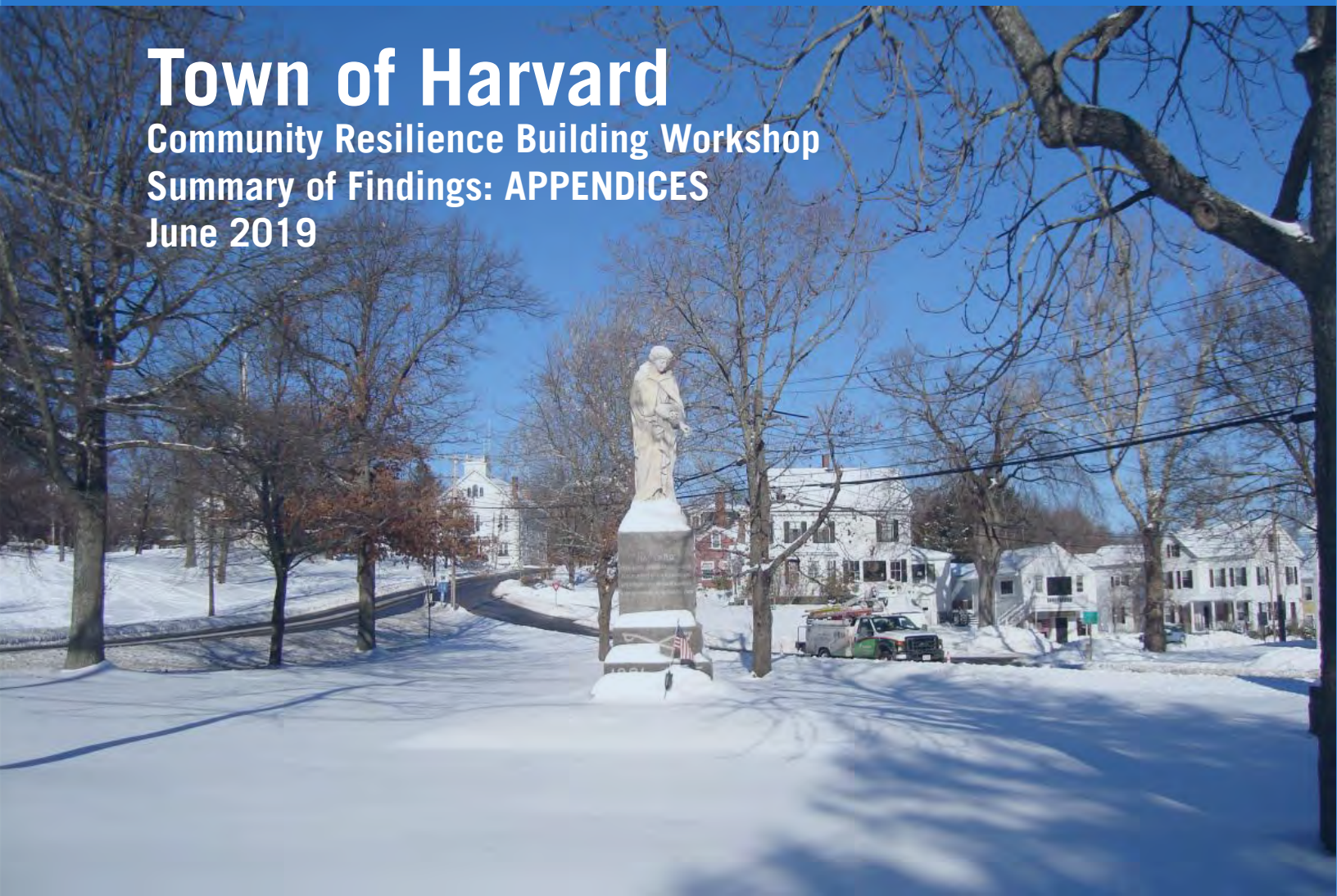


Town of Harvard

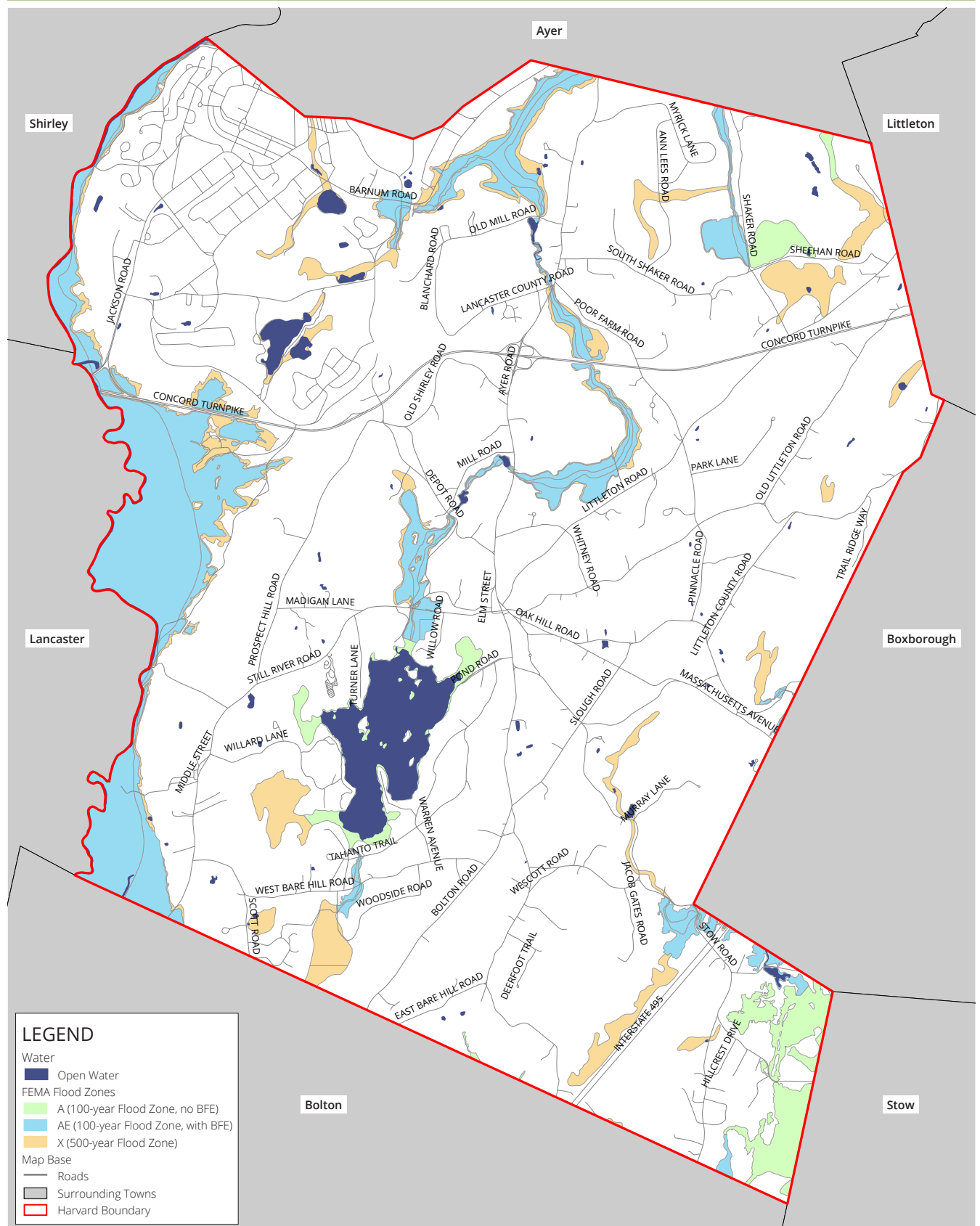
Community Resilience Building Workshop
Summary of Findings: APPENDICES
June 2019



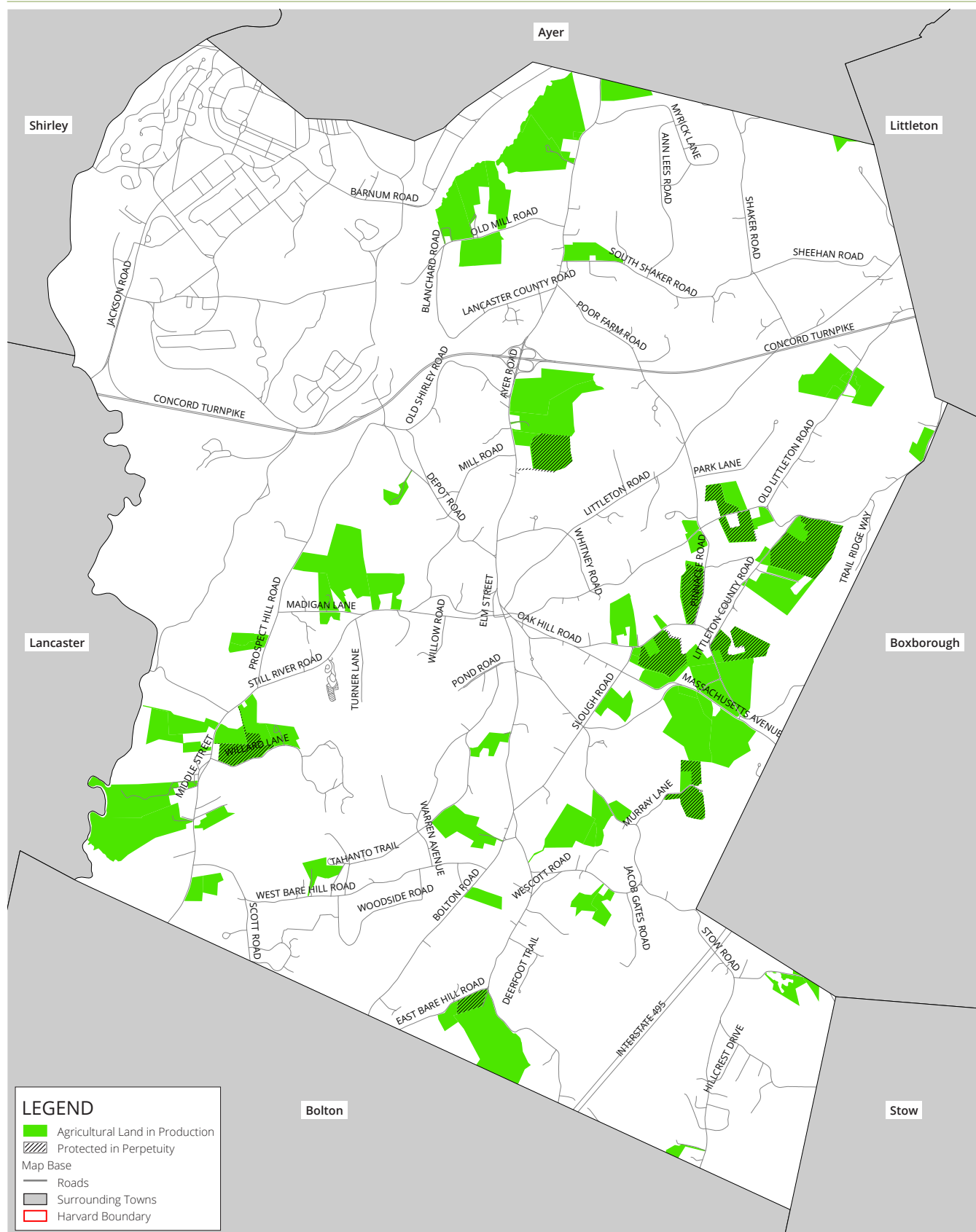
APPENDIX A: PREPARATORY INFORMATION

The following maps were used to prepare for CRB Workshop #1. Maps used in the workshop itself are in Appendix C.

