Randolph, Massachusetts

MVP Resilience Building Workshop

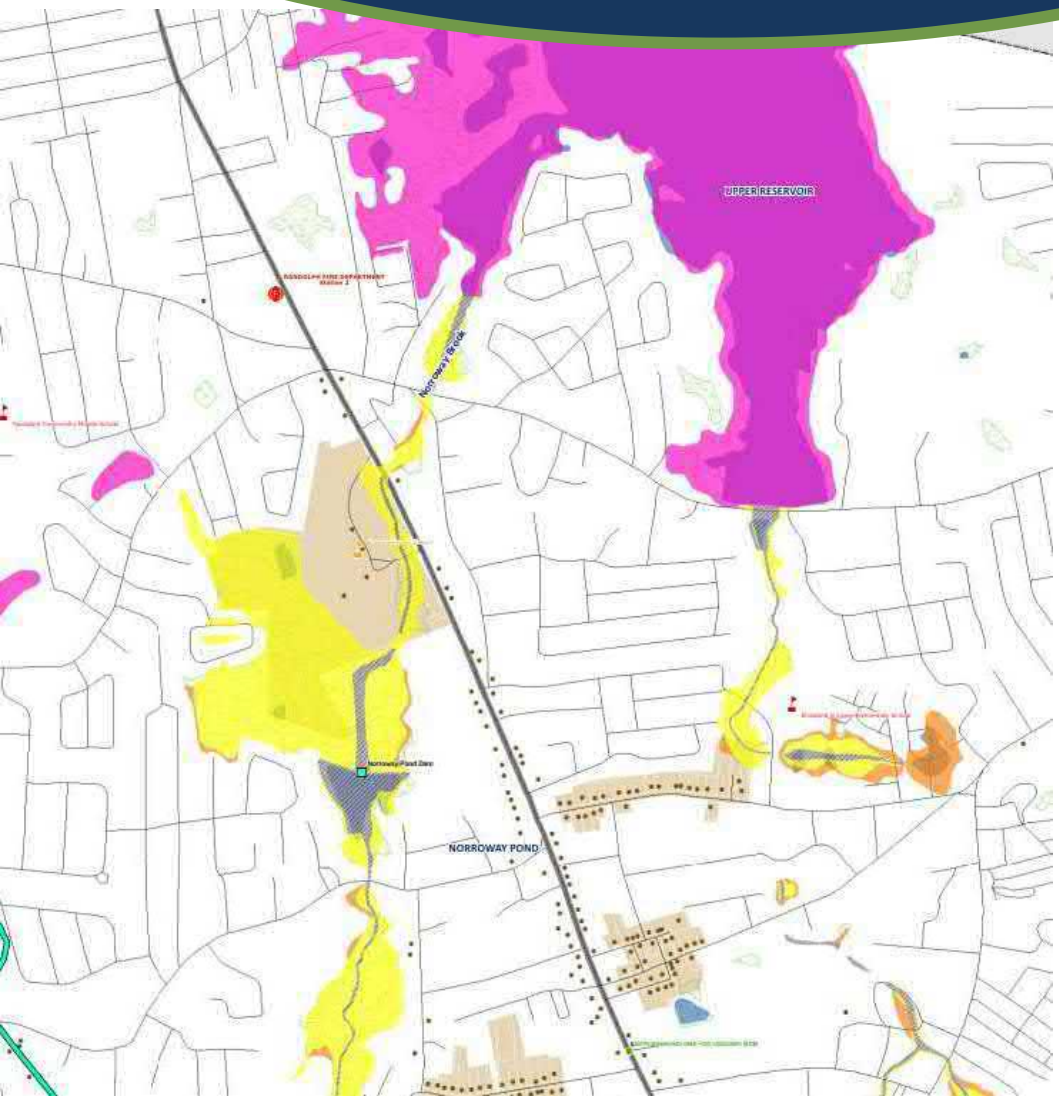
June 2021

MVP Community Resilience Program

Community Resilience Building Workshop

Summary of Findings Report

Town of Randolph, Massachusetts



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June 2021

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1.0 OVERVIEW

The Town of Randolph is located in Norfolk County, 15 miles south of Boston at the intersection of Routes 93/128 and 24. It is bordered by Milton and Quincy to the north, Braintree to the east, Avon to the southwest, Holbrook to the southeast, and Canton and Stoughton to the west. The town encompasses about 10.5 square miles, and is within the Boston Harbor watershed, mostly within the Weymouth and Weir River sub-basin, with a portion of the western side of Town in the Neponset River watershed. Its physical geography is part of the Boston Basin, which consists of low coastal plains with generally gently sloping terrain. The town's population has grown from 30,963 in the 2000 US Census to 32,158 in the 2010 US Census. The town has scattered areas of wetlands, several streams and ponds, and a large amount of medium density residential area.

Over the past several years there have been an increasing number of impacts due to climate change that have affected the Town of Randolph. With more frequent storms, the high winds often associated with those storms have caused increasing downed trees and powerlines, with multiple storms having this effect during extreme weather every year, most notably during the Patriot's Day storm of 2007 and the Ice Storm of 2008. In March 2010 after influences globally, heavy rain fell in eastern Massachusetts causing severe flooding.

In response to the effects of climate change, the Town of Randolph sought out the Municipal Vulnerability Preparedness (MVP) Program and conducted a Community Resilience Building (CRB) workshop to identify and address the growing vulnerabilities in Town.

The Workshop's central objectives were to:

- Define top local natural and climate-related hazards of concern;
- Identify existing and future strengths and vulnerabilities; and
- Develop prioritized actions for the Community.

Randolph partnered with BETA as its state-certified MVP Planning grant provider to assist with the process and facilitate the CRB workshop. The core team set goals for the workshop and identified and engaged community members to participate. Inviting members of the municipality to directly address intensifying natural hazards due to climate change creates more targeted solutions to these problems and encourages the community to take ownership of the ongoing efforts involved in these solutions. This program is designed to foster discussion in order to help municipalities identify the vulnerabilities, strengths, and opportunities to take action to reduce risk and build resilience in their communities.

1.1 COMMUNITY RESILIENCE BUILDING WORKSHOP

As part of the MVP Program, the Town of Randolph received a grant to host a CRB Workshop. This report documents the results from the CRB Workshop which BETA facilitated following the CRB framework. The CRB framework is a system of discussions and note taking developed by The Nature Conservancy and prescribed by the MVP Program. The goal of this workshop was to further investigate the Town's prior planning efforts and resiliency measures and to develop a list of strengths, and priority actions to focus on in the immediate future.

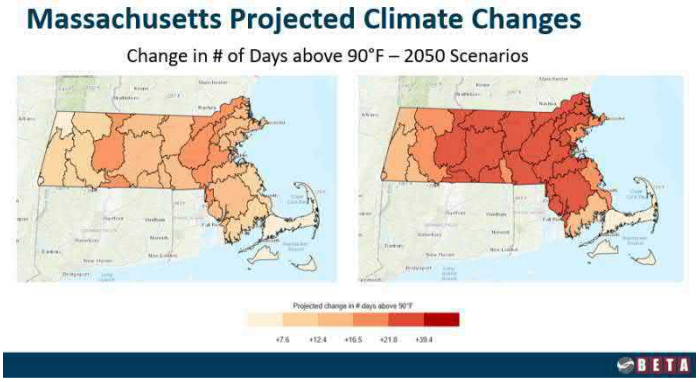
1.1.1 PARTICIPANTS AND PLANNING

Planning began with discussions between BETA and DPW Superintendent and Jean Pierre-Louis (Office Engineer) to identify the core team and participant invite list which was selected with guidance from the CRB Workshop Participant Worksheet. An effort was made to invite participants from several different

departments to have a broad range of perspectives on how climate change would affect the town. There were 10 participants from the community who attended the CRB workshop, and they represented many different departments, boards and community members. Diverse representation was crucial to the success of the program, as the DPW noticed different hazards than the Board of Health and Planning Department. Randolph has a lot of interactions with the surrounding towns, especially within the DPW and Planning Department. Folks from these departments had a more regional understanding of these Town problems, where some other attendees had a more town-focused approach during discussion. This diversity of thought and perspective allowed the workshop to be highly informative and an overall success. The core team, workshop invite list and list of participants is attached in **Appendix A**.

Due to the COVID-19 pandemic, the event was held virtually. The participants were divided into two groups, distinguished by the colors red and blue as noted on the matrices. These teams were split up using the "mixed sector" approach, described in the CRB Workshop Guide as grouping "participants from diverse sectors together to foster an exchange of different perspectives and actions for community resilience building. This approach helps participants see the connections comprehensively and develop common actions with co-benefits across sectors." These effects were evident, and the diversity in thought led to a difference in priorities, creating a dynamic discussion throughout the workshop, where participants were introduced to assets and perspectives which they had not previously considered. In the end the groups were able to identify resiliency opportunities that solved multiple vulnerabilities across departments.

1.1.2 Workshop Process



It was decided that the workshop would be held in one, six-hour session, held on Wednesday, June 9, 2021. The workshop session was held from 1:00 pm to 7:00 pm via Zoom. BETA led this workshop with Andrew Dennehy, a CRB-trained individual, and others. They provided an overview of climate change in the area as well as climate observations and projections from the Northeast Climate Science Center research, and implications that these changes will have on Randolph's infrastructure, society, and environment so participants could have a more informed discussion throughout the rest of the workshop. The presentation is attached in **Appendix B**.

Throughout the Workshop process, BETA facilitators led the participants in discussion, often using some of the "Triggering Questions" identified in the Community Resilience Building Workshop Guide. Some questions which proved to be most useful were: What hazards have impacted your community in the past? What hazards are impacting your community currently? Where and how often do these impacts occur? What natural resources are important to your community? What makes this infrastructure vulnerable? Location, age, building codes, type of housing?

The session began with an overview of the CRB Workshop, the goals of this session and climate change predictions for the Boston Harbor Basin by BETA MVP-Certified facilitator Andrew Dennehy, P.E.. Projections for this area predict that precipitation will increase by 14.5%, there will be 38% fewer days below freezing, and up to 5 times as many days over 90° F by 2050. A summary of this information, which was given to participants as a handout, is attached in **Appendix C**. A map of the town overlaid with FEMA flood zones was provided to each small group and a map depicting critical facilities in town was also displayed for reference. These maps can be found in **Appendix D**.

The participants then broke out into their designated small groups for further discussion. Small group discussions began by assessing hazards affecting Randolph. This portion of the MVP workshop also incorporated the discussion of Randolph's Hazard Risk Summary Table from the Randolph Hazard Mitigation Plan. Participants filled out the table by discussing the 14 natural hazards most impactful in Massachusetts. These 14 hazards can be seen in **Figure 1**, taken from the 2018 State Hazard Mitigation and Climate Adaptation Plan[1].

After this discussion, groups developed a list of the top four hazards of concern each group felt Randolph was most impacted by. Groups referenced maps to discuss vulnerable areas, infrastructure, flood zones, and community resources in order to better assess which hazards to prioritize in the Risk Matrix.

Figure 1: 14 Hazards Identified in Massachusetts SHMCAP

The participants then returned to the larger group to discuss and come to a consensus on the top four hazards moving forward. After a discussion of the hazards brought up by both groups, the top 4 agreed upon hazards were identified as Flooding, Severe Winter Storms/High Winds, Extreme Temperatures, and Drought. After this discussion, the participants returned to their groups in order to discuss features and add them to the matrix. Additionally, during this period of time, participants reviewed and updated a Critical Facilities List which will be used and referenced in the Randolph Hazard Mitigation Plan. Looking at the map in conjunction with the four identified hazards allowed the participants to more clearly see the risk and strength of specific areas and identify the locations most impacted by the top 4 hazards identified as a priority. This was very helpful in discussion of which features were most important. Participants also identified who owned each feature and categorized it as vulnerability or strength. These matrices can be found in **Appendix D**.

The participants continued within their small groups to fill in the Risk Matrix by discussing action items that address the hazard and the feature by either posing a solution to a hazard/feature or enhancing the strengths of a feature against a specific hazard identified in the previous session. Some common action items included public outreach and education and ensuring backup generator power. Throughout the small group discussions, the BETA facilitators stayed with groups to ask questions to prompt discussion (triggering questions) and provide guidance.

After actions had been identified, the small groups decided whether each action was a high, medium, or low priority and if the time frame was short term, long term, or ongoing action. This prioritization naturally separated the many actions into categories, making it easier to distinguish the *most* important. Using this information each small group determined their top five or six priority actions to present to the large group.

After the groups had completed the above tasks individually, participants reconvened to discuss, rank and prioritize together in order to come to a consensus on the highest priority actions to be taken across

[1] Massachusetts Emergency Management Agency – 2018 https://www.mass.gov/files/documents/2018/10/26/SHMCAP-September2018-Full-Plan-web.pdf

Randolph. Each group explained their thought process and stated their top five actions. A discussion ensued in which the group at large deliberated why some items should or shouldn't be included in the priority actions. The results and any other notable information throughout the process of the workshop are described in the following sections of this report. Notes were taken during the discussions of the hazards, critical facilities and assets, and when each group contributed their ideas during large group discussion. These were typed and "screen-shared" during the discussion so everyone could see. These notes can be found in **Appendix E**.

