TOWN OF GRANBY

April 3, 2019

Municipal Vulnerability Preparedness
Community Resiliency Building Workshop

SUMMARY OF FINDINGS

Catalyst for Regional Progress
PVPC

Prepared and Presented by

Pioneer Valley Planning Commission and the Town of Granby

This project and the following report are made possible through funding from the Massachusetts Executive Office of Energy and Environmental Affairs' Municipal Vulnerability Preparedness (MVP) Grant Program.

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OVERVIEW

The need for municipalities, regional planning organizations, and state and federal agencies to increase planning and activities toward resilience and adaptation to extreme weather and mounting natural hazards is strikingly evident in the Pioneer Valley and Town of Granby. Recent events--such as the 2016 drought, extreme cold spells in the winter of 2017-2018, the microburst of 2014, and the October ice storm of 2011-- have reinforced this urgency and compelled communities like Granby to proactively plan and mitigate potential risks through a community driven process. Ultimately, the commendable leadership demonstrated by Granby's efforts will reduce the exposure and vulnerability of its citizens, infrastructure and ecosystems. This work also contributes to the greater climate resilience of the entire Pioneer Valley region.

Recognizing the importance of both mitigation and adaptation strategies to deal with the challenges of climate change, the Town of Granby used the Municipal Vulnerability Preparedness (MVP) Planning grant as an opportunity to integrate these objectives into existing programs. The Town has an active Conservation Committee and is a certified Green Community. In 2018, members of the Select Board, Planning Board, Emergency Management community and other town leaders formed a team to pursue funding from the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA) to advance a Community Resilience Building workshop under the MVP program. The Town was awarded funding to complete the MVP planning program to increase awareness of risks from and decrease vulnerabilities to natural and climate related hazards.

The core directive of the MVP program is to engage community stakeholders to facilitate the education, planning and ultimately implementation of priority climate change adaptation actions. Completion of the MVP process will enable the Town to achieve MVP certified community status from EOEEA by June of 2019 and receive preference for future state grants.

This report provides an overview of the top hazards, current concerns and challenges, strengths, and proposed actions to improve the Town of Granby's resilience to natural and climate-related hazards today and in the future. The summary of findings provided in this report is supported by more detailed analyses in the Town's 2017 Natural Hazard Mitigation Plan Update.

COMMUNITY RESILIENCE BUILDING WORKSHOP

The Town of Granby employed a unique "anywhere at any scale", community-driven process known as the Community Resilience Building framework to host an 8-hour workshop on March 9, 2019. The list of workshop invitees and workshop content was guided by input from an interdisciplinary core MVP planning team composed of town elected officials, community members, and consultants from the Pioneer Valley Planning Commission. The workshop's central objectives were to:

- Affirm community consensus of the local meaning of extreme weather and local natural and climate-related hazards;
- Identify existing and future vulnerabilities and strengths;
- Develop and prioritize actions for the Town and a broad stakeholder network;
- Identify opportunities for the community to advance actions to reduce risk and increase resilience.

Approximately 12 participants from town boards and committees, local businesses, and other interest groups attended the workshop, which included a combination of large group presentations and small group activities. Pioneer Valley Planning Commission began the day with a presentation outlining the workshop process and goals, updating participants on past and ongoing local planning efforts, and presenting new state-provided climate projection data to enable both decision-support and risk visualization. Participants then broke out into two small groups and assumed different participatory roles and responsibilities to engage in a rich dialogue sharing ideas and experiences.

TOP HAZARDS & VULNERABLE AREAS

Leading up to the workshop, the core MVP planning team worked with input from town officials to identify the top 4 natural hazards for the Town of Granby. These hazards were narrowed down based on findings from previous planning processes, stakeholder input, and new climate change projections. Severe winter weather with snow, ice, and wind was identified as a hazard of greatest concern by most team members, as was severe storms with resulting storm water and culvert flooding. Wildfires and brushfires resulting from drought and severe weather were also determined as a major concern due to the community's large amount of forest land. During the community resilience building workshop, participants had an opportunity to approve of these selections as the hazards that have the greatest impacts on Granby's operations and natural resources, and on residents' safety and wellbeing.

TOP HAZARDS

- Severe winter weather, including snow, ice, blizzard, and wind
- Hurricanes and tropical storms including wind, storm-water flooding, and heavy rain
- Flooding
- Wildfire/Brushfire

AREAS OF CONCERN

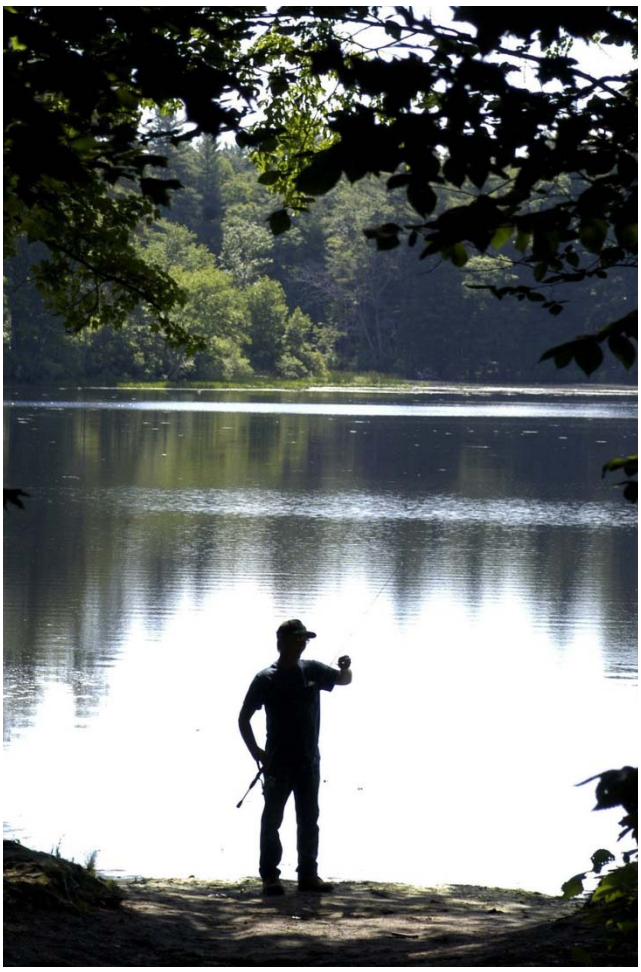
Infrastructure: Solar substations causing new stress on grid, potential for drinking water contamination due to the high percentage of private wells

Water Infrastructure: Problem and undersized culverts causing flooding, beaver dams reducing flood storage capacity, dams in poor repair

Natural Resources: Water quality and quantity is of concern due to high number of private wells, bugs are killing trees from the inside so that they are unexpectedly rotting

Human and Social: Aging population may be disconnected from resources, residents with limited mobility may have trouble evacuating during an emergency, people in Granby want to take care of themselves and may be socially isolated, limited tax base from which to draw revenue, low buy-in for reverse 911

CURRENT CONCERNS & CHALLENGES BY HAZARD



The Town of Granby faces multiple challenges related to the impacts of climate change and natural hazard-related weather events. In recent years, the Town has experienced a series of disruptive and dangerous weather events including the severe snow and ice storms of 2009 and 2011, and the arctic cold weather in the winter of 2017/2018. Impacts from storms are exacerbated by increasingly weakened forest and tree health due to influxes in harmful pests in local forests. Unhealthy trees and their limbs are more likely to be brought down onto powerlines by the weight of snow, ice, or water and under the force of wind, leading to more prolonged power outages and elevating risks to residents and infrastructure. The magnitude and intensity of these events over the course of just a few years has increased awareness of natural hazards along with climate change and motivated communities like Granby to comprehensively improve resilience at the individual and municipal level.

Granby's MVP workshop participants were generally in agreement that the Town and region are experiencing more intense and frequent storm events, the impacts of which affect the daily activities of all residents. There was also common concern about the challenges of being prepared for future severe weather events, including the ability to shelter residents close to home; the resilience of the transportation network to changing weather and temperature fluctuations and the need for the system to remain operational for emergency travel, at a minimum; and the desire to become energy independent for increased resiliency during system-wide power outages. Furthermore, participants established a common directive to improve the efficiency and efficacy of communication systems throughout town, both in times of emergency and in day-to-day operations, and to improve food security in town.

SPECIFIC CATEGORIES OF CONCERNS & CHALLENGES

Flooding at Dufrense Park in Granby
Source: Jay Joyce

ELECTRICAL DISTRIBUTION SYSTEM

Electricity is one of the most critical pieces of infrastructure in modern societies, and electrical service outages in Granby can be caused or impacted by all of the hazards prioritized during the MVP process. The many residents in town that are mobility-limited, less technologically advanced, or health impaired in any way are particularly vulnerable to the secondary impacts of a power outage, including prolonged exposure to extreme cold or heat.

As was noted by Granby residents, National Grid does not do a great job with preventative maintenance in the town. Before many of the large-scale solar developments had been installed in town, National Grid had a great deal of surplus capacity in its substations. When solar was installed in large quantities, this surplus was removed to make room for what was being produced by solar developers, who then sold the surplus to private developments, as opposed to leaving it for the use of the town. National Grid will no longer put any money into upgrading the station as they claim it is the responsibility of solar developers to maintain.

COMMUNICATION NETWORKS

In addition to equipment and infrastructure challenges, workshop participants noted a need to increase education about and uptake of existing communication channels that could serve residents during an emergency and for day-to-day announcements. The Town subscribes to a reverse 911 system that can distribute information to any residents who sign up for alerts, but which only helps those residents who know about it and sign up. Participants also expressed concern over the social isolation that ensues from residents aging in place without close neighbors. While the town has a Wellness Check program for some of these isolated individuals, it is an opt-in system and some may not know about it. The needs for improved community gathering spaces and increased diversity of communication methods were highlighted.

