



2019 ANNUAL
CONFERENCE & EXHIBIT

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RESILIENT STRATEGIES IN A RURAL NON-COASTAL COMMUNITY

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January 28, 2019



Presentation Outline

Overview of Ayer Community, Infrastructure, DPW Operations

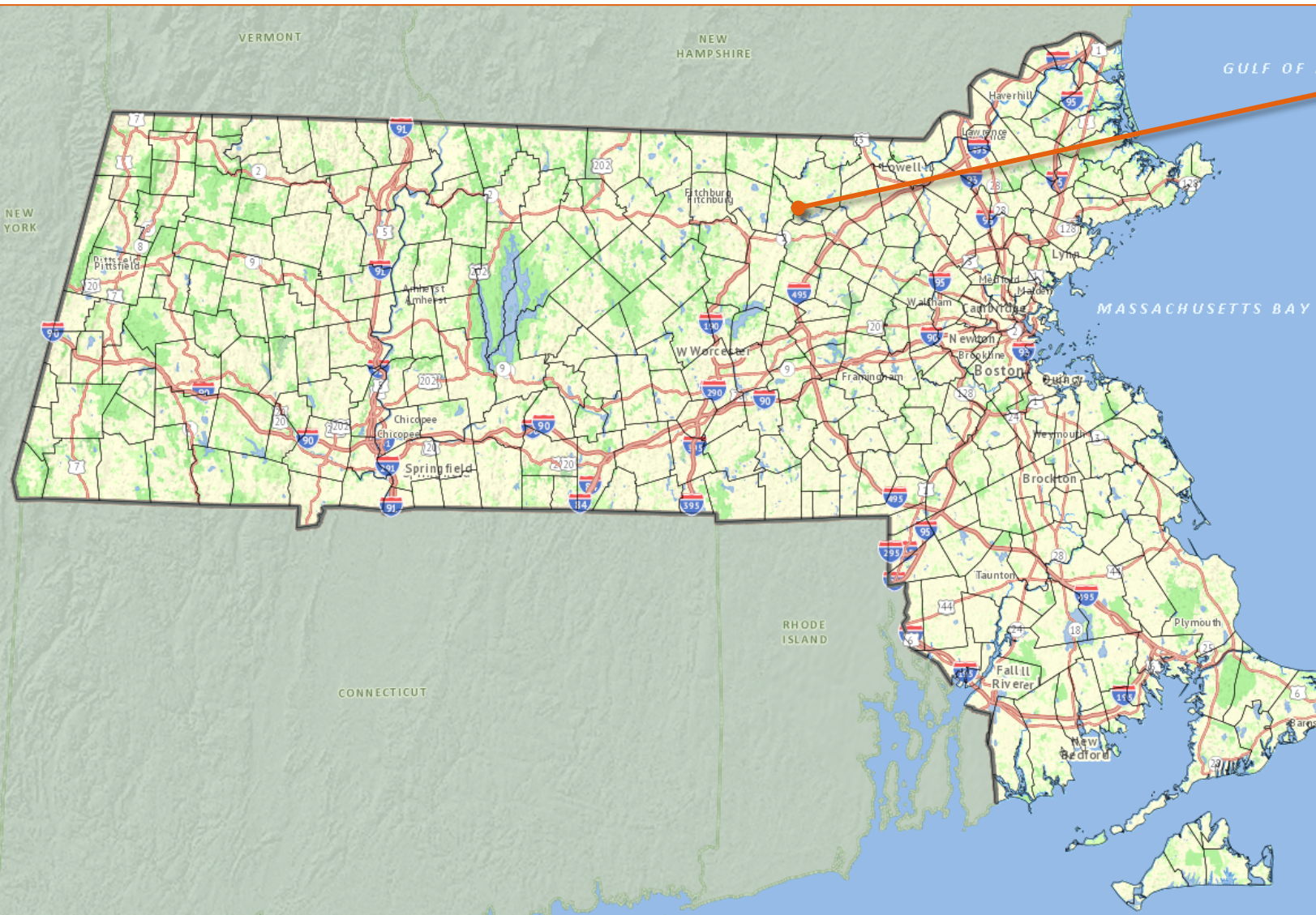
Resiliency Planning – Who, what, why

Municipal Vulnerability Preparedness - MVP

What have we done?

Where do we want to go?