2.0 Summary of Findings

2.1 Current Concerns & Challenges

2.1.1 Top Hazards Of Concern

During the small group discussion, the following hazards were identified as being most prevalent and/or impactful in the Town of Randolph and were brought up for discussion in the larger group. Several of these hazards were grouped together because of their similarities.

Red Group Top Priorities

- Flooding
- Drought/Extreme Temperatures
- Severe Winter Storms/High Wind Events
- Invasive Species

Blue Group Top Priorities

- Flooding
- Nor'easter/Snow/Blizzard
- High Wind
- Drought

The small groups had many of the same concerns in mind while choosing top natural hazards. Every group identified flooding, winter storms, high wind events and drought as a top priority affecting Randolph. There were only small differences in the wording of these priority hazards. Conversation continued in greater depth during the discussion of features and actions and is discussed in later sections.

Drought was the most universal concern among workshop participants as it affects almost the whole town. The Town jointly manages and treats public water supply with the Town of Holbrook. The Town of Braintree also draws water from Great Pond for its residents. Due to the water supplying three towns, it was universally agreed that drought should be a top hazard for the entire group.

Many participants wanted to address the consequences of winter storms, or high wind events, as these are extremely common in Randolph and cause a significant number of trees to fall or lose branches. These events can affect the powerlines. After even a small storm the cleanup can be a few days' work for the DPW, and can seriously affect many aspects of the town, including schools, jobs, the elderly, the power grid etc. The language was able to be shifted in order to accommodate all the concerns identified in the group.

Ultimately, some of these hazards could be grouped together into one category and through the discussion there was largely group consensus on what the top four hazards should be with some discussion of the wording. The group decided on the following hazards as the top four.

Top Hazards

- **Flooding**
- **Severe Winter Storms/High Winds**
- **Extreme Temperatures**
- **Drought**

2.1.2 Areas of Concern

In discussing the top hazards, participants naturally began pointing out areas where these hazards often occur. The hazards which triggered the most discussion were flooding and extreme temperatures. Participants discussed various locations marking out areas of concern, like the water treatment plant and schools. The map shows several areas in the 100-year flood zone as well as areas of wetlands and other water bodies. These are the most likely areas to flood. These larger bodies of water were called out on the maps as well as in the Risk Matrix as a concern. During a severe storm, the town would see major consequences.

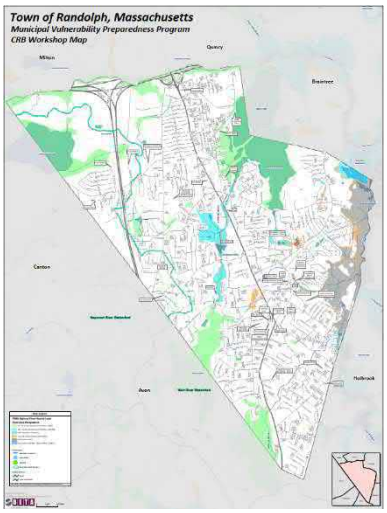


Figure 2: Map of Randolph used in the CRB Workshop

Randolph has experienced an increasing number of weather-related events in recent years, and these events are expected to continue this upward trend due to climate change. Severe storms that bring high winds or heavy precipitation can have serious effects by knocking down branches and trees, which may block roads or tear down power lines, taking a day or so to clean up and restore. Drought has also been an increasing concern throughout town and community education and outreach is especially important, as the town's water supply is also shared with Braintree and Holbrook.

2.1.3 Important Features Related to Identified Hazards

Based on the frequency and severity of the four identified hazards, the groups discussed which areas, communities and systems would be most affected by the occurrence of these hazards. Three categories of town features were discussed: infrastructural, societal, and environmental. Below is a list of all the community features the groups identified:

- Infrastructural
    - Water Treatment Plant
    - Water Distribution System
    - Sewer Pumping Stations and Wastewater System
    - Stormwater Drainage Systems
    - Power System
    - Communication Towers
    - Town Facilities
        - DPW
        - Fire/Police
        - Town Hall
    - Roads, Bridges, Culverts
- Societal
    - Parks/Fields
    - Veteran's Home/Group Homes
    - Food Pantry
    - Non-English Speaking Population
    - Public Housing

    - Cemeteries
    - At-Risk Populations
    - All Schools
    - Hotels
    - Religious Institutions
    - Supermarkets
    - Pharmacies
    - Historical Sites
- Environmental
    - Norroway Pond/Powers Farm
    - Great Pond Reservoir
    - Watersheds
    - Blue Hills Reservation
    - Belcher Park
    - Open Spaces
    - Closed Landfill
    - Bear Swamp

It is important to note that not all these features were considered vulnerabilities. Some of these features are already strong and as the small groups began to think about ranking, the largest vulnerabilities were identified and prioritized.

2.2 Strengths and Assets

Workshop participants noted that the town has strengths in each of the three feature categories: societal, environmental, and infrastructural. Some of the features were noted as both a strength and a vulnerability, like the stormwater drainage systems in town and the schools. The stormwater drainage systems are in good condition and maintained regularly, but it's failure could cause flooding problems town-wide, so in that way it is both a vulnerability and a strength. Similarly, schools are a strength because the town has facilities in place in case of an emergency, but they need backup generators or better HVAC systems that make these stronger resources.

Participants agreed that the open spaces and parks/fields in the town, such as Belcher Park, are strengths. They provide habitat for wildlife and options for increasing flood storage, in the event the Town chooses to investigate that.

The Communication Towers in Town are considered a strength because they provide the means of contacting the public in case of an emergency and keep the public in contact with emergency personnel to report emergency events.

Critical town facilities like the fire and police headquarters are strengths. They are centrally located to access the Town as needed, which is particularly helpful in emergency situations. The Town Hall being centrally located is advantageous as a location of sharing information with the public. The Hall along with other community organizations (ie. Religious institutions) may reach different groups of people to help spread information, which is very much a strength in Randolph.

Appendix D has more detailed information for reference.

2.3 Future Actions and Resolutions to Improve Community Resilience

Some of the common action items that related to the biggest concerns came up repeatedly in small groups and are described below.

- *Drought:* Water conservation and public education/outreach was the most commonly discussed action item regarding drought. Because water from Great Pond is jointly distributed with Holbrook, and Braintree also operates a treatment plant, conserving water must be at least a town-wide community effort. Education on watering and water conservation as well as a potential monitoring system to detect leaks or overuse would be a great help in reducing the impacts of drought felt by the residents.
- *Culverts/Bridges:* Both groups mentioned culverts and bridges as a feature that was a concern. Participants agreed that stronger maintenance programs should be prioritized to ensure proper culvert sizing and structural integrity of the bridges. Both groups discussed active inspection and maintenance should be implemented, as well as working with the Town and private owners of the culverts in Randolph to perform preventative care.
- *Sewer System:* Some participants expressed interest in conducting an infiltration and inflow study in an effort to keep more groundwater out of the sewer system. Additionally, removing this extra water would reduce cost and strain on the pump stations in town.
- *Tree Trimming:* During high wind or heavy snowstorm events, downed trees and branches cause major maintenance problems in town. Tree trimming and tree removal is extremely important preventative maintenance which the Town would like to encourage power companies to continue to keep up with, as many of these trees are not maintained by the town.

Some of these items became incorporated into the top five priority action items, while the rest of that list came from more general concerns addressed in the top four hazard categories facing Randolph.

2.3.1 PRIORITIZING ACTIONS

Participants at the workshop identified a number of recommended actions to address vulnerabilities and increase resiliency. The following is a complete list of these recommendations listed by priority but not ranked within the priority category. See **Appendix D** for the actions as they relate to hazards and features and whether they pertain to a strength or vulnerability. In addition, see **Appendix E** For list of all priority hazards and priority actions.

The high priority actions are as follows:

- Water Treatment Plant: Water conservation/education communication with the public. Water usage regulations. MWRA Emergency Connection upgrade. Install flood barriers/wall and elevate equipment. Ensure backup generator power. Install an air control system to help control temperature to prevent overheating/freezing.
- Water Distribution System: Water conservation/education communication with the public. Dredge reservoirs, construct storage tanks. Install low flow fixtures and implement water usage regulations. Install emergency connection with neighboring towns. Ensure backup generator power. Replace cat iron pipes susceptible to freezing.
- Wastewater System / Sewer Pumping Stations: Ensure backup generator power and that equipment has proper heating/cooling abilities. Conduct an I/I investigation and mitigation. Ensure critical infrastructure is elevated above flood plains and ensure proper installation of underground utilities. Tree trimming program near stations.
- Town Facilities (Fire/Police, Town Hall): Ensure backup generator power for long-term use. Ensure grading/drainage is sufficient to channel water away from buildings, and properly seal/waterproof doors.
- Schools: Ensure backup generator power for long-term use, improve the HVAC systems. Maintenance programs for heating and cooling equipment, cooling stations when necessary. Ensure grading/drainage is sufficient to channel water away from buildings, and properly

seal/waterproof doors. Ensure critical infrastructure is elevated above flood plains and underground utilities are properly installed. Public outreach in the classrooms on water usage. Snow removal as necessary. Prepare to use as shelters.

- Reservoirs: Conduct inspections during drought to make appropriate repairs. Monitor height for overtopping to water treatment plant. Ensure backup generator power at the treatment plant. Tree trimming/removal program. Water conservation/education communication with the public.
- Watersheds: Conduct hydrologic studies for water management practices. Safeguard against contamination.

The medium priority actions are as follows:

- Stormwater Drainage Systems: Conduct drainage study; resize system where appropriate. Catch basin and pipe cleaning program. Easement clearing program. Increase pervious areas. Use of Best Management Practices. Maintain and clear blockages during storm events, public outreach to help clear storm drains.
- Power System: Ensure critical infrastructure is elevated above flood plains and underground utilities are properly installed. Tree trimming program. Remove redundant systems and equipment. Have the system underground where possible. Investigate new power sources (solar/wind/water). Public outreach during periods of high temperatures to limit power usage.
- Roads, Bridges, Culverts: Implement maintenance programs. Enforce private culvert cleaning. Conduct culvert/bridge studies; resize culverts, repair or replace as necessary. Ensure structural integrity and critical roadways are not subject to washouts. Conduct bridge study to ensure bridges are built to withstand temperature changes.
- Supermarkets: Ensure grading/drainage is sufficient to channel water away from buildings and properly seal/waterproof doorways. Ensure backup generator power for long-term use. Public outreach on water usage.
- Pharmacies: Ensure grading/drainage is sufficient to channel water away from buildings and properly seal/waterproof doorways. Ensure backup generator power. Inspect structural integrity due to ages of buildings. Public outreach on water usage.
- Elderly/Disabled Populations: Public outreach, volunteer programs. Set up as shelters to use when needed (warming, cooling). Snow removal program. Set up water stations.
- Veteran's Home/Group Homes: Public outreach, volunteer programs. Set up as shelters to use when needed (warming, cooling). Snow removal program. Set up water stations.
- Food Pantry: Ensure food is stored above flood plain. Snow removal program. Consider backup generator power.
- Non-English Speaking Population: Public outreach in native languages.
- Public Housing: Public outreach, volunteer programs. Set up as shelters to use when needed (warming, cooling). Snow removal program. Set up water stations.
- At-Risk Populations: Public outreach, volunteer programs. Set up as shelters to use when needed (warming, cooling). Mental health intervention. Snow removal program. Set up water stations.
- Open Spaces: Proper maintenance of drainage in the area, use of plantings with deep root systems. Tree trimming/removal program. Use of drought resistant plantings.
- Belcher Park: Proper maintenance of drainage in the area, use of plantings with deep root systems. Tree trimming/removal program. Use of drought resistant plantings.
- Bear Swamp: Proper maintenance of drainage in the area, use of plantings with deep root systems. Tree trimming/removal program. Use of drought resistant plantings.

The low priority actions are as follows:

- Communication Towers: Ensure critical infrastructure is elevated above flood plains and underground utilities are properly installed. Ensure backup generator power. Tree trimming program. Ensure equipment has proper heating/cooling.
- DPW Buildings/Storage: Ensure structurally stable to withstand wind/snow loads. Ensure air control to maintain fleet/vehicle repairs.
- Hotels: Ensure grading/drainage is sufficient to channel water away from buildings, and properly seal/waterproof doors. Ensure backup generator power. Public outreach on water usage.
- Religious Institutions: Ensure grading/drainage is sufficient to channel water away from buildings, and properly seal/waterproof doors. Ensure backup generator power. Inspect structural integrity due to age of buildings. Public outreach on water usage.
- Historical Sites: Ensure grading/drainage is sufficient to channel water away from buildings, and properly seal/waterproof doors. Ensure backup generator power. Public outreach on water usage.
- Parks/Fields: Proper maintenance of drainage in the area, use of plantings with deep root systems. Tree trimming/removal program. Use of drought resistant plantings.
- Cemeteries: Proper maintenance of drainage in the area, use of plantings with deep root systems. Tree trimming/removal program. Use of drought resistant plantings.
- Norroway Pond/Powers Farm: Maintain culverts/drainage channels. Monitor/adjust pond height at the dam as necessary. Proper maintenance of drainage in the area, use of plantings with deep root systems. Tree trimming/removal program. Use of drought resistant plantings. Provide public education on grass fire prevention.
- Blue Hills Reservation: Conduct hydrologic study (landslide possibility). Proper maintenance of drainage in the area, use of plantings with deep root systems. Tree trimming/removal program. Use of drought resistant plantings. Provide public education on grass fire prevention.
- Closed Landfill: Maintain drainage systems.