VULNERABLE POPULATIONS

According to American Community Survey 2013-2017 estimates, approximately 24.3% of Granby's population is over the age of 60. The greatest concerns with this population are isolation during a winter power outage or prolonged exposure to extreme heat. Power outages, especially when concurrent with

extreme temperatures, leave the elderly and medically vulnerable populations at extremely high risk. Other vulnerable populations of note include those who live in the handful of group homes scattered throughout the town who have developmental disabilities or mental health challenges, those who are low-income, and those who do not speak English as a first language. Granby relies on the local high school and senior center as short-term shelters; however these spaces are not appropriate for long-term sheltering as they do not have air conditioning or bathing areas.

Culverts and Flooding

Residents who attended the MVP Workshop noted that flooding has gotten much worse in recent years. In areas where rainwater used to be absorbed after hours, like Dufresne Park, water now stands like a pond for several days. This year, Granby experienced flooding on State Route 202 near School Street and the MacDuffie School that included a flow coming toward the brook, something that has not occurred before.

Part of the issue with flooding in the area is due to the town's outdated culverts. All of the town's many culverts are undersized or in disrepair and cannot handle short duration, increased intensity rainfall events. All upgraded or new culverts must meet state stream crossing standard, but the cost to do just one replacement project now can equal the entire Highway Department budget in Granby. The result is that projects do not get done and culverts continue to age, deteriorate, and lead to flooding. The town would like some relief to be able to fix culverts to the maximum extent possible based on limited available funding.

In addition, a University of Massachusetts Amherst team is currently studying the increased groundwater table throughout New England. They have found that groundwater levels are trending to be higher than before, which likely contributes to flooding issues in Granby.

Transportation Infrastructure

Participants in the MVP Workshop noted that the town's roads lack redundancy and that access to certain roads (namely, Amherst Street) would be disastrous if lost during an emergency. Navigating around these primary thoroughfares would take considerable time. Another issue is present in the fact that many of Granby's private roads are difficult for emergency vehicles to access due to steep sloping and lack of maintenance. Along with potential culvert flooding, these conditions could provide quite difficult during emergencies when the need for speedy emergency service is a necessity.

Drinking Water Resources

90% of the residents of Granby access their drinking water through private wells. Participants expressed concern over groundwater contamination from previous and current land uses. Following are some of the issues raised:

- Wells along Route 202 have been impacted by salt traced to aggressive winter road maintenance by Mass DOT along that route. There is concern that with the upgrades to Route 202, this problem will only become worse.
- With the highest number of horses per capita in Massachusetts, there is concern about those keeping horses and other hobby farmers not disposing of waste appropriately and introducing contaminants to drinking water.
- For numerous small lots in Town the distance between on-site private well and septic system may not be adequate given rising groundwater and the frequency of larger storms and saturation of soils.
- Testing at the well for the East Meadow Elementary School--located on grounds used previously for firefighting training activities--showed the presence of perflourinated compounds in water. As a result, the well was dug to tap into supply at a far greater depth. The Town reports that is well is now regularly tested and results reported to Mass DEP.

Given the myriad issues, many residents are supportive of expanding public water lines and voted recently at special town meeting to support a $1.2 million project to extend water infrastructure from South Hadley into Granby up Highway 202. This is the first of a multi-phase, long-term project.

DAMS

There are four dams in Granby and one dike, three of the dams are publicly owned and one is owned by private citizens (Aldrich Lake Dam). Maintenance costs and inspection requirements can be prohibitive, and private dams often fall into disrepair. The Aldrich Lake Dam and Forge Pond Dam and Dikes have been identified by Massachusetts Department of Conservation and Recreation as “Significant Hazard” dams, requiring routine safety inspection every five years and an emergency action plan and. The Aldrich Dam is in “Satisfactory” condition, however the Forge Pond Dam and Dike and the Dufresne Farm Pond Dam are in “Poor” condition. The Quenneville Dam is not currently holding water, but is considered “Unsafe.”

CURRENT STRENGTHS & ASSETS

As a result of Granby's broad experience with extreme weather and the impacts of climate change, workshop participants were quick to point out their communities' strengths in responding to the challenges identified above. Reinforcing and expanding upon these strengths and community assets is a common theme to the proposed actions presented later in this report to increase resiliency against the impacts of climate change.

Some of the key strengths discussed included:

- The townspeople are fairly self-sufficient and many have backup generators, wood stoves, and access to well water in the case of an emergency that might leave them stranded.
- Granby Charter Days, a weekend long community event, brings residents and business owners together once a year to gather and share information and spend time in Dufresne Park.
- The MacDuffie School, a private school located within the town, provides needed tax revenue.
- The town offers a robust set of services for seniors including programming at the local senior center, Meals on Wheels program, a food pantry, and a Wellness Check program for those seniors who live alone. Due to the small size of the town, participants noted that if a senior has not been seen for a few days, people will notice and check in on each other.
- Westover Air Force Reserve Base is located on the edge of Granby.
- Granby is home to large amount of forest land that protects the town from runoff, captures carbon, and keeps groundwater clean.
- Shelter space is available during the case of an emergency at the local high school and at the senior center.
- The town is home to four churches, two of which are very active in the community.
- The schools in Granby attract families with school-age children and host an active Parent Teacher Association.

TOP RECOMMENDATIONS TO IMPROVE RESILIENCE

Workshop participants identified more than 25 actions that the Town of Granby, in collaboration with neighboring municipalities, regional partners and state agencies should take to improve resilience to the impacts of climate change. Toward the end of the workshop, each small group presented its three top priority actions to the large group. These actions were grouped with like actions from other small groups, and then voted on by the large group[1].

The following priority recommendations were developed at the 2 small group tables, and are presented below in no specific order:

- Hire a consultant to update the zoning bylaws in Granby.
- Properly fund the tree warden and forestry expenses.
- Provide more funding for road infrastructure and maintenance.
- Work on creating better Town Board and Committee coordination to mitigate problems, particularly in reference to the permitting of the Route 202 project. This action is intended to address communication issues amongst these groups.
- Promote economic development to increase the tax revenue of the town, potentially by hiring an economic development consultant to create an economic development plan.

[1] The actions with the most votes were to complete construction of the Broadband network in town, Improve communications through use of Blackboard Connect, community meetings, and other avenues, and Conduct a town-wide inventory and investment prioritization plan of transportation infrastructure.

- Consolidate Town Hall and government offices in the West Street location.
- Secure water and sewer resources for the town by extending water and sewer lines up Route 202 from the town of South Hadley to the Town of Belchertown. This could also include exploring a natural gas pipeline.

The entire suite of recommendations can be categorized into the following categories:

- Community and Economic Development
- Open Space/Tree Management
- Emergency Management/Communications
- Water Infrastructure
- General Infrastructure

All recommended MVP actions were shared with the public at a public listening session on April 1, 2019. Materials from the Public Listening Session are provided in Appendix E.

A full list of the final recommendations, organized by high, medium, and low priority, is provided below.

HIGH PRIORITY ACTIONS

CATEGORY	ACTION	LEAD
Emergency Management/ Communications	Better promote Reverse 911; boost effort by engaging with PTA to reach more people of all ages, use light-up electric sign to advertise.	
Community and Economic Development	Create economic development plan to promote industrial/commercial development that can share in tax burden. This plan should address the impact of the extension of sewer and water lines up Route 202.	
	Consolidate the town government buildings and build a new senior center at the site of the old West Street School.	
	Work on creating better Town Board and Committee coordination to mitigate problems, particularly in reference to the permitting of the Route 202 project. This action is intended to address communication issues amongst these groups.	
General Infrastructure	Add sewer to parts of Town where especially vulnerable populations live, tapping into USDA and SRLF sources	
	Increase funding for infrastructure maintenance to address failing and undersized culverts	
	Install a water and sewer system along Route 202 to provide amenities to residents and businesses throughout the town. These services should be available to vulnerable populations, and should reach all the way to MacDuffie School.	
Water Infrastructure	Ensure higher design standards for managing storm water/impervious surfaces; develop committee-town checklist so that no more problems arise	
	Design and construct new culverts, starting with the one on Amherst Street, and continue to address all culverts over time.	
	Cisterns should be strategically placed throughout the town for firefighters to use as water sources.	
	Study options for the future of Forge Pond Dam and whether it should be removed.	
Open Space/Tree Management	Properly fund tree warden and forestry expenses	
	Look into ways to restrict solar farm construction on forested areas.	

