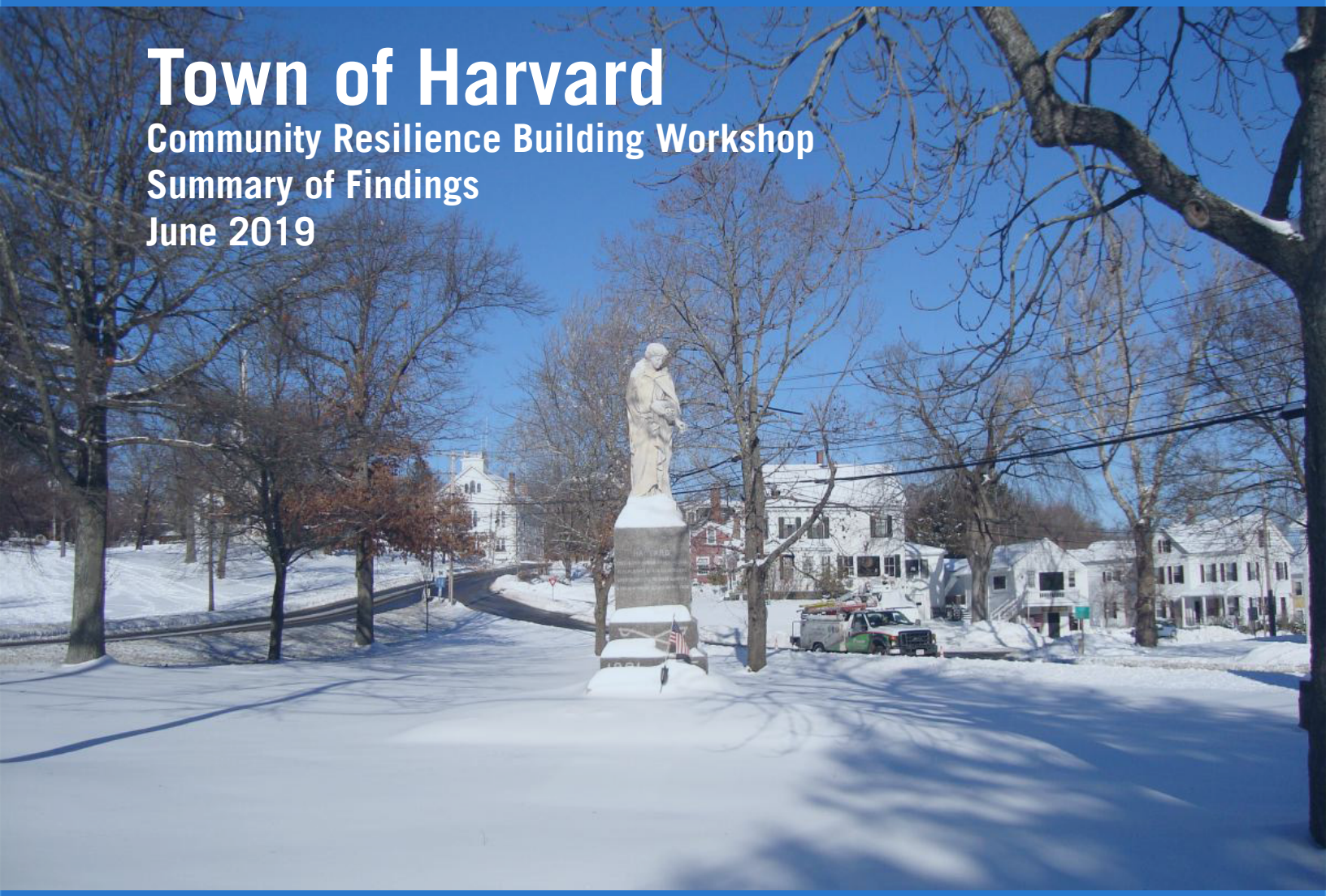
Town of Harvard

Community Resilience Building Workshop
Summary of Findings
June 2019



Town of HARVARD Massachusetts

Prepared for the Town of Harvard
Prepared by Harriman

TABLE OF CONTENTS

RECOMMENDED CITATION

Town of Harvard. (2019). Community Resilience Building Workshop Summary of Findings. Harriman. Harvard, Massachusetts.

OVERVIEW

Governor Baker signed Executive Order 569 (EO 569) *Establishing an Integrated Climate Change Strategy for the Commonwealth* in September 2016. EO 569 included components for the Secretary of Energy and Environmental Affairs and the Secretary of Public Safety to "establish a framework for each City and Town in the Commonwealth to assess its vulnerability to climate change and extreme weather events, and to identify adaptation options for its assets" and "provide technical assistance to Cities and Towns to complete vulnerability assessments, identify adaptation strategies, and begin implementation of these strategies." The Massachusetts Executive Office of Energy and Environmental Affairs (EEA) subsequently developed the Municipal Vulnerability Preparedness (MVP) program, designed to provide support for municipalities to begin planning for climate change resiliency and implementing priority projects.

This process requires a community to define for itself those priority projects that will help it adapt to or mitigate the impacts of climate change. EEA is posting the completed reports from each community on their website; the reports from the 2017-2018 grant round can be found here: https://www.mass.gov/service-details/2017-2018-mvp-planning-reports. This website will become a database of the priorities by region and across the state as a whole.

Harvard's MVP process identified a strong desire to understand best practices for implementation across the state. As the EEA continues to compile reports from communities and begins to fund specific resiliency strategies, adding information to resilientMA.org on best practices for specific adaption or mitigation strategies that have been implemented in Massachusetts is a critical resource for communities with limited resources in terms of funding sources and time, both staff and volunteer.

COMMUNITY NEED

Harvard is experiencing increasingly more unpredictable and severe weather that can potentially cause damage to the community, and, in particular, its economic base and history as an agricultural community. In recognition of the need to plan for future climate change and extreme weather events, Harvard applied for, and was awarded, a $35,000 grant from the MVP program to complete an assessment and develop a resiliency plan using the Community Resilience Building (CRB) Framework (www.communityresiliencebuilding.com). The two CRB workshops and this Summary of Findings were prepared according to the CRB process and report template. The Town retained Harriman, a design and engineering firm, to facilitate the overall MVP process. Daniel Cooley, Professor of Plant Pathology at the Stockbridge School of Agriculture at the University of Massachusetts-Amherst, joined the team for the survey, workshops, and report focused on the impacts of climate change

on agriculture. The Harriman team included a State-certified MVP provider who oversaw the planning and workshop facilitation during the CRB process.

PREPARATION FOR WORKSHOPS

A Core Group was established for this planning process:

- Christopher Ryan, Director of Community and Economic Development
- Liz Allard, Land Use Administrator/Conservation Agent
- Kara McGuire Minar, Select Board
- Sharon McCarthy, Board of Health
- Eric Broadbent, Harvard Energy Advisory Committee (HEAC)
- Kerri Green, Agricultural Advisory Commission
- Justin Brown, Planning Board
- Jarrett Rushmore, Planning Board

The Core Group and Harriman held a kick-off meeting during the initial stages of the planning process to discuss previous planning efforts, characterize preliminary hazards and areas of concern, and begin to develop a list of key stakeholders to invite to participate in the CRB workshops. Discussions also included logistics of the workshops, including the invitation process and format of the half-day workshops.

To prepare workshop materials, the Core Group and Harriman reviewed various resources and publications, including:

- *Massachusetts State Hazard Mitigation and Climate Adaptation Plan* (2018), Massachusetts Emergency Management Authority and the Executive Office of Energy and Environmental Affairs
- *State of the Climate* (2018), National Oceanic and Atmospheric Administration (NOAA)
- *NOAA Technical Report NESDIS 149-MA* (2017), North Carolina Institute for Climate Studies
- *Massachusetts Climate Change Projections* (2017), Massachusetts Executive Office of Energy and Environmental Affairs
- *Montachusett Region Natural Hazard Mitigation Plan 2015 Update* (2015), Montachusett Regional Planning Commission
- *Town of Harvard Open Space and Recreation Plan* (2016), Town of Harvard

WORKSHOP PROCESS

As an agricultural and residential community, Harvard is faced with a unique set of challenges and impacts related to climate change. For this reason, the Town sponsored two half-day agricultural workshops on February 2, 2019 and March 9, 2019 to focus specifically on these issues. These were followed by two three-hour CRB workshops on Thursday,

April 11, 2019, and Thursday, April 25, 2019, which addressed the broader impacts of climate change on Harvard outside of the agriculture industry. All workshops were held at Harvard Town Hall. The agendas, handouts, and presentations for the two CRB workshops are included in *Appendix B: Workshop Agendas and Presentations*. The goals of the workshops 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

AGRICULTURAL WORKSHOP #1

AGRICULTURAL WORKSHOP #1

The first agricultural workshop, held on February 2, 2019, focused on characterizing Harvard's hazards and identifying their vulnerabilities and strengths. The workshop began with a presentation by Harriman which introduced the Core Group and facilitators and then went on to provide an overview of the MVP program and the Agricultural and CRB Workshop processes, followed by an overview of climate change. The presentation also reviewed recent climate events within the United States, climate projections for Massachusetts, and climate projections and potential impacts on Harvard. At this point, consultant team member Daniel Cooley, Professor of Plant Pathology at the University of Massachusetts Amherst, gave a presentation on the relationship between climate change and agriculture in Harvard. The information about the impacts of climate change on agriculture in the Northeast as currently understood included data on current and projected extremes in rainfall and precipitation. Professor Cooley then discussed the Harvard Agricultural Survey which provided specific data on the agricultural industry in Harvard. The survey polled Harvard farmers on how climate change has already impacted their businesses and their concerns for the future. After summarizing this information, Harriman introduced the workshop activities.

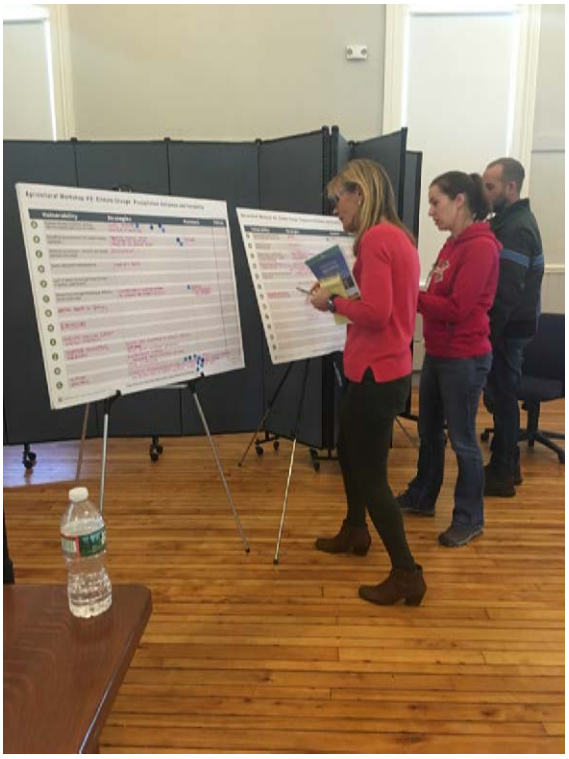
The participants were asked to brainstorm past, current, and future hazards related to agriculture and climate change in Harvard. The workshop participants formed three small groups for focused discussions. Participants were asked to characterize their top four priority hazards in Harvard and identify community vulnerabilities and strengths of Harvard's

infrastructural, societal, and environmental features. Each group filled in the corresponding portion of the CRB Risk Matrix after identifying the priority hazards and community features.

The groups were also asked to identify and map the community vulnerabilities and strengths using the two base maps, one which showed water and FEMA flood zones and the other which showed agricultural properties (see *Appendix C Community Resilience Building Workshop Participatory Mapping* for the results). Workshop participants reunited in a large group and a representative from each small group reported a brief summary of their group's discussion, top priority hazards, and community vulnerabilities and strengths.

AGRICULTURAL WORKSHOP #2

The second agricultural workshop was held on March 9, 2019 and focused on prioritizing strategies for climate change mitigation and adaptation. The workshop opened with a presentation by Harriman which provided overviews of the MVP process and climate change, concepts related to risk and risk management, a summary of the first agricultural workshop as well as the farmer interviews that took place afterward. There was a pause in the presentation to allow participants an opportunity to add to the list of vulnerabilities that was generated at the first workshop. After that, Professor Cooley gave a presentation on climate change mitigation and agriculture in Harvard which provided information and resources on potential adaptation strategies, tactics, and tools related to agriculture, precipitation variability and extremes with a focus on soil health, an overview of irrigation, an erosion case study, temperature variability and extremes including frost and heat, growing-season length, and chilling, challenges in pest management, and planning specific adaptation tactics.



AGRICULTURAL WORKSHOP #2

Following the presentations, participants broke into small focus groups for continued discussion. Matrices were provided with the first column, "vulnerabilities," completed with the identified vulnerabilities from the prior workshop. The focus groups then discussed

and filled in the "strategies" and "partners" columns for each vulnerability. There were separate matrices for temperature, precipitation, economic/market, regulatory, and other. After the matrices were filled out, each person was given five sticker dots to place on the strategies that they felt should be given the highest priority. The following discussion questions guided the prioritization of the strategies:

- Vulnerabilities: How are you vulnerable to these pressures?
- Strategies: How could you mitigate/adapt to these pressures?
- Partners: Whose help do you need and what is that help?
- Prioritize: What are the five most important strategies to you?

The workshop concluded with each group reporting back the strategies that got the most votes for prioritization. The data, analysis, results, and recommendations from the Agricultural Workshops are presented in a companion report: *The Impact of Climate Change on Agriculture: Harvard Massachusetts.*

CRB WORKSHOP #1

CRB WORKSHOP #1

The first CRB Workshop focused on characterizing the Town's top hazards and determining if identified community features were strengths, vulnerabilities, or both, given the potential effects of the identified hazards. The workshop on April 11, 2019 began with an overview by Harriman of the workshop's agenda, introduced the Core Group and facilitators, and described the MVP program and the CRB workshop process. The presentation also reviewed recent climate events within the United States, climate projections for Massachusetts, and climate projections and potential impacts on Harvard. Finally, the presentation concluded with the hazards in Harvard identified during the Agricultural Workshops and introduced the small group exercises.

Participants then brainstormed additional priority hazards and voted on the top four. After this, the attendees divided into two groups and were asked to identify community vulnerabilities and strengths of Harvard's infrastructural, societal, and environmental fea-

tures. Feedback was used to fill in the corresponding portion of the CRB Risk Matrix after identifying the priority hazards and community features.

Each group was also asked to identify and map the community vulnerabilities and strengths using the base maps (base maps are in *Appendix A: Preparatory Information* and the results are in *Appendix C: Community Resilience Building Workshop Participatory Mapping*).The two groups reunited into a single group and a representative of each small group reported a brief summary of their group's discussion and community vulnerabilities and strengths. Harriman wrapped up the workshop by presenting a brief preview of the second CRB workshop.

The input from this workshop has been incorporated into *Top Hazards*, *Areas of Concern*, *Specific Categories of Concerns and Challenges*, and *Current Strengths and Assets* below.

