Town of Leverett

Municipal Vulnerability Preparedness (MVP) Program

MVP Resiliency Plan

December 2020

Facilitated by the
Franklin Regional Council of Governments
A State-Certified MVP Provider

MVP Resiliency Plan

Including the Summary of Findings from the
Community Resilience Building Workshop
October 2019

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Town of Leverett
Community Resilience Building Workshop
Summary of Findings

Overview:

Throughout Franklin County, Massachusetts, communities are experiencing more extreme weather events – especially heavy rains and flooding – along with higher temperatures and other climate-related conditions. These types of conditions are predicted to increase as a result of climate change. According to down-scaled climate data from resilientMA.org,[1] the major climate change drivers in Franklin County and Leverett are:

- An increase in average temperature, as well as more extreme heat and extreme temperature fluctuations;
- An increase in annual precipitation and an increase in very heavy precipitation events – where more rain, snow, or ice falls in a short period of time – interspersed at times with very dry periods;
- Stronger storms with higher winds, due to an overall warmer climate with more moisture in the atmosphere.

In the face of these changes, municipalities have more of a sense of urgency to increase their resilience and adapt to extreme weather events and mounting natural hazards. Relatively recent events in Franklin County, such as Tropical Storms Irene (August 29-30, 2011) and "Snow-tober"(October 28, 2011), have reinforced this urgency and compelled communities like the Town of Leverett to proactively plan and mitigate potential risks. This type of planning will reduce the vulnerability of Leverett's people, infrastructure and natural resources, and will empower Leverett's officials and citizens to take steps to protect themselves and their community.

In the early spring of 2019, with funding from the Massachusetts Executive Office of Energy and Environmental Affairs, the Franklin Regional Council of Governments (FRCOG) offered the Town of Leverett technical assistance in completing their Community Resilience Building Workshop to achieve a designation as a Municipal Vulnerability Preparedness Community or "MVP" Community. As a State-certified MVP Provider, the FRCOG helped Leverett engage in a community-driven process that brought together climate change information and local knowledge to conduct the workshop, whose central objectives were to:

- Define top local natural and climate-related hazards of concern;
- Identify existing and future strengths and vulnerabilities;

[1] http://www.resilientma.org/map/

- Develop prioritized actions for the Community;
- Identify immediate opportunities to collaboratively advance actions to increase resilience.

This report summarizes the findings of the Town of Leverett's Community Resilience-Building Workshop.

Community Resilience Building Workshop

Summary of Findings

The Town of Leverett, population 1,876, has conducted a number of planning projects in previous years, including its 2014 Hazard Mitigation Plan, which enabled the Town to identify high priority hazards as well as areas, infrastructure and populations vulnerable to a variety of hazards, and action items to potentially address hazards. Other recent Leverett plans include: 2019 Capital Plan, 2019 Open Space and Recreation Plan, 2018 ADA Self Evaluation & Transition Plan, updated Emergency Action Plans, 2016 Community Development Strategy, Green Communities Energy Reduction Plan, and a 2010 Forest Management Plan.

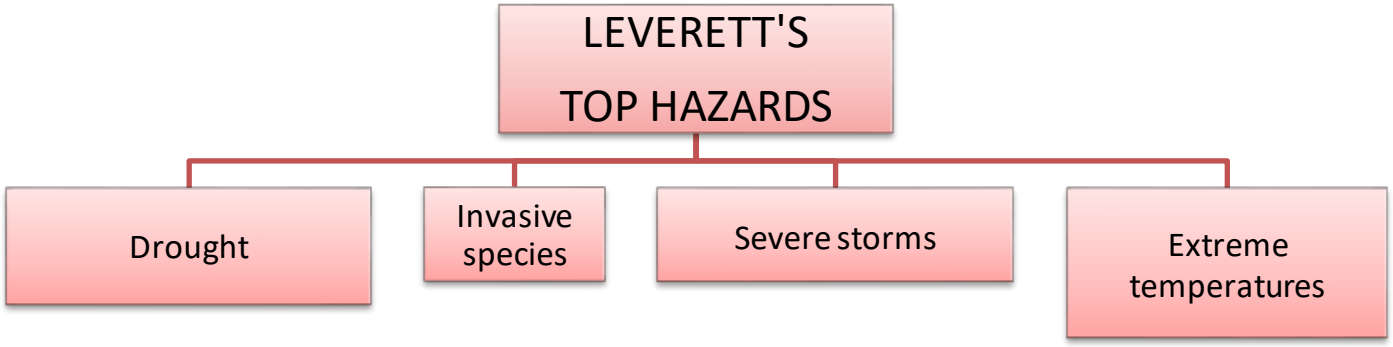
In spite of Leverett's diligence in completing these planning efforts, there was still a need for the community to conduct a hazard assessment across scales – from individual buildings and bridges to rivers and landscapes, and across sectors – infrastructure, society and environment – looking specifically through the lens of climate change and its likely impacts.

Workshop participants considered climate change impacts most likely to impact Leverett, include rising and extreme air temperatures, extreme weather events and increased precipitation, both in quantity and intensity.

The workshop was critical to enabling participants to think about and engage with people from different sectors. People representing public health, planning, fire, water pollution control, and several others came together to determine the most threatening hazards to the Town of Leverett and to agree upon high priorities and actions to address them.

Top Hazards

Workshop participants discussed a number of hazards that impact Leverett, deliberating on how frequent, how intense and how widespread each hazard has been and could potentially be in the future. Hazards discussed included: dam failures, severe winter storms/ice storms, earthquakes, hurricanes, wind storms/microbursts, tornados, ice jams, floods, wild fires, landslides, droughts, manmade hazards and extreme temperatures. Top hazards identified by the participants are as follows:



Areas of Concern

Infrastructure and buildings: Vulnerable power grid, with widespread power outages occurring after one cut to the system; poor cell phone coverage throughout Town; roadside trees; emergency communication infrastructure; culvert on Route 63; closed or failing bridges, Lake Wyola dam; private dam on Dudley Pond; three phase electric power; lack of backup water supply for fire fighting purposes; clogged dry hydrants.

Transportation: Many unpaved roads with poor drainage; flooding on Route 63 from Long Plain Brook; emergency access routes; impassable roads during winter months; ice jams and flooding on Teawaddle Hill Road; flooding on Briggs Road and Dudleyville Road.

Localized flooding frequently occurs on Route 63

Public sanitation and water: Residents on private wells without a backup water supply in the event of a power outage; Lyme disease and mosquito borne diseases; landfill pollution plume and contaminated wells on Teawaddle Hill Road.

People: Emergency communication systems throughout Town due to several dead zones.

Ecosystems and natural resources: Invasive species such as the hemlock wooly adelgid, Japanese knotweed, and Eurasian milfoil; dead brush in local forests; steep slopes; beaver dam flooding near Williams Brook/Richardson Road and throughout Town; overgrown vegetation on Long Plain Brook near Bull Hill Road.

Current Concerns & Challenges Presented by Hazards

Participants in the workshop discussed a number of hazards, both natural and humanmade which have impacted the community in recent years. Short-term, acute weather events including severe rain and snow storms, ice and wind are of the most concern for participants.

For many in Franklin County, Tropical Storm Irene in 2011 is a bellwether event, demonstrating the extent and severity of extreme weather and increased rain that is predicted to become more frequent in the coming years. Although Leverett was not impacted nearly as severely as towns to the west, the damage and extreme impact from Irene was felt throughout the region.

Workshop participants expressed concern about heavy rain events and potential future flooding, particularly with the rise of wetlands caused by beaver dams throughout the Town. Heavy snow, ice and wind events were also identified as a top hazard, due to the potential for downed trees and widespread power outages. Blocked emergency access routes were also a primary concern, especially with regard to how these events can delay emergency responders and affect the community during moments of emergency. Even though most residents in Leverett are accustomed to severe winter weather, such events can still have broad and significant impacts on the Town.

Temperature extremes, such as high heat and freezing temperatures were another top concern. Elderly and low income residents are particularly vulnerable to extreme temperatures and may lack air conditioning or safe ways to adequately heat their homes. Extreme heat can also contribute to poor air quality by trapping emitted pollutants close to the ground, affecting people with asthma and other respiratory diseases. Periods of extended high heat or extreme cold may strain the already vulnerable electrical grid in Town.

Participants also identified manmade hazards as a top concern, particularly culvert failure and bridge failure. Additionally, fragmented communication networks also pose a threat for safe and timely evacuations during an emergency.

Specific Categories of Concerns and Challenges

Vulnerability of roads, bridges, and culverts: Many roads throughout Leverett are unpaved and do not have sufficient drainage. This is not a historical issue – residents have been accustomed to roads freezing from November to April – but that is no longer the case as seasonal temperatures change and roads are freezing less. Temperature swings in the winter months now cause the roads to become muddy, churned, and increasingly difficult to traverse. Dudleyville Road was closed for a couple of days in Spring 2019 due to this issue. The Town of Leverett cannot pave the roads, so solutions will need to focus on minimizing the amount of water on unpaved segments. Participants acknowledged that road damage will continue to be of great concern.

Bridge closures were also high on participant's list of concerns. Bridges across Town often go out when there is severe weather. These closures can block off the already limited number of emergency access routes available to responders and residents. The closure of the bridge on Old Coke Kiln Road was noted as a specific concern by participants.

***Vulnerability of infrastructure*:** The power grid in Leverett is intrinsically vulnerable. Workshop participants noted that widespread outages occur if as little as one line or pole is knocked down, and explained that if the system is damaged on Bull Hill Road approximately two-thirds of the Town can lose power. Participants also noted cuts to the system on Bull Hill Road and Depot street will knock out communication lines. Tree hazards were noted as a primary threat to the grid, but participants mentioned conditions are improving in some areas because Eversource is changing cutting patterns for the installation of three phase power. However, aggressive cutting is still needed throughout Town.

Participants discussed the possibility of installing additional cell towers in order to strengthen communication avenues, but cited past studies that concluded Leverett's topography would prevent a successful expansion of service. As of March 2020, one cell tower is being installed in Town, which should help to increase Verizon coverage.

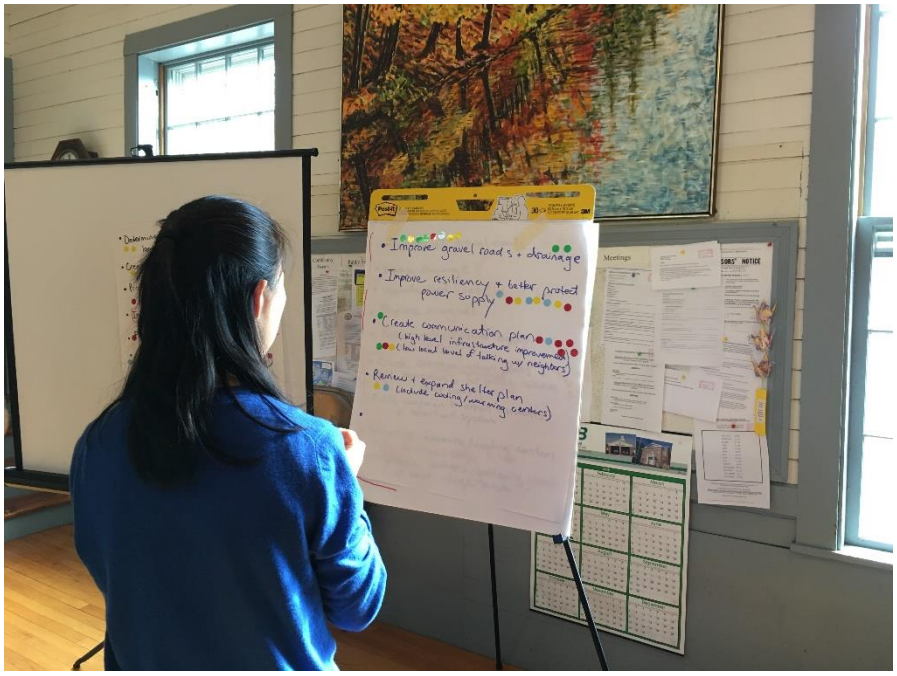
A lack of three phase power was also brought up as an infrastructural vulnerability. The Town currently does not have three phase (industrial grade) power. The addition of this type of power in Town would greatly benefit public safety, and would also allow for more opportunities with regard to charging stations for electric cars.

Uncertainty of water supplies during hazards or power outages: Leverett's residents are dependent on private wells for all their water needs, as there is no public water supply system. Periods of prolonged drought can affect residents; private wells have run dry in the past. Participants recalled a 5 year long drought in the 1960s, which was severe enough to lower water levels in the Quabbin Reservoir by 40 feet and cause many of the wells in Leverett to go dry.