Community Overview



Town of Ayer

Location

- Most western town in Middlesex County

Population

- 7,600

Area

- Total: 9.6 mi²
- Land: 9.0 mi²
- Water: 0.6 mi² (5.75%)

DPW Operations

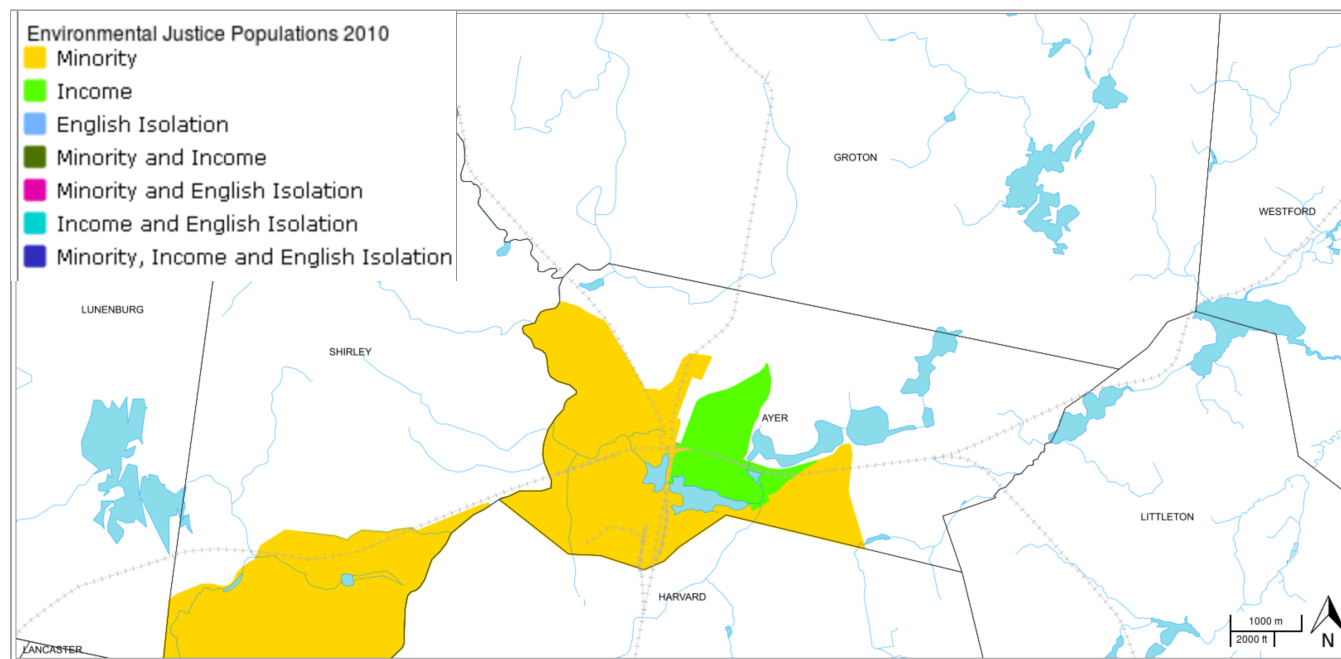
- Municipal water, wastewater, highway, stormwater and solid waste operations

Land Use in Ayer

Table 3: Land Use by Community

Community	Forest		Residential		Commercial & Industrial		Agricultural		Wetlands & Water		Transportation		Other		Total
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
Ashburnham	19428	74.13%	1721	6.57%	53	0.20%	618	2.36%	3940	15.03%	7	0.03%	442	1.69%	26209
Ashby	12055	78.25%	1166	7.57%	35	0.23%	891	5.78%	916	5.94%	1	0.01%	342	2.22%	15406
Athol	16135	75.57%	1885	8.83%	258	1.21%	450	2.11%	1817	8.51%	126	0.59%	682	3.19%	21352
Ayer	2475	40.70%	846	13.92%	519	8.53%	133	2.18%	349	5.74%	951	15.64%	809	13.29%	6082
Clinton	1336	28.75%	246	5.28%	1225	26.36%	75	1.61%	80	1.72%	1106	23.80%	580	12.48%	4647
Devens	1885	42.17%	147	3.28%	241	5.39%	17	0.37%	407	9.11%	221	4.96%	1551	34.70%	4470

Vulnerable Populations



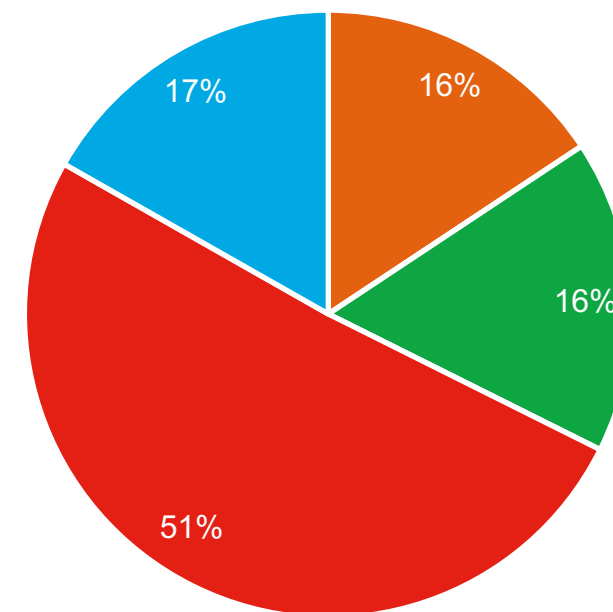
In Massachusetts a community is identified as an Environmental Justice community if any of the following are true:

- Median household income at or below 65 percent of the statewide median income
- 25% or more of the residents identify as a race other than white; or
- 25% or more of households have no one over the age of 14 who speaks English only or very well - English Isolation

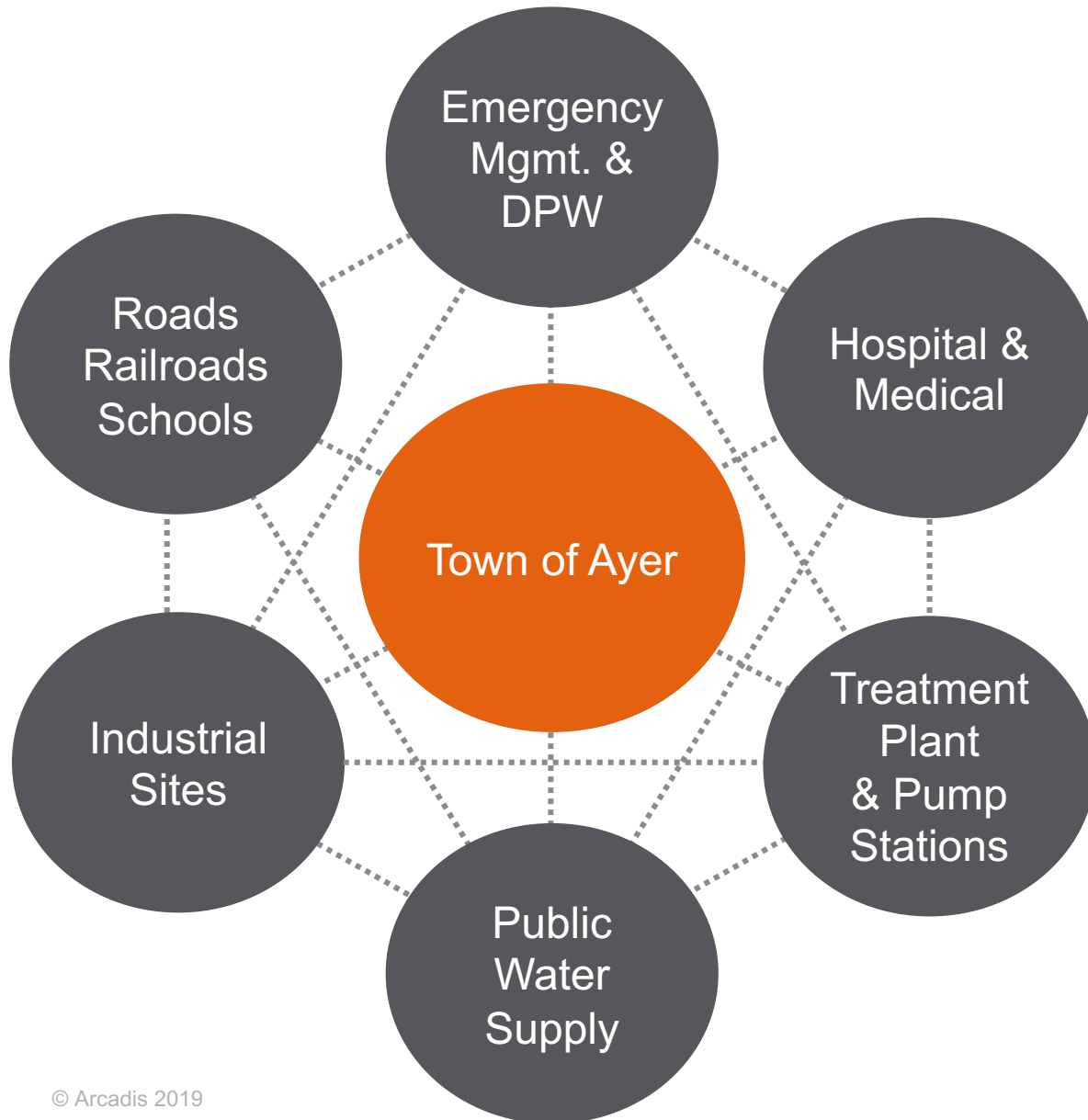
Source: <https://www.mass.gov/info-details/environmental-justice-communities-in-massachusetts>

Ayer Population by Age

0-19 20-34 35-64 65+



Source: U.S. Census, American Community Survey, 5- year estimates, 2013-2017



Critical Facilities

Ayer Implements:

Reverse 911

Shelter identification and public notification of locations

Evacuation Routes identified

- Open house at Fire Department
- Emergency Response Team
- Emergency Committee with Regional School District

Current Town Planning Efforts

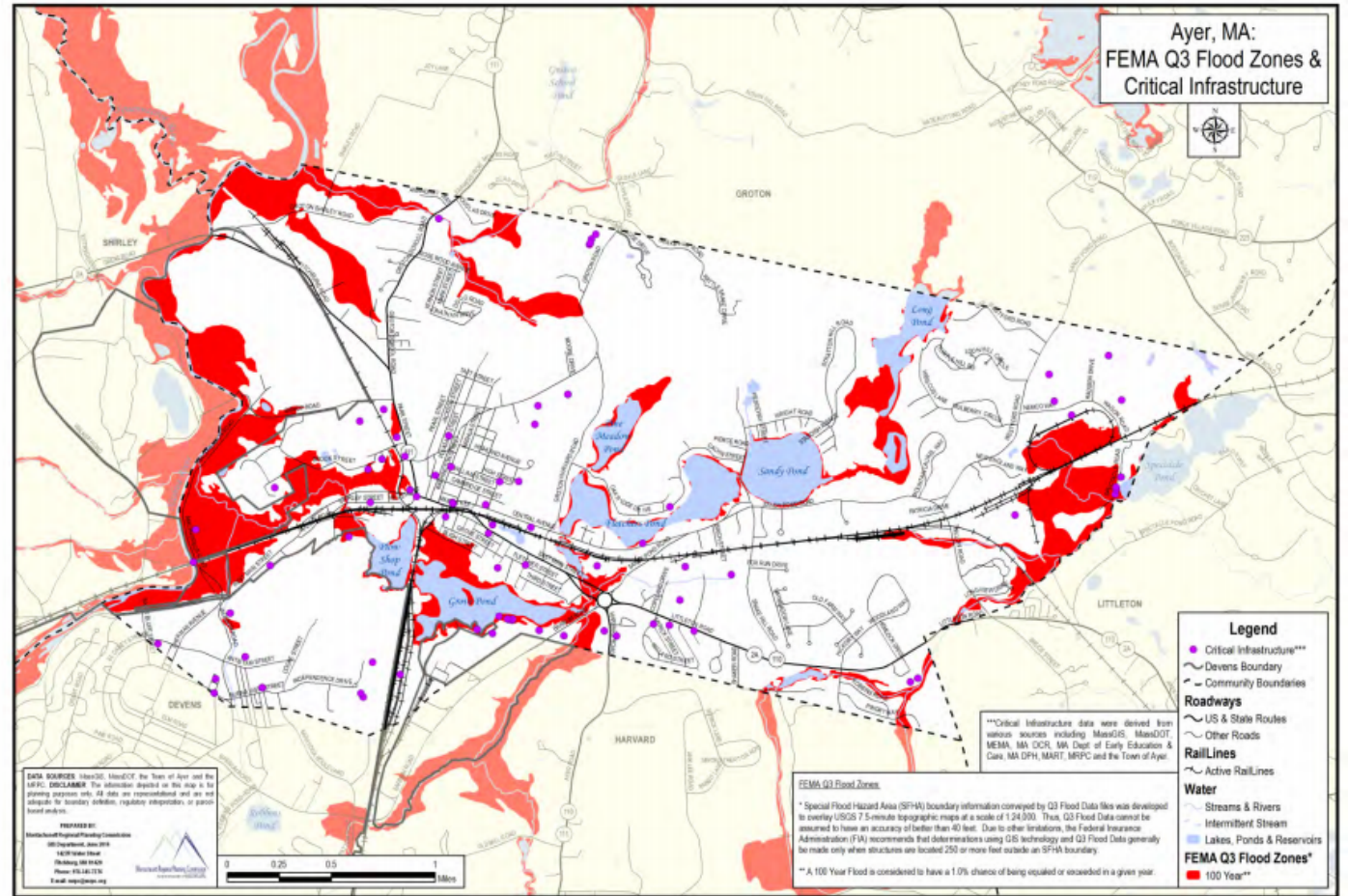
Hazard
Mitigation Plan

Comprehensive
Emergency
Management
Plan

Water Supply

Joint Emergency
Preparedness
Committee

Emergency
Planning Tools
for Residents



Next: MA Municipal Vulnerability Preparedness Program

Existing Citizen Action Tools

Town of Ayer
Massachusetts

About Ayer | Departments | Boards & Committees | Community

Home

Public Safety

- Police Department
- Fire Department
- Emergency Management**
- Department of Public Works
- CodeRed Citizen Notification
Receive Community Information by phone, text, email.
- Sex Offenders
- Domestic Violence
- Ayer Police Safety Tips