CRB WORKSHOP #2

CRB WORKSHOP #2

Workshop #2 focused on building upon the findings of Workshop #1 to develop action steps the Town can take to be more resilient to the projected impacts of climate change. The workshop on April 25, 2019 began with a review of Workshop #1's findings and an overview of Workshop #2. The presentation included a brief review of climate change and the impacts on the region around Harvard, and then provided examples of actions identified by other towns participating in the MVP program for each of the categories: infrastructural, societal, and environmental, as well as information about MVP action grants. Participants were asked to briefly review the top four priority hazards and community vulnerabilities and strengths in Harvard from the first CRB Workshop. Attendees divided into three groups by interest: Infrastructural, Societal, and Environmental. The matrices were partially completed with the strengths and vulnerabilities identified in CRB Workshop #1. Each group identified actions to address community vulnerabilities and reinforce strengths and time-frames to address those actions.

The small groups reunited into a single group. Each person was given four sticker dots and asked to place a dot next to their top priority action items, based on the top four priorities identified by the small groups. Facilitators then concluded the workshop describing next

steps for the MVP process and the community. The results of this workshop are provided in *Top Recommendations to Improve Resilience.*

PUBLIC LISTENING SESSION

The findings from the workshops were presented to the public at a listening session on May 30, 2019. A copy of the public notice is included in Appendix E. The listening session preceded the Third Annual Town of Harvard Environmental Forum. Topics at the forum included how to reduce the Town's carbon footprint and the need to consider the environmental impacts of Town activities and decisions. To encourage participation and celebrate the end of the planning process, the meeting was catered by Sorrento's Pizza.

LISTENING SESSION

Chris Ryan and Eric Broadbent presented the MVP process and results on behalf of the Town and the MVP Core Committee. Attendees at the Listening Session participated fully in the questions and answer period that followed; those questions and responses are summarized in Appendix E.

TOP HAZARDS AND VULNERABLE AREAS

PROJECTED IMPACTS

When scientists talked about global warming in the 1990s, they focused on the average annual global temperature and sea level rise. Scientists now have more data, better computational models, and better observations to record and analyze the most significant effects of climate change. Wildfires, hurricanes and associated extreme rainfalls, flooding, drought, and heat waves have all worsened due to climate change, in addition to the increase in global temperatures and sea level rise.

Public health is also being affected; the Centers for Disease Control and Prevention (CDC) has found that illnesses from mosquito, tick, and flea bites more than tripled in the United States from 2004-2016. New disease vectors are possible from newly invasive species, such as the Asian long-horned tick – the first invasive tick in the United States in approximately 80 years.

The Town of Harvard, like many communities in Massachusetts, has already been impacted by and is expected to face further impacts from two major changes: the shift from more heating days to more cooling days and the increase in the intensity of precipitation events. Some of the impacts include the following:

- Services the Town needs to provide to its residents, such as cooling shelters for those who cannot cool their homes, increased public health awareness and prevention, and emergency services during and after storm events
- The viability of agriculture, part of the Town's economic base, which faces threats from drought, variable temperatures during a single season, and pest activity
- The future of significant natural resources such as ponds, wetlands, and forests that are threatened by storm damage, drought, invasive pets and plants, and diseases

The presentations during CRB Workshops 1 and 2 reviewed recent climate events within the United States, climate impacts within Massachusetts, and climate projections and potential impacts on Harvard. For example, data for Massachusetts from *NOAA Technical Report NESDIS 149-MA* (2017) show average annual temperatures increased almost 3°F between 1900-2014 and the number of days when the maximum temperature was above 90°F has been consistently above average since the 1990s. The report also noted that all precipitation metrics (e.g., observed extreme precipitation events) have been highest during the most recent decade of data (2005–2014).

Data from the Massachusetts Executive Office of Energy and Environmental Affairs' clearinghouse of climate science maps, data, documents (resilientMA.org) was also presented during CRB Workshop #1. ResilientMA provides climate projections from the Northeast Climate Adaptation Science Center. Downscaled to the level of major watershed basins, these projections provide a more focused look at what specific municipalities may experience in the future. The Nashua Basin is composed of 32 municipalities, including the majority of the land area in Harvard. Some key projections for the Nashua Basin include:

Average, maximum, and minimum temperatures are expected to increase

- Seasonally, maximum summer and fall temperatures are expected to see the highest projected increase
- Days with daily maximum temperatures over 90°F are expected to increase
- Days with daily minimum temperatures below 32°F are expected to decrease

	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: resilientMA.org, 2018

Precipitation will be more variable

- "Extreme" precipitation events are likely to occur more frequently. Extreme weather includes blizzards, nor'easters, and hurricanes. According to resilientma.org, the Commonwealth's clearinghouse of climate data, the trend of more intense thunderstorms and downpours in the Northeast is likely to continue
- Winter is expected to see the greatest change in precipitation (increase 2-22% by 2050s, increase 6-39% by 2090s)
- Given projected increase in average temperatures, this precipitation is more likely to be rain
- Snow is likely to be wetter and heavier
- Fall and summer are expected to continue to have the most consecutive dry days

SNOW ON THE SMALL TOWN COMMON
CREDIT: TOWN OF HARVARD

CRB Workshop #1 also reviewed the following hazards previously identified in the *Montachusett Region Natural Hazard Mitigation Plan 2015 Update*:

- A high risk for heavy rain, snow melt, high winds, nor'easters, heavy snow, and wildfire.
- A moderate risk for hurricanes, tornadoes, severe thunderstorms, ice storms, blizzards, drought, and extreme temperatures.

Hazards identified at recently held agricultural workshops:

- High and low temperatures, and too much or too little precipitation.

Hazards identified by participants who filled out an online survey:

- High temperatures and heat waves, temperature fluctuations, drought, high winds, and soil and water contamination by salts and other contaminants.

TOP HAZARDS

In CRB Workshop #1, the large group identified the following hazards in Harvard within the context provided by the presentation on potential impacts of climate change and the hazards identified in the Agricultural Workshops. The original hazards were as follows:

- Flooding
- Large storm events
- Wind
- Ice storms
- Pests/invasive species
- Drought

- Extreme temperature/ temperature swings (from the Agricultural Workshops)
- Extreme Precipitation (from the Agricultural Workshops)
- Sea Level Rise (e.g. migration)
- Extreme thunderstorms
- Tornadoes
- Extreme heat
- Wildfire

Of these identified hazards, the four (4) priority hazards were:

- Pests/Invasive Species (8 votes)
- Extreme Precipitation (7 votes)
- Extreme Temperatures and Temperature Swings (6 votes)
- Ice Storms (6 votes)

See *Appendix D: Harvard Agriculture and Community Resilience Building Workshop Matrices and Top Priority Actions* for the results of this discussion. *Current Concerns And Challenges Presented by Hazards and Climate Change* provides more information about the impact of recent hazards in Harvard.

AREAS OF CONCERN

The identified hazards will impact much of Harvard, given the broad distribution of natural ecosystems and agricultural lands adjacent to residential and other developed spaces. In CRB Workshop #1, the participants identified the following as specific geographic areas and facilities of concern:

- **Environmental –** All public byways and waterways, including trails, roadsides, and Bare Hill Pond
- **Facilities –** All municipal sites including the police station and the Department of Public Works, schools (Hildreth Elementary School and The Bromfield School), the Harvard Library, and the area behind Town Hall
- **Infrastructure –** Town Center Sewer, various culverts (including one off Littleton Road, the recently replaced culvert on Stow Road, and the one between Turner Lane and Willow Road)

The maps from CRB Workshop #1 are included in *Appendix D: Harvard Agriculture and Community Resilience Building Workshop Matrices and Top Priority Actions* and the vulnerabilities and strengths participants identified are discussed in *Specific Categories of Concerns and Challenges*, and *Current Strengths and Assets.*

CURRENT CONCERNS AND CHALLENGES PRESENTED BY HAZARDS AND CLIMATE CHANGE

2008 ICE STORM
CREDIT: ROCHELLE GREAYER, PITH AND VIGOR

2008 ICE STORM
CREDIT: ROCHELLE GREAYER, PITH AND VIGOR

FRANK W. CARLSON FINDS NO SURVIVING PEACHES ON HIS 25-ACRE FARM
CREDIT: THE BOSTON GLOBE - JONATHAN WIGGS

The impacts of climate change have already been felt in the Town of Harvard, especially by the agricultural community. The majority of the impacts have been from significant weather events, including power losses from winter storms and agricultural losses from unseasonal temperature swings.

In 2008, the governor of Massachusetts declared a state of emergency following an ice-storm that devastated northern Worcester county. Many residents in the southern part of Harvard lost their power for over a week after the December storm as a result of fallen trees and downed limbs. The loss of electricity was minor in the northern part of Harvard which is served by a transmission line originating in Ayer.

In 2016, temperature swings went unnoticed by most in Massachusetts, but for Harvard had a devastating impact on the agricultural economy. This weather event, or in this case series of events, is a textbook example of the types of weather changes that are expected to become more frequent and less predictable as climate change worsens. Milder-than-usual temperatures in early February encouraged peaches to bud early. Then, around February 14, the temperatures swung dramatically to reach near-record-lows. This frost killed all of the early peach buds, decimating what some estimated to be 99% of the peach crop in Massachusetts that year, an event that came to be known as

"The Valentine's Day Massacre." Massachusetts produced 1,455 tons of peaches in 2015, and almost none in 2016. Plums, nectarines, apricots, and cherries were also impacted. The Connecticut Peach Festival even had to re-brand to a Corn Festival that year. While this type of event is expected to occur more often in the future, many area farmers had never experienced anything like it before this. Diane Ventura, a fifth-generation farmer at Ashley's Peaches in Acushnet was quoted in the Boston Globe exclaiming that her family hadn't lost an entire crop in a century of farming.

More recent weather events have been less severe but still posed some serious challenges to the Harvard community. A June hail storm in 2017 damaged the apple crop at Carlson and Westward Orchards, as well as some of the blueberry crop at Westward. A 2018 snow-storm brought record-low temperatures, high winds, and drifting snow forcing schools and town buildings to shut down for two days.

As recently as this year (2019) the fire department had to respond to several reports of fallen trees on utility wires following the February 25 wind storm. This storm also led to the explosion of a transformer in Ayer which caused wide-spread power-outages leaving around 2,000 homes in the dark. This was the worst power-failure since the 2008 storm.

SPECIFIC CATEGORIES OF CONCERNS AND CHALLENGES

The small groups discussed specific infrastructural, societal, and environmental concerns and challenges during the workshop. Some of the specific concerns were characterized as vulnerabilities, though some were considered both vulnerabilities and strengths depending on the hazard or impact. A full listing of vulnerabilities is found in the CRB risk matrices in *Appendix D: Harvard Agriculture and Community Resilience Building Workshop Matrices and Top Priority Actions*.

INFRASTRUCTURAL

Climate change can have significant impacts on infrastructure, causing wear and tear above normal levels or actually destroying important assets. Continual maintenance and replacement can be a drain on municipal budgets. Meanwhile, critical infrastructure, such as major roads or utilities, can create public safety hazards when impaired.

However, infrastructure, particularly green infrastructure, can be an important mitigation or adaptation resource. Properly designed stormwater management systems can help clean water runoff before it reaches surface water or drinking water supplies. Wetlands can act as flood storage, buffering uplands from the impact of more intense precipitation events. The following sections discuss some of the concerns related to Harvard's infrastructure in terms of climate change as identified by the participants in CRB Workshop #1.

STORMWATER MANAGEMENT

Several features related to stormwater management were identified as vulnerabilities in the Town of Harvard. In an effort to manage invasive plant species in the pond, the Bare Hill Pond Watershed Management Committee has been periodically conducting drawdowns of the pond since 2002. Drawdowns have ranged in depth from 1.5' in 2002, to as high as 7' in 2011, when more depth was needed for a beach excavation project. In 2013, the pond was left alone to see if a lower drawdown frequency would work, but there was a minor resurgence of some invasives. The impacts of climate change could have a major impact on this method of invasive species control. In order to conduct a drawdown, ideal conditions are consistently cold consecutive days with little rain or snow, which will be increasingly unlikely as climate change causes more extreme and less predictable weather.[1] Additionally, the dam system is in need of higher capacity for storm-water detention and drainage in general. Other identified vulnerabilities related to storm-water management are erosion and the runoff of contaminants from nearby properties into the water supply and wetlands, which further compounds the problem of invasive species growth.

MUNICIPAL SERVICES

The lack of designated cooling and warming shelters for extreme temperature events is a significant vulnerability for the community. There are air conditioners and generators at the library and the police training room, but neither has the capacity to hold a large number of people if necessary. Participants also noted that the distribution of fire stations and the location of the Department of Public Works (DPW) can limit the capacity for emergency response, especially if major roads are blocked by fallen trees. While Harvard is close to Nashoba Valley Medical Center, Emerson Hospital, and several urgent care centers in neighboring towns, no medical centers are located within the Town. The final major infrastructural vulnerability identified is the utility systems. Power lines are highly susceptible to damage from fallen branches and trees during storm events. Coupled with the inadequate number of alternative power sources (generators and batteries) in Harvard, this has been known to lead to town-wide power failures and road closures.

ROADS

Undersized culverts contribute to flooding by not having the capacity to move enough water during storm events. This compounds many of the issues previously discussed related to storm-water management and could lead to further road closures as a result. Another vulnerability participants identified is the degradation of the paving on the roads town-wide, but particularly on Massachusetts Avenue.

[1] Aquatic Restoration Consulting, LLC. (2017). Bare Hill Pond In-Lake Water Quality and Plant Surveys. Bare Hill Pond Watershed Management Committee, Town of Harvard. Retrieved May 10, 2019

SEPTIC/SEWER SYSTEMS

The Town of Harvard has primarily private septic systems with leach fields and a very limited Town sewer district. This means maintenance is the responsibility of the property owner. Rising ground-water levels and intense precipitation can damage septic tanks and leach fields. Expanding the Town sewer system might be necessary if the Town wishes to add development; such expansion could address failing residential and commercial systems if that becomes an issue.

DEVELOPMENT PATTERNS

Harvard falls within three different watersheds: Nashua, Concord, and Merrimack. As Harvard's residential development is widely distributed and intermingled with undeveloped lands, the environmental impacts of this development will be felt across Harvard's ecosystems. As new buildings are built, the location of that development relative to existing development, town services, and natural resources should be carefully considered to maximize the use of existing infrastructure and minimize the impact on natural resources.

SOCIETAL

A sustainable society is one in which connections are strong and supported by a network of municipal, nonprofit, and volunteer organizations. Goods and services necessary for survival are readily available. Vulnerable populations are identified and considered when planning for disasters and when disasters hit. Public health is integrated into planning both in terms of prevention of disease and reinforcement of healthy behaviors through the design of the environment. The sections below identify societal vulnerabilities identified by the participants in CRB Workshop #1.

EMERGENCY RESPONSE

Vulnerabilities related to emergency response capacity are also discussed as an infrastructural issue under *Municipal Services*. As a societal vulnerability, emergency response issues stem from missed opportunities in communication and regional collaboration. For this reason, it is listed as both a vulnerability and a strength in the community. While there is currently no official comprehensive emergency plan in place, Harvard is well-poised to establish one with the coordination of surrounding municipalities.

