TOWN OF PELHAM
Community Resilience Building Workshop

Summary of Findings

5/24/2018

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for the Town of Pelham by
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with a grant from the MA Executive Office of Energy & Environmental Affairs

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TOWN OF PELHAM
COMMUNITY RESILIENCE BUILDING WORKSHOP

SUMMARY OF FINDINGS

OVERVIEW

The need for municipalities, regional planning organizations, the state and federal agencies to increase resilience and adapt to extreme weather events and mounting natural hazards is strikingly evident in the Pioneer Valley Town of Pelham. Recent events such as the 2016 drought, extreme cold spells in the winter of 2017-2018, and Tropical Storm Irene and Hurricane Sandy before that have reinforced this urgency and compelled communities like the Town of Pelham to proactively plan and mitigate potential risks through a community driven process. Ultimately, the commendable leadership demonstrated by Pelham's efforts will reduce the exposure and vulnerability of Pelham's citizens, infrastructure and ecosystems and serve as a model for communities across the Pioneer Valley, Massachusetts, New England, and the Nation.

The Town of Pelham has long been engaged in climate action and resilience efforts. The town has an active Energy Committee and Neighbor to Neighbor community that have been meeting since 2011 with the rise of the local Transition Town movement. In 2016, Pelham completed a Natural Hazard Mitigation Plan and in 2017 unanimously passed a climate change resolution in Town Meeting calling on elected and appointed officials to implement measures that conserve vital water and energy resources, and minimize carbon emissions. Shortly thereafter, leaders from Pelham's Energy Committee, Neighbor to Neighbor community, and Transition Town movement came together with elected and appointed officials to form a new partnership focused on increasing awareness of risks from natural and climate related hazards. A municipal-based core team emerged to pursue funding from the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA) to advance a Community Building Workshop under the newly established Municipal Vulnerability Preparedness (MVP) program. The core directive of the effort was to engage community stakeholders to facilitate the education, planning and ultimately implementation of priority climate change adaptation actions. 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.

The Town of Pelham employed a unique "anywhere at any scale", community-driven process known as the Community Resilience Building Workshop

(www.CommunityResilienceBuilding.com). The CRB Risk Matrix was integrated into the workshop process alongside new state-provided climate projection data to provide both decision-support and risk visualization for the Town of Pelham. Using this workshop process, rich with information, experience, and dialogue, the participants produced findings which are outlined in this summary report. This report provides an overview of the top hazards, current concerns and challenges, current strengths, and actions to improve the Town of Pelham'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 2016 FEMA-approved Hazard Mitigation Plan.

Figure 1. Participants split into three small groups to complete their CRB Risk Matrices

SUMMARY OF FINDINGS

Pelham's Select Board, Planning Board, Energy Committee, Emergency Management Director, and Highway Superintendent came together in 2017 with a common understanding that building resilience to climate change is important for any community and is well aligned with specific actions underway in the town.

These partners represented key players in municipal vulnerability preparedness in Pelham. For instance, as the primary board regulating development in town, the Pelham Planning Board understands that development patterns have the ability to increase or decrease the town's vulnerability to natural hazards, which are likely to worsen as the climate changes. Similarly, the Energy Committee seeks to reduce municipal energy usage and encourage residents to take advantage of energy efficiency programs to build collective resilience. Having weathered ten days in town without power, the energy committee is also currently exploring opportunities for solar deployment as a means of energy independence, especially during times of natural disasters.

Many of the partners had recently participated in the creation of Pelham's first Hazard Mitigation Plan, highlighting their commitment to working towards making Pelham and its residents more resilient in the wake of climate change. This program would give the Town the opportunity to revisit the conversation, identify additional actions that focus not only on mitigation, but also preparedness, and inspire action to move the plan towards implementation.

This core group of partners pursued the MVP workshop both as an opportunity for various stakeholders to assess vulnerabilities in town, and to brainstorm ideas in order to become a more resilient community.

The Workshop's central objectives were to:

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

TOP HAZARDS AND VULNERABLE AREAS

Each MVP workshop participant brought a unique perspective of preparedness to the table. When asked "What does Climate Vulnerability Preparedness look like to you?" in the beginning of the day, participant responses included:

> *"Able to weather disasters and long-term emergencies with joy, grace, and safety."*
>
> *"Having an educated population. 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."*

"Plans for personal, property, and infrastructure safety and recovery. Plans for mitigation, independence and interdependence."

"Prepare for the unprecedented."

A short time later, participants were asked to confirm the top hazards for Pelham as defined by the core team in previous meetings. These hazards were narrowed down based on findings from Pelham's previous planning processes, including the 2016 Hazard Mitigation Plan, stakeholder input and new climate change projections. These resources pointed to 6 hazards as the top priorities for Pelham to consider in assessing vulnerability, preparedness, and planning for resiliency.

Top Hazards

- Extreme temperatures
- Drought
- Flooding
- Severe winter weather
- Severe storms
- High winds

Once split into small groups, each group was asked to select 4 of the 6 top hazards to use in developing the CRB Risk Matrix. Drought, severe storms, and high winds were chosen by all three groups. While flooding was not chosen as a stand-along category, participants considered flood issues as secondary impacts under the severe storms and severe winter storms categories. Extreme temperature was chosen by two teams. According to the participants, these hazards have direct and increasing impacts on Pelham residents and town resources, including natural areas, buildings, roadways, drinking and wastewater systems, and other critical infrastructure.

Features and Areas of Concern

Once each team chose its top hazards, participants were asked to identify community features and characteristics, including vulnerabilities and strengths, in each of the three categories: Environmental, Societal, and Infrastructural.

Most of the strengths identified by Pelham's MVP participants fell into the Environmental and Societal categories. These included actively protected forestry and conservation lands, bylaws that protect critical ecosystems and drinking water resources, a strong town culture of neighborly support and helping one another, active town committees, as well as a strong sense of community surrounding the elementary school. Existing reverse 911 systems, highway and public safety equipment, and the potential for the town campus, encompassing the Community Center and Elementary School, to serve as an emergency shelter were among the features noted as infrastructural strengths. Furthermore, roughly 10% of Pelham residents currently live in the area adjacent to the town campus. With passage of new village center zoning district in May, 2018, population growth and infrastructure will be concentrated around this new resilient campus. This rezoning will help to facilitate growth in a manner that will put large segments of the population in

close proximity to municipal buildings that have been outfitted to help the town prepare to deal with the impacts of a changing climate.

The vulnerabilities identified in many ways paralleled the strengths mentioned above, illustrating the ways that climate change can create new risks to otherwise healthy ecosystems. Robust forested lands and contiguous swaths of open space are vulnerable to invasive species whose populations will increase as winters warm up. They will also host a growing population of vector-borne disease agents such as ticks and mosquitos, species that may flourish in warming temperatures and increased ponding after heavy rainfall events.

The town library is part of the "town campus," a grouping of buildings including the library, elementary school, and public safety complex that serve as the town's emergency shelter. However, the library's HVAC system is in dire need of upgrades, and could malfunction during an emergency scenario which would jeopardize the health and safety of any residents taking shelter there. Back-up power at the campus can support some of the shelter operations but is reliant on fossil fuels, and therefore would be limited if transportation routes to fuel sources were cut off, or if availability were limited for another reason.

Pelham has long been a rural small town that relies on its natural resources to sustain the lifestyles and well-being of its residents. Many Pelham residents rely on groundwater protected by the water protection overlay district as their sole source for drinking water, which they pull from private wells. In the case of a power outage, these same residents could be without access to drinking water if they don't have access to a hand pump or backup power source, making the availability of a fully operational emergency shelter even more critical. The reliance on private wells and groundwater speaks to the importance of maintaining Pelham's forest cover, and the necessity to continue protecting the watershed for public and private water supply. Furthermore, it highlights the need to put into place some mechanism to ensure potable water for well-users in case of power outages and emergencies.

Due to its rural nature, most residents in Pelham handle residential sewage through on-site septic systems, and only a small segment of the western part of the town on the Amherst line is served by municipal sewer. The reliance on septic has potentially hampered economic development in the town, and poses a challenge to future village center development proposals.

While the town has active participation in its boards and commissions, the population of residents in government service and volunteer boards is aging, and younger people face barriers to getting involved. These barriers may be exacerbated by the town's difficulty in communicating effectively with its residents. The aging population, while actively serving as volunteers and sources of local knowledge, are also more vulnerable to physical isolation in the event of a weather emergency, as not all elderly have access to a vehicle or are comfortable using digital technologies. Elderly residents are more vulnerable to extreme heat and cold, which highlights the need for adequate heating and cooling centers to be operational in town, and for the existence and availability of those resources to be effectively communicated to residents in need.

A number of town roads and culverts experience localized flooding and impassibility during heavy rainstorms. Residents may become stranded without notification when roads are closed for safety purposes until waters recede.

Figure 2. Participants marked up base maps during the workshop to record information about vulnerable features in town.

CURRENT CONCERNS AND CHALLENGES PRESENTED BY HAZARD

The Town of Pelham has several concerns and 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 summer 2016 drought, power outages due to severe snow and ice storms (1978,1996, 2009 and 2011), and the arctic cold weather in the winter of 2017/2018. 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 Pelham to comprehensively improve resilience at the individual and municipal level.

Pelham'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 a common concern about the need for and challenges of being prepared for future severe weather events, including the ability to shelter residents in town, the ability of the transportation network of roads, culverts, and small bridges to be resilient to floods and remain operational, and the desire to become energy independent for increased resiliency during system-wide power outages.