CATEGORY	ACTION	LEAD
	- Remove tax exempt status of solar farms - Categorize solar farms as impervious surfaces	

MEDIUM PRIORITY ACTIONS

CATEGORY	ACTION	LEAD
Emergency Management/ Communications	Coordinate with COA and Emergency Management to help aging population	
	Hire a consultant to update the zoning bylaws in Granby	
Community and Economic Development	Examine cluster bylaw to ensure that it allows smaller homes, especially for ages 55+	
General Infrastructure	Hold joint Conservation Committee/DPW meeting to review stream crossings (culverts and bridges) and prioritize for repair and funding, comparing notes on condition, public safety, and habitat values	
Water Infrastructure	Get information from Mass DCR-ODS to determine status of dams and compliance and work with to ensure public safety, including town-owned dams	
	Create a park improvement plan for Dufresne Park that addresses beaver damage, erosion, the dam, and storm water management.	
Open Space/Tree Management	Greater public protection of forest in order to keep drinking water supply viable and pure	

LOW PRIORITY ACTIONS

CATEGORY	ACTION	LEAD
General Infrastructure	Conduct analysis of private roads and assess whether solutions to ongoing problems are possible.	
	Analyze the grid and determine whether Granby should start its own utility company (separate from BOS)	
	Conduct a study of emergency road access to ensure that emergency vehicles can access all parts of town safely.	
Water Infrastructure	Conduct a water quality and drinking water study to identify problem areas and causes while educating the public, particularly vulnerable populations who may not know about the dangers of not testing.	
Open Space/Tree Management	Properly address street trees and condition	

ACTION IMPLEMENTATION DESIGN

Once participants voted on the top priority actions, each team was asked to select two actions and begin to develop an implementation plan. For each action, the small groups filled out an Action Implementation Design worksheet, providing information on the lead agency/ department for implementation, the partners that would need to be involved for successful project completion, an estimated cost for the project, known or potential funding sources, and implementation milestones. This exercise was a tool for Granby decision makers to get a head start on the thought process that would be required to apply for an MVP Action Grant, a funding opportunity from EOEEA that was announced shortly after the completion of Granby's MVP workshop. The completed Action Implementation Design worksheets are provided in Appendix C.

WORKSHOP PARTTICIPANTS

Approximately 12 participants from Town departments, committees and boards, large land owners, community organizations, and businesses were in attendance at the MVP workshop.

PARTICIPANT NAME	DEPARTMENT/COMMITTEE AFFILIATION, POSITION
Lilian Camus	Neighborhood Revitalization, Planning Board
Steve Carpenter	Land and business owner
June Carpenter	Land and business owner
Gail Demary	Realtor
Richard Domeracki	Key Stakeholder
Jay Joyce	Granby Selectboard
John Libera	Finance Committee
Chris Martin	Hazard Mitigation Committee
John Mitchell	Hazard Mitigation Committee
Amanda Smith	Conservation Committee
John Sullivan	Public Facilities
Micheline Turgeon	Board of Health
Dave Desrosiers	Highway Department Supervisor and Hazard Mitigation Committee

MVP WORKING GROUP

- Jay Joyce, Town of Granby Select Board
- Chris Martin, Town of Granby Town Administrator
- David Desrosiers, P.E., Town of Granby Highway Superintendent
- John Mitchell, Jr, Town of Granby Fire Chief
- Corrin Meise-Munns, Pioneer Valley Planning Commission
- Emily Slotnick, Pioneer Valley Planning Commission

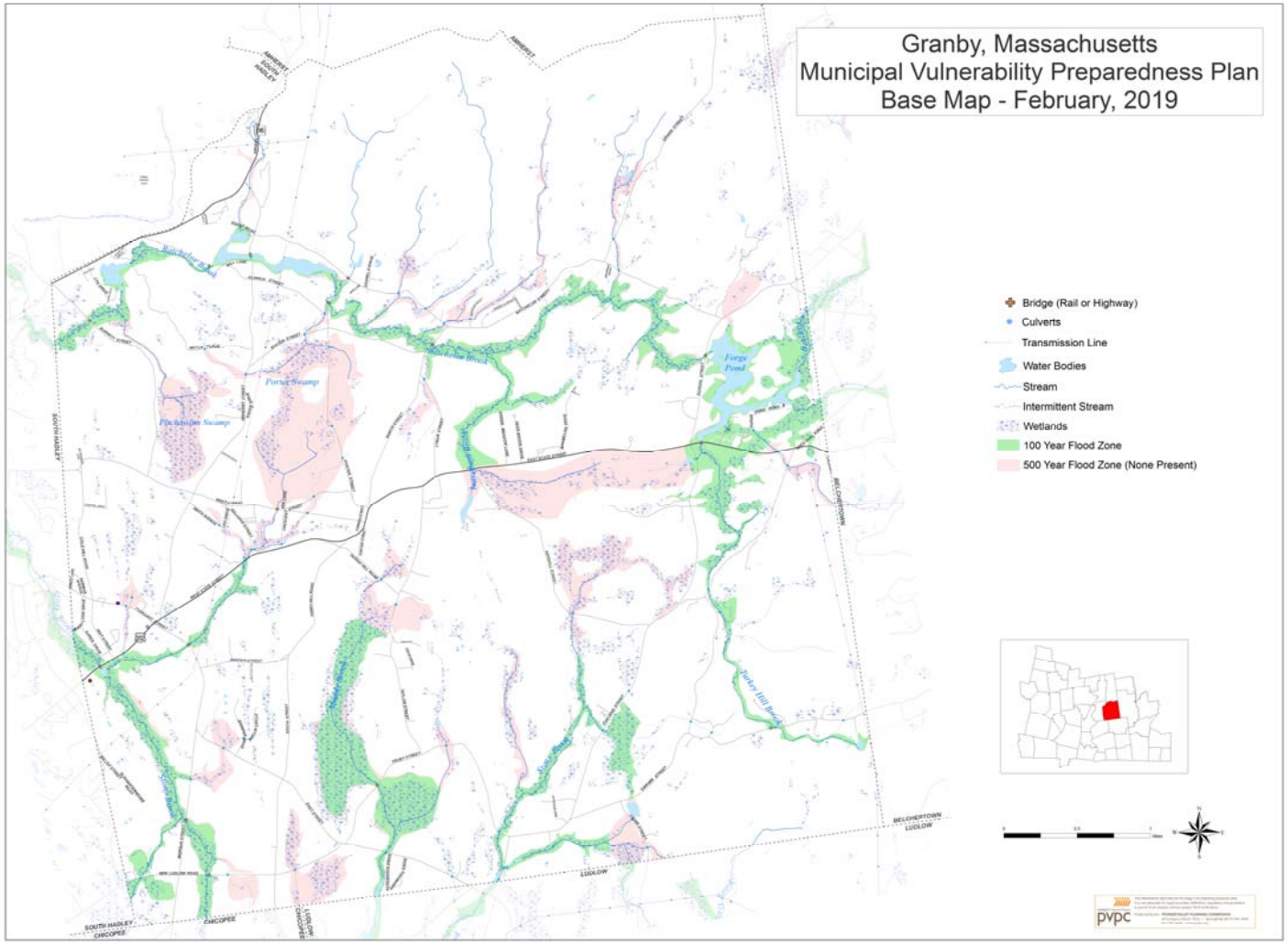
WORKSHOP FACILITATORS

- Emily Slotnick, Pioneer Valley Planning Commission
- Patty Gambarini, Pioneer Valley Planning Commission
- Allison Curtis, Pioneer Valley Planning Commission