An adequate water supply is also a concern during power outages because the wells run on electricity, so residents would be without water, unless an emergency water supply or backup power system was established. During the workshop, participants identified artesian wells

located throughout Town that could potentially be used as a backup supply during a power outage. These wells did not run dry during the drought in the 1960s, so they are believed to be a reliable source of water. Participants also discussed how to make sure residents have a local backup supply of water after identifying the need for a water resiliency plan.

Vulnerability of water supplies to contamination: Although it is beneficial for residents to have their own water supply, there are some concerns about the contamination of individual water supplies. Four homes are currently affected by a contamination plume coming from the Town's landfill, and future increases in the intensity and frequency of flooding events may pose similar threats to the aquifer. Beaver dams found throughout Leverett also pose a threat to a clean water supply, as the dams are creating small wetlands that subsequently capture stormwater. Several residents in Leverett have reported contaminated wells and suspect that it is caused by beaver dams.



A workshop participant prioritizes resiliency actions.

Sheltering of Residents: Participants raised concerns about options for sheltering during periods of extreme temperatures. The Mount Toby meetinghouse could be used as a cooling shelter, but is not officially designated as a shelter where residents could stay overnight during an emergency. Further, Mount Toby is not an ideal location for sheltering because it is connected to a septic system. Participants discussed the North Leverett Baptist Church as a potential option for sheltering, but is not a viable option due to similar concerns. The Leverett Village Coop is able to serve as a designated heating and cooling shelter for residents in North Leverett, and they are working on obtaining a backup generator to preserve their food stock and help residents during an emergency. Based on the discussion about shelters at the workshop, Town Officials determined there is a need to develop a sheltering guide for the Town, which would provide specific information about when a sheltering location would open.

Sheltering was also a concern to workshop participants due to the lack of communication networks in Town. Residents discussed how it is very difficult to get in touch with everyone in Town in the event of an emergency, and were concerned that the emergency communication system doesn't have up to date information.

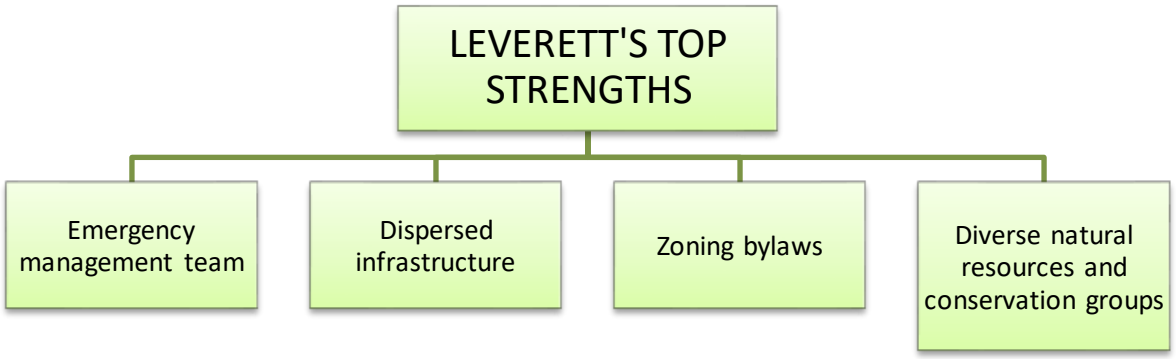
Vulnerability of residents to flooding: Several areas in Leverett are prone to flooding, and workshop participants voiced concerns about areas that may worsen over time. Route 63 is

particularly prone to flooding due to a vegetation issue in Long Plain Brook, and flooding on this road has recently caused many accidents. The Army Corps of Engineers was noted to previously dredge the Brook, but since they have stopped flooding has become a larger issue.

Invasive species and insect borne diseases: The hemlock wooly adelgid is an invasive species of particular concern in Leverett, as it has already caused extensive damage to hemlock trees throughout Town. As previously discussed, tree damage is a threat to Leverett's power and communication lines, and fallen trees due to invasive species may further exacerbate the issue. Fallen trees due to the hemlock wooly adelgid are hazardous even when not in proximity to power lines, because they may serve as biofuel during a wildfire. Participants noted the forest on Brushy Mountain is well maintained for invasives, but non-working forests throughout the Town are at the greatest risk of wildfires. An increase in insect borne diseases, such as Lyme disease, was also voiced as a concern by several workshop participants.

Current Strengths and Assets

Leverett residents, for the most part, know how to take care of themselves during routine snow storms, power outages and other such conditions. Participants expressed pride that people who have lived in Leverett for a long time are accustomed to weathering storms and helping out neighbors. Many families in Town know each other and know the first responders and Town staff who help run the Town. Participants sited several strengths and assets that help keep their community resilience in the face of climate change and other challenges. They include:



Societal strengths and assets: These include Leverett's informal community leaders, neighborhood groups and communication networks. Participants said that there is a strong sense of community in the Town, and neighbors are always willing to help each other out during emergencies. Workshop participants also discussed the possibility of developing self-organized warming shelters within neighborhoods so residents don't have to travel far during winter emergencies. The Town also sends out robocalls during emergencies to ensure residents are well informed of any precautions they need to take. Additionally, Leverett has an active Emergency Management Committee, which is a useful resource for the Town during hazards. This Committee is known to communicate with residents, run shelters, visit residents who might need help during an emergency, and respond quickly and efficiently to resolve problems.

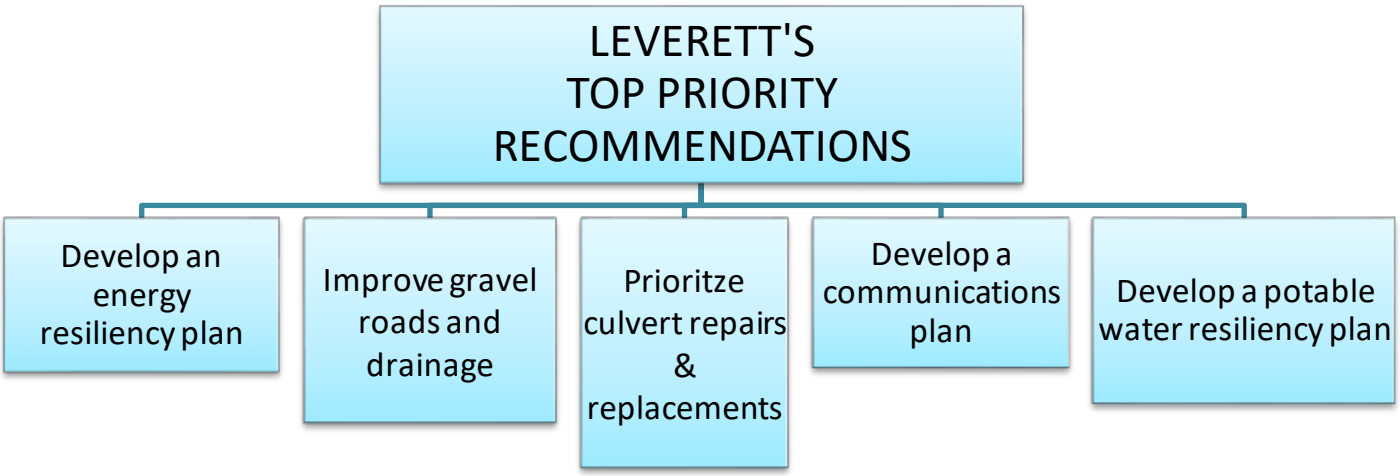
Dispersed infrastructure: Each household in Leverett has its own septic and water system, which helps to prevent widespread outages of necessary infrastructure. The Town's records are all digitized, and the Town Administration is currently working on setting up an automatic backup program that will sync the Town's data once every hour.

Zoning bylaws: Leverett's current zoning bylaws encourage resiliency, as industrial and commercial zoning is not allowed. These bylaws help to reduce the possibility of the Town's water supply being contaminated.

Diverse Natural Resources and conservation groups: Workshop participants noted that there are many protected open spaces throughout the Town. Also, there are several active conservation groups in the Town, such as the Friends of Leverett Pond, the Rattlesnake Gutter Trust, and the Conservation Commission. All of these groups help to advocate and protect open space in Leverett.

Top Recommendations to Improve Resilience

Leverett's top priority recommendations, shown below, address key vulnerabilities while building upon current strengths.



Developing an energy resiliency plan topped the list of a highest priority recommendation, with workshop participants agreeing that reinforcing the power grid is essential.

Improving gravel roads and drainage is also a top priority recommendation, especially in order to ensure the availability of emergency access routes.

Prioritizing culvert repairs & replacements and seeking funding for the design and construction of culverts is a high priority recommendation. The FRCOG completed a full culvert assessment during the writing of this plan that the Town can use to plan for future upgrades. The assessment details the conditions of culverts throughout Leverett and includes an interactive map; the report is included in the Appendix with a link to the map.

Developing a communications plan is essential for the Town of Leverett. Cell phone service is extremely limited throughout Town, which increases the vulnerability of isolated residents to hazards. The Town should develop a plan to prioritize and conduct infrastructure improvements.

Developing a potable water resiliency plan should be considered a top priority recommendation. Actions suggested by workshop participants include determining the locations of artesian wells throughout Town or installing microgrids to limit the number of residents who lose power and the ability to pump water.

Community Resilience Building
Risk Matrix

www.CommunityResilienceBuilding.org

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability
S = Strength

Features	Location	Ownership	V/ S	Recommendations	Top Priority Hazards: Flooding	Extreme Temperatures	Fire	Drought	Priority (H - M - L)	Time (Short Long Ongoing)
Infrastructural										
Gravel Roads	Town-wide	Town	V/S	Many of the gravel roads throughout Town, such as Dudleyville Road are deteriorating. A drainage assessment should be completed to determine ways to prevent flash flooding on these roads. The Town has already developed a Gravel Roads Committee to work on some of these issues and develop a long range plan. The Committee will work to prioritize solutions, and determine the most cost effective options.	**X**	**X**			**H**	**O**
Vegetation build up along roads	Town-wide	Town/State	V	Some roads in Town are overgrown with vegetation, which is subsequently causing the roads to flood. The Town is aware of competing regulations that prevent this problem from being fixed quickly. The Conservation Commission and Town should continue to work together to address this issue.	**X**		**X**		**H**	**S**
Zoning bylaws	Town-wide	Town	V/S	The Town should continue reviewing zoning bylaws and revising them as needed in order to encourage climate resiliency, balance affordability, and diversify the Town's tax base.		**X**		**X**	**H**	**S**
Culverts	Town-wide	Town	V	Use the results from FRCOG's 2020 *Town of Leverett Culvert Assessment* to prioritize repairs and replacements of culverts to build resiliency to severe storms and flooding events. Seek funding for the design and construction of high priority culverts. Findings from the assessment show 64% of the Town's culverts are in good condition, 11% are in Fair condition, 11% are in Poor	**X**				**H**	**S/O**

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Features	Location	Ownership	V/ S	Recommendations	Top Priority Hazards: Flooding	Extreme Temperatures	Fire	Drought	Priority **H** - **M** - **L**	Time **S**hort **L**ong **O**ngoing
				condition, and 14% are in critical condition.						
Bridges	Town-wide	Town-wide	V	Fix and upgrade bridges throughout Town, especially those that are on emergency access routes used by residents and emergency responders.	**X**	**X**	**X**		**H**	**S/O**
Tree Hazards	Town-wide	Private/Town	S	Implement a program to inventory Town trees so pruning or removal of trees/limbs will strategically reduce risks/hazards. Create a schedule to address priority areas, such as the sharp turns on Shutesbury Road. Meet bi-annually with the utility to ensure priority areas are included in the plan. Additionally, locate areas in Town where a 20-foot clear zone (similar to cutbacks for 3 phase power) would be appropriate. Further modifying cutting patterns in Town would help to mitigate hazards associated with the mud season in the Spring and decrease damage to power lines during a severe wind event.	**X**		**X**		**M**	**O**
Power supply	Town-wide	Private/Town	V	The power supply in Leverett is vulnerable to all hazards. Hire a consultant to develop an energy resiliency plan for Leverett, which should include a feasibility study for a microgrid and/or three phase power.	**X**	**X**	**X**	**X**	**H**	**S/L**
Water resiliency	Town-wide	Private	V	A potable water resiliency plan should be developed to ensure residents have access to water in the event of an emergency. This plan could include inventorying possible sources of water for fire suppression.	**X**	**X**	**X**	**X**	**H**	**S**