Home » Departments » Fire Department

Emergency Management

- CodeRed - Emergency Notification System
- Emergency Preparedness Checklist
- Emergency Preparedness Video
- Emergency Supplies List
- Massachusetts Alerts Smart Phone App.
- MEMA Website**
- MEMA News Release Family Hurricane Preparedness
- MEMA Press release relative to structural and roof collapse issues
- MEMA Tips for Preparing for a Storm
- Montachusett Region Hazard Mitigation Plan - May 2016
- National Grid Winter Safety Information
- Power Outages Safety Tips
- Protecting Your Property during a Hurricane
- Snow & Freezing Temperature Dangers

Emergency Kit Checklist

- 3 days of nonperishable / non-cook food
- water (1 gal. per day per person), medication
- flashlight, battery operated radio, extra batteries
- first aid kit, cash, cell phone and charger
- TD cards information: (Dr., meds, allergies) family / friends

Dangers Related To Snow Accumulation And Freezing Temperatures Remain

Clearing around gas appliance vents and meters and reporting gas odors still a priority

February 18, 2015 CONTACT: Media Relations – 781-907-3980

National Grid is urgently asking Massachusetts and Rhode Island news media to continue to remind home and businesses owners that they must protect themselves from dangers associated with the record snow and cold the region is experiencing. This includes:

- Remove snow and ice that is overhanging natural gas meters and service lines. Falling ice and snow can damage this equipment and result in gas leak. Use caution and using a brush or broom is recommended.
- Take immediate action anytime you suspect a natural gas leak
- Be very cautious when working close to power lines when clearing snow and ice from roofs and around power lines
- Clearing snow from around furnace and other gas appliance vents. Failing to do so could cause deadly carbon monoxide (CO) to back up into buildings

Here are some things to remember:

Natural Gas Leaks

- All occupants should leave the house immediately. Do not use the telephone or light switches for any reason
- After leaving the house and reaching a safe environment, call the National Grid 24-hour gas emergency number: MA: 1-800-233-5325, RI: 1-800-840-1595
- Do not return to your home until National Grid tells you it is safe

Snow Clearing Safety

- Be aware of your gas meter and piping location before snow plowing or snow blowing; mechanized equipment can cause damage or leaks if it comes in contact with equipment
- Heavy snow loads and ice could damage the connections of your electric and gas service to your building
- Look at the electric connection point from a safe distance to be sure it hasn't been pulled away from the building
- Keep all ladders, shovels, roof rakes and other devices well clear of any lines coming from the street to the structure, regardless of material
- As snow is removed from roofs, decks and other overhangs, be aware of what is below that could become buried as snow hits the ground. Be especially mindful of the location of your electricity and gas meters as they could be damaged by falling snow and ice

Carbon Monoxide

- If you suspect carbon monoxide is present in your home, go outside immediately and breathing deeply, then call 911. If symptoms, such as dizziness and nausea, are severe, get

Why Plan?