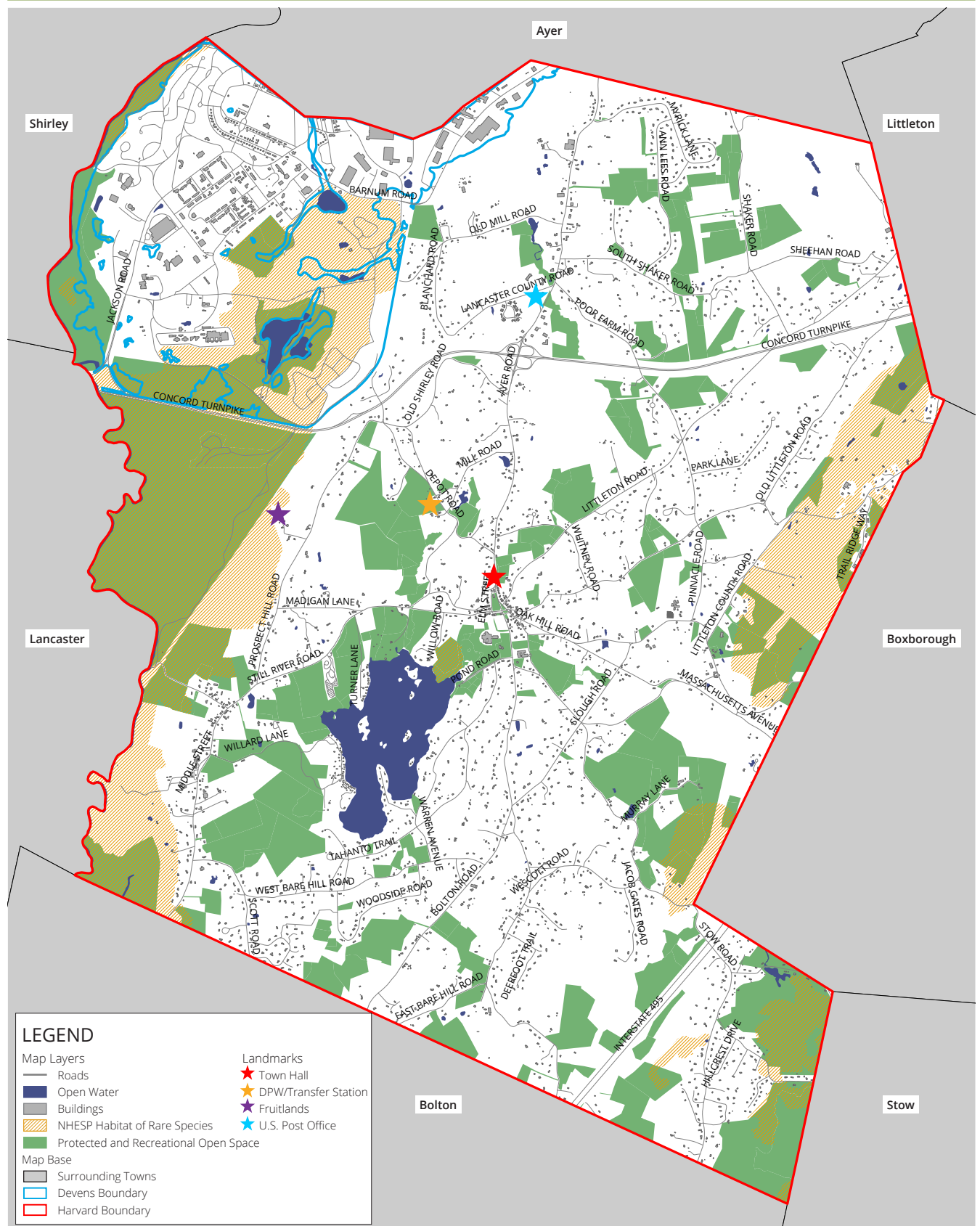
Existing Conditions: Water and FEMA Zones



Existing Conditions: Agricultural Properties



Existing Conditions



APPENDIX B: WORKSHOP AGENDAS AND PRESENTATIONS



Municipal Vulnerability Preparedness (MVP) Workshop #1

Agenda

April 11, 2019

- 5:30 Registration
- 6:00 Welcome and Introductions
- 6:10 MVP Overview, Workshop Process, Overview of Climate Change
- 6:40 Hazard Characterization
- 6:50 Small Group Discussion
 - Introductions, identify person for report out
 - Identify Harvard's vulnerabilities and strengths
- 7:30 Break
- 7:45 Continue Small Group Discussion
- 8:15 Small Group: Report Outs
- 8:30 Wrap up and Introduce Workshop #2

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BOSTON

PORTLAND

PORTSMOUTH

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Guide to Today's Discussion

Full Group Discussion: Hazards

Suggested from Agriculture Workshops

TEMPERATURE	PRECIPITATION
Extreme low	Extreme low (drought)
Extreme high	Extreme high (flooding)
Prolonged low or high	Shift in patterns
Increased variability within a single season	Shift in intensity

Choose two additional hazards of high importance

OTHER HAZARDS	SUBSETS
Tornadoes	Drought
Ice Storms	Flooding
Wind Storms	Heat Wave
Wildfire	Prolonged Cold

Which hazards are most important to Harvard based on what you know? Consider the following:

- Where have these hazards impacted Harvard in the past?
- Where do these hazards impact Harvard now?
- Where might these hazards impact Harvard in the future?

Small Group Discussion Topics: Strengths and Vulnerabilities

Think about the hazards identified earlier. What and who are exposed to these hazards?

- Infrastructure
- People (Societal)
- Environment

Focus on identifying the following:

- **Strengths and vulnerabilities** (what is the strength or vulnerability? Is it both?)
- **Location** (where is the strength or the vulnerability?)
- **Ownership** (who owns or who is responsible?)

Massachusetts Resources: Additional Information and Potential Actions (Workshop 2)

Municipal Vulnerability Preparedness Program sponsors these community-led engagement processes throughout the Commonwealth. (<https://www.mass.gov/municipal-vulnerability-preparedness-mvp-program>)

As part of the MVP Program, the Commonwealth has sponsored **Resilient MA**, a data clearinghouse of information related to climate change. (<http://resilientma.org/>)

Community Resilience Building is the organization that provided the workshop format and structure for this planning effort. (<https://www.communityresiliencebuilding.com/>)

The Trust for Public Land provides interesting tools for looking at projections and impacts with a model for Boston and surrounding communities that are relevant for other towns and cities. (<https://www.tpl.org/climate-smart-cities-boston>)

The **Massachusetts Climate Change Adaptation Coalition** also has useful local, national, and international resources. (<https://www.massadapt.org/resources.php>)

Climate Action Now/Western Massachusetts is a local group with information about climate change. (<http://climateactionnowma.org>)



1 Infrastructure

- What infrastructure is vulnerable to hazards? (transportation, schools, dams, churches, etc.)
- What makes the infrastructure vulnerable? (location, age, etc.)
- What infrastructure should be added to the map? (equipment storage locations, bridges on main streets/evacuation route, heating/cooling/emergency shelter center)
- Are any vulnerable to hazards?

Examples of Vulnerabilities

- Main road floods during storms, blocking emergency response
- Power outages during heat waves lead to health concerns
- High winds resulting in sustained electrical outages

Examples of Strengths

- Undersized culvert replaced to reduce flooding in key intersection
- Hurricane roof installed at school with improved sheltering capacity
- Improvement to communication systems during extreme weather

2 Societal

- Are there any areas with vulnerable populations? (elderly, disabled, youth, special needs, etc.)
- What are the strengths and vulnerabilities of people in your community? (active civic groups, police/fire/emergency services, strong communication for emergency information, etc.)

Examples of Vulnerabilities

- Senior housing without back-up generators during heat waves
- Residents without access to transportation during hurricane evacuation
- Household contaminate and sewage mobilization during flooding

Examples of Strengths

- Reliable communication protocols across departments for all employees
- “Neighbor-helping-neighbor” program aligned with emergency operations
- Well-supported emergency volunteer organizations

3 Environmental

- What natural resources are important to Harvard?
- What benefits do they provide? (storm buffering, fire breaks, erosion control, water quality improvement, slope stabilization, etc.)
- What are exposed to current and future hazards?
- Are there any areas with vulnerable plants or animals?
- Are there any areas with Title V concerns?

Examples of Vulnerabilities

- Proliferation of subdivisions in wildfire and flood prone areas
- Trees threatening above-ground utility lines

Examples of Strengths

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





Harvard Municipal Vulnerability Preparedness

Workshop 1

April 11, 2019

HARRIMAN

Workshop Agenda

6:00	Welcome and Introductions
6:10	MVP Overview, Workshop Process, Overview of Climate Change
6:40	Hazard Characterization
6:50	Small Group Discussion • Introductions within the group, identify people for scribe and report out • Identify Harvard's vulnerabilities and strengths for Infrastructure, Societal, and Environmental Profiles
7:30	Break
7:45	Continue Small Group Discussion
8:15	Small Group: Report Outs
8:30	Wrap up and Introduce Workshop #2

April 11, 2019

Harvard Municipal Vulnerability Preparedness (MVP) Workshop

Introductions

- MVP Core Group
 - Christopher Ryan, Director of Community and Economic Development
 - Liz Allard, Land Use Administrator
 - Kara Minar, Select Board
 - Sharon McCarthy, Board of Health
 - Eric Broadbent, Harvard Energy Advisory Committee
 - Kerri Green, Agricultural Advisory Commission
 - Justin Brown, Planning Board
 - Jarrett Rushmore, Planning Board
- Harriman – MVP Facilitators
 - Emily Keys Innes, Director of Planning and Senior Planner
 - Katie Moore, Planner

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Harvard Municipal Vulnerability Preparedness (MVP) Workshop

3

Overview of the Municipal Vulnerability Preparedness (MVP) Program

What is the MVP Program?

- A component of MA Executive Order 569 (2016)
- Grant funding for technical support to
 - Complete vulnerability assessments
 - Develop action-oriented resiliency plans

Why is the Town Participating?