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Top Priority Hazards

Features	Location	Ownership	V/ S	Recommendations	Flooding	Extreme Temperatures	Fire	Drought	Priority **H** - **M** - **L**	Time **S**hort **L**ong **O**ngoing
Dry hydrants	Mill Pond, throughout Town	Town	S/V	Assess dry hydrants in Leverett for wildfire fighting capabilities. Dry hydrants are located near old Coke Kiln Bridge, Leverett Pond, and on Cave Hill Road and Shutesbury Road. Silt is clogging some of the hydrants, which could impact wildfire fighting efforts. The hydrants should also be periodically cleared.			**X**	**X**	**L**	**O**
Societal										
Emergency contact system	Town-wide	Town	S	Continue to raise awareness about the emergency contact system and get more residents to sign up for the program. The Town currently uses Blackboard Connect, but is looking into alternatives that will allow for more effective emergency communications.	**X**	**X**	**X**	**X**	**H**	**O**
Emergency Response Communication Systems	Town-wide	Town	S	Fire and police staff in Leverett use Verizon network extenders to maintain access to the internet in the event of a power outage. The Town strongly supports the installation of additional cell towers and Wi-Fi boosters to increase access for all residents.	**X**		**X**		**M**	**O**
Emergency planning public education	Town-wide	Town	S/V	Continue to educate the public on emergency plans, such as sheltering in place. The focus should be on educating all residents, and not just vulnerable populations.	**X**	**X**	**X**	**X**	**H**	**O**
Public information outreach	Town-wide	Town	S	Continue public information outreach initiatives started by the Board of Health to educate residents about the insect borne diseases.		**X**			**H**	**O**
Sheltering Plan	Town-wide	Town/Private	S/V	Review and expand the current sheltering plan to include warming/cooling centers. Cooling	**X**	**X**	**X**		**H**	**S**

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Top Priority Hazards

Features	Location	Ownership	V/ S	Recommendations	Flooding	Extreme Temperatures	Fire	Drought	Priority **H** - **M** - **L**	Time **S**hort **L**ong **O**ngoing
				centers are a current gap and should be a focus of the review. Public education and outreach should be conducted to provide better information about the Town's sheltering plan. The Town should develop a brochure to explain the resources available at each shelter and what would trigger activation.						
Environmental										
Insects and pests on farms	Regional/ Town-wide	Private	V	Join the regional mosquito district, or form one locally. Determine where urban gardens and pollinator habitats could be installed.			**X**		**M**	**O**
Lyme disease	Regional	Town	V	Conduct public education and outreach about Lyme disease.		**X**			**L**	**O**
Protected open space	Town-wide	Private/Town	S	There are many large areas of protected open space in Leverett. Additionally, W.D. Cowls actively works to remove hemlocks damaged by wooly adelgid, which helps to decrease the risk of wildfires in local forests.	**X**	**X**	**X**	**X**	**N/A**	**N/A**
Aquatic plants management	Leverett Pond	Town	V	Aquatic species management is needed at Leverett Pond.	**X**				**L**	**O**
Local forests	Town-wide	Public/Private	S/V	Climate resilient forestry practices should be adopted for Town land and privately owned land. Education and outreach should be arranged for private landowners and businesses.	**X**	**X**	**X**	**X**	**H**	**O**
Beaver dams	Town-wide	N/A	V	A comprehensive beaver inventory should be completed, in addition to a comprehensive management plan.	**X**		**X**		**H**	**O**
Localized Flooding	Teawaddle Brook, Roaring Brook,	Town	V	Hire a consultant to implement flood mitigation solutions on Teawaddle and East Leverett Road, Roaring Brook, and Doolittle Brook where flooding is a	**X**				**H**	**O**

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									H - **M** - **L**	**S**hort **L**ong **O**ngoing
	Doolittle Brook			problem using the hydraulic analysis prepared by FRCOG's engineer.						

Highest Priority Recommendations

- Work with a consultant to review zoning bylaws to encourage climate resiliency and incorporate findings from the MVP and Hazard Mitigation Planning processes into the zoning review.

- Hire a consultant to Implement flood mitigation solutions on Teawaddle and East Leverett Road, Roaring Brook, and Doolittle Brook where flooding is a problem using the hydraulic analysis prepared by FRCOG's engineer.

- Hire a consultant to develop an energy resiliency plan for Leverett, which should include a feasibility study for a microgrid and/or three-phase power.

- Develop and implement a communications plan for the Town. A plan should be made for infrastructural improvements and a village level plan to ensure residents have a way to communicate with one another during emergencies. Continue to enroll residents in the Town-wide emergency contact system.

- Review existing sheltering plan and update to include warming and cooling shelters. Investigate private/public agreements with businesses and community members. Prepare a brochure for residents to explain the resources available at each shelter and what type of hazardous even would lead to a specific shelter opening.

- Complete a drainage assessment to determine ways to prevent flash flooding on Dudleyville Road and other gravel roads that are deteriorating. The Town has already developed a Gravel Roads Committee to work on some of these issues and develop a long-range plan. The Committee will work to prioritize solutions, and determine the most cost effective options.

- Identify Town-owned forested areas that are at higher risk for wildfires (near residential areas, high-wire utilities, etc.) to implement climate resilient forest management practices that reduce the risk of fire hazards (such as the removal of slash). Coordinate with utility company for tree clearing work.

- Evaluate and implement nature-based solutions to increase flood resiliency on Long Plain Road and Teewaddle Hill Road.

- Use the results from FRCOG's 2020 *Town of Leverett Culvert Assessment* to prioritize repairs and replacements of culverts to build resiliency to severe storms and flooding events. Seek funding for the design and construction of high priority culverts.

- Hire a consultant to develop a potable water resiliency plan; investigate the feasibility of using artesian wells as a source of water during an emergency.

- Seek funding to install underground water tanks/cisterns at the Elementary School and the North Fire Station to provide water for firefighting and supplement dry hydrants and Sawmill Dam water sources that may be impacted by drought and climate change.

- Seek funding and technical assistance to develop a beaver management strategy to reduce the risk to infrastructure, private property and residents from flooding associated with beavers. Maintain communication with property owners on Richardson Road where a beaver dam is a known concern. Monitor additional beaver activity and impoundments in Town.

Moderate Priority Recommendations

- Consider joining the Pioneer Valley Mosquito Control District.

- Hire a consultant and/or work with the utility company to site additional cell towers and Wi-Fi boosters in Town to increase access to communication services for all residents.

- Implement a program to inventory Town trees so pruning or removal of trees/limbs will strategically reduce risks/hazards. Create a schedule to address priority areas, such as the sharp turns on Shutesbury Road. Meet bi-annually with the utility to ensure priority areas are included in the plan.

- Locate areas in Town where a 20-foot clear zone (similar to cutbacks for 3 phase power) would be appropriate. Further modifying cutting patterns in Town would help to mitigate hazards associated with the mud season in the Spring and decrease damage to power lines during a severe wind event.

Lower Priority Recommendations

- Continue to routinely remove aquatic species from Leverett Pond.

- Develop a public education program that covers insect borne diseases such as Lyme disease, West Nile Virus, and EEE.

- Assess dry hydrants in Leverett for wildfire fighting capabilities. Dry hydrants are located near old Coke Kiln Bridge, Leverett Pond, and on Cave Hill Road and Shutesbury Road. Silt is clogging some of the hydrants, which could impact wildfire fighting efforts. Periodically clear the dry hydrants in Town in order to ensure they are usable during an emergency event.

CRB Workshop Participants: Department/Commission/Representative:

Gail Berrigan, Leverett Conservation Committee
Jeff Baily, Leverett Elementary School
Andrew Smith, MA Executive Office of Energy and Environmental Affairs
Sharon Raskevitz, Leverett Cemetery Association
Joseph Raskevitz, Leverett Cemetery Association
Natalie Halasz, Leverett Library
Susan Nagy, Leverett Emergency Planning Board
Mike Fair, Board of Health
Jim Field, Emergency Management
Tom Hankinson, Select Board
Susan Mareneck, Historical Commission
Scott Minckler, Police Chief
Matt Boucher, Highway Department
John Ingram, Fire Department
Don Robinson, North Leverett Church/Community Member
Brian Cook, Fire Department
Tom Wolff, Leverett Alliance
Steve Freedman, Planning Board
Cong Chen, Community Member
Nick Bagley, Community Member
Tom Powers, Leverett MLP
Richard Nathhorst, Planning Board

CRB Workshop Project Team: Organization and Role

Town of Leverett

Marjorie McGinnis, Town Administrator
Lisa Stratford, Town Clerk

Franklin Regional Council of Governments:

Kimberly Noake MacPhee, Land Use and Natural Resources Program Manager
Megan Rhodes, Senior Land Use and Transportation Planner
Helena Farrell, Land Use and Natural Resources Planner
Xander Sylvain, Emergency Preparedness Program Assistant
Allison Gage, Land Use and Natural Resources Planner

Recommended Citation

Noake MacPhee K. Rhodes M. Farrell H. Sylvain A. Gage A. (2020) Town of Leverett Community Resilience Building Workshop Summary of Findings. Franklin Regional Council of Governments.

Photo credits:

Cover	Leverett Pond	Friends of Leverett Pond
Cover	North Leverett Sawmill	Lori Lynn Hoffer

All other photos not cited above were taken by the FRCOG.

