Westwood, Massachusetts

MVP Community Resilience Program

Resilience Building Workshop

February 2020

SUMMARY OF FINDINGS

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MVP Community Resilience Program

Westwood, Massachusetts

Resilience Building Workshop

SUMMARY OF FINDINGS

Prepared by: BETA GROUP, INC.
Prepared for: Town of Westwood, MA

February 2020

TABLE OF CONTENTS

LIST OF APPENDICES

1.0 OVERVIEW

The Town of Westwood, located in the North of Norfolk County, is in both the Charles River Watershed Basin and Boston Harbor Watershed Basin. Westwood is a suburban town whose growing population was under 15,000 at the time of the 2010 census but, has grown to over 16,000 according to 2017 estimates. The town has a large area of wetlands and several water bodies in town, including Noannet and Buckmaster Ponds, as well as several brooks. Additionally, there are several critical areas subject to frequent flooding such as University Ave. train station.

Over the past several years there have been an increasing number of impacts due to climate change that have affected the Town of Westwood. With more frequent storms and associated high winds, Westwood is experiencing downed trees and powerlines causing problems town-wide, as seen during extreme weather in 2012. Extreme rainstorms flooded homes and closed roads with serious affect to University Ave. In more recent years the town has experienced a variety of environmental hazards from invasive species, vector borne disease from mosquitos, which became a widespread problem this year, and extreme flooding effects from an increasing number of beaver dams. Not only have weather patterns become more severe, but the demographic of local wildlife is shifting as well, bringing in larger numbers of animals like beavers, which can seriously affect streams and flooding in a way not previously seen in Westwood.

In response to the effects of climate change, the Town of Westwood sought out the Municipal Vulnerability Preparedness (MVP) Program and conducted a Community Resilience Building (CRB) workshop in order 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 strengthen and vulnerabilities;
- Develop prioritized actions for the Community;
- Identify immediate opportunities to collaboratively advance actions to increase resilience.

Participants Sign-In to Westwood CRB Workshop

Westwood 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 Westwood received a grant to host the 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

The participants were selected with guidance from the CRB Workshop Participant Worksheet. An effort was made to invite participants from several different areas of town involvement in order to have a broad range of perspectives on how climate change would affect the Town. There were 16 participants representing many different departments for the town and region, as well as 3 BETA facilitators. This was crucial to the success of the program, as the Fire Department representative noticed different hazards than the Neponset River Watershed Association (NRWA) representative Highway department, and the Town Administrator. Additionally, workshop participants who had never attended a CRB workshop had a more town-focused approach, where regional representatives who had previously participated in a CRB Workshop had a broader approach to discussion. This diversity of thought and perspective allowed the workshop to be highly informative and an overall success. The list of invitees and participants is attached in **Appendix A**.

Participants listen to BETA Presentation

The participants were divided into three groups, distinguished by the colors red, blue, and green, as noted on the maps and 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. The core team for the

CRB Workshop consisted of Andy Dennehy of BETA, Mike Jaillet, former Town Administrator, Todd Korchin Director of Public Works and Brendan Ryan Department of Public Works

1.1.2 WORKSHOP PROCESS

It was decided that the workshop would be held in two, four-hour sessions, held on Tuesday, November 12 and Thursday November 14, 2019. Workshop sessions were held from 10:00 am to 2:00 pm at the Westwood Building Department. BETA led this workshop with multiple CRB-trained individuals. 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 Westwood'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 CRB 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?

1.1.2.1 DAY 1

The first four-hour session was held on Tuesday, November 12, 2019 and 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 facilitators Melissa Recos, P.E. and Andrew Dennehy, P.E. Some of the research and projects presented were that precipitation is projected to increase 8%, there will be 28% fewer days below freezing, and up to 4 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**.

Andy Dennehy of BETA Presents Power-Point to Workshop Participants

The participants then broke out into their designated small groups for further discussion. Small group discussions began by discussing hazards affecting Westwood and developing a list of the top four hazards of concern each group felt Westwood was most impacted by. Groups annotated maps to highlight vulnerable areas, infrastructure, flood zones, and community resources in order to better

assess which hazards to prioritize in the Risk Matrix. Groups were made up of a facilitator (a member of the BETA team), a scribe/spokesperson, and three other workshop participants.

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, High Wind/Winter Storms, Drought/Extreme Temperatures and Invasive Species. After this discussion, the participants returned to their groups in order to discuss features and add them to the matrix. Looking at the map in conjunction with the four identified hazards allowed the participants to more clearly see the flood risk areas as well as identify the locations most impacted by the other three 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**.

1.1.2.2 DAY 2

The second four-hour session was held on Thursday November 14, 2019 and began with a brief presentation and overview of day one. The participants then returned to 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 tree trimming, investigate beaver control program, investigate dam removal or maintenance, and looking into alternative power sources, especially for areas that often lose power. Throughout the small group discussions, the BETA facilitators stayed with groups to ask questions to prompt discussion (triggering questions) and provide guidance.

Small Group Discussion of Priority Hazards Using Town Map

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 all 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 Westwood. 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. The sheets where each group contributed their ideas during large group discussion 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 individual group discussion, the following hazards were identified as being most prevalent and/or impactful in the Town of Westwood and were brought up for discussion in the larger group.

- Inland Flooding
- Hurricanes
- Drought
- Health Concerns
- Heat/ Wildfires
- High Wind/Heavy Snow
- Extreme Temperature
- Invasive Species

Participants Discuss Priority Hazards in Large Group

The small groups had many of the same concerns in mind while choosing top natural hazards. One of the most common concerns was the recent outbreak in EEE in the area as well as the serious impact beavers have on the local culverts, streams and floodplains. One group addressed EEE under the hazard "Health Concerns" while another grouped mosquitos, beavers and other types of wildlife under "Invasive Species". These concerns were universal among participants and recognized as important, especially considering the Town currently does not have a solution or mitigation effort in place for these species. In recent years the beaver population has dramatically increased, and the effects are being seen all over Town.

Flooding was universally thought to be a problem, as the consequences are severe. Additionally, as rains and impermeable surfaces increase, so does the risk of serious storms, flashfloods, and other rain events which cause flooding, and have serious consequences to Town functioning. Conversation continued in greater depth during the discussion of features and actions and, is discussed in later sections.

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**
- **High Wind/ Winter Storms**
- **Drought/Extreme Temperature**
- **Invasive Species**

2.1.2 AREAS OF CONCERN

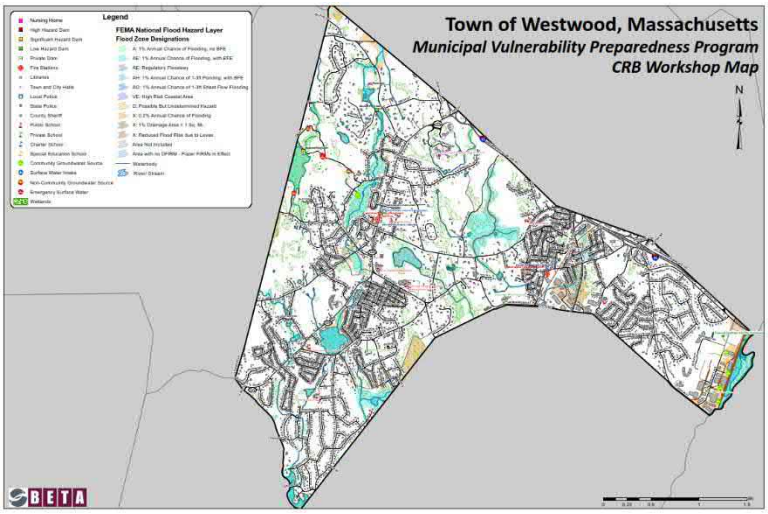
In discussing the top hazards, participants naturally began pointing out areas where these hazards often occur. The hazards which triggered the most discussion were flooding and invasive species. Participants circled various locations marking out both natural and beaver dams, which contribute to flooding problems in the area. When dams overflow or are released the down-stream area often floods, especially if it coincides with a storm event, as noted on the map.

Some areas that often experience flooding are the University Ave. train station, which is also a community groundwater source. A second area that frequently experiences flooding is a low-laying neighborhood between Pond St. and Edgewood Rd. Work was recently done in this area on the drainage system which has alleviated much of the flooding.

Westwood has experienced a number of weather-related events in recent years, and these events are expected to increase due to climate change. Flooding in the low-laying areas, especially those near bogs and downstream of dams are a major concern for Westwood. High winds /winter storms posed another major concern for many of the workshop participants, because this weather leads to fallen trees and downed power lines, especially the power lines of Martha Jones school, which can have serious affect on the function of the school.

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:



Map of Westwood used in the CRB Workshop Process

- Infrastructural
  - Culverts
  - Dams
  - Bridges
  - Sewer Infrastructure
  - Roadways
  - Low-laying areas
  - Sewer Pump Stations
  - Town Buildings
  - Drainage Infrastructure
  - Power and Communication
  - Domestic and well Water systems
  - Transportation
- Societal
  - Low income/ Disadvantaged Population
  - Public Services Staff
  - Children/Students
  - Schools
  - Residential Areas
  - Hale Reservation
  - Business community
  - Parks/Playgrounds/fields
  - Commuter Traffic
  - Elderly Population
  - Shelter Facilities
  - Vulnerable Neighborhoods

    - Faith based organizations
- Environmental
    - Conservation Area
    - Parks & Open Space/ Sports Fields
    - Water Protection Districts
    - Buckmaster Pond-Reservoir
    - Rivers/Brooks
    - Watersheds/Flood plains
    - Ground water/Water table/Well Fields
    - Dams
    - Trees
    - Wildlife

Participants Discuss Features in Small Groups

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.

2.1.4 Prioritizing Actions

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

- *Hydrologic Study:* With so many dams, culverts and bridges in town, participants wanted to be able to assess the current conditions and areas for improvement. This would include a catch basin cleaning and maintenance plan, as well as a drainage study and floodplain analysis. A full-scale analysis of all the related facets of hydrology is important to be able to best understand and develop solutions to the flooding, and drainage issues in Town.
- *Tree Trimming:* During high wind or heavy snowstorm events, downed trees and branches cause major maintenance problems in Town, especially to the Martha Jones School, which often loses power. Tree trimming is extremely important preventative maintenance which the Town would like to encourage Eversource to continue to keep up with, as many of these trees are not maintained by the Town. The tree-trimming program will also address related concerns expressed by many of the participants regarding power and communication systems.
- *Investigate and Develop Beaver Management Plan:* There are many beavers and dams in Town, including a large area where beavers frequently build dams and lodges, as marked on the blue group map in **Appendix D**. This is extremely difficult for the town to manage because the beaver population seems to be growing and they construct dams at an alarming rate. This can have various affects downstream and, the Town does not have an effective management plan at this time.
- *Dams:* This was a major theme throughout the workshop; as projected rains increase, participants discussed the worry that Westwood will not be able to manage the increase in flow through drain system, and other mitigation efforts. One of the biggest discussions revolved around the necessity or effectiveness of dams and, whether to release, repair or deconstruct them. Participants understood the need for more flood mitigation in the coming years but, were hesitant to rely on dams for this process. Because of this, a dam study was a highly ranked need moving forward.
- *Conant Road Culvert:* Culverts were a major point of concern among all of the workshop participants; whether they discussed undersized culverts or beavers damming up culverts causing flooding, or an old culvert in need of replacement or repair. While all culverts were

discussed, Conant Road Culvert was especially cause for concern as it is undersized and nearing the end of its useful life. The town has particular issues with this culvert and the participants spent significant time discussing related actions.

- *Engage Student Population in Resiliency Efforts*: Many of the participants expressed the desire to engage the student population in a water management, recycling, or other resilience education programs. Many participants felt that engaging the student population would not only teach the next generation but, will also encourage their families to consider conservation as well.

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 Westwood.

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 water system and the power and communication systems. The participants agreed that having a trees and open space in town is a great asset. Open space provides options for increasing flood storage or restoring floodplains, in the event the Town chooses to investigate that. Trees provide habitat for wildlife and help with erosion control.

Town Public services, such as DPW, Fire and Police departments, are also considered a strength by the group at large. Westwood has a fire house at two locations to provide swift response in case of emergency all over town and, has a centralized filling station at the DPW for all municipal trucks. It is critical to town safety and operations that these services are maintained as a strength. **Appendix D** has a more detailed description for reference.

Another priority to the participants was the involvement of students in conservation efforts. The Neponset River Watershed Association (NRWA) already has a program that integrates the students into their public outreach program. This is an asset that is currently being taken advantage of by Westwood and, will hopefully build on to increase this strength moving forward.

2.3 Future Actions and Resolutions to Improve Community Resilience

2.3.1 Prioritizing Actions

Below is a list of all the actions organized by how each group ranked them (high, medium and low priority). Additionally, there are a few actions that were ranked differently by different groups. In this list some similar items were combined; for more information, see **Appendix D**.