re·sil·ience

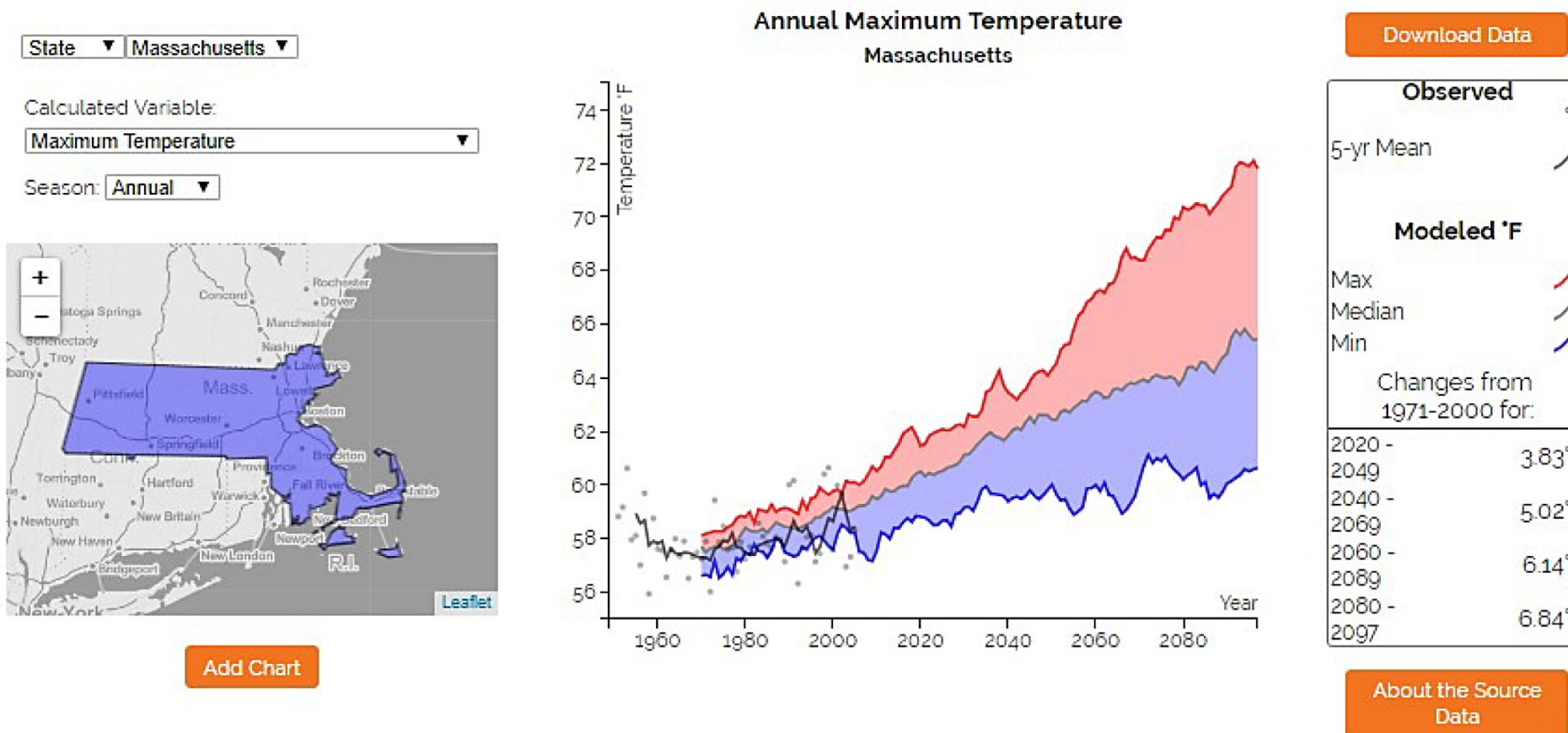
rə'zilyəns/

noun

1. the ability of a strained body to recover its size and shape after deformation caused especially by compressive stress
2. an ability to recover from or adjust easily to misfortune or change



Massachusetts Temperature Changes



<http://www.resilientma.org/datagrapher/?c=Temp/basin/maxt/JJA/SuAsCo/>

Climate Change Impacts

	Climate Driver	Exposure	Health Outcome	Impact
<p>Extreme Heat</p>	More frequent, severe, prolonged heat events	Elevated temperatures	Heat-related death and illness	Rising temperatures will lead to an increase in heat-related deaths and illnesses
<p>Outdoor Air Quality</p>	Increasing temperatures and changing precipitation patterns	Worsened air quality (ozone, particulate matter, and higher pollen counts)	Premature death, acute and chronic cardiovascular and respiratory illnesses	Rising temperatures and wildfires and decreasing precipitation will lead to increases in ozone and particulate matter, elevating the risks of cardiovascular and respiratory illnesses and death.
<p>Flooding</p>	Rising sea level and more frequent or intense extreme precipitation, hurricanes, and storm surge events	Contaminated water, debris, and disruptions to essential infrastructure	Drowning, injuries, mental health consequences, gastrointestinal and other illness	Increased coastal and inland flooding exposes populations to a range of negative health impacts before, during, and after events
<p>Vector-Borne Infection (Lyme Disease)</p>	Changes in temperature extremes and seasonal weather patterns	Earlier and geographically expanded tick activity	Lyme disease	Ticks will show earlier seasonal activity and a generally northward range expansion, increasing risk of human exposure to Lyme and disease-causing bacteria.
<p>Water-Related Infection (Vibrio vulnificus)</p>	Rising sea surface temperature, changes in precipitation, and runoff affecting coastal salinity	Recreational water or shellfish contaminated with Vibrio vulnificus	Vibrio vulnificus induced diarrhea & intestinal illness, wound and bloodstream infections, death	Increases in water temperatures will alter timing and location of Vibrio vulnificus growth, increasing exposure and risk of water-borne illness.
<p>Food-Related Infection (Salmonella)</p>	Increases in temperature, humidity, and season length	Increased growth of pathogens, seasonal shifts in incidence of Salmonella exposure	Salmonella infection, gastrointestinal outbreaks	Rising temperatures increase Salmonella prevalence in food, longer seasons and warming waters increase risk of exposure and infection.
<p>Mental Health and Well-Being</p>	Climate-change impacts, especially extreme weather	Level of exposure to traumatic events, like disasters	Distress, grief, behavioral health disorders, social impacts, resilience	Changes in exposure to climate- or weather-related disasters cause or exacerbate stress and mental health consequences, with greater risk for certain populations.