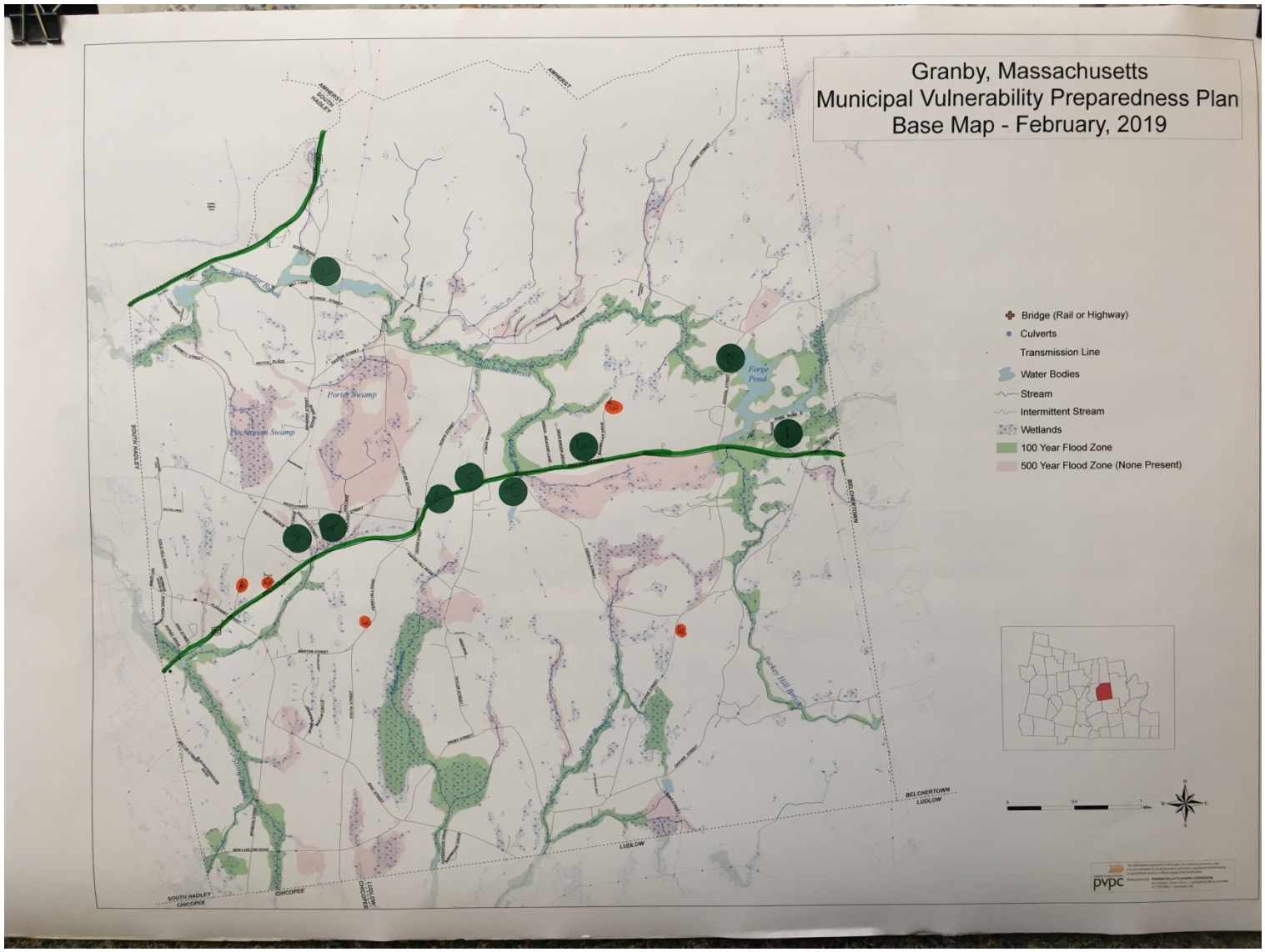
ACKNOWLEDGEMENTS

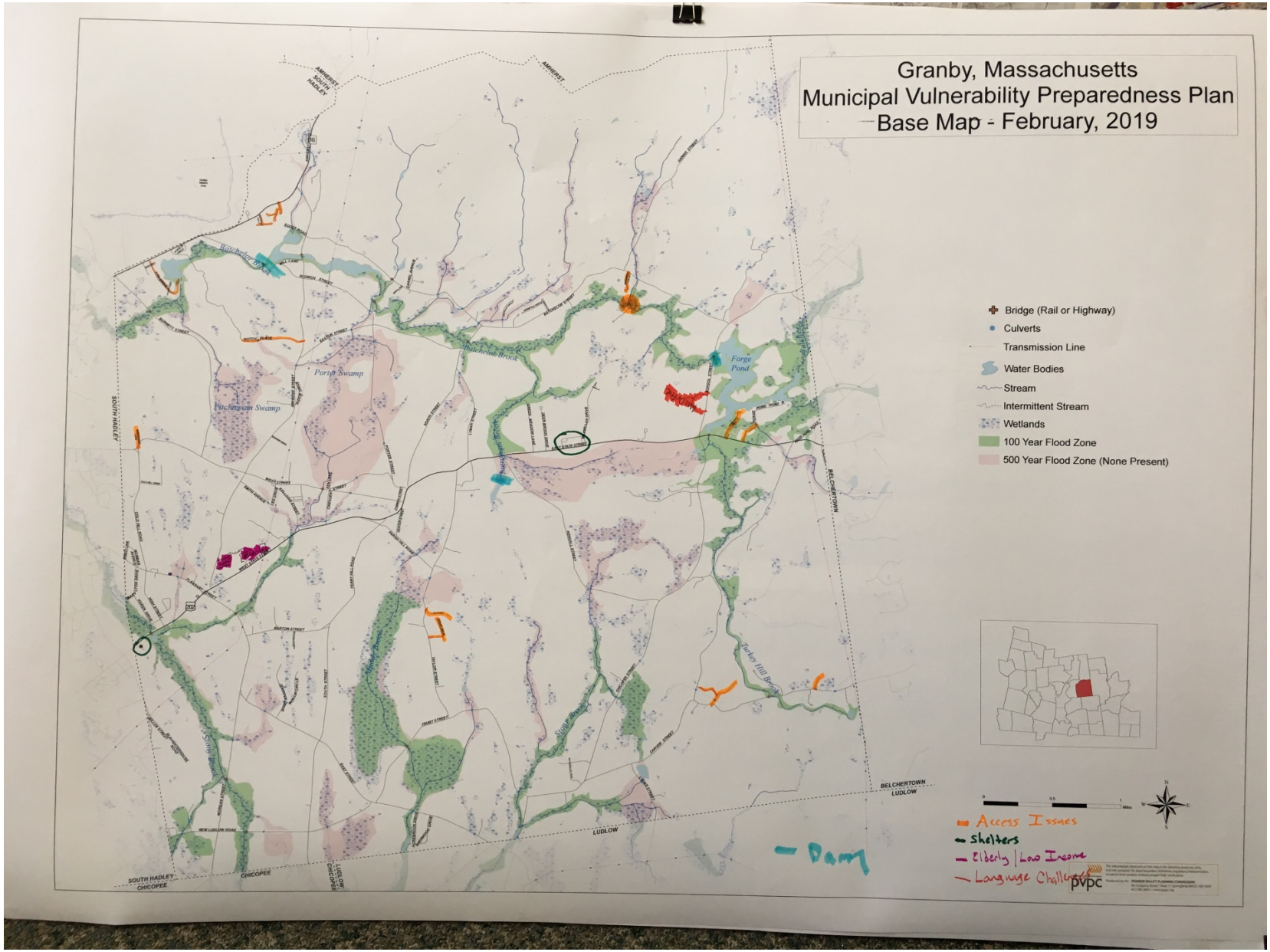
Special thanks to the Town of Granby Select Board and Town staff for their willingness to enhance this process and provide the facilities to convene. This project was made possible in part through funding from the Massachusetts Executive Office of Energy and Environmental Affairs, and from significant volunteer commitments from the Granby MVP.

APPENDIX A: WORKSHOP BASE MAP



APPENDIX B: PARTICIPATORY MAPPING RESULTS




Granby, Massachusetts
Municipal Vulnerability Preparedness Plan
Base Map - February, 2019
Bridge (Rail or Highway)
Culverts
Transmission Line
Water Bodies
Stream
Intermittent Stream
Wetlands
100 Year Flood Zone
500 Year Flood Zone (None Present)
Access Issues
shelters
Elderly | Low Income
Language Challenges
Dam
pvpc
Porter Swamp
Patchinsam Swamp
Forge Pond
Tucker Hill Brook
Stony Brook
AMHERST
SOUTH HADLEY
CHICOPEE
LUDLOW
BELCHERTOWN

APPENDIX C: PARTICIPANT HANDOUTS

Granby Municipal Vulnerability Preparedness Workshop

DATE: Saturday, March 9, 2019
TIME: 8:30a.m. – 4:30p.m.
PLACE: Granby Senior Center

AGENDA

8:00 a.m. – 8:30 a.m.	**Registration**
8:30 a.m. – 10:00 a.m.	**Introductions** and **Presentation**: MVP, Climate Data, Local Conditions
10:00 a.m. – 10:15 a.m.	**Break**
10:15 a.m. – 12:30 p.m.	**Morning Small Team Workshop** o Identify Community Vulnerabilities and Strengths o Report out (11:45 a.m.) o Identify and Prioritize **C**ommunity Actions, Priority and Urgency (1 of 3 categories)
12:30 p.m. – 1:00 p.m.	**Lunch**
1:00 p.m. – 2:30 p.m.	**Afternoon Small Team Workshop** o Identify and Prioritize **C**ommunity Actions, Priority and Urgency (2nd and 3rd categories) o Identify 3-4 priority actions and write on cards o Report Outs (2:00 p.m.)
2:30 p.m. – 2:45 p.m.	**Break and Vote on Top Priorities**
2:45 p.m. – 3:45 p.m.	**Afternoon Small Team Workshop Continued** o Implementation Design o Final Report Outs (3:30)
3:45 p.m. – 4:00 p.m.	**Wrap-up and Next Steps**

Municipal Vulnerability Preparedness

Action Implementation Design

COMMUNITY ACTION

Consolidate town Hall

Lead Implementing Agency/ Department (Emergency Manager, Select Board, DPW, Fire Chief, Finance Committee, Planning Board, etc.)

Select board, planning board, Town Admin

Partners (Neighboring municipalities, State actors, local non-profits and land trusts, community groups, etc.)

Police, Fire, conservation, council on aging, community groups, school board?

Cost (Dollar estimate, or Low: < $50,000, Medium: $50,000 – $100,000, High: > $100,000)

$ ~~$~~ 12 million or $8 for 2 new buildings (net zero)

Funding Sources (Capital Improvement Plan, Staff Time, Chapter 90, Hazard Mitigation Grant Program (HMGP), other grants, etc.)

National Grid, Colombia Gas, MVP, Gov. Baker ~~budget~~, Bond, tax $/ voter approval or denial.

Implementation Milestones

Examples:
1. Create and convene a committee to oversee progress;
2. Dissiminate 300 information packets to raise awareness about the initiative;
3. Apply for a grant to fund more robust public outreach, education, and awareness campaign.

1. Funding for plans
2. ~~Start engineering site plans~~
2. hire consultant & make plans
3. Go to vote
4. ~~town~~ Demo / Hazardous waste
5. Construction

Note: Cost estimates take into account the following resources:
- Town staff time for grant application and administration (at a rate of $25 per hour)
- Consultant design and construction cost (based on estimates for projects obtained from town and general knowledge of previous work in town)
- Town staff time for construction, maintenance, and operation activities (at a rate of $25 per hour)

Municipal Vulnerability Preparedness

Action Implementation Design

COMMUNITY ACTION

Expand Sewer infrastructure and new water line along 202 coindor as far as MacDuffie School.

Lead Implementing Agency/ Department (Emergency Manager, Select Board, DPW, Fire Chief, Finance Committee, Planning Board, etc.)

Economic Development Committee

Partners (Neighboring municipalities, State actors, local non-profits and land trusts, community groups, etc.)

Selectboard, DPW, Fire department, Conservation Committees, Planning Board (permits), State Police, Board of Health

Cost (Dollar estimate, or Low: < $50,000, Medium: $50,000 – $100,000, High: > $100,000)

Extremely High. $18-20 million plus.

Funding Sources (Capital Improvement Plan, Staff Time, Chapter 90, Hazard Mitigation Grant Program (HMGP), other grants, etc.)