SPECIFIC CATEGORIES OF CONCERN AND CHALLENGES

Recent Past Hazards

- **Drought**
  One of the key discussions in the workshop revolved around the town's drinking water supply which is predominantly comprised of private wells tapping into layers of groundwater stored either in subsurface sand and soil deposits, or in fractures within the bedrock beneath. Drinking water sourced in this manner is highly susceptible to drought. Workshop participants called for a focused study of drinking water resources vulnerability relative to new climate change projections, the risk of severe drought, and the projected increase in intense precipitation events.
  One MVP participant believed that most people in Pelham drastically undervalue the importance of drinking water and ensuring safe supply, especially given that so many are on private wells and few have their water tested.

- **Flooding**
  The occurrence of major flooding is Pelham is considered fairly minimal. Less than 1% of the Town's land (112 acres) is within the 100-year floodplain and no land is within the 500-year floodplain. Historically, flooding of residential basements of homes built in or near the wetland buffer zones have been the only incidences of flooding in town. In the town's Hazard Mitigation Planning process, however, it was also noted that undersized and/or blocked culverts have caused localized flooding of roadways in town. This information was reaffirmed during the workshop process. Many participants began the workshop confident that flooding was not an issue in Pelham, but later when asked to identify vulnerable features in town, pointed out a number of problem culverts where flooding does occur

regularly, and other locations where roadway flooding cut off access to some residential areas from the rest of the town.

- **Severe Snow and Ice Storms**
  In recent history, Pelham has been impacted by a number of severe storms. The snow and ice is exacerbated by the vast canopy cover in town leading to power disruptions across the town for extended periods of time. Recent events have included:
    - Winter of 2009-A severe ice storm caused widespread power outages
    - October of 2011- Heavy snowfall fell across the Valley before the trees lost their leaves. This caused extensive damage to the trees and brought down many power lines. After this storm, parts of Pelham were without power for close to five days.

  The slow restoration of power to the residents of Pelham is attributed to the town being located at the end of power lines.

- **Energy Independence**
  The Town of Pelham has an active Energy Committee in town that is tasked with working to reduce municipal energy usage in town per the Green Communities program. Due to the recent storms that have left Pelham without power for extended periods of time and a desire to be more sustainable, the Energy Committee has also started to think about how the town might be able to create local power sources that could help residents "weather" future storms and help reduce their contributions to climate change. The desire to be energy independent goes beyond ensuring that the town buildings have renewable energy that can function when the grid is down, but also seeks to ensure that residents have this built in resiliency.

- **Ability to Shelter in Town**
  The lack of sheltering capabilities in town surfaced as an area of concern by the MVP leadership team and during the hazard mitigation planning process. Currently, the Town has agreements in place with UMass Amherst and Belchertown if the need for long term sheltering is necessary. The Public Safety Complex has a generator in place that will allow for continued operations at the facility and can function as a warming and cooling center in the event of extreme weather. The Public Safety Complex currently does not have the supplies in place to be a full scale shelter and there are concerns that even if the equipment were in place, there would not be enough skilled volunteers to staff the shelter.

- **Limited Communication**
  All of the concerns present in Pelham are further exacerbated by ongoing engagement and communication issues in town. Like many small towns in Massachusetts, Pelham is run by a core team of dedicated volunteers; many who have played a role in the local town government for the past few decades. These dedicated volunteers are considered a great asset to the Town. The core team and workshop participants, however, have noted that it can be extremely challenging to engage the average resident in town matters. Many people are engaged with the Town during the short window of time that their children attend the

local elementary school, but this engagement diminishes as soon as the child moves onto the regional middle school. Social capital is a key component to ensuring that a community is resilient and many believe that the town will be better suited to respond in time of emergencies if community building and stronger networks of communication are put in place beforehand.

- **Invasive Species and Forestry Practices in Forested Lands**
  Pelham's landscape is defined by its heavily forested lands. This forested land is particularly susceptible to the introduction and damage from invasive species and pests that could be introduced to the area as the climate changes. Pests of particular concern include wooly adelgid, emerald ash borer, red pine scale and purple loostrife.

  Pelham's woodlands are actively forested, and watershed protection lands aren't necessarily protected from this activity. The resource extraction process can have negative impact on the land (for example, large vehicles can degrade the stream banks as they log the area). Much of the active forestry lands in Pelham are registered through the Chapter 61 program and therefore have active management plans in place that are administered by the conservation commission. Given the nature of volunteer boards, follow up on adherence to the management plans can be a problem.

  Pelham has taken recent steps to model what sustainable forestry can look like. In 2016, the Town voted to preserve 185 acres of land in town as a community forest and have partnered with the Kestrel Land Trust and the University of Massachusetts at Amherst to transform the land into a living classroom in regards to sustainable forest management.

CURRENT STRENGTHS AND ASSETS

Many things that were considered challenges were also strengths in some respects. For example, having a small group of committed residents running the town was seen as strength, but will be a challenge as the town's volunteers continue to age. Some of the key strengths discussed included:

- Existing social networks: The elementary school provides a robust social network for families with students in K-6 and the school principal and PTO have good working relationship and willingness to take up wider community projects. The library also puts on a lot of programming that brings community members together.
- High Level of education
- Pelham's conservation areas and community forest. The biggest strength is how the amount of protected open space and forest land where development is controlled and managed.
- Public safety, emergency management and preparedness: Current/existing long term planning around replacing police, fire and DPW equipment has led to these town departments having the high quality tools that they need to do their job.
- A history of working with their neighboring communities to share services that their town doesn't need full time. They are currently part of the Quabbin Health District, share middle and high schools with Amherst, get water and sewer through Amherst and share an assessor.

- Strong volunteer base: This includes a marked longevity of town board members and officials. However, one younger, relatively new Pelham resident in the MVP workshop group felt left out by all the older people who have been consistently running the town for 40 years
- Small town, 'look after one another' feeling.
- Long history of thoughtful planning. A review of the relevant planning documents in Pelham showed that over the years, planning processes and their final products have built upon one another and the town has worked towards implementing many of the key actions found within this document. A great example of this is the Town's Village Center zoning, which was just adopted at the 2018 Annual Town Meeting. The suggestion of this area of town as a key location for housing and development first appears in a 1997 draft Master Plan, and is later explored in both a housing needs assessment and suitable land inventory.

TOP RECOMMENDATIONS TO IMPROVE RESILIENCE

The following priority recommendations are presented in no specific order:

- **Create a safe haven on the "Town campus"** that could provide energy, water, and food needs for people. In order to succeed in creating this sustainable campus, the following must be considered:
    - Equip public buildings with solar back-up power and energy storage batteries in order for critical facilities to provide continuous operation during an extended grid outage where access to fossil fuel is uncertain.
    - Upgrade HVAC system in the Public Safety building and library to meet the needs of emergency sheltering.
    - Conduct a feasibility study on how to make the library, school, and public safety buildings (the "town campus") into a fully operational long-term emergency shelter, and/or shorter term warming and cooling center.
    - Create an emergency sheltering and operations plan that would model how to account for all of Pelham's roughly 1,300 residents. Part of the planning process would include identifying vulnerable populations to ensure all members of vulnerable groups are accounted for/checked in on during an emergency.
    - Create a community food pantry that is partially stocked with preserved produce from the community garden that is canned during a community-wide pantry party.
- **Resilient roadways.** Due to its historic development patterns and vast conservation and watershed protection lands, Pelham's residential development is quite dispersed throughout town. In the event that sheltering is required, Pelham's residents need to travel to neighboring towns to seek safety. Thus, the need for roads that are safe, passable and designed to withstand the higher amounts of rain and snowfall that are projected toward the middle and second half of this century is extremely important. To ensure that Pelham's roads are resilient, the following is needed:
    - Conduct a town-wide culvert assessment to identify vulnerable culverts in need of repair or replacement, as well as other top priorities for investment and upgrading built infrastructure
    - Identify areas where erosion is an issue.

    - Determine costs to implement improvements.
    - Pursue funding to implement the resources needed.
- **A better connected Pelham.** The need to further develop social capital and the lines of communication between the Town and its residents was a top recommendation out of the CRB workshop. By undertaking an extensive community building process, where neighbors have the opportunity to interact not only with the town, but with one another, the town will be better able to leverage these newly formed networks in times of need. Potential actions to help improve communication and build community in Pelham include:
    - Improve communication, beyond just emergency alerts. This includes creating a digital town calendar that highlights all of the events happening in town—not just board meetings—and creating a mechanism for communicating amongst one another.
    - Comprehensive resident based Public Information Campaign to reduce personal, family vulnerability and efficiently share resources pertaining to climate mitigation
    - Connect people, including from one individual to another (especially seniors that might be isolated), within neighborhoods, and through the various groups operating in Town. This effort may also be linked to the proposed emergency sheltering and operations plan, described above.
    - Neighbor to neighbor campaign involving civic groups
    - Community events that will facilitate community building and enhance resiliency. One idea of particular interest is establishing a food pantry that is replenished through regular pantry parties. The pantry parties, which would bring residents together to preserve locally harvested fruits and vegetables and share a meal, would advance multiple key objectives in town including community building, the sharing of resources and, by stocking a pantry in the Town Campus, would enhance the Town's ability to provide food to displaced residents when needed. In order to do this effectively and safely, the Town needs to create a food-safety kitchen. Initial discussions suggest that the Community Hall might be the best location in Town to create this space, except that building does not have back-up power so it couldn't be used for food prep during an outage.
    - Create a new resident welcome packet and committee so that newcomers feel welcome and able to get involved in Town activities and events. This will help maintain Pelham's small town, 'look after one another' feeling.