Source: US Global Change Research Program, 2016. The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. Crimmins, A., J. Balbus, J.L. Gamble, C.B. Beard, J.E. Bell, D. Dodgen, R.J. Eisen, N. Fann, M.D. Hawkins, S.C. Herring, L. Jantarasami, D.M. Mills, S. Saha, M.C. Sarofim, J. Trtanj, and L. Ziska, Eds. U.S. Global Change Research Program, Washington, DC, 312 pp.

Steps to Resilience



Resiliency Planning Process



MA Municipal Vulnerability Preparedness Program

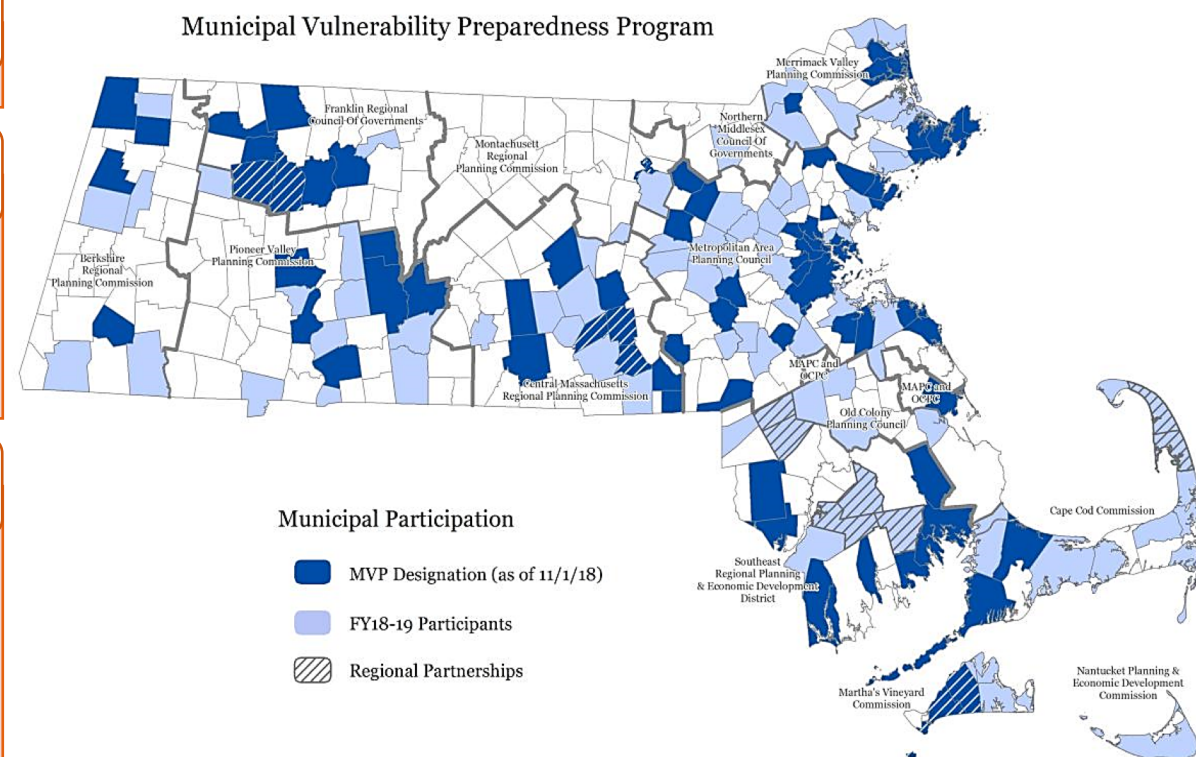
MA Executive Order 569 (September 2016)

Technical Support & funding for MA municipalities

- Vulnerability Assessment
- Community Engagement
- Actionable Resiliency Plans

Grant Opportunities

- **MVP Planning Grant:** complete vulnerability assessment, community involvement requirements, final report – receive MVP designation
- **MVP Action Grant:** Must have MVP designation. For communities to implement priority climate adaptation actions identified through MVP process.