The high priority actions are as follows:

- Undersized Culverts (Esp. Conant Rd): Hydrologic study of assets to identify vulnerabilities & culvert upgrades with recommended actions, Identify natural flood storage/ LID applications throughout town, consider options to protects culverts from large debris, develop Culvert cleaning/maintenance program, Evaluate small ponds for animal/ mosquito habitat
- Dams (Esp. @ Crystal Hill): Look at legal ramifications and town obligation for longevity of dam, Risk Assessment/ Study of assets with recommended actions, consider dam removal options to protect culverts and other assets, develop maintenance plan, Evaluate small ponds for animal/ mosquito habitat
- Bridges: Culvert sizing study, Culvert cleaning program, Beaver Control program

- Roadways & low-laying areas: Create a plan/study identifying vulnerable neighborhoods & populations within for evacuation & emergency response, Study of assets with recommended actions, Knotweed program, Preventative paving measures (avoid frost heaves etc.), Drainage Study, Additional CB cleaning, equipment upgrades, Continue to encourage Eversource to trim their trees, Additional pretreatment of roads before storms
- Wastewater Pump Stations: Address Flooding (esp. Conant Rd), Backup Power, Backup pumps, bypass connection, Electronics cooling, Beaver Control Plan
- Drainage Infrastructure: Continue to implement Catch basin cleaning/ maintenance plan. Evaluate system capacity & assess upgrade when Re-paving, associate with Road Master Plan, Add Pavement Markings to identify locations of CB's, Evaluate system capacity & assess upgrade when Re-paving, associate with Road Master Plan
- Power & Communication: Test/Upgrade/Maintain Emergency Communication Systems and infrastructure, Study on Town-wide Emergency Communication Systems (DPW, Fire & Police), Investigate backup power for Town facilities, Continue to improve Emergency operations center, Consolidate all communication, Solar backup system/ microgrid for Police/Fire/ Town hall, Continue to encourage Eversource to trim their trees, or Relocate wires underground, Investigate Critical locations to be exempt from brown-outs, Look into Alternative Power Source & Conservation Education
- Elderly, Disabled, Low-Income, Disadvantaged Population: Cooling stations, bottled water, A/C program, Outreach, Transportation, Communication & Shelter , Investigate Critical locations to be exempt from brown-outs, Look into Alternative Power Source, Communicate EEE Risk & ways to avoid, Pre-treat Mosquito Breeding grounds, Update current plan/ create a plan to maintain access to facilities, ability for people to get there &emergency personnel to get there, Educate & market plans in place, Outreach, Transportation, Communication & Shelter , Evaluate Emergency Operation Plan, Actively Maintain list of high risk people
- Schools: Frequent loss of power at Martha Jones School, Look into new generator, Investigate Alternative Power Source and storage of power. Maintain generator at Highschool because it's a shelter, Air Condition Schools, Look into Alt Power to support schools, Continue energy efficiency assessment with Tom Philbin, Continue & enhance school environmental education, Communicate EEE Risk & ways to avoid, Pre-treat Mosquito Breeding grounds, Move programs inside or earlier in the day
- Groundwater/Water Table: Investigate LID measures, Water Conservation & Stormwater management to augment infiltration, Investigate LID measures & opportunities
- Floodplains and Conservation areas: Downed tree removal and disposal, Investigate opportunities to increase flood plain, Investigate ways to coordinate with surrounding towns, Dredging/disposal, flood storage, Water Restoration/Conservation outreach, Develop study to identify and Implement management plan for invasive species (plants, insects and animals especially beavers) general health of conservation Areas Removal & Disposal of Growth, outreach about water quality & pet waste, Educate Public on Concerns & issues

The Medium priority actions are as follows:

- Sewer Pump Station & System infrastructure: Hydrologic study to identify needs/vulnerabilities, Continue to implement I/I Plan, Investigate sewer systems located in Flood Plan
- Wells & Domestic Water system/hydrants: Work with district to ensure maintenance & upgrades are done, Investigate Water conservation Regulations for new development, Implement & update water conservation program, implement/ update stormwater bylaw

- Town Buildings: Protect HVAC at Police HQ, Energy Efficient Upgrades, Mosquito Control, Investigate backup power for Town facilities, Continue to improve Emergency operations center,
- Shelter facilities @ High School & Council on Aging: Update current plan, create a plan to maintain access to facilities, ability for people to get there &emergency personnel to get there & Solar power backup system
- Businesses & Faith based organizations: Update current plan/ create a plan to maintain access to facilities, ability for people to get there &emergency personnel to get there, Engage with businesses, Reach out to organizations and include in emergency management planning, Tree trimming equipment upgrades, storm management, Mosquito/Tick Control, Business outreach
- Students/Children: Continue & enhance school environmental education programs, Continue to implement Catch basin cleaning/ maintenance plan, Education Outreach & communication, Continue & enhance school environmental education programs, Look into Alternative Power Source, Communicate EEE Risk & ways to avoid, Pre-treat Mosquito/ Tick Breeding grounds, Move programs inside or earlier in the day
- Residential Area: Investigate Alternative Power Source, Continue to implement Catch basin cleaning/ maintenance plan. Evaluate system capacity & assess upgrade when Re-paving, associate with Road Master Plan, Add Pavement Markings to identify locations of CB's , Continue to be licensed to operate shelter and provide necessities in the event of power outage, Communicate EEE Risk & ways to avoid, Pre-treat Mosquito Breeding grounds
- Dams: Study of removal/maintenance & improvements, Mosquito and Beaver control
- Parks and Open Space: Educate Public on Concerns & issues, Study to identify maintenance plan for invasive species & general health of conservation Areas, mosquito/ tick control & education, Develop and Implement management plan for invasive species (plants, insects and animals) Investigate & create policy for invasive plants, Continue to acquire open space & floodplains, Turf in lieu of grass, Shading & trees, Plant more trees, Investigate locations , investigate resilient trees, Continue and Expand trail maintenance, Tree/Overgrowth management/ Continue to encourage Eversource to trim their trees, Investigate LID measures & opportunities, Drainage Study/ Upgrades
- Well fields & water Protection Districts: Outreach/ De-icing, Continue implementing regulations to protect District & flood plains, Water conservation Outreach, Educate Public on Concerns & issues, Study to identify maintenance plan for invasive species & general health of conservation Areas
- Rivers, Brooks, Streams, and Watersheds: Restore streams and wetlands to hold flood waters, risk assessment/study of assets with recommended actions, consider options to protect culverts from large debris, drainage studies and develop maintenance plan, investigate ways to improve water quality, investigate locations to plant more trees/investigate resilient trees, investigate water conservation regulations, plan to protect trout population in streams, and water restoration/conservation outreach

The low priority actions are as follows:

- Public Safety: Upgrade fuel system and storage facility, Estimate Fuel need and consumption, Evaluate, Equip & Train staff on how to properly manage these emergencies
- Commuter Traffic: Signage/Light boards & Communication, Knotweed program and Beaver control.
- Buckmaster Pond Reservoir: Educate Public on Concerns & issues, Study to identify maintenance plan for invasives & general health of conservation Areas, Mosquito control, Drainage Maintenance, water restoration/Conservation outreach

- Wildlife: Develop Beaver management plan/ Investigate Dam removal & wetland restoration, Communicate EEE Risk and ways to avoid, Pre-treat mosquito breeding grounds, Investigate water conservation Regulations, Plan to protect trout population in streams

2.3.2 Highest Priority Actions

The top actions, presented to 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.

- Hydrologic Study to identify flooding vulnerabilities & projects
- Dams – look at legal ramifications & town obligation for longevity
- Consolidated communication system addressing resilience and redundancy
- Upgrade fuel system and storage capacity for Town Vehicles
- Educate public & Study to develop maintenance plan for invasive species and general health of conservation areas
- Perform Risk analysis on condition of local dams and culverts
- Evaluate drainage systems capacity and assess upgrades
    - Associate with road master plan
- Investigate critical locations to be exempt from brown outs/ look into alternative power sources
- Enhance emergency Operations center and communications
- Evaluate small ponds for animal/ wildlife habitats
- Coordinate with surrounding towns to investigate increasing floodplain/ flood storage
- Study on Bridges/Culverts
- Radio system upgrades
- Underground power
- Mosquito/beaver control
- Drainage studies
- Public outreach

Participants Discuss Top Priority Actions

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

- **Emergency Operations and Communication Systems**
- **Develop Stormwater Master Plan (Including culvert sizing, overall hydrology/floodplains, street drainage capacity analysis, dam investigation)**
- **Community Education and Outreach**
- **Undergrounding Power**
- **Mosquito/ Beaver Control**
- **Fuel Storage and Capacity**

The emergency operations and communications were prioritized because they are crucial to the function of the town, and while many participants wanted to focus on preventative or restoration

measures, everyone recognized the importance maintaining and developing the emergency response systems.

Participants saw a wide range of stormwater issues, and drainage areas that the Town does not adequately understand. Because of this they agreed that developing a stormwater master plan would be beneficial in order to organize and prioritize the different parts of the expansive stormwater system. This also allows the Town to have a holistic view of any stormwater problem. A study allows research to determine the best method, whether it is increasing flood storage, installing L.I.D. measures or upsizing a culvert to address a flooding issue.

Community Education and Outreach was prioritized because without involvement, the projects chosen by town leadership will be less effective and supported. Informing the public of the risks of hazards and the benefits of mitigation actions creates a more environmentally conscious public, which is the ultimate goal. All participants agreed that this is a crucial effort.

Underground Power was prioritized because the Martha Jones school often loses power during events due to fallen trees or branches on the power lines. While it is a priority to resolve a power outage anywhere in town, losing power at the school has a greater risk to more people, affecting all the students and their families or care givers, as well as teachers and other staff. This is extremely disruptive to the school schedule and therefore was seen as a very high priority.

This year as there was a major EEE outbreak which cancelled outdoor events, increased need for treatment and additional precaution, and posed serious health risks to residents, especially children and the elderly. Westwood like many other communities in the region were unprepared for this outbreak, therefore many of the participants emphasized pretreatment and preparedness. Additionally, the beaver population has increased dramatically in recent years and have been damming up multiple rivers in Westwood, causing some flooding. The Town has been working to solve this problem in a way which won't harm the beaver population while maintaining the natural flow of the river but have yet to come to a solution.

Currently, the Town has a fuel storage and filling station is currently located near the DPW, this has many benefits but because of the centralized location, in the event of an emergency it is possible that town vehicles could be cut off from fuel.

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

Westwood presented the CRB process and summary of findings at a public listening session at Westwood Public Library on March 2, 2020. This meeting was held before a regularly schedule Board of Selectmen Meeting and was advertised on the Town's website and residents and interested parties were encouraged to attend.

The following topics were discussed during the Listening Session:

- Overview of the Municipal Vulnerability Preparedness Program
- Nature Based Solutions and their role in the Program
- Climate data and projections
- Impacts from Climate Change
- Workshop overview
- Hazards, features and actions identified during the workshop

- Priority Actions developed during the workshop
- The next steps for the Town in the program

Input from the attendees of the Listening Session was focused on public outreach and education programs and an increase in renewal energy sources such as solar power for Town-owned properties. In particular, attendees felt increased involvement of the Town's public schools would be beneficial. The overall hydrology of the Town was also a topic of discussion with several large environmental areas discussed with particular concern about flooding associated with these areas.

All of their concerns had previously 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 Westwood 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 Westwood'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 (2020, February). MVP Community Resilience Building Workshop Summary of Findings, Westwood, MA.

5.0 Acknowledgements

Many thanks to the MVP Core Team members and CRB workshop participants. Thank you to the Town of Westwood for providing and coordinating a space to host 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

List of Participants

Appendix A: List of Participants

11/12/2019	11/14/2019	First	Last	Town Department/ Role
x	x	Ken	Aries	Westwood Public Schools
		Cindy	Barenthaler	Public Works Departmet
		Richard	Barry	Operations Manager
		Karon	Catrone	Conservation Agent
		Richard	Cerullo	Deputy Fire Chief
	x	Eileen	Commane	DWWD
x	x	Ian	Cooke	Neponset River Watershed Ass.
x	x	John	Deckers	Westwood Fire Department
		Joe	Doyle	Building Inspector
		Patricia	Healey	Public Works Departmet
x	x	Mike	Jaillet	Town Aministrator
x	x	Pete	Kane	Resident
x	x	Todd	Korchin	Westwood Public Works
x	x	Nora	Loughnane	Community & Economic Dev.
x	x	Abby	McCabe	Westwood Planning
		James	McCarthy	Facilities Manager
	x	Carolyn	Meklenburg	MVP Regional Coordinator
	x	Jared	Orsini	Health Director
x	x	Phil	Paradis	BETA/Public Works & Engineering
x	x	Mike	Perkins	Building Department
x	x	Brendan	Ryan	Westwood Public Works
x	x	Karon	S. Catrone	Conservation Commission
x		Jeffrey	Silva	Westwood Police
	x	Joe	Vinci	Westwood Police

11/12/2019	11/14/2019	Name	BETA Group Title
x	x	Andrew Dennehy, PE	Project Manager
x	x	Mary Beth Irwin	Engineering Designer
x	x	Melissa Recos, PE	Project Manager

APPENDIX B

- **Community Resilience Building Workshop Presentation**
  Westwood, MA

Municipal Vulnerability Program (MVP)

Westwood, MA

November 12th, 2019

Welcome and Introductions

- Andy Dennehy, Associate, BETA Group, Inc.
- Melissa Recos, Project Manager, BETA Group, Inc.
- Mary Beth Irwin, Engineering Designer, BETA Group, Inc.