2.3.2 Highest Priority Actions

The top actions, presented by the small groups, to all the participants are listed below. As in other categories there was overlap in the findings and opinions of the groups.

Red Group Priority Actions

- Power system protection
- Water conservation/public outreach
- Drain/culvert maintenance
- Access to emergency services

Blue Group Priority Actions

- Ensure backup generator power at priority buildings (water treatment plant, DPW, fire/police, schools)
- Improve HVAC systems in schools

After each group presented their proposed top action items there was a large group discussion about the merits of each. Participants discussed how feasible and pertinent each action was to the priority hazards listed earlier. In general, the participants recognized each action as important to the town and the discussion proceeded to come up with consensus on the top priority actions to be taken as a result of the Municipal Vulnerability Preparedness Workshop. The results are as follows:

Highest Priority Actions

- **Generator power for critical facilities**
- **HVAC system improvements for schools**
- **Power system protection**
- **Access to emergency services**
- **Water conservation & public outreach**
- **Drain/culvert maintenance**

There are several important buildings without backup generators, including the Water Treatment Plant, Fire/Police Station, Town Hall, and schools. In order to ensure continuous water supply and emergency services, these are critical locations to have a power supply during emergency events.

In addition, schools need an improved HVAC system to improve air quality and prepare for the use of these buildings as shelters when necessary. Due to its large capacity, it would be important to equip these buildings to shelter during emergency events.

Planning with National Grid to discuss backup power and rerouting capabilities in the event of a power outage was a significant priority due to the length of time that the Town has been without power during recent storm events. The effects of being without power and the risk of it happening again poses a threat to the elderly, the disabled and emergency response efforts as the Town works to clear roads and restore order.

Keeping power supply on during emergency events (either through backup generators or the work through National Grid for rerouting capabilities) is critical for residents in Town. Currently, they feel during emergency situations there is not a clear service responding quick enough. With power ensured to fire/police departments and roadways kept clear, this would help reduce issues in emergency response.

Water conservation and public outreach was discussed at length. In almost all aspects of town features and the hazards, communicating with the public on how to conserve water is a top priority. These discussions and campaigns, as well as looking into monitoring systems, are critical to help reduce the effects of drought in town.

Drain and culvert maintenance were grouped because of how interconnected the problem and solutions are. A culvert study would examine the condition of existing culverts (finding areas to repair or replace) and investigate upsizing them to restore a more natural flow path of water. These actions are significantly important to residents to reduce the risk of roadway washouts during severe storms.

While this document describes much of the discussion that ensued during the CRB Workshop there is additional detail in the Appendices. See **Appendix D** for a list of all the actions and assets whether it was considered a strength or vulnerability, and **Appendix E** for list of all priority hazards and priority actions.

2.4 PUBLIC LISTENING SESSION

Randolph presented the CRB process and summary of findings at a public listening session virtually on June 22, 2021. This provided an opportunity for any member of the interested public to learn, ask questions, and provide feedback about the workshop and the results that emerged. The following topics were discussed during the Listening Session:

- Concern for Environmental Justice Communities
- Inclusion of Non-English Speaking Populations
- Development of Program to Mitigate Stormwater Runoff Entering Brooks, Ponds, and Reservoirs
- Tree Trimming Program

Many of the public's concerns have been captured in the Workshop and are included in the Summary of Findings.

3.0 Next Steps

3.1 Continuing with the MVP Program

Conversations held through the MVP CRB Workshop and listening session highlighted climate related challenges facing Randolph and enlightened participants and the public to the importance of preparing for and addressing them. Participants identified many short- and long-term strategies for adapting to the changing climate.

The findings will serve as a basis for Randolph's MVP Action Grant application, providing an opportunity to take the community's ideas and turn them into actions. Priority actions identified during the workshop will also be integrated into local planning efforts to improve the town's resiliency to the effects of climate change.

4.0 Citation

BETA Group (2021, June). MVP Community Resilience Building Workshop Summary of Findings, Randolph, MA.

5.0 Acknowledgements

Many thanks to the MVP Core Team members and CRB workshop participants. Thank you to the Town of Randolph for providing guidance on the workshop and listening session and for making the workshop a priority for town staff to take part in.

Funding for the CRB workshop was provided through a Massachusetts MVP Planning Grant.

APPENDIX A

- Core Team and Workshop Participant List

CORE TEAM

Member Name	Affiliation
Chris Pellitteri	Dept of Public Works
Brian Howard	Town Manager
Jean Pierre-Louis	Office Engineer
Gerard Cody	Board of Health
Anthony Marag	Randolph Police Department
Richard Donovan	Randolph Fire Department
Michelle Tyler	Town Planner

WORKSHOP DATE: 6/9/2021

TIME: 1:00 PM

List of Participants

Participant	Department
Ann Martin	Board of Health
Brian Howard	Town Manager
Chris Pellitteri	Department of Public Works, Superintendent
Dov Yoffe	Board of Health
Gerard Cody	Board of Health, Director
Jane Hendrickson	Council on Aging
Joseph Dunn	Conservation Commission
Michelle Tyler	Town Planner
Peggy Montlouis	Council on Aging
Pete Taveria	Planning Board

Name	BETA Group Title
Andrew Dennehy, P.E.	Senior Associate
Katelyn Burke	Engineering Designer

List of Invitees

Name	Department
Dr. David Kaplan	Board of Health
Ann Martin	Board of Health
Barbara Mahoney	Board of Health
Dov Yoffe	Board of Health
Patricia Cedeno-Zamor	Board of Health
Joe Dunn	Conservation
Christopher Kimball	Conservation
Pamela Ilobachie	Conservation
Bobby Young	Conservation
Carl Brown	Conservation

Name	Department
Finnette Catabois-Davis	Conservation
Catherine Grant	Council on Aging
Cheryl Frazier	Council on Aging
Claire Crowell	Council on Aging
Desiree Etienne	Council on Aging
Irene Canavan	Council on Aging
Jane Hendrickson	Council on Aging
Maragret Callahan	Council on Aging
Patricia Cedeno-Zamor	Council on Aging
Peggy Montlouis	Council on Aging
Kevin Cook	Director of Veterans Services
Gerard Cody	Director, Board of Health
Jeannette Travaline	Exec. Director, Chamber of Commerce
Janine Smith	Finance Director
Ronald Lum	Housing Authority
Eudolf Rainford	Housing Authority
Janine Henry	Housing Authority
Judith Belyea	Housing Authority
Annie St. John Joseph	Housing Authority
Bill Clark	IT Director
Michelle Tyler	Planner
Alexandra Alexopoulos	Planning Board
Steven Monteiro	Planning Board
Peter Taverira	Planning Board
Anthony Plizga	Planning Board
Sara Bergman	Planning Board
Senator Walter Timilty	Senator
Bruce Ayers	State Rep.
William Driscoll	State Rep.
Thea Stovell	Superintendent, Randolph Public School
Christine Griffin	Town Attorney
William Alexopoulos	Town Council
Ryan Egan	Town Council
Richard A. Brewer, Jr.	Town Council
James F. Burgess, Jr.	Town Council
Natacha Clerger	Town Council
Kenrick Clifton	Town Council
Jesse Gordon	Town Council
Katrina Huff-Larmond	Town Council
Christos Alexopoulos	Town Council
Sean Fontes	Zoning Board
Alexander Costa	Zoning Board
Barry Reckley	Zoning Board
Christopher Spears	Zoning Board
Kevin O'Connell	Zoning Board

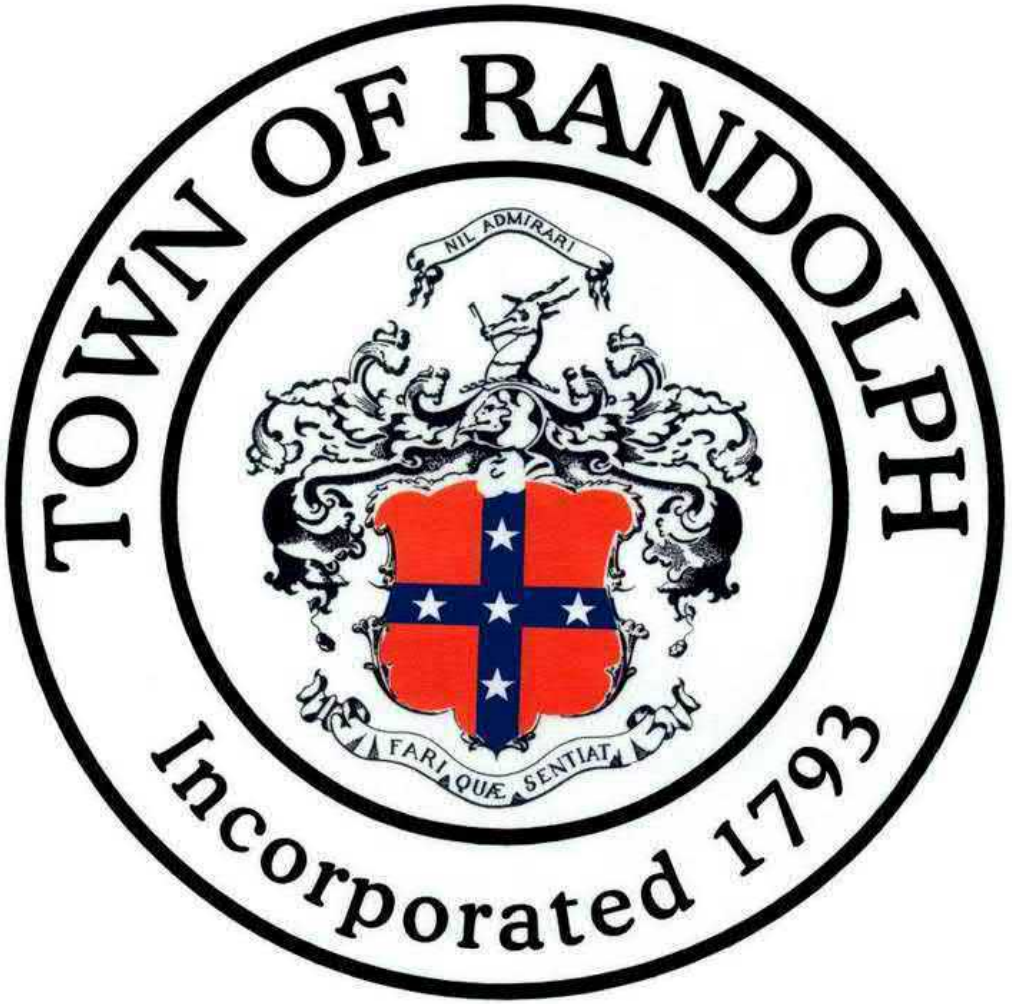
APPENDIX B

- CRB Workshop Presentation

Municipal Vulnerability Program (MVP)

Randolph, MA

June 9th, 2021



Welcome and Introductions

- Andrew Dennehy, Senior Associate, BETA Group, Inc.
- Katelyn Burke, Engineering Designer, BETA Group, Inc.

Municipal Vulnerability Program Agenda

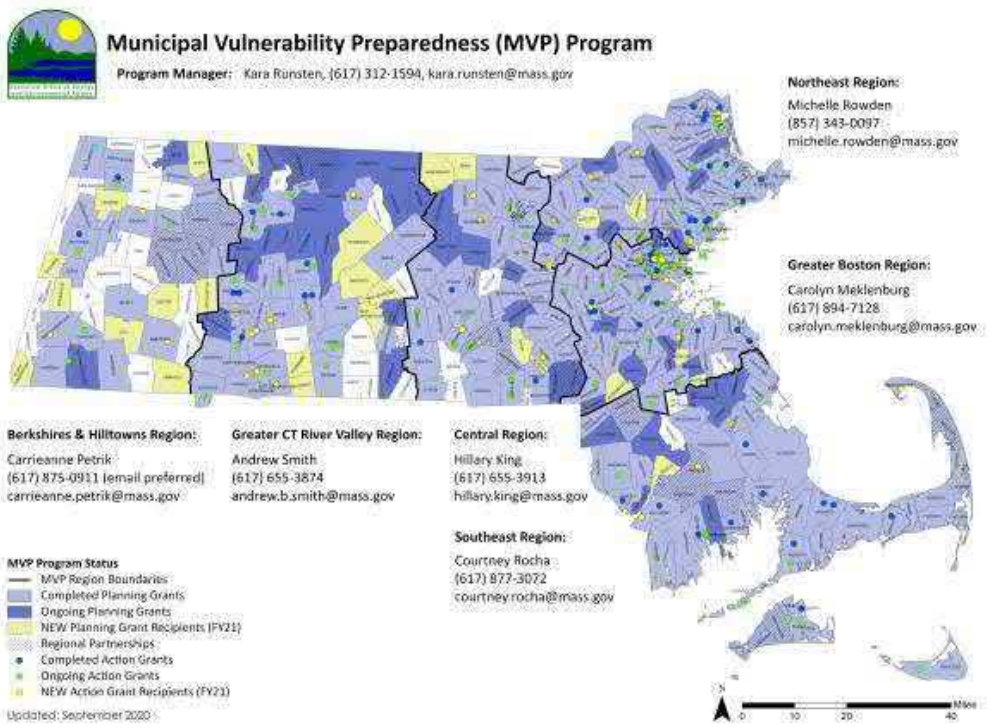
- Program Overview
- Workshop Overview
- Discussion of Hazard Mitigation Plan
- Science and Resources Information
- Introduction to Small Team Exercise #1
- Reporting Small Team Findings #1
- Small Team Exercise #2
- Reporting Small Team Findings #2
- Summary Discussion

Program Overview

EXECUTIVE ORDER 569: AN INTEGRATED CLIMATE CHANGE STRATEGY FOR THE COMMONWEALTH 9.16.16

- Reducing greenhouse gas emissions to combat climate change
- Preparing for the impacts of climate change
  - State Adaptation Plan
  - Agency Vulnerability Assessments
  - Municipal Support
  - Climate Coordinators

Program Overview



1. Engage Community
2. Identify CC impacts and hazards
3. Complete assessment of vulnerabilities & strengths
4. Develop and prioritize actions
5. Take Action

Program Overview

Two MVP Grant Opportunities

RFR 1: MVP Planning Grant

RFR 2: MVP Action Grant

Nature Based Solutions

Nature-Based

Nature-Based Solutions *use* natural systems, *mimic* natural processes, or *work in tandem with* traditional approaches to address natural hazards like flooding, erosion, drought, and heat islands.