STEWARDSHIP

Workshop participants had an interesting discussion about the different attitudes toward stewardship within the community. New families have been attracted by Harvard's school system. As a Right-to-Farm community, agricultural practices are deeply ingrained within Harvard's fabric and identity. Some community members have a deep understanding of

the impacts of their practices on the environment and each other; others may be less aware of how their practices can affect Harvard's ecosystems and agricultural assets. For example, the use of pesticides to manage ticks and mosquitoes impacts all insects, including bees which are vital to the pollination and livelihood of the apple orchards. Other practices include the impact on water quality, which affects all, from over-fertilization of lawns and the use of pesticides. The forests of Harvard are an immense asset, but the lack of a town-wide forest management plan is a further hindrance to collective stewardship efforts.

DEVELOPMENT PATTERNS

Development patterns are discussed as both infrastructural and societal vulnerabilities. A lack of connections between certain roads means that blockages, such as fallen trees or downed power lines, may make certain areas inaccessible during emergencies. Development patterns have contributed to the isolation of certain vulnerable populations within the community, such as the elderly, the young, and those with limited mobility.

ENVIRONMENTAL

Environment is a large term, but in the context of this discussion, the term "environmental" includes natural resources such as wetlands, bodies of water, and forests. These resources are vulnerable to climate change; for example, pests and diseases can weaken trees, leading to an increased risk of forest fires over a large area or a higher likelihood of power loss from fallen trees on utility lines. However, they are also mitigation factors; those same trees act as carbon sinks and help with cooling during heat waves. The sections below identify the environmental vulnerabilities identified by the participants in CRB Workshop #1.

LAND MANAGEMENT

Many of the identified vulnerabilities associated with the environment pertain to various land management practices. One such vulnerability is the occurrence of abandoned apple trees. When not properly maintained, these trees harbor various diseases and pests which then travel to viable orchards. Forest management, previously discussed as a societal issue, is obviously an environmental one as well. While the forests are a tremendous strength for their ecological services, recreational opportunities, and beautification, the lack of coordinated management practices also make them a vulnerability. Beavers further contribute to forest vulnerability as a species with their own management plan and agenda (to dam and flood a habitat for themselves.) As the architects of the animal world, beavers come into frequent conflict with human efforts. Other land management issues include erosion control and groundwater quality. Poor ground water quality has a detrimental effect on both the agricultural industry and public health.

INSECTS

Disease-bearing insects threaten the health of plants, animals, and humans, leading to public health issues, such as the spread of the West Nile virus and Lyme disease that can spread from the animal population to the human population.

The presence of certain disease-bearing insect populations, such as ticks and mosquitoes, are a vulnerability that is often addressed by spraying pesticides. This creates a reciprocal problem by diminishing the populations of pollinators that are vital to the agriculture industry.

PLANTS

Invasive plant species crowd-out more ecologically-productive native flora. This has been a recurring problem at Bare Hill Pond. The current management strategy is to lower the water level each winter (see the prior discussion under *Infrastructural: Storm-water Management*.) Invasive plant species also occur town-wide, particularly along roadsides.

TREES

There are many vulnerabilities related to trees in Harvard. Forested areas may have trees of a similar age after pastures were reforested, making these areas vulnerable to simultaneous susceptibility to blight, drought, and storm damage. The lack of tree maintenance and blight from pests and diseases contribute to the likelihood of fallen trees and limbs causing power outages and road closures and the possibility of wildfires from dead trees and brush drying out during periods of drought. These issues are all vital to whether or not a forest or wooded area can properly perform as a carbon sink to absorb carbon dioxide from the atmosphere, cleaning the air and performing other vital ecological functions.

CURRENT STRENGTHS AND ASSETS

During CRB Workshop #1, participants identified strengths and assets within Harvard that could help the community mitigate or be more resilient to the impacts of hazards related to climate change and extreme weather events. Some of the strengths were also characterized as vulnerabilities, which were noted in the previous section, depending on the hazard or impact. A full listing of strengths and assets is found in the CRB risk matrices in *Appendix D: Harvard Agriculture and Community Resilience Building Workshop Matrices and Top Priority Actions*.

- **Private Septic Systems, Town Sewer** – While private septic systems and a limited Town sewer are listed as a hazard, they are also seen as strengths for a number of reasons. The Town's limited sewer district is both an asset and a limitation; future nonresidential development is likely to be clustered in the district making best use of

existing infrastructure. However, the remainder of the Town will remain reliant on septic systems which, if not properly maintained, can have a negative impact on the environment and public health. If properly installed and maintained, septic systems can be a sustainable approach to the Town's sewage needs as there is less need for the additional infrastructure (e.g., pump stations, paving operations, system maintenance) required for a centralized system.

- **Emergency Response Systems** – While Emergency Response and Management is discussed as a vulnerability for its lack of a comprehensive strategy, workshop participants praised Harvard's municipal officials and staff for their inter-departmental communication and coordination. The Town does not yet have a single shelter capable of holding a large population and providing all necessary services, but the generators Harvard does have available at various municipal buildings are a strength. In addition to police and fire departments, the Town of Harvard has a strong volunteer EMT base as well as a snowmobile club capable of reaching an emergency during severe weather.
- **Isolated Population** – The community's isolated population, also identified as a concern, creates a small-town identity that facilitates communication and cooperation. Harvard has a history of active resident volunteerism on numerous local committees and addressing significant community needs. The engaged residents can convey information from the Town to the public and assist neighbors when needed. The Council on Aging was one particular entity identified as a strength for its critical role in connecting the isolated elderly population with the rest of the community.
- **Trees and Forests** – The community of Harvard benefits from extensive tree cover and forested areas. Benefits include carbon sequestration, air filtration, rainwater retention, wildlife habitat, and cooling as a result of the shade provided by the canopy. Aging and ailing trees are listed under vulnerabilities due to their threat to power lines and utilities, especially during weather events. In spite of that risk, trees and forests are also one of Harvard's greatest assets. Not only do Harvard's trees provide vital ecological services, they beautify the environment and lend themselves to Harvard's identity. A further strength is the sense of stewardship that many Harvard residents have for the land and forests, as they understand their ecological and cultural significance.
- **Conservation** – Harvard enjoys extensive conservation areas with maintained trails. The website of the Harvard Conservation Trust (HCT) provides extensive and easily accessible information about the land and trails. The Harvard Conservation Commission and HCT also work closely with the Sudbury Valley Trustees, a collaboration which protects and enhances Harvard's natural resources, including the many wetlands and the critically important Bare Hill Pond Watershed.
- **Communication** – Workshop participants identified the local weekly newspaper (the Harvard Press) and a town e-bulletin board services ("Nextdoor Harvard") as vital avenues for communication and reinforcement of Harvard's identity.

TOP RECOMMENDATIONS TO IMPROVE RESILIENCE

Participants in CRB Workshop #2 focused on developing and prioritizing actions to reduce vulnerabilities and enhance strengths for the infrastructural, societal, and environmental

features identified in CRB Workshop #1. The participants were instructed to consider the following when determining the priority of a given action:

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

As is consistent with the CRB methodology, these priorities were based on the expertise of the people invited to participate in the workshops and their familiarity with the impacts of climate change on their areas of responsibility. A list of participants is found in *Acknowledgments,* below.

A full listing of actions, prioritization, and associated time frames is found in the CRB risk matrices in *Appendix D: Harvard Agriculture and Community Resilience Building Workshop Matrices and Top Priority Actions*. Each small group identified their top four priority actions, which were compiled for the large group to vote on their overall top priority action items. The top four actions receiving the most votes are listed as the highest priority, below.

HIGHEST PRIORITY (TOP 3)

Several priorities have been amalgamated into the creation of a Climate Action Plan.

- Create an implementation committee to manage the process of creating and monitor implementation of a comprehensive Climate Action Plan that would include, at minimum, the following planning modules:
  - A town-wide tree/forest management plan that would address trees on public lands and public rights-of-way
  - Land stewardship plan
  - Invasive species planning
  - An agricultural action plan
  - Coordinate emergency management planning with climate change vulnerabilities that includes vulnerable populations and road system interconnectivity
- Establish a Climate Vulnerability Liaison within Town government responsible for capital planning oversight.
- Create an emergency response network and a medical professional network to coordinate professional and volunteer-based emergency and medical response teams. This combined network should include Town public safety departments (police, fire, Board of Health, Council on Aging, DPW), existing or new CERTs (Civilian Emergency Response Teams), and existing volunteer organizations, such as Harvard's Snowmobile Club.

HIGH PRIORITY

- Establish and equip The Bromfield School as a stay-over shelter with a prepared management plan. Establish and equip Hildreth House as a cooling and warming shelter with amenities like phone charging and hot coffee.
- Add more alternative power sources (generators and batteries) to all municipal buildings.
- Strengthen the Town's website for cross-cultural communication, preparation, and coordination.
- Provide opportunities for cross-cultural exchanges to connect disparate groups. Implement public awareness and education programming pertaining to farm success planning.
- Monitor, manage, maintain, and preserve public lands. Educate private land-owners on best practices for collective stewardship.
- Remove invasive plant species from conservation lands and plant native species where ecological edges and buffer zones have been disturbed.
- Provide education in systems-thinking and stewardship (i.e. fertilizers and ecological buffers.)
- Create and implement a comprehensive regional strategy for land stewardship including best practices for bittersweet removal and deer fencing.
- Support the "Pond Committee" who oversees the monitoring and management of Bare Hill Pond.
- Continue and support the work of the Board of Health which provides educational programming pertaining to public health and disease control including tick control methods.
- Provide educational programming on pollinators and pollinator habitat and the impacts of spraying for ticks and mosquitoes on pollinator species.

MODERATE PRIORITY

- Evaluate, design, expand, and upgrade the culvert system and maintain a budget for emergency repairs and replacements.
- Evaluate, plan, and implement an expanded storm-water detention system and maintain a budget for emergency repairs and replacements.
- Adopt a by-law and seek funding for town-wide evaluation and recommendations for improving drainage and storm-water management.
- Plan for expanded emergency response capacity. Improve facilities and implement plans to coordinate the department of public works, fire, and EMT.
- Tamper roads to create crowns for water run-off.
- Implement vegetative buffers along roadsides.
- Improve erosion control.
- Create a shared information base to foster better community understanding.
- Provide educational programming on invasive species.
- Create, identify, and coordinate a "metagroup" of community groups and neighborhood organizations for improved cross-cultural communication.

- Provide education and monitor the proper disposal or conservation of older trees.
- Monitor Bare Hill Pond for algae blooms. Improve and expand infrastructure as needed.
- Provide educational programming on the rhododendron threat, soil health, integrated pest management (IPM), and inter-planting (planting companion plantings to maximize land use, reduce the impacts of disease and pests, and improve soil health).

LOWER PRIORITY

- Evaluate road conditions and secure funding as needed to improve infrastructural resilience.
- Evaluate private septic systems to identify problematic locations. Evaluate the vulnerabilities, advantages, and funding needed to expand the Town sewer system.
- Maintain a budget for shelter supplies.
- Collate strategies for hazards pertaining to settlement patterns in small New England towns.
- Evaluate and improve road connectivity and redundancies through systems planning.
- Include Devens' vulnerable populations in planning efforts.
- Assess and create a plan to connect all vulnerable populations to coordinate emergency response.
- Create and implement a Land Stewardship/Bare Hill Pond and Watershed Plan.
- Improve erosion control through use of silt fencing and hay bales; establish a by-law to enforce.
- Test wells and water sources for contamination, educate the public about risks and best practices for management. Prioritize land around wetlands, ecological buffers, and groundwater resources.
- Aid the Harvard Conservation Trust and the Sudbury Valley Trustees in conserving more land and implementing more public outreach and education.
- Build aquifer cisterns and fire ponds.
- Provide educational programming pertaining to crops and farming in Harvard. Topics to include adjusting crops to the growing season, using Hoop Houses (greenhouses), transitioning to more southern varieties of apples, using nutrient sprays such as Manganese to improve calcium uptake, micro-nutrients, raised plant beds, and smudge pots to prevent frost on small farms.
- Create a community water bank and appoint an agricultural liaison for expert consultations.

ACKNOWLEDGMENTS

Thank you to the Core Group members for planning and facilitating the MVP process:

- Christopher Ryan, Director of Community and Economic Development
- Liz Allard, Land Use Administrator/Conservation Agent

- Kara McGuire Minar, Select Board
- Sharon McCarthy, Board of Health
- Eric Broadbent, Harvard Energy Advisory Committee (HEAC)
- Kerri Green, Agricultural Advisory Commission
- Justin Brown, Planning Board
- Jarrett Rushmore, Planning Board

Special thanks to the Harvard community members and organizations who contributed their time and expertise during the workshops to make this a comprehensive document:

NAME	ORGANIZATION	FARM SIZE	COMMERCIAL / RECREATIONAL	WORKSHOPS ATTENDED
Beth Williams	Council on Aging			KO
C. Ron Ostberg				Ag1/Ag2/CRB1
Chris Ryan	Town/MVP Core			KO/Ag1/Ag2/ CRB1/CRB2
David Durrant	Micheldever Farm	5-29.9 acres	Commercial	Ag1
Didi Chadran	Community Preservation Committee			CRB1
Eric Broadbent	HEAC/MVP Core			KO/Ag1/Ag2/ CRB1/CRB2
Erin McBee	Planning Board	5-29.9 acres		Ag2
Fran Maiore	Council on Aging			KO
Fred Honchelle		5-29.9 acres	Commercial	Ag1
George Watkins				Ag1/Ag2
Gwen Leonard	Harvard Cons. Trust			CRB1
Jarrett Rushmore	Planning Board/MVP Core			CRB1
Jaye Waldron	Conservation Commission			CRB1/CRB2
Jennifer Finch	Finance Committee			CRB2
Jim Burns	Conservation Commission/ Harvard Maple	0-4.9 acres	Recreational	Ag1
Joan Eliyesil	Harvard Press			Ag1
Justin Brown	Planning Board/ MVP			CRB1
Kerri Green	Agricultural Advisory Committee/MVP Core			KO/Ag1/Ag2/ CRB2
Chris Green	Westward Orchard	30+ acres	Commercial	Ag1/Ag2
Laura McGovern	Agricultural Advisory Committee/Dunroven Farm	5-29.9 acres	Commercial	Ag1
Libby Levison	Board of Health	0-4.9 acres	Recreational	Ag1/Ag2
Linda Hoffman	Old Frog Pond Farm	0-4.9 acres	Commercial	Ag2