- Increasingly more unpredictable and severe weather is occurring
- Agriculture is a significant part of the town's composition and identity; Dedicated MVP component focusing on agriculture
- Completion qualifies Harvard for access to further grant funding

MVP Plan must follow the Community Resilience Building (CRB) Framework

- Developed by The Nature Conservancy (www.CommunityResilienceBuilding.com)
- Develop core team, community-driven workshops to identify hazards, current challenges, strengths, and priority actions

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Harvard Municipal Vulnerability Preparedness (MVP) Workshop

Workshop Process

- A. Prepare for the Workshop
- B. Characterize Hazards
- C. Identify Community Vulnerabilities and Strengths
- D. Identify and Prioritize Community Actions
- E. Determine the Overall Priority Actions
- F. Put it All Together
- G. Move Forward



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Harvard Municipal Vulnerability Preparedness (MVP) Workshop

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Characterize Hazards

- Identify past, current, and future hazards
- Determine top-priority hazards (large group)

(Workshop 1)

Community Resilience Building Workshop Risk Matrix

High Priority for action over the Short or Long term (and Ongoing)
 Low Priority for action over the Short or Long term (and Ongoing)

Features	Location	Ownership	V or C	Top 4 Hazards (Tornado, floods, wildfire, hurricanes, snow/ice, drought, sea level rise, heat wave, etc.)	Priority	Time
Coastal Flooding SLR/Storm Surge				Ice and Snow	High	Long
				Rain Events	High	Long
				Inland Flooding and Rain Events	High	Long
				Wind	High	Long

Infrastructure

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Harvard Municipal Vulnerability Preparedness (MVP) Workshop

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Identify Community Vulnerabilities and Strengths

- Infrastructural
- Societal (People)
- Environmental

(Workshop 1)

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Community Resilience Building Workshop Risk Matrix

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

Features	Location	Ownership	V or S	Coastal Flooding SLR/Storm Surge	Inland Flooding and Rain Events	Ice and Snow	Wind	Priority	Time
Infrastructural									
Town Campuses	Specific	Town	V						
Evacuation Routes- Roads	Town-wide	Town/State	V						
Nursing Homes/Elderly Care Facilities	Multiple	Private	V						
Homeowners Associations/Neighborhoods	Town-wide	Town/Private	V						
Electrical Distribution System	Multiple	CL&P/Town	V						
Dams (inland and coastal)	Multiple	Private	V						
Railway and State Bridges	Multiple	Amtrak/State	V						
Septic Systems	Town-wide	Private	V						
State Roads/ Intersections	Town-wide	State/Town	V						
Wharves and Shore Infrastructure	Shore	Town/State-Private	V						
Waste Water Treatment Facility	Specific	Town	V						
New Ambulance Center	Specific	Town	S						
Zoning Regulations (maintain large lot size)	Multiple	Town	S						
Business District (power generators)	Specific	Town/Private	S						

Harvard Municipal Vulnerability Preparedness (MVP) Workshop

Identify and Prioritize Community Actions

- Actions and Next Steps
- Prioritization
- Timeframe for Action

(Workshop 2)

Community Resilience Building Workshop Risk Matrix						
H = High priority for action over the Short or Long term (and Ongoing) V = Vulnerability S = Strong						
Features	Location	Ownership	V or S	Coastal Flooding SLR/Storm Surge	Ice and Snow	Wind
Infrastructure						
Town Campuses	Specific	Town	V	Identify risk from flooding events; Identify alternative locations for critical facilities; Verify in anticipation plan annually		
Evacuation Routes- Roads	Town-wide	Town/State	V	Install highly visible signage for evacuation routes; Develop and implement communication program		
Nursing Homes/Elderly Care Facilities	Multiple	Private	V	Improve power generation; Review building codes and zoning for existing and future facilities		
Homeowners Associations/Neighborhoods	Town-wide	Town/Private	V	Engage Neighborhood Associations and develop comprehensive response plan with Town; Advise "Neighborhood Neighbor" Program; Develop comprehensive neighborhood-based emergency plans		
Electrical Distribution System	Multiple	CL&P/Town	V	Within floodplain area, establish plan to address protection and long-term resilience of equipment		
Dams (inland and coastal)	Multiple	Private	V	Prevent possibility of catastrophic dam failure; Identify and remove dams to minimize downstream flooding due to failure		
Railway and State Bridges	Multiple	Amtrak/State	V	Improve communications between parties; Report and grow ferry infrastructure and improve bridge structures; Assess vulnerability and prioritize infrastructure in pavement list		
Septic Systems	Town-wide	Private	V	Assess opportunities for community systems or alternative treatment technology; Upgrade regulations to reduce contamination in water ways		
State Roads/Intersections	Town-wide	State/Town	V	Coordinate with DOT, volunteers, public works to improve response; Need signage to warn of flooding risk in critical intersections		
Wharves and Shore Infrastructure	Shore	Town/State-Private	V	Establish community dialogue regarding retaining/relocating infrastructure; Assess comprehensive shoreline management plan		
Waste Water Treatment Facility	Specific	Town	V	Conduct a shoreline stability feasibility study; Relocate to low risk area within next 25 years		
New Ambulance Center	Specific	Town	S	Continue to support services in budget; Add additional staff and vehicle in next annual cycle		
Zoning Regulations (maintain large lot size)	Multiple	Town	S	Current building codes control development in risky areas; Consider additional zoning incentives (TDAs) to reduce risk to residential zones		
Business District (power generators)	Specific	Town/Private	S	Identify business district with power generators in place; Prioritize shoreline and gas stations		

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Harvard Municipal Vulnerability Preparedness (MVP) Workshop

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Climate Change

- “It’s pretty clear that climate change is starting to have a very significant impact on our communities, on our infrastructure, on personal property, on real property and on community property.”
 - Charlie Baker, Governor of Massachusetts
- “Every company, investor, and bank that screens new and existing investments for climate risk is simply being pragmatic.”
 - Jim Yong Kim, Former President of the World Bank
- “Climate change is a key problem facing people.”
 - David Malpass, Current President of the World Bank
- “The effects of a changing climate are a national security issue with potential impacts to Department of Defense (DoD) missions, operational plans, and installations. ... To achieve these goals, DoD must be able to adapt current and future operations to address the impacts of a variety of threats and conditions, including those from weather and natural events. To that end, DoD factors in the effects of the environment into its mission planning and execution to build resilience.”
 - *Report on Effects of a Changing Climate to the Department of Defense*, January 2019

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Overview of Climate Change

- Climate change
 - A change in the state of the climate ... whether due to natural variability or as a result of human activity
- Natural hazard
 - Natural events that threaten lives, property, and other assets
 - Often can be predicted; they tend to occur repeatedly in the same geographic locations because they are related to weather patterns or physical characteristics of an area
- Risk
 - The potential for an unwanted outcome resulting from a hazard event
- Vulnerability
 - The propensity or predisposition to be adversely affected
 - A function of exposure, sensitivity, and adaptive capacity

Definitions from the *Massachusetts State Hazard Mitigation and Climate Adaptation Plan, 2018*

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A hazard is the sun.

The risk is sunburn.

The vulnerability includes the length of exposure to the sun, how sensitive the skin is to it.

Risk/Risk Management

- Defining risk, understanding risk, and managing risk
 - Rational actor paradigm: making the optimal choice based on an understanding of maximizing the benefit and minimizing the losses
 - Behavioral economics: studies why people don't always make the rational choice
- Define your risk by understanding where/how you are vulnerable
- Understand the strategies that can reduce your vulnerability
- Identify the cost of implementing the strategy vs. the cost of doing nothing
- **Know that you will never have perfect information, and that reducing vulnerability/risk is a series of actions over time, not a single decision**

Resources

- Risk, Uncertainty and Rational Action; Carlo C. Jaeger, Thomas Webler, Eugene A. Rosa, Ortwin Renn
- The Resilience Dividend: Being Strong in a World Where Things Go Wrong, Judith Rodin
- Antifragile: Things that Gain from Disorder, Nassim Nicholas Taleb

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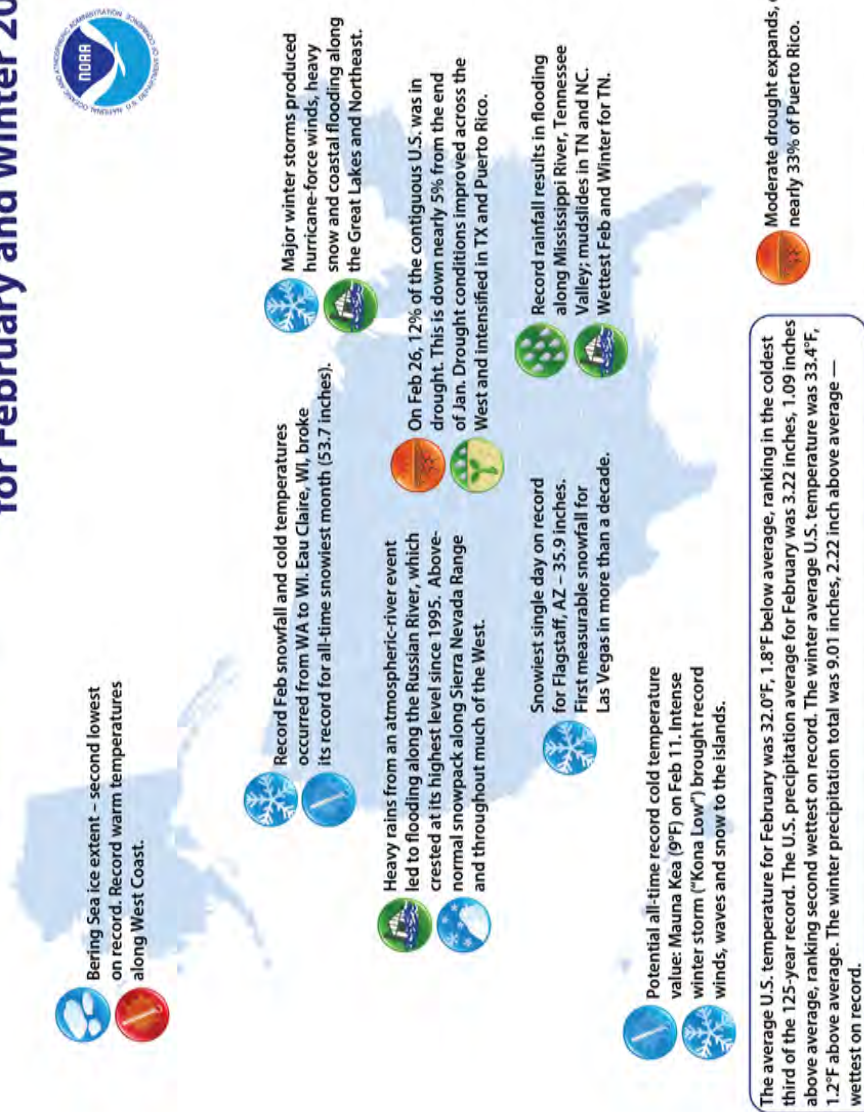
11

Overview of Climate Change - US

- For the ninth consecutive month, the Northeast was wetter than normal.
- Precipitation was 114% of normal in Massachusetts

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U.S. Selected Significant Climate Anomalies and Events for February and Winter 2019