Green Infrastructure

Low Impact Development (LID

Nature Based Solutions

Floodwater Detention and Retention Basins

Daylighting Rivers and Streams

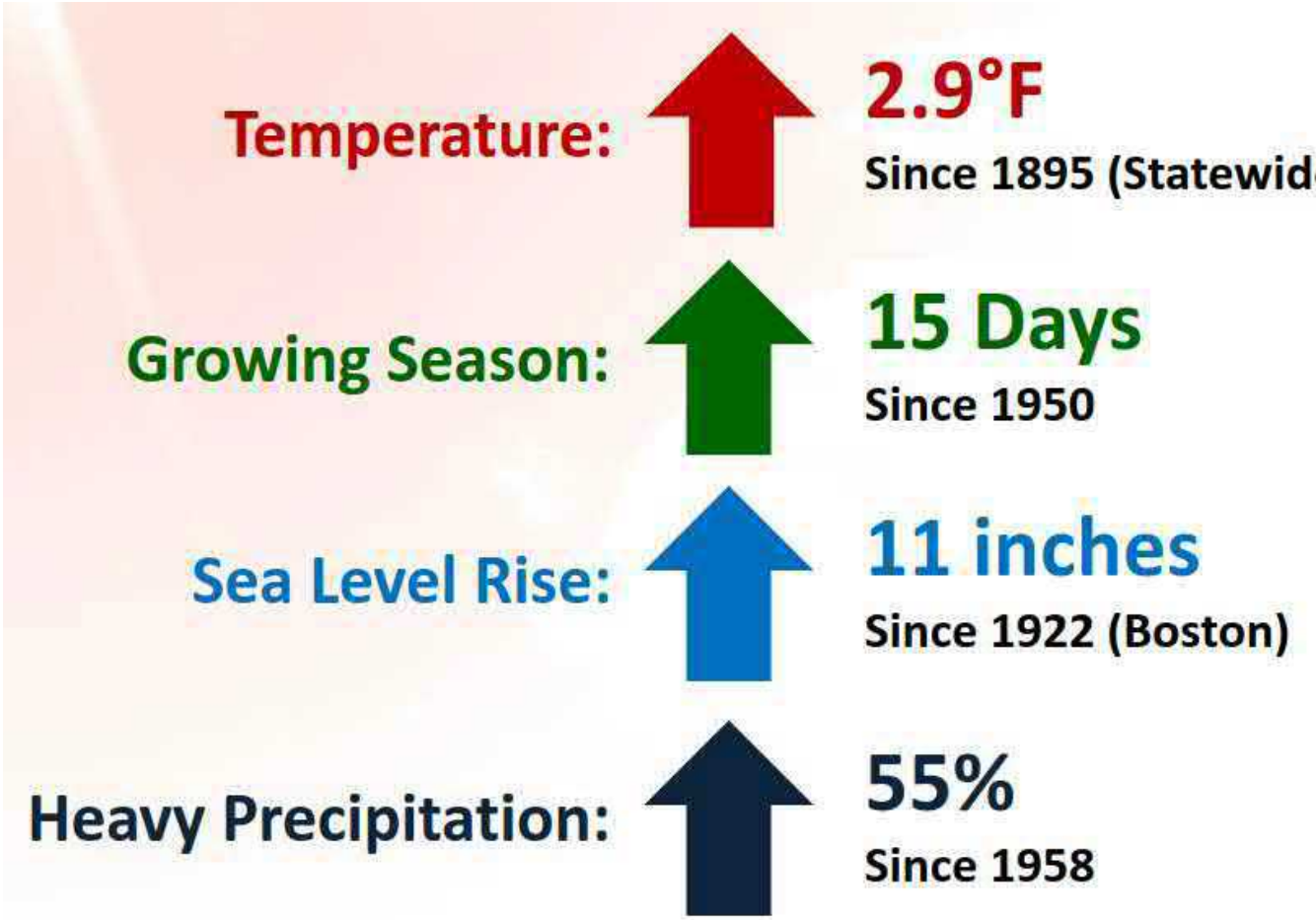
Open Space Preservation through Land Acquisition

Green Streets

Flood Friendly Culverts

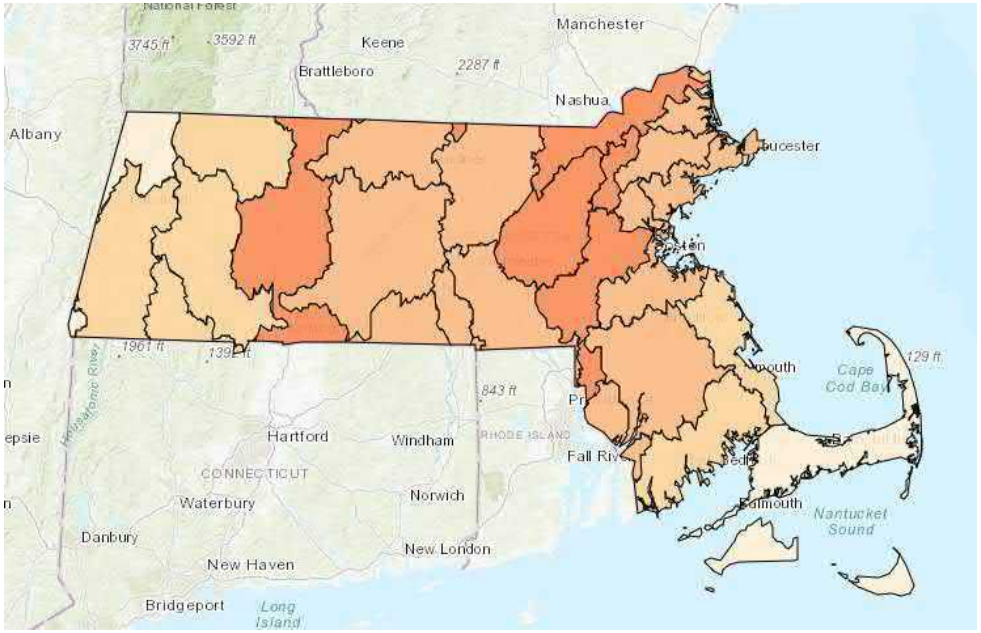
Regulatory and Policy Approaches to Address Hazards

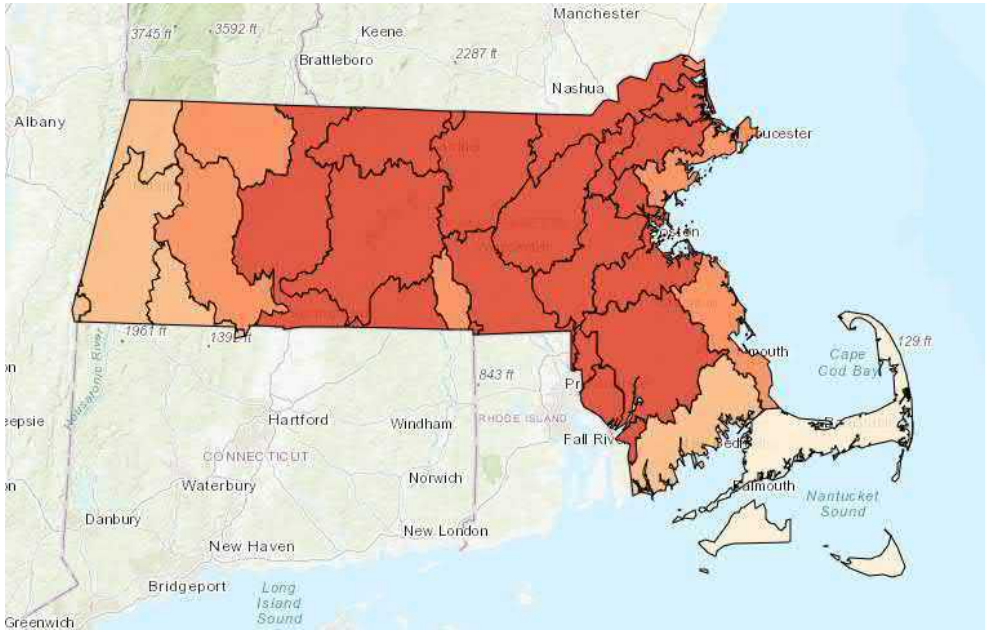
Massachusetts Observed Climate Changes



Massachusetts Projected Climate Changes

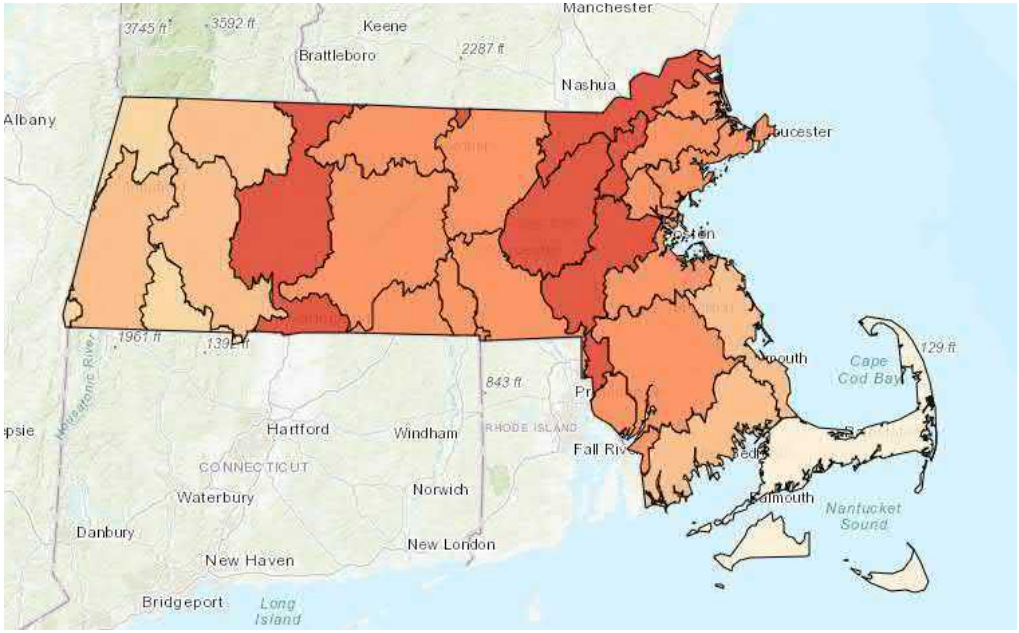
Change in # of Days above 90°F – 2050 Scenarios