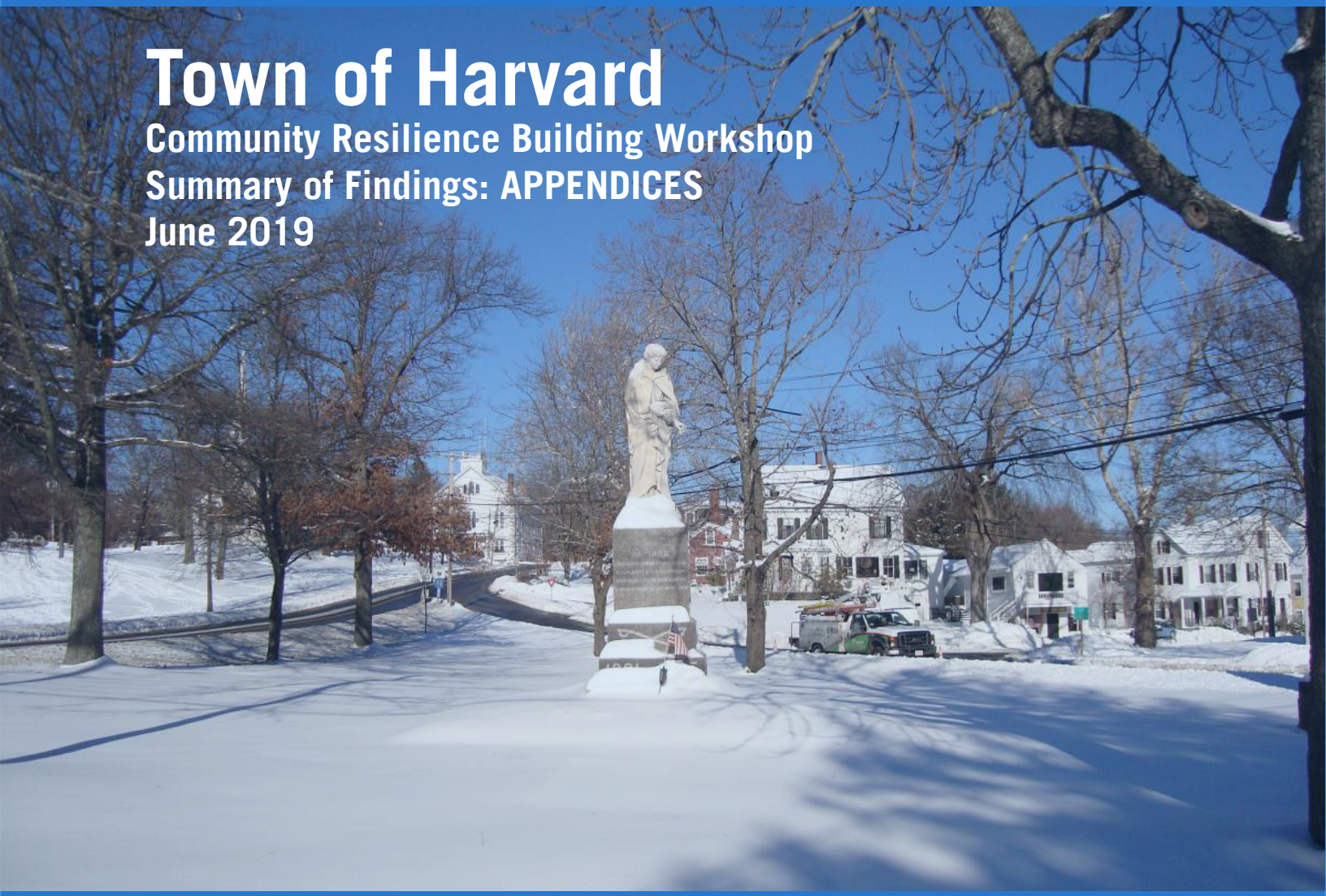
NAME	ORGANIZATION	FARM SIZE	COMMERCIAL / RECREATIONAL	WORKSHOPS ATTENDED
Liz Allard	Planning Board/ Conservation Commission/ MVP Core			KO/Ag1/Ag2/ CRB1
Matthew Varrell	Harvard Alpaca Ranch	5-29.9 acres	Commercial	Ag1/Ag2
Megan Glen	Pond Committee			CRB1
Molly Cutler	Sudbury Valley Trustees			CRB1
Neil Angus	Devens Enterprise Commission			CRB1
Nicky Schmidt	AAC	0-4.9 acres	Recreational	Ag1/Ag2
Pam Durrant	Micheldever Farm	0-4.9 acres		Ag1
Pam Lawson	Doe Orchards	30+ acres	Commercial	Ag1/CRB2
Pat Natoli	Town/Police/Fire/DPW			KO/CRB2
Rene, Christiane Turnheim		5-29.9 acres	Commercial	Ag1
Rick Sicard	Fire			KO
Rob Traver	Agricultural Advisory Committee	0-4.9 acres	Recreational	Ag1
Sharon McCarthy	Board of Health/MVP Core			KO/CRB1
Stacia Donahue	Planning Board	0-4.9 acres		Ag1/CRB2
Stephanie O'Keefe	Westward Orchard	30+ acres	Commercial	Ag1/Ag2
Sydney Blackwell	Land Stewardship Subcommittee			CRB1
Tim Kilhorr	Department of Public Works			KO/ CRB1
Tom Cotton	Harvard Conservation Trust	30+ acres		Ag1/Ag2/CRB1/ CRB2
Vicky Lochiatto		5-29.9 acres	Commercial	Ag1
Wendy Sisson	Conservation Commission/ Land Stewardship Subcommittee			Ag1/CRB2

*Note: KO = Kick-off Meeting; Ag1 = Agricultural Workshop #1; Ag2 = Agricultural Workshop #2; CRB1 = CRB Workshop #1; CRB2 = CRB Workshop #2.

HARRIMAN

Town of Harvard

Community Resilience Building Workshop
Summary of Findings: APPENDICES
June 2019



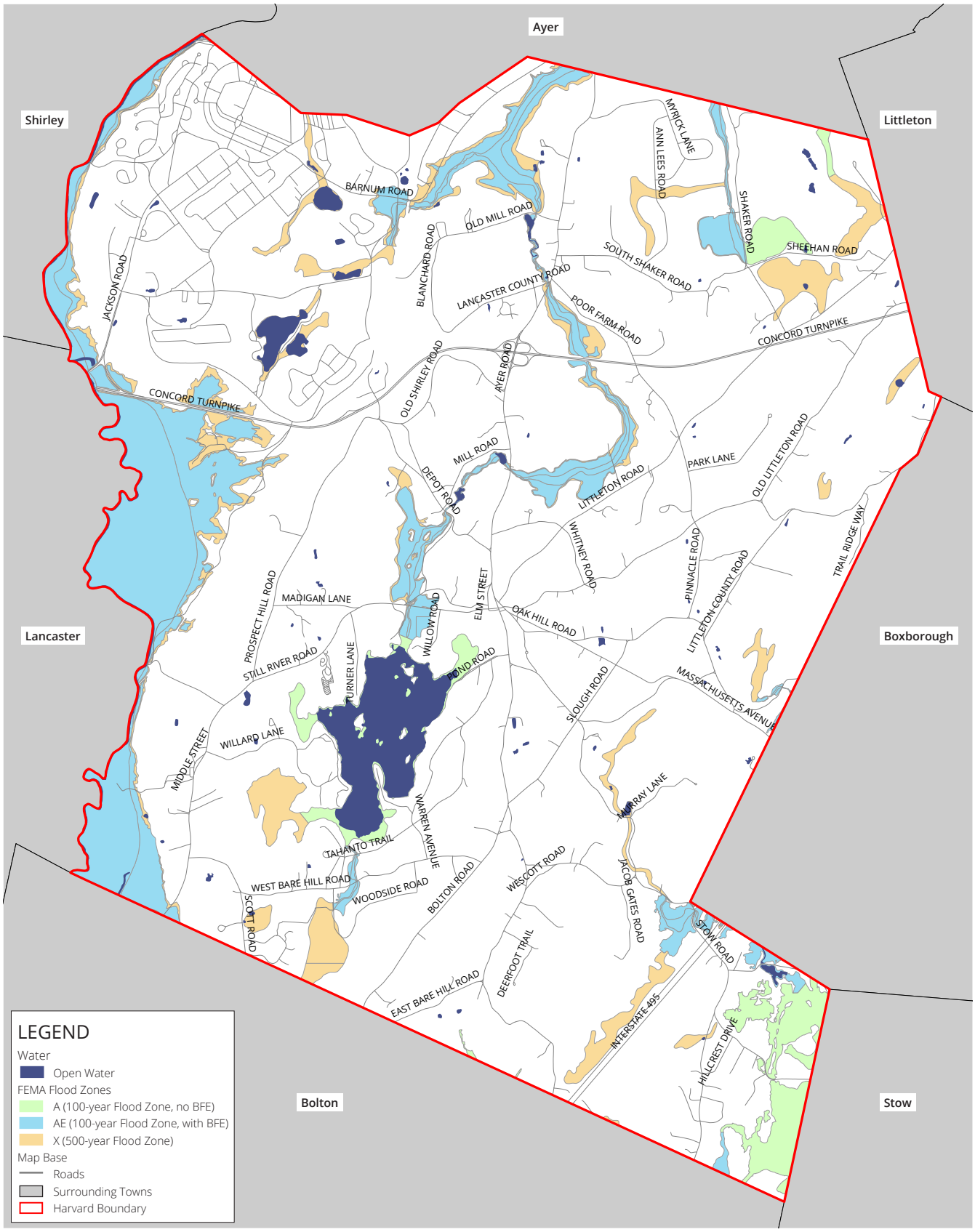
Town of HARVARD Massachusetts

Prepared for the Town of Harvard
Prepared by Harriman

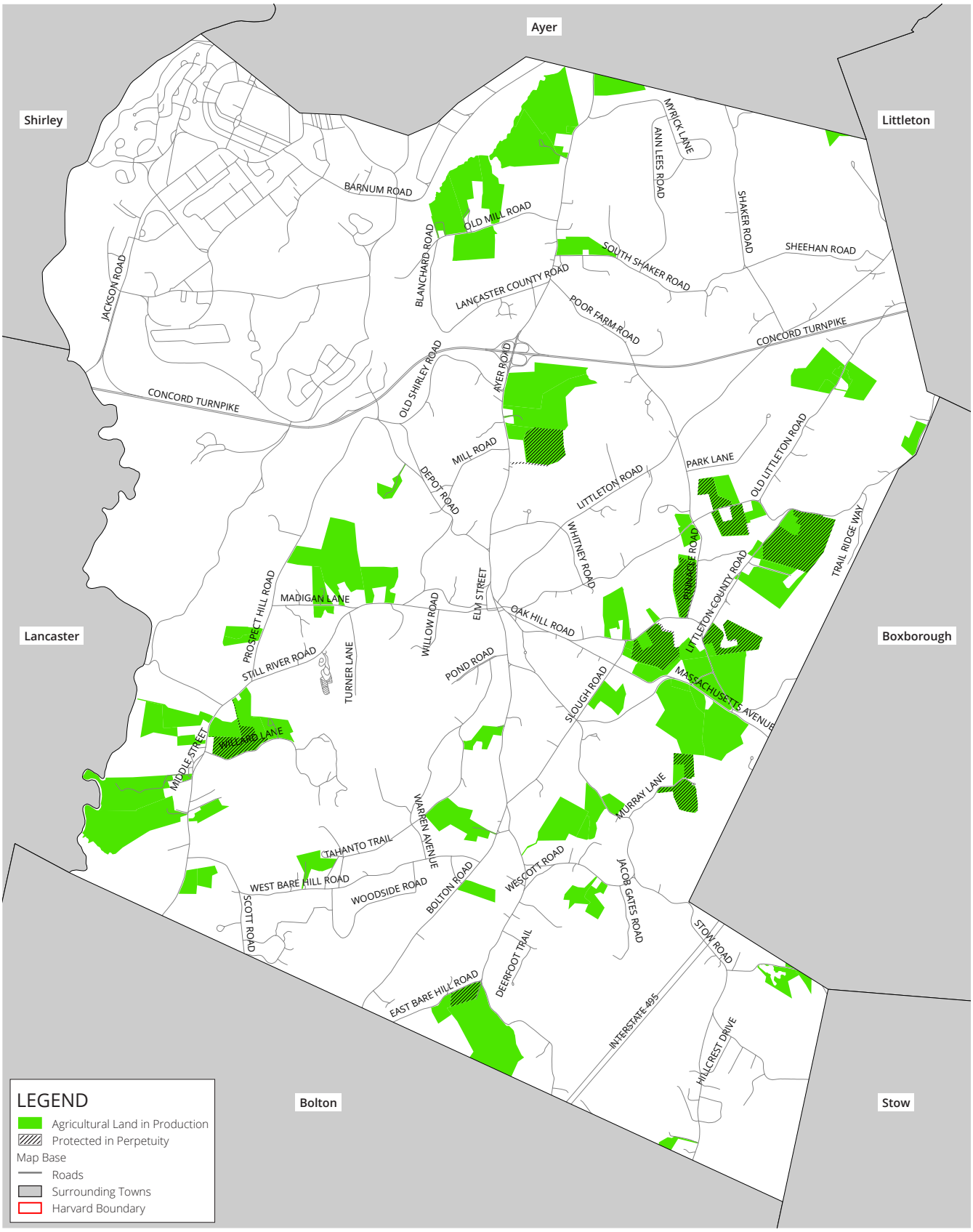
APPENDIX A: PREPARATORY INFORMATION

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

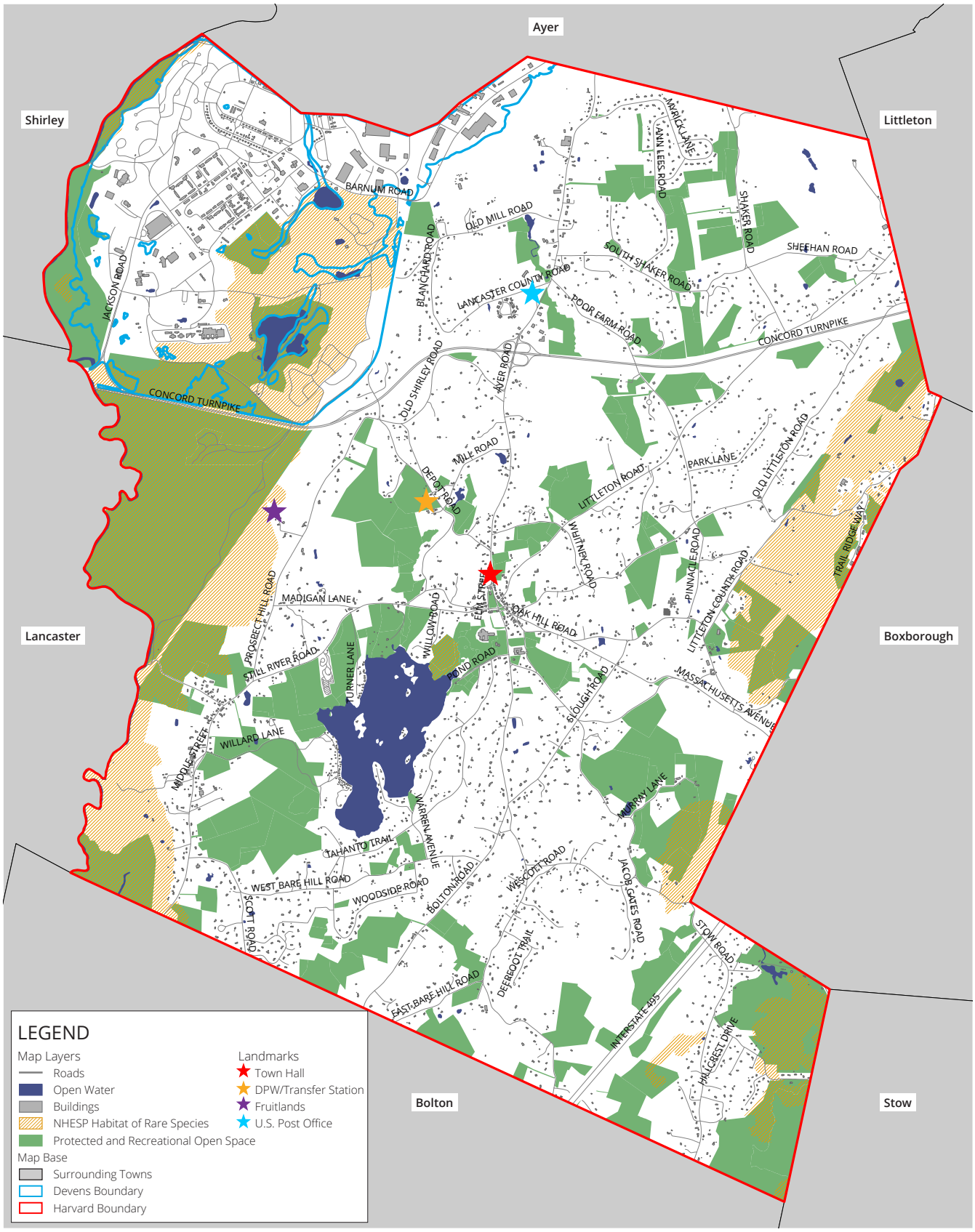
Existing Conditions: Water and FEMA Zones



Existing Conditions: Agricultural Properties



Existing Conditions



APPENDIX B: WORKSHOP AGENDAS AND PRESENTATIONS

HARRIMAN

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

AUBURN

BOSTON

PORTLAND

PORTSMOUTH

harriman.com

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 have 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

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

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?