Municipal Vulnerability Program Agenda

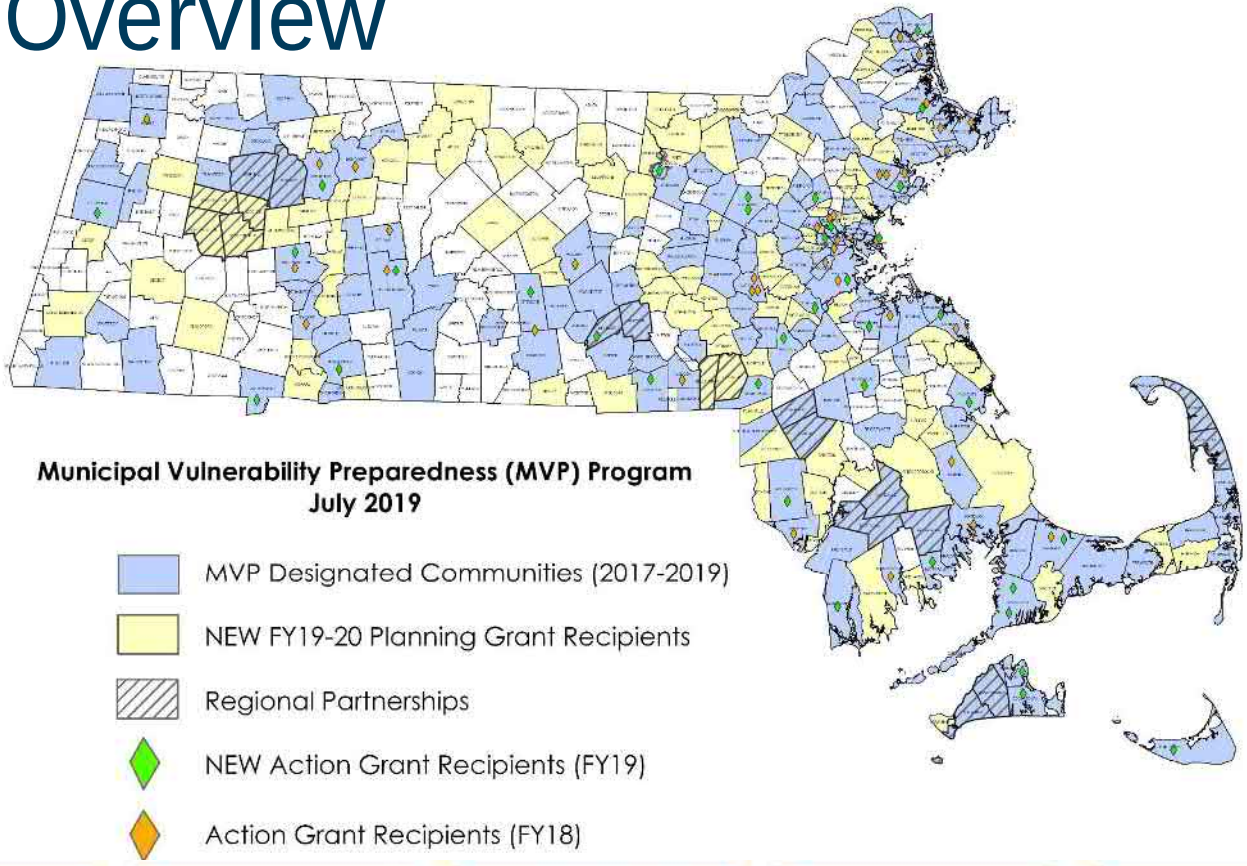
- Program Overview
- Workshop Overview
- Science and Resources Information
- Introduction to Small Team Exercise
- Reporting Small Team Findings
- Summary Discussion
- Wrap-up and Introduce Workshop #2 (Wednesday)

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

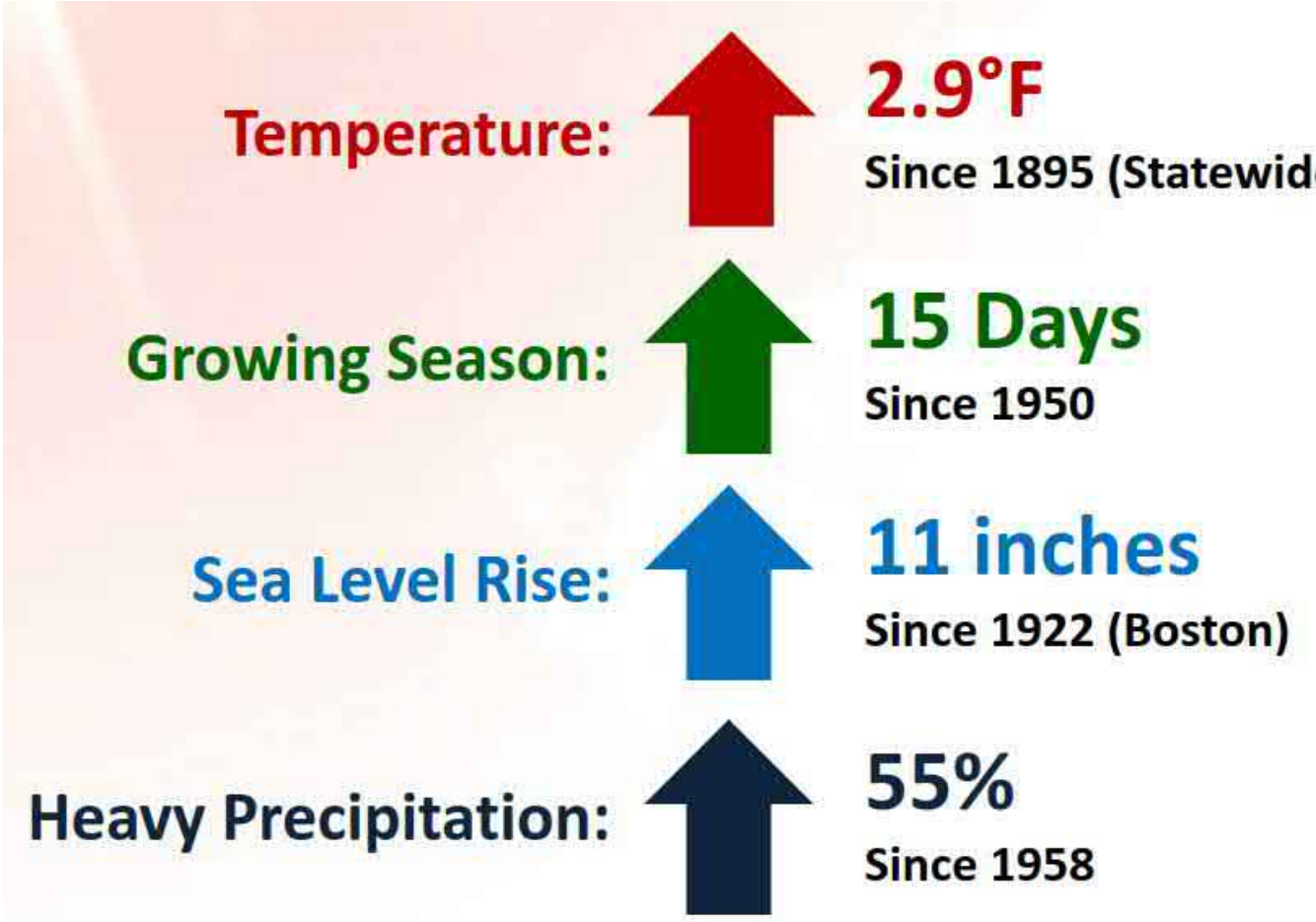
Open Space Preservation through Land Acquisition

Green Streets

Flood Friendly Culverts

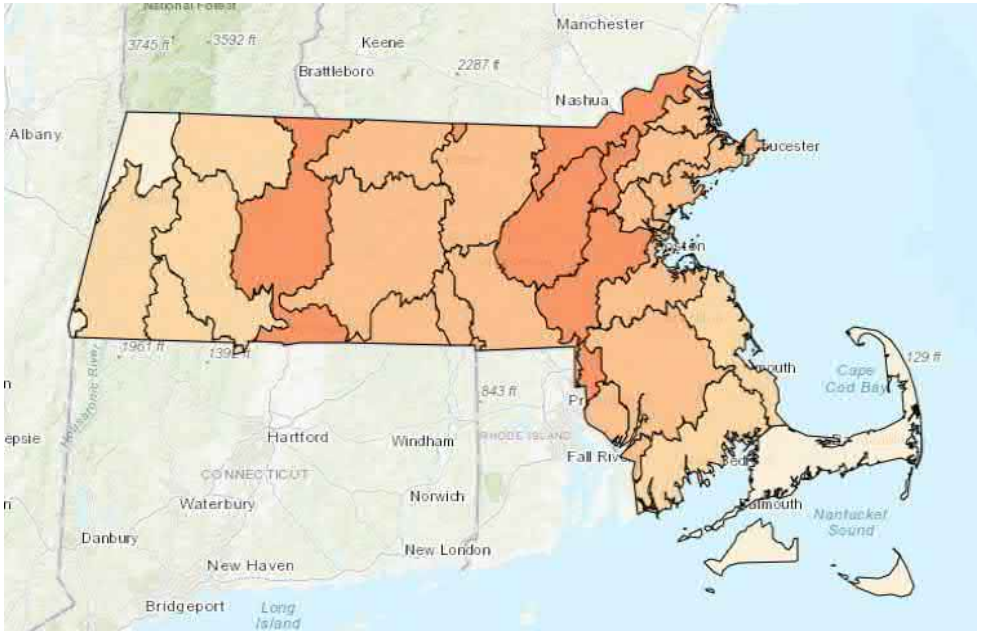
Regulatory and Policy Approaches to Address Hazards