Other recommendations to improve resilience and reduce vulnerability in Pelham included:

- Improve capacity for sheltering in place
    - Create a program to provide funding assistance or a subsidy to homeowners who would like to purchase backup generators or PV systems and storage to be more resilient during power outages
    - Target outreach to well owners that rely on a power source to pump drinking water
- Create a program providing soil and water testing and collection, and providing subsidies to improve individual residential well care and to help acquire individual residential hand pumps

- Monetize the community forest and the Watershed Protection District area for CO2 capture so the town can make investments to reduce vulnerability
- Conduct a feasibility study for sewer extension within the proposed west Pelham Village Center

Figure 3. 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.

Action Implementation Design

Once participants voted on the top priority actions, each team was asked to select one action 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 Pelham decision makers to get a head start on the thought process that would be required to apply for a MVP Action Grant, a funding opportunity from EOEEA that was announced shortly after the completion of Pelham's MVP workshop. The completed Action Implementation Design worksheets are provided in Appendix D.

CRB Workshop Participants: Department/Committee and Position

Participant Name	Department/Committee Affiliation, Position
Karen Ribeiro*	Pelham Select Board
Caitlin Dragun-Bianchi	Pelham Energy Committee
Abbie Jenks	Pelham Planning Board, Community Garden Committee
Rick Adamcek	Superintendent, Pelham Public Works
Jodi Levine	Director, Pelham Library
David Waskiewicz	Pelham Building Inspector
Stan Swiercz	Pelham Energy Committee
Cyd Reiman	Pelham Community Preservation Committee, Community Garden Committee
Dana MacDonald	Pelham Conservation Commission, Community Preservation Committee
Bill Pula	Pelham Board of Health
John Trickey	Pelham Finance Committee
Roger Conant	Pelham Community Garden Committee
Judy Eiseman	Pelham Planning Board
Alisa Pearson	Pelham Board of Selectman
Lisa Desjarlais	Principal, Pelham Elementary
Gary Thomann	Chief, Pelham Police Department
Peter Hepler	Biologist, Local Farmer
Gale Hubley	Trustee, Pelham Library
Tilman Lukas	Pelham Housing Committee, Conservation Commission
Alexandra Davis	Smith College
Isa Wang	Co-Owner, Bower Studio
Karl Martini	Pelham Historical Commission
Lexi Dewey*	Pelham Planning Board
Joe Larson*	UMass Professor, chairman of the Massachusetts Fisheries and Wildlife Board

**Invited but unable to attend*

CRB Workshop Project Team:

- Abbie Jenks, Core Team Member (Pelham Planning Board, Community Garden Committee)
- Karen Ribeiro, Local Project Coordinator and Core Team Member (Pelham Select Board)
- Stan Swiercz, Core Team Member (Pelham Energy Committee)
- Emily Slotnick, Lead Facilitator (Pioneer Valley Planning Commission)
- Ashley Eaton, Facilitator (Pioneer Valley Planning Commission)
- Catherine Ratté, Facilitator (Pioneer Valley Planning Commission)
- Patty Gambarini, Facilitator (Pioneer Valley Planning Commission)
- Alexandra Davis, Facilitator (Smith College)

Citation

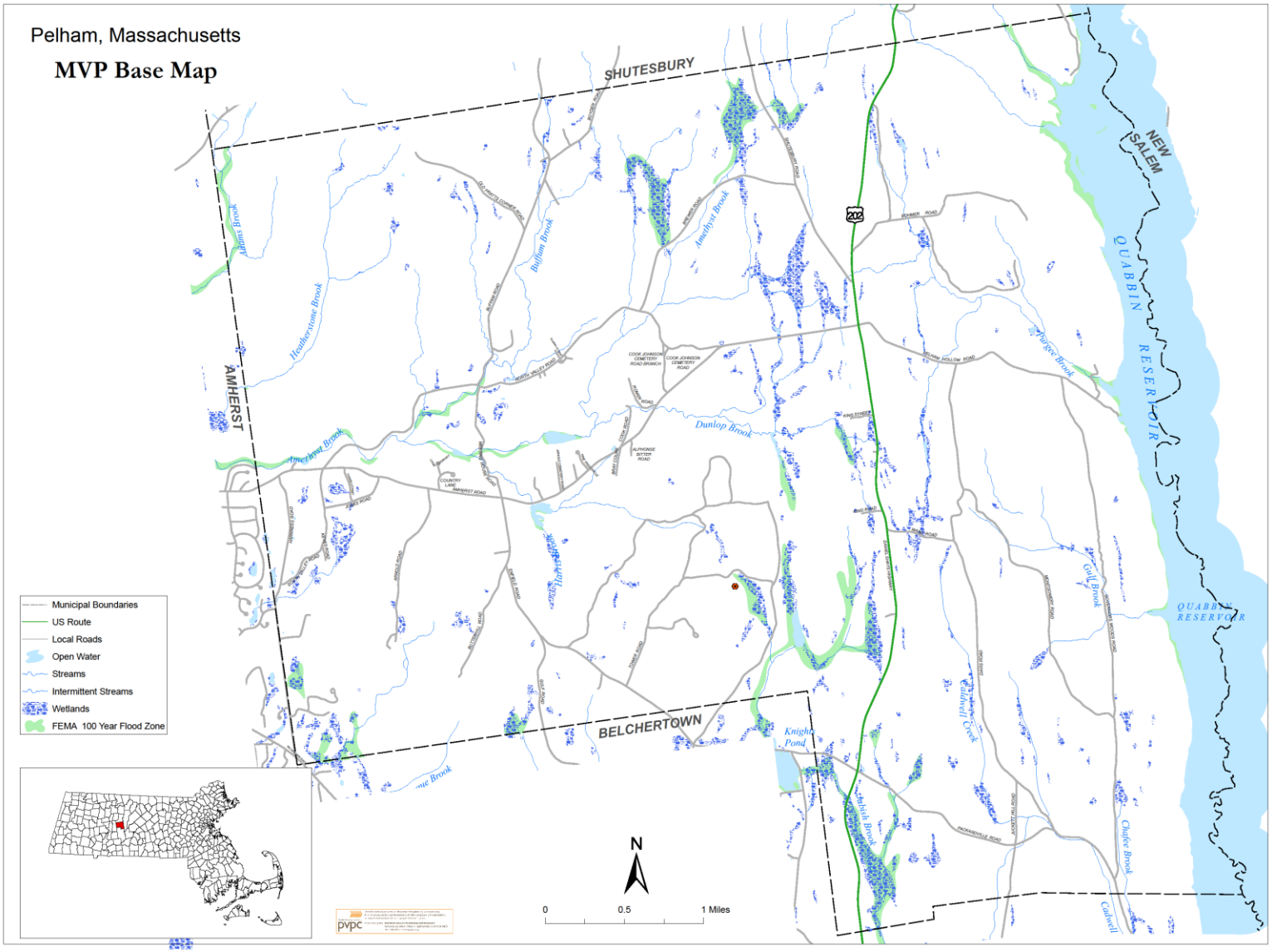
Town of Pelham 2018 Community Resilience Building Workshop Summary of Findings. Pioneer Valley Planning Commission. Pelham, Massachusetts.

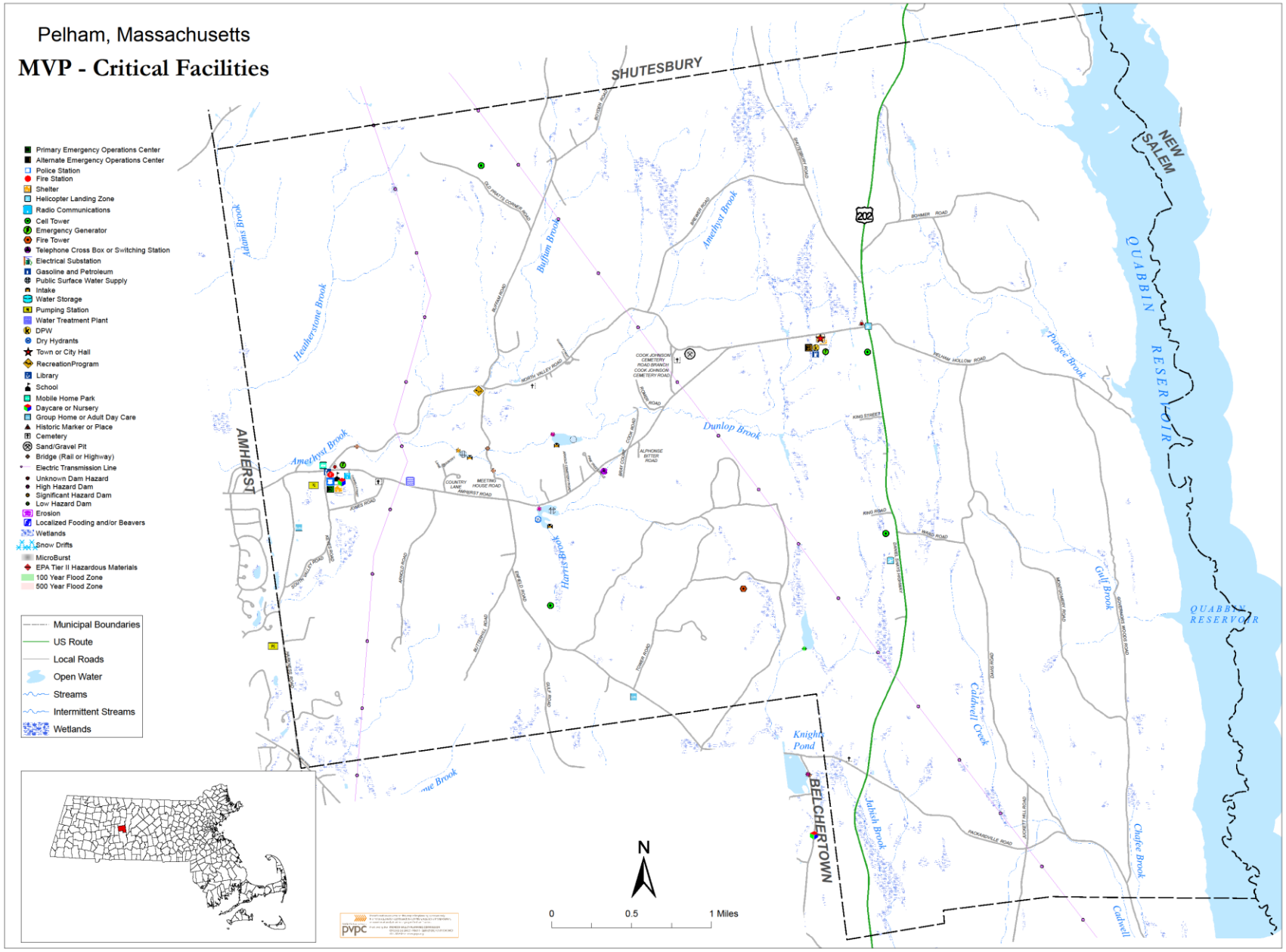
ACKNOWLEDGMENTS

Special thanks to the Town of Pelham, Board of Selectmen, and 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 Pelham Core Team Members: Karen Ribeiro, Stan Swiercz, and Abbie Jenks.