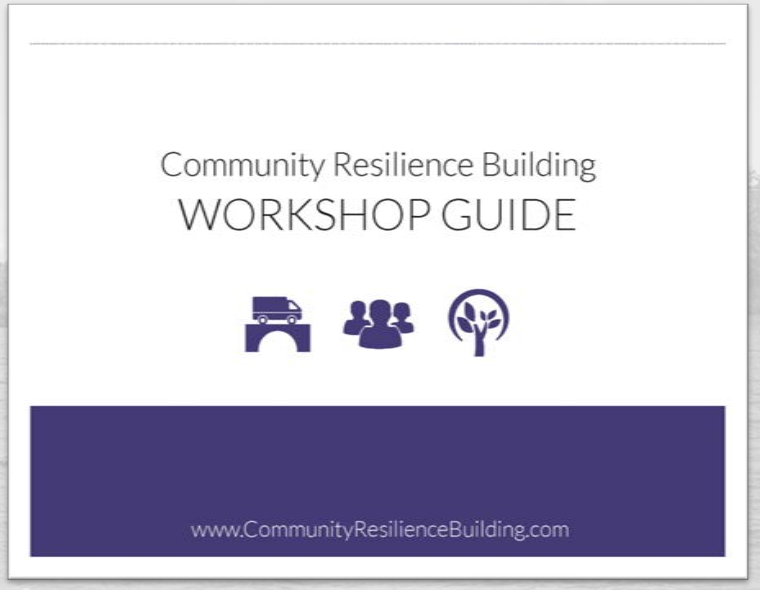
- Increasingly more unpredictable and severe weather is occurring
- Agriculture is a significant part of the town's composition and identity; Dedicated MVP component focusing on agriculture
- Completion qualifies Harvard for access to further grant funding

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

Workshop Process

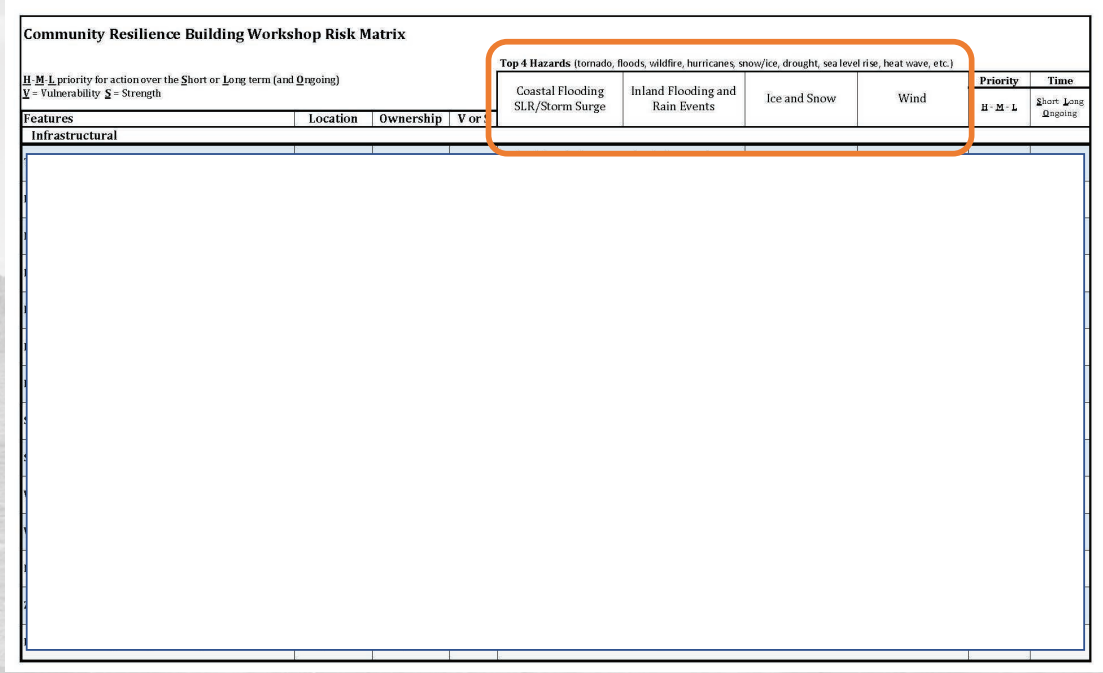
A. Prepare for the Workshop
B. Characterize Hazards
C. Identify Community Vulnerabilities and Strengths
D. Identify and Prioritize Community Actions
E. Determine the Overall Priority Actions
F. Put it All Together
G. Move Forward



Characterize Hazards

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

(Workshop 1)



Community Resilience Building Workshop Risk Matrix

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

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

Features	Location	Ownership	V or S	Coastal Flooding SLR/Storm Surge	Inland Flooding and Rain Events	Ice and Snow	Wind	Priority H - M - L	Time Short Long Ongoing
Infrastructural									

Identify Community Vulnerabilities and Strengths

- Infrastructural
- Societal (People)
- Environmental

(Workshop 1)

Community Resilience Building Workshop Risk Matrix

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

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

Features	Location	Ownership	V or S	Coastal Flooding SLR/Storm Surge	Inland Flooding and Rain Events	Ice and Snow	Wind	Priority H - M - L	Time Short Long Ongoing
Infrastructural									
Town Campus	Specific	Town	V						
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						

Identify and Prioritize Community Actions

- Actions and Next Steps
- Prioritization
- Timeframe for Action

(Workshop 2)

Community Resilience Building Workshop Risk Matrix

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

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

Features	Location	Ownership	V or S	Coastal Flooding SLR/Storm Surge	Inland Flooding and Rain Events	Ice and Snow	Wind	Priority H - M - L	Time Short Long Ongoing
Infrastructural									
Town Campus	Specific	Town	V	Verify risk from flooding events; Identify alternative locations during peak flooding; Verify maintenance plan annually				H	S
Evacuation Routes - Roads	Town-wide	Town/State	V	Install highly visible signage for evacuation routes; Develop and implement communication program				H	S
Nursing Homes/Elderly Care Facilities	Multiple	Private	V	Improve power generation; Review building codes and zoning for existing and future facilities				H	S
Homeowners Associations/Neighborhoods	Town-wide	Town/Private	V	Engage Neighborhood Associations and develop cooperative response plan with Town: Advance "Neighbor helping Neighbor" Program; Develop comprehensive neighborhood-based emergency plans				H	S
Electrical Distribution System	Multiple	CL&P/Town	V	Within floodplain area, establish plan to address protection and long-term relocation of equipment		Upgrade transformers; Maintain power line protection zone (tree trimming)		H	O-L
Dams (inland and coastal)	Multiple	Private	V	Prevent possibility of catastrophic dam failure; Identify and remove dams to minimize downstream flooding due to failure				H	L
Railway and State Bridges	Multiple	Amtrak/State	V	Improve communications between parties; Expand green/gray infrastructure and improve bridge structures; Assess vulnerability and prioritize infrastructure improvement list				M	S
Septic Systems	Town-wide	Private	V	Assess opportunities for community systems or alternative treatment technology; Upgrade regulations to reduce contamination in water ways				M	L
State Roads/Intersections	Town-wide	State/Town	V	Coordinate with DOT, volunteers, public works to improve response; Need signage to warn of flooding risk in critical intersections				M	L
Wharves and Shore Infrastructure	Shore	Town-State-Private	V	Establish community dialogue regarding retaining/relocating infrastructure; Advance comprehensive shoreline management plan				L	S
Waste Water Treatment Facility	Specific	Town	V	Conduct alternative siting feasibility study; Relocate to low risk area within next 25 years.				L	L
New Ambulance Center	Specific	Town	S	Continue to support services in budget; Add additional staff and vehicle in next annual cycle					Ongoing
Zoning Regulations (maintain large lot size)	Multiple	Town	S	Current building codes control development in risky areas; Consider additional zoning incentives (TDRs) to reduce risk to residential units					Ongoing
Business District (power generators)	Specific	Town/Private	S	Downtown business district with power generators in place; Prioritize pharmacy and gas stations					Ongoing

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

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

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

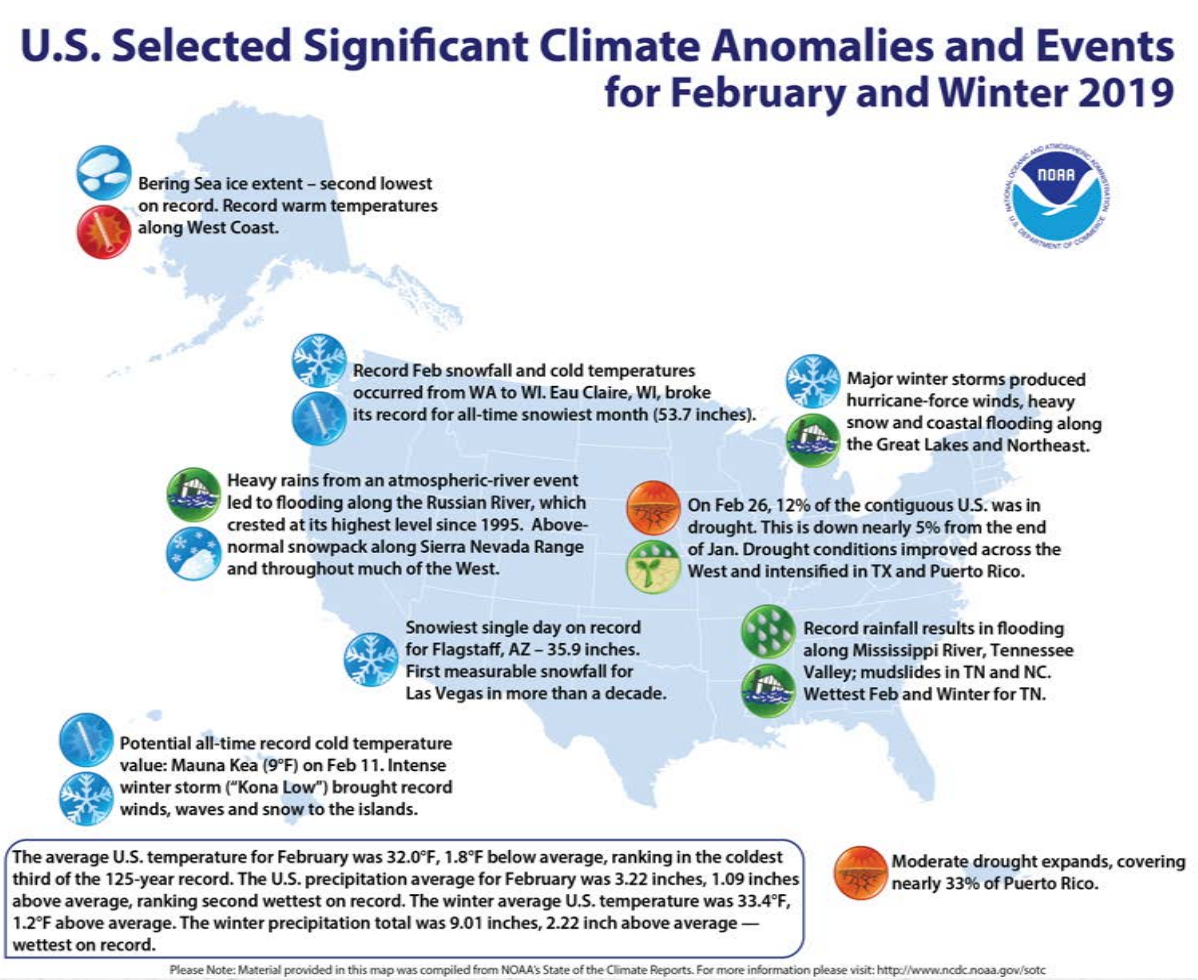
- Define your risk by understanding where/how you are vulnerable
- Understand the strategies that can reduce your vulnerability
- Identify the cost of implementing the strategy vs. the cost of doing nothing
- **Know that you will never have perfect information, and that reducing vulnerability/risk is 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

Overview of Climate Change - US

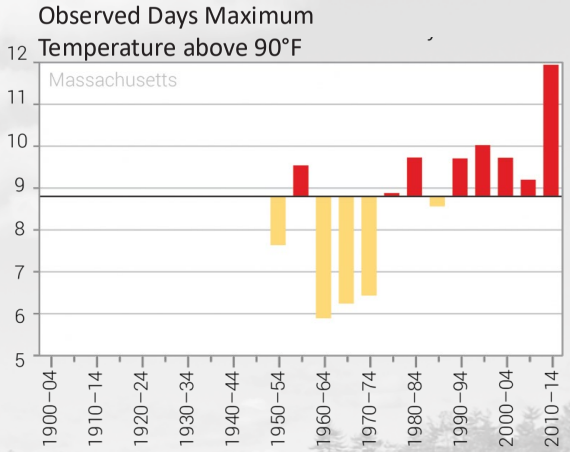
- For the ninth consecutive month, the Northeast was wetter than normal.
- Precipitation was 114% of normal in Massachusetts