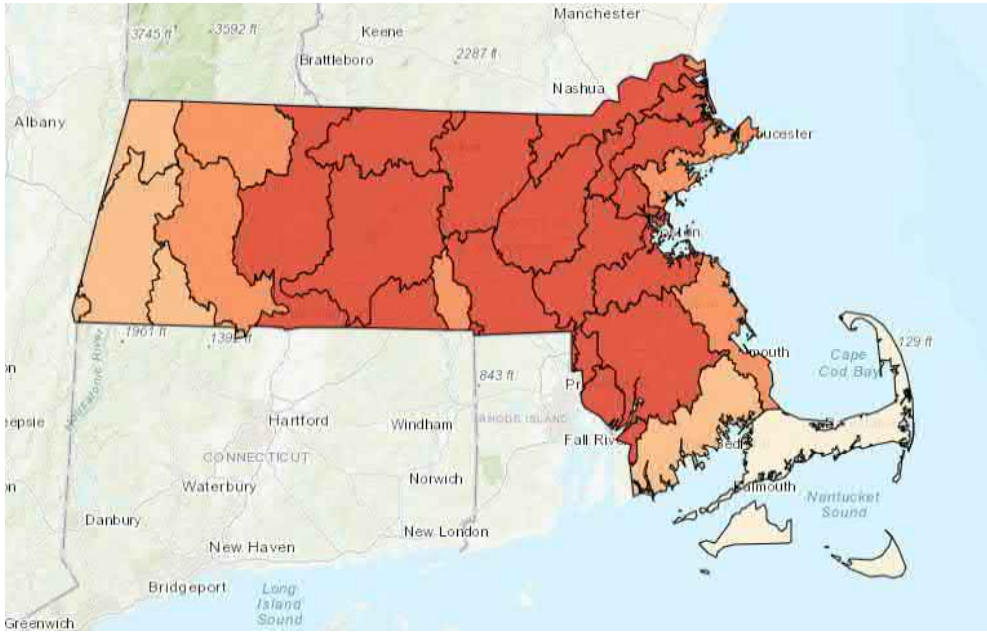
Massachusetts Observed Climate Changes



Massachusetts Projected Climate Changes

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



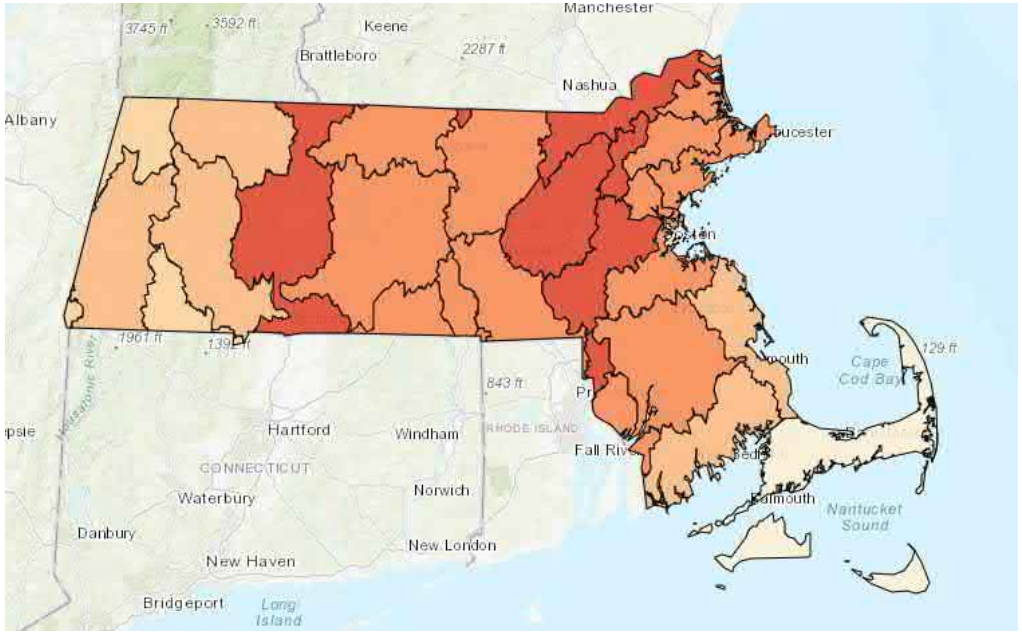


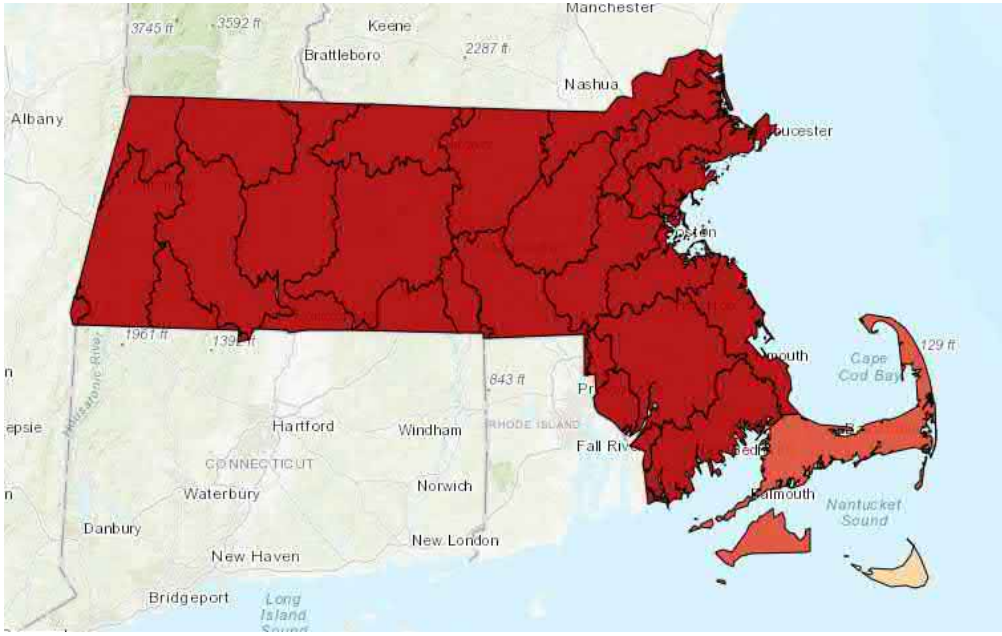
Projected change in # days above 90°F

+7.6 +12.4 +16.5 +21.8 +39.4

Massachusetts Projected Climate Changes

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



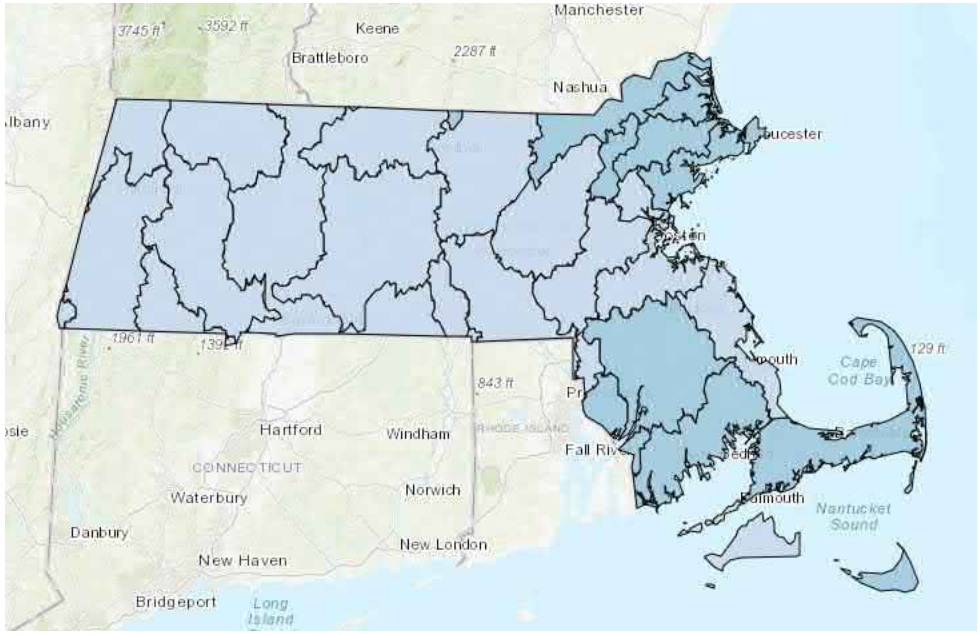


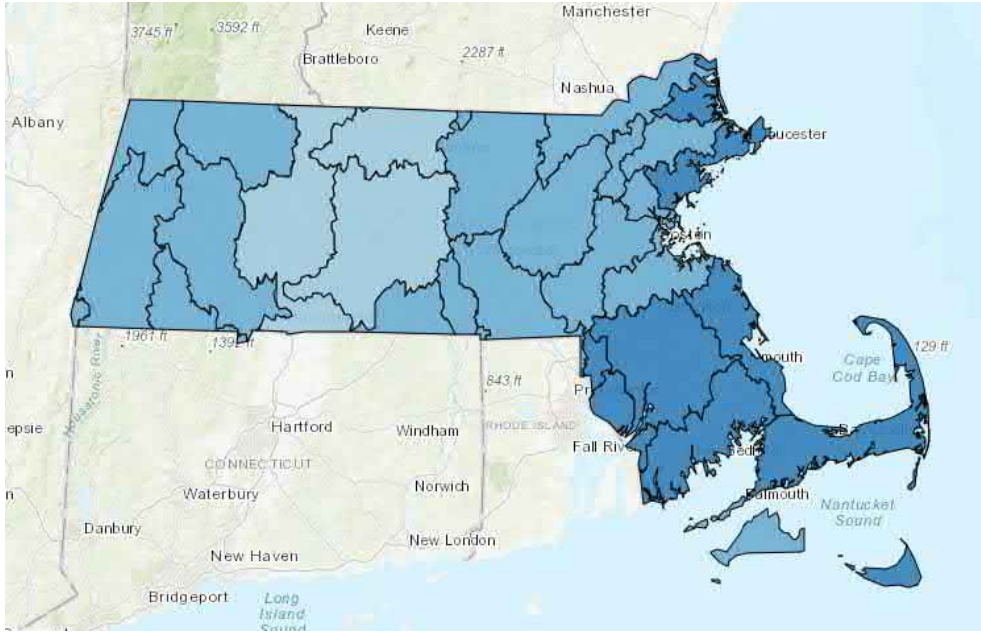
Projected change in # days above 90°F

+7.6 +12.4 +16.5 +21.8 +39.4

Massachusetts Projected Climate Changes

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



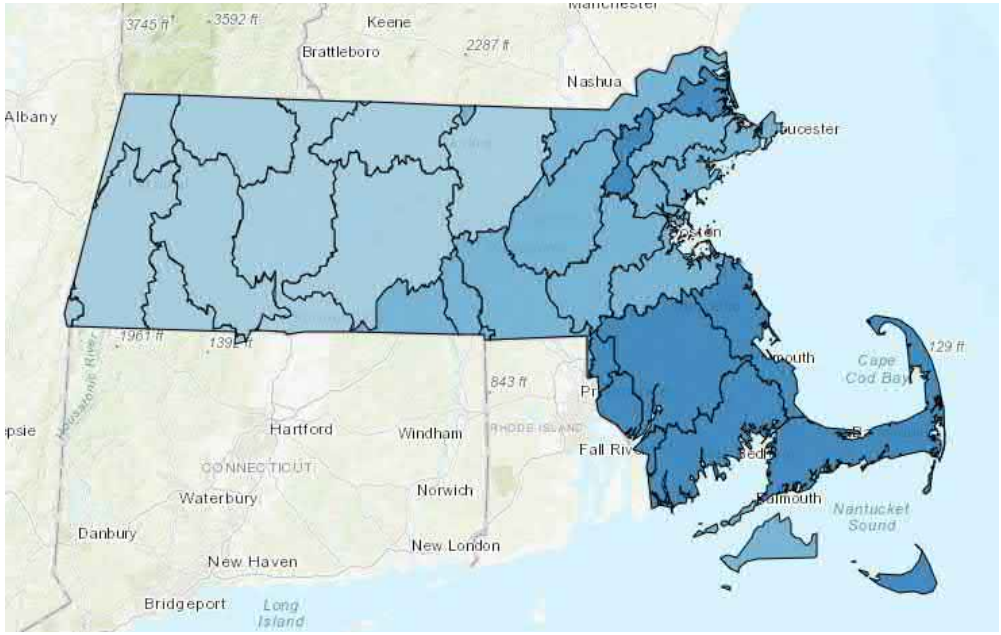


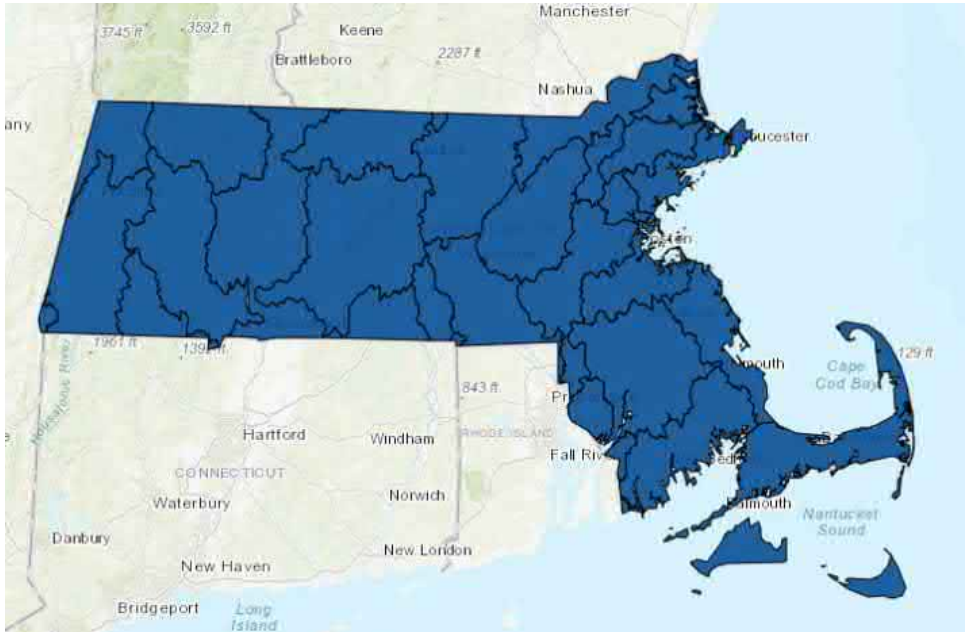
Projected change in # days below 32 °F

-20.6 -25.6 -30.8 -33.9 -47.3

Massachusetts Projected Climate Changes

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



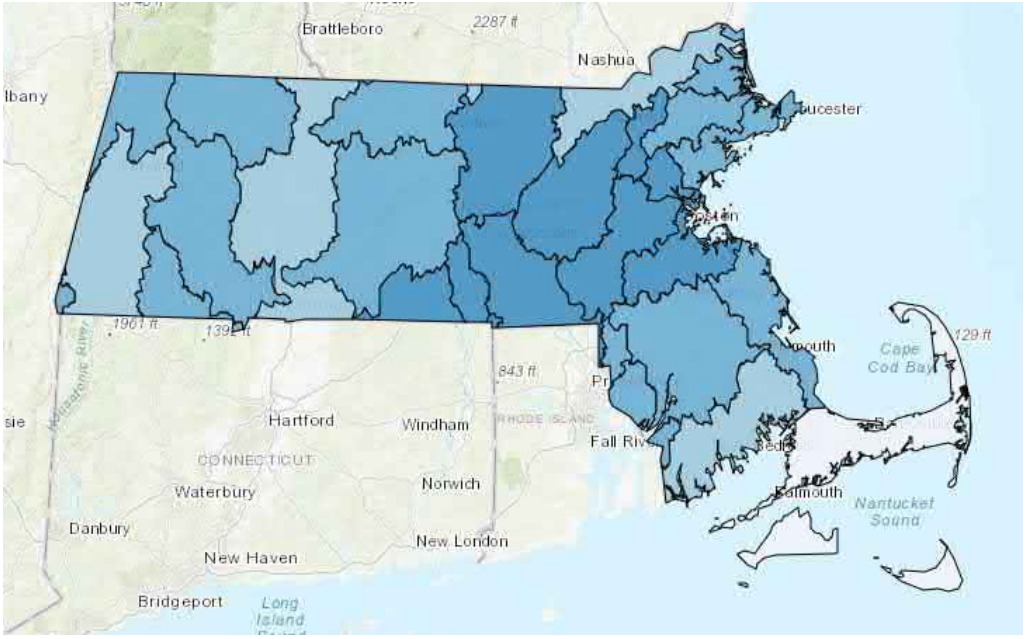


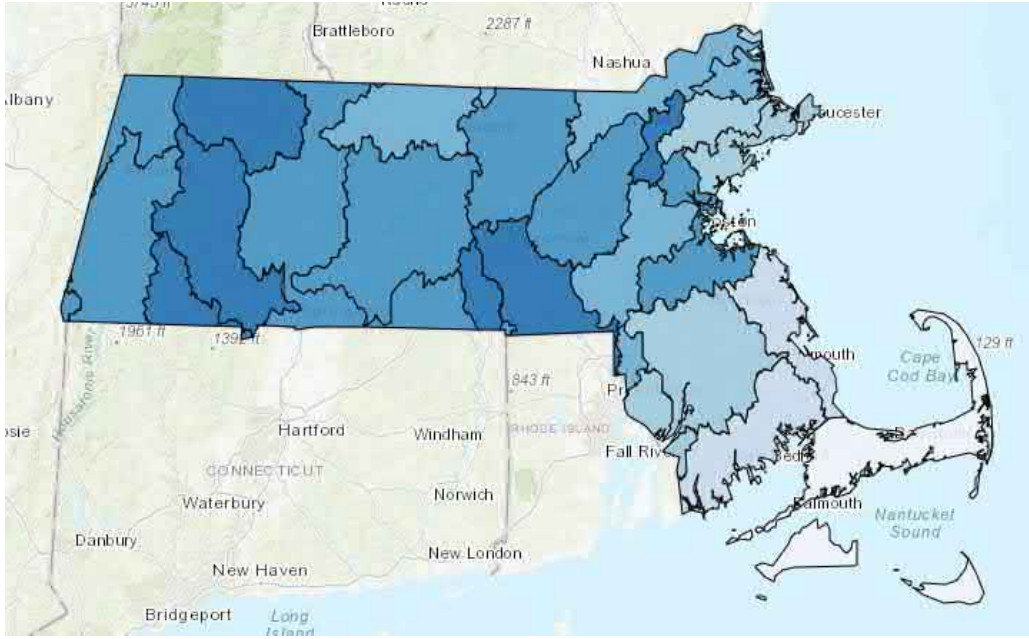
Projected change in # days below 32 °F

-20.6 -25.6 -30.8 -33.9 -47.3

Massachusetts Projected Climate Changes

Change in Inches of Precipitation– 2050 Scenarios



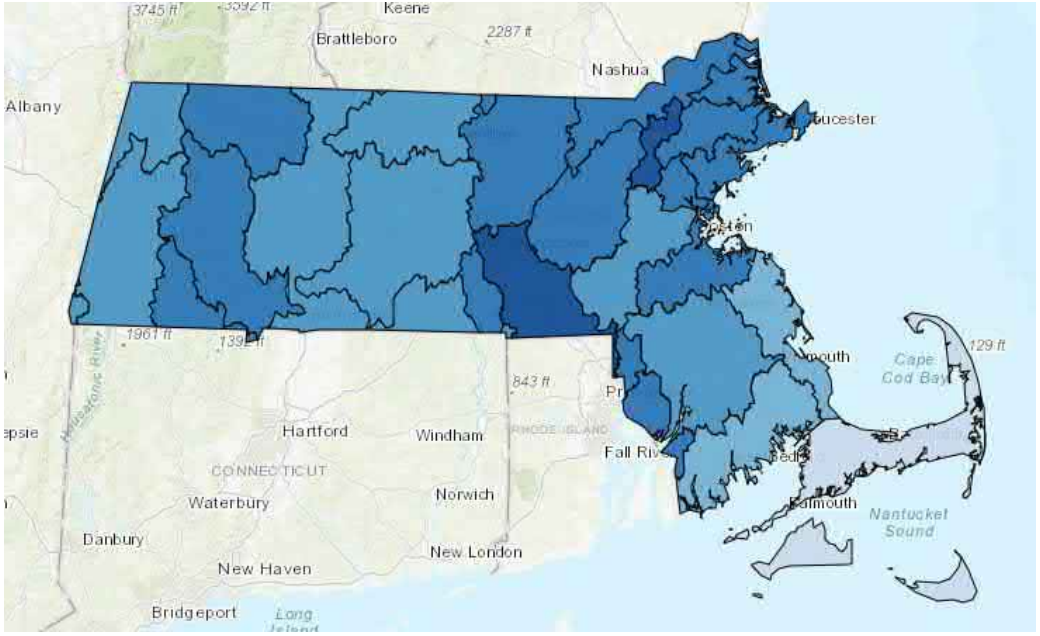


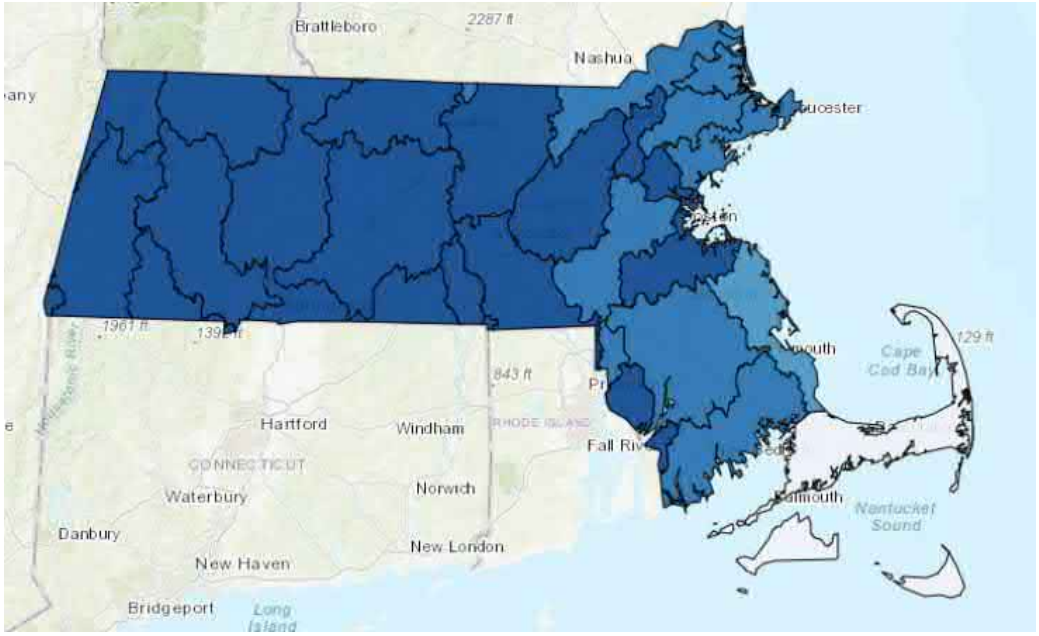
Projected change in inches of total precipitation

+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
Number of days per year with daily Temp > 90°F	5 days	Increase by 7-26 days	Increase by 10-63 days
Number of days per year with daily Temp < 32°F	146 days	Decrease by 19-40 days	Decrease by 24-64 days
Heating degree-days per year (HDD)	6839 Degree-Day °F	Decrease by 773-1627	Decrease by 1033-2533
Cooling degree-days per year (CDD)	457 Degree-Day °F	Increase by 261-689	Increase by 356-1417
Growing degree-days per year (GDD)	2344 Degree-Day °F	Increase by 531-1210	Increase by 702-2347
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
  - Changes to growing seasons
  - Larger demands on energy systems
- Increased Precipitation and Downpour Intensity
  - Increased risk of flooding
  - Water quality impacts
  - Impact on agriculture and natural ecosystems
- Changes to Rain and Snow Patterns
  - Reduced snow cover
  - Potential increase in drought events
  - Impacts to habitats and species

Workshop Overview

- Characterize Hazards (Workshop #1)
- Identify Community Vulnerabilities and Strengths (Workshop #1)
- Identify and Prioritize Community Actions (Workshop #2)
- Determine the Overall Priority Actions (Workshop #2)
- Develop Comprehensive Summary Products (Workshop #2)

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 Short Long Ongoing
Infrastructural									
Societal									
Environmental									

Characterize Hazards

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