APPENDIX

A. BASE MAP USED FOR PARTICIPATORY MAPPING EXERCISE, AND SUPPORTING RISK MAPS




Pelham, Massachusetts
MVP - Critical Facilities
Primary Emergency Operations Center
Alternate Emergency Operations Center
Police Station
Fire Station
Shelter
Helicopter Landing Zone
Radio Communications
Cell Tower
Emergency Generator
Fire Tower
Telephone Cross Box or Switching Station
Electrical Substation
Gasoline and Petroleum
Public Surface Water Supply
Intake
Water Storage
Pumping Station
Water Treatment Plant
DPW
Dry Hydrants
Town or City Hall
RecreationProgram
Library
School
Mobile Home Park
Daycare or Nursery
Group Home or Adult Day Care
Historic Marker or Place
Cemetery
Sand/Gravel Pit
Bridge (Rail or Highway)
Electric Transmission Line
Unknown Dam Hazard
High Hazard Dam
Significant Hazard Dam
Low Hazard Dam
Erosion
Localized Fooding and/or Beavers
Wetlands
Snow Drifts
MicroBurst
EPA Tier II Hazardous Materials
100 Year Flood Zone
500 Year Flood Zone
Municipal Boundaries
US Route
Local Roads
Open Water
Streams
Intermittent Streams
Wetlands
SHUTESBURY
NEW SALEM
AMHERST
BELCHERTOWN
QUABBIN RESERVOIR
Adams Brook
Heathersone Brook
Buffum Brook
Amethyst Brook
Dunlop Brook
Harris Brook
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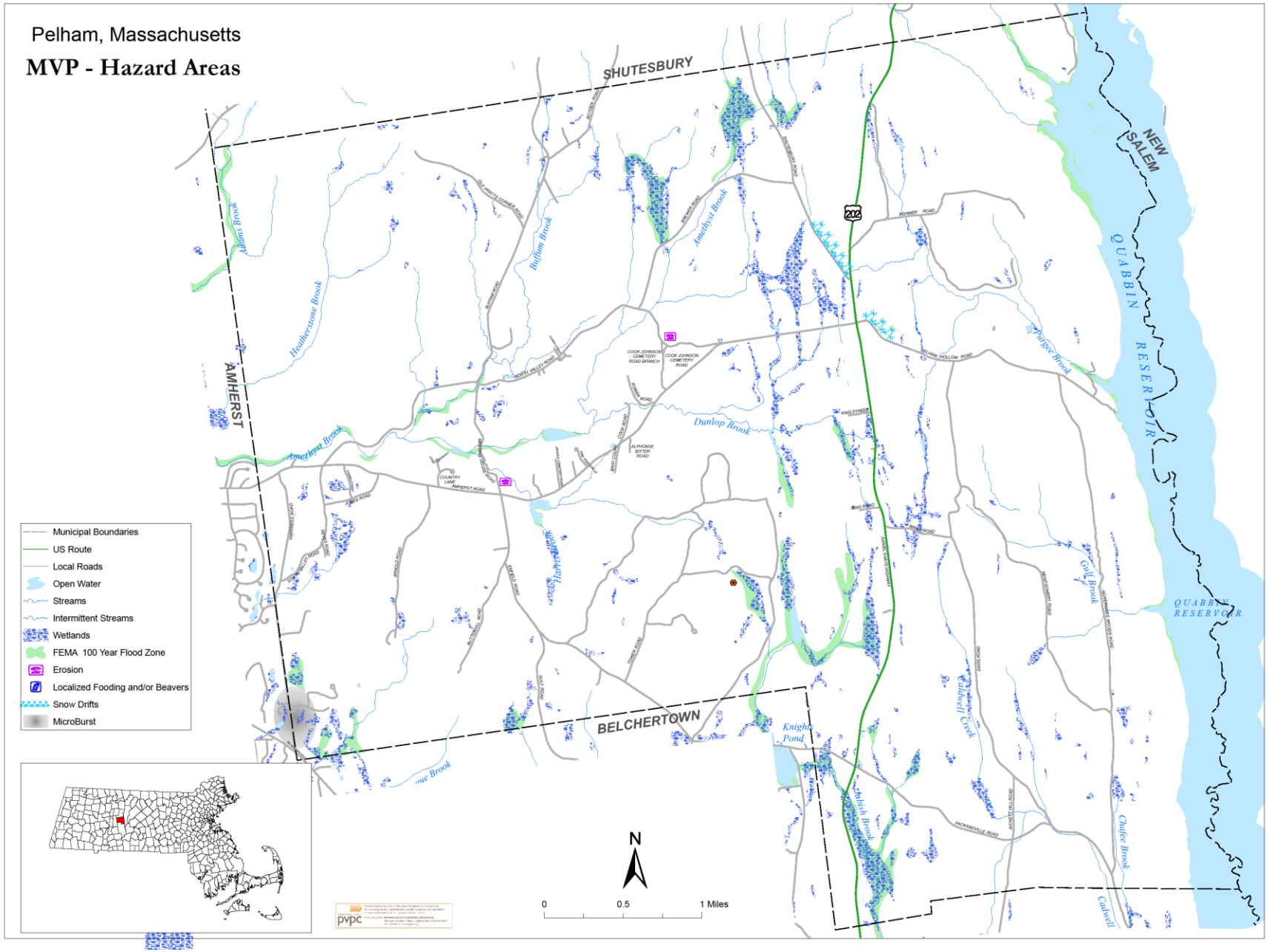
1 Miles
pvpc


Pelham, Massachusetts
MVP - Hazard Areas
SHUTESBURY
NEW SALEM
AMHERST
BELCHERTOWN
QUABBIN RESERVOIR
Municipal Boundaries
US Route
Local Roads
Open Water
Streams
Intermittent Streams
Wetlands
FEMA 100 Year Flood Zone
Erosion
Localized Fooding and/or Beavers
Snow Drifts
MicroBurst
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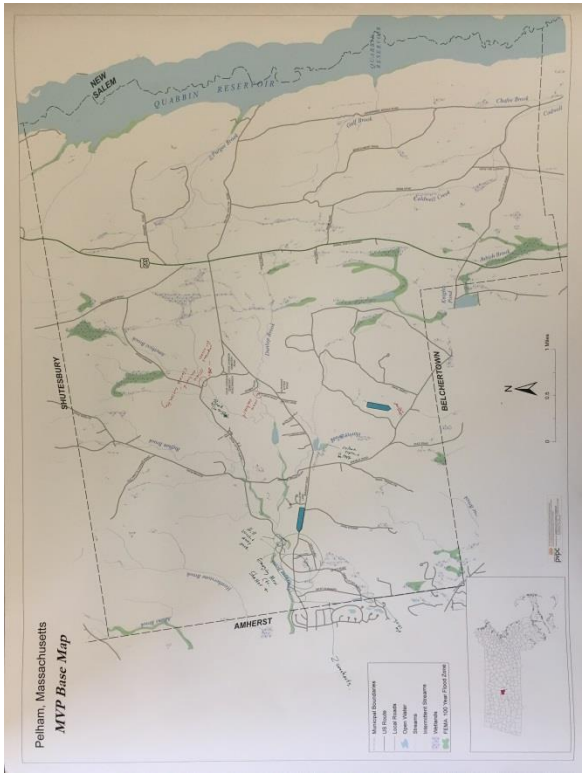
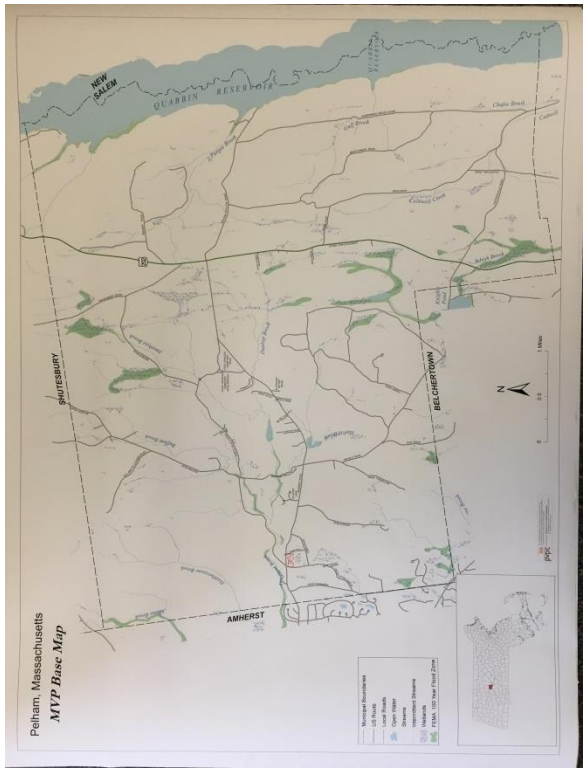
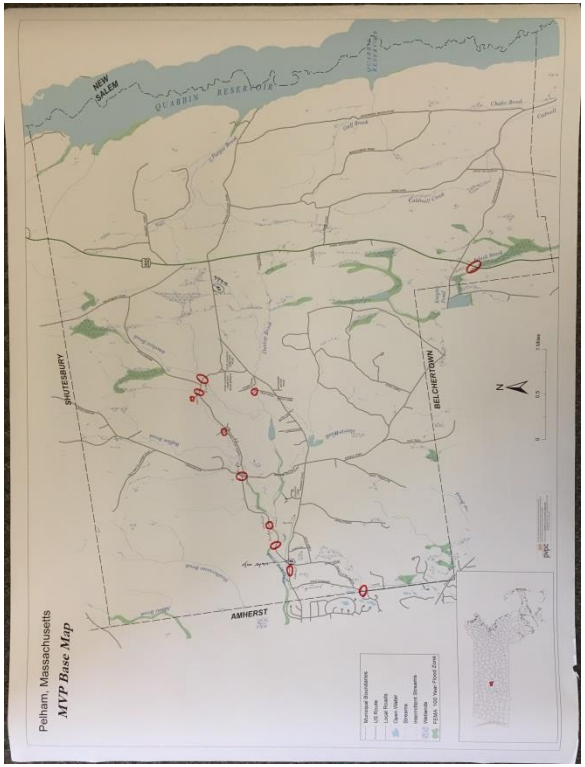
1 Miles
pvpc

