUESTIONS

Contact Information:

- **Rebecca Cheney, Town Planner**
  - Rcheney@westfordma.gov
  - (978) 399-2577
- **Janet Moonan, PE, Project Manager**
  - JSMoonan@tighebond.com
  - (781) 708-9826

Information on Town's website at:

- https://www.westfordma.gov/1309/Municiple-Vulnerability-Preparedness-Pla

HMP/MVP Public Meeting
Town of Westford Planning Board Meeting

ATTENDEES: Darrin Wizst, Mike Bonenfant, Jeff Morrissette, Dylan O'Connor, Janet Moonan, Tighe & Bond, Kate Hollister, Gary Lavelle, Matt Salem, Rebecca Cheney

DATE: May 28, 2020

On May 28, 2020, the HMP/MVP Process was discussed at the Town of Westford's Planning Board Meeting. The meeting was held virtually due to COVID-19 restrictions. A recording of the meeting can be found at the link below.

Meeting Summary

Janet Moonan, PE, from Tighe & Bond gave a 20 minute presentation on the HMP/MVP Process and opened the floor to discussion afterwards. Presentation is included as an attachment.

Discussion items included:

- Where to locate the HMP/MVP packet that includes survey information, mapping, general information, etc.
    - Response: Information can be located on the Town's HMP/MVP website. Additionally, a copy of the presentation will be sent after the meeting.
- How increased rainfall, storms, etc. are being taken into consideration within the Town.
    - The State has already adjusted the amount of rainfall for storm categorizations and more changes are in the works.
    - Engineering Department considers these factors when planning and reviewing projects.
- Culverts, bridges, and other projects can be considered within this funding however, nature based solutions are preferred.
- Confirmation that cell towers are listed in the assets list.
- Topics not applicable under this grant will be covered in Emergency Management Planning documents.

Meeting Recording

https://www.westfordcat.org/watch-online/government/meetings-coverage/planning-board/episode/5-18-2020-webinar