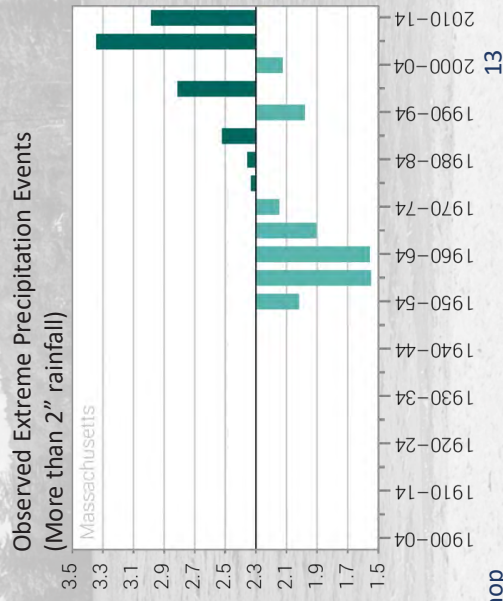
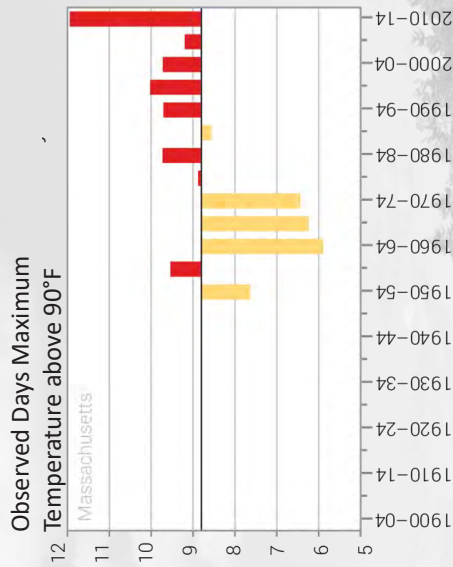
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Overview of Climate Change - MA

- Average annual temperatures increased almost 3°F between 1900-2014
- Number of days maximum temperature was above 90°F has been consistently above average since the 1990s
- All precipitation metrics have been highest during the most recent decade of data (2005–2014)

Source: NOAA Technical Report NESDIS 149-MA, 2017



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Overview of Climate Change - MA

MA Executive Office of Energy and Environmental Affairs created a clearinghouse of climate science maps, data, documents (resilientMA.org)

Projections from Northeast Climate Adaptation Science Center (e.g., temperature, precipitation)

- “Downscaled” to major watershed basin (Harvard is in the Merrimack, Nashua, and Sudbury-Assabet-Concord (SuAsCo) Basins)
- Temperature projections are more certain than precipitation

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Trail along Bare Hill Wildlife Sanctuary –
December 2008 ice storm



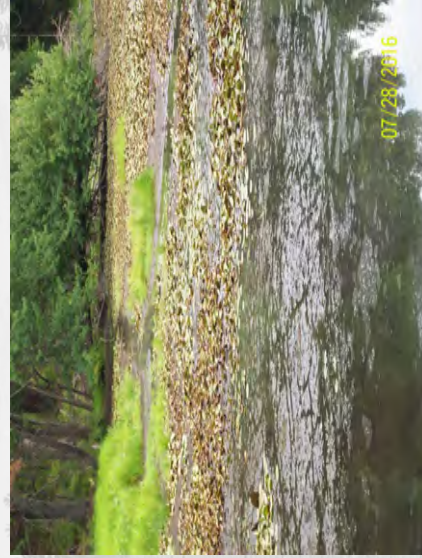
Trail along the Powell-Abbot-Reed
land – December 2008 ice storm
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Ice storm 2008
Source: Rochelle Greayer
Harvard Municipal Vulnerability Preparedness (MVP) Workshop



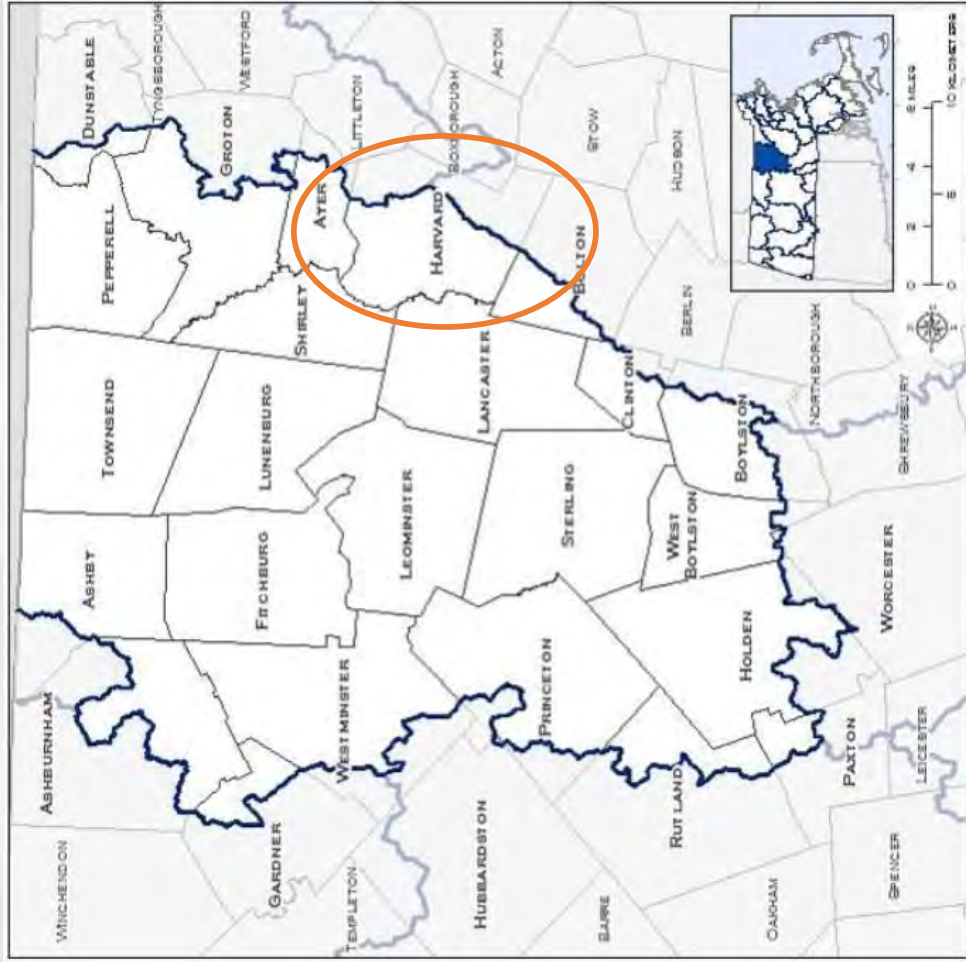
Bower's Brook along Cruft Lane – July 2016
drought



William's Pond Stow Road – July 2016 drought

Overview of Climate Change - Nashua Basin

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Overview of Climate Change - Nashua Basin

- Increased average, maximum, and minimum temperatures
 - Increased seasonal temperatures; winter is expected to see greater increases
- More days with extreme heat (daily maximum temperatures over 90°F)
- Fewer days with daily minimum temperatures below 32°F

	Baseline (1971-2000)	Mid-century (2050s)	End of Century (2090s)
Average annual temperature (°F)	46.8°F	+ 3.0 to 6.4°F	+ 3.9 to 11.0°F
Annual days max temperature >90°F	4 days	9 to 30 more days	13 to 70 more days
Annual days min temperature <32°F	156 days	19 to 38 fewer days	23 to 64 fewer days

Source: resilient MA, 2018

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Overview of Climate Change - Nashua Basin

- Number of days receiving over 1" precipitation are variable; winter is expected to see the highest increase
- Winter is expected to see the greatest change in precipitation (increase 2-22% by 2050s, increase 6-39% by 2090s)
- Fall and summer are expected to continue to have the most consecutive dry days

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Climate-related Hazard Characterizations

Town of Harvard's hazards as identified in the *Montachusett Region Natural Hazard Mitigation Plan 2015 Update*

- High risk: Heavy rain, Snow melt, High winds, Nor'easters, Heavy snow, Wildland fire
- Moderate risk: Hurricanes, Tornados, Severe thunderstorms, Ice storms, Blizzard, Drought, Extreme temperatures

Agriculture Workshop

- Temperature (high and low temperatures), Precipitation (too much, too little, frequency)

Pre-workshop Survey (<http://tinyurl.com/harvardclimatesurvey>)

- High temperatures and heat waves, Temperature fluctuations, Drought, High winds, Soil and water contamination by salts and other contaminants

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Harvard Municipal Vulnerability Preparedness (MVP) Workshop

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Hazards in Harvard

- What hazards have impacted Harvard in the past/currently/future?
 - How? Where? Frequency?
- Other concerns or considerations?

Top 4 Hazards in Harvard

- Temperature
(Agriculture Workshop)
- Precipitation
(Agriculture Workshop)
- _____
- _____

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Harvard Municipal Vulnerability Preparedness (MVP) Workshop

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Small Groups

1. Group introductions: Name, organization/department
2. Identify a spokesperson and a scribe (not the facilitator)
3. Focus on identifying:
 - Strengths and vulnerabilities (what is the strength or vulnerability? Is it both?)
 - Location (where is the strength or the vulnerability?)
 - Ownership (who owns or who is responsible?)
4. Choose 1 strength and 1 vulnerability from each section (infrastructure, societal, environment) to report back to the group

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Report Out from Small Groups

- 1 strength and 1 vulnerability from each section
 - Infrastructure
 - Societal
 - Environment

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Next Steps

Workshop #2

April 25, 6-9pm

Town Hall

- Develop and prioritize actions and clearly delineated next steps
- Identify opportunities to advance actions that further reduce the impact of hazards and increase resilience across and within Harvard

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Harvard Municipal Vulnerability Preparedness (MVP) Workshop

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Municipal Vulnerability Preparedness (MVP) Workshop #2

Agenda

April 25, 2019

5:30 Registration

6:00 Welcome and Introductions

6:10 Workshop #1 Findings and Workshop #2 Overview

6:30 Small Group Discussion

- Introductions, identify person for report out
- Develop actions to address Harvard's vulnerabilities and reinforce strengths
- Prioritize actions and identify associated timeframes

7:15 Break

7:30 Continue Small Group Discussion

8:00 Small Group: Report Outs

8:15 Determine Overall Priorities

8:30 Wrap up and Next Steps

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Guide to Today's Discussion

Workshop 1: Priority Hazards

PESTS/INVASIVE SPECIES

EXTREME TEMPERATURES/TEMPERATURE SWINGS

EXTREME PRECIPITATION

ICE STORMS

Workshop 1: Strengths and Vulnerabilities

- Grouped by Infrastructure, Societal, Environmental
- Choose your group by your area of expertise

Today's Goals

A Identify actions to address a vulnerability or take advantage of a strength for one or more of the priority hazards.

For example, what action would you take relative to trees falling on power lines (vulnerability) in an ice storm (hazard)?

B Group actions by:
Priority (High, Medium, Low)

Consider:

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

Timeframe

- Current projects to reduce flooding are an **ongoing (O)** action
- Ensuring evacuation procedures are updated annually is a **short-term (S)** action
- Elevating a road or replacing a bridge are **long-term (L)** actions

C Identify top four actions (highest priorities):

- Within each group
- Through the larger group

MVP Action Grants: Project Categories

- Detailed Vulnerability and Risk Assessment
- Public Education and Communication
- Local Bylaws, Ordinances, Plans, and Other Management Measures
- Redesigns and Retrofits
- Nature-Based Storm-Damage Protection, Drought Prevention, Water Quality, and Water Infiltration Techniques
- Nature-Based, Infrastructure and Technology Solutions to Reduce Vulnerability to Extreme Heat and Poor Air Quality
- Nature-Based Solutions to Reduce Vulnerability to other Climate Change Impacts
- Ecological Restoration and Habitat Management to Increase Resiliency



1 Infrastructure

Sample Actions

- Secure new generators for critical facilities
- Integrate future risks into capital improvement plans
- Improve access in high-risk locations
- Install flood-proof manhole covers
- Conduct alternative site feasibility study for at-risk waste-water treatment facility. Relocate to low risk area within next 25 years.
- Assess vulnerability and prioritize infrastructure and improvement list.