USDA, MVP, Capital Improvement, DEP, DOT

Implementation Milestones

Examples:
1. Create and convene a committee to oversee progress;
2. Disseminate 300 information packets to raise awareness about the initiative;
3. Apply for a grant to fund more robust public outreach, education, and awareness campaign.

1. Find funding
2. Public engagement and education
3. Hire consultants for design of phase 1 + 2...
4. RFPS for construction

Note: Cost estimates take into account the following resources:
- Town staff time for grant application and administration (at a rate of $25 per hour)
- Consultant design and construction cost (based on estimates for projects obtained from town and general knowledge of previous work in town)
- Town staff time for construction, maintenance, and operation activities (at a rate of $25 per hour)

Municipal Vulnerability Preparedness

Action Implementation Design

COMMUNITY ACTION Better Town Board/Committee Coordination to mitigate problems

- Prescreening Committee for development projects

Lead Implementing Agency/ Department (Emergency Manager, Select Board, DPW, Fire Chief, Finance Committee, Planning Board, etc.)

Planning Board

Partners (Neighboring municipalities, State actors, local non-profits and land trusts, community groups, etc.)

All other relevant Town Boards & Committees

Cost (Dollar estimate, or Low: < $50,000, Medium: $50,000 – $100,000, High: > $100,000)

Low <$50,000

Funding Sources (Capital Improvement Plan, Staff Time, Chapter 90, Hazard Mitigation Grant Program (HMGP), other grants, etc.)

Town

Implementation Milestones

Examples:
1. Create and convene a committee to oversee progress;
2. Dissiminate 300 information packets to raise awareness about the initiative;
3. Apply for a grant to fund more robust public outreach, education, and awareness campaign.

- Initial notice to convene meeting of representatives of all Boards & Committees.

Note: Cost estimates take into account the following resources:
- Town staff time for grant application and administration (at a rate of $25 per hour)
- Consultant design and construction cost (based on estimates for projects obtained from town and general knowledge of previous work in town)
- Town staff time for construction, maintenance, and operation activities (at a rate of $25 per hour)

Municipal Vulnerability Preparedness

Action Implementation Design

COMMUNITY ACTION Promote Economic Development to increase tax revenue

- Review of zoning map to determine whether General Business zones should be expanded and include additional uses.
- Look into Tax Incentive Financing Program.
- Look into special Tax Agreement - 5yr limit
- Look into Economic opportunity Area - potential expansion of Belchertown EOA

Lead Implementing Agency/ Department (Emergency Manager, Select Board, DPW, Fire Chief, Finance Committee, Planning Board, etc.)

- Planning Board + Selectboard

Partners (Neighboring municipalities, State actors, local non-profits and land trusts, community groups, etc.)

- Finance
- Chamber of Commerce

Cost (Dollar estimate, or Low: < $50,000, Medium: $50,000 – $100,000, High: > $100,000)

Medium $ 50,000 - $100,000

Funding Sources (Capital Improvement Plan, Staff Time, Chapter 90, Hazard Mitigation Grant Program (HMGP), other grants, etc.)

Multiple State Agencies

Implementation Milestones

Examples:
1. Create and convene a committee to oversee progress;
2. Dissiminate 300 information packets to raise awareness about the initiative;
3. Apply for a grant to fund more robust public outreach, education, and awareness campaign.

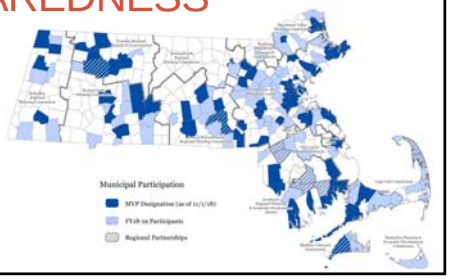
1. Create a committee to review current zoning maps & business incentives.
2. Committee creates report w/ findings + recommendations + presents to a joint Planning Board/Selectboard meeting.
3. If Boards agree, hire a PR firm to assist in promoting program

Note: Cost estimates take into account the following resources:
- Town staff time for grant application and administration (at a rate of $25 per hour)
- Consultant design and construction cost (based on estimates for projects obtained from town and general knowledge of previous work in town)
- Town staff time for construction, maintenance, and operation activities (at a rate of $25 per hour)

APPENDIX D: MVP WORKSHOP PRESENTATION

MUNICIPAL VULNERABILITY PREPAREDNESS

Town of Granby, Ma



Introductions

1. Name
2. Your role in / relationship to Granby (staff, board and committee members, business owner, resident, etc.)

MVP Planning Grant Purpose and Goals

- **Community-led process** that employs local knowledge
- **Mainstream** climate change data
- **Look to communities** as local innovators
- **Coordinate** statewide efforts

Complete workshop – vulnerability assessment and action plan

Preference for projects that propose **"Nature based solutions"**

Community Resilience Building WORKSHOP GUIDE

Granby MVP Purpose and Goals

- Share ideas about climate change, impacts, and actions to reduce vulnerabilities
- Become a "MVP "Certified" Community
- MVP Action Grant

Outline of Workshop

Agenda

Time	Activity
9:00 a.m.	Introductions, MVP, Climate Data, Local Conditions
10:30 a.m.	**Break**
10:40 a.m.	Small Team: ID/Map Community Vulnerabilities and Strengths
11:40 a.m.	Small Team: Identify and Prioritize Community Actions
12:30 p.m.	**Lunch**
1:00 p.m.	Small Team: Identify and Prioritize Community Actions (Cont.)
1:30 p.m.	Small Team: Identify Priority and Urgency/Timeline
2:05 p.m.	**Break**
2:20 p.m.	Report Outs, Vote on Top Priorities
3:05 p.m.	**Break**
3:15 p.m.	Implementation Design Exercise
4:00 p.m.	Wrap-up and Next Steps

Activity #1: What changes have you seen in the natural environment over the course of your lifetime?

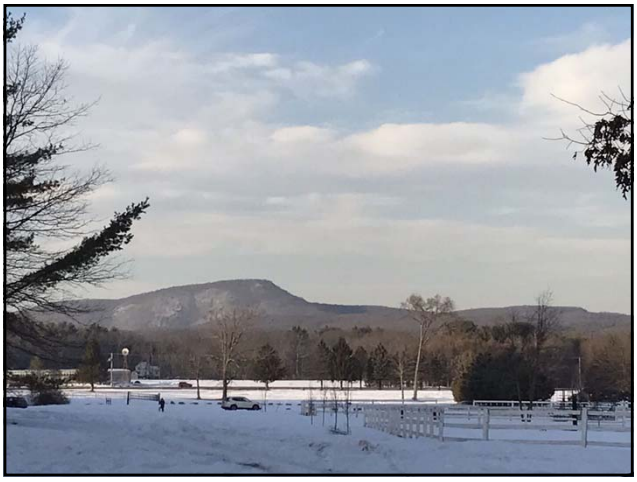
Example: My street floods once or twice per year now, and it never did in the past

Example: Fewer blue jays at my bird feeder in the winter

Example: Asian beetle and EAB destroyed the ash trees in town

Example: Early thaws followed by late cold snaps have damaged fruit yields

Fill out sticky note, and add to board



Concerns and Challenges

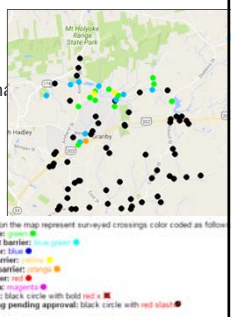
Problem and undersized culverts

- Amherst St over Aldrich Lake; Dufresne Park Dam; Bachelor St before MacDona

Localized flooding

- Meadow Glen Drive
- East State Street (Route 202)
- Carver Street
- Chicopee Street
- Batchelor Street
- Harris Street
- Trompke Avenue

Beaver dams reduce flood storage capacity

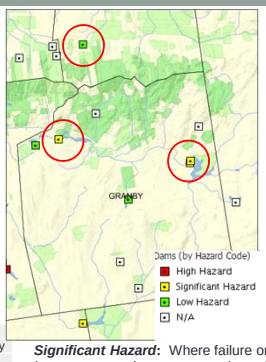


The colored circles on the map represent surveyed crossings color coded as follow:

- **Full Passage:** green
- **Insignificant barrier:** blue green
- **Minor barrier:** blue
- **Moderate barrier:** yellow
- **Significant barrier:** orange
- **Severe barrier:** red
- **Missing data:** magenta
- **No crossing:** black circle with bold red x
- **New crossing pending approval:** black circle with red slash

Concerns: Dams

Dam	Hazard Level	Condition
Aldrich Lake Dam	Significant	Satisfactory
Forge Pond Dam-	Significant	Poor
Forge Pond Dike	Significant	Poor
Dufresne Farm Pond Dam	Low	Poor
Quenneville Dam	Low-Not holding water now	Unsafe



Significant Hazard: Where failure or improper operation may cause loss of life & damage to homes, industrial or commercial facilities, secondary highways or railroads or interrupt use or service of relatively important facilities.