B. Participatory Mapping Map(s) (outputs from Step C and D)







C. PARTICIPANT HANDOUTS

Pelham Municipal Vulnerability Preparedness Workshop

DATE: Saturday, April 21, 2018

TIME: 8:30a.m. – 4:30p.m.

PLACE: Ramsdell Room / Pelham Community Center
2 South Valley Road
Pelham, MA

AGENDA

8:30 a.m. **Registration**

9:00 a.m. – 12:30 p.m. **Introductions**

Presentation: MVP, Climate Resources, and Priority Hazards

Morning Small Team Workshop

- Identify Community Vulnerabilities and Strengths
- Break
- Small Team: Identify and Prioritize Community Actions

12:30 p.m. – 1:15 p.m. **Lunch**

1:15 p.m. – 4:00 p.m. **Afternoon Small Team Workshop**

- Identify Priority and Urgency
- Report Outs

Large Group Vote on Top Priorities

- Break

Implementation Design and Final Report Outs

4:00 p.m. – 4:30 p.m. **Wrap-up and Next Steps**

D. PELHAM CRITICAL FACILITIES

FACILITY CLASSIFICATION

A Critical Facility is defined as a building, structure, or location which:

- Is vital to the hazard response effort
- Maintains an existing level of protection from hazards for community residents and property
- Would create a secondary disaster if a hazard were to impact it

The Critical Facilities List for the Town of Pelham has been identified utilizing a Critical Facilities List provided by the State Hazard Mitigation Officer. Pelham's Hazard Mitigation Committee has broken up this list of facilities into three categories:

- Facilities needed for emergency response in the event of a hazard event.
- Facilities or institutions that include special populations which would need additional attention in the event of a hazard event.
- Facilities that have potential supplies and resources needed for response.

The critical facilities and evacuation routes potentially affected by hazard areas are identified following this list. The Past and Potential Hazards/Critical Facilities Map (Appendix A) also identifies these facilities.

CATEGORY 1 – EMERGENCY RESPONSE SERVICES

Emergency Operations Center

Primary: Fire and Police Complex- 2 South Valley Road
Alternate: Town Hall (Rhodes Building) - 352 Amherst Road
Alternate: Pelham Highway Department- 353 Amherst Road

Fire Station

Pelham Fire Department – 2 South Valley Road

Police Station

Pelham Police Department – 2 South Valley Road

Highway Garage

Pelham Highway Department – 353 Amherst Road

Water Department

Town of Amherst Water Department- Amherst, MA (Provides 20% of town water and hydrants)
Amherst Water Treatment Plant and Pumping Station-86 Amherst Road

Emergency Fuel Stations

Diesel: Pelham Highway Department- 353 Amherst Road
Gasoline: None. Use gas stations in neighboring towns.

Emergency Electrical Power Facility

One portable generator- Pelham Highway Department- 353 Amherst Road
Multiple small generators located at Pelham Highway Department

Emergency Shelters

Pelham has no designated shelters that are stocked with supplies. The following can be used as heating and cooling facilities:

- Pelham Elementary School- 45 Amherst Road
- Pelham Department of Public Works-353 Amherst Road
- Town Hall- 351 Amherst Road
- Fire and Police Complex- 2 South Valley Road

The town has an agreement in place with the University of Massachusetts at Amherst to act as a shelter if needed. Residents have also gone to shelters in Belchertown in the past.

Dry Hydrants, Fire Ponds, and Water Sources Hawley Reservoir- Dry Hydrant and Fire Pond

Water

Pumping Stations
2 South Valley Road
Harkness Road (Sewage)

Helicopter Landing Sites

Primary: Intersection of Route 202 and Amherst Road
Alternate: Knight's Corner Field- 180 Daniel Shay's Highway

Communications

Route 202- Mont Lincoln Area has 3 towers. (2 Public Safety and 1 commercial)
Old Pratt Corner Road- 1 commercial tower
Public Safety Complex- 2 South Valley Road (Radio Communications)

Primary Evacuation Routes

Route 202
Amherst Road
Harkness Road
Enfield Road
North Valley Road to Buffam Road

Bridges Located on Evacuation Routes

No bridges on Evacuation Routes

CATEGORY 2 – FACILITIES/POPULATIONS TO PROTECT

The following populations and facilities may require special attention during a hazard event.

Special Needs Population

Group Homes
Harkness Road
Packardville Road (Currently closed, but may be reopening)

Elderly Housing/Assisted Living

None

Recreation Areas[1]

Community Garden- Meetinghouse Road
Pelham Library- 2 South Valley Road

Schools

Pelham Elementary School- 45 Amherst Rd.

Places of Worship (None)

None

Historic Buildings/Sites

Pelham Community Hall- 36 Amherst Road
Pelham Historical Complex (Old Town Hall and Church)- near 351 Amherst Road

Apartment Complexes None
Employment Centers None
Camps None
Mobile Home Parks

8 Mobile Homes- 34 Amherst Road

CATEGORY 3 – POTENTIAL RESOURCES

Contains facilities that provide potential resources for services and supplies.

Food

Pelham Elementary School- 45 Amherst Road
Pelham Community Hall- 36 Amherst Road (Full kitchen that could be used for cooking.)

Hospital/Medical Supplies (nearest)

Cooley-Dickinson Hospital- Northampton
Urgent Care- University Drive, Amherst

Gas Commercial Gas Station- College Street, Amherst

Building Material Suppliers

Leaders Lumber- Amherst
Cowls- Amherst
Amherst Farm Supplies- Amherst

Heavy Materials Suppliers

Warner Brothers-Sunderland

[1] Additions to the "Recreation Areas" assets provided by the MVP team included: Pelham Community Forest on North Valley Road, Buffam Falls Conservation Area on North Valley Road/Meetinghouse Road, the Elementary School Playground, Cadwell Forest, Mount Orient, and several Other Conservation Areas.

Critical Facilities and Evacuation Routes Potentially Affected by Hazard Areas			
Hazard Type	**Hazard Area**	**Critical Facilities Affected**	**Evacuation Routes Affected**
Flooding	Along rivers, streams and wetlands.	None	Route 202 near Jabish Brook
Severe Snowstorms/Ice Storms	Whole town	None	North section of Route 202
Severe Thunderstorms which cause wind damage	Whole town	Older buildings including the DPW, Town Hall and historic buildings were not designed/built to withstand strong winds.	Route 202 near Jabish Brook (if flooding)
Hurricanes	Whole town	Older buildings including the DPW, Town Hall and historic buildings were not designed/built to withstand strong winds.	Route 202 near Jabish Brook (if flooding)
Tornadoes/Microburst	Whole town	Depends where it hits	Depends where it hits
Wildfire/Brushfire	Whole Town	None	None
Earthquakes	Whole Town	Older buildings not constructed to earthquake standards.	None
Dam Failures	Areas downstream of the Hawley, Hill and Intake Reservoir	None	Hawley Reservoir- Amherst Road Hill Reservoir- Meetinghouse Road
Drought	Whole Town	None	None
Landslides	North Valley Road, Arnold Road, Meetinghouse Road, Amherst Road at Bray Court	None	Amherst Road at Bray Court and North Valley Road

EXISTING MITIGATION CAPABILITIES

The Town of Pelham has numerous policies, plans, practices, programs and regulations in place (as of 2016) that were serving to mitigate the impact of natural hazards in the Town of Pelham. These various initiatives are summarized, described and assessed on the following pages and have been evaluated in the "Effectiveness" column.