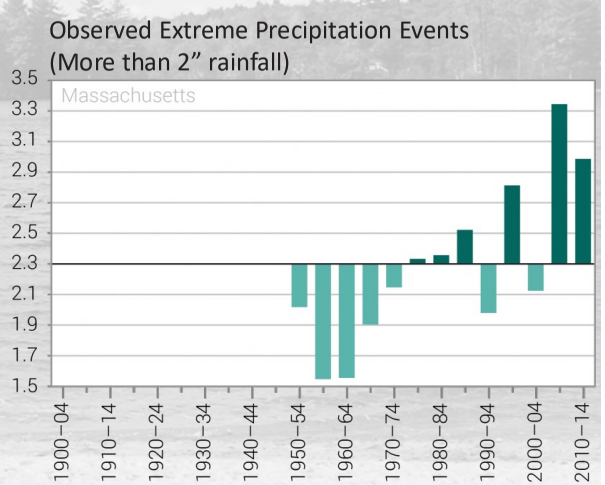


Overview of Climate Change - MA

- 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





Overview of Climate Change - MA

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

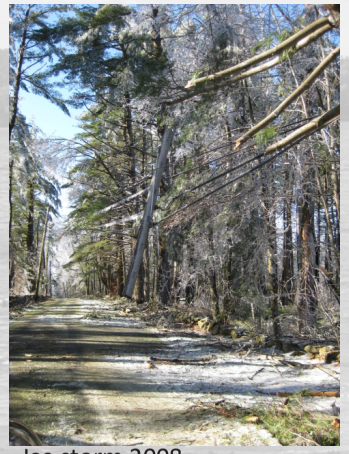
Projections from Northeast Climate Adaptation Science Center (e.g., temperature, precipitation)

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

Trail along Bare Hill Wildlife Sanctuary – December 2008 ice storm

Bower's Brook along Cruft Lane – July 2016 drought

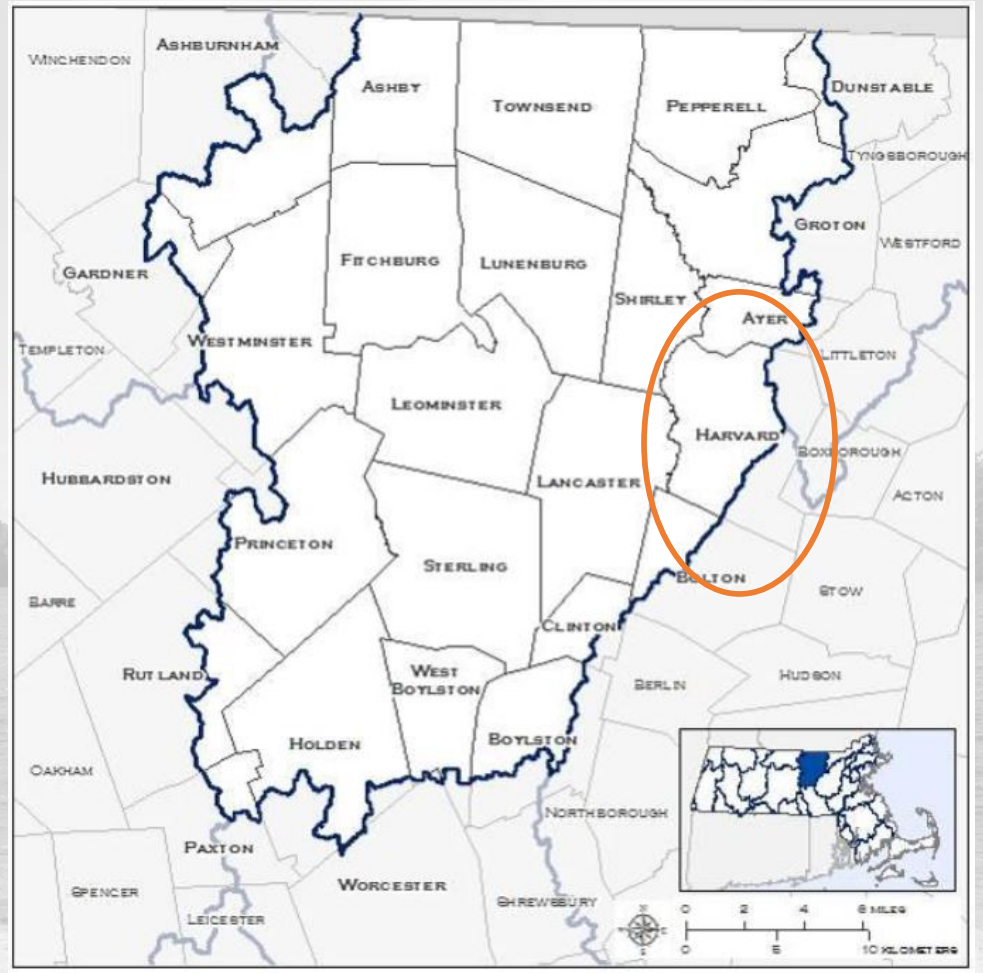
Trail along the Powell-Abbot-Reed land – December 2008 ice storm



Ice storm 2008
Source: Rochelle Greayer

William's Pond Stow Road – July 2016 drought

Overview of Climate Change - Nashua Basin



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

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

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

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)
- _____
- _____

Small Groups

1. Group introductions: Name, organization/department

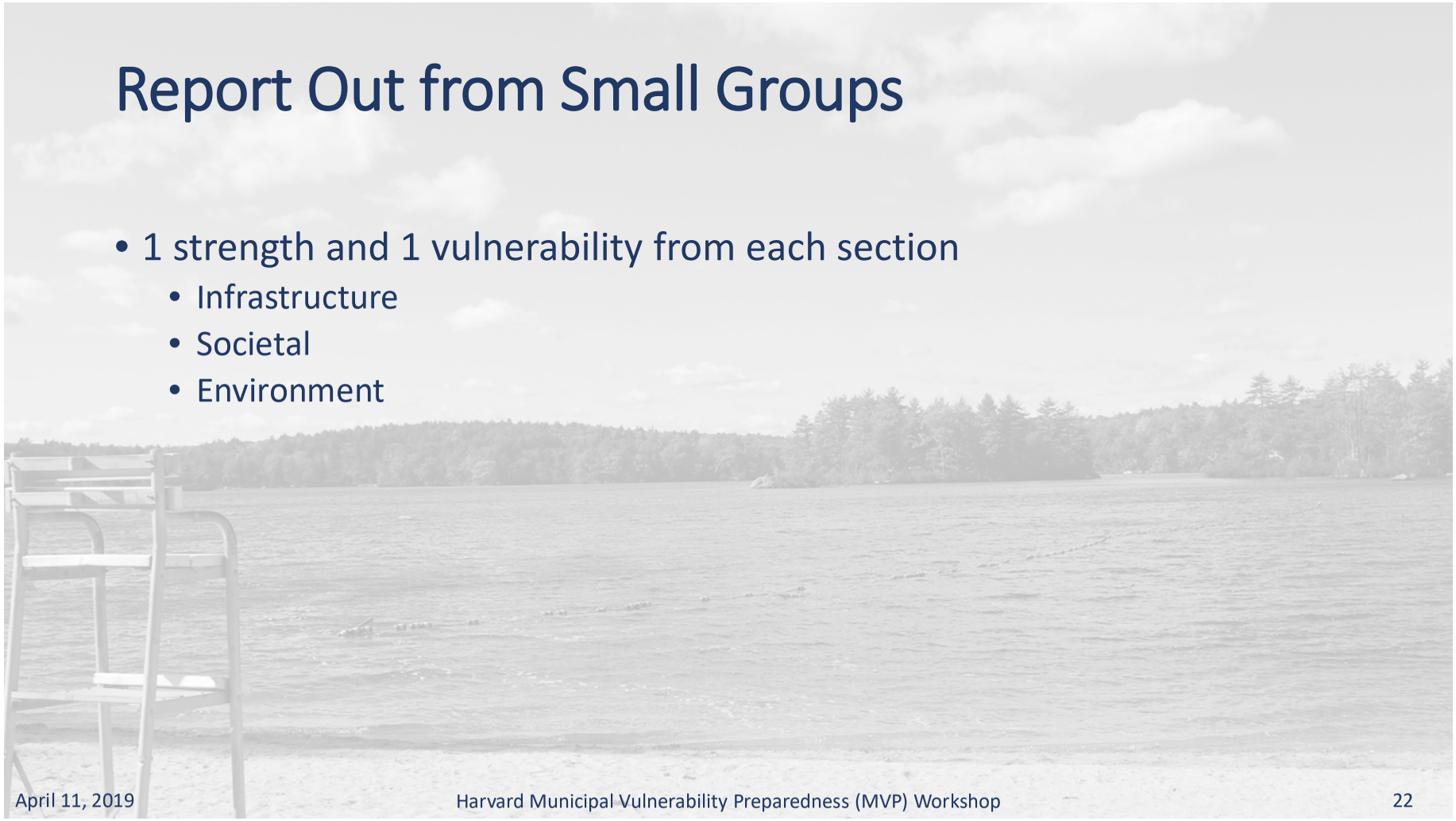
2. Identify a spokesperson and a scribe (not the facilitator)

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

Report Out from Small Groups

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



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

HARRIMAN

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

AUBURN

BOSTON

PORTLAND

PORTSMOUTH

harriman.com

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

- 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

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

Review Workshop 1

What is the MVP Program?

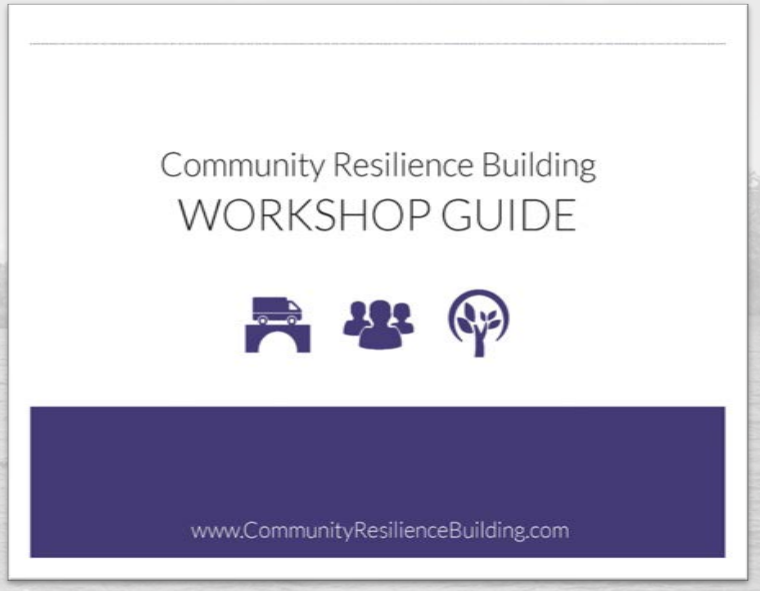
- A component of MA Executive Order 569 (2016)
- Grant funding for technical support to
  - Complete vulnerability assessments
  - Develop action-oriented resiliency plans

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

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



Identify and Prioritize Community Actions

- Actions and Next Steps
- Prioritization
- Timeframe for Action

(Today)

Community Resilience Building Workshop Risk Matrix

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

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

Features	Location	Ownership	V or S	Coastal Flooding SLR/Storm Surge	Inland Flooding and Rain Events	Ice and Snow	Wind	Priority H - M - L	Time Short Long Ongoing
Infrastructural									
Town Campus	Specific	Town	V	Verify risk from flooding events; Identify alternative locations during peak flooding; Verify maintenance plan annually				H	S
Evacuation Routes - Roads	Town-wide	Town/State	V	Install highly visible signage for evacuation routes; Develop and implement communication program				H	S
Nursing Homes/Elderly Care Facilities	Multiple	Private	V	Improve power generation; Review building codes and zoning for existing and future facilities				H	S
Homeowners Associations/Neighborhoods	Town-wide	Town/Private	V	Engage Neighborhood Associations and develop cooperative response plan with Town: Advance "Neighbor helping Neighbor" Program; Develop comprehensive neighborhood-based emergency plans				H	S
Electrical Distribution System	Multiple	CL&P/Town	V	Within floodplain area, establish plan to address protection and long-term relocation of equipment		Upgrade transformers; Maintain power line protection zone (tree trimming)		H	O-L
Dams (inland and coastal)	Multiple	Private	V	Prevent possibility of catastrophic dam failure; Identify and remove dams to minimize downstream flooding due to failure				H	L
Railway and State Bridges	Multiple	Amtrak/State	V	Improve communications between parties; Expand green/gray infrastructure and improve bridge structures; Assess vulnerability and prioritize infrastructure improvement list				M	S
Septic Systems	Town-wide	Private	V	Assess opportunities for community systems or alternative treatment technology; Upgrade regulations to reduce contamination in water ways				M	L
State Roads/Intersections	Town-wide	State/Town	V	Coordinate with DOT, volunteers, public works to improve response; Need signage to warn of flooding risk in critical intersections				M	L
Wharves and Shore Infrastructure	Shore	Town-State-Private	V	Establish community dialogue regarding retaining/relocating infrastructure; Advance comprehensive shoreline management plan				L	S
Waste Water Treatment Facility	Specific	Town	V	Conduct alternative siting feasibility study; Relocate to low risk area within next 25 years.				L	L
New Ambulance Center	Specific	Town	S	Continue to support services in budget; Add additional staff and vehicle in next annual cycle					Ongoing
Zoning Regulations (maintain large lot size)	Multiple	Town	S	Current building codes control development in risky areas; Consider additional zoning incentives (TDRs) to reduce risk to residential units					Ongoing
Business District (power generators)	Specific	Town/Private	S	Downtown business district with power generators in place; Prioritize pharmacy and gas stations					Ongoing

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

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

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.

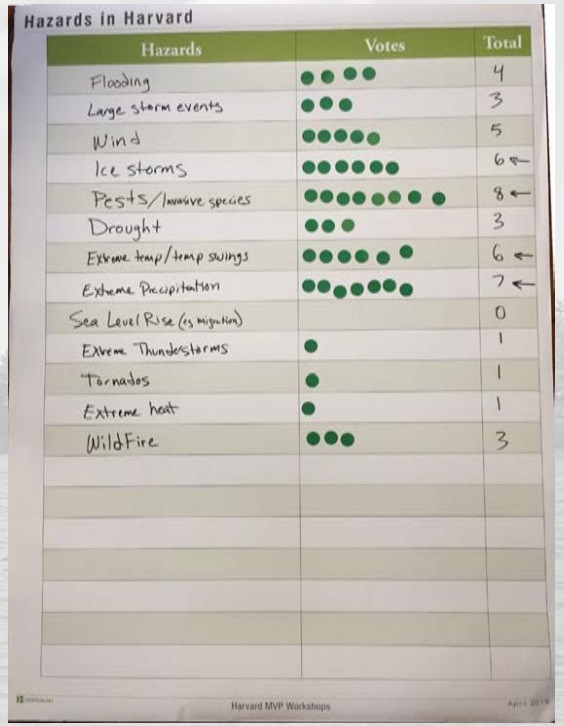
Actions to address vulnerability include staying in the shade or wearing sunblock.

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

Top 4 Hazards in Harvard

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



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.

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

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.

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.

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

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.