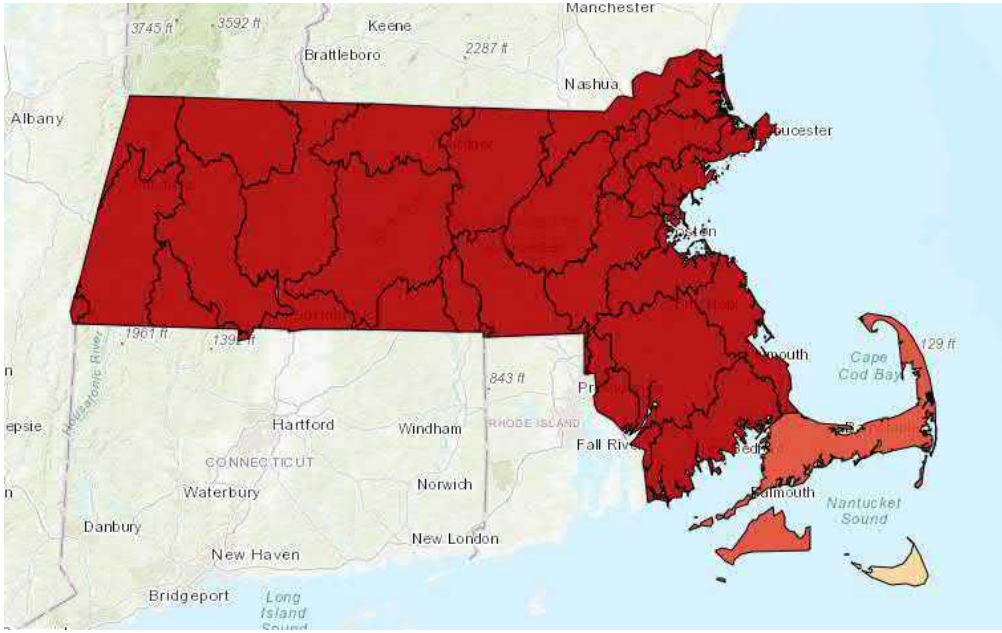




Massachusetts Projected Climate Changes

Change in # of Days above 90°F – 2090 Scenarios





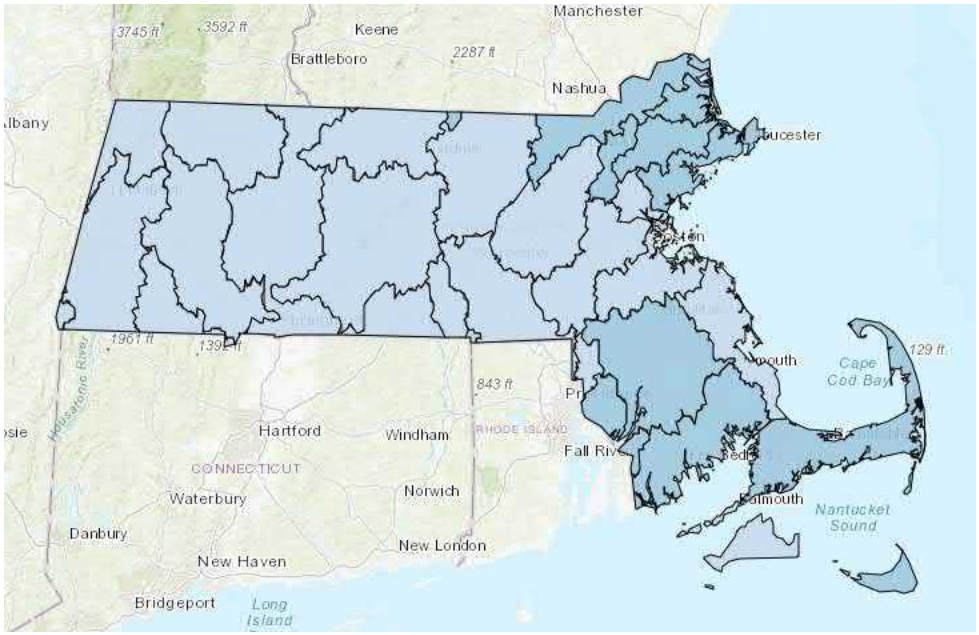
Projected change in # days above 90°F

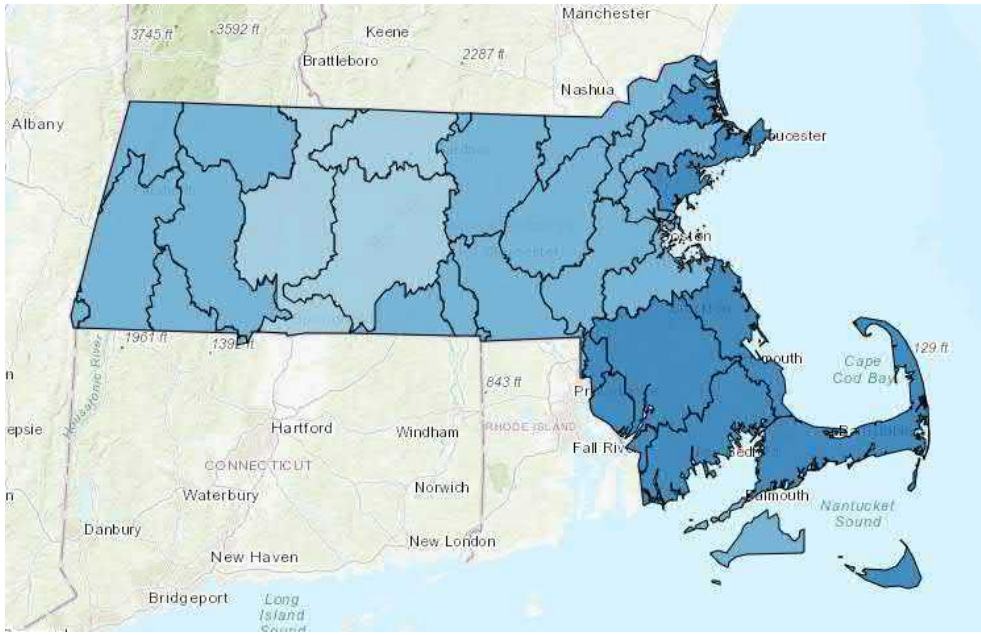
+7.6 +12.4 +16.5 +21.8 +39.4

BETA

Massachusetts Projected Climate Changes

Change in # of Days below 32°F – 2050 Scenarios



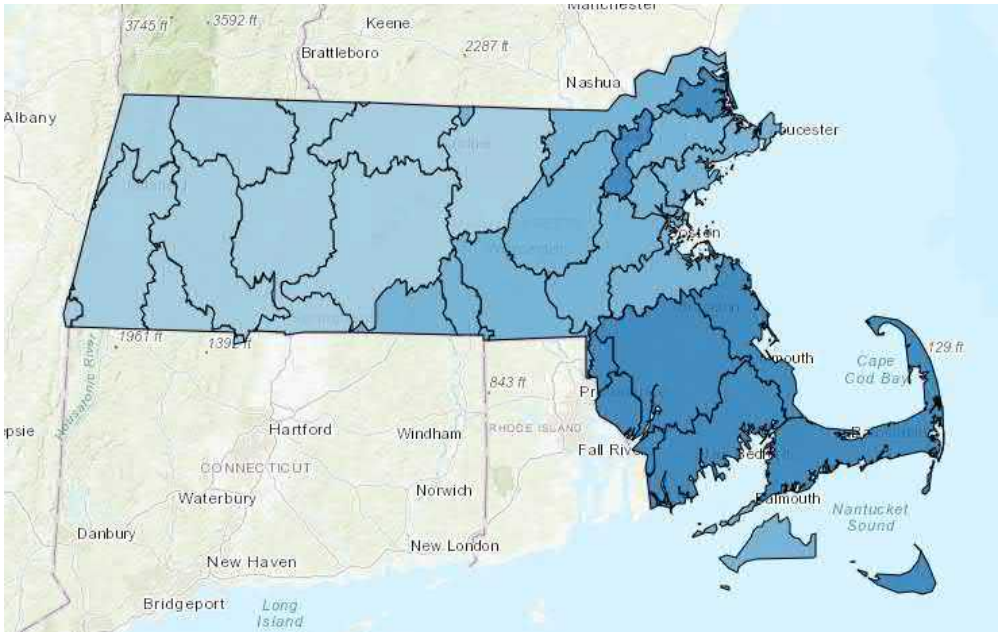


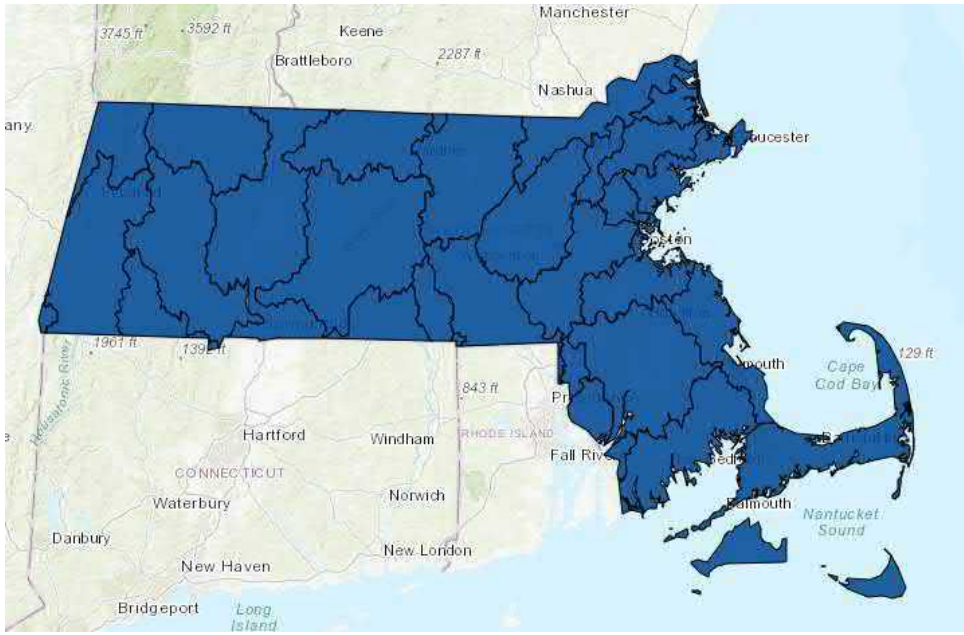
Projected change in # days below 32 °F

-20.6 -25.6 -30.8 -33.9 -47.3

Massachusetts Projected Climate Changes

Change in # of Days below 32°F – 2090 Scenarios



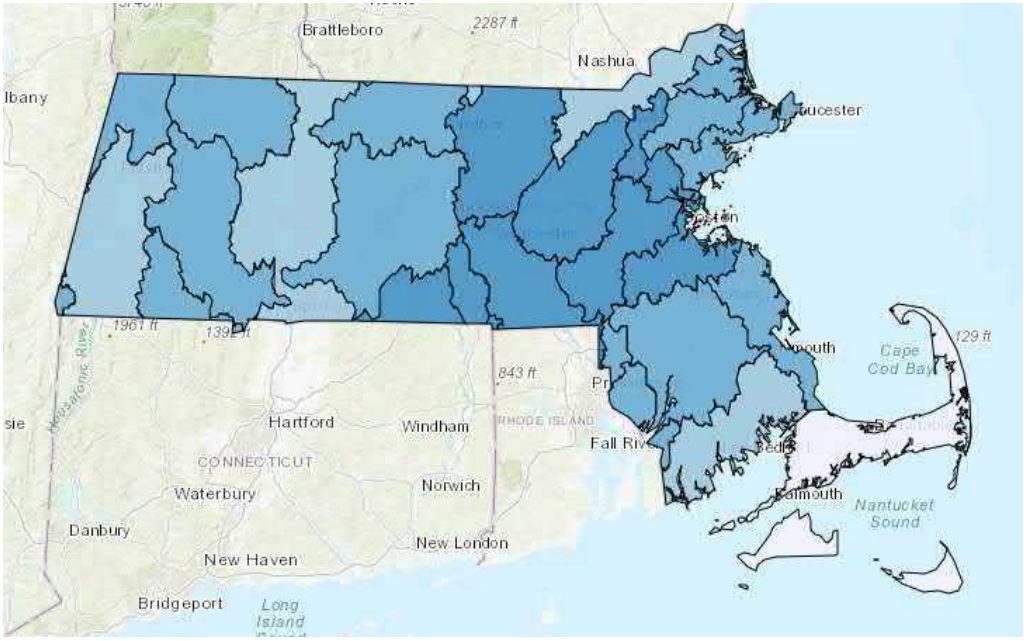


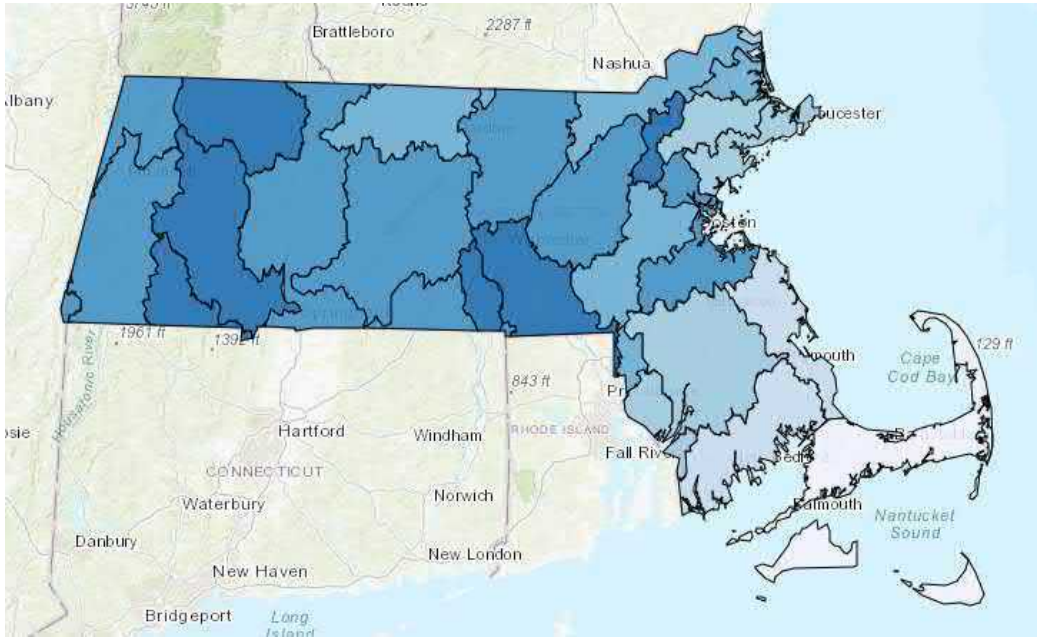
Projected change in # days below 32 °F

-20.6 -25.6 -30.8 -33.9 -47.3

Massachusetts Projected Climate Changes

Change in Inches of Precipitation– 2050 Scenarios



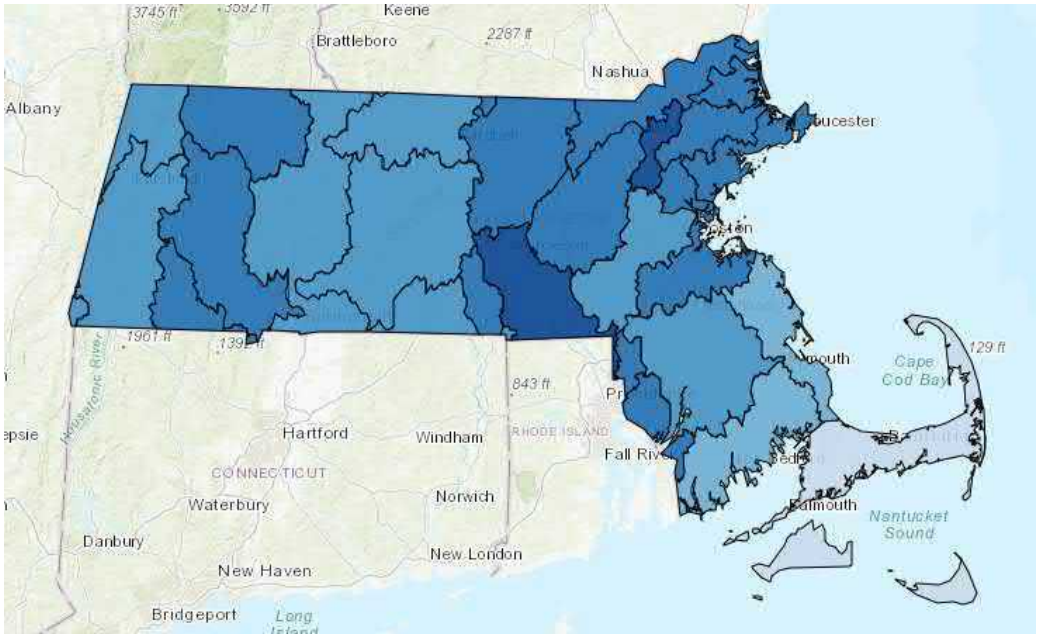


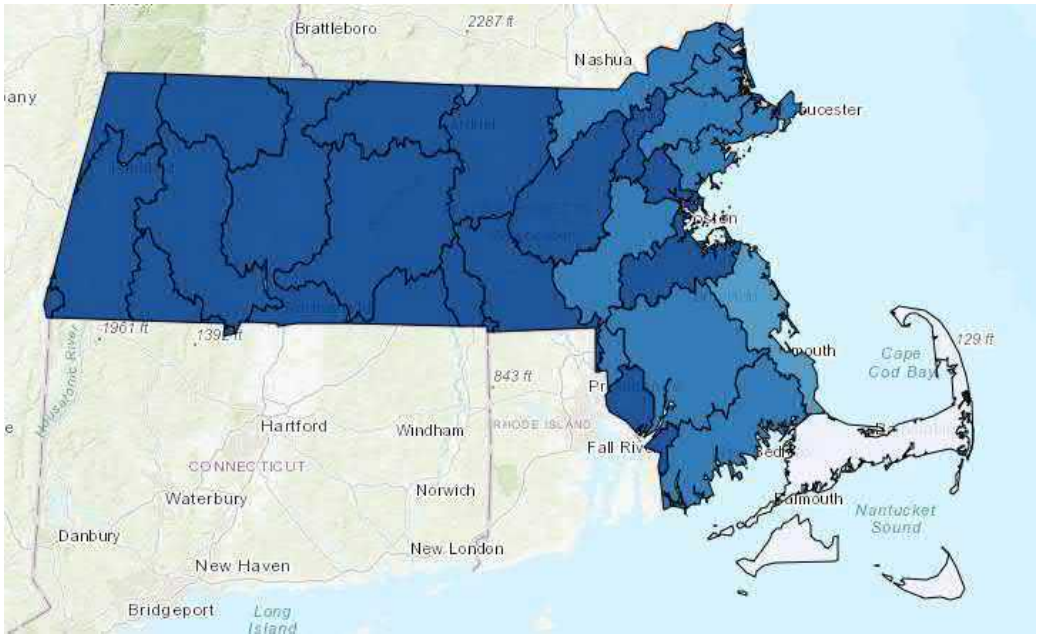
Projected change in inches of total precipitation

+1.9 +2.5 +3 +3.4 +3.9 +4.5

Massachusetts Projected Climate Changes

Change in Inches of Precipitation– 2090 Scenarios





Projected change in inches of total precipitation

+1.9 +2.5 +3 +3.4 +3.9 +4.5

Massachusetts Projected Climate Changes

Variable	Observed Value (1971-2000 average)	Change by 2050s	Change by 2090s
Annual average temperature	47.5 °F	Increase by 2.8-6.2 °F	Increase by 3.8-10.8 °F
Days per year with Temp > 90°F	5 days	Increase by 7-26 days	Increase by 10-63 days
Days per year with Temp < 32°F	146 days	Decrease by 19-40 days	Decrease by 24-64 days
Total Precipitation per year	47 inches	Increase by 0.9-6 inches	Increase by 1.2-7.3 inches
Number of days with precip > 1 in	7 days	Increase by 0-3 days	Increase by 1-4 days

Impacts from Climate Change

Increasing Temperatures

- Increase in heat-related illnesses
- Higher ozone levels and poorer air quality
- Changes to growing seasons
  - Algal blooms become larger and more frequent
  - Native species may decline and invasive species move in
  - Warmer winters contribute to increase in vector-borne diseases (Lyme, EEE West Nile)
- Larger demands on energy systems
  - Peaks in power demand during hot summer days can cause outages

Impacts from Climate Change

Increased Precipitation and Downpour Intensity

- Increased risk of flooding
  - Roadway ponding hazards and closures
  - Damage to roadways and infrastructure
  - Basement flooding
  - Increase potential for toxic mold build-up
- Water quality impacts
  - More frequent large rain events degrade habitat and carry soils and nutrients to lakes and waterways (elevated risk for swimming, fishing, drinking)
- Impact on agriculture and natural ecosystems

Impacts from Climate Change

Changes to Rain and Snow Patterns

- Reduced snow cover
- Impacts to habitats and species
- Potential increase in drought events
  - Local water supply shortages
- Extreme weather
  - Safety risks
  - Public service disruptions
  - Power outages
  - Infrastructure sustains more wear and tear