Existing Mitigation Capabilities				
Strategy	Action Type	Description	Hazards Mitigated	Effectiveness / Improvements
Water Supply Protection District	Zoning bylaw	Overlay district to protect groundwater resources by regulating certain uses, drainage, and special permit procedures.	Flooding	Effective. No changes.
Wetlands Regulations	Zoning bylaw	Proposed developments located near wetlands must meet requirements.	Flooding	Effective. No changes.
Height Restrictions	Zoning bylaw	The Town restricts height of development based on use and location.	Flooding Severe Thunderstorms/ Winds Tornadoes Hurricanes	Effective. No Changes.
Wetlands Regulations	Subdivision Regulation	Proposed developments located near wetlands must meet requirements.	Flooding	Effective. No Changes.
Roadway Slope Standard	Subdivision Regulation	Slopes on new roads are limited to 6-8%	Landslides	Effective. No Changes.
Drainage System Requirements	Subdivision Regulation	Drainage systems in subdivisions must be designed to accommodate a 10-year flood and bridges, culverts, and detention ponds must be designed to handle 100-year flood.	Flooding.	Effective. No Changes.
Burn Permits	Regulation	Residents must obtain burn permits, and staffs provide information on safe burning practices.	Wildfire/Brushfire	Effective. No Changes

Existing Mitigation Capabilities				
Strategy	Action Type	Description	Hazards Mitigated	Effectiveness / Improvements
Pelham Open Space and Recreation Plan	Planning Document	Plan inventories natural resources and promotes their preservation.	All Hazards	Work to implement the goals and policies in plan. Plan has expired and should be updated to include recent information.
Flood Control Structures	Capital Construction	There are four dams in Pelham.	Flooding	Effective. No changes
State Building Code	State Regulation	The town has adopted the State Building Code, which promotes the construction of buildings that can withstand a certain degree of hazards.	Severe Snow/Ice Storms Tornadoes/Microburst Severe Thunderstorms/ Wind	Effective. No changes.
Dam Inspections	State Regulation	DCR has an inspection schedule that is based on the hazard rating of the dam (low, medium or high hazard).	Dam Failure	Effective. (ensures that dams are adequately designed) No changes
Shelters	Operational Strategy	There are five shelters identified.	All Hazards	Effective. Currently only equipped to operate as warming and cooling stations. Could be expanded to serve as extended-stay shelter.
Public Education and Outreach	Operational Strategy	The Fire Department has an ongoing education program in the schools regarding fire safety and a program aimed at senior citizens	Wildfire/Brushfire	Effective. Consider mailing of information to expand populations reached.
New Dam Construction Permits	Operational Strategy	State law requires a permit for the construction of any dam.	Dam Failure	Not Effective. (The responsibility of this is now on dam owners, who may not have sufficient $ to comply.)
Tree Management	Operational Strategy	Town works with Eversource to ensure that power lines are not at risk of danger from trees.	Severe Snow/Ice Storm Hurricanes Severe Thunderstorms/ Winds	Effective. No Changes.
Backup Power	Operation Strategy	The Town has a mobile generator that can be used in case of power outage.	Severe Snow/Ice Storm Hurricanes	Effective. No Changes.

E. Implementation Worksheets

Municipal Vulnerability Preparedness
Action Implementation Design

	Lead Agency/ Department for Implementation	Partners	Cost	Funding Sources	Implementation Milestones
COMMUNITY ACTIONS	Examples: Emergency Manager, Select Board, DPW, Fire Chief, Community Preservation Act Committee, Finance Committee, Planning Board, etc.	Examples: Neighboring municipalities, State actors, local non-profits and land trusts, community groups, etc.	**L**ow: < $50,000 **M**edium: $50,000 – $100,000 **H**igh: > $100,000	Examples: Capital Improvement Plan, Staff Time, Chapter 90, Hazard Mitigation Grant Program (HMGP), other grants, etc.	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.

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

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	Examples: Emergency Manager, Select Board, DPW, Fire Chief, Community Preservation Act Committee, Finance Committee, Planning Board, etc.	Examples: Neighboring municipalities, State actors, local non-profits and land trusts, community groups, etc.	Low: < $50,000 Medium: $50,000 – $100,000 High: > $100,000	Examples: Capital Improvement Plan, Staff Time, Chapter 90, Hazard Mitigation Grant Program (HMGP), other grants, etc.	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.
Ensuring Safe Haven can support Pelham Residents with adequate water, shelter, food, & medical needs.		WHRSAC - Homeland Security Council			
* without use of fossil fuels, - Heating & cooling shelter plan - HVAC studies - Organize Community Dinner (Committee TBD)	- Energy committee - Select board - Emergency Manager Possibly Friends of Library, PTO - * Board of Health	- PVPC Pioneer Valley - Planning Commission - MEMA - Board of Health - DOER - Dept. of Energy Resources	- Low	Annual Dues/Commission Funding	- Would need to write a letter of intent
- Determine who will organize + Receive Safe Haven - Use of battery & structural engineering study of roofs - Library, school - police - solar panels/tanks - Study of how many people could fit in safe Haven	- Energy Committee - DPW	- School Dept. - Amherst Survival Center	Med/High High		

Note: Cost estimates take into account the following resources:

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Municipal Vulnerability Preparedness
Action Implementation Design

COMMUNITY ACTIONS	Lead Agency/ Department for Implementation	Partners	Cost	Funding Sources	Implementation Milestones
	Examples: Emergency Manager, Select Board, DPW, Fire Chief, Community Preservation Act Committee, Finance Committee, Planning Board, etc.	Examples: Neighboring municipalities, State actors, local non-profits and land trusts, community groups, etc.	Low: < $50,000 Medium: $50,000 – $100,000 High: > $100,000	Examples: Capital Improvement Plan, Staff Time, Chapter 90, Hazard Mitigation Grant Program (HMGP), other grants, etc.	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.
Public Education, Community Building and Outreach	Selectboard Establish working committee	Town Boards Council on Aging Neighbor to Neighbor School Food Bank of Co. MA Amherst Survival Center IT committee	$75,000	MVP Community Compact?	1) Convene a committee 2) Identify needs 3) Develop inventory of people's skills, knowledge, tools, machinery & services, etc. 4) Research and develop welcome packet for new residents. To be shared with all towns people. 5) Share using snail mail, email, social media, town website
		Energy Committee Amherst/Pelham moms Next Door Community Garden Committee Historic Society People of Pelham!			6) Engage IT specialist to develop text message system for emergencies. Develop opt in system for other town-wide events/information. 7) IT specialist maintains information on website. 8) Organize series of meetings, potlucks, events to bring community together to share & explain resources. Facilitated. Themed gatherings on resilience & sustainability. 9) Evaluation & develop budget for maintenance & sustainability.

Note: Cost estimates take into account the following resources:

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- Town staff time for construction, maintenance, and operation activities (at a rate of $25 per hour)

Municipal Vulnerability Preparedness
Action Implementation Design

COMMUNITY ACTIONS	Lead Agency/ Department for Implementation	Partners	Cost	Funding Sources	Implementation Milestones
	Examples: Emergency Manager, Select Board, DPW, Fire Chief, Community Preservation Act Committee, Finance Committee, Planning Board, etc.	Examples: Neighboring municipalities, State actors, local non-profits and land trusts, community groups, etc.	Low: < $50,000 Medium: $50,000 – $100,000 High: > $100,000	Examples: Capital Improvement Plan, Staff Time, Chapter 90, Hazard Mitigation Grant Program (HMGP), other grants, etc.	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.
identify + repairing problem culverts	DPW	Cons Comm, Bill Pula, DEP, DOT, ACE, DER - Division of Ecological Restoration	inventory - Low design most Low replace medium - high ↳ depends if bridge or culvert	- HMP grant - State culvert replacement grant - PDMC + HGMP - small bridge grant understanding what is culvert is poor design, erosion, wash out ↳ town funding for match and or Division of Ecological Restoration	1.) go state list of culverts (DEP failing + vulnerable) (Scott Jackson's list) 2.) talk w/ DPW + Cons Comm 3.) baseline list established of problem culverts 4.) prioritize to fix - main road, condition of culverts 4½) - can it be remedied, enviro sensitivity, isolation by enviro. up + down stream (water retention) 5.) Funding to cover engineering/design work for replacement, if need 6.) seeking for funding replacement 7.) celebrate new culvert
					Side action: re-evaluate our de-icing procedures for roads ↳ push from DEP to use sticky pretreatment + salt

Note: Cost estimates take into account the following resources:

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- Town staff time for construction, maintenance, and operation activities (at a rate of $25 per hour)

→ Comprehensive Zoning Overhaul to make sure that all local regulations are BEST for Climate action

Municipal Vulnerability Preparedness
Action Implementation Design

COMMUNITY ACTIONS	Lead Agency/ Department for Implementation	Partners	Cost	Funding Sources	Implementation Milestones
	Examples: Emergency Manager, Select Board, DPW, Fire Chief, Community Preservation Act Committee, Finance Committee, Planning Board, etc.	Examples: Neighboring municipalities, State actors, local non-profits and land trusts, community groups, etc.	Low: < $50,000 Medium: $50,000 – $100,000 High: > $100,000	Examples: Capital Improvement Plan, Staff Time, Chapter 90, Hazard Mitigation Grant Program (HMGP), other grants, etc.	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.
Culvert Study [Target ~~3~~ problem] - OR Comprehensive Assessment of all.	DPW Select Board	~~MassDOT~~ DEP	~~$180,000 - $125,000~~	MVP	Secure $ ~~Issue~~ Water Issue RFP Select Engineering firm Oversee firm Receive Final Report Seek $ to implement solutions
Feasibility ~~for~~ study for Sewer Line Extension b/c of Village Ctr. Dev. plan	DPW Select Board	Amherst ~~DEP?~~ ~~Hadley?~~	$100,000 ~~$125,000~~	MVP	as above
Public Information & Education Resource Sharing / Connecting Residents	Select Board	NO	~~$75,000~~	MVP	1) Research + develop Welcome Packet New Residents 2) Distribute 3) Improve website to include all new Info Engage IT Specialist 4) Text message system / Email Mailings. / social media 5) Organize ~~an~~ series of public Mtgs/dinner/picnic to bring people together + show/explain 6) Evaluate 7) Social Media
Consultant to Study how to make Libr/School P.S. [illegible]	EMD Building Insp.		~~$20,000~~	MVP	

Note: Cost estimates take into account the following resources:

- Town staff time for grant application and administration (at a rate of $25 per hour)
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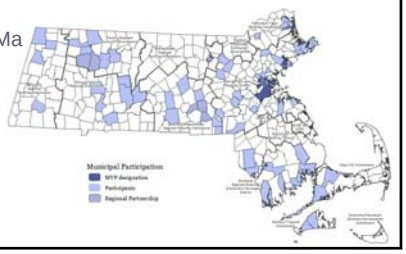
- Town staff time for construction, maintenance, and operation activities (at a rate of $25 per hour)

F. MVP Workshop Presentation

MUNICIPAL VULNERABILITY PREPAREDNESS

Town of Pelham, Ma



Introductions

1. Name
2. Relationship to Pelham, or your role in the Town (for staff, board and committee members, etc.)
3. One area, topic, or idea that you are passionate about, and excited to talk about today

MVP Purpose and Goals

- **Community-led process** that employs local knowledge
- **Accessibility**
- **Partnerships** and leveraging existing efforts
- **Mainstream** climate change
- **Communities** as local innovators
- **Frame** coordinated statewide efforts.