Appendices

Maps

Exercise Outputs

Workshop Presentation

Community Survey

Public Comment Period Summary

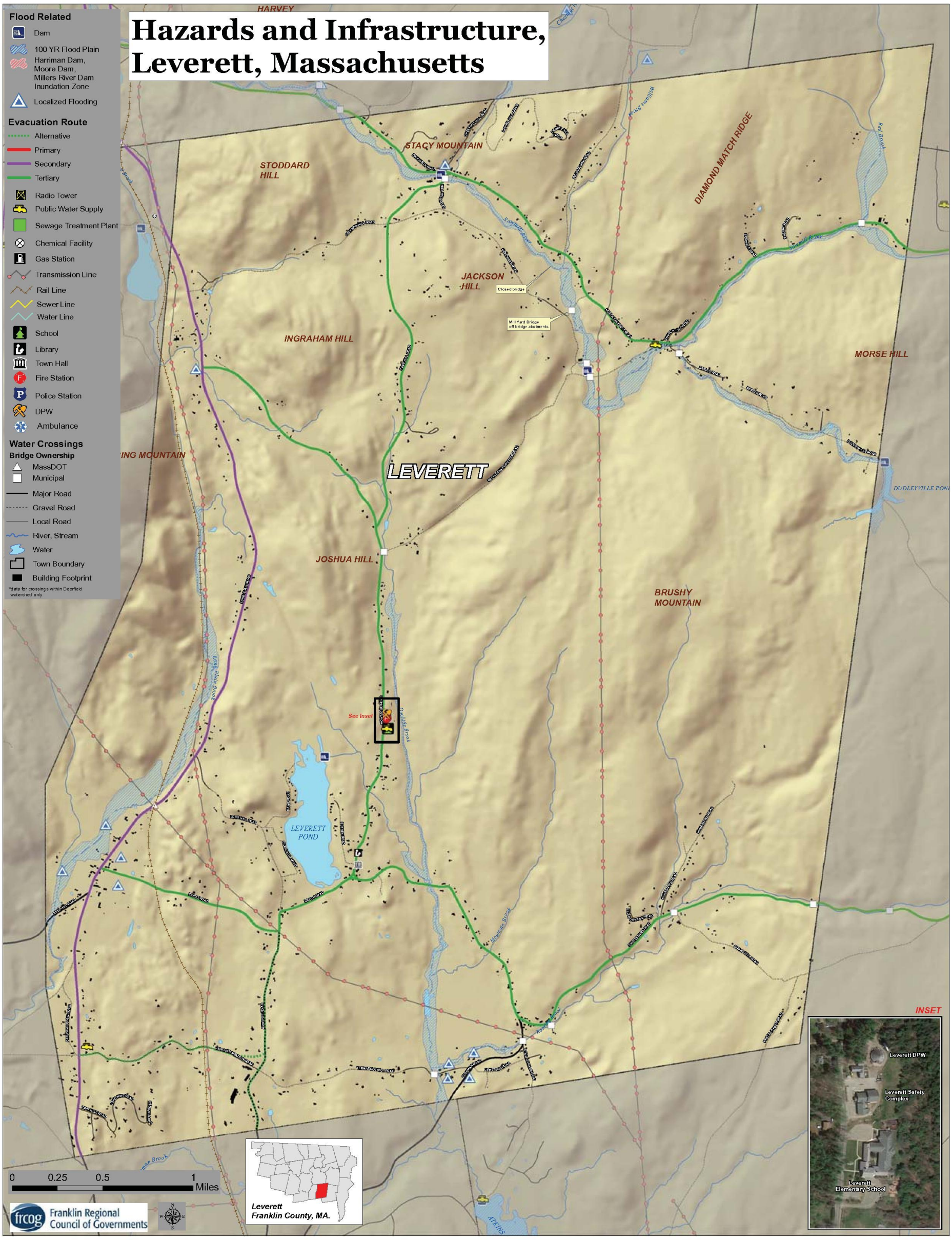
MVP Listening Session Presentation

Infographics

2020 Leverett Culvert Assessment

BASE MAP: Environmental

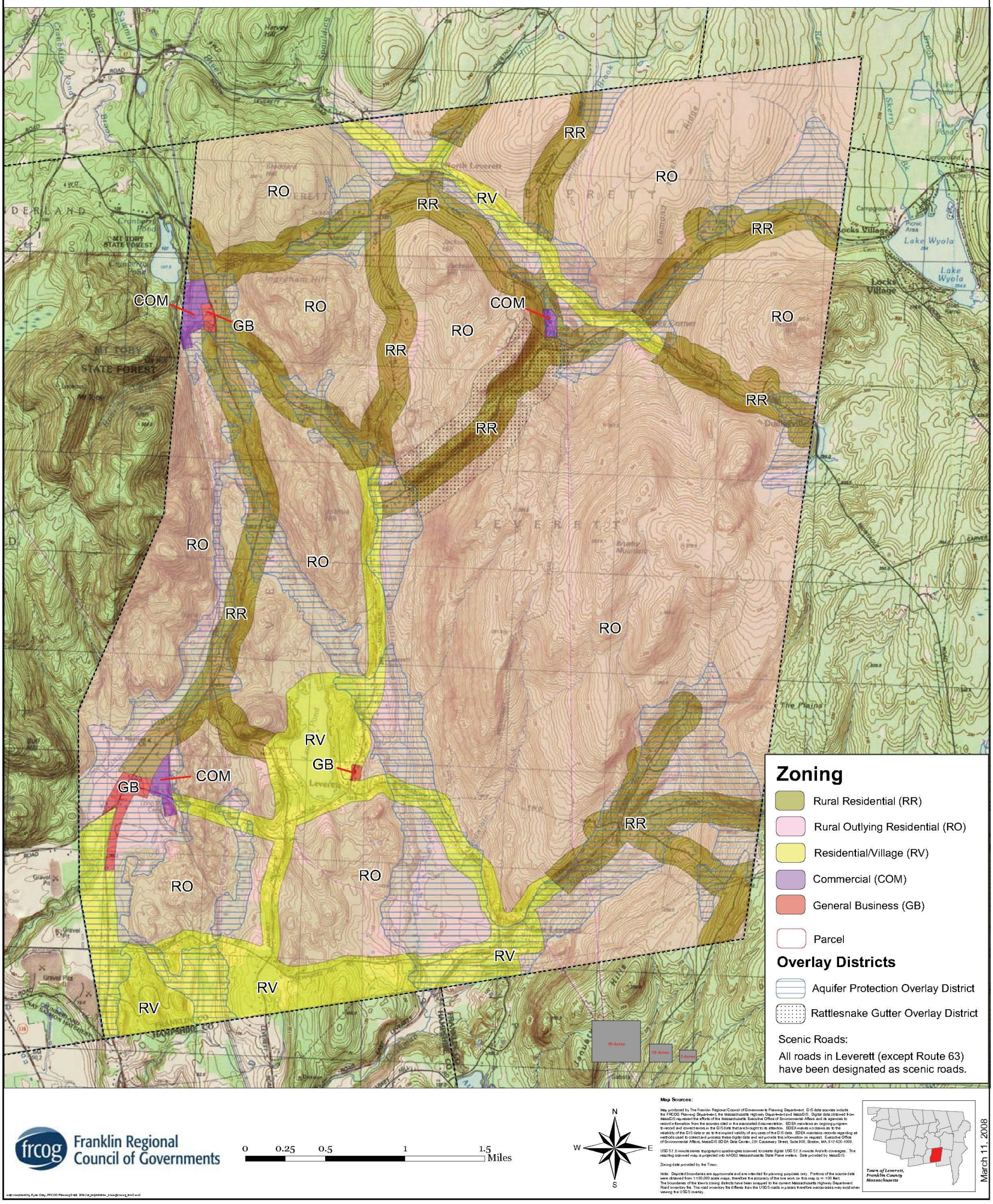
BASE MAP: Infrastructural and Societal



BASE MAP: Zoning

Town of Leverett
Official Zoning Map

March 11, 2008



Franklin Regional Council of Governments

0 0.25 0.5 1 1.5 Miles

N W E S

Map Sources:

Map produced by The Franklin Regional Council of Governments Planning Department. GIS data sources include the FRCOG Planning Department, the Massachusetts Highway Department and MassGIS. Digital data obtained from MassGIS represent the efforts of the Massachusetts Executive Office of Environmental Affairs and its agencies to record information from the sources cited in the associated documentation. EOEA maintains an ongoing program to record and correct errors in the GIS data that are brought to its attention. EOEA makes no claims as to the reliability of the GIS data or as to the implied validity of any uses of the GIS data. EOEA maintains records regarding all methods used to collect and process these digital data and will provide this information on request. Executive Office of Environmental Affairs, MassGIS EOEA Data Center, 251 Causeway Street, Suite 900, Boston, MA, 617-626-1000.

USGS 7.5 minute series topographic quadrangles scanned to create digital USGS 7.5 minute Arc/Info coverages. The resulting scanned map is projected into NAD83 Massachusetts State Plane meters. Data provided by MassGIS.

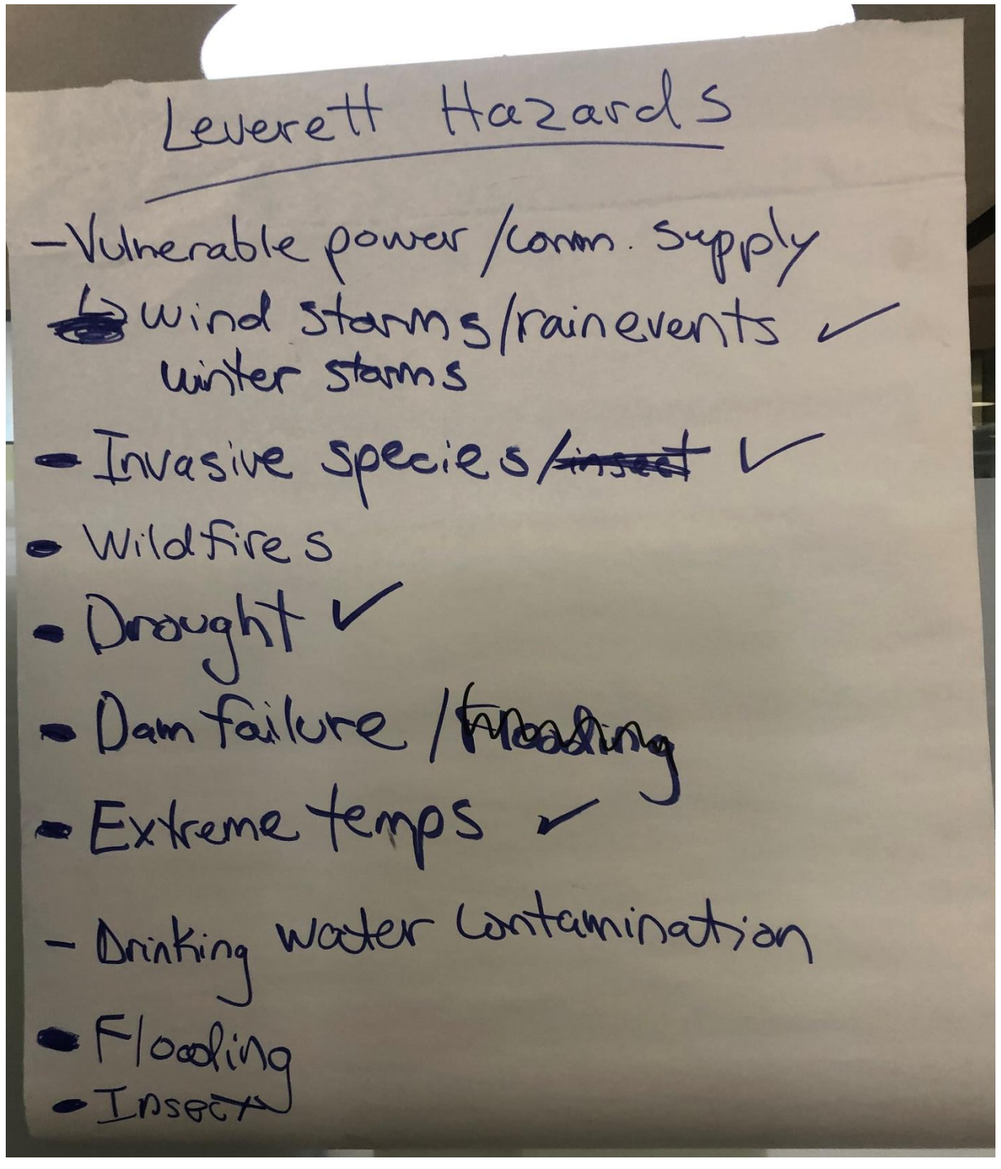
Zoning data provided by the Town.

Note: Depicted boundaries are approximate and are intended for planning purposes only. Portions of the source data were obtained from 1:10,000 scale maps, therefore the accuracy of the line work on this map is +/- 100 feet. The boundaries of the town's zoning districts have been snapped to the current Massachusetts Highway Department Road inventory file. The road inventory file differs from the USGS roads in places therefore inaccuracies may exist when viewing the USGS overlay.

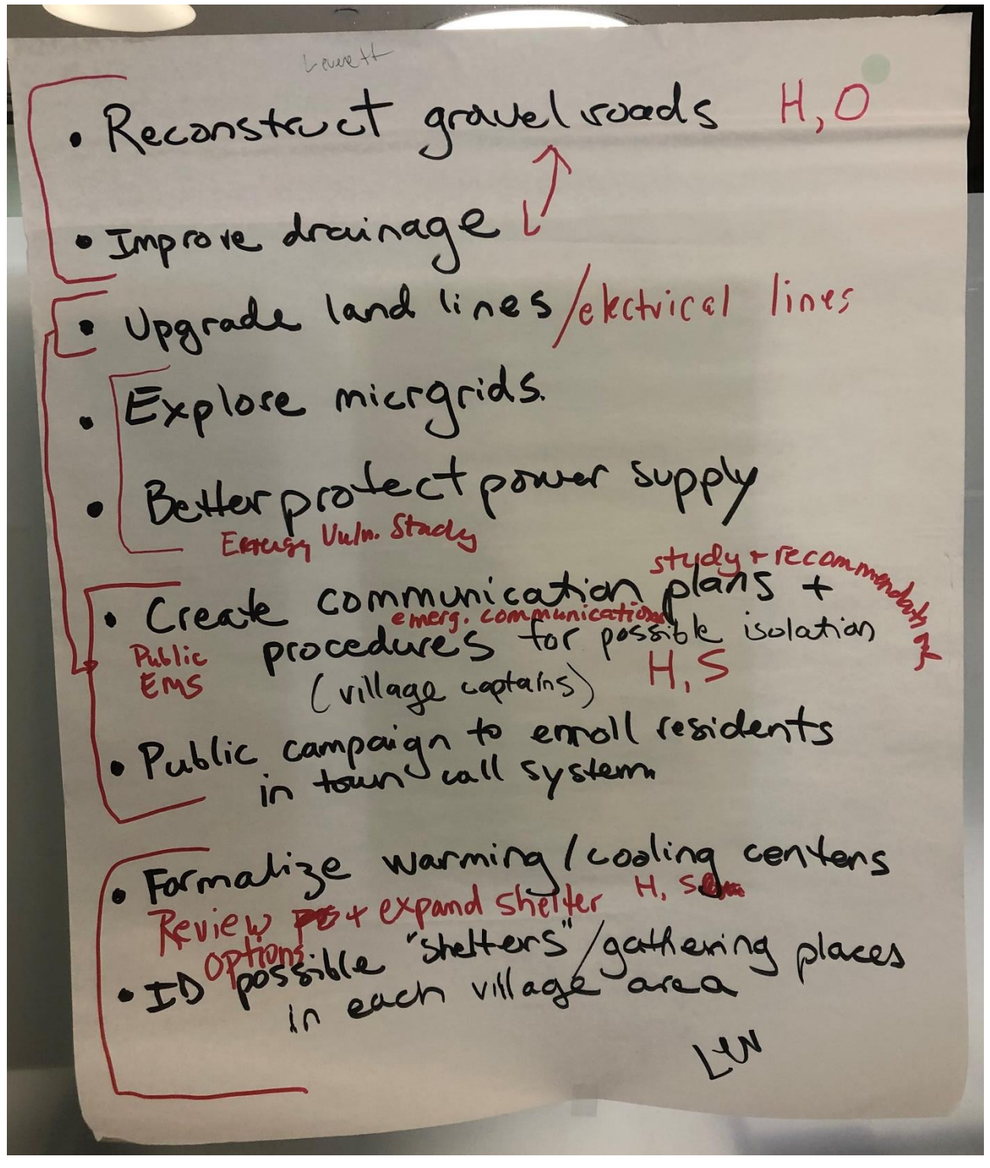
Town of Leverett, Franklin County Massachusetts