Concerns and Challenges

Water quality

- >90% of the population relies on private wells
- Rising Groundwater Table
- Issues with PFAS Per- and polyfluoroalkyl substances)
- New wells at East Meadow School tested positive for PFAS
- Legacy pesticide use from historic farming activities and small scale hobby operations, horses, Alpaca Farm
- Community leach fields are perceived risk

Concerns and Challenges

- Water Quality and quantity
  - 2016, shallow wells dried up and became contaminated
  - Emergency (fire) water supply no longer sufficient
- Electrical Grid
  - Solar substations cause new stress on the grid
  - Bugs are killing trees
- People want to take care of themselves
  - don't want to leave their homes during power outages or other emergencies.
- Communication
  - Low buy-in for reverse 911
  - Muni telephone system vulnerable to power outage

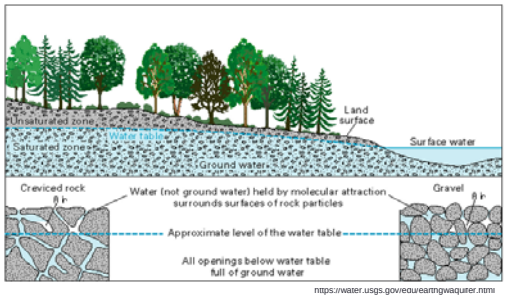
Granby's Assets and Features

- Emergency back-up power
  - Public Safety Complex and schools
- Reverse 911
- Senior Center – 3'rd place and EOC
- High school – emergency shelter
- National Grid infrastructure upgrades
- Historic and recreational resources
- 2/3 of the community (roughly 12,000 acres) are forested

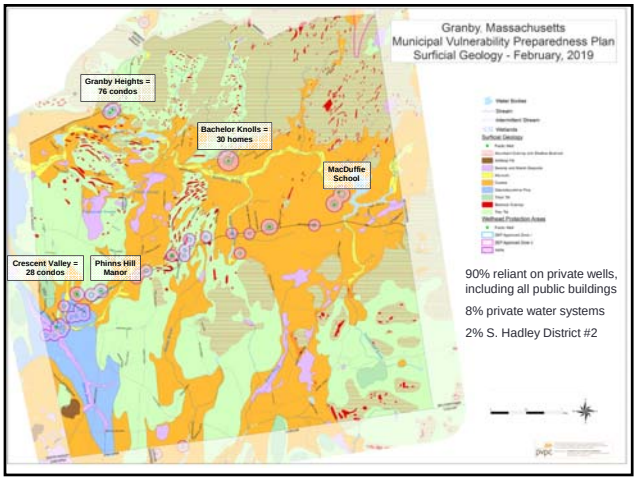
Drinking water

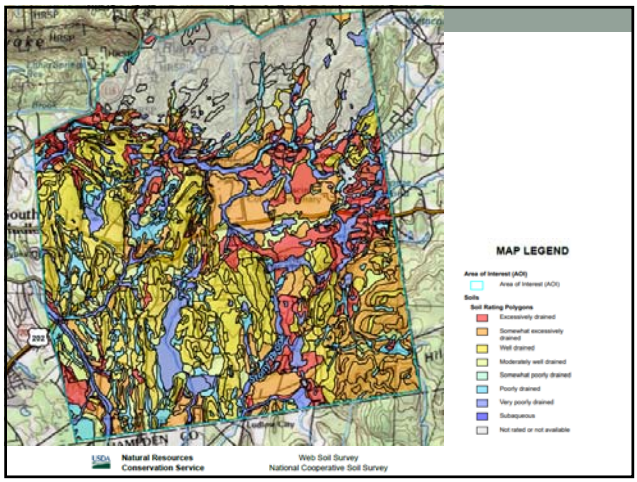
Three characteristics that shape nature of supply

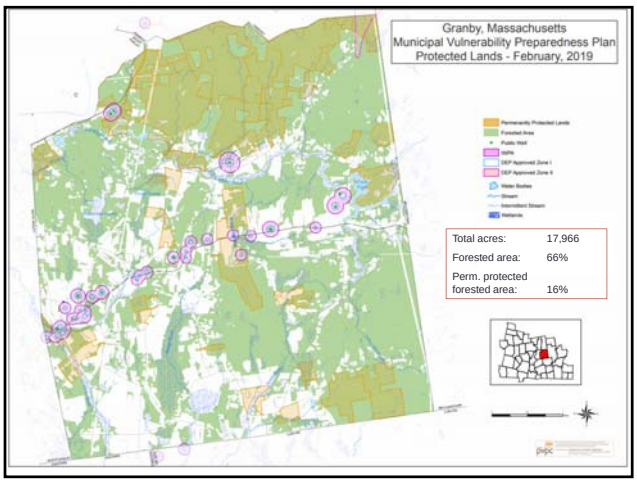
- Geology
- Soils
- Land use/forest cover

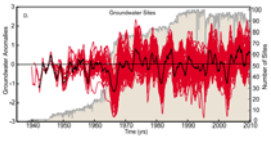


https://water.usgs.gov/edu/earthgwaquifer.html









From Weider and Boutt, New England Groundwater Table, 2010

- Groundwater – like temperature, precipitation, streamflow—on the rise and more pronounced recently
- Higher water table attributed to both increased precipitation, but also land use changes

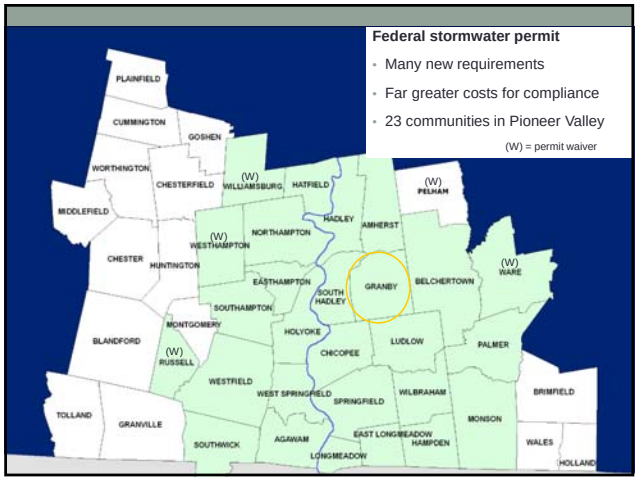
- Most wells in Town understood to be shallow
- Greater susceptibility to contamination as groundwater rises
- More vulnerable locations include:
  - Small lots with well and septic
  - Wells along Route 202 with intrusion of road salt

Connecting to Quabbin Supply

Stormwater

- Important ties to drinking water
- Keep contaminants out of flows
- Typically encourage strategies to soak up rain for recharge

Source: P. Gambarini



Federal stormwater permit

- Many new requirements
- Far greater costs for compliance
- 23 communities in Pioneer Valley

(W) = permit waiver

Permit elements that may help w/ resilience

- New development and redevelopment standards (LID / nature based solutions)
- Mapping of municipal storm system and inspections of outfalls and interconnections
- More frequent cleaning of catch basins

Massachusetts Green High Performance Computing Center, Holyoke

Global Climate Trends

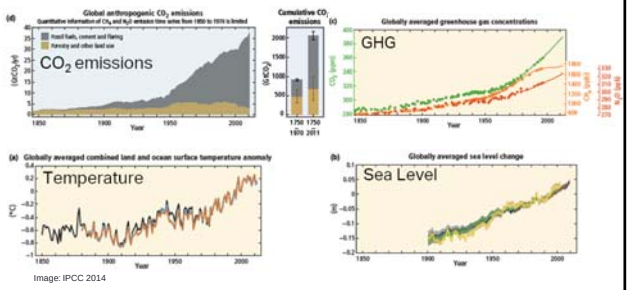


Image: IPCC 2014

- 14 of 15 hottest recorded years since 2000
- July, August 2016, then July 2017 – hottest months on record

Massachusetts Observed Climate Trends

Temperature: ↑ **2.9°F**
Since 1895 (Statewide)

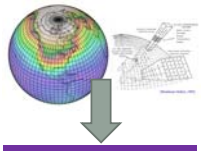
Growing Season: ↑ **15 Days**
Since 1950

Heavy Precipitation: ↑ **11 inches**
Since 1922 (Boston)

MA Climate Projections

- Statewide projections comprised of county-and basin-level information

Global Climate Models (GCMs)



Latest, state of the art climate model simulations (CMIPS) used in the IPCC report (2013)

Model Selection
Rigorous assessment of model performance and projections

Karmalkar et al., *under review*

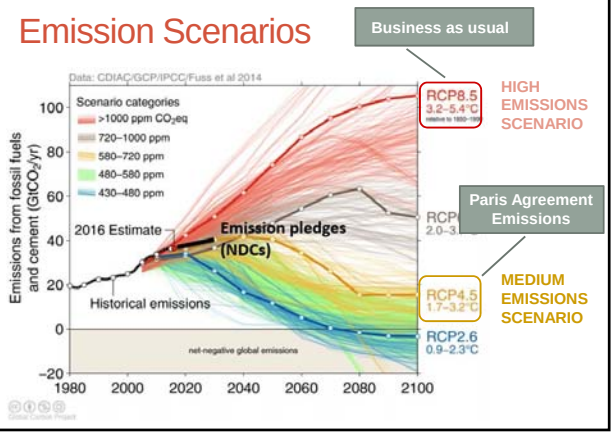
Daily data for MA at 6-km resolution

DOWNSCALED MODEL DATA

Statistical Downscaling

Pierce et al., 2014

Emission Scenarios



Massachusetts Climate Changes Projected by 2090's

Temperature ↑ **7.2°F**
Avg. annual; Range 4 to 11°F

7.2°F Days ↑ **34 Days**
Annual; Range 11 to 64 days

2" Precipitation Days: ↑ **47%**
Annual

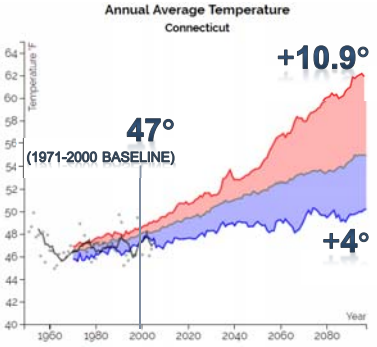
Source: Northeast Climate Adaptation Science Center

Average Temperatures

- ↑ in annual and seasonal average, max., and min. temps
- Summer highs may ↑ 9% by 2050, 17% 2100
- Fall highs may ↑ 12% by 2050, 20% 2100

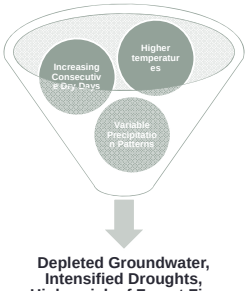
Impacts

- Rain v. snow
- Ecosystem viability
- Consecutive dry days
- Drought and fire



Average Temperatures PLUS…

- Invasive Species
  - Changing hierarchies in ecosystems
  - Ecosystem stress opens invasive pathways
- ↑ in mosquito populations - West Nile virus and triple E.
- ↑ in existing tick-borne diseases and change in geographical distribution of others



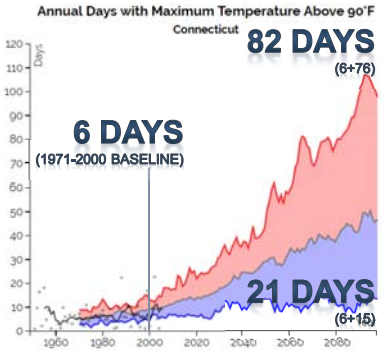
Depleted Groundwater, Intensified Droughts, Higher risk of Forest Fire

Extreme Temperatures

- Major jump w/ high emissions scenarios
- By 2100, up to +60 days above 90 in summer, +12 days above 90 in fall.