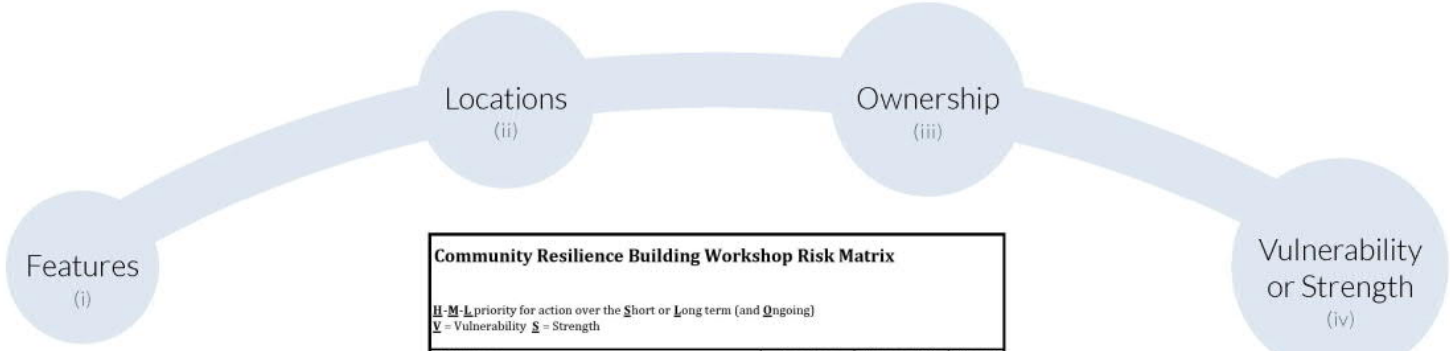
Direct participants to make a list of hazards (causes of impacts) that the community has dealt with, currently faces, and anticipates experiencing in the future (i.e., tornados, ice/wind storms, drought, wildfire, tsunamis, sea level rise, landslides, earthquakes, etc.). Utilize the following triggering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

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.

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)

Introduction to Small Team Exercise

- Team Facilitators
- Introductions
- Choose Team Spokesperson and Scribe
- Discuss 4 Top Hazards

Hazard Characterization

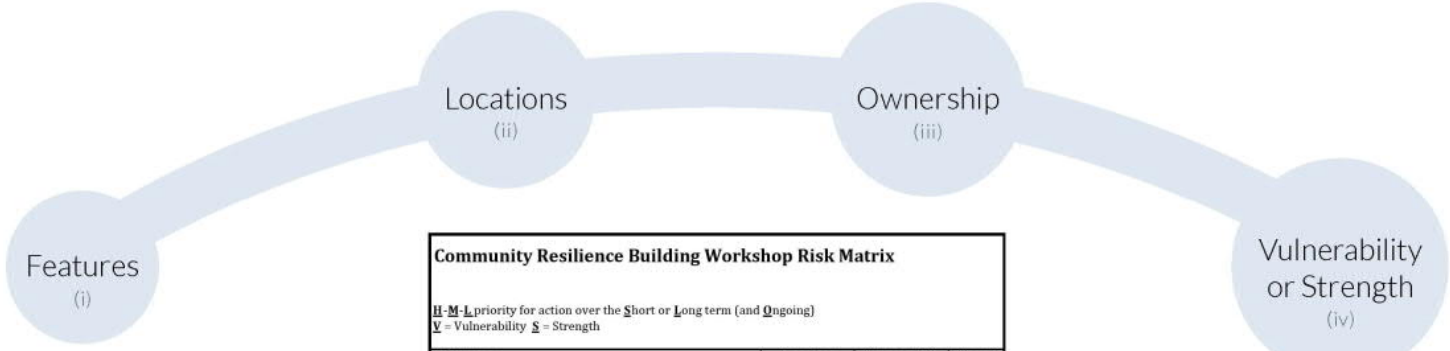
- Inland Flooding
- Tsunami
- Severe Winter Storm
- Drought
- Extreme Temperatures
- Tornadoes
- Landslide
- Wildfires
- Coastal Flooding
- Invasive Species
- Earthquakes
- Coastal Erosion
- Hurricanes/Tropical Storms
- Other Severe Weather (strong wind, extreme precipitation)

Reporting Small Team Findings

Small Group Breakout #1

- Spokesperson to present findings on hazards to full group
- Full group develops top 4 hazards

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)
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Reporting Small Team Findings

Small Group Breakout #2

- Spokesperson to present findings on features to full group
- Full group discusses findings

Wrap-up and Introduce Workshop #2

- Consensus on hazards
- Discussion of assets
- Any questions from today's workshop
- Workshop #2
  - Identify and Prioritize Community Actions
  - Determine the Overall Priority Actions

Municipal Vulnerability Program (MVP)

Westwood, MA

November 14th, 2019

Welcome and Introductions

- Andy Dennehy, Associate, BETA Group, Inc.
- Melissa Recos, Project Manager, BETA Group, Inc.
- Mary Beth Irwin, Engineering Designer, BETA Group, Inc.

Municipal Vulnerability Workshop Agenda

- Reporting Small Team Findings on Assets
- Summary Discussion on Assets
- Small Group Breakout
  - Develop Actions
  - Prioritize Actions
  - Urgency of Actions
- Reporting Small Team Findings on Priority Actions
- Consensus on Priority Actions
- Wrap-up

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

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Environmental									

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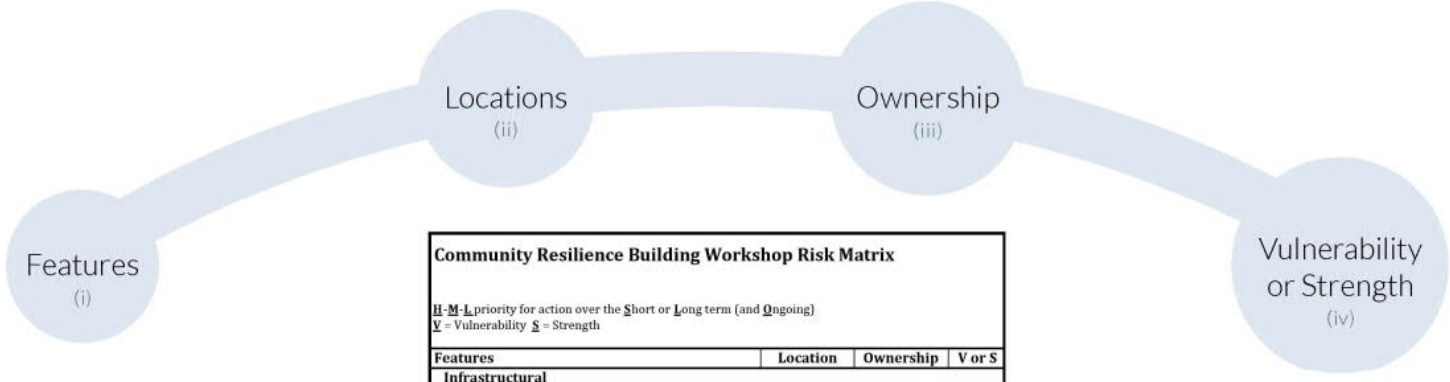
Identify Community Vulnerabilities and Strengths



Community Resilience Building Workshop Risk Matrix

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

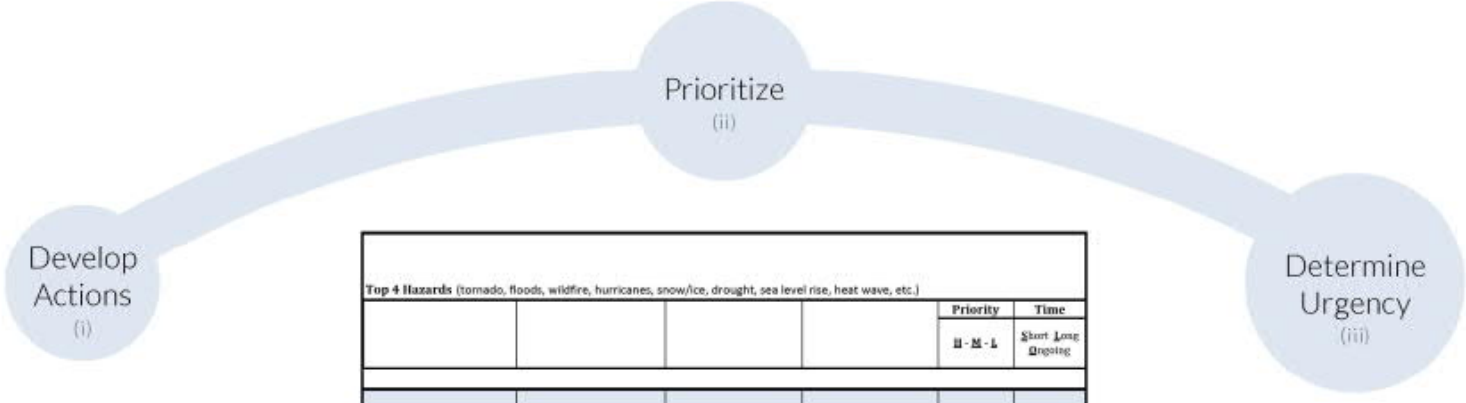
Features	Location	Ownership	V or S
Infrastructural			
Societal			
Environmental			

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.