2 Societal

Sample Actions

- Increase hazard awareness in high-risk areas through education and outreach
- Foster a neighbor-helping-neighbor program across the community
- Reconfigure evacuation routes and update signage.
- Create and distribute extreme weather flyers and communicate available services
- Identify level and location of housing units vulnerable to flooding. Develop long term plan to address vulnerabilities.
- Conduct feasibility analysis for regional shelter. Construct within 15 years.

3 Environmental

Sample Actions

- Protect and manage parks and lands located in flood zones
- Stabilize vulnerable slopes with native vegetation
- Protect and manage lands in flood zones
- Manage and diversify age structure for forest in Town
- Assess and identify key vulnerabilities from tree fall

Highest Priorities: Local Examples

Devens

- Provide the ability for more staff coverage for the Fire Department during extreme weather events.
- Engage military in Emergency Operations Center (EOC) exercises.
- Perform more regular maintenance of existing culverts throughout Devens and specifically along Willow Brook, Patton Road, and Barnum Road to reduce flood issues, as well as seek funding for culvert improvements throughout Devens.
- Develop a resource-and-supply relocation plan for organizations that provide community resources and services.
- Develop a relocation plan for the Women's Shelter, Veterans Housing and all other social services within Devens to ensure that the facilities can be accessed at all time.
- Promote Code Red, by encouraging more local employees (and not just employers) to subscribe to the system.
- Develop multi-lingual and accessible emergency management messaging.

Littleton

- Use available groundwater and surface water level data to develop GIS-based groundwater mapping, and provide Littleton Water Department with a template for future data so that it can be directly loaded into the GIS mapping database.
- Apply extra MVP funds to review of the Littleton regulatory code for improvements that could be made to further support and encourage LID in future development projects in Littleton
- Replacement of shade trees
- Establishment of contiguous open space and conservation land

Stow

- Conduct a Water Supply Vulnerability Assessment and Educate the Public on Water Supply
- Update the Hazard Mitigation Plan
- Develop a Hazard Transportation and Communication Plan
- Develop Programs to Increase Resiliency of the Farming Community



Table 1: Reasons for Identifications of Vulnerabilities and Strengths

Features	Why
Infrastructural	
Town Sewer	In town center, good resource for the center (e.g., reduces pollution) but needs maintenance
Power Lines	Vulnerable to trees/debris falling on the lines following severe weather
Utility System	Potential for slow response and extended periods of outage following severe weather
Emergency Management Communications (also Societal)	First responder agencies communicate well
Cooling Centers	No officially designated cooling centers – other shelters?
Roads	Condition of roads can be an issue; Accessibility issues following severe weather
Private septic systems	Leach fields can fail in extreme precipitation
Culverts	Town has done work on culverts (replaced one that provides critical access); some vulnerable culverts may need replaced or preventative clearance of debris
Societal	
Snowmobile Club	Has chainsaws, etc. Could respond in ice storms to clear down trees, etc. Could receive training from fire department.
Emergency Management Plan	Plan may need annual updates and communication of updates for plans/processes to all Town agencies
Emergency Management Communications (also Infrastructure)	Neighborhoods need greater communication
Forest and Land Management (also Environmental)	
Volunteer Base	A wide knowledge base is available throughout town, need to determine how best to mobilize/communicate Harvard Conservation Trust does volunteer trail work/maintenance Bare Hill Pond Association identified point sources, created management program
Invasives Action	
Vulnerable Population	Seniors, isolated, disabled people throughout town
Environmental	
Trees (Right of Way)	Tree health can be a problem, take down overhead utility lines Trees generally serve as carbon sink, flood/erosion control
Bare Hill Pond	Provides flood capacity; Reliant on sufficient ice/cold to kill weeds; Phosphorus capture system needs maintenance
Wetlands	Found throughout town, provide flood absorption capacity
Tree Species Mix	Tree health can be a problem Trees generally serve as carbon sink, flood/erosion control

Table 1

Table 1: Reasons for Identifications of Vulnerabilities and Strengths

Features	Why
Forest and Land Management (also Societal)	Awareness and understory maintenance need addressed
Conservation Lands	Prevent erosion, increase flood capacity
Invasive Plants	Town and Harvard Conservation Trust has done some work on invasive plants, but more needs done. Difficult to address if on private properties.
Insects	Project climate changes mean winter cold weather may not be enough to kill insects (e.g., ticks). Lack of awareness regarding issues surrounding spraying for mosquitos, etc.

Table 1

Table 2: Reasons for Identifications of Vulnerabilities and Strengths

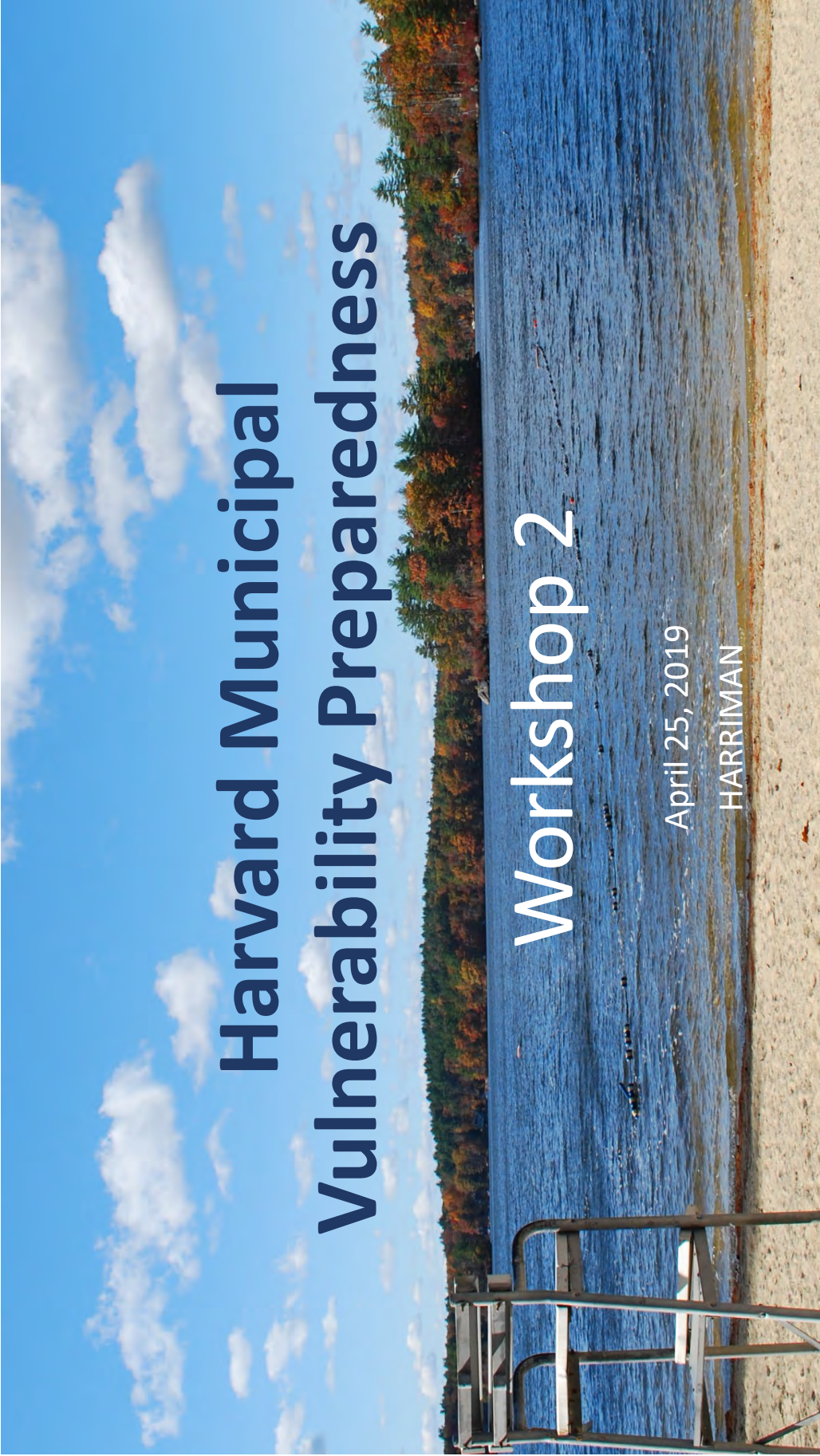
Features	Why
Infrastructural	
Dam	"Significant Hazard Dam" – Potential to Fail In High Storm Events
Stormwater Management	
Utilities	Utilities (saturated ground/wind → trees down) → Blocked Roads → Power Outages
Distribution of Fire Stations	
Undersized Culverts	Not a significant risk At Bare Hill Pond, only an issue during heavy rain event on top of draw-down (to cope with invasive species) → Washout
Poorly-paved Roads	
Residential Development/Infrastructure within 3 Different Watersheds	
Medical Centers	Nashoba, Emerson, Urgent Care
Opportunity for Pedestrian/Bike Trail Connection to Devens	
Generators at Municipal Buildings	Some buildings do not have a back-up generator; School, Police station, library, and DPW garage all have generators
Societal	
Water Quality	Coliform
No Designated Shelter	No formally designated shelters; no single shelter with A/C and Generator Police Training Room-previously used as cooling center Library and High School have A/C
Opportunities for Regional Coordination (Devens)	Potential for regional collaboration/equipment sharing
Neighbors Helping Neighbors	
Budget	
Emergency Response	
Emergency Services	Close coordination between Police, Fire, and EMT
Volunteer EMTs	
Communication (Online, Alternative, Reverse 911)	
Council on Aging	Connects seniors to the rest of the town
Small Town Identity	Identity, press, internet
Individual vs. Collective Action	

Table 2

Table 2: Reasons for Identifications of Vulnerabilities and Strengths

Features	Why
Elderly Population vs. Young/Family Population	Cultural divide -Investment in open space -Support local agriculture (Lack of stewardship)
Development Patterns	Will lead to more flooding in the future ~25 years
Isolated Populations	
Environmental	
Native Flora	Garlic mustard/Japanese knotweed/bittersweet/poison ivy crowding out native grasses
Bare Hill Pond	Runoff into pond (non-point-source pollution) causes spikes in invasive species, requiring a draw-down of the pond each year Recreation, habitat, beauty, ecological buffer
Beavers	Cause flooding
Ticks	Ticks → Public Health issue → Spraying pests harms other flora and fauna
Forests	Ecological services Deer eating understory → Monoculture Snowfall impacts deer population Resource - USFS Suggested plants/new zones
Harvard Conservation Trust, Sudbury Valley Trustees	Community resources Help with grant writing
Agriculture	Vulnerable to extreme temperature and precipitation swings Economy, identity

Table 2



Harvard Municipal Vulnerability Preparedness

Workshop 2

April 25, 2019

HARRIMAN

Workshop Agenda

- | | |
|------|--|
| 6:00 | Welcome and Introductions |
| 6:10 | Workshop #1 Findings and Workshop #2 Overview |
| 6:30 | Small Group Discussion <ul style="list-style-type: none">• Introductions within the group, identify person for report out• Develop actions to address Harvard's vulnerabilities and reinforce strengths• Prioritize actions and identify associated timeframes |
| 7:15 | Break |
| 7:30 | Continue Small Group Discussion |
| 8:00 | Small Group: Report Outs |
| 8:15 | Determine Overall Priorities |
| 8:30 | Wrap up and Next Steps |

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Harvard Municipal Vulnerability Preparedness (MVP) Workshop

Introductions

- MVP Core Group
 - Christopher Ryan, Director of Community and Economic Development
 - Liz Allard, Land Use Administrator
 - Kara Minar, Select Board
 - Sharon McCarthy, Board of Health
 - Eric Broadbent, Harvard Energy Advisory Committee
 - Kerri Green, Agricultural Advisory Commission
 - Justin Brown, Planning Board
 - Jarrett Rushmore, Planning Board
- Harriman – MVP Facilitators
 - Emily Keys Innes, Director of Planning
 - Jess Wilson, Urban Designer and Planner

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Harvard Municipal Vulnerability Preparedness (MVP) Workshop

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Review Workshop 1

What is the MVP Program?