Tighe&Bond

APPENDIX H

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

Westford's Priority Assets				Westford's Top Natural Hazards Nor'easters Extreme temperatures Other severe weather (High winds, thunderstorms, Ice storms, hurricanes/tropical storms, Blizzard, microburst) Invasive Species	Priority	Time
Name	**Location**	**Ownership (Town, State, Federal, Private)**	**Vulnerability (V) or Strength (S)**		**H - M - L**	**S**hort **L**ong **O**ngoing
				Actions to Address Westford's Top Hazards		
Elderly Population	Throughout Town	Private	V - If living alone at home they may have not be able to get out as often, may need assistance to get food or assistance with evacuation S - experience of having survived many natural hazard disasters and being creative in up with solutions that are based on those experiences	Improve contact and communication if sheltering is required with an extended power outage. Provide or communicate meal service.	M	Short
Elderly Living Alone	Throughout Town	Private	S - Town has a special population registry (~111 people), most are seniors	Providing transportation to support people getting to food pantry,	M	Ongoing
Senior Center	Cameron Senior Center, Route 225	Town	S - Already has a backup generator	None identified	-	-
Minority Population	Throughout Town	Private	V - There is a significant population of specific minorities in Westford.	Need to consider population in planning and emergency preparedness.	M	Ongoing
Westford Nursing Home	Littleton Road	Private	V - staffing can be an issue during a natural hazard	Keep inventory of facilities updated, enhance communication on planning, provide assistance with planning. Consider methods to strengthen planning for these facilities and coordination with Town.	M	Ongoing
Low Income Housing, including veterans	North Street, Carlisle Road	Private	S - Provides safe housing and services during natural hazard, V - communication systems could be affected by natural hazards	In addition to communication, some coordination with services they use, about emergency response. If people don't have cell phones, internet, etc. There are situations where everyone is trying to get service and can't get through, need redundancy. Additional communication infrastructure? Cell towers.	M	Ongoing
Caregivers	Throughout Town	Private	S - help people recover from situations by providing support, V - may not be able to provide services to individuals as readily as a facility or Town	Providing information to caregivers of special needs, elderly, other vulnerable populations about what to do, resources to call. Provide that information in multiple languages if needed.	M	Short
Higher density area	Villages, cluster subdivisions (e.g., townhouse developments, apartments)	Private	V - denser areas in Town, therefore a storm could affect greater grouping of population	Potential mitigation action to add trees, stormwater improvements. Maybe amend zoning bylaw to address heat island effects and planting requirements, less grass, native plants, think about it from a resilience perspective.	H	Ongoing
Bridges by EPOC	Littleton Road	Private	V - 54 bed assisted living facility for Alzheimer's, could need extensive assistance S - Town helps them exercise plan once in a while, Facility is on a generator, and is required to have an evacuation plan and CEMP on-site.	Improve communication	M	Short
Adult day center	Various locations	Private	V - these are typically single family homes	Improve communication	M	Short
Historic districts	Five throughout town	Private/State	S - areas give Westford important historic character, help with property values. V - old buildings not designed for specific natural hazards	Updating local code that would apply if a building was being renovated or was damaged to consider mitigation of natural hazards and ADA compliant.	L	Long
Communication Network	Facebook	Private	S - helps different groups receive information, neighbor helping neighbor type network. There's a lot of platforms including social media, ties into different populations and churches. We have platforms like carrot connection. A lot of people do communicate. There are disadvantages (e.g. Hanover Westford), it's 400 apartments and whole community. Westford does not have town-wide list service. Town has reverse RAID. May be able to connect with folks on the management team for those developments (may have something internal). When paving in subdivision, all have homeowners/subdivision network, and want to expand a way of communicating - reaching out to everyone in community, even if have small network, could email, instead of answer phone.	Fine tune communication plan to be strategic for natural hazards.	M	Short
Churches	Various locations	Private	S - help people recover from situations by providing support and networking, and sometimes provide space. Typically these are not used as shelters (e.g. backup power doesn't exist). They are a strength and can offer individual families resources.	None identified	-	-
Shelters	Blanchard School/ Cameron Senior Center	Town	S - have used Senior Center overnight, can house 30 people, after that scale up and use a school	Maintain these facilities and communication about their availability.	M	Ongoing
Westford Food Pantry	20 Pleasant Street	Town	S - provides food during natural hazards	Coordinate with food pantry to determine if they have plans during severe weather/etc.	M	Ongoing
Westford Community Garden	Graniteville Road	Town	S - provide food during natural hazards. Water available to site, and electricity to pump. Scouts have made shelter to get out sun.	Could be education around community garden and other gardens around town, to plant drought resistant plants or native plants.	M	Ongoing