Community Resilience Building
WORKSHOP GUIDE

Pelham MVP Purpose and Goals

- Share ideas about climate change, natural hazards, and their impacts to Pelham's assets and operations
- Brainstorm actions to enhance assets and reduce vulnerabilities to hazards

Agenda

Time	Activity
8:30 a.m.	Registration
9:00 a.m.	Introductions, Climate Resources, and Priority Hazards
10:30 a.m.	Break
10:40 a.m.	Small Team: Identify Community Vulnerabilities and Strengths
11:30 a.m.	Small Team: Identify and Prioritize Community Actions
12:30 p.m.	Lunch
1:15 p.m.	Small Team: Identify Priority and Urgency
1:45 p.m.	Report Outs, Vote on Top Priorities
2:30 p.m.	Break
2:45 p.m.	Implementation Design
3:10 p.m.	Report Outs
3:30 p.m.	Wrap-up and Next Steps

Outline of Workshop

Past Planning

Master Plan- 1997

- Encourage land use in Pelham that favors residential use, open space and watershed protection in areas that complement the rural character of the town, while permitting limited commercial development.
- Identify and preserve the environmental quality of Pelham's open spaces and natural resources while maintaining the town's visual rural character and open spaces.
- Create a village center that promotes limited economic development, nurtures a sense of community identity and maintains the town's rural character.

Open Space and Recreation Plan- 2008

- **Goals:** Conservation Area Stewardship, Water and Resource Protection, Public Education and Regional Collaboration
- **Strategies:**
  - Investigate the need for forest management at each conservation area
  - identify areas the town should prioritize in obtaining conservation restrictions or acquiring.

Past Planning

Housing Needs Study- 2014

- **Concerns** about housing for seniors and a lack of housing variety
- **Key strategies** recommended:
  - Convene a Housing Committee
  - Undertake Land Inventory
  - Regulatory changes: Small lots, village centers, etc.

Land Inventory and Assessment- 2017

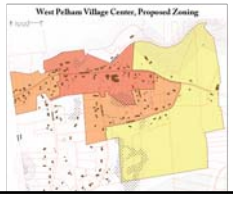
- Identified land suitable for housing development or redevelopment to support future housing diversity and affordability of housing options (cognizant of environmental constraints)

Hazard Mitigation Plan – 2016

- **Key Goal:** To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to the following hazards: flooding, severe snowstorms/ice storms, severe thunderstorms, hurricanes, tornadoes, microbursts, wildfires/brushfires, earthquakes, dam failures, drought and landslides.
- 13 **action strategies** including:
  - Town Wide Notification System
  - Identifying Problem Culverts

Past and Ongoing Actions

GREEN COMMUNITIES
Massachusetts
DEPARTMENT OF ENERGY RESOURCES



Concerns and Challenges in Pelham

- Recent Past Hazards
  - Drought→ Concerns about water availability
  - Ice Storms → Lack of Power for Many Days
- Energy Independence
- Ability to Shelter in Town
- Limited Communication

Assets and Features in Pelham

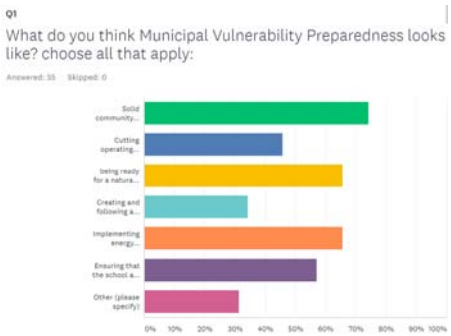
- Natural resources
  - Open space and forest land
  - Ground water
  - Other
- Regulatory
  - Zoning- Steep Grade and Earth Removal
  - Wetlands bylaw
  - Stormwater bylaw in the works
- Emergency Response Plans address hazards
- New public safety building
- Historic resources
- Active community members/human capital

What does Climate Vulnerability Preparedness Look Like to You?

Pelham's MVP "prep" Survey

1. **What do you think Municipal Vulnerability Preparedness looks like?**
   - *#1 – solid community engagement, committee participation and collaboration*
2. **Which of the following activities would you be interested in?**
   - *#1 – reducing fossil fuel consumption and emissions in our community*
3. **Please rank your priorities as a Pelham resident**
   - *#1 – Having a quality school system*
4. **Select options about your experience as a Pelham community member**
   - *#1 – I regularly enjoy hiking or other outdoor activities in Pelham*
5. **How would you describe Pelham**
   - *#1 – Very friendly*
6. **Select options about your experience as a Pelham homeowner**
   - *#1 – Have intentionally reduced energy consumption*

Pelham's MVP "prep" Survey



Taking Action

Climate Action and Clean Energy Plan (2014)	Sustainability and Climate Action Management Plan (SCAMP) (2010)	Deerfield River Watershed Climate Change Vulnerability Assessment Pilot Project (2018)	MA Executive Office of Energy and Environmental Affairs MVP (2017-)
A plan to guide actions in response to climate-change and its impacts. Offers strategies for local and regional actors to reduce GHG emissions and protect communities from climate-related damage.	A roadmap to reducing resource use and associated impacts, and a guide to institutional cultural change.	Develops protocols for assessing the present and future extreme flood vulnerability of culverts to be incorporated as part of decision making process	Supports cities and towns to begin the process of resiliency planning. Focusing on vulnerabilities associated with climate change.

Global Climate Trends

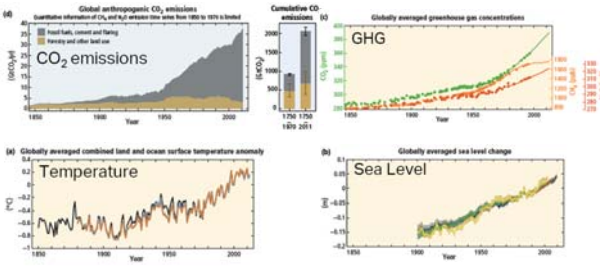


Image: IPCC 2014

U.S. $ Billion Disasters

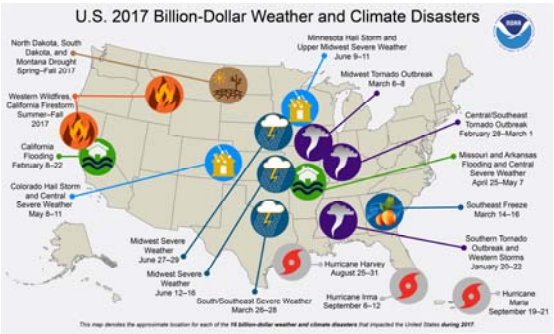
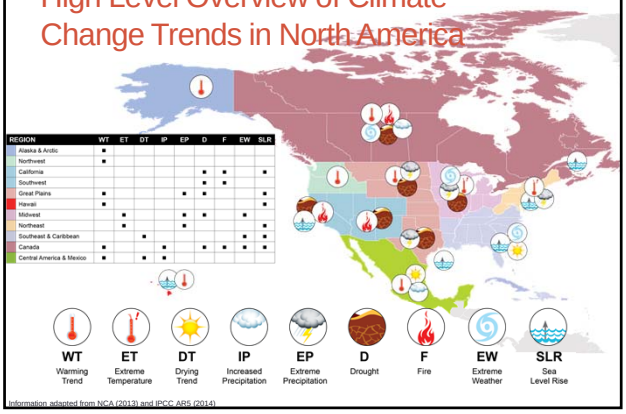


Image: NOAA 2018

High Level Overview of Climate Change Trends in North America

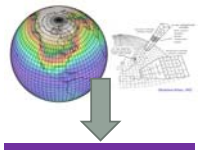


Information adapted from NCA (2013) and IPCC AR5 (2014)

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*

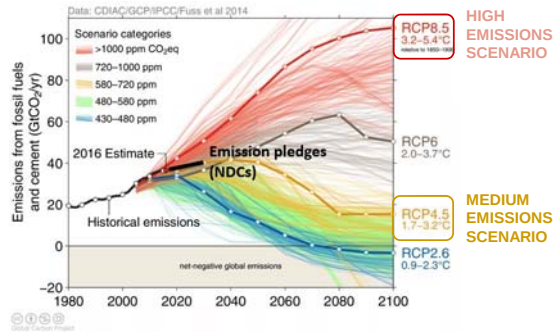
Daily data for MA at 6-km resolution

DOWNSCALED MODEL DATA

Statistical Downscaling

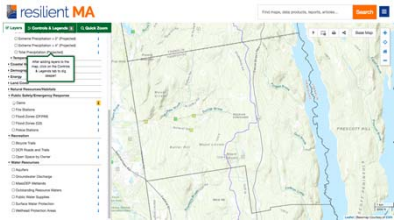
Pierce at al., 2014

Emission Scenarios



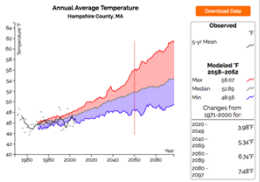
Hampshire County Climate Projections

- Average temperatures increase through 2100
- Increasing frequency, intensity and duration of heatwaves.
- Up to 25% increase in winter precipitation by mid-century
- Increase in the frequency of heavy downpours



Extreme Temperatures

Summer daytime high temperatures rarely go above 95°F in today's climate. The # of days with extreme heat increases significantly under high emissions scenarios.