- A component of MA Executive Order 569 (2016)
- Grant funding for technical support to
 - Complete vulnerability assessments
 - Develop action-oriented resiliency plans

Why is the Town Participating?

- Increasingly more unpredictable and severe weather is occurring
- Impact on Town infrastructure and services; impact on public health
- Agriculture is a significant part of the town's composition and identity – dedicated MVP component focusing on agriculture
- Completion qualifies Harvard for access to further grant funding

April 25, 2019

Harvard Municipal Vulnerability Preparedness (MVP) Workshop

Workshop Process

- A. Prepare for the Workshop
- B. Characterize Hazards
- C. Identify Community Vulnerabilities and Strengths
- D. Identify and Prioritize Community Actions
- E. Determine the Overall Priority Actions
- F. Put it All Together
- G. Move Forward



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Climate Change

- “It’s pretty clear that climate change is starting to have a very significant impact on our communities, on our infrastructure, on personal property, on real property and on community property.”
 - Charlie Baker, Governor of Massachusetts
- “Every company, investor, and bank that screens new and existing investments for climate risk is simply being pragmatic.”
 - Jim Yong Kim, Former President of the World Bank
- “Climate change is a key problem facing people.”
 - David Malpass, Current President of the World Bank
- “The effects of a changing climate are a national security issue with potential impacts to Department of Defense (DoD) missions, operational plans, and installations. ... To achieve these goals, DoD must be able to adapt current and future operations to address the impacts of a variety of threats and conditions, including those from weather and natural events. To that end, DoD factors in the effects of the environment into its mission planning and execution to build resilience.”
 - *Report on Effects of a Changing Climate to the Department of Defense*, January 2019

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Review of Terminology

- Climate change
 - A change in the state of the climate ... whether due to natural variability or as a result of human activity
- Natural hazard
 - Natural events that threaten lives, property, and other assets
 - Often can be predicted; they tend to occur repeatedly in the same geographic locations because they are related to weather patterns or physical characteristics of an area
- Risk
 - The potential for an unwanted outcome resulting from a hazard event
- Vulnerability
 - The propensity or predisposition to be adversely affected
 - A function of exposure, sensitivity, and adaptive capacity

Definitions from the *Massachusetts State Hazard Mitigation and Climate Adaptation Plan*, 2018

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A hazard is the sun.

There is risk for sunburn.

The vulnerability includes the length of exposure to the sun, how sensitive the skin is to it.

Actions to address vulnerability include staying in the shade or wearing sunblock.

Overview of Climate Change - MA

- Summarized by the MA Executive Office of Energy and Environmental Affairs
 - resilientMA.org - clearinghouse of climate science maps, data, documents
 - “Downscaled” to major watershed basin (Harvard is in the Merrimack, Nashua, and Sudbury-Assabet-Concord (SuAsCo) watersheds)
- Temperature projections
 - Average, maximum, and minimum temperatures are expected to increase
 - Days with daily maximum temperatures over 90°F are expected to increase
- Precipitation projections
 - Precipitation will be more variable
 - “Extreme” precipitation events are likely to occur more often

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Top 4 Hazards in Harvard

- Pests/Invasive Species
- Extreme Precipitation
- Extreme Temperatures/Temperature Swings
- Ice Storms

Hazards	Votes	Total
Flooding	4 dots	4
Large storm events	3 dots	3
Wind	5 dots	5
Ice storms	6 dots	6
Pests/invasive species	8 dots	8
Drought	3 dots	3
Extreme temp/temp swings	6 dots	6
Extreme precipitation	7 dots	7
Sea Level Rise (is implied)	0 dots	0
Extreme Thunderstorms	1 dot	1
Tornadoes	1 dot	1
Extreme heat	1 dot	1
Wildfire	3 dots	3

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Vulnerabilities and Strengths in Harvard

- Agriculture was mentioned as both a strength and a vulnerability in the first workshop two weeks ago; the specific strength and vulnerabilities for agriculture have been brought into the matrix.
- We have combined the two tables from the first workshop and you will be working today on the strengths and vulnerabilities in each category.

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Small Groups

1. Group introductions: Name, organization/department.
2. Identify a spokesperson (not the facilitator or scribe).
3. Review strengths and vulnerabilities; add anything that is missing.
4. Identify actions to address community vulnerabilities and reinforce strengths.
5. Prioritize actions and identify a timeframe for each action.
 - Choose your group's top 4 priority actions for reporting to the group and voting

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Identify Actions: Examples

Infrastructural

- Secure new generators for critical facilities
- Integrate future risks into capital improvement plans
- Improve access in high-risk locations
- Install flood-proof manhole covers
- Conduct alternative site feasibility study for at-risk waste-water treatment facility. Relocate to low risk area within next 25 years.
- Assess vulnerability and prioritize infrastructure and improvement list.

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Identify Actions: Examples

Societal

- Increase hazard awareness in high-risk areas through education and outreach
- Foster a neighbor-helping-neighbor program across the community
- Reconfigure evacuation routes and update signage.
- Create and distribute extreme weather flyers and communicate available services
- Identify level and location of housing units vulnerable to flooding. Develop long term plan to address vulnerabilities.
- Conduct feasibility analysis for regional shelter. Construct within 15 years.

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Identify Actions: Examples

Environmental

- Protect and manage parks and lands located in flood zones
- Stabilize vulnerable slopes with native vegetation
- Protect and manage lands in flood zones
- Manage and diversify age structure for forest in Town
- Assess and identify key vulnerabilities from tree fall

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Prioritize Actions: Devens

Highest Priority Actions

- Provide the ability for more staff coverage for the Fire Department during extreme weather events.
- Engage military in Emergency Operations Center (EOC) exercises.
- Perform more regular maintenance of existing culverts throughout Devens and specifically along Willow Brook, Patton Road, and Barnum Road to reduce flood issues, as well as seek funding for culvert improvements throughout Devens.
- Develop a resource-and-supply relocation plan for organizations that provide community resources and services.
- Develop a relocation plan for the Women's Shelter, Veterans Housing and all other social services within Devens to ensure that the facilities can be accessed at all time.
- Promote Code Red, by encouraging more local employees (and not just employers) to subscribe to the system.
- Develop multi-lingual and accessible emergency management messaging.

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Prioritize Actions: Concord

Highest Priority Actions: Prioritized by category

- Promote and highlight low impact development and green infrastructure.
- Prioritize action plan for police/fire/CPW facilities located in the floodplain.
- Find ways to improve cell service throughout the town to ensure ongoing communication.
- Rehabilitate or build new bridges and dams to account for climate projections and the 100-year flood, starting with South Bridge.
- Expand database and educational outreach to seniors and medically vulnerable to collect information on critical needs, including prescriptions
- Inventory and develop a needs assessment for vulnerable populations to expand plans for emergency preparedness
- Review existing communication and preparedness and response protocols and plans (from businesses, schools, town) to ensure they are aligned
- Develop an integrated resource management plan for the town.
- Educate people and encourage ecosystem health by utilizing updated emerging threats and best practices.
- Create an economic action plan/partnership between public and private agricultural sites.
- Take action through policies and programs to increase water efficiency and minimize the use of fresh water for irrigation.

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Prioritize Actions: Littleton

Highest Priority Actions

- Use available groundwater and surface water level data to develop GIS-based groundwater mapping, and provide Littleton Water Department with a template for future data so that it can be directly loaded into the GIS mapping database.
- Apply extra MVP funds to review of the Littleton regulatory code for improvements that could be made to further support and encourage LID in future development projects in Littleton
 - Replacement of shade trees
 - Establishment of contiguous open space and conservation land

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Prioritize Actions: Stow

Highest Priority Actions

- Conduct a Water Supply Vulnerability Assessment and Educate the Public on Water Supply
- Update the Hazard Mitigation Plan
- Develop a Hazard Transportation and Communication Plan
- Develop Programs to Increase Resiliency of the Farming Community

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Prioritization and Urgency

Prioritization Considerations

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

Example Timeframes

- Current projects to reduce flooding are an ongoing (O) action
- Ensuring evacuation procedures are updated annually is a short-term (S) action
- Elevating a road or replacing a bridge are long-term (L) actions

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2019 MVP Action Grants

- To implement priority climate adaptation actions identified by MVP Communities
- Who's eligible?
 - Municipalities with MVP designation
 - Municipalities completing MVP process who have completed workshop(s) and have identified prioritized actions
- Applications were due April 19, 2019
- Funding: \$5 million for 2018, \$10 million for 2019
 - May request up to \$2 million
 - Awards are expected to range from \$25,000-\$2 million
 - Regional proposals may request up to \$5 million
- Match: At least 25% of total project cost required

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MVP Action Grants

- Projects to build resilience, are proactive and clearly demonstrate efforts to redesign, re-evaluate, or reconsider and incorporate new climate change data
- Projects are encouraged to use nature-based strategies to address climate change impacts
- Many of these projects might also be funded through existing grant programs
 - e.g., EEA's Dams and seawalls, CZM's coastal resiliency, DER's culvert replacements

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MVP Action Grants – Project Categories

- Detailed Vulnerability and Risk Assessment
- Public Education and Communication
- Local Bylaws, Ordinances, Plans, and Other Management Measures
- Redesigns and Retrofits
- Nature-Based Storm-Damage Protection, Drought Prevention, Water Quality, and Water Infiltration Techniques
- Nature-Based, Infrastructure and Technology Solutions to Reduce Vulnerability to Extreme Heat and Poor Air Quality
- Nature-Based Solutions to Reduce Vulnerability to other Climate Change Impacts
- Ecological Restoration and Habitat Management to Increase Resiliency

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MVP Action Grants

- 2018: 39 Applications for Action Grant
- Projects included:
 - Marsh resiliency
 - Wastewater and drinking water infrastructure
 - Climate migrants

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Report Out from Small Groups

- Choose your group's top 4 priority actions for reporting to the group and voting

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Identify Top Priority Actions

- Review the top actions identified by the small groups
- Place your dots next to the actions you feel are the highest priorities within Harvard