Introduction to Small Team Exercise

- Team Facilitators
- Introductions
- Choose Team Spokesperson and Scribe
- Develop Actions
- Prioritize Actions
- Develop Urgency

Introduction to Small Team Exercise



Top 4 Hazards (tornado, floods, wildfire, hurricanes, snow/ice, drought, sea level rise, heat wave, etc.)				Priority	Time
				H - M - L	Short Long Ongoing

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).

Introduction to Small Team Exercise

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	Widen 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 at 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.

Reporting Small Team Findings

Small Group Breakout

- Spokesperson to present findings on priority actions
- Full group develops top five priority actions

Wrap-up

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

APPENDIX C

- **CR**B Wor**k**sho**p** H**an**do**ut**s

IMPROVING COMMUNITIES TOGETHER

Westwood Municipal Vulnerability Preparedness (MVP) Program Workshop

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

SUMMARY OF MODELING RESULTS

- By 2050, average temperatures could increase by 10%. By 2090, average temperatures could increase by almost 19%.
- Number of days with temperatures +90 °F could increase by 4 times as today by 2050. By 2090, there could be almost 8 times as many +90 °F than today.
- Number of days with temperatures below freezing could drop by almost 28% by 2050 and almost 50% 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	53.94 – 55.37	54.98 – 59.46
Maximum Annual Temperature (°F)	59.55	63.29 – 64.65	64.32 – 68.70
Minimum Annual Temperature (°F)	40.70	44.58 – 46.07	45.65 – 50.12
Annual Days with Max Temp over 90°F	7.85	23.76 – 31.31	28.46 – 61.68
Annual Days with Min Temp below 32°F	119.21	94.24 – 86.03	86.43 – 60.04
Annual Heating Degree-Days (Base 65°F)	6,079	5,096 – 4,830	4,821 – 3,991
Annual Cooling Degree-Days (Base 65°F)	636	1,047 – 1,247	1,198 – 1,859
Annual Growing Degree-Days	2,733	3,472 – 3,793	3,697 – 4,732

[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

Westwood Municipal Vulnerability Preparedness (MVP) Program Workshop

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

SUMMARY OF MODELING RESULTS

- Average annual precipitation could increase 8% by 2050s and almost 11% 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	49.55 – 49.79	50.49 – 51.02
Winter Precipitation (inches)	11.82	12.83 – 13.01	13.58 – 14.46
Spring Precipitation (inches)	11.59	12.38 – 13.22	12.76 – 13.96
Summer Precipitation (inches)	10.51	10.77 – 11.58	10.64 – 11.54
Fall Precipitation (inches)	12.18	12.67 – 12.84	12.31 – 12.49
Annual Days with Precipitation over 1 inch	9.06	10.51 – 11.06	11.19 – 11.88
Annual Days with Precipitation over 2 inches	1.27	1.68 – 1.82	1.72 – 1.99
Annual Days with Precipitation over 4 inches	0.08	0.14 – 0.16	0.13 – 0.20
Annual Consecutive Dry Days	17.46	18.43 – 18.45	18.07 – 19.35

[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

Westwood Municipal Vulnerability Preparedness (MVP) Program Workshop

DEMOGRAPHIC DATA[1]

Parameter	Breakdown
Total Area	11.4 square miles
% of Land Use	Agriculture = 1.7% Forest = 40.8% Open Space = 3.3% Recreation = 2.4% Urban = 50.0% Water = 1.7%
Population	14,621
Age	0-19 = 28% 20-34 = 9% 35-64 = 43% 65+ = 20%
Household Income	<$40,000 = 14% $40,000 - $60,000 = 9% $60,000+ = 77%
% Below Poverty Line	2%
Race	Asian = 7% Black = 0% White = 91% Other = 2%
Ethnicity	Hispanic = 3% Not Hispanic = 97%
Environmental Justice	0%
% Population Over 65 Living Alone	5.9%
Heart Attack Hospitalizations	17.9 (age-adjusted rate per 10,000 people)
Asthma Emergency Visits	25.4 (age-adjusted rate per 10,000 people)
Pediatric Asthma Prevalence	11.2% of all children enrolled in grades K-8

[1] Source: MA Dept of Public Health, 2018. MA Environmental Public Health Tracking Community Profile for Westwood. Report Created on October 24, 2019.

IMPROVING COMMUNITIES TOGETHER

Westwood 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 Westwood, Massachusetts
Municipal Vulnerability Preparedness Program
CRB Workshop Map

Legend

- Nursing Home
- High Hazard Dam
- Significant Hazard Dam
- Low Hazard Dam
- Private Dam
- Fire Stations
- Libraries
- Town and City Halls
- Local Police
- State Police
- County Sheriff
- Public School
- Private School
- Charter School
- Special Education School
- Community Groundwater Source
- Surface Water Intake
- Non-Community Groundwater Source
- Emergency Surface Water
- Wetlands

FEMA National Flood Hazard Layer

Flood Zone Designations

- A: 1% Annual Chance of Flooding, no BFE
- AE: 1% Annual Chance of Flooding, with BFE
- AE: Regulatory Floodway
- AH: 1% Annual Chance of 1-3ft Ponding, with BFE
- AO: 1% Annual Chance of 1-3ft Sheet Flow Flooding
- VE: High Risk Coastal Area
- D: Possible But Undetermined Hazard
- X: 0.2% Annual Chance of Flooding
- X: 1% Drainage Area < 1 Sq. Mi.
- X: Reduced Flood Risk due to Levee
- Area Not Included
- Area with no DFIRM - Paper FIRMs in Effect
- Waterbody
- River/ Stream

N

0 0.25 0.5 1 1.5 Mi

BETA

Town of Westwood, Massachusetts

Municipal Vulnerability Preparedness Program

CRB Workshop Map

Legend

- Nursing Home
- High Hazard Dam
- Significant Hazard Dam
- Low Hazard Dam
- Private Dam
- Fire Stations
- Libraries
- Town and City Halls
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0 0.25 0.5 1 1.5

BETA

Town of Westwood, Massachusetts

Municipal Vulnerability Preparedness Program

CRB Workshop Map

Legend

- Nursing Home
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- D: Possible But Undetermined Hazard
- X: 0.2% Annual Chance of Flooding
- X: 1% Drainage Area < 1 Sq. Mi.
- X: Reduced Flood Risk due to Levee
- Area Not Included
- Area with no DFIRM - Paper FIRMs in Effect
- Waterbody
- River/ Stream

N

0 0.25 0.5 1 1.5 Mi

BETA

Appendix D: Compiled Ranking Matrix

Community Resilience Building Risk Matrix

www.CommunityResilienceBuilding.org

H-M-L priority for action over the Short or
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	High Wind/ Winter Storms	Drought / Extreme Temp	Invasive Species	Priority H - M - L	Time Short Long Ongoing
Infrastructural									
Sewer Pump Station & System infrastructure	Town-wide	Town	V & S	Hydrologic study to identify needs/vulnerabilities, Continue to implement I/I Plan, Investigate sewer systems located in Flood Plan				Various	S - O
Dams (Esp. @ Crystal Hill)	Town-wide & 42 Mill St	Private	V	Look at legal ramifications and town obligation for longevity of dam, Risk Assessment/ Study of assets with recommended actions			Risk Assessment/ Study of assets with recommended actions, consider dam removal options to protect culverts and other assets, develop maintenance plan, Evaluate small ponds for animal/ mosquito habitat	H	S & L
Culverts (undersized)	Town-wide	Town & Private	V	Hydrologic study of assets to identify vulnerabilities & culvert upgrades with recommended actions, Identify natural flood storage/ LID applications throughout town, Consider options to protects culverts from large debris, develop Culvert cleaning program, develop Maintenance Plan			Risk Assessment/ Study of assets with recommended actions, consider options to protect culverts, develop maintenance plan, Evaluate small ponds for animal/ mosquito habitat	H	S & L
Bridges	Town-wide	Town, State & Federal	V & S	Culvert sizing study, Culvert cleaning program			Beaver Control Program	H	L/O
Roadways & Low-lying areas	Town-wide	Town, State & Federal	V & S	Create a plan/study identifying vulnerable neighborhoods & populations within for evacuation & emergency response, Study of assets with recommended actions,				Various	S & L & O
				Drainage Study, Additional CB cleaning	Equipment Upgrades, Continue to encourage Eversource to trim their trees, Additional pretreatment	Previous Paving Measure	Knotweed Program		
Waste Water Pump Stations	Town-wide	Town	V & S	Address Flooding (esp. Conant Rd)	Backup Power, Backup pumps, bypass connection	Electronics Cooling	Beaver Control Program	H	L/O
Wells & Domestic & hydrant water system	Town-wide	Public & DWWD	V & S	Work with district to ensure maintenance & upgrades are done, Monitor Water Quality in Major Flood event		Work with district to ensure maintenance & upgrades are done, Investigate Water conservation Regulations for new development, Implement & update water conservation program, implement/ update stormwater bylaw		Various	S & O
Town Buildings	Town-wide	Town	V & S		Protect HVAC at Police HQ	Energy Efficient Upgrades	Mosquito Control	M	L
				Investigate backup power for Town facilities, Continue to improve Emergency operations center					
Drainage Infrastructure	Town-Wide	Public & Private	V & S	Continue to implement Catch basin cleaning/ maintenance plan. Evaluate system capacity & assess upgrade when Re-paving, associate with Road Master Plan	Continue to implement Catch basin cleaning/ maintenance plan. Add Pavement Markings to identify locations of CB's		Evaluate system capacity & assess upgrade when Re-paving, associate with Road Master Plan	H	S & O
Power & Communication	Town-Wide	Town & Private	V & S		Continue to encourage Eversource to trim their trees, or Relocate wires underground	Investigate Critical locations to be exempt from brown-outs, Look into Alternative Power Source & Conservation Education		Various	S & L & O
				Test/Upgrade/Maintain Emergency Communication Systems and infrastructure, Study on Town-wide Emergency Communication Systems (DPW, Fire & Police), Investigate backup power for Town facilities, Continue to improve Emergency operations center, Consolidate all communication, Solar backup system/ microgrid for Police/Fire/ Town hall					
Societal									
Shelter facilities @ High School & Council on Aging	Nahatan St	Town	V & S	Update current plan, create a plan to maintain access to facilities, ability for people to get there &emergency personnel to get there & Solar power backup system				M	O
Elderly, Disabled, Low-Income, Disadvantaged Population	Town-wide	Private & Public	V	Update current plan/ create a plan to maintain access to facilities, ability for people to get there &emergency personnel to get there, Educate & market plans in place, Outreach, Transportation, Communication & Shelter , Evaluate Emergency Operation Plan, Actively Maintain list of high risk people,			Communicate EEE Risk & ways to avoid, Pre-treat Mosquito Breeding grounds	H	S & O
						Cooling stations, bottled water, A/C program, Outreach, Transportation, Communication & Shelter , Investigate Critical locations to be exempt from brown-outs, Look into Alternative Power Source			
Public Safety	Town-Wide	Town	V & S	Upgrade fuel system & storage facility, Estimate Fuel need and consumption				L	O
				Evaluate, Equip & Train staff on how to properly manage these emergencies					
Businesses & Faith based organizations	Town-wide	Private	V & S	Update current plan/ create a plan to maintain access to facilities, ability for people to get there &emergency personnel to get there, Engage with businesses, Reach out to organizations and include in emergency management planning				Various	O
					Tree trimming equipment upgrades, storm management	Business outreach	Mosquito/ tick control		
Students/Children	Town-Wide		V & S	Continue & enhance school environmental education programs, Continue to implement Catch basin cleaning/ maintenance plan. Education Outreach & communication		Continue & enhance school environmental education programs, Look into Alternative Power Source	Continue & enhance school environmental education, Communicate EEE Risk & ways to avoid, Pre-treat Mosquito/ Tick Breeding grounds, Move programs inside or earlier in the day	Various	O
				Evaluate system capacity & assess upgrade when Re-paving, associate with Road Master Plan	Add Pavement Markings to identify locations of CB's				
Schools	Town-Wide	Town			Frequent loss of power at Martha Jones School, Look into new generator, Investigate Alternative Power Source and storage of power. Maintain generator at Highschool because it's a shelter.	Air Condition Schools, Look into Alt Power to support schools, Continue energy efficiency assessment with Tom Philbin	Continue & enhance school environmental education, Communicate EEE Risk & ways to avoid, Pre-treat Mosquito Breeding grounds, Move programs inside or earlier in the day	H	L & O
Residential Area	Town-Wide		V & S	Continue to implement Catch basin cleaning/ maintenance plan. Evaluate system capacity & assess upgrade when Re-paving, associate with Road Master Plan, Add Pavement Markings to identify locations of CB's , Continue to be licensed to operate shelter and provide necessities in the event of power outage		Investigate Alternative Power Source	Communicate EEE Risk & ways to avoid, Pre-treat Mosquito Breeding grounds	M	S & O
Commuter Traffic	Town-wide		V	Signage/ Light boards & Communication			Knotweed program & Beaver control	L	S
Environmental									
Buckmaster Pond- reservoir	Pond St.	Town, Norwood & Private	V	Drainage maintenance		Water Restoration/Conservation outreach	Educate Public on Concerns & issues, Study to identify maintenance plan for invasives & general health of conservation Areas, Mosquito control	L	O
Well fields & Water Protection districts (2)	University Ave & High St	Town, DWWD & Private	V	Continue implementing regulations to protect District & flood plains, Outreach	Outreach / De-icing	Water Restoration/Conservation outreach	Educate Public on Concerns & issues, Study to identify maintenance plan for invasives & general health of conservation Areas	Various	O
Flood Plains & Conservation Areas	Town-Wide	Town & Private	V & S	Investigate opportunities to increase flood plain, Investigate ways to coordinate with surrounding towns, Dredging/disposal, flood storage	Downed tree removal/ Disposal	Water Restoration/Conservation outreach	Develop study to identify and Implement management plan for invasive species (plants, insects and animals especially beavers) general health of conservation Areas Removal & Disposal of Growth, outreach about water quality & pet waste, Educate Public on Concerns & issues	Various	S & L
Parks & Open Space	Town-Wide	Town & Private	V & S	Investigate LID measures & opportunities, Drainage Study/ Upgrades	Continue and Expand trail maintenance, Tree/Overgrowth management/ Continue to encourage Eversource to trim their trees,	Continue to acquire open space & floodplains, Turf I.L.O. grass, Shading & trees, Plant more trees, Investigate locations , investigate resilient trees	Educate Public on Concerns & issues, Study to identify maintenance plan for invasives & general health of conservation Areas, mosquito/ tick control & education, Develop and Implement management plan for invasive species (plants, insects and animals) Investigate & create policy for invasive plants	Various	L & O
Dams	Town-wide	Private	V	Dam study/Removal/ Maintenance & improvements			Mosquito and Beaver control	M	L
Wildlife	Town-Wide		V & S	Develop Beaver management plan/ Investigate Dam removal & wetland restoration		Investigate water conservation Regulations, Plan to protect trout population in streams	Develop Beaver management plan/ Investigate Dam removal & wetland restoration, Communicate EEE Risk and ways to avoid, Pretreat mosquito breeding grounds	L	O
Rivers, Brooks, Streams & Watersheds	Town-Wide	Town & Private	V & S	Restore streams & wetlands to hold flood waters, Risk Assessment/ Study of assets with recommended actions, Consider options to protects culverts from large debris, Drainage studies & develop Maintenance Plan	Risk Assessment/ Study of assets with recommended actions, Consider options to protects culverts from large debris, develop Maintenance Plan	Investigate ways to improve Water Quality, Investigate locations to plant more trees/investigate resilient trees, Investigate water conservation Regulations, Plan to protect trout population in streams, Water Restoration/Conservation outreach	Removal & Disposal of Growth, outreach about water quality & pet waste, Develop and Implement management plan for invasive species (plants, insects and animals)	Various	S & L & O
Groundwater / Water Table	Town-Wide	Town & Private	V & S	Investigate LID measures & opportunities		Water Conservation & Stormwater management to augment infiltration, Investigate LID measures & opportunities		H	O