Workshop Overview

- Characterize Hazards
- Identify Community Vulnerabilities and Strengths
- Identify and Prioritize Community Actions
- Determine the Overall Priority Actions
- Develop Comprehensive Summary Products

Workshop Overview

Community Resilience Building Risk Matrix www.CommunityResilienceBuilding.org

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

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

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

Characterize Hazards

Identify past, current, and future hazards (large team).

Direct participants to make a list of hazards (causes of impacts) that the community has dealt with, currently faces, and anticipates experiencing in the future (i.e., tornados, ice/wind storms, drought, wildfire, tsunamis, sea level rise, landslides, earthquakes, etc.). Utilize the following triggering questions to accelerate dialogue and surface initial agreement on top four hazards.

- What hazards have impacted your community in the past? Where, how often, and in what ways?
- What hazards are impacting your community currently? Where, how often, and in what ways?
- What effects will these hazards/changes have on your community in the future (5, 10, 25 years)?
- What is exposed to hazards and climate threats within your community?
- What have been the impacts to operations and budgets, planning and mitigation efforts?
- Others concerns or considerations related to impacts?

A **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 **Action** to reduce risk from the hazard is to apply sunscreen or seek shade.

Top to bottom: © Rich Reid/TNC, © Devan King/TNC, © Jay Harrod/TNC

Hazard Characterization

- Inland Flooding
- Tsunami
- Severe Winter Storm
- Drought
- Extreme Temperatures
- Tornadoes
- Landslide
- Wildfires
- Coastal Flooding
- Invasive Species
- Earthquakes
- Coastal Erosion
- Hurricanes/Tropical Storms
- Other Severe Weather (strong wind, extreme precipitation)

Identify Community Vulnerabilities and Strengths

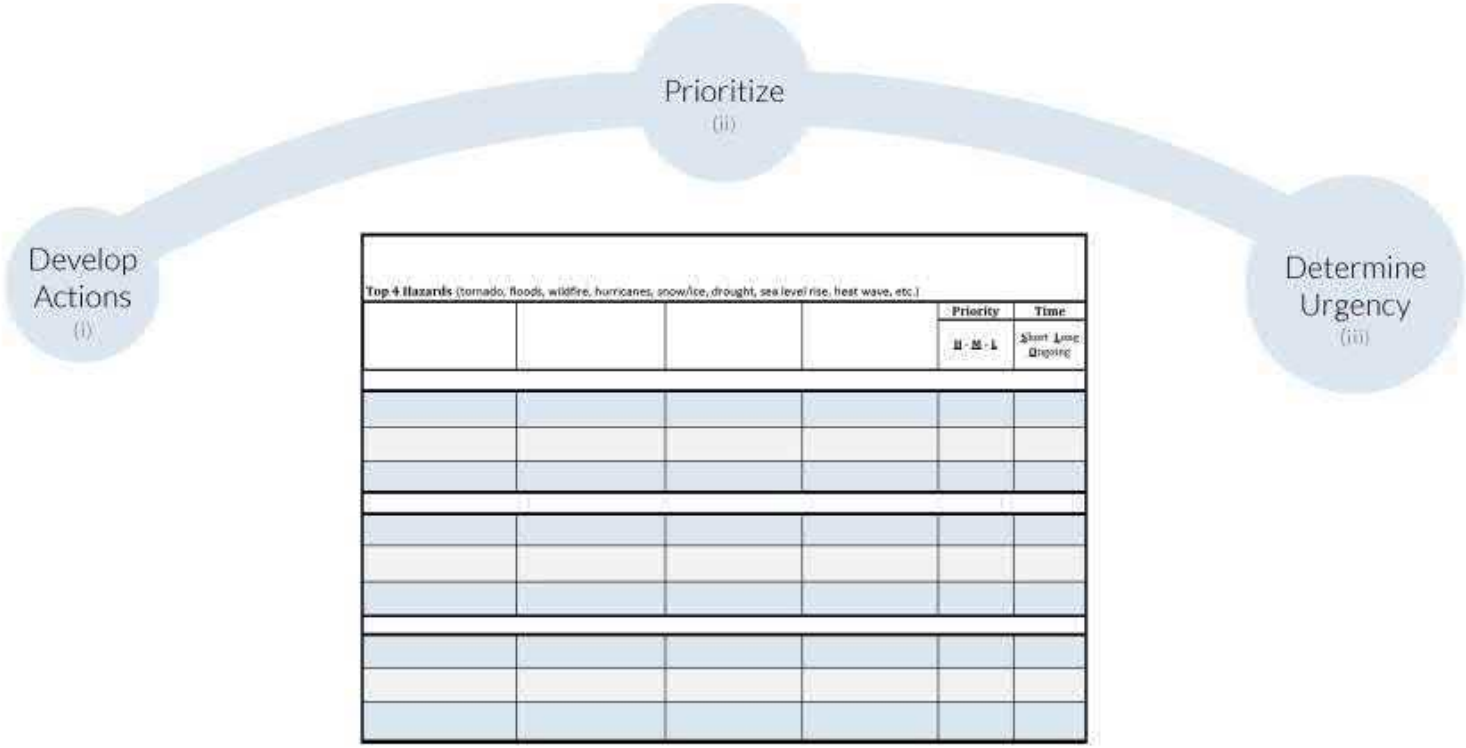
Community Resilience Building Workshop Risk Matrix

H-M-L priority for action over the Short or Long term (and Ongoing)
V = Vulnerability S = Strength

Features	Location	Ownership	V or S
Infrastructural			
Societal			
Environmental			

Steps C1, C2 and C3 below focus on identifying intrastructural, societal and environmental vulnerabilities and strengths. Each step requires three tasks to complete the Risk Matrix: **(i)** identify features, **(ii)** describe feature locations, **(iii)** identify feature ownership, and **(iv)** identify each feature as a vulnerability or strength, or both.

Develop and Prioritize Actions



Steps D1, D2 and D3 below focus on identifying and prioritizing intrastructural, societal and environmental actions. Each step requires three tasks to complete the Risk Matrix: **(i)** develop actions, **(ii)** prioritize actions (**H**igh, **M**edium, **L**ow), and **(iii)** determine urgency (**O**ngoing, **S**hort-term, **L**ong-term).