Medical Reserve Core	Based out of Westford	State/Federal	S - 520 person volunteer person, serves both medical and non-medical needs. 2/3 of them are medical-related volunteers. Range anywhere from doctor to nurse practitioners, coordinated by Town, serve seven communities (Lowell Chelmsford, Dracut, Billerica, Tyngsboro and Tewksbury). V - That group can always use resources - isn't a large budget to support MRC. Funded by medical reserve core funds, state and feds, and donations and grants.	Continue to support program.	H	Ongoing
Group homes	77 Graniteville Road, Line Road, Plain Road, Around Nab	Private	S - Town requires coordination with facilities during response activities	Improve communication	M	Ongoing
Bridges	Town Farm Road Bridge, Graniteville Bridge, Bridge Street Bridge (full list in culvert project including ownership	Mixed	V - if these structures fail, inhibit passage across key locations in Town. S - provide critical emergency access routes	Assessment of DOT inspections and initiation of maintenance and repair/replacement program.	M	Ongoing
Electric Grid & National Grid	Town-wide	Private	V - when power goes out, serious impact to residences, business, emergency response. S - National Grid response	Continue their trimming programs and emergency response. Strategic vegetation program that considers locations of power lines.	M	Short
Culverts	Keyes Brook Culvert, Vine Brook Culvert, Town wide	Town	S - allow water to travel through Town and reduce flooding, V - when fail, impede transportation	Initialization of maintenance /repair replacement program	H	Short
Roads	Town-wide	Town	V - if fail, environmental impacts and potential for property damage (more for culverts than roads)	Proactive maintenance of roadways.	H	Ongoing
Gas infrastructure, Tennessee Pipeline goes through section of Town	Town-wide, high pressure gas transmission line - crosses on southern border on Carlisle	Private	V - Lot of aging gas infrastructure in Town that needs updating. Many leaks.	Continue to attempt coordination with roadway and water work. Town typically reaches out to gas company before do Town project. Make every attempt while road is open to accommodate. If its just resurfacing, gas company may not take advantage.	H	Ongoing
Dams	Murray Printing Company Dam, Nabnasset Lake Dam, additional public and private dams (list in SWMMP)	Mixed	V - overtopping. In March 2010, Nab Dam almost overtopped, and town had to address. Couple years ago consultant did assessment of all three town-owned dams. Nothing imminent, but do have some deficiencies. These need to get addressed. Need to consider climate change. Emergency Action Plans developed/updated recently. V - Private dams - are liabilities to Town. Town has limited ability to control the private locations (Greystone doesn't meet state's criteria), dam located within Mill itself that controls the canal in Abbot Mill complex has a direct effect - if fails, dam is overwhelmed, that water is going to drain the lake and upstream watershed.	Continue required DCR inspections. Implement recommended mitigation/maintenance. Education and outreach - need to make sure private dam owners are complying, coordination with state agencies.	H/M	Ongoing
Schools	Multiple locations	Town	S - some schools provide shelter space	Education about hazards and vulnerabilities	L	Long
Police Central Station	53 Main Street	Town	S - Dispatch center is located at this facility. Recently combined fire and police into central dispatch. this site provides emergency response V - Generator is holding up pretty well, it's on capital replacement plan, and discussed addressing during future building projects. Agreed it is a major component needed to support operations.	Maintain facility.	H	Ongoing
Fire Department	65 Boston Road, Nab. Fire Station on Oak Hill Road, Rogers Fire 39 Town Farm Road	Town	S - provides emergency response	Continue to work on upgrades to emergency communications receiver and transmitters. FCC is supposed to come up with a relocation plan for t-band spectrum channels that affect fire and police by February 2021 unless they extend the date or there is legislation to prevent this from happening. Monitor situation	H	Ongoing
Highway Department	28 North Street	Town	S - provides response to natural hazards	Only built with one entrance - would be ideal if adjacent property became available to add second access. Beneficial to increase fuel storage for redundancy for all Town vehicles. Currently only fuel highway and some other vehicles at this site. Fuel will not deliver to facility if there is snow on the ground or predicted for that day, and will not deliver fuel if thunderstorms. Building is 15 years old, re-evaluate lightening suppression system, some have been previously compromised	L	Short/Long
Westford Public Works	TBD	Town	S - provides response to natural hazards	Town manager is evaluating Public Works Department to consolidate these functions.	H	Short
Town Hall	55 Main Street	Town	S - provides information to residents and offices for public services V - biggest worry is cellar flooding and making sure there's a backup. There's a bunch of mechanical equipment in basement. All buildings in Town that have basements with mechanical systems need backup water removal. In Town Hall, do have a lot of paper storage, mostly stored in basement, some in vault, as time goes on it becomes a complicated storage issue. Records management, do have redundancy in a lot of it, some of it is about state records law.	Need more space for physical records and change in state's allowance for scanned documents to satisfy some of those permanent record requirements. One of places considered is new to be built town center building, that is only potential.	H	Short