March 11, 2008

Top Hazards

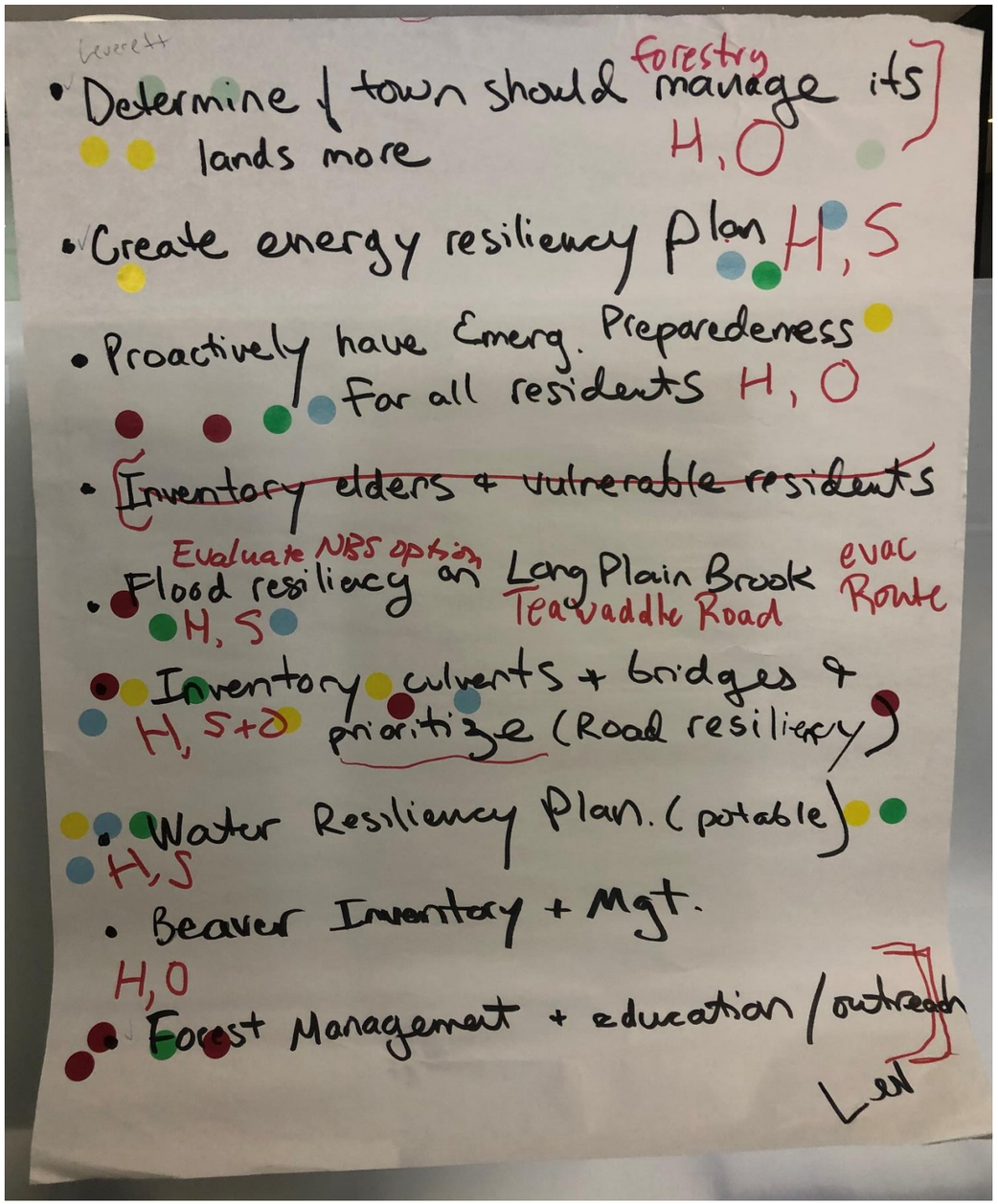


Recommendation Prioritization (1 of 4)

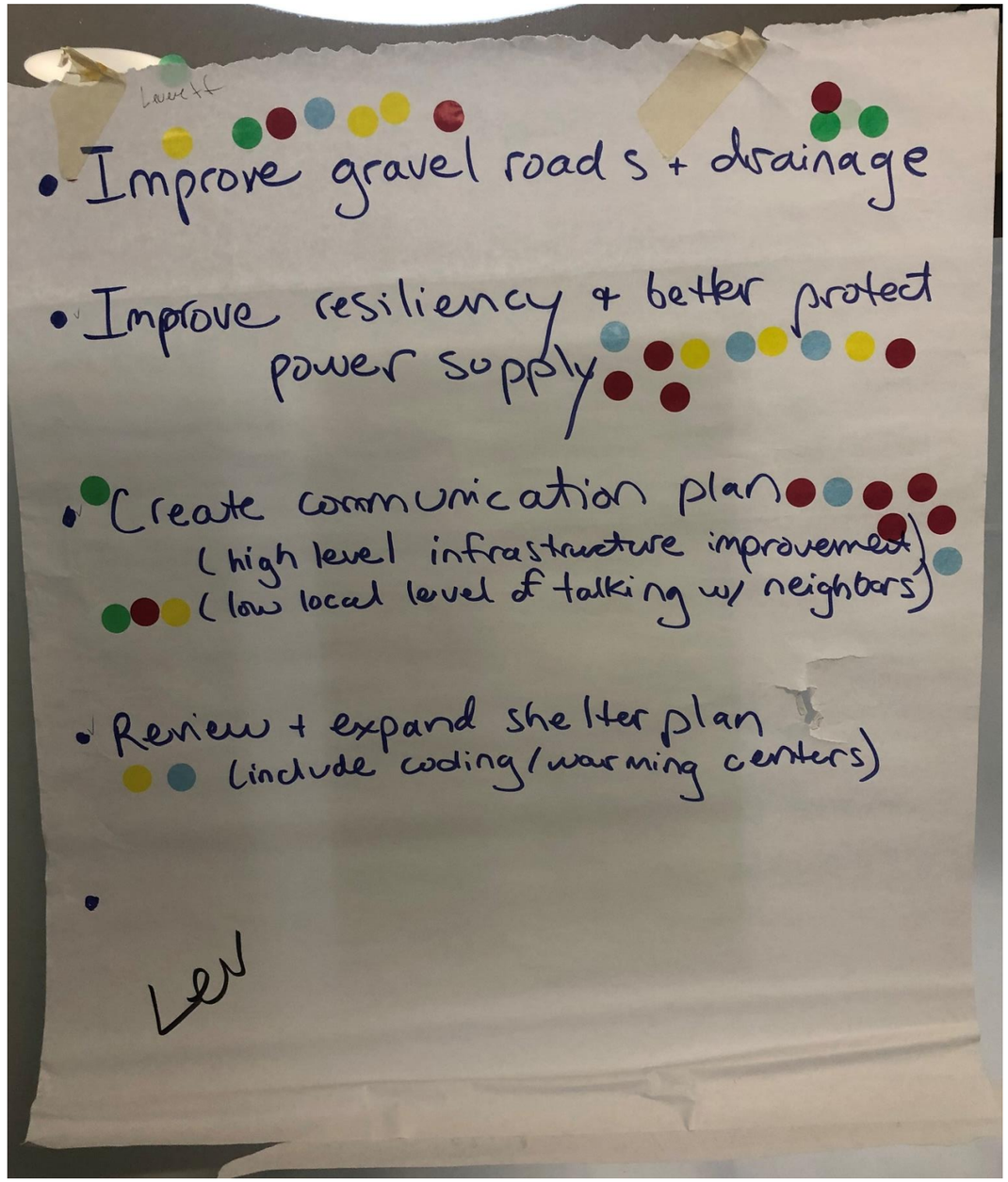


EXERCISE OUTPUTS (CONT.)

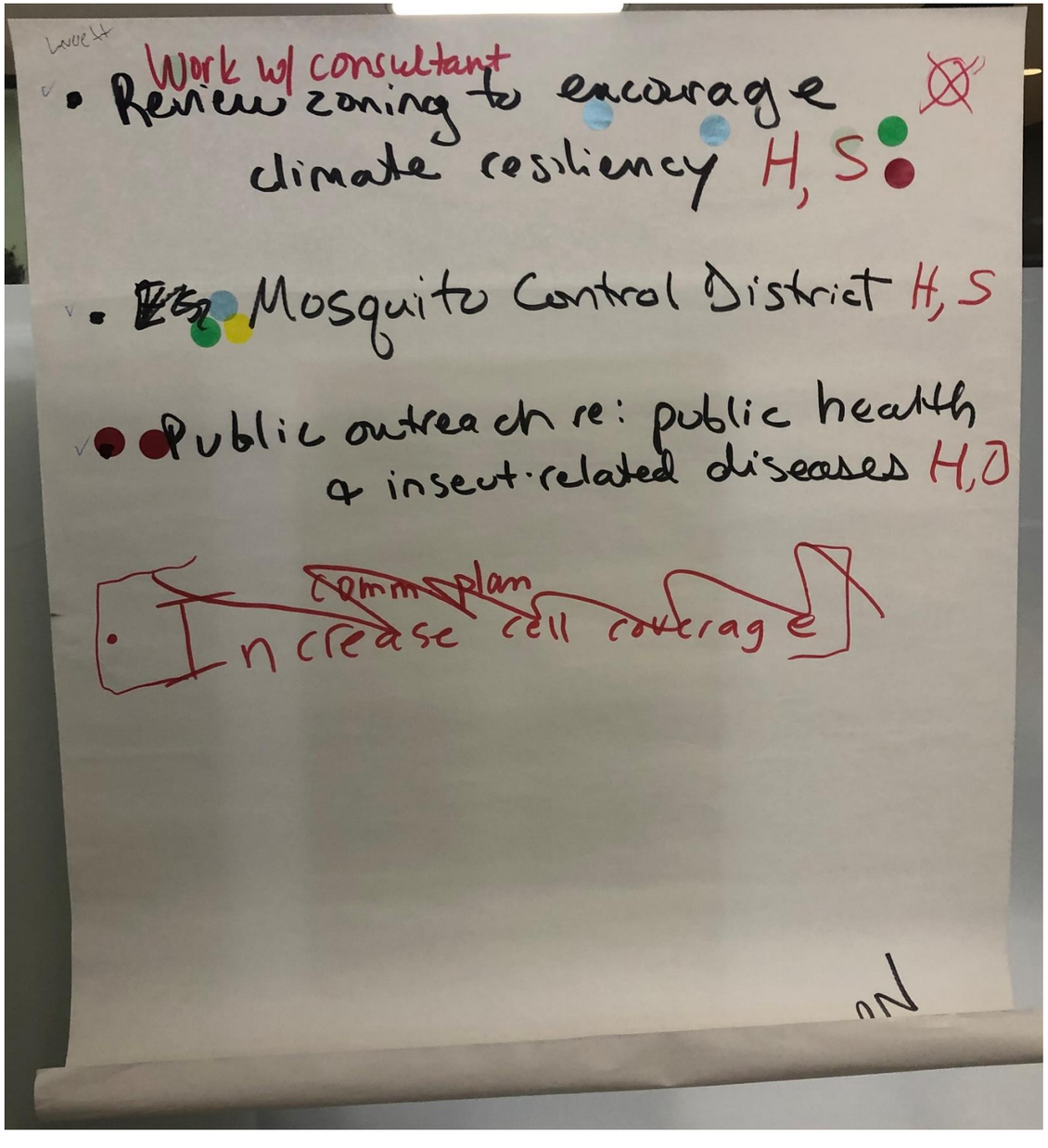
Recommendation Prioritization (2 of 4)



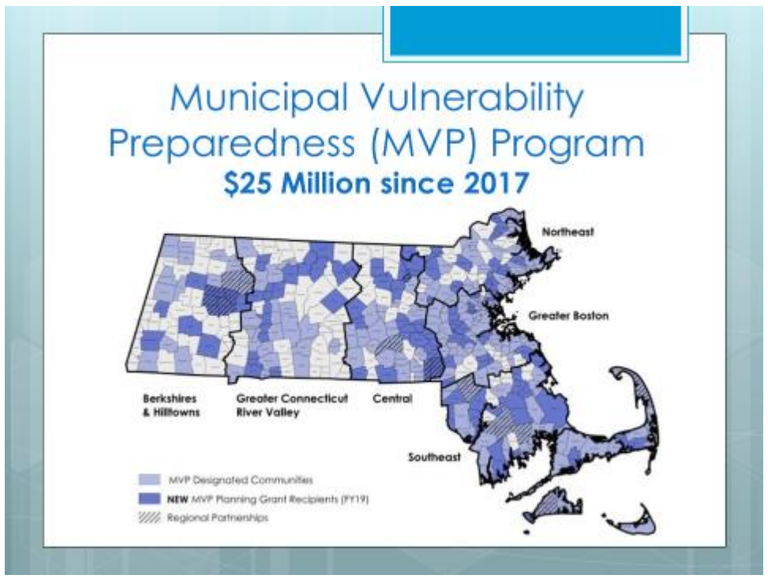
Recommendation Prioritization (3 of 4)