Example Actions

Community Resilience Building Workshop Risk Matrix

H-M-L priority for action over the Short or Long term (and Ongoing)
V = Vulnerability S = Strength

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

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

More examples of actions:

- Improved access in high-risk locations
- Reduce housing stock in vulnerable areas
- Prioritize development in low-risk areas
- Integrate future risks in capital improvement plans
- Flood-proof manhole covers
- Secure new generators for critical facilities

When prioritizing, consider factors such as:

- Funding availability and terms
- Agreement on outstanding impacts from recent hazard events
- Necessity for advancing longer term outcomes
- Contribution towards meeting existing local and regional planning objectives

Examples of urgency:

- Current project to install hurricane-proof roof on school is an ongoing **(O)** action.
- Ensuring evacuation procedures are updated annually is considered a short-term **(S)** action.
- Reducing housing stock in high-risk areas, elevating a road, or replacing a bridge are long-term **(L)** actions.

Wrap-up

- Discuss actions and priorities
- Consensus on top five priority actions
- Questions?
- Next Steps
- Wrap-up

APPENDIX C

- Workshop Handouts

Randolph Municipal Vulnerability Preparedness (MVP) Program Workshop

BOSTON HARBOR BASIN CLIMATE CHANGE PROJECTIONS (PRECIPITATION)[1]

SUMMARY OF MODELING RESULTS

- Average annual precipitation could increase 14.5% by 2050s and 20.7% by 2090s.
- Greatest increase in precipitation will occur during winter months.
- Greatest increase in consecutive dry days will occur during fall months.

PRECIPITATION PROJECTIONS

Climate Parameter	Baseline (1971-2000)	Mid-Century (2050s)	End of Century (2090s)
Annual Precipitation (inches)	46.07	46.47 – 52.77	46.77 – 55.59
Winter Precipitation (inches)	11.82	12.32 – 14.42	12.52 – 16.52
Spring Precipitation (inches)	11.59	11.59 – 13.79	12.09 – 14.59
Summer Precipitation (inches)	10.51	9.91 – 12.01	8.61 – 12.21
Fall Precipitation (inches)	12.18	11.38 – 13.78	10.68 – 14.08
Annual Days with Precipitation over 1 inch	9.06	10.06 – 12.46	10.66 – 13.56
Annual Days with Precipitation over 2 inches	1.27	1.57 – 1.97	1.57 – 2.47
Annual Days with Precipitation over 4 inches	0.08	0.08 – 0.18	0.08 – 0.28
Annual Consecutive Dry Days	17.46	17.56 – 19.86	17.26 – 21.26

[1] Source: Northeast Climate Science Center, 2018. Massachusetts Climate Change Projections. University of MA Amherst. Published by MA Executive Office of Energy and Environmental Affairs. Available at: http://resilientma.org/data/datamajor-river-basins.

IMPROVING COMMUNITIES TOGETHER

Randolph Municipal Vulnerability Preparedness (MVP) Program Workshop

BOSTON HARBOR BASIN CLIMATE CHANGE PROJECTIONS (TEMPERATURE)[2]

SUMMARY OF MODELING RESULTS

- By 2050, average temperatures could increase by 14%. By 2090, average temperatures could increase by almost 25%.
- Number of days with temperatures +90 °F could increase by 5 times as today by 2050. By 2090, there could be 10 times as many +90 °F than today.
- Number of days with temperatures below freezing could drop by 38% by 2050 and almost 66% by 2090.
- Less energy is expected to be spent on heating in the winter, but more energy is expected to be spent on cooling in the summer.

TEMPERATURE PROJECTIONS

Variable	Baseline (1971-2000)	Mid-Century (2050s)	End of Century (2090s)
Average Annual Temperature (°F)	50.13	54.13 – 57.13	56.43 – 62.43
Maximum Annual Temperature (°F)	59.55	63.35 – 66.35	65.55 – 71.55
Minimum Annual Temperature (°F)	40.70	44.80 – 47.90	47.20 – 53.30
Annual Days with Max Temp over 90°F	7.85	22.85 – 42.25	34.15 – 78.85
Annual Days with Min Temp below 32°F	119.21	73.51 – 93.61	40.91 – 78.21
Annual Heating Degree-Days (Base 65°F)	6,078.6	4,392.5 – 5,091.7	3,297.8 – 4,509.4
Annual Cooling Degree-Days (Base 65°F)	636.02	1,068.12 – 1,527.72	1,311.72 – 2,412.12
Annual Growing Degree-Days	2,733.34	3,500.84 – 4,219.14	3,974.44 – 5,551.24

[2] Source: Northeast Climate Science Center, 2018. Massachusetts Climate Change Projections. University of MA Amherst. Published by MA Executive Office of Energy and Environmental Affairs. Available at: http://resilientma.org/data/datamajor-river-basins.

Randolph Municipal Vulnerability Preparedness (MVP) Program Workshop

DEMOGRAPHIC DATA[1]

Parameter	Breakdown
Total Area	10.5 square miles
% of Land Use	Agriculture = 0.7% Forest = 32.1% Open Space = 6.0% Recreation = 0.9% Urban = 54.7% Water = 5.6%
Population	32,058
Age	0-19 = 21% 20-34 = 20% 35-65 = 43% 65+ = 16%
Household Income	<$40,000 = 29% $40,000 - $60,000 = 16% $60,000+ = 54%
% Below Poverty Line	12%
Race	Asian = 12% Black = 40% White = 42% Other = 7%
Ethnicity	Hispanic – 8% Non-Hispanic – 92%
Environmental Justice	100%
% Population Over 65 Living Alone	3.7%
Asthma Emergency Visits	85.9 (age-adjusted rate per 10,000 people)
Pediatric Asthma Prevalence	16.4% of all children enrolled in grades K-8

[1] Source: MA Dept of Public Health, 2018. MA Environmental Public Health Tracking Community Profile for Randolph. Report Created on June 22, 2021.

IMPROVING COMMUNITIES TOGETHER

Randolph Municipal Vulnerability Preparedness (MVP) Program Workshop

EXAMPLES OF STRENGTH AND VULNERABILITIES[1]

INFRASTRUCTURE

Examples of Vulnerabilities:

- Main road floods during storms, blocking emergency response.
- Power outages during heat waves lead to health concerns.
- Wildfire and high winds resulting in supply chain interruptions.
- Sewer pump stations become submerged and inoperable.
- Compromised rail system due to heat-related warping of tracks.

Examples of Strengths:

- Critical road elevated and passable by emergency management
- Hurricane roof installed at school with improved sheltering capacity.
- Hardened utility lines reduce outages due to ice storms.
- Undersized culvert replaced to reduce flooding in key intersection.
- Improvement to communication systems during extreme weather.

SOCIETAL

Examples of Vulnerabilities:

- Senior housing without backup generators during heat waves.
- Residents without access to transportation during hurricane evacuation.
- Household contamination and sewage mobilization during flooding.
- Limited areas of refuge in elementary schools during tornados.

Examples of Strengths:

- Reliable communications protocols across departments for all employees.
- “Neighbor-helping-neighbor” program aligned with emergency operations.
- Well-supported volunteer organizations (fire, ambulance, CERTs).
- Faith-based and civic groups with hazard preparedness plans.

ENVIRONMENTAL

Examples of Vulnerabilities:

- Proliferation of subdivisions in wildfire and flood prone areas.
- Lack of urban tree canopy increasing heat island effect.

Examples of Strengths:

- Forested watersheds maintain drinking water supply during droughts.
- Native, vegetated slopes remain stable after intense 24hr rain events.
- Floodplains provide stormwater storage and downstream flood reduction.

[1] Source: Community Resilience Building Workshop Guide, communityresiliencebuilding.com

APPENDIX D

- Workshop Matrices and Maps

Town of Randolph, Massachusetts
Municipal Vulnerability Preparedness Program
CRB Workshop Map

Community Resilience Building Risk Matrix

BLUE GROUP

www.CommunityResilienceBuilding.org

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

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

Features	Location	Ownership	V or S	Flooding	Severe Winter Storms/High Winds	Extreme Temperatures	Drought	Priority H - M - L	Time Short Long Ongoing
Infrastructural									
Water Treatment Plant	Town-wide	Town	V	Install flood barriers/wall (new building already planned at new location away from floodrisk).	Ensure backup generator power.	Air control system to help control temperature - overheating/freezing.	Water restrictions, public notifications.	H	S
Sewer Pumping Stations	Town-wide	Town	V & S	Conduct an I/I investigation, ensure I/I mitigated.	Ensure backup generator power.		-	H	O
Stormwater Drainage Systems	Town-wide	Town	V & S	Investigate pipe sizes and conditions; resize or line as necessary.	Maintain and clear blockages during storm events.	-	-	M	O
DPW Buildings/Storage	Town-wide	Town	V & S	-	Structural - withstand wind/snow loads.	Air control to maintain fleet/vehicle repair.	-	L	O
Town Facilities - Fire/Police, Town Hall	Town-wide	Town	S	Ensure grading/drainage is sufficient to channel water away from buildings. Proper sealing/waterproofing of doors.	Ensure backup generator power for long-term use.		-	H	S, L, O
Roads, Bridges, Culverts	Town-wide	Town/State	V & S	Conduct culvert/bridge studies, repair or replace as necessary. Clear vegetation overgrowth.	Structural integrity. Ensure critical roadways are not subject to washouts.	Bridge study to ensure bridges are built to withstand temperature changes.	-	M	L
Societal									
All Schools	Town-wide	Town	V & S	Ensure grading/drainage is sufficient to channel water away from buildings. Proper sealing/waterproofing of doors.	Ensure backup generator power for long-term use. Improved HVAC systems.		Public outreach on water usage.	H	S, L
Hotels	Town-wide	Private	S	Ensure grading/drainage is sufficient to channel water away from buildings. Proper sealing/waterproofing of doors.	Ensure backup generator power.		Public outreach on water usage.	L	S
Religious Institutions	Town-wide	Private	S	Ensure grading/drainage is sufficient to channel water away from buildings. Proper sealing/waterproofing of doors.	Ensure backup generator power. Inspect structural integrity (due to age of buildings).	-	Public outreach on water usage.	L	S
Supermarkets	Crawford Square	Private	S	Ensure grading/drainage is sufficient to channel water away from buildings. Proper sealing/waterproofing of doors.	Ensure backup generator power for long-term use.		Public outreach on water usage.	M	S
Pharmacies	Town-wide	Private	S	Ensure grading/drainage is sufficient to channel water away from buildings. Proper sealing/waterproofing of doors.	Ensure backup generator power. Inspect structural integrity (due to age of buildings).	-	Public outreach on water usage.	M	S
Historical Sites	Crawford Square	Town/Private	V	Ensure grading/drainage is sufficient to channel water away from buildings. Proper sealing/waterproofing of doors.	Ensure backup generator power.		Public outreach on water usage.	L	L
Environmental									
Powers Farm	North Main St	Town	V	Maintain culverts/drainage channels. Monitor/adjust pond height at the dam as necessary.	-	-	Adjust pond height at the dam. Provide public education on grass fire prevention.	L	O
Great Pond Reservoir	Pond Street	Town/Tri-Town	V	Monitor height for overtopping to treatment plant.	Ensure backup generator power at the treatment plant.	-	Conduct inspections during drought to make appropriate repairs. Water restrictions, public notifications.	H	O
Watersheds	Town-wide	Town/Tri-Town	V	Conduct hydrologic studies. Safeguard against contamination.	Conduct hydrologic studies for water management practices.			H	O
Blue Hills Reservation	North Randolph	DCR	V	Conduct hydrologic study - landslide possibility.	-	Public education on fire safety.		L	O