Prioritize Actions: Concord

Highest Priority Actions: Prioritized by category

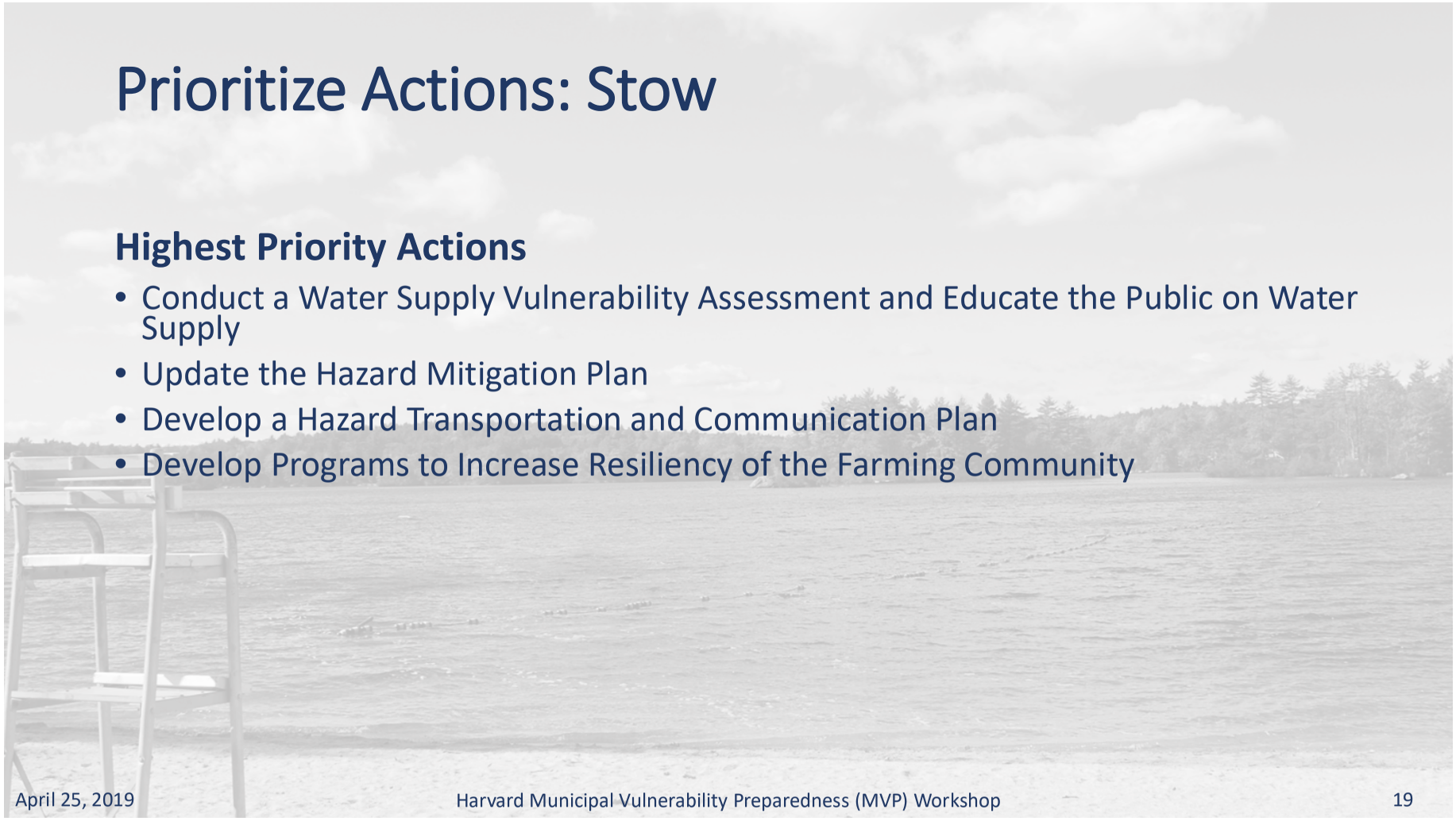
- **Promote and highlight low impact development and green infrastructure.**
- **Prioritize action plan for police/fire/CPW facilities located in the floodplain.**
- **Find ways to improve cell service throughout the town to ensure ongoing communication.**
- **Rehabilitate or build new bridges and dams 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.**

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

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

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

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

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

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

MVP Action Grants

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

Report Out from Small Groups

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

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

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

Harvard Municipal Vulnerability Preparedness

Workshop 2

April 25, 2019

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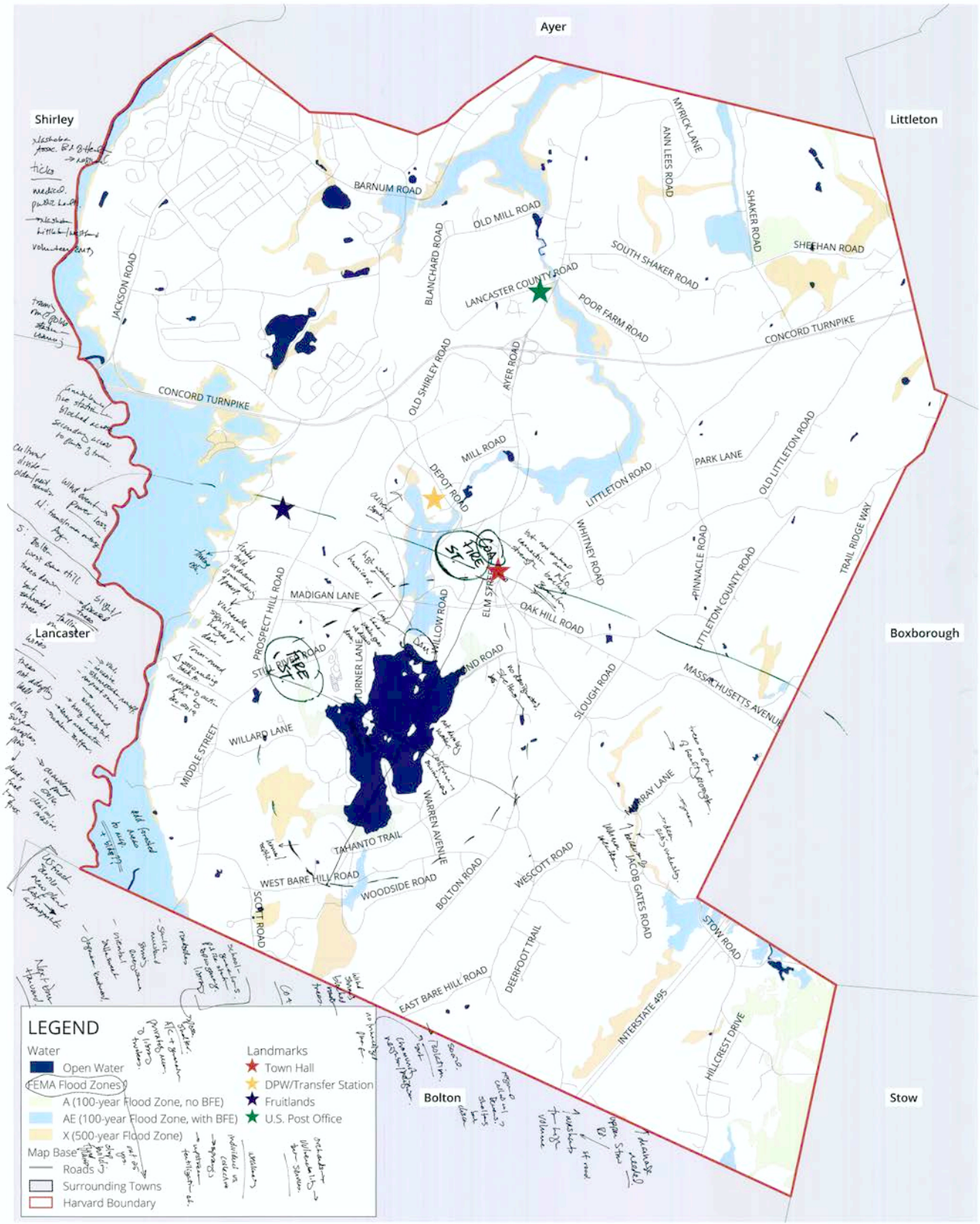
APPENDIX C: COMMUNITY RESILIENCE BUILDING WORKSHOP PARTICIPATORY MAPPING

Existing Conditions: Water and FEMA Zones



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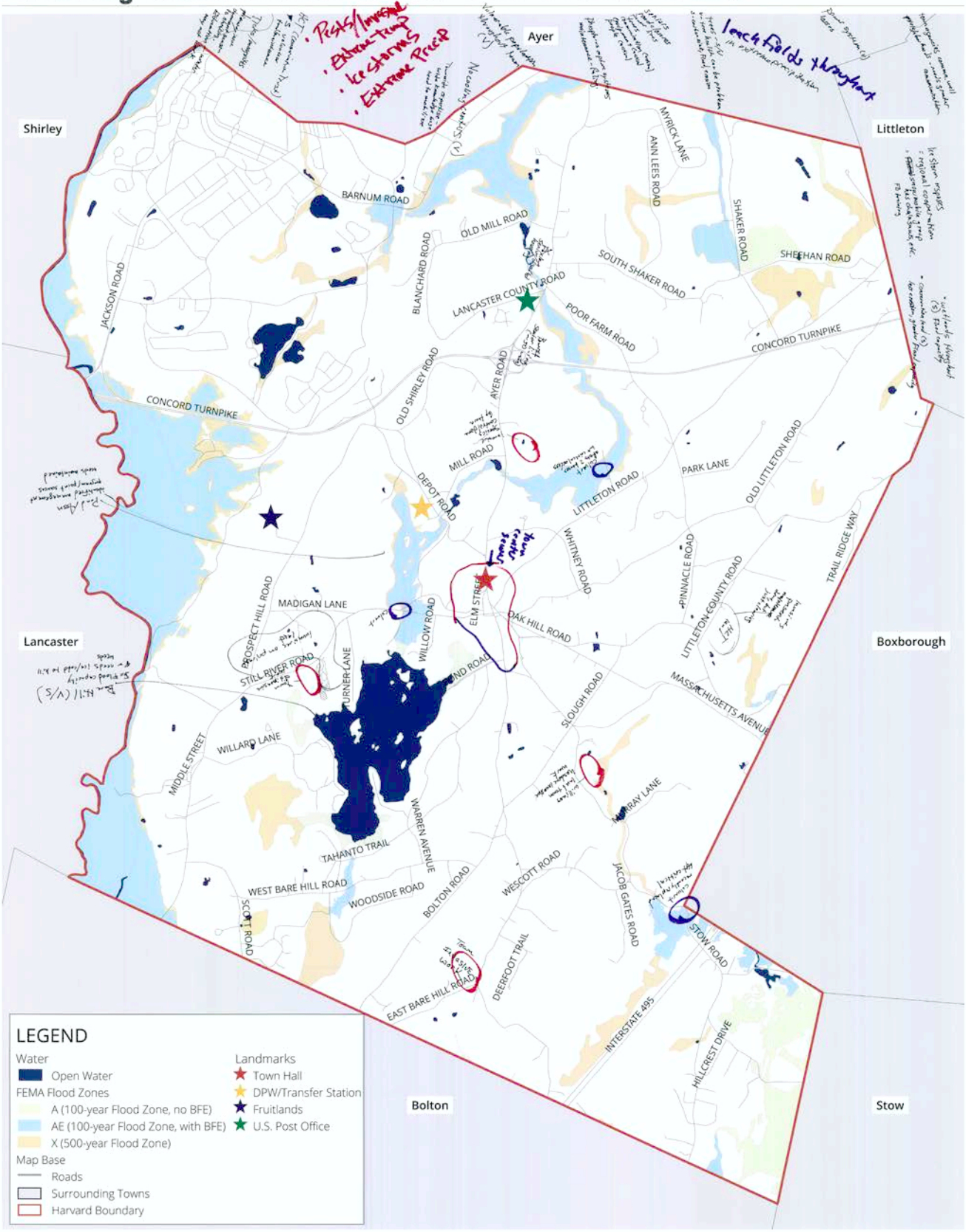
Harvard MVP Workshops

April 2019

Existing Conditions: Water and FEMA Zones



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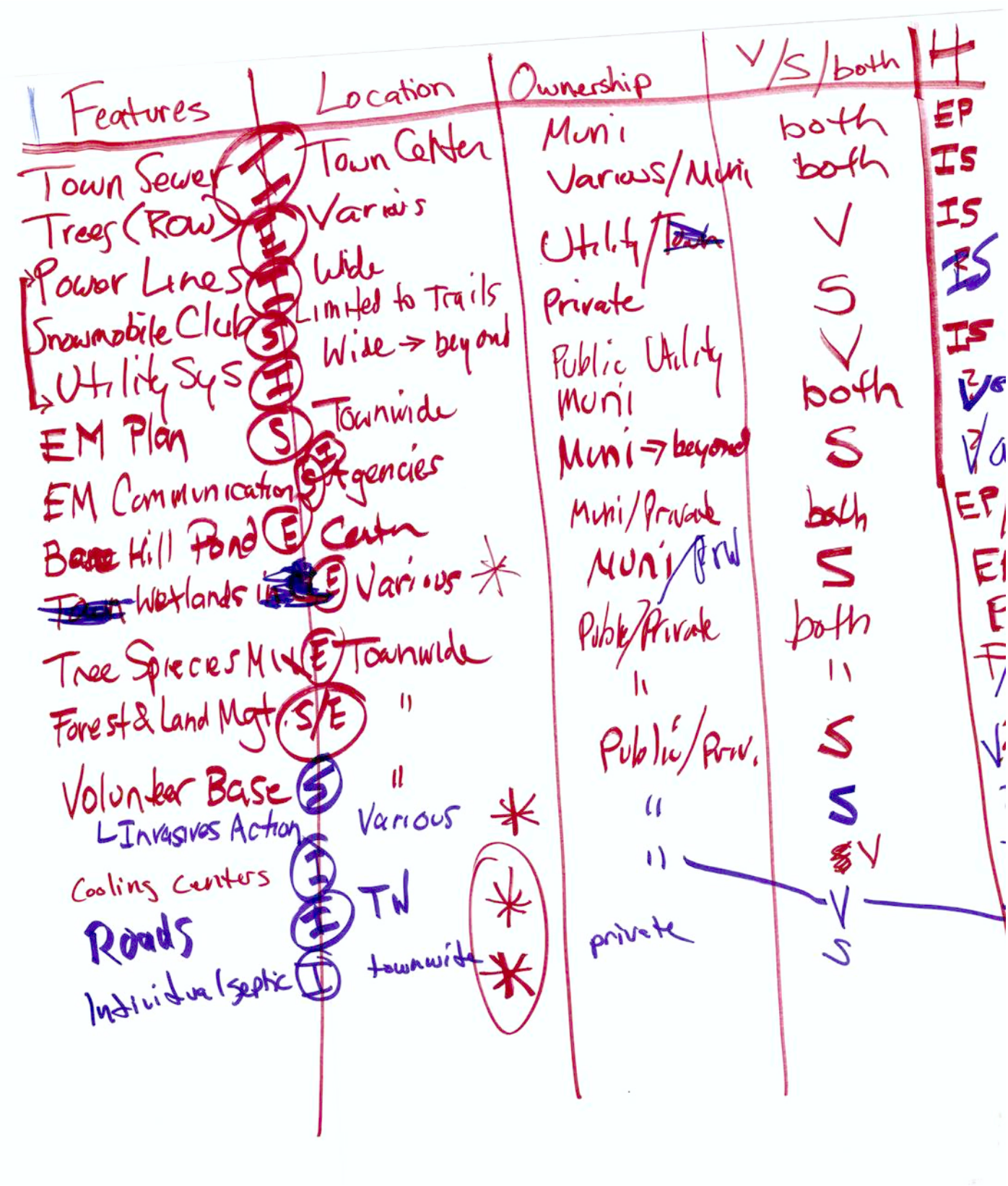
Harvard MVP Workshops