Impacts

- Heat impacts vulnerable pops.
- ↑ in cooling degree days

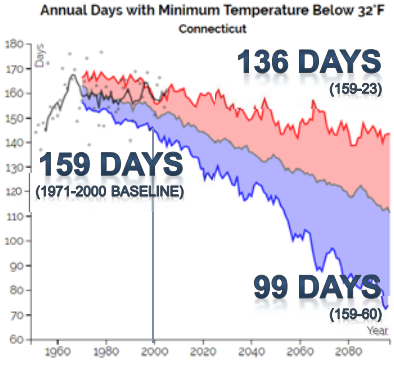


Cold Temperatures

- Fewer days below 32° and 0°
- ↓ in 32° days by 2050 projected in fall and spring
- ↑ length of frost-free season

Impacts

- Pests and insects
- Vegetative growing season
- Maintenance costs

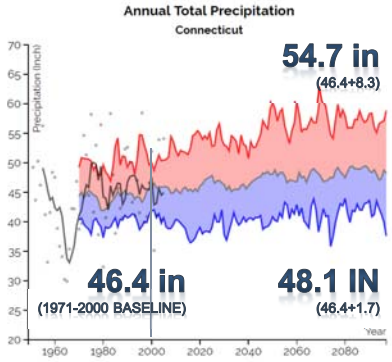


Precipitation

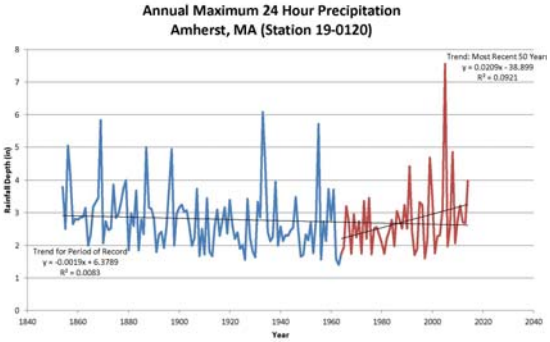
- Annual total precipitation ↑ 1.3 – 6.2" by 2050
- Greatest ↑ in spring and winter

Impacts

- Winter rain
- Reduced snow cover and ice melt



Historical Trend: Maximum Precipitation



Source: Linnean Solutions

Precipitation >1"

- Annual ↑ 1.48 days by 2050
- Greatest ↑ in spring and winter

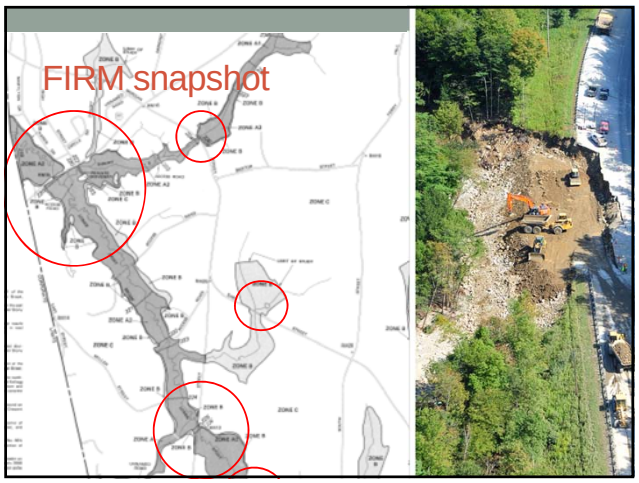
Impacts

- Water quality
- Flood risk
- Erosion
- Stormwater infrastructure

Extreme Precipitation > 1" (Projected) — Connecticut Basin

Season	Baseline (days)	Projected change in # Days with precipitation > 1" 2030s	2050s	2070s	2090s
Annual	6.5	+0.85	+1.48	+1.94	+1.87
Fall	1.89	+0.27	+0.36	+0.32	+0.29
Spring	1.56	+0.28	+0.4	+0.66	+0.71
Summer	1.98	+0.25	+0.29	+0.33	+0.3
Winter	1.04	+0.26	+0.45	+0.69	+0.84

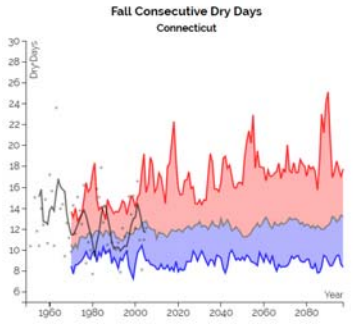
FIRM snapshot



Consecutive Dry Days

- Increasing consecutive dry days in summer and fall

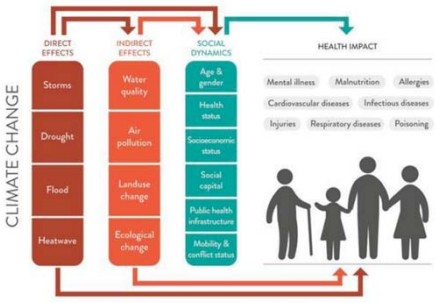
Impacts
- intensified droughts
- weakened tree root systems, making them more susceptible to toppling during high wind events
- Increases the risk of wild fire



Climate Projections Summary

By 2100
- Increase (↑) in:
  - Average temperatures
  - Min and max temperatures
  - # of days with temps over 90, 95, and 100
  - Cooling degree days (65 and above)
  - Winter precipitation – intensity and frequency
- Decrease (↓) in:
  - # of days below 32 and 0
  - # of heating degree days (65 and below)
  - Fall precipitation (potential)

Who and what is especially vulnerable?



Challenges
- More extreme storm events/ precipitation
  - More and longer heat waves
- More summer drought

Who and what is especially vulnerable?

Vulnerable populations

- Under 5 and over 65 years old
  - Various daycares throughout town
  - Elderly housing: Phins Hill
- Low income
- Disabled and chronic illness
  - Several group homes throughout town
- Limited English speakers
- Socially or physically isolated
- **Agricultural community**

Other vulnerable assets - transportation infrastructure/culverts, drinking water, forests, biodiversity

Activity #2: What does **Climate Vulnerability Preparedness** Look Like to You?

Examples:

"Able to weather disasters and long-term emergencies with joy, grace, and safety."

"Having water and heat available during all weather events."

"Variable and flexible social network. Flexible plan to address short-term problems in the context of long-term goals."

"Sharing resources with others in my community. Communication."

"Prepare for the unprecedented."

Fill out sticky note, and add to board

Municipal Planning & Existing Ongoing/ Identified Actions

Plan / Code	Identified Action (Past or Ongoing)
2016/2017 Hazard Mitigation Plan	• Inventory and assess culverts and bridges on evacuation routes – replace problem culverts • Assess resiliency of muni telephone infrastructure and how residents would access 911 services during an outage. • Fix Forge Pond Dam (vegetative clearing) • Increase Reverse 911 sign-ups • Complete a Stormwater Management Plan • Evaluate Key Water Holes in town for use in fire response.
Stormwater Management	• GI actively promoted in new MS4 permit
OSRP	• Encourages natural resource protection
Building Code	• Adopted State Building Code and stretch code, requires homes be built to higher energy efficiency standards

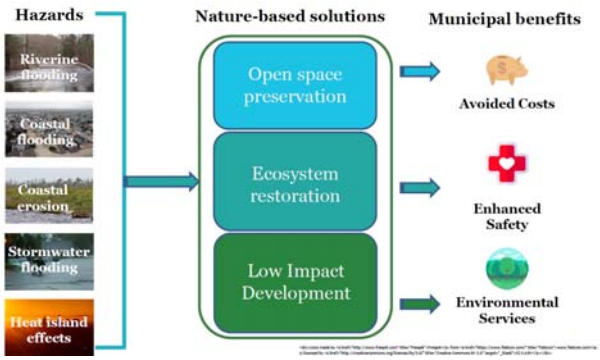
Past and Ongoing Actions

- Certified Green Community
- Completed Master Plan, now being implemented
- Erosion Control and Sediment Plan in place
- DPW does tree trimming, cleans drainage, mows areas, cleans culverts, pretreats road before snow storms
- Reverse 911 – appx. 1/3 of town enrolled
- Considering joining Community Preservation Act Prgrm
- Fire and DPW part of a state-wide mutual aid agreement. Police part of a region-wide mutual aid agreement.
- DLTA investigation on groundwater

MVP and Nature-Based Solutions

- The sustainable management and use of nature for tackling challenges such as climate change, water and food security, biodiversity protection, human health, and disaster risk management.
- Provides co-benefits for people and nature

MVP and Nature-Based Solutions



Nature-Based Solutions: Examples

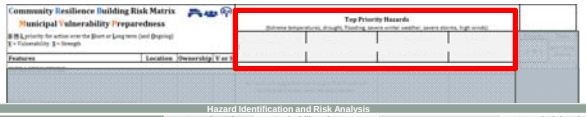
- Maintaining healthy, resilient forests will help them continue their critical function of carbon sequestration.
  - Monitor for early detection and removal of invasive plant species
  - Maintaining species- and age-diverse forest
- Flood/fish friendly culverts protect infrastructure and aquatic habitat
- Rain gardens to reduce localized flooding and recharge aquifer

Any Questions?