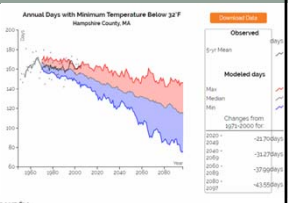


Hampshire County

		Projected change in # days above 90°F			
Season	Baseline (Days)	2030s	2050s	2070s	2090s
Annual	4.15	+11.45	+19.66	+30.4	+39.57
Fall	0.18	+0.94	+1.6	+3.11	+4.58
Spring	0.22	+0.41	+0.72	+1.35	+2.12
Summer	3.74	+9.86	+17.23	+25.44	+32.14
Winter	0	0	0	0	0

Cold Temperatures

- Fewer days below 32° and 0°
- Greatest change in fall (12.53 fewer days below 32° by 2050) and spring (9.77 fewer days)

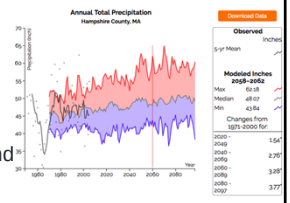


Hampshire County

		Projected change in # days below 32 °F			
Season	Baseline (days)	2030s	2050s	2070s	2090s
Annual	161.78	-18.38	-27.08	-35.14	-41.03
Fall	32.79	-8.67	-12.53	-14.88	-16.84
Spring	43.03	-6.88	-9.77	-13.13	-14.83
Summer	0.03	-0.09	-0.09	-0.09	-0.1
Winter	85.87	-2.84	-5.12	-7.44	-9.91

Precipitation

- Annual Total Precipitation ⇧ 3.78" by 2050
- Greatest increases in spring and winter
  - +1.84" in spring by 2090s
  - +2.16 in winter by 2090s

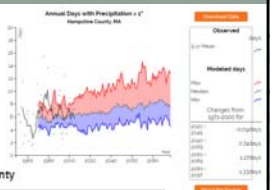


Hampshire County

		Projected change in inches of total precip.			
Season	Baseline (Inches)	2030s	2050s	2070s	2090s
Annual	47.88	+2.62	+3.78	+4.36	+4.77
Fall	12.29	+0.41	+0.57	+0.33	+0.13
Spring	12.48	+0.89	+1.22	+1.53	+1.84
Summer	12.48	+0.63	+0.88	+0.94	+0.91
Winter	10.62	+0.64	+1.06	+1.65	+2.18

Precipitation >1”

- Annual ⇧ 1.6 days by 2050
- Greatest increases in spring and winter



Hampshire County

Season	Baseline (days)	Projected change in # Days with precipitation > 1”			
		2030s	2050s	2070s	2090s
Annual	7.12	+1.05	+1.64	+2.09	+1.99
Fall	2.07	+0.34	+0.41	+0.38	+0.34
Spring	1.71	+0.27	+0.44	+0.67	+0.73
Summer	2.18	+0.26	+0.31	+0.37	+0.35
Winter	1.13	+0.27	+0.48	+0.75	+0.9

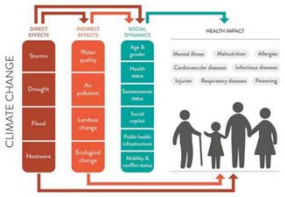
Consecutive Dry Days

Hampshire County

Season	Baseline (# Consecutive Days)	Projected change in # of consecutive dry days			
		2030s	2050s	2070s	2090s
Annual	16.45	+0.54	+0.91	+0.83	+0.81
Fall	11.85	+0.82	+0.94	+1.23	+1.26
Spring	12.04	-0.22	-0.05	-0.13	-0.14
Summer	11.63	+0.28	+0.25	+0.45	+0.33
Winter	11.5	+0.13	+0.4	+0.07	+0.06

What are the challenges, and who is especially vulnerable?

- Challenges
  - More extreme storm events/precipitation
  - More and longer heat waves
  - More summer drought
- Vulnerable populations
  - Under 5 and over 65 years old
  - Low income
  - Disabled and chronic illness
  - Limited English speakers
  - Socially or physically isolated



Top Hazards

1. Extreme Temperatures
2. Drought
3. Flooding
4. Severe Winter Weather (Including blizzard, snow, ice)
5. Severe Storms (Including thunder, lightning, hurricanes)
6. High Winds (Including tornado, microburst)

Data and maps available during workshop

- Resources for today
  - Participant Folder
    - Hazard Mitigation Plan Excerpts
      - Critical Facilities list and map
      - List of evacuation routes
      - Existing Mitigation Capabilities
    - Critical Facilities and (Past) Hazard Area Map
  - Downscaled climate projections (on computer)
  - Plans: HMP, OSRP, Land Inventory and Assessment, Housing Needs Study, Master Plan
  - Proposed zoning map
  - In-house “Experts

Any Questions?

Risk Matrix Exercise

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	Owner-ship	V or S	Hazard 1	Hazard 2	Hazard 3	Hazard 4	
Environmental								
EXAMPLE: Drinking water resources/ground water	*Multiply/ Town-wide*	*State - Town - Private*	*S/V*					

Risk Matrix Exercise

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Risk Matrix

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

Features	Location	Owner-ship	V or S	Hazard 1	Hazard 2	Hazard 3	Hazard 4	
Environmental				**Community Actions**				
EXAMPLE: Drinking water resources/ground water	*Multiply/ Town-wide*	*State - Town - Private*	*S/V*		*Conduct assessment to comprehensively identify vulnerabilities and develop action plans to increase resilience of natural resources and long term water quality/quantity. Implement improvements*			

Risk Matrix Exercise

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

Features	Location	Owner-ship	V or S	Hazard 1	Hazard 2	Hazard 3	Hazard 4	Priority	Time
								H - M - L	**S**hort **L**ong **O**ngoing
Environmental				**Community Actions**					
EXAMPLE: Drinking water resources/ground water	*Multiply/ Town-wide*	*State - Town - Private*	*S/V*		*Conduct assessment to comprehensively identify vulnerabilities and develop action plans to increase resilience of natural resources and long term water quality/quantity. Implement improvements*			*H*	*S*

After Risk Matrices are Complete…

- Turn in Priority Cards
- Report Outs
- Dot Voting
- Implementation Exercise and Report Outs

G. PUBLIC LISTENING SESSION MATERIALS

1. Agenda

Pelham Municipal Vulnerability Preparedness Public Listening Session

DATE: Wednesday, May 30

TIME: 7:00p.m. – 8:30pm

PLACE: Ramsdell Room / Pelham Community Center
2 South Valley Road
Pelham, MA

AGENDA

7:00 p.m. **Resilience Card Game and Introductions**

- Pick your top three "*What I have*" and "*What I need*" from the "Resilience and Climate Action" card deck

7:20 p.m. **MVP Workshop Process Overview and Summary of Findings**

7:55 p.m. P**ublic Q&A**

8:20 p.m. **Conclusion and Closing Input**

- Each participant should fill out two sticky notes:
  - One thing/action that I, as an individual, pledge to do to become more resilient and reduce my vulnerability to climate change
  - One thing I want the town/my elected officials to pledge to do to reduce our vulnerability to climate change

8:30 p.m. **Adjourn**

2. Resilience and Climate Action Card Game Results

Climate Action Cards **Card**	*Tally Mark is reported as one of the things an individual has noted as needing*
Recycling Containers	
Safe Sidewalks to Walk	
Grocery Store in Neighborhood	
Food Pantry	
Replace Inefficient Heating/Cooling Systems	
Access to ZipCar	
Home/Apartment Garden	
Community Garden	
Bicycle/Bike Lanes	
Hybrid or Electric Car	
Geo-thermal Energy	
Solar Energy	
Community Supported Agriculture (CSA)	
Mobile Market Stop	
Yard and Home Composting Bin	
Good Bus Service	
Carpool	
Air Sealing and Insulation	
Free Home/Apartment Energy Assessment	
Clothesline	
Energy Efficiency Appliances and Systems	

Resiliency Cards **Card**	*Tally Mark is reported as one of the things an individual has noted as needing*
Personal Vehicle	
Insurance (Renter's and Homeowner's)	
Smart Phone or Other Device to Get News	
Bicycle	
Rain Garden	
Trees	
Food Pantry	
AC in my Home/Apartment	
Bus Stop	
Good Job	
Family Emergency Plan	
Friends/Family	
Emergency Preparedness Kit	
Solar Panels	
Back-Up Generator or Other Source of Power	
Faith Community- For Help When I Need	
Trust/Confidence in Local Government	
Know Locations of City Cooling/Warming Centers	
Confidence In Police to Protect You and Your Family	
Nextdoor Metro App	
Enrolled with City For Emergency Alerts	
Extra Food	

3. Notes