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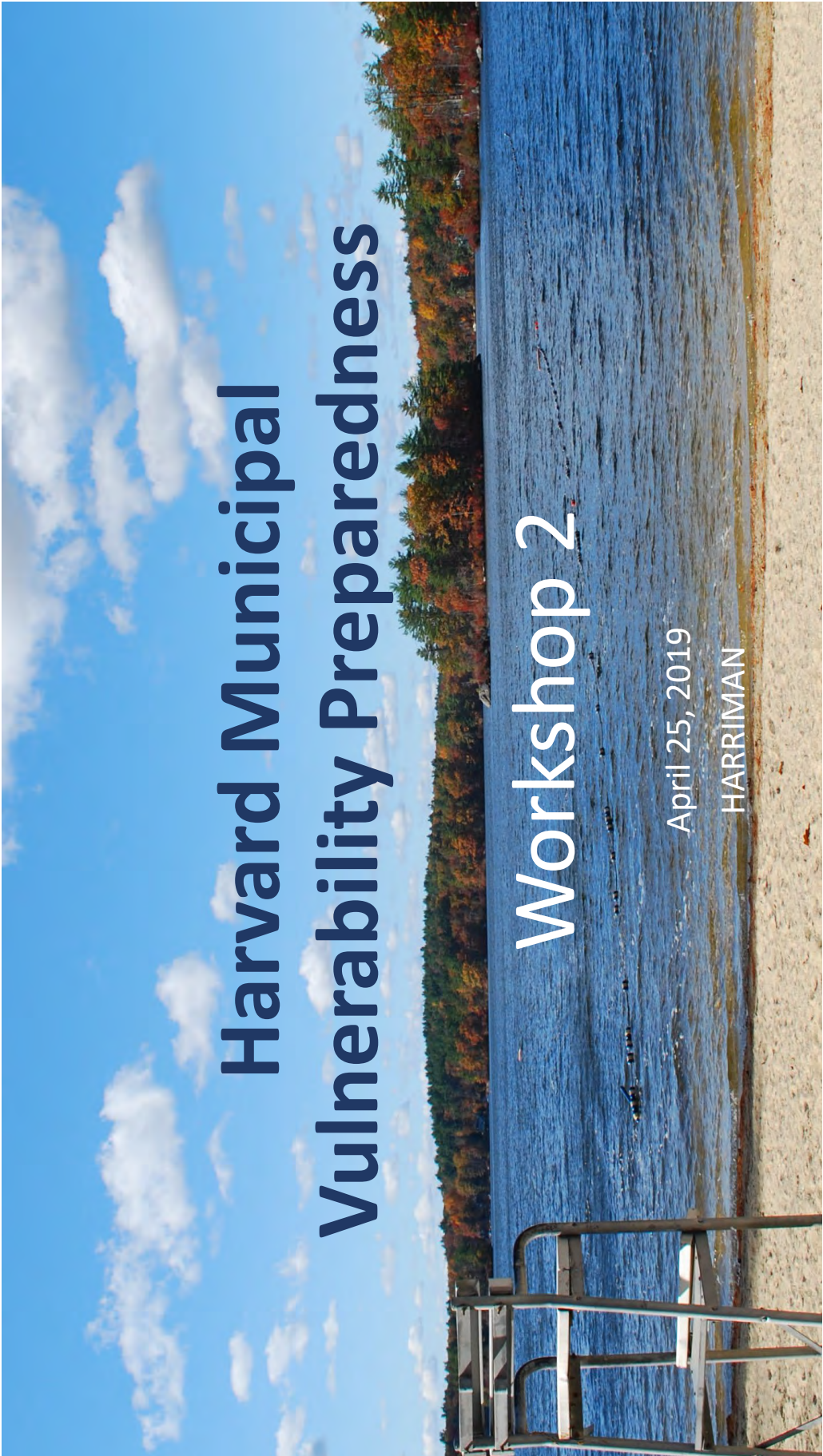
Next Steps

- Develop Workshop Summary of Findings Report
- Community Listening Session
- Submit materials to the state, become an “MVP Community”
- To maintain MVP Community designation, the Town must provide the Commonwealth with a yearly progress report outlining the steps they have taken towards implementing their priority actions
 - For example: Pursue funding for priorities and projects; update existing local plans using the outcomes of the workshop

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Harvard Municipal Vulnerability Preparedness

Workshop 2

April 25, 2019

HARRIMAN

APPENDIX C: COMMUNITY RESILIENCE BUILDING WORKSHOP PARTICIPATORY MAPPING

[illegible]

[illegible]

APPENDIX D: HARVARD AGRICULTURE AND COMMUNITY RESILIENCE BUILDING WORKSHOP MATRICES AND TOP PRIORITY ACTIONS

Hazards in Harvard

Hazards	Votes	Total
Flooding		4
Large storm events		3
Wind		5
Ice storms		6 ←
Pests/Invasive species		8 ←
Drought		3
Extreme temp/temp swings		6 ←
Extreme Precipitation		7 ←
Sea Level Rise (es migration)		0
Extreme Thunderstorms		1
Tornados		1
Extreme heat		1
Wild Fire		3

Features	Location	Ownership	V/S/both	H
Town Sewer	Town Center	Muni	both	EP
Trees (Row)	Various	Various/Muni	both	IS
Power Lines	Wide	Utility/ Town	V	IS
Snowmobile Club	Limited to Trails	Private	S	IS
Utility Sys	Wide → beyond	Public Utility	V	IS
EM Plan	Townwide	Muni	both	V
EM Communication	Agencies	Muni → beyond	S	V
Base Hill Pond	Center	Muni/Private	both	EP
Town Wetlands	Various *	Muni/ prv	S	EP
Tree Species M	Townwide	Public/Private	both	F
Forest & Land Mgt.	"	"	"	"
Volunteer Base	"	Public/Private	S	V
L Invasives Action	Various *	"	S	"
Cooling Centers	TN	"	V	"
Roads	Townwide *	private	V	"
Individual Septic	Townwide *		S	"

→ POND - SLV. → DAM.

→ DE N to N vs. Isolation
→ Individual vs. collective cultural / physical
lack of shelter -

→
- Warming / cooling
- ^{lack} generators / etc.

→ Trees — Value as ecosystems
aging, blighted, nonnative
deer / tick

Community Resilience Building Risk Matrix

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

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

Features	Location	Ownership	V or S	Pests/Invasive Species	Extreme Precipitation	Extreme Temp/Temp Swings	Ice Storms	Priority	Time
Budget	Townwide	Public	V	Herbicides → new targeting	Climate vulnerability analysis in town govt. Capital planning	Strengthen Town Website for Cross-cultural comm/press/coord.	Having shelter supplies → Budget for IT.	H	S
Communication Dispatch Method (online, alternative, Reverse 911)	Varies	Municipal Beyond	V/S						
Council on Aging as connector for seniors	Behind Fire Station/Town Hall	Municipal Beyond	S					H	S
Development patterns	Town	Public	V	Settlement patterns/ hazards. Collate strategies for small N.E. Towns.	Road connectivity/Redundancy → System Planning			H	S
Structure/Rural Ret./Preservation and existing population (social change)	Townwide	Public/Private	V	Shared information base and community understanding.	"Cultural" exchanges → connect disparate groups Public awareness/education			M	O
Education (individual action vs. collective action)					→ Farm Success Planning			H	S
Understanding of farm practices by new residents									
Emergency management	Agencies	Municipal-Beyond	S						
Emergency communications (also Infrastructure)									
Emergency Management Plan	Townwide	Municipal	V/S						
Emergency Response/ Emergency Services and opportunity for regional collaboration	Town/ Region	Region/ Beyond	V/S		Preparedness Education (E) - Harvard Local			H	S
Forest and land management (also Environmental)	Townwide	Public/Private	V/S	Conservation in Fagopy	Finalizing Plan				
Invasives Action	Various	Public/Private	S	Planning & Education * Invasives Event (F)				M	S
No designated shelter (also Infrastructure)			V						
Opportunities for Regional Coordination (Devens)			S						
Devens stewardship to leverage opportunities for Harvard									
Harvard Conservation Trust, Sudbury Valley Trustees (also Societal)			S	Include DEVENS Wikimedia page.					
Small town identity/ local press			S	A Creation/ID of...				M	O
Snowmobile Club	Limited to Trails	Private	S	B Coordination of Community Groups & Neighbors					
Volunteer Base	Townwide	Public/Private	S					H	O
Volunteer EMTS			S						
Vulnerable population/ Isolated populations	Townwide		V						
Elderly, young, family									
Water Quality			V						



HARVARD MVP WORKSHOPS

APRIL 2019

Community Resilience Building Risk Matrix

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

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

Features	Location	Ownership	V or S	Pests/Invasive Species	Extreme Precipitation	Extreme Temps/ Temp Swings	Ice Storms	Priority H-M-L	Time S-L-O
Infrastructure									
Lack of shelters (cooling and warming centers) (Seaside Blvd. and Hwy 101)	Air conditioning and generator at library, police training room	Municipal	V		Equip. brought. School as a storage/shelter, prepare a management plan	Equip. and storage. Hildreth, then as a cooling/warming center (phone emergency, hot water, etc.)	Some storage. Some storage. (action items)	M	S
No designated shelter (also Societal)	Townwide	Public/Private	V/S	Expanding school and widening system	Equip. plan, and upgrade. Equip. for emergency response			M	O
Culverts/undersized (both tables) (Flow, capacity, capacity, flow, flow)	Bare Hill Pond	Municipal	V	Expand stormwater detention	Evaluate, design, and upgrade. Budget for emergency response			M	O
Dam (timing of draw-down)	1-Near Town Hall; 2-SW	Municipal	V		Plan for expanded capacity. Plan for improved facilities. Implement plan			M	O
Dispersed capacity for emergency use (Early on, shelter) (CPR, Fire, EMT)	Upper Stow Road	Municipal	V	Expand stormwater detention	Evaluate, plan, implement			M	O
Lack of Drainage (drawing for one, critical, water, etc.)	Agencies	Municipal-Beyond	S	No action req'd					
Emergency management communications (also Societal)	Schools, police station, DPW, library, fire, etc.	Municipal	V/S		Add generator	Add generators		H	S
Generators at municipal buildings	Nashoba, Emerson, Urgent Care	Private	V		Medical professional networking (CERT, civilian emergency response team)			H	S
Medical centers			S		Subcontracted business				
Opportunity for pedestrian/bike trail connection to Devens	Massachusetts Avenue	State	V		Secure additional funding. Evaluate need relative to resilience			L	O
Poorly-paved roads	Townwide	Private	V/S		Identify problem locations, evaluate regarding snow service			L	L
Private septic systems			V		Identify problem locations, evaluate regarding snow service				
Each field throughout town			V		Identify problem locations, evaluate regarding snow service				
Residential development/infrastructure within 3 different watersheds	Townwide	Municipal	V		Secure additional funding, evaluate need relative to resilience			L	O
Roads	Townwide	Municipal	V		Adapt by law and apply. Secure funding for townwide evaluation, recommendations, funding			M	O
Stormwater management (Cerritos)	Townwide	Municipal	V/S	Collect, disperse, store, water, etc.	Identify potential vulnerabilities and advantages, evaluate, and modify if beneficial			L	L
Town sewer (Cerritos, low, etc.)	Town Center only	Municipal	V	Prep. management, evaluate, basic funding, etc.	Evaluate, seek funding, consider preferential claims			H	S
Utility system (both tables)	Townwide-Beyond	Utility	V		Secure funding, etc.			M	O
Power lines, trees, road closures	Townwide	Public/Private	V		Secure funding, etc.			M	O
Runoff of contaminants into water supply/wetlands	Townwide	Public/Private	V		Secure funding, etc.			M	O