Gas Stations	Cumberland Farm (188 Littleton Rd), Gulf (179 Littleton Road), Mobil (185 Littleton Road), United (215 Groton Road), Getty/BP (262 Groton Road, 1 Oak Hill Road), Shell (498 Groton Road), Citgo (169 Plain Road),	Private	S - provide gas, and in some cases snacks, in emergency. V - if power goes out, these facilities don't work. One of the vulnerably is that gas stations are located in two parts of town. Two on Littleton road, the other two are on Route 40. Two areas of impact, and there are no gas stations in Town. S - Have a fairly extensive hazardous materials storage application managed by Town, and requires following a plan, to protect from spills and leaks.	Inventory of gas stations and which facilities would be able to operate during natural hazard.	L	Long
Cell Towers & Antennas	Multiple locations	Private	S - provides community with communication. V - Not all cell towers have backup generators or are reliable in storm events. When it's time to renew lease, carriers are dropping leases. This is a major hole in places that you previously did have that service. Not all of those have backup power, so if power is lost, you also compromise that signal.	One of the things we can do is to communicate to people... AM radio system and people have this in their car. Could do inventory and coordination.	H	Short
Drinking water treatment, wells, and distribution including pumping stations	Town-wide, specific	Town	S - and V - Redacted to post online	Continue with Water Departments master plan implementation	H	Ongoing
Secondary Salt Shed	30 Beacon Street	Town	S - strength because it provides second location for deicing V - Built in 1997, and roof /shingles are about at end of useful life. Whole idea is keeping the approx. 5000 tons of salt from getting wet.	Evaluate structure and put on a capital replacement list.		
Information Technology Center	Redacted to post online.	Town	V - central servers, email, Town documents, central hub for all things internet, fiber run through there, some redundancies, but if building were wiped out, would be a big issue.	Trying to create redundancies in system. Have a secondary system at highway garage. Town-wide need to keep maintaining UPS (power supply) in case something goes down. Mike wells and Paul Fox. Plan is as part of Town annex building proposed, that would be central IT dept., and second hub would also be housed at Westford Academy, which is in process of being upgraded with generator (card readers, data storage, phones, internet, etc.)	H	Short
Communications infrastructure	Police, Fire, Highway towers, Behind Town Hall/Police station, there is an AM radio antenna	Town	S - multiple locations with repeaters, repeater antennas around Town. Important to maintain Town Public Safety and Highway on their own (current it's redundant). Town's communication system is in good shape.	Could improve capabilities	H	Ongoing
Wastewater Facilities	Town has various locations with wastewater systems, and numerous private systems (e.g. new apartment complex, hotels)	Town system and private systems	S - Town staff maintain facilities, program replacement needs, and facilities are alarmed	None identified	-	-
Railroad	Stony Brook line	Private	Line comes from Groton and exists through N Chelmsford. One of the heaviest traveled freight routes in New England..anything that goes to north/nh/Maine. Owned by Pan Am. Also a site used for switching cars out. S - transportation of goods. V- derailment and spills including risk to Public Water Supply, risk to river and environment	Railroad has an updated ERP. Due to not having a railroad yard in Westford, the crew utilize the mobile plan when going through Westford, however the hazmat material instructions that they train on also gives the crews directions along with an 8 hour hazmat class that is federally required.	L	Short
Interstates	495 and Route 3	MassDOT	S - MassDOT has their own response plans.	Coordinate with MassDOT to understand what plans are.	H	Short
Fire Department Landing Zones	Various locations	Town	S - There are 11 landing zones, 2 of which are plowed through winter. Emergency response and public health, state police have access as well V - other zones may need additional snow removal to get a helicopter in during winter storms, some are athletic fields.	Consider cost/benefit of snow removal for emergency landing zones not currently plowed.	L	Long
Aquifers	Mapped in MassGIS	N/A	V - Vulnerable to invasive species, period low water flow followed by flooding, perchlorate, pesticides and fertilizers, new erosion due to new buildings which removes buffer land around waterbodies. S - subcommittee in Healthy Westford that may add links to website S - Water Dept. has been working on Stony Brook restoration - working on keeping flow and measuring water levels. S - Use of fertilizer and reducing use of fertilizer and deicer are part of Water Dept's public education. S- Conservation Comm. has similar requirements, and requires Native Plant restoration. V - use of chemicals on lawns and agriculture and impacts on groundwater and wells.	Could do education about lawn maintenance, septic system maintenance Update language on Water Dept Website Planning Board update language to encourage native plantings? Put information about conservation land and dog leashing in information received at time of dog license renewal	M/L	Short
Conservation Lands	Emmet Lands, Stony Brook Conservation Lands/East Boston Camps	Town, Private	V - Pet waste from dog walking causing trash and nutrients/pathogens, overuse causes other problems such as erosion and litter. V / S - During COVID19 period, these are being used for walking in woods, seen dirt bikers there, there is a pond in middle of land (Nashoba Pond) S - conservation trust has programs, Stream team for water quality measurements, Mile a Minute weekly poll and water chestnut poll (annual, during growth season), S - really a well used location, people of all ages use for recreation, resource for public health	Citizen education about invasive. More education about use (dogs, motor vehicles, etc.) - enhanced or different approach. Town counsel confirmed dogs have to be leashed. Greater enforcement on dog walking? Animal control has been great at helping educate. More of a ranger position? Not enforcement but more about education (existing Town resources are stretched, need to recognize that)	L	Long