Community Resilience Building Risk Matrix

RED GROUP

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

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

Features	Location	Ownership	V or S	Flooding	Severe Winter Storms/High Winds	Extreme Temperatures	Drought	Priority H - M - L	Time S Long O Ongoing
Infrastructural									
Water Distribution System	Town-wide	Town	V & S	-	Ensure backup power where required.	Replace cast iron pipe susceptible to freezing.	Water Conservation; Public Outreach; Dredging Reservoirs; Construction of Storage Tanks; Low flow fixtures; Water usage regulations; emergency connection with neighboring towns	H	O
Culverts/Bridges	Town-wide	Town/State	V & S	Maintenance programs; private culvert cleaning enforcement; culvert sizing studies; culvert upsizing where required	-	-	-	H	L-O
Power System	Town-wide	Private	V & S	Ensure critical infrastructure is elevated above flood plains; proper installation of underground utilities	Tree trimming program; undergrounding where possible; redundant systems and equipment; investigate new power sources (solar/wind/water)	Public outreach during periods of high temps; limit power usage during high temps	-	M	L
Drainage System	Town-wide	Town	S	Catch basin and pipe cleaning program; easement cleaning/clearing program; drainage study; upsizing system where appropriate; increase pervious areas; use of Best Management Practices	Catch basin clearing program; public outreach to clear storm drains	-	-	H	L-O
Water Treatment Plant	Pond Street	Joint Board	V	Fortify Plant against flooding potential; elevate equipment	Ensure backup power; tree trimming is close proximity to plant;	-	Water Conservation; Public Outreach; Water usage regulations; MWRA Emergency Connection upgrade	H	S
Wastewater System/Pump Stations	Town-wide	Town	S	Ensure critical infrastructure is elevated above flood plains; proper installation of underground utilities; Backup power	Ensure backup power; tree trimming is close proximity to stations	Ensure equipment has proper cooling and heating	-	H	O
Communication Towers	Town-wide	Private	S	Ensure critical infrastructure is elevated above flood plains; proper installation of underground utilities; Backup power	Ensure backup power; tree trimming is close proximity to stations	Ensure equipment has proper cooling and heating	-	L	L
Societal									
Parks/Fields	Town-wide	Town	S	Proper maintenance of drainage in the area; plantings with deep root systems	Tree trimming/removal program	Use of drought resistant plantings		L	O
Elderly/Disabled Populations	Town-wide	N/A	V	Public outreach; volunteer programs				M	O
				Shelters when required	Warming shelters when required; snow removal programs	Cooling stations; shelters when required	Water stations		
Veteran's Home/Group Homes	Town-wide	Private	V	Public outreach; volunteer programs				M	O
				Shelters when required	Warming shelters when required; snow removal programs	Cooling stations; shelters when required	Water stations		
Food Pantry	Center of Town	Private	V & S	Ensure food is stored above flood plain	Ensure snow removal; consider backup power	-	-	M	O
Non-English Speaking Population	Town-wide	N/A	V	Public outreach in native languages				M	O
Public Housing	Sunshine, Pleasant	Town	V	Public outreach; volunteer programs				M	O
				Shelters when required	Warming shelters when required; snow removal programs	Cooling stations; shelters when required	Water stations		
Schools	Town-wide	Town	V & S	Ensure critical infrastructure is elevated above flood plains; proper installation of underground utilities	Snow removal; backup generators; shelters when necessary	Maintenance programs for heating and cooling equipment; cooling stations when necessary	Public outreach in classrooms	H	O
Cemeteries	Town-wide	Private	V	Proper maintenance of drainage in the area; plantings with deep root systems	Tree trimming/removal program	Use of drought resistant plantings		L	O
At-Risk Populations	Town-wide	N/A	V	Public outreach; volunteer programs				M	O
				Shelters when required	Warming shelters when required; snow removal programs; mental health intervention	Cooling stations; shelters when required; mental health intervention	Water stations		
Environmental									
Reservoirs	Pond Street/Oak Street	Tri-Town	V & S	-	Tree trimming/Removal program	-	Dredging; Public Outreach; Water Conservation	H	L
Norroway Pond/Powers Farm	N. Main Street	Town	V & S	Proper maintenance of drainage in the area; plantings with deep root systems	Tree trimming/Removal program	Use of drought resistant plantings		M	O
Belcher Park	Liberty/Allen	Town	S	Proper maintenance of drainage in the area; plantings with deep root systems	Tree trimming/Removal program	Use of drought resistant plantings		M	O
Open Spaces	Town-wide	Town/Private	S	Proper maintenance of drainage in the area; plantings with deep root systems	Tree trimming/Removal program	Use of drought resistant plantings		M	O
Blue Hills Reservation	North Randolph	State	V & S	Proper maintenance of drainage in the area; plantings with deep root systems	Tree trimming/Removal program	Use of drought resistant plantings		M	O
Closed Landfill	West of Rte. 24	Private	V & S	Ensure drainage systems are properly maintained	-	-	-	L	O
Bear Swamp	Central Randolph	Town	V & S	Proper maintenance of drainage in the area; plantings with deep root systems	Tree trimming/Removal program	Use of drought resistant plantings		M	O

Community Resilience Building Risk Matrix

COMBINED RED/BLUE MATRICES

www.CommunityResilienceBuilding.org

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

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

Features	Location	Ownership	V or S	Flooding	Severe Winter Storms/High Winds	Extreme Temperatures	Drought	Priority H - M - L	Time S Short L Long O Ongoing
Infrastructural									
Water Treatment Plant	Pond Street	Joint Board	V	Install flood barriers/wall (new building already planned at new location away from floodrisk). Elevate equipment.	Ensure backup generator power; Tree Trimming in close proximity to Plant	Air control system to help control temperature - overheating/freezing.	Water Conservation; Public Outreach; Water Usage Regulations; MWRA Emergency Connection upgrade	H	S
Water Distribution System	Town-wide	Town	V & S	-	Ensure backup power where required.	Replace cast iron pipe susceptible to freezing.	Water Conservation; Public Outreach; Dredging Reservoirs; Construction of Storage Tanks; Low flow fixtures; Water usage regulations; emergency connection with neighboring towns	H	O
Wastewater System / Sewer Pumping Stations	Town-wide	Town	V & S	Ensure backup generator power. Conduct an I/I investigation, ensure I/I mitigated; Ensure critical infrastructure is elevated above flood plains; Proper installation of underground utilities.	Tree trimming in close proximity to stations	Ensure equipment has proper cooling and heating	-	H	O
Stormwater Drainage Systems	Town-wide	Town	V & S	Catch basin and pipe cleaning program; Easement clearing program; Drainage study; resize system where appropriate; Increase pervious areas; Use of Best Management Practices	Maintain and clear blockages during storm events through catch basin cleaning program and outreach to public to clear storm drains.	-	-	M	O
Power System	Town-wide	Private	V & S	Ensure critical infrastructure is elevated above flood plains; proper installation of underground utilities	Tree trimming program; undergrounding where possible; redundant systems and equipment; investigate new power sources (solar/wind/water)	Public outreach during periods of high temps; limit power usage during high temps	-	M	L
Communication Towers	Town-wide	Private	S	Ensure backup generator power. Ensure critical infrastructure is elevated above flood plains; Proper installation of underground utilities	Tree trimming in close proximity	Ensure equipment has proper cooling and heating	-	L	L
DPW Buildings/Storage	Town-wide	Town	V & S	-	Structural - withstand wind/snow loads.	Air control to maintain fleet/vehicle repair.	-	L	O
Town Facilities - Fire/Police, Town Hall	Town-wide	Town	S	Ensure grading/drainage is sufficient to channel water away from buildings. Proper sealing/waterproofing of doors.	Ensure backup generator power for long-term use.		-	H	S, L, O
Roads, Bridges, Culverts	Town-wide	Town/State	V & S	Maintenance programs; Private culvert cleaning enforcement; Culvert/bridge studies; Culvert resizing, repair or replace as necessary	Structural integrity. Ensure critical roadways are not subject to washouts.	Bridge study to ensure bridges are built to withstand temperature changes.	-	M	L
Societal									
Schools	Town-wide	Town	V & S	Ensure grading/drainage is sufficient to channel water away from buildings; Proper sealing/waterproofing of doors; Ensure critical infrastructure is elevated above flood plains; Proper installation of underground utilities	Ensure backup generator power for long-term use. Improved HVAC systems. Snow removal; Shelters when necessary	Maintenance programs for heating and cooling equipment; cooling stations when necessary	Public outreach in classrooms on water usage.	H	S, L
Hotels	Town-wide	Private	S	Ensure grading/drainage is sufficient to channel water away from buildings. Proper sealing/waterproofing of doors.	Ensure backup generator power.		Public outreach on water usage.	L	S
Religious Institutions	Town-wide	Private	S	Ensure grading/drainage is sufficient to channel water away from buildings. Proper sealing/waterproofing of doors.	Ensure backup generator power. Inspect structural integrity (due to age of buildings).	-	Public outreach on water usage.	L	S
Supermarkets	Crawford Square	Private	S	Ensure grading/drainage is sufficient to channel water away from buildings. Proper sealing/waterproofing of doors.	Ensure backup generator power for long-term use.		Public outreach on water usage.	M	S
Pharmacies	Town-wide	Private	S	Ensure grading/drainage is sufficient to channel water away from buildings. Proper sealing/waterproofing of doors.	Ensure backup generator power. Inspect structural integrity (due to age of buildings).	-	Public outreach on water usage.	M	S
Historical Sites	Crawford Square	Town/Private	V	Ensure grading/drainage is sufficient to channel water away from buildings. Proper sealing/waterproofing of doors.	Ensure backup generator power.		Public outreach on water usage.	L	L
Parks/Fields	Town-wide	Town	S	Proper maintenance of drainage in the area; plantings with deep root systems	Tree trimming/removal program	Use of drought resistant plantings		L	O
Elderly/Disabled Populations	Town-wide	N/A	V	Public outreach; volunteer programs. Shelters when required	Warming shelters when required; snow removal programs	Cooling stations; shelters when required	Water stations	M	O
Veteran's Home/Group Homes	Town-wide	Private	V	Public outreach; volunteer programs. Shelters when required	Warming shelters when required; snow removal programs	Cooling stations; shelters when required	Water stations	M	O
Food Pantry	Center of Town	Private	V & S	Ensure food is stored above flood plain	Ensure snow removal; consider backup power	-	-	M	O
Non-English Speaking Population	Town-wide	N/A	V	Public outreach in native languages				M	O
Public Housing	Sunshine, Pleasant	Town	V	Public outreach; volunteer programs. Shelters when required	Warming shelters when required; snow removal programs	Cooling stations; shelters when required	Water stations	M	O
Cemeteries	Town-wide	Private	V	Proper maintenance of drainage in the area; plantings with deep root systems	Tree trimming/removal program	Use of drought resistant plantings		L	O
At-Risk Populations	Town-wide	N/A	V	Public outreach; volunteer programs. Shelters when required	Warming shelters when required; snow removal programs; mental health intervention	Cooling stations; shelters when required; mental health intervention	Water stations	M	O
Environmental									
Norroway Pond/Powers Farm	North Main St	Town	V & S	Maintain culverts/drainage channels; Monitor/adjust pond height at the dam as necessary; Proper maintenance of drainage in the area; Plantings with deep root systems	Tree trimming/removal program	Use of drought resistant plantings. -	Adjust pond height at the dam; Provide public education on grass fire prevention	L	O
Reservoirs	Pond Street / Oak Street	Tri-Town	V & S	Monitor height for overtopping to treatment plant	Ensure backup generator power at the treatment plant; Tree trimming/removal program	-	Conduct inspections during drought to make appropriate repairs; Water conservation/public outreach; Dredging	H	O
Open Spaces	Town-wide	Town/Private	S	Proper maintenance of drainage in the area; plantings with deep root systems	Tree trimming/Removal program	Use of drought resistant plantings		M	O
Watersheds	Town-wide	Town/Tri-Town	V	Conduct hydrologic studies. Safeguard against contamination.	Conduct hydrologic studies for water management practices.			H	O
Blue Hills Reservation	North Randolph	DCR	V & S	Conduct hydrologic study - landslide possibility; Proper maintenance of drainage in the area; Plantings with deep root systems	Tree trimming/removal program	Public education on fire safety; Use of drought resistant plantings		L	O
Belcher Park	Liberty/Allen	Town	S	Proper maintenance of drainage in the area; plantings with deep root systems	Tree trimming/removal program	Use of drought resistant plantings		M	O
Closed Landfill	West of Rte. 24	Private	V & S	Ensure drainage systems are properly maintained	-	-	-	L	O
Bear Swamp	Central Randolph	Town	V & S	Proper maintenance of drainage in the area; plantings with deep root systems	Tree trimming/removal program	Use of drought resistant plantings		M	O

APPENDIX E

- **Group Discussion Notes**

DISCUSSION OF HAZARDS

Red Group Top Hazards

- Flooding
- Drought/Extreme Temperatures
- Severe Winter Storms/High Wind Events
- Invasive Species

Blue Group Top Hazards

- Flooding
- Nor'easter/Snow/Blizzard
- High Wind
- Drought

TOP 4 HAZARDS

Flooding
Severe Winter Storms/High Winds
Extreme Temperatures
Drought

DISCUSSION OF CRITICAL FACILITIES

- **Added to the List**
  - MDC Bridge
  - Rte. 24 Bridges
  - Bridge over 95/128 Exchange
  - Lindwood Cemetery
  - Oakland Cemetery
  - Trinity Childcare
  - Step Ahead Childcare
  - Knowledge Tree
  - Stars
  - Bridle Path Apartments
  - Adult Day Cares
    - Soley Leve Adult Day Care
    - Cadre Ideal
  - Care One Medical Facility
  - Intergenerational Community Center
  - Stetson Hall
  - Food Pantry
  - Corkin Building
  - Turner Free Library
  - Town Swimming Pool
  - America Food Basket
  - Randolph Pharmacy
  - Holiday Inn Express
  - Comfort Inn
  - Gas Stations
  - Wholesale Food Suppliers
  - Johnson Drive Solar Installation
  - Spring of Water School
  - May Institute
  - Randolph/Holbrook MBTA Station
  - Rocky Mountain Springwater

- **Removed from the List**
  - Tower Hill Early Childhood Center
  - Play Group Plus
  - St. Mary's School
  - Fernwood Propane Co.
  - Sunbridge Nursing
  - Signature Medical
  - Milton Hospital and Associates
  - TKT Theraphies Inc.
  - DPW Barn
  - Emergency Operations Center
  - Centennial Health Center
  - Senior Center
  - Rite Aid Pharmacy
  - Lynwood Memorial Park
  - Devine Elementary School

DISCUSSION OF ACTIONS

Red Group Top Actions

- Power system protection
- Water conservation/public outreach
- Drain/culvert maintenance
- Access to emergency services

Blue Group Top Actions

- Ensure backup generators for priority buildings
- Improve HVAC systems in schools

TOP ACTIONS

- **Generator power for critical facilities**
- **HVAC system improvements for schools**
- **Power system protection**
- **Access to emergency services**
- **Water conservation & public outreach**
- **Drain/culvert maintenance**