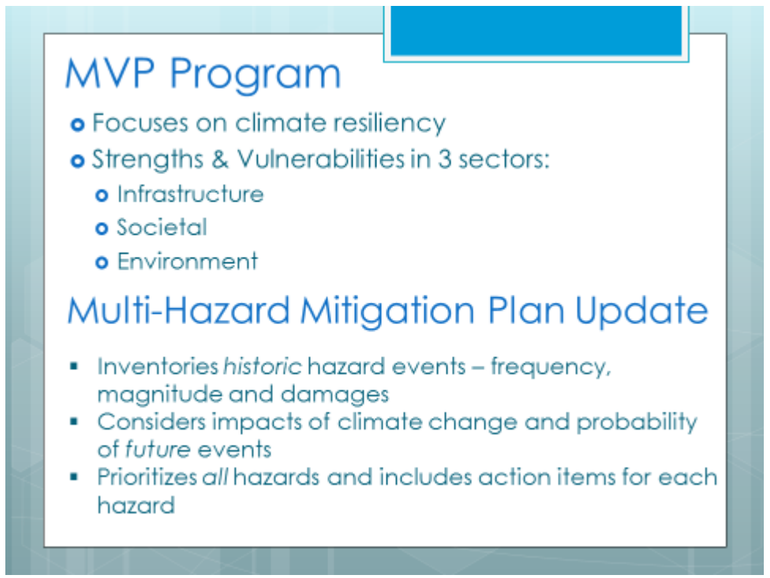


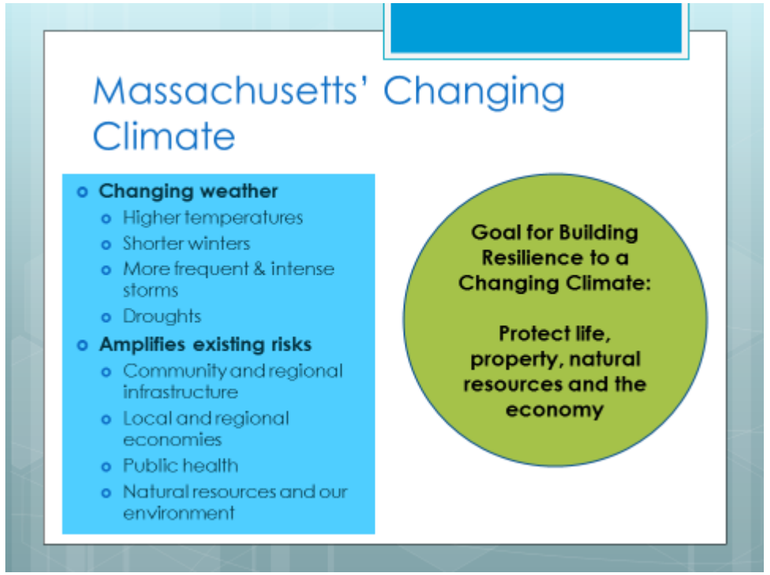
Recommendation Prioritization (4 of 4)



WORKSHOP PRESENTATION



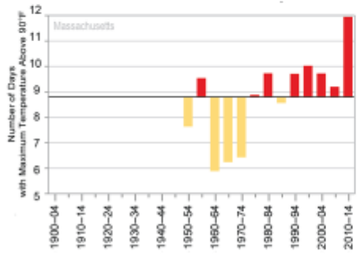




WORKSHOP PRESENTATION (CONT.)

Higher Temperatures

Change in Observed Number of Extreme Heat Days (>90 degrees)

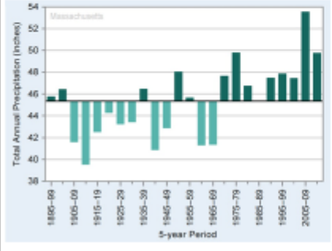


Heat Waves

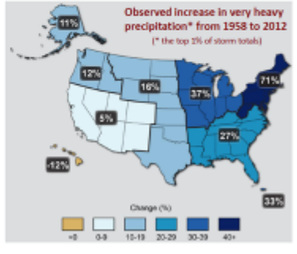
- Number of days >90° are predicted to increase.
- By 2050 - 6 to 25 more days
- By 2100 - 9 to 60 more days

Heavy Precipitation

Observed Annual Precipitation



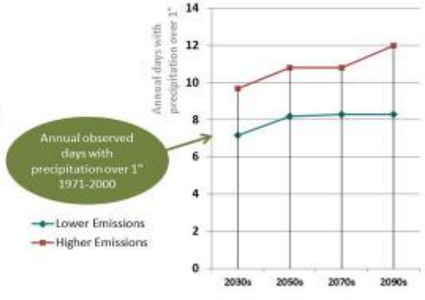
Observed Increase in Heavy Precipitation



Heavy Precipitation

Predictions

By the end of the century, our area could have 5 additional days of rainstorms that dump over 1 inch of rain.



Extreme Weather Events

- Tropical storms
- Tornadoes
- Thunderstorms
- Snow storms
- Drought

➢ The frequency, intensity, duration and geographic extent of these extreme storms is likely to increase.

Recent Severe Storms 2008 Ice Storm

2017 Conway Tornado

WORKSHOP PRESENTATION (CONT.)

Recent Severe Storms
2011 Tropical Storm Irene

Snowtober!!! 2011 Historic Nor'easter

Making tracks
Cross-country team nets 24-hour relay to raise money
PAGE B1

Pumpkin toss
Smashing pumpkins draws crowd to help flood victims.
PAGE C1

THE RECORDER
Serving the people of Franklin County and the North Quabbin Region
recorder.com
1792
MONDAY
OCTOBER 31, 2011

Snowstorm slams region

Thousands without power

THE RECORDER
Serving the people of Franklin County and the North Quabbin Region
1792
WEDNESDAY
NOVEMBER 2, 2011

Storm recovery slow

Widespread tree damage hampers line repairs

■ Storm

THE RECORDER
Serving the people of Franklin County and the North Quabbin Region
1792
TUESDAY
NOVEMBER 1, 2011

Area cold seek shelter

Residents flock to Turners high school

■ **Shelter:** People get warm, charge devices

THE RECORDER LOCAL
recorder.com
• TALK OF THE TOWNS • NATIONAL/WORLD NEWS
TUESDAY
NOVEMBER 1, 2011 — PAGE C1

100 percent of Gill still without power

Recent Severe Storms
2019 Microburst

Microburst wreaks havoc in Deerfield, Montague - The Recorder 7/31/2019

Montague and Deerfield took heavy damage from Tuesday afternoon's storm, with Eversource reporting about 800 power outages from downed trees and utility poles between the two towns.

In addition, the storm damaged crops and greenhouses.

October 16, 2019

The storm that brought heavy rain and damaging winds Wednesday night into Thursday morning is being referred to as a "bomb cyclone."

https://www.weld.com/weather/weather-news/what-is-a-bomb-cyclone

Infrastructure

A changing climate is exposing us to greater risk.

What is it?

- Roads and bridges
- Power grid
- Drinking Water
- Wastewater Treatment
- Communications
- Housing
- Emergency Response
- Schools

Vulnerabilities

- Increase in Precipitation and Extreme Storm Events
- Damages from Flooding, Wind Storms, Snow/Ice Storms, & Extreme Temperatures

Expected Impacts from Higher Temperatures

Infrastructure

Energy
- Increased demand will strain energy infrastructure
- Disrupt service (potential for widespread brownouts or blackouts)

Transportation
- More frequent maintenance required to address:
  - deterioration of asphalt roads
  - buckle railroad tracks
  - thermal expansion of bridges

WORKSHOP PRESENTATION (CONT.)

Societal (Leverett Residents)

A changing climate is exposing us to greater risk.

What is it?

- Availability of health care services
- Access to lifelines (food/water, emergency response personnel, etc.)
- Support networks that connect and maintain the supply of goods and services to vulnerable populations.

Vulnerabilities

- Vulnerable populations
  - Elderly
  - Low/moderate income
  - Special needs
  - Languages spoken

Effects of Climate Change on Town Residents (societal)

A changing climate is exposing us to greater risk.

- Heat-Related Illness and Death
- Danger from Storms & Flooding
- Insect-Borne Diseases
- Allergies & Pollen
- Waterborne Disease & Algal Blooms
- Vulnerable populations
- Shelters & services

Health impacts from a changing climate are magnified by individual health issues and circumstances of vulnerable populations

Environment

A changing climate is exposing us to greater risk.

Natural Resources

- Coldwater streams
- Forests
- Farmland
- Floodplains
- Habitat
- Wetlands
- Aquifers

Vulnerabilities

- Flooding
- Erosion
- Impacts to water quality and quantity
- Loss of species diversity
- Invasive pests and plants
- Wetland soils become less absorptive
- More stormwater runoff, less groundwater recharge

Let's Get Started!

- **Identify Past, Current and Future Hazards**
- **Determine Top Priority Hazards**
  - Which 4 hazards pose the greatest threat to the town currently and in the future?
- **Brainstorm resiliency actions for Infrastructure, Societal and Environmental vulnerabilities.**
  - Examples:
    - Upgrade culverts, flood-proof drinking water supplies
    - Evacuation drills and extreme weather communications protocols to protect vulnerable populations
    - Protect wetlands and floodplains to improve flood resiliency
- **Determine top priority Resiliency Actions for Leverett**

Let's Get Started!

Identify past, current, and future hazards

- What hazards have impacted your community?
- Where and how often have the hazards occurred?
- What effects will these hazards have on your community in the future (5, 10, 25 years)?
- What is exposed to hazards and climate threats within your community? For example, roads, elderly, natural resources.
- What have been the impacts to the town's operations and budgets, planning and mitigation efforts?
- Other concerns?

Community Survey

Public Outreach

The MVP Planning Committee identified local stakeholders who did not attend the workshop and mailed or emailed a follow up survey. The purpose of the survey was to identify how local businesses or community services have been impacted by natural hazards and what their concerns are as climate change continues to impact the Town. A total of two responses were received and their comments were incorporated into the plan as appropriate. Below is a copy of the survey stakeholders were asked to complete.

Leverett MVP Stakeholder Survey

Instructions: You may complete the survey **online** or by **mail**. Should you respond via mail, please use the enclosed envelope to do so. If you would like to quickly respond online please navigate to SurveyMonkey site via the following link: https://www.surveymonkey.com/r/LeverettCS.

You can also access the survey via the QR code if you use a smartphone. Open your rear-facing camera and hover it above this image and then open the link that pops up:

Thank you for your time!

1. What is your name and the name of your organization?

2. What type of service do you manage?
    a. Community mental health
    b. Assisted living
    c. General community services
    d. Medical services
    e. Other

3.

Extreme weather events in recent years have affected your service in recent years

a. Not at all
b. Somewhat
c. Moderate
d. Frequent
e. Extreme

4. Which hazards have interrupted your service in recent years?
    a. Flooding
    b. Drought
    c. Extreme Temperatures
    d. Invasive Species
    e. Other

5. Which aspects of your service are the most vulnerable to hazards?
    a. Treatment plans
    b. Access to clients
    c. Infrastructure
    d. Other (please detail)

6. Are you aware of how extreme weather or changes in climate could impact your services?
    a. Do you feel that you have adequate information on how your business could be impacted in the future?

7. What steps (if any) are you taking to safeguard your services against severe weather hazards? Some examples include developing an emergency plan, installing hurricane windows, basement drainage, partnering with other local businesses)
    a. If yes, please describe the actions taken.
    b. If yes, what hazard was the adaptation in response to?

8. Are there any steps you are planning to take?
    a. If yes, do you project any barriers to implement the changes?

9. What resources would be the most beneficial to you?
    a. Information on funding
    b. A workshop on how to prepare/enhance protection
    c. Detailed region/sector impacts
    d. Contact details for state or town officials
    e. Details on how future climate changes will impact my business
    f. A network of other small businesses in the area who face similar risks

10. Have you previously engaged your clients in issues relate to climate change or resiliency?
    a. If yes, what was your approach?
    b. If not, has your organization considered conducting outreach?

11. What could the Town do to support your continued success?

12. ***Any other information you would like to provide?***

Public Comment Period

A public listening session and public comment period were held to provide Leverett residents and Town Officials an opportunity to review and comment upon the draft Leverett MVP Resiliency Plan.

The public listening session was held as a standalone meeting on November 30th at 6:00 p.m. via zoom. FRCOG staff presented the MVP program as well as findings from the workshop, provided opportunities for feedback on the Town's top resiliency actions, and answered questions from attendees.