Floodplain	Mapped by FEMA	All	S - Last year, the FEMA firm maps were in process of being updated for basically north of 495 (Merrimack), anticipate review and approval in next year to 18 months.	Land acquisition for flood mitigation. Inventory of properties for purchase.	M	Ongoing
Forge Beach	Pleasant Street	Town	S - Beach testing at 14 beaches - monitor water quality	None identified	-	-
Forge Pond		N/A	V - invasive species in lakes and ponds, stormwater runoff contributing pollutants to waterbodies, water quality issues, erosion S- Healthy lakes and ponds initiative, contract out for management each year	Stormwater management LID, retrofits. Erosion control projects	H	Ongoing
Keyes Pond		N/A	V - invasive species in lakes and ponds, stormwater runoff contributing pollutants to waterbodies, water quality issues, erosion S- Healthy lakes and ponds initiative, contract out for management each year	Stormwater management LID, retrofits. Erosion control projects	H	Ongoing
Long Sought for Pond		N/A	V - invasive species in lakes and ponds, stormwater runoff contributing pollutants to waterbodies, water quality issues, erosion S- Healthy lakes and ponds initiative, contract out for management each year	Stormwater management LID, retrofits. Erosion control projects	H	Ongoing
Nabnasset Lake		N/A	V - invasive species in lakes and ponds, stormwater runoff contributing pollutants to waterbodies, water quality issues, erosion S- Healthy lakes and ponds initiative, contract out for management each year	Stormwater management LID, retrofits. Erosion control projects	H	Ongoing
Open Space - All	Various locations	Town, Private	S - Westford has an Open Space and recreation Plan that has been approved by EOEEA (conditionally) V - dumping, trash, invasive species, erosion	See other actions	-	-
Open Space - Connected	Various locations	Town, Private	V - erosion S - OSRP talks about connectivity. It's a goal, whenever looking at development. Rivers and stream are great corridors, and stony brook going east/west. Westford works with Neighboring communities (e.g. Littleton) and how to connect with their open space	Continue to maintain and foster corridors	M	Ongoing
Stony Brook Watershed	Watershed	N/A	V - lack of watershed-based planning across various sectors	Consider planning and managing on a watershed basis both with corridors and wildlife conservation	L	Long
Trails	Various locations	Town, Private	S - Scouts often maintain or build new trails and bridges. Westford healthy committee work hard to keep trails clean, Town has extensive trails in Town, well mapped, and well marked. Volunteer trail crews do a lot of the maintenance. Conservation Trust helps support trail access. Great mapping. Healthy Westford committee that has a sub-committee for walking Westford - have a whole plan for making Westford walkable.	Implementation of the Stormwater Management Master Plan for water quality and drainage benefits. Hinges on funding through the Stormwater Fee.	H	Ongoing
Tree Cover	Throughout Town	Town, Private	V - don't have an active tree planting program. National Grid cut down 1000 trees along roadway, planned for 1000 more this year. Reduces shade. S - grant in process for highway department to plant trees	Consider tree inventory and planting program. We need to have a understanding of which species are best at climate change and promote planting of those species.	M	Long
Vernal Pools	Throughout Town	State/Federal	S - state and local rules avoid encroaching on these important locations and prohibiting development. S - the state does have the layer for potential certified vernal pools, and is on Town's GIS - have it available and people can use it to check if working near potential vernal pool	Residents can do vernal pool certifications, volunteers can help with capacity issues . Could any of these be under Westford Academy community service work? Potentially!	M	Long
Wetlands	Throughout Town	N/A	S - Local wetlands bylaw V- Beavers especially at pond outlets and culverts	Citizens need information about how to determine if fill/loam is clean.	M	Short
Invasive Species	Throughout Town	All	V - both terrestrial and aquatic issues with invasive plants	Mapping of invasive to prioritize most problematic and most sensitive resource area. Education to residents on Town website or as handout available about how to identify them, how to remove them, etc.	L	Long
Developable Land	Throughout Town	Mostly private	V - Zoning bylaw is strong, but committee may grant variances S - order of conditions requires clean fill to avoid invasive and seeds, along with avoiding contamination. Conservation Commission does a good job prohibiting storage of fuels and undesirable liquids within buffer zone.	Town-wide invasive species mitigation plan.	M	Ongoing
Landfill/Fields/Open Spaces	Throughout Town	Various	S - Management of fields is done by both Water Dept and parks, and now are postponing mowing old dump late into season to allow for pollination	Strategy to come up with comprehensive mowing schedule to consider pollination and nesting	M	Short
Forest	Throughout Town	Various	S /V - The Forrest Committee focus is financial, and there is a forest management plan. The committee isn't able to do everything they want due to limited funding, however they do prune and manage.	Continue to support Committee	M	Ongoing
Town Common		Town	S - Rec Dept trying to use organic methods	Continue to attempt practice	M	Ongoing
Open Spaces	Throughout Town	Various	V - Landfill area mowing - could be meadowlarks nesting and timing is crucial for mowing. Applies beyond landfill.	Strategy to come up with comprehensive moving schedule to consider pollination and nesting	M	Ongoing
Conservation Lands	Throughout Town	Various	V - all of our conservation lands have challenges with adjacent residents, camping, yard waste, landscaping encroaches	Conservation Commission has a sub-committee about borders and boundaries, and talking about boundary marking.	M	Ongoing
Natural Buffer	Throughout Town	Various	V - Require buffers, but then Town staff get stuck cleaning up and maintaining	Continue to require buffers	M	Ongoing