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	Flooding	High Wind/ Winter Storms	Drought / Extreme Temp.	Invasive Species	Priority H-M-L	Time S Short L Long O Ongoing
Infrastructural									
Dams & Culverts	Town-Wide	Public & Private	V	Risk Assessment Study of Assets with Recommended Actions -Develop Maintenance Plan	Consider options to protect culverts from large debris		Evaluate small ponds for fauna/mosquito habitat	H	S&L
Drainage Infrastructure			V&S	*Continue to implement Catchbasin cleaning/maintenance Plan * Evaluate system capacity & assess upgrade when Re-Paving to associate w/ Road Master Plan	Add Pavement Marking to Identify location of CB's	Investigate Water Conservation Rebate for New Dev		H	S&O
Wells / Water Supply		Public DWWD	V&S	Monitor WG in Major Flood event	Test/evaluate Study on Town-wide Emerg Systems -Investigate Backup Power for Town	Implement & update Water Conservation Program Implement/Update Stormwater Bylaw		H	
Power & Communication		Town & Private	V&S		Continue to encourage Eversource to Trim/thin trees - Continue to improve Emergency Operation center	Investigate critical locations to Be Exempt from Power outages -Look into Alternative Power Source		H	
Sewer		Town	V&S	-Continue to implement I/I Plan -Investigate Sewer Systems located in Flood Plain				L	O
Transportation		Town, State & Private	V&S	See Dams/culverts				M	S&L
Societal									
Elderly Population	Town-Wide		V	-Evaluate Emergency Op. Plan Actively maintain High Risk People			-Communicate EEE Risk & ways to avoid -Pre-treat Mosquito Breeding Grounds	H	S&O
Low Income Households			V					M	S&O
Public Safety		Town	V&S	Evaluate/ Equip & Train Staff on How to Properly Manage these Emergencies				L	O
Students			V&S	Continue & Enhance School Environment Education Programs			Move programs inside or earlier in the day	L	O
Residential Area			V&S	Copy From Drainage -Continue to Be Utilized to open Shelter	Provide necessities in the event of power outage Frequently lose Power	Investigate Alt Power Source		M	S&O
Schools		Town	S&V		Martha Jones → look into New generator - Investigate Alternative Power Source → Storage of Power ↳ Maintain generator @ H.S. bc this shelter	-Air Condition Schools -look into Alt Power to Support -Continue Energy efficiency Assess w/ TownPhilbin	Copy from Students	H	L&O
Environmental									
Trees	Town Wide	Town & Private	V&S	Develop Manage Beaver Dam Removal & wetlands restoration Investigate	See eversource Comment	Plant/Move trees - Investigate location & Investigate Resilient Trees	Investigate & create Policy for Invasive Plants	M	L&O
Wildlife		God				-Investigate Water Conservation Plans -Plan to Protect Trout Pop. in Streams		L	O
Parks & Open Space		Town & Private		-Investigate LID measures & opportunities	Continue & Expand Trail Maintenance	Continue to acquire Open Space & Flood Plains	Implement Develop & Management Plan for Invasive Species	M	L
Streams & Waterbodies				Copy From Dam Restore to hold Flood waters Streams/wetlands	Copy Dam & Culvert	Investigate ways to improve W.Q.		M	S&L
Flood Plains				Flood plain -Increase Investigate opportunities to -Investigate ways to coordinate w/ surrounding towns				M	S&L
Ground Water / Water Table						Water Conservation & Stormwater Mgmt to augment infiltration		H	O

Appendix D: Blue Group Ranking Matrix

Community Resilience Building Risk Matrix

www.CommunityResilienceBuilding.org

H-M-L priority for
V = Vulnerability S

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

Features	Location	Ownership	V or S	Flooding	High Wind/ Winter Storms	Drought / Extreme Temp	Invasive Species	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
Dams & Culverts	Town-Wide	Public & Private	V	Risk Assessment/ Study of assets with recommended actions, Consider options to protects culverts from large debris, develop Maintenance Plan		x	Risk Assessment/ Study of assets with recommended actions, consider options to protect culverts, develop maintenance plan, Evaluate small ponds for animal/ mosquito habitat	H	S & L
Drainage Infrastructure	Town-Wide	Public & Private	V & S	Continue to implement Catch basin cleaning/ maintenance plan. Evaluate system capacity & assess upgrade when Re-paving, associate with Road Master Plan	Continue to implement Catch basin cleaning/ maintenance plan. Add Pavement Markings to identify locations of CB's	x	Evaluate system capacity & assess upgrade when Re-paving, associate with Road Master Plan	H	S & O
Wells / Water Supply	Town-Wide	Public & DWWD	V & S	Monitor Water Quality in Major Flood event	x	Investigate Water conservation Regulations for new development, Implement & update water conservation program, implement/ update stormwater bylaw	x	H	S & O
Power & Communication	Town-Wide	Town & Private	V & S	x	Investigate Critical locations to be exempt from brown-outs, Look into Alternative Power Source Test/Maintain Emergency Communication Systems, Study on Town-wide Emergency Communication Systems, Investigate backup power for Town facilities, Continue to encourage Eversource to trim their trees, Continue to improve Emergency operations center		x	H	S & O
Sewer	Town-Wide	Town	V & S	Continue to implement I/I Plan, Investigate sewer systems located in Flood Plan	x	x	x	L	O
Transportation	Town-Wide	Town, State & Private	V & S	Risk Assessment/ Study of assets with recommended actions, Consider options to protects culverts from large debris, develop Maintenance Plan	Test/Maintain Emergency Communication Systems, Study on Town-wide Emergency Communication Systems, Investigate backup power for Town facilities, Continue to encourage Eversource to trim their trees, Continue to improve Emergency operations center	x	x	M	S & L
Societal									
Elderly Population	Town-Wide		V	Evaluate Emergency Operation Plan, Actively Maintain list of high risk people		Investigate Critical locations to be exempt from brown-outs, Look into Alternative Power Source	Communicate EEE Risk & ways to avoid, Pre-treat Mosquito Breeding grounds	H	S & O
Low Income Households	Town-Wide		V	Evaluate Emergency Operation Plan, Actively Maintain list of high risk people		Investigate Critical locations to be exempt from brown-outs, Look into Alternative Power Source	Communicate EEE Risk & ways to avoid, Pre-treat Mosquito Breeding grounds	M	S & O
Public Safety	Town-Wide	Town	V & S	Evaluate, Equip & Train staff on how to properly manage these emergencies				L	O
Students	Town-Wide		V & S	Continue & enhance school environmental education programs, Continue to implement Catch basin cleaning/ maintenance plan. Evaluate system capacity & assess upgrade when Re-paving, associate with Road Master Plan	Add Pavement Markings to identify locations of CB's	Continue & enhance school environmental education programs, Look into Alternative Power Source	Continue & enhance school environmental education, Communicate EEE Risk & ways to avoid, Pre-treat Mosquito Breeding grounds, Move programs inside or earlier in the day	L	O
Residential Area	Town-Wide		V & S	Continue to implement Catch basin cleaning/ maintenance plan. Evaluate system capacity & assess upgrade when Re-paving, associate with Road Master Plan, Add Pavement Markings to identify locations of CB's , Continue to be licensed to operate shelter and provide necessities in the event of power outage		Investigate Alternative Power Source	Communicate EEE Risk & ways to avoid, Pre-treat Mosquito Breeding grounds	M	S & O
Schools	Town-Wide	Town	V & S	x	Frequent loss of power at Martha Jones School, Look into new generator, Investigate Alternative Power Source and storage of power. Maintain generator at Highschool because it's a shelter.	Air Condition Schools, Look into Alt Power to support schools, Continue energy efficiency assessment with Tom Philbin	Continue & enhance school environmental education, Communicate EEE Risk & ways to avoid, Pre-treat Mosquito Breeding grounds, Move programs inside or earlier in the day	H	L & O
Environmental									
Trees	Town-Wide	Town & Private	V & S	x	Continue to encourage Eversource to trim their trees,	Plant more trees, Investigate locations , investigate resilient trees	Investigate & create policy for invasive plants	M	L & O
Wildlife	Town-Wide		V & S	Develop Beaver management plan/ Investigate Dam removal & wetland restoration	x	Investigate water conservation Regulations, Plan to protect trout population in streams	Develop Beaver management plan/ Investigate Dam removal & wetland restoration, Communicate EEE Risk and ways to avoid, Pretreat mosquito breeding grounds	L	O
Parks & Open Space	Town-Wide	Town & Private	V & S	Investigate LID measures & opportunities	Continue and Expand trail maintenance	Continue to acquire open space & floodplains	Develop and Implement management plan for invasive species (plants, insects and animals)	M	L
Streams & Waterbodies	Town-Wide	Town & Private	V & S	Restore streams & wetlands to hold flood waters, Risk Assessment/ Study of assets with recommended actions, Consider options to protects culverts from large debris, develop Maintenance Plan	Risk Assessment/ Study of assets with recommended actions, Consider options to protects culverts from large debris, develop Maintenance Plan	Investigate ways to improve Water Quality, Investigate locations to plant more trees/investigate resilient trees, Investigate water conservation Regulations, Plan to protect trout population in streams	Develop and Implement management plan for invasive species (plants, insects and animals)	M	S & L
Flood Plains	Town-Wide	Town & Private	V & S	Investigate opportunities to increase flood plain, Investigate ways to coordinate with surrounding towns	x	x	Develop and Implement management plan for invasive species (plants, insects and animals)	M	S & L
Groundwater / Water Table	Town-Wide	Town & Private	V & S	Investigate LID measures & opportunities	x	Water Conservation & Stormwater management to augment infiltration, Investigate LID measures & opportunities	x	H	O