The following were in attendance:

- Margie McGinnis, Town Administrator
- James Field, Emergency Management Director
- John Ingram, Fire Department
- Matt Boucher, Highway Department
- Ray Bradley, Resident
- Richard Nathhorst, Planning Board
- Scott Minkler, Police Chief
- Tom Hankinson, Select Board

Participants provided feedback on the draft report attended and asked questions during the listening; comments are summarized below. Overall the meeting attendees were happy with the plan and the presentation.

Summary of comments from the November 30, 2020 Listening Session:

1. Participants were concerned with the increase in heavy precipitation events
2. Leverett Pond is important as water source for firefighting
3. Participants were interested in the Town taking on projects that address:
    a. Road infrastructure and drainage
    b. Reinforcing communication lines

We held a vote on which resiliency actions the Town should take on first and the following responses were recorded:

1. Inventory culverts, bridges, and prioritize repairs (3 votes)
2. Implement climate resilient forest management practices that reduce the risk of fire hazards (1 vote)
3. Improve gravel roads and drainage (1 vote)

The public comment period was held from November 30th through December 14, 2020, during which the public was invited to submit comments via email. No comments were received.

The public listening session and public comment period were advertised on the Town of Leverett's website. The press release, shown below, was provided to the local newspaper and the event was also

advertised via a flyer posted on the Town website.

FOR IMMEDIATE RELEASE

CONTACT: *Marjorie McGinnis, Town Administrator,* townadministrator@leverett.ma.us

LEVERETT RESIDENTS INVITED TO VIRTUAL MVP LISTENING SESSION

The Town of Leverett is hosting a public meeting to review the results of the Municipal Vulnerability Preparedness (MVP) Community Resilience Building Workshop, as well as the draft MVP Resiliency Plan, on Monday, November 30th at 6:00 p.m. via a Zoom webinar. Participants at the workshop, held in October 2019, included representation from the Leverett Fire, Police, and Highway Departments, Planning Board, Conservation Commission, Board of Health, Cemetery Association, Elementary School, Library, Emergency Planning, as well as interested residents. Workshop participants helped to define the top local natural and climate-related hazards of concern, identified existing and future strengths and vulnerabilities, and identified and prioritized actions and projects the Town can implement to increase resilience to climate change.

The MVP grant program, a program of the MA Executive Office of Energy and Environmental Affairs, provides support for cities and towns in Massachusetts to begin the process of planning for climate change resiliency and implementing priority projects. The state awards communities with funding to complete vulnerability assessments and develop action-oriented resiliency plans. Communities who complete the MVP program become certified as an MVP community and are eligible for MVP Action grant funding and other opportunities.

Public comments will be accepted during the meeting, and during a public comment period until December 14th. The public meeting notice with registration details, draft MVP Plan, and public comment information is posted on the Town's website at https://leverett.ma.us/n/6073/Leverett-Municipal-Vulnerability-Preparedness-Meeting.

Leverett
Municipal Vulnerability Preparedness (MVP)
Public Meeting

Photo courtesy of Friends of Leverett Pond

The Town of Leverett and the Franklin Regional Council of Governments invite Leverett residents to hear about and comment on the MVP Plan:

- ✓ **Attend the public meeting: November 30th at 6pm via Zoom**
- ✓ **Provide public comment between November 30 – December 14:**
  - **MVP Plan is located at https://www.leverett.ma.us**
  - **Submit a comment via email to Margie McGinnis, Leverett Town Administrator: townadministrator@leverett.ma.us**

WE WANT YOUR FEEDBACK!

Monday, November 30, 6:00 p.m.

Zoom Webinar

Please register in advance of the meeting

https://us02web.zoom.us/webinar/register/WN_QtmnlDGYTrWB8HY7M8RFdw

Photos courtesy of Friends of Leverett Pond and The Town of Leverett

Municipal Vulnerability Preparedness (MVP) Listening Session

Town of Leverett

November 30, 2020

Municipal Vulnerability Preparedness (MVP)

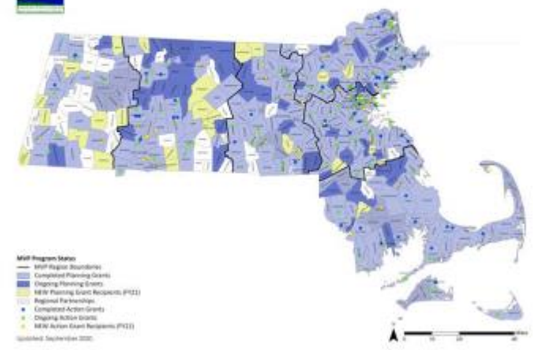
Executive Office of Energy and Environmental Affairs

- ✓ Provides support for MA municipalities to plan for climate change resiliency and implement priority projects.
- ✓ Provides a simple, straightforward process
- ✓ Certifies municipalities as MVP communities
- ✓ Can award communities with funding to complete vulnerability assessments and implement resilience projects

1. Engage Community → 2. Identify impacts & hazards → 3. Assess vulnerabilities & strengths → 4. Develop & prioritize actions → 5. Take action

Massachusetts Municipal Vulnerability Preparedness (MVP) Program Launched 2017

$44 Million to cities and towns since 2017



Municipal Vulnerability Preparedness (MVP)

Community Components

- Infrastructural
- Societal
- Environmental

Community Resilience Building Workshop

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

Workshop Participants

- Leverett Planning Board
- Police Department
- Fire Department
- Leverett Alliance
- Town Administrators
- Board of Health
- Emergency Management
- Highway Department
- Cemetery Association
- Leverett Library
- Elementary School
- Historical Commission
- Residents
- North Leverett Church

Benefits of having participants from different sectors/departments:

- ➢Local knowledge and experience
- ➢Working across departments / sectors
- ➢Reaching consensus

Changing Climate Variables

- Higher temperatures
- Increased precipitation
- More frequent & intense storms
- More frequent droughts

Amplify existing risks:

- ➢ Community and regional infrastructure &economies
- ➢ Public health and well being
- ➢ Natural resources and our environment

Goal for Building Resilience to a Changing Climate: Protect life, property, natural resources and the economy

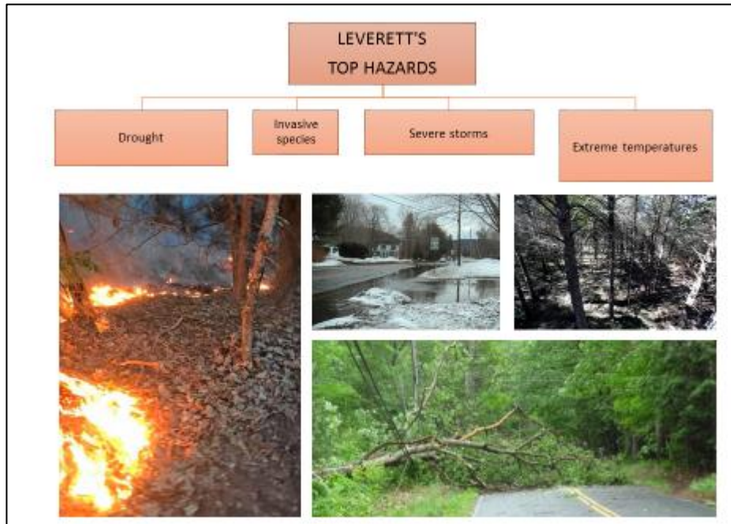
Workshop Outcomes

A climate resilient town will be able to maintain functions, protect its residents and emerge stronger and better prepared for future storm events and a changing climate.

The goal of building resilience is protect life, property, natural resources and the economy

What changes have you seen in the natural environment over the course of your lifetime?

Please comment using the chat box



Photos courtesy of the Hampshire Gazette, Harvard Forest, and the Town of Leverett

Leverett's Vulnerabilities

Areas of Concern

Infrastructure: Many unpaved roads with poor drainage; flooding on Route 63 from Long Plain Brook; emergency access routes; impassable roads during winter months; ice jams and flooding on Teawaddle Hill Road; flooding on Briggs Road and Dudleyville Road

Society: Emergency communication systems throughout Town due to several dead zones

Environment: Invasive species such as the hemlock wooly adelgid, Japanese knotweed, and Eurasian milfoil; dead brush in local forests; steep slopes; beaver dam flooding near Williams Brook/Richardson Road and throughout Town; overgrown vegetation on Long Plain Brook near Bull Hill Road

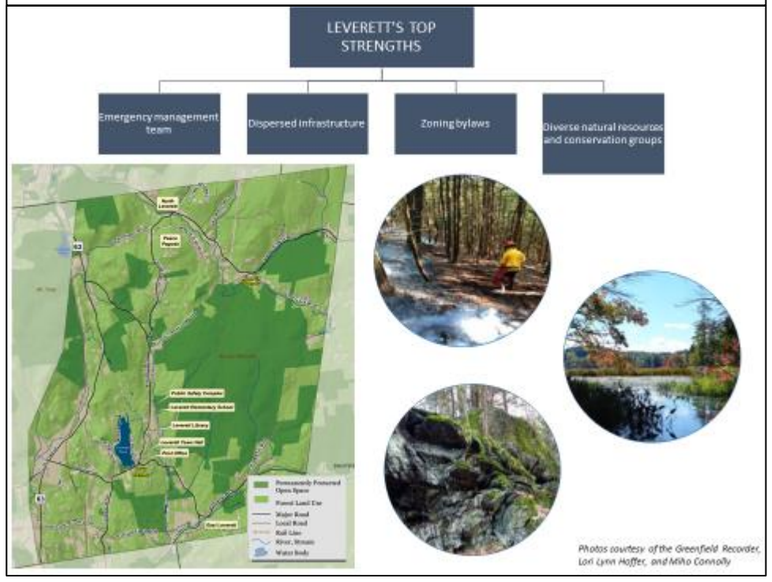
Which features of Leverett do you think are most vulnerable to climate change impacts?

Please comment using the chat box

Critical Facilities / Infrastructure:
- Roads and bridges
- Power grid
- Drinking Water
- Wastewater Treatment
- Communications
- Housing
- Emergency Shelters / Town Buildings
- Schools
- Access to Hospitals / Medical Facilities

Population / Society:
- Public health
- Access to lifelines (food/water, emergency response personnel, etc.)
- Vulnerable populations
- Public services
- Local / regional economy

Environment:
- Invasive species
- Wildlife and plant life
- Forests
- Farms
- Water quality
- Water supply
- Urban forests / street trees



Photos courtesy of the Greenfield Recorder, Lori Lynn Hoffer, and Mike Connolly

Leverett's Top Priority Recommendations

Develop an energy resilience plan	✓ Conduct a feasibility study for a microgrid ✓ Address risks to the power supply
Improve gravel roads and drainage	✓ Ensure all roads are accessible in an emergency
Inventory culverts, bridges, and prioritize repairs	✓ Assess condition of all culverts in Town and determine which need to be repaired or replaced
Develop a communications plan	✓ Develop a plan to prioritize and conduct infrastructure improvements
Develop a potable water resiliency plan	✓ Determine the location of artesian wells throughout Town ✓ Ensure residents who rely on well water have access to a backup water supply

High Priority Action Items from Leverett's Hazard Mitigation Plan

Implement a program to inventory Town trees so pruning or removal of trees/limbs will strategically reduce risks/hazards. **Create a schedule to address priority areas**, such as the sharp turns on Shutesbury Road. Meet bi-annually with the utility to ensure priority areas are included in the plan.

Identify Town-owned forested areas that are at higher risk for wildfires (near residential areas, high-wire utilities, etc.) to **implement climate resilient forest management practices that reduce the risk of fire hazards (such as the removal of slash).** Coordinate with utility company for tree clearing work.

Implement flood mitigation solutions on Teawaddle and East Leverett Road, Roaring Brook, and Doolittle Brook where flooding is a problem using the hydraulic analysis prepared by FRCOG engineer and recommendations from NRCS that successfully addressed flooding on Route 63/Depot Road. Utilize a team of NRSC and town officials to address the stream, which is not flowing correctly due to vegetative overgrowth.

Which resiliency action should Leverett pursue first?

Municipal Vulnerability Preparedness: NEXT STEPS

1. Endorse your MVP Plan
2. Apply for MVP Grants which can include:

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

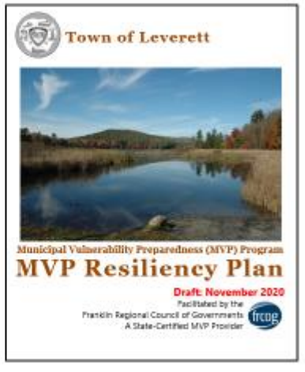
Municipal Vulnerability Preparedness (MVP)

Q & A

Ask in the **Q&A** or **raise your hand** to request microphone access

We need your input!