April 2019

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 (eg migration)		0
Extreme Thunderstorms	●	1
Tornados	●	1
Extreme heat	●	1
WildFire	●●●	3


Features
Location
Ownership
V/S/both
Town Sewer
Trees (ROW)
Power Lines
Snowmobile Club
Utility Sys
EM Plan
EM Communication
Base Hill Pond
Wetlands
Tree Species Mix
Forest & Land Mgt
Volunteer Base
Invasives Action
Cooling Centers
Roads
Individual Septic
Town Center
Various
Wide
Limited to Trails
Wide → beyond
Townwide
Agencies
Center
Various
Townwide
"
"
Various
TW
townwide
Muni
Various/Muni
Utility/
Private
Public Utility
Muni
Muni → beyond
Muni/Private
Muni/Prvt
Public/Private
"
Public/Prvt.
"
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private
both
both
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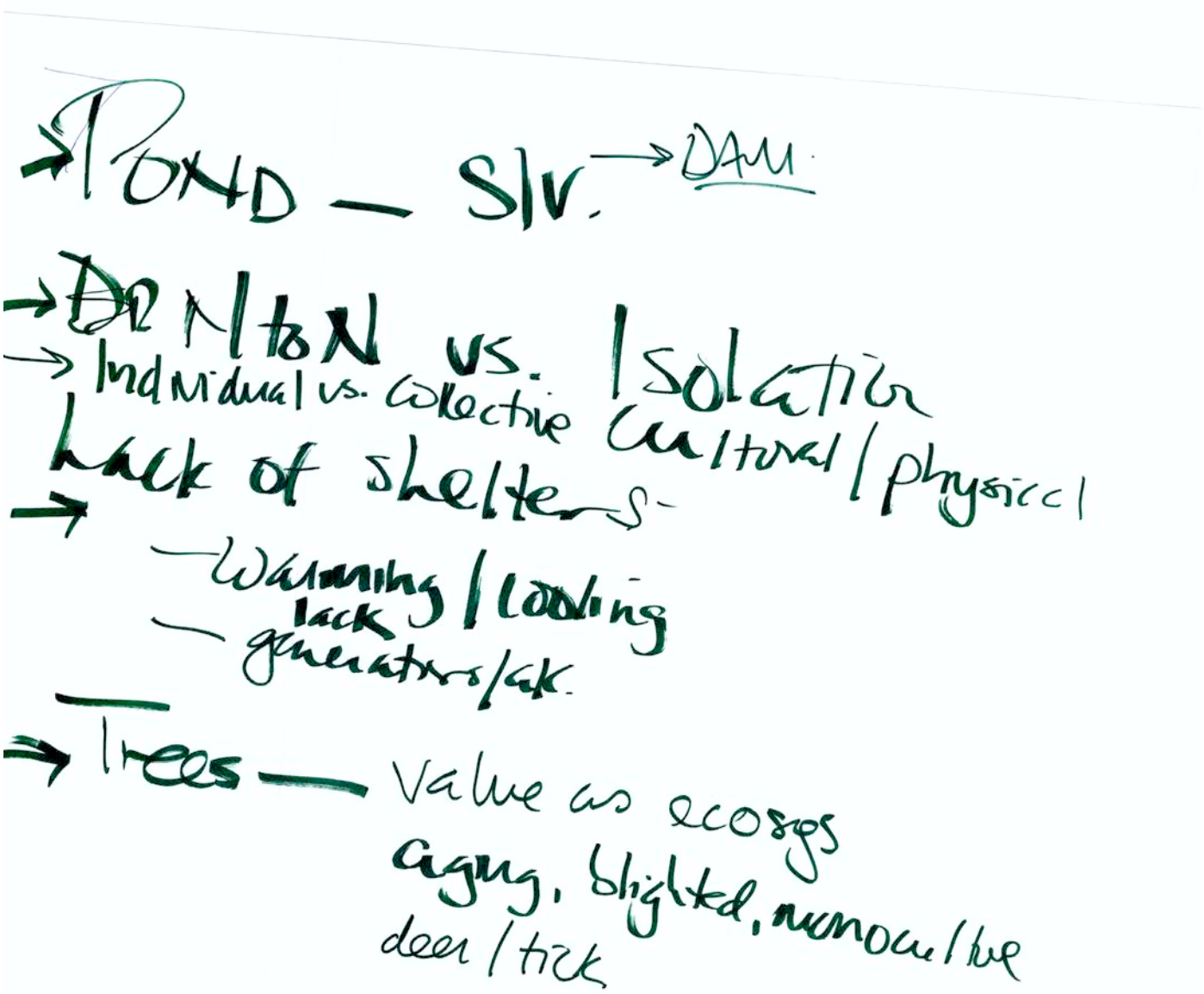
POND — SW. → DAM
DR N/to N vs. Isolation
Individual vs. Collective Cultural / physical
Lack of shelters
Warming / cooling
lack
generators/ac
Trees — value as ecosys
aging, blighted, removal/be
deer / tick

Community Resilience Building Risk Matrix

www.CommunityResilienceBuilding.org

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
Societal									
Budget	Townwide	Public	V	Herbicides -> DPW Targeting	Climate vulnerability liaison in town govt. Capital planning	6	Having shelter supplies -> Budget for It.	H L	S O
Communication Dispatch NextDoor (online, alternative, Reverse 911)	Varies	Municipal Regional	V/S		A	Strengthen Town Website 15	B		
Council on Aging as connector for seniors and COA	Behind Fire Station/Town Hall	Municipal Regional	S			for Cross-cultural comm/prep/coord.	H 4	H	S
Development patterns	Town	Public	V	Settlement patterns/ hazards Collate strategies for small N.E. Towns.	Road connectivity/Redundancy	-> System Planning			
Suburban/Rural Raft/Disconnect Disconnect between new residents and existing population (social change) Education (individual action vs. collective action) Understanding of farm practices by new residents Generational/Income	Townwide	Public/ Private	V	Shared information base and community understanding.	"Cultural" exchanges -> Farm Success Planning	Connect disparate groups Public awareness/Education	D 4	M	O
Emergency management communications (also Infrastructure)	Agencies	Municipal-Beyond	S						
Emergency Management Plan	Townwide	Municipal	V/S						
Emergency Response/ Emergency Services and opportunity for regional collaboration	Town/ Region	All agencies	V/S		Preparedness Education - Harvard Local	E 4		H	S
Forest and land management (also Environmental)	Townwide	Public/ Private	V/S	Coordination in Forestry Planning	Forestry 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) Devens stewardship to leverage opportunities for Harvard			S	Include DEVENS vulnerable pops.					
Harvard Conservation Trust, Sudbury Valley Trustees (also Societal)			S	A Creation/ID of... B Coordination of Community Groups <Neighborhoods	Metagroup G		13	M	O
Small town identity/ local press			S	Based on School Proximity?					
Snowmobile Club	Limited to Trails	Private	S			CLIMATE ACTION PLAN C	6	H+	O
Volunteer Base Neighbors helping neighbors	Townwide	Public/ Private	S						
Volunteer EMTs			S						
Vulnerable population/ Isolated populations Elderly, young, family	Townwide		V	S/T Actionable	connection of all vulnerable populations to coordinate emergency response; Assessment and Plan to enable				
Water Quality			V		Land Stewardship Plan — also Bare Hill Plan				

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HARVARD MVP WORKSHOPS

APRIL 2019

Community Resilience Building Risk Matrix

www.CommunityResilienceBuilding.org

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) (Schools Used and too) (have backup generators) No designated shelter (also Societal)	Air conditioning and generator at library, police training room	Municipal	V		Equip Bromfield School as a stay over shelter, prepare a management plan	Equip and manage Hildreth House as a cooling/warming center (phone recharging, hot coffee, etc.)	Same as above / Equip / extreme temps	M	S
Culverts/undersized (both tables) (for example, managing Bare Hill Pond)	Townwide	Public/ Private	V/S	Expanding culvert, and redesign system	Evaluate, design, and upgrade Budget for more emergency upgrades			M	O
Dam (timing of draw-down)	Bare Hill Pond	Municipal	V	Expand stormwater detention	Evaluate, design, and upgrade Budget for more emergency replacement			M	O
Response Capacity for emergencies Distribution of fire stations (only one station) (DPW, Fire, EMT)	1-Near Town Hall; 2-S-W	Municipal	V		Plan for expanded capacity Plan for improved facilities Implement plans	←	Plan for expanded capacity Plan for improved facilities Implement the plan	M	O
Lack of Drainage (storm has been drained winter 2019)	Upper Stow Road	Municipal	V	Expand stormwater detention	Evaluate, plan, implement			M	O
Emergency management communications (also Societal)	Agencies	Municipal- Beyond	S	← no action req'd →					
Generators at municipal buildings (High school, Town wells)	Schools, police station, DPW, library, Town Hall x	Municipal	V/S		Add generators →	Add generators	same	H	S
Medical centers	Nashoba, Emerson, Urgent Care	Private	V		Medical professional networking CERT Civilian emergency response team) Show Medical volunteers		→ same	H	S
Opportunity for pedestrian/bike trail connection to Devens			S						
Poorly-paved roads	Town wide Massachusetts Avenue	State	V		Secure additional funding Evaluate need relative to resilience	→	same	L	O
Private septic systems Lach fields throughout town	Townwide	Private	V/S		Identify problem locations, evaluate expanding sewer service	→	same	L	L
Residential development/Infrastructure within 3 different watersheds			V		Identify problem locations Evaluate expanding sewer service				
Roads	Townwide	Municipal	V		Secure additional funding, evaluate need relative to resilience	→	same	L	O
Stormwater management (Cerosion)	Townwide	Municipal	V	Collect expansion stormwater detention	Adopt bylaw and apply, Seek funding for town-wide evaluation, recommendations, funding			M	O
Town sewer (very limited)	Town Center only	Municipal	V/S		Identify potential vulnerabilities and advantages, seek funding and modify if beneficial			L	L
Utility system (both tables) Power lines, trees, road closures	Townwide- Beyond	Utility	V	Tree management evaluate, seek funding, undertake preventative clearance	Evaluate, seek funding, undertake preventative clearance		same	H	S
Runoff of contaminants into water supply/wetlands	Townwide	Public/ Private	V		~~Tamper~~ roads Vegetative buffers Stone vs log erosion control Drainage, stormwater management improvement			M	O

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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
Environmental									
Abandoned apple trees harbor disease/pests	Townwide	Public/ Private	V	Health / Proper -> Disposal of old trees Forest Manage.	X	M - H Education and monitor	Proper Disposal. Con Com Ag Com ?	L (private) H (if funding)	O
Bare Hill Pond (both tables)	Bare Hill Pond	Municipal/ Private	V/S	Draw - Down (O) M -> Education -> fertilizers / buffer H/O (Pond Committee) and work	Need infrastructure.	Heat -> Monitor for Algae Bloom. Pond Committee M - O	X	H/M	O
Beavers			V						
Conservation lands	Townwide	Public/ Private	V/S	Monitor, maintain, remove (Public) M-O Education of private owners (HCT, ...) Conservation Stewardship; Rhododendron Threat			Damage; monitor - fix	M	O
Disease threats to plants, animals (*difference between organic and non-organic*)	Townwide	Public/ Private	V	EDUCATION (GROWING EDUCATION EFFORTS)	Rhododendron Threat; Soil health; Inter-planting	IPM (add bullet point in report)			
Erosion	Townwide	Public/ Private	V	X	Development -> silt fence, hay bales. -> Erosion Ctrl Bylaw -> O - L			O	L
Forests/Forest and land management (also Societal) **Woodlands/Forest <10 Acres**	Townwide	Public/ Private	V/S	EDUCATION - LANDOWNER PROGRAM LAND MANAGEMENT. (Monitor.)	Joint forest management for CO2 Sequestration integration of management plans.		Not enough data? - Manage.	L	L
Groundwater quality for agriculture and community health (Devens) FOOD SAFETY ACT	Townwide	Public/ Private	V	✓	-> CONTAMINATION WELLS/SOURCES TESTING (INFRASTRUCTURE)	PRIVATE: EDUCATION. PRIORITIZE LAND AROUND WETLAND GROUNDWATER RESOURCES	BUFFERS - ACTION - ACQUISITION OF		O
Harvard Conservation Trust, Sudbury Valley Trustees (also Societal)			S	HCT CONSERVE MORE LAND + SVT. PUBLIC EDUCATION.					
Insects (including Ticks)	Townwide	Public/ Private	V	DEER MGMT STRATEGIES.					
Invasive Plants crowding out native flora **Invasives – plants, wildlife, pests (*difference between organic and non-organic*) W.I. ticks (regional problem), mice, impact on water pumping** Deer? Beavers	Townwide, esp. roadsides	Public/ Private	V	REMOVAL ON CONSV. LAND. - H-O NATIVE PLANTINGS WHEN BUFFERS / EDGES DISTURBED M/H - O		**Systems Education, deer fencing- comprehensive regional strategies land stewardship- collective, No bird feeders near homes**	REMOVING BITTERSWEET - MGMT.	H M/H	O O
Lack of water at the right time (limited irrigation, well-depth) - damage shade trees		Public/ Private	✓		(LOSS OF GROWING TIME) ∆ CROPS	IRRIGATION -> BUT AQUIFER CISTERNS (BOLD) FIRE PONDS (INFRASTRUCTURE)			
Reduced production in amount and quality/ varietals not viable		Private			**Education**	**Education** ∆ CROPS			
Shorter planting season		Public/ Private			**Adjust crop according to growing period. Hoop house Apples – Craft Southern Varieties Nutrient sprays – Maganese – helps calcium uptake micro nutrients**				
Stress from drought/flooding at different times of the year		Public/ Private			**Community water bank Agricultural liaison for expert consultations**				
Stress from heat/cold variation within a single season		Private				**Smudge pot for small farms**			
Super-saturated fields/pastures					**Raised beds** INFRAST. COMPONENT				
Disappearance of insects **Threats to/loss of pollinators: outside companies spraying for mosquitos, ticks**	Townwide	Public/ Private	V	Health Committee - O - Education Tick Control Methods Disease Control Public Health Campaign		**Regulations- don't allow during day (timing) Public Education-neonix awareness of context-day-year. Pollinator Gardens – school program native bee houses.** + PATHWAYS + TOWN ISLANDS		H	O
Trees (Carbons sink/Species mix/Monoculture/Blight/Age)	Townwide	Public/ Private	V/S						
Trees (Right of Way)	Townwide	Various/ Municipal	V/S	TREE MANAGEMENT PLAN /	TOWN (REPLACEMENT).	(TRIMMING) TREE WARDEN?		H	S
Weather impacts when spraying can occur.		Private							
Wetlands	Various	Municipal/ Private	V/S						

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HARVARD MVP WORKSHOPS

APRIL 2019

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.

Commonwealth of Massachusetts

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

JENNIFER E. BENSON
REPRESENTATIVE
37TH MIDDLESEX DISTRICT

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 winder. 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 anther committee. The MVP Core Group is under the Energy Advisory Committee.