Regroup at 10:45

Risk Matrix Exercise 1a: Characterize Hazards

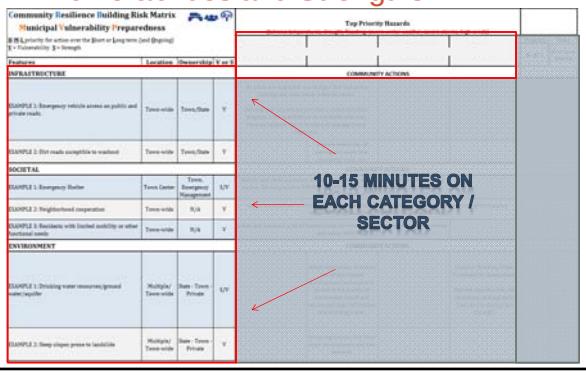
Which climate-influenced natural hazards are the top priorities to consider in assessing vulnerability and planning for resiliency?



Hazard Identification and Risk Analysis

Type of Hazard	Location of Occurrence	Probability of Future Events	Impact	Hazard Risk Index Rating
Flooding	Small	Low (100 year) Very High(Local)	Limited (100 year) Minor (Local)	4-Low (100 year) 1-Very High (local)
Severe Snowstorms/ Ice Storms	Large	Very High	Limited	3-Medium
Severe Thunderstorms/Winds/ Tornadoes/Microburst	Medium	Very High	Limited	3-Medium
Hurricanes	Large	High	Limited	2-High
Wildfire / Brushfire	Large	High	Minor	3-Medium
Earthquakes	Large	Very Low	Catastrophic	5-Very Low
Dam Failures	Small	Low	Minor	4-Low
Drought	Large	Low	Minor	4-Low
Extreme Temperature	Large	Medium	Minor	4-Low

Risk Matrix Exercise 1b: ID Vulnerabilities and Strengths

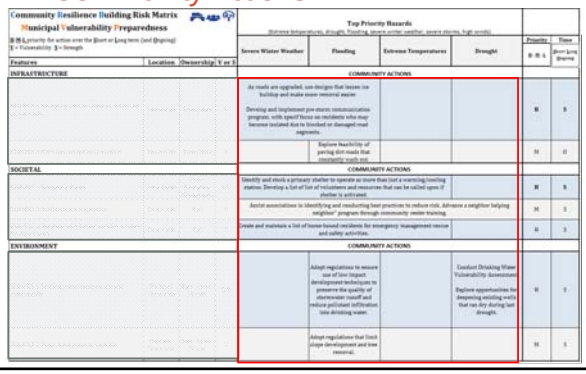


Data and maps available during workshop

- Resources for today
  - Agenda
  - Example completed risk matrix
  - Notes sheets
  - Maps
    - Base map – for mapping exercise
    - Critical Facilities and (Past) Hazard Area Map
  - Downscaled climate projections (on computer)
  - 2016-2017 HMP

Regroup at 11:40

Risk Matrix Exercise Part 2: ID Community Actions



MVP Action Grants: Project Categories

Detailed Vulnerability and Risk Assessment
- e.g., Watershed and Water Supply Vulnerability, Risk Assessment & Management Strategy (City of Gloucester)

Public Education and Communication
- e.g., Learning from Hurricane Maria Survivors (City of Holyoke)

Local Bylaws, Ordinances, Plans, Other Mgmt. Measures
- e.g., Climate Resilience Policy Audit/Amendments, LID & Design Guidelines (Town of Brookline)

Redesigns and Retrofits
- e.g., N. River Canal Resilient Wall, Riverwalk & Park (Peabody)

Ecological Restoration & Habitat Mgmt. to ↑ Resiliency
- e.g., Sawmill Brook Central Pond Restoration Design (Manchester)

MVP Action Grants: Project Categories

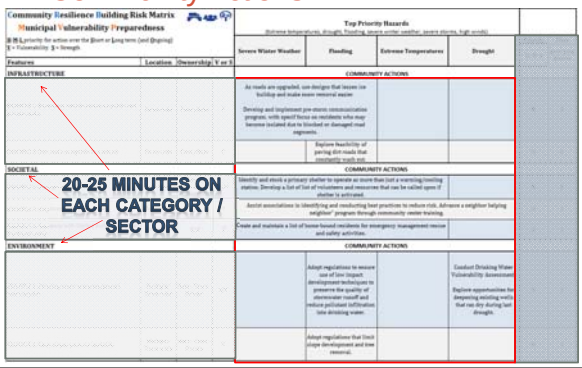
- **Nature-Based Storm-Damage Protection, Drought Prevention, Water Quality, and Water Infiltration Techniques**
  - Road Flooding Protection Project (Town of Montague)
- **Nature-Based, Infrastructure and Technology Solutions to Reduce Vulnerability to Extreme Heat and Poor Air Quality**
  - Tree Planting Plan to Mitigate Heat Islands and Reduce Runoff (Town of Natick)
- **Nature-Based Solutions to Reduce Vulnerability to other Climate Change Impacts**
  - Water/Sewer Infrastructure Green Emergency Power Study (Town of Holden)

What is a "Winning" MVP Action?

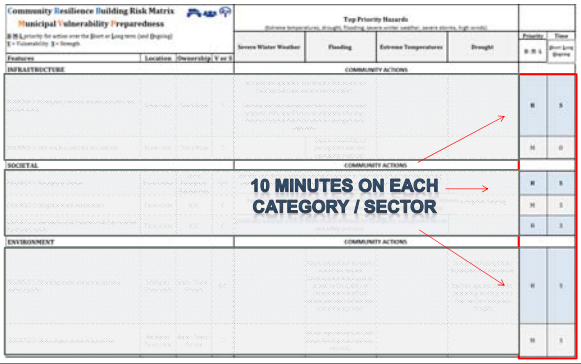
To Mitigate Flooding/Storm water, Water Quality, or Heat
- Drainage Model & Conceptual Strategies to Reduce Future Flooding (City of Medford)
- Designs with Nature to Reduce Storm Damage (City of Northampton)
- Retrofit Parking Lot to Reduce Urban Heat Island (City of Cambridge)

Opportunities to Include NBS in Follow-on Project Phases
- Town-wide Road Stream Crossing Assessment (Town of Belchertown)
- Assessing Storm-energy Reduction by the Vegetated Salt Marsh Plat form (Town of Newbury)
- Lawrence Brook Watershed Flood Mitigation & Water Quality Improvement (Peabody)

Risk Matrix Exercise Part 2: ID Community Actions



Risk Matrix Exercise Part 3: Prioritize Actions



Break

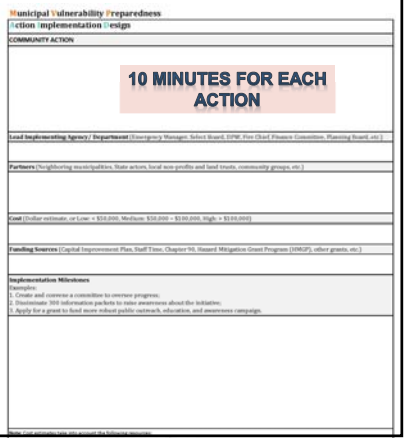
Regroup at 2:20

After Risk Matrices are Complete…

- Report Outs
- Turn in Priority Cards
- Dot Voting

After Risk Matrices are Complete…

- Implement-ation Exercise
- Report Outs


Municipal Vulnerability Preparedness
Action Implementation Design
COMMUNITY ACTION
10 MINUTES FOR EACH ACTION
Lead Implementing Agency/ Department (Emergency Manager, Select Board, DPW, Fire Chief, Finance Committee, Planning Board, etc.)
Partners (Neighboring municipalities, State actors, local non-profits and land trusts, community groups, etc.)
Cost (Dollar estimate, or Low: < $50,000, Medium: $50,000 – $100,000, High: > $100,000)
Funding Sources (Capital Improvement Plan, Staff Time, Chapter 90, Hazard Mitigation Grant Program (HMGP), other grants, etc.)
Implementation Milestones
Examples:
1. Create and convene a committee to oversee progress;
2. Disseminate 300 information packets to raise awareness about the initiative;
3. Apply for a grant to fund more robust public outreach, education, and awareness campaign.

Thank You!

APPENDIX E: PUBLIC LISTENING SESSION

The MVP Planning Team decided that the best way to disseminate information regarding the MVP and to illicit feedback was to broadcast the public listening session on local cable television during one of the town's Select Board meetings. In attendance were three members of the select board, a representative from the highway department, the town administrator, and the town clerk. Response to the presentation was generally positive from those in attendance. People expressed gratitude that the Commonwealth had decided to increase the maximum funding allotted for action grants and were excited about the opportunity to access these funds.