- Public Comment Period through December 14th
- The full draft plan is available at: https://www.leverett.ma.us
- Submit comments to Marjorie McGinnis, Town Administrator townadministrator@leverett.ma.us



Municipal Vulnerability Preparedness (MVP) Program

2020 Town of Leverett Report Summary

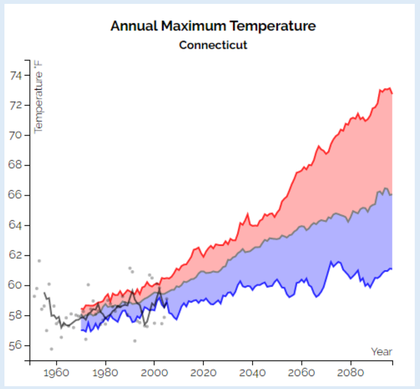
Facilitated by the
Franklin Regional Council of Governments
A State Certified MVP Provider

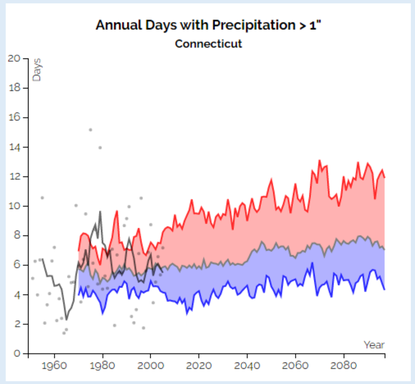
Overview

The Municipal Vulnerability Preparedness grant program (MVP) provides support for cities and towns in Massachusetts to begin the process of planning for climate change resiliency and implementing priority projects. Here in Franklin County, communities are experiencing more extreme weather events – especially heavy rains and flooding – along with higher temperatures and other climate-related conditions, increasing the urgency to address resilience and adaptation.

Climate Change Impacts

- Increased Temperatures
- Increased Precipitation
- More Extreme Weather





Data source: Resilient MA

Engage

Facilitated by FRCOG in Fall 2019, the Community Resiliency Building Workshop and Public Listening Session helped the town of Leverett to:

- Define top local natural and climate related hazards;
- Identify existing and future strengths and vulnerabilities;
- Develop prioritized actions for the community; and
- Identify opportunities to advance actions to increase resilience

Participants:

Select Board, Police Department, Planning Board, Town Administrator, Energy Committee, EMD, Board of Health, Conservation Commission, Historical Commission, Highway Department, Residents, FRCOG

Identify

Workshop participants discussed a number of hazards that impact Leverett, deliberating on how frequent, how intense and how widespread each hazard has been and could potentially be in the future. The top hazards identified for Leverett:

Leverett's Top Hazards

- Drought
- Invasive species
- Severe storms
- Extreme temperatures

Breakdown of Leverett's Top Vulnerabilities:

Infrastructural

Drainage on unpaved roads throughout Leverett is a concern to residents. This is not a historical issue – residents have become accustomed to roads freezing from November to April but that is no longer the case as seasonal temperatures change and roads are freezing less. Bridge closures during severe weather is also a top vulnerability. Closures can block the already limited emergency access routes available to responders and residents.

Societal

There is a need to conduct education and outreach about Leverett's sheltering plan. Residents expressed that they don't know enough about the current options and what conditions would trigger a shelter opening to the public. Leverett does not yet have any designated heating or cooling shelters, which will be needed as extreme temperature events become more common.

Environmental

The hemlock wooly adelgid is an invasive species of particular concern in Leverett, as it has already caused extensive damage to hemlock trees throughout Town. tree damage is a threat to Leverett's power and communication lines, and fallen trees due to invasive species may further exacerbate the issue. Fallen trees due to the hemlock wooly adelgid are hazardous even when not in proximity to power lines, because they may serve as biofuel during a wildfire. Participants noted the forest on Brushy Mountain is well maintained for invasives, but non-working forests throughout the Town are at the greatest risk of wildfires.

Municipal Vulnerability Preparedness (MVP) Program

2020 Town of Leverett Report Summary

Facilitated by the
Franklin Regional Council of Governments
A State Certified MVP Provider

3) Assess

Leverett has a number of strengths and assets, as identified by workshop participants. These include strong social, physical, and environmental infrastructure that increases the resiliency of communities in the face of climate change.

Leverett's Top Strengths

- Emergency management team
- Dispersed infrastructure
- Zoning bylaws
- Diverse natural resources and conservation groups

Breakdown of Leverett's Top Strengths:

Infrastructural

Each household in Leverett has its own septic and water system, which helps to prevent widespread outages of necessary infrastructure. The Town's records are all digitized, and the Town Administration is currently working on setting up an automatic backup program that will sync the Town's data once every hour.

Societal

Leverett has an active Emergency Management Committee, which is a useful resource for the Town during hazards. This Committee is known to communicate with residents, run shelters, visit residents who might need help during an emergency, and respond quickly and efficiently to resolve problems.

Environmental

Workshop participants noted that there are many protected open spaces throughout the town. Also, there are several active conservation groups in the town, such as the Friends of Leverett Pond, the Rattlesnake Gutter Trust, and the Conservation Commission. All of these groups help to advocate and protect open space in Leverett.

4) Develop

Strengthening infrastructure was a common theme in many of the recommendations to emerge from the workshop, all aimed at increasing resilience and reducing vulnerability to the impacts of climate change. The top five highest priorities are shown below.

Leverett's Highest Priority Recommendations

- Develop an energy resiliency plan
- Improve gravel roads and drainage
- Inventory culverts, bridges, and prioritize repairs
- Develop a communi-cations plan
- Develop a potable water resiliency plan

4) Action!

- ❑ Integrate MVP findings into Hazard Mitigation Plan update
- ❑ Endorse MVP Plans to become MVP communities
- ❑ Apply for MVP Action Grants

Eligible projects include:

- Vulnerability and risk assessment
- Education and communication
- Local bylaws and ordinances
- Redesigns and retrofits
- Nature-based solutions
- Ecological restoration and habitat management

TOWN OF LEVERETT
CULVERT ASSESSMENT

Fall 2020

Franklin Regional Council of Governments

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English: If this information is needed in another language, please contact the FRCOG Title VI Specialist at (413) 774-3167.

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Town of Leverett Culvert Assessment

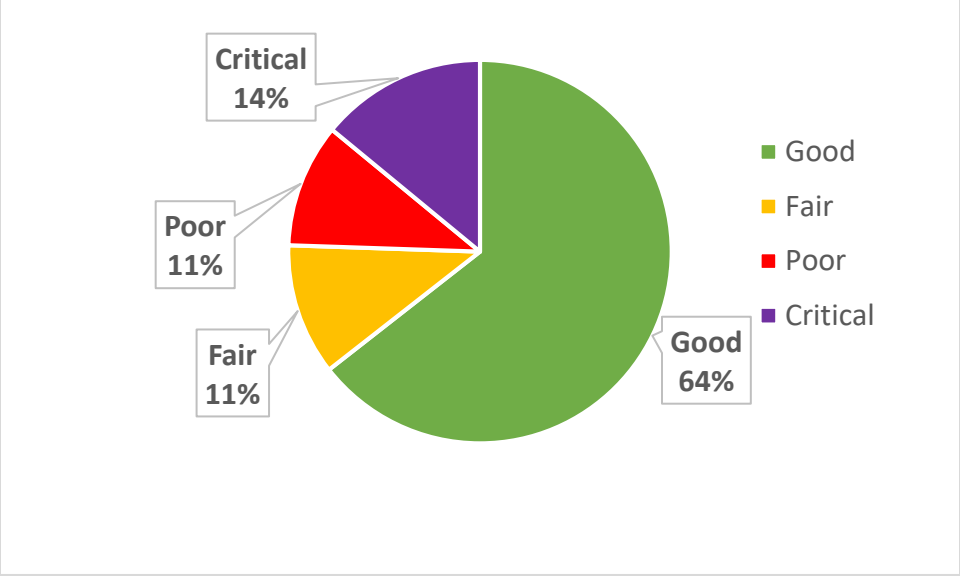
Fall 2020

Project Summary

In Fall of 2020, the Franklin Regional Council of Governments (FRCOG) conducted an inventory and assessment of the Town of Leverett's culverts. The work included: 1) locating every culvert and marking each inlet and outlet with GPS; 2) evaluating the physical state of each inlet, outlet, and the interior of the culvert, if visible; and 3) providing an overall Condition grade of each culvert's inlet and outlet. This project is intended to be a rapid assessment for a town's Highway Department and Select Board so that they can have an understanding of the location and condition of the town's culverts in order to prioritize maintenance and capital improvement planning.

This assessment took place from October to November 2020. FRCOG identified a total of approximately 310 culvert and drainage structures on Leverett's roadways. Of these, 64% were assessed as being in Good condition, while another 14% were identified as being in Critical condition needing immediate attention for either replacement or maintenance. Figure 1 below shows the condition breakdown of the condition of the Town's culverts.

Figure 1: Condition of Leverett's Culverts as of November 2020



Culvert Assessment

The FRCOG staff assessed all culverts and drainage structures on the town-maintained roads that they could locate. The assessments were conducted using the standardized guidance from the Culvert Condition Assessment Manual (2017) developed by the North Atlantic Aquatic Connectivity Collaborative (NAACC). FRCOG Staff evaluated various aspects of the culverts;

took pictures documenting the conditions at the time of the assessment; and noted any particularly unique situations. The final product is a database with each culvert's inlet and outlet given a unique identifier along with the accompanying details about their conditions and a photograph. In addition to the database, the FRCOG created both a hardcopy map and an interactive online map for the Town to use. The hardcopy map shows each culvert with its ID number and is color-coded by its Condition. The hardcopy maps have been designed so that they can be used in the field by Highway Department staff as they conduct maintenance. The online version of the map is interactive and users can click on each culvert to see its picture and view all of the data that is included in the database. The online map can be found here: https://arcg.is/CSiC8.

The FRCOG also added to the maps the location of the MassDOT-inspected bridges in Leverett for additional information. Those bridges will have MassDOT inspection reports available that provide very detailed information on those structures. MassDOT inspects bridges at least once every two years. Towns are sent copies of these reports when completed and can also be requested from MassDOT District 2.

The following section provides definitions for each of the fields within the Culvert Database.

Culvert Assessment Definitions

Culvert Number

This is the number assigned to the culvert. i = inlet, o = outlet. Example, 22i and 22o are the inlet and outlet for culvert #22.

Date

Date that the FRCOG staff conducted the assessment.

Size

Approximate diameter of the pipe.

Material

What material is the culvert pipe made of? Choices include:

- Plastic
- Metal
- Cast Iron
- Clay
- Concrete
- Other

Appurtenance (APPURTEN)

This describes the structure (if any) surrounding the inlet/outlet of the pipes that give support to the culvert end. Choices include:

- Headwall/Wingwall
- Apron
- Cover
- Metal grate
- Other

Appurtenance Material (APPUR_MAT)

The material that the appurtenance is constructed from. Choices include:

- Concrete
- Field stone
- Asphalt
- Other

Type of Crossing

This describes the type of the culvert. Choices include:

- Round
- Elliptical
- Open Bottom
- Box
- Drop Inlet

Percent Blockage

This describes how well water can enter or exit the pipe. What percentage is the inlet/outlet blocked? Choices include:

- 0%
- 25%
- 50%
- 75%
- 100%

Grade of Culvert

This describes how the inlets and outlets are situated relative to the stream grade. Is the inlet/outlet submerged? Can water flow easily into it? Is there a free fall of water from the outlet that could cause scour? Choices include:

- Submerged (pipe is below surface of ground/water level)
- At Grade (pipe is even with ground)

- Cascade (outlet is raised above the stream bottom such that water flows very steeply downward across rock or other hard material when flowing from the structure)
- Free Fall (outlet of the structure is above the stream bottom such that water drops vertically when flowing out of the structure)
- Free Fall to Cascade (outlet of the structure is raised above the stream bottom such that the water drops vertically onto a steep area of rock or other hard material, and then flows very steeply downward until it reaches the stream)

Free Fall/Submerged (FREEFALL_SUB)

The distance of the free fall from the outlet to the stream bed or the distance the pipe is submerged under the ground (measured in inches).

Condition

This is the overall grade assigned to each inlet and outlet based on the following criteria.

GOOD = Culvert is in good condition with no apparent need of service.

FAIR = May have small issues that need to be addressed or has a large free fall (>10") that could lead to scour and erosion problems. If a culvert was blocked by 25% then it was assigned as Fair.

POOR = Has issues that should be addressed soon before they become critical. May have issues that are affecting performance of culvert and/or is 50% blocked.

CRITICAL = Has issues that are currently impacting performance and could lead to failure. May be blocked 75-100%. Immediate attention may be necessary for either replacement or simply maintenance.

For questions or updates to the culvert and bridge database and/or map, please contact:

Megan Rhodes, Senior Transportation Planner at (413)774-3167 x132 or mrhodes@frcog.org

Ryan Clary, Senior GIS Planner at (413)774-3167 x 124 or rclary@frcog.org.