Community Resilience Building Risk Matrix

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

H.M.L. priority action over the Short or Long-term (and Ongoing)				Top Priority Hazards (normal, floods, wildfires, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)					
Features	Location	Ownership	V or S	Pests/Invasive Species	Extreme Precipitation	Extreme Temp/Temp Swings	Ice Storms	Priority H-M-L	Time S-L-O
Environmental									
Abandoned apple trees harbor disease/pests	Townwide	Public/ Private	V	Apple trees - do pond of old trees - threat - Manage Dwarf - Dwarf (O) - → Education - facilities, buffer H/O Road Council, log book	X	Education and monitor Heat → Monitor for Midge Burn. Road Council - M-O	Apple disposal - Apple H/O (if funding)	L (public)	O
Bare Hill Pond (both tables)	Bare Hill Pond	Municipal/ Private	V/S		Not infrastructure.		X	H/M	O
Beavers			V						
Conservation lands	Townwide	Public/ Private	V/S	Monitor, identify, remove (Public) M-O Education of Public (if O), Conservation Lands Woodland, Thicket	Soil health IPM → Contamination (POLLUTANTS) Testing (INFRASTRUCTURE)		Daisy, juniper - fr.	M	O
Disease threats to plants, animals (difference between organic and non-organic)	Townwide	Public/ Private	V	EDUCATION - (GROUPING - EDUCATION - EFFORTS) (add - benefit points - report)					
Erosion	Townwide	Public/ Private	V	EDUCATION - LANDSCAPE REPAIR LANDS MANAGEMENT (Monitor)	Joint forest management for CO2 sequestration integration of management plans.		Not enough data? - Manage.	L	L
Forests/Forest and land management (also Societal)	Townwide	Public/ Private	V/S						
Woodlands/Forest <10 Acres	Townwide	Public/ Private	V						
Groundwater quality for agriculture and community health (DeVens)	Townwide	Public/ Private	V	LET CONSERVE MORE LAND ASNT PUBLIC EDUCATION - DEER MGMT STRATEGIES	→ CONTAMINATION (POLLUTANTS) Testing (INFRASTRUCTURE)	PRIVATE: EDUCATION → PROLOGUE LAND AROUND WETLANDS - ADDITIONAL OF GROUNDWATER RESOURCES			
Harvard Conservation Trust, Sudbury Valley Trustees (also Societal)	Townwide	Public/ Private	S						
Insects (including Ticks)	Townwide	Public/ Private	V	REMOVAL OF COMPOUND - H-O NATIVE PLANTS WHICH BUTTERS/EDGERS DISTURBED M/H - O		Systems Education, deer fencing - comprehensive regional strategies land stewardship - collective, No bird feeders near homes	REMOVING BITTERROOT - MGMNT.	H	O
Invasive Plants crowding out native flora	Townwide, esp. roadsides	Public/ Private	V			VEDICATION → BUT MONITOR CISTERN (POW) FIRE DRAIN (INTEGRATED) Δ COPS		M/H	O
Invasives - plants, wildlife, pests (difference between organic and non-organic) W.I. ticks (regional problem), mice, impact on water pumping	Townwide, esp. roadsides	Public/ Private	V		(Loss of biodiversity) - Δ COPS				
Lack of water at the right time (limited irrigation, well-depth) - damage, slake	Townwide	Public/ Private	V						
Reduced production in amount and quality/variety not viable	Townwide	Public/ Private	V						
Shorter planting season	Townwide	Public/ Private	V						
Stress from drought/flooding at different times of the year	Townwide	Public/ Private	V						
Stress from heat/cold variation within a single season	Townwide	Public/ Private	V						
Super-saturated fields/pastures	Townwide	Public/ Private	V						
Disappearance of insects	Townwide	Public/ Private	V						
Threats to/loss of pollinators: outside companies spraying for mosquitos, ticks	Townwide	Public/ Private	V	Health Council - D - Education - Tick Control Methods INSECT CONTROL PUBLIC HEALTH CAMPAIGN		Regulations - don't allow during day (timing) Public Education - non-x awareness of context - day-year. Pollinator Gardens - school program native bee houses (POLLINATOR ISLANDS)		H	O
Trees (Carbon sink/Species mix/Monoculture/Blight/Age)	Townwide	Public/ Private	V/S						
Trees (Right of Way)	Townwide	Various/ Municipal	V/S	TECH MANAGEMENT PLAN/TOWN (PERACEMENT) - (TECHNICAL) - (P.E. WAGNER?)				H	S
Weather impacts when spraying can occur.	Various	Private	V/S						
Wetlands	Various	Municipal/ Private	V/S						

APPENDIX E: PUBLIC LISTENING SESSION NOTICE



Town of Harvard



MVP Listening Session

Date: Thursday, May 30, 2019

Time: 6:00 pm to 7:00 pm

Place: Town Hall Meeting Room

Food: Dinner will be catered by Sorrento's Pizza

NOTE: The MVP Meeting will take place just prior to the 3rd Annual Town of Harvard Environmental Forum. We encourage you to participate in both events! Please contact Bruce Leicher at bruceleicher@aol.com if you have any questions about the Forum.

The Town of Harvard Municipal Vulnerability Preparedness (MVP) Subcommittee invites the general public to a Listening Session to hear the findings of the MVP Assessment process and the draft priorities that Harvard will emphasize in the action plan.

This is the final meeting of the MVP planning process and your final opportunity to comment on the draft plan and recommended actions. We hope you take this opportunity to join us and share your thoughts on the findings and proposed actions.

A number of climate change-related hazards have been identified by working groups and a number of assets in Harvard such as farms, forests, and infrastructure have vulnerabilities to climate change. We want to hear what you think about our priorities and next steps.

Please contact **Christopher Ryan, AICP** at cryan@harvard.ma.us if you have any questions about the MVP Listening Session. Please pass the word around about this last change to participate in this part of the MVP initiative.



JENNIFER E. BENSON
REPRESENTATIVE
37TH MIDDLESEX DISTRICT

Commonwealth of Massachusetts

HOUSE OF REPRESENTATIVES
STATE HOUSE, BOSTON, MA 02133-1054

Committee:
Chair
Health Care Financing
STATE HOUSE, ROOM 236
TEL: (617) 722-2430

May 30, 2019

Mr. Christopher Ryan
Town of Harvard
13 Ayer Road
Harvard, MA 01451

Dear Mr. Ryan,

I regret that I cannot be at the Municipal Vulnerability Preparedness Listening Session tonight, but I would appreciate if you could read this statement to the attendees on my behalf:

I would like to express my support for Harvard's participation in the Municipal Vulnerability Preparedness program, and the MVP Subcommittee on their collective efforts to ensure the town is prepared to deal with the effects of climate change.

In the coming decades, the Northeast will experience the consequences of climate change more than any other region in the continental United States. In the past century, the average temperature in the region has risen by 2° Fahrenheit, and further warming of 4° to 6° is expected by 2050. The frequency and duration of heatwaves is already rising, as is the frequency of heavy precipitation and severe storms.

Even as Massachusetts and the rest of the world works to reduce emissions to slow climate change, in the near future, Harvard will be more vulnerable to flooding, forest fires, and damage to agricultural and conservation land. That is why it is so important that the town is taking the threat of climate change seriously, and taking advantage of the MVP Program. I will gladly provide letters of support for Harvard's MVP Action grant applications, and my office is prepared to assist the town in any way we can.

To everyone attending tonight's listening session, thank you for your involvement in helping the town identify vulnerabilities. Climate change on this scale is something humanity has never experienced. Through meetings like this one, of concerned citizens working together, we'll do our best to find ways to protect our communities.

Sincerely,

Jennifer Benson
State Representative
37th Middlesex District

QUESTIONS AND ANSWERS AT THE MAY 30 LISTENING SESSION

The following questions and answers have been paraphrased from the input after the presentation at the Listening Session:

- Please add the Council on Aging to the list of partners for an emergency response network. [Added]
- Please note that the findings from the workshops were based on who could come and participate, especially the second workshop. Many people represented the conservation community rather than the agricultural community. Some priorities were not as specific to agriculture as they could be. This should be emphasized in the plan and information from the survey should be included.
- Frustration with the process: the speaker understood the state-wide process but wanted more prescriptions and specifics to give to the agricultural community, including a timeline. When is the appropriate time to switch? Harvard should act as a test subject with the grant and push for more specific actions.
 - The proposed Climate Action Plan should include an agricultural plan; the scope of that should be framed by the Agricultural Advisory Committee.
- Speaker also hoped that the Agricultural Advisory Committee would provide input on policies that would assist the farming community.
- The lack of input from the agricultural community creates a trap; the criteria are not competitive. Harvard should try to work with surrounding communities to discuss agriculture rather than using pre-digested priorities. The Lieutenant Governor should be involved.
- The survey was an opt-in survey that skewed results; a certain level of detail is missing or not understandable.
 - Future outreach to farmers should be personal communication.
- Need to connect the dots regarding increased temperatures in the winter-time. Apple trees in New England are different. In Pennsylvania and Maryland, apple trees can survive in warm winters. New England varieties require cold in the winter. Decreased chilling days mean that the trees are nonproductive. The cost to change New England apple trees to trees suitable for the Maryland climate is huge. [Note that projections suggest that the climate of Massachusetts in 2040 will be similar to that of Maryland now.]
- Development patterns impact hazards and risks. Harvard has a mostly residential tax base. The speaker was concerned about individual impacts on wetland and meadows from individual spraying and pest management techniques.
- Speaker asked how long will the plan be applicable?
 - This is a blueprint for moving forward. An implementation plan [Climate Action Plan] will identify partners, timeline, prioritization, and funding sources.
- Speaker noted that for some people Harvard IS the plan. Concern that based on changes elsewhere (coastal regions) the population of Harvard may increase.
- Wind needs to be mentioned more as a hazard (it fell just under the threshold on the prioritization vote). The aging of trees is an issue with power lines. Tornadoes in Massachusetts usually die just past the Berkshires, but this could be a future issue. Downed trees can prevent movement around town: this is a problem in an emergency. What can go wrong and how does the Town mitigate it?
- Speaker asked what the Town can do to improve/assist the bee population?
 - Local development patterns have an impact on wetlands and wildlife. Education programs are required for spraying pest management techniques, use of pesticides, and lawn care.
- Speaker felt the listening session was very informative; very good program. As the temperatures change to more days above 90 degrees, are there practical ways to address vulnerable citizens?
- Where are cooling centers?
 - Expansion of Council on Aging will allow it to act as a cooling center but they will not have a generator. The school has air conditioning and a generator, but the speaker did not know which other facilities did.
- Who is working on next steps and how will this work?
 - The report should have a recommendation for an implementation committee [Added] which will be responsible for the Climate Action Plan. The Select Board will need to decide if the implementation committee becomes a standing committee or remains under another committee. The MVP Core Group is under the Energy Advisory Committee.