BETA

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

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

Features	Location	Ownership	V or S	Flooding	High Wind / Winter Storm	Drought / Ext. Temps	Invasive Species	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
Waste Water Pump Stations	T. W.	Town	V/S	Address Flooding (Spec. Conant Rd.)	Back Up Power / Bypass Back Up Pumps / Conn's	Electronics Cooling	Beaver Control Program	H	L/O
Bridges / Culverts	T. W.	Town / State & Fed.	V/S	Culvert Sizing Study / Culvert Cleaning Program	N/A	N/A	↓	H	L/O
Roadways	T. W.	Town / State / Fed.	S	Drainage Study Addl CB Cleaning	Equipment Upgrades Tree Trimming Addl Pretreatment	Prev. Paving Measures	Knotweed Program	H	O
Police/Fire/DPW Radio Systems	T. W.	Town	V	Upgrade/Replace Comm. Systems →			N/A	H	S
Town Buildings	T. W.	Town	V/S	N/A	Protect HVAC @ Police Hq	Energy Eff. Upgrades	Mosquito Control	M	L
Power & Comm. Systems	T. W.	Eversource Verizon/Comcast	V	N/A	Trim Trimming Reloc. U.G.	Conserv. Education	N/A	H	L/O
Societal									
Elderly & Disadvantaged Pop's	T. W.	N/A	V	Outreach Transportation Communication / Shelters	→	Cooling Stations Bottled Water A/C Program →	N/A	H	S
Commuter Traffic	T. W.	N/A	V	Signage / Light Boards Communication	→	→	Knotweed Program Beaver Control	L	S
Parks / Playgrounds / Fields	T. W.	Town	S	Drainage Study / Upgrades	Tree / Overgrowth Management	Turf I. L.O. Grass Shading / Trees	Mosquito Control	L	L/O
Hale	Northwest Section	Private	S	↓	↓	N/A	Education ↓	L	L
Children	T. W.	Parents	V	Education Outreach / Communication →	→	→	Mosquito/Tick Control	H	O
Business Community	T. W.	Private	S	N/A	Trees Trimming Equip. Upgrades Storm Management	Business Outreach	↓	H	O
Environmental									
Rivers / Brooks / Watersheds	T. W.	N/A	V	Drainage Studies & Maint. / Outreach	N/A	Water Restr / Outreach / Conserv.	Removal & Disposal / Beavers Of Growth / Outreach	H	L/O/S
Conservation Areas	T. W.	Town	S	Dredging / Disposal Flood Storage	Downed Tree Removal / Disposal	↓	↓	M	O
Wet. Fields	T. W.	DWWD	V	Outreach	Outreach / Deicing	↓	N/A	H	O/S
Buckmaster Pond	Pond St.	Town / Norwood	V/S	Drainage Maint.	N/A	↓	Mosquito Control	L	O
[redacted] Dams	T. W. [redacted] Hill	Private	V	Dam Study / Removal / Improvements	Maint.	N/A	↓ Beavers	M	L

Appendix D: Red Group Ranking Matrix

Community Resilience Building Risk Matrix

www.CommunityResilienceBuilding.org

H-M-L priority for action over the Short or Long
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	High Wind/ Winter Storms	Drought / Extreme Temp	Invasive Species	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
Waste Water Pump Stations	Town-wide	Town	V & S	Address Flooding (esp. Conant Rd)	Backup Power, Backup pumps, bypass connection	Electronics Cooling	Beaver Control Program	H	L/O
Bridges/Culverts	Town-wide	Town, State & Federal	V & S	Culvert sizing study, Culvert cleaning program	N/A	N/A	Beaver Control Program	H	L/O
Roadways	Town-wide	Town, State & Federal	S	Drainage Study, Additional CB cleaning	Equipment Upgrades, tree trimming, Additional pretreatment	Previous Paving Measure	Knotweed Program	H	O
Police/Fire/DPW Radio Systems	Town-wide	Town	V	Upgrade communication Systems			N/A	H	S
Town Buildings	Town-wide	Town	V & S	N/A	Protect HVAC at Police HQ	Energy Efficient Upgrades	Mosquito Control	M	L
Power & Communication Services	Town-wide	Eversource, Verizon & Comcast	V	N/A	Tree Trimming/Relocate wires underground	Conservation Education	N/A	H	L/O
Societal									
Elderly & Disadvantaged Population	Town-wide	N/A	V	Outreach, Transportation, Communication & Shelter		Cooling stations, bottled water, A/C program, Outreach, Transportation, Communication & Shelter	N/A	H	S
Commuter Traffic	Town-wide	N/A	V	Signage/ Light boards & Communication			Knotweed program & Beaver control	L	S
Parks/Playground/ Fields	Town-wide	Town	S	Drainage Study/ Upgrades	Tree/Overgrowth management	Turf I.L.O. grass, Shading & trees	Mosquito/ tick control	L	L/O
Hale	Northwest Section	Private	S	Drainage Study/ Upgrades	Tree/Overgrowth management	N/A	mosquito/ tick control & education	L	L
Children	Town-wide	Parents	V	Education Outreach & communication			Mosquito/ tick control	H	O
Business Community	Town-wide	Private	S	N/A	Tree trimming equipment upgrades, storm management	Business outreach	Mosquito/ tick control	H	O
Environmental									
Rivers/ Brooks/ Watersheds	Town-wide	N/A	V	Drainage studies & Maintenance/ outreach	N/A	Water Restoration/Conservation outreach	Removal & Disposal of Growth, Beavers control plan, outreach about water quality & pet waste	H	L/O/S
Conservation Areas	Town-wide	Town	S	Dredging/disposal, flood storage	Downed tree removal/ Disposal	Water Restoration/Conservation outreach	Removal & Disposal of Growth, Beavers control plan, outreach about water quality & pet waste	M	O
Well Fields	Town-wide	DWWD	V	Outreach	Outreach / De-icing	Water Restoration/Conservation outreach	N/A	H	O/S
Buckmaster Pond	Pond St.	Town & Norwood	V & S	Drainage maintenance	N/A	Water Restoration/Conservation outreach	Mosquito control	L	O
Dams	Town-wide	Private	V	Dam study/Removal/ Maintenance & improvements		N/A	Mosquito and Beaver control	M	L

Community Resilience Building Risk Matrix

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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	High Wind / Winter Storms	Drought / Extreme Temps	Invasive Species	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
Sewer Pump Station & System infrastructure	TW	Town	V/S	Hydrologic study to identify needs/vulnerabilities of culverts				H	S
* Dam at Crystal Hill	42 Mill	Private	V	Look at legal ramifications and town obligation for longevity of dam				H	S
Culverts (undersized townwide)	TW	Town & Private	V	hydrologic study to identify vulnerabilities & culvert upgrades; identify natural flood storage/LID applications throughout town				H	S
Domestic & hydrant water system	TW	DWWD	V/S	Work with district to ensure maint & upgrades are done		Work with district to ensure maint & upgrades are done		L	O
Electrical system & Communication Network	TW	Public & Private	V	← Solar backup system/microgrid for Police/Fire/Town Hall; Purchase portable generators & hookups →	← consolidate all communications; cont. to upgrade & maint infrastructure →			M	S
Low lying areas & roadways	TW	Public & Private	V	create a plan/study identifying vulnerable neighborhoods & populations within for evacuation & emergency response				H	S
Societal									
Shelter Facilities @ HS & COA	2 ON Nahatan St	Town	S/V	Update Current plan/ create a plan to maintain access to facilities, ability for people to get there & emergency personel to get there	Solar power back-up system →			M	O
Elderly Population & Disabilities & Disadvantage	TW	Private	V	←	←	Educate & Market plans in place →		H	S
Vulnerable Neighborhoods	TW	Public & Private	V	←	←	←		H	S
Public Services (Police/Fire/DPW)	TW	Public	S	upgrade fuel system & storage Estimate fuel need & consumption	facility →	→		H	S/L
Businesses	TW	Private	S/V	←	engage with businesses to include in emergency planning →	→		L	O
Students	TW	N/A	S/V				Education & engagement	M-L	O
Faith based organizations	TW	& Private	S	←	Reach out to organizations and include in emergency management plans →	→		M-L	O
Environmental									
Buckmaster Pond - Reservior	Pond Street	Town on Norwood & Westwood & Private	V				↕	L	O
Water Protection Districts (2)	University Ave & High Street	Town & Private	V	Continue implementing regulations to protect District & flood plains				L	O
Parks & Open Space / Sports Fields	TW	Town & Private	S/V					M	O
Conservation Areas	TW	Town	S				•Educate public on Concerns & issues Study ~~& monit~~ to identify Maintenance plan for invasives & general health of Cons. Areas	H	S

Appendix D: Green Group Ranking Matrix

Community Resilience Building Risk Matrix

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H-M-L priority for action over the Short or Long
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	High Wind/ Winter Storms	Drought / Extreme Temp	Invasive Species	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
Sewer Pup Station & System infrastructure	Town-wide	Town	V & S	Hydrologic study to identify needs/vulnerabilities of culverts				H	S
Dam at Crystal Hill	42 Mill St	Private	V	Look at legal ramifications and town obligation for longevity of dam				?? H	S
Culverts (undersized)	Town-wide	Town & Private	V	Hydrologic study to identify vulnerabilities & culvert upgrades, Identify natural flood storage/ LID applications throughout town				H	S
Domestic & hydrant water system	Town-wide	DWWD	V & S	Work with district to ensure maintenance & upgrades are done		Work with district to ensure maintenance & upgrades are done		L	O
Electrical system & Communication network	Town-wide	Public & Private	V	Consolidate all communication, continue to upgrade & maintain infrastructure, Solar backup system/ microgrid for Police/Fire/ Town hall, Purchase portable generators & hookups				M	S
Low-lying areas & roadways	Town-wide	Public & Private	V	Create a plan/study identifying vulnerable neighborhoods & populations within for evacuation & emergency response				H	S
Societal									
Shelter facilities @ High School & Council on Aging	Nahatan St	Town	V & S	Update current plan/ create a plan to maintain access to facilities, ability for people to get there &emergency personnel to get there	Solar power backup system			M	O
Elderly/Disabled/ Disadvantaged Population	Town-wide	Private	V	Update current plan/ create a plan to maintain access to facilities, ability for people to get there &emergency personnel to get there, Education & market plans in place				H	S
Vulnerable Neighborhoods	Town-wide	Public & Private	V	Update current plan/ create a plan to maintain access to facilities, ability for people to get there &emergency personnel to get there				H	S
Public Services (Police/Fire/ DPW)	Town-wide	Public	S	Upgrade fuel system & storage facility, Estimate Fuel need and consumption				H	S/L
Businesses	Town-wide	Private	V & S	Update current plan/ create a plan to maintain access to facilities, ability for people to get there &emergency personnel to get there, Engage with businesses to include in emergency planning				L	O
Students	Town-wide	N/A	V & S				Education & engagement	M & L	O
Faith based organizations	Town-wide	Private	S	Update current plan/ create a plan to maintain access to facilities, ability for people to get there &emergency personnel to get there, Reach out to organizations and include in emergency management plans				M & L	O
Environmental									
Buckmaster Pond- reservoir	Pond St.	Town, Norwood & Private	V				Educate Public on Concerns & issues, Study to identify maintenance plan for invasives & general health of conservation Areas	L	O
Water Protection districts (2)	University Ave & High St	Town & Private	V	Continue implementing regulations to protect District & flood plains			Educate Public on Concerns & issues, Study to identify maintenance plan for invasives & general health of conservation Areas	L	O
Parks & open space/ sports fields	Town-wide	Town & Private	V & S				Educate Public on Concerns & issues, Study to identify maintenance plan for invasives & general health of conservation Areas	M	O
conservation areas	Town-wide	Town	S				Educate Public on Concerns & issues, Study to identify maintenance plan for invasives & general health of conservation Areas	H	S

APPENDIX E

- **Top Priority Voting Results**

Inland Flooding ✱ ✱
High wind / Heavy Snow ✱
Drought ✱
Extreme Temps ✱ Heat ✱
Invasive Species

Hurricanes
Health concerns

Flooding
High Wind/ ~~Heavy Snow~~ Winter storms
Drought/Extreme Temps
Invasive species

- Hydrologic Study to identify flooding vulnerabilities & projects
- Dam-look at legal ramifications & town obligation for longevity
- Consolidated Communication System addressing resilience & redundency
- Upgrade fuel system & storage capacity
- Educate public & Study to identify maintenance plan for invasives and general health of conservation areas

- PERFORM RISK ANALYSIS ON LOCAL DAMS & CULVERTS
  ↓ CONDITION OF
- EVALUATE DRAINAGE SYSTEMS CAPACITY & ASSESS UPGRADES
  & ASSOCIATE WITH ROAD MASTER PLAN
- INVESTIGATE CRITICAL LOCATIONS TO BE EXEMPT FROM BROWN OUT / LOOK INTO ALTERNATE POWER SOURCES
- ENHANCE EMERGENCY OPS. CENTER & COMMUNICATIONS
- EVALUATE SMALL PONDS FOR ANIMAL/WILDLIFE HABITATS
- INVESTIGATE INCREASING FLOODPLAIN/FLOOD STORAGE/ COORDINATE W/ SURROUNDING TOWNS

Red Group
Priority Actions

- Bridge/Culvert Study
- Radio System Upgrade
- Undergrounding Power
- Misquito/Beaver Control
- Drainage Studies
- Public Outreach

- Emergency Ops. & Communication Sys.
- Develop Stormwater master Plan
  - ↳ Culvert sizing
    - ↳ Overall Hydrology / Flood plains
    - ↳ Street Drainage Capacity Analysis
    - ↳ Dam Investigation
- Community Education & outreach
- Undergrounding Power
- Misquito/Beaver Control
- Fuel Storage & Capacity