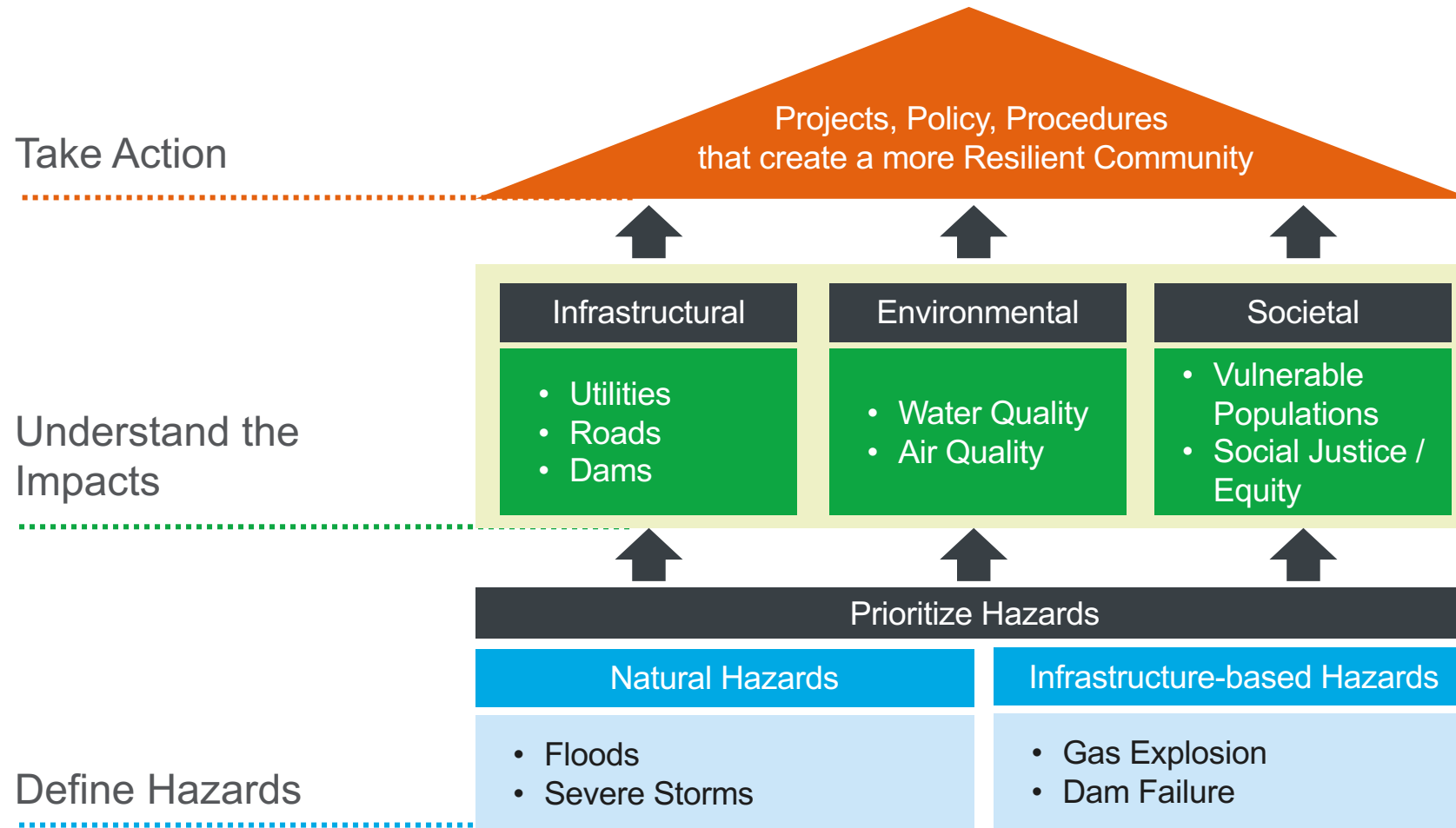
Source: Massachusetts Municipal Vulnerability Preparedness (MVP) Program Information Page:
<https://www.mass.gov/service-details/mvp-program-information>

MA Municipal Vulnerability Preparedness Program

CRB Workshops / Matrix

Community Resilience Building Risk Matrix				www.CommunityResilienceBuilding.org					
<p>H-M-L priority for action over the Short or Long term (and Qngoing) V = Vulnerability S = Strength</p>				Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)					
				Priority		Time			
Features	Location	Ownership	V or S					H - M - L	Short Long Qngoing
Infrastructural									
Societal									
Environmental									

Hazard and Impact Types



Natural Hazards

Flooding

Hurricanes/Tropical Storms

Nor'easters

Severe Winter Storms

Tornadoes

Wildfires

Drought

Extreme Temperatures

Earthquakes

Landslide

Ayer Natural Hazard Matrix

Natural Hazard	Likelihood of Occurrence	Location	Impacts	Hazard Index
Natural Hazard Separated by Flood, Atmospheric Related and Winter Related, Other Natural Hazards, and Geologic Hazards	3 = Highly Likely 2 = Possible 1 = Unlikely	3 = Regional/State 2 = Multi Community/Regional 1 = Local/Town	4 = Catastrophic 3 = Critical 2 = Limited 1 = Negligible	Ranking Determined by Combining the Likelihood, Location and Impacts of a Natural Hazard
Flood-Related Hazards				
• Heavy Rain	2	1	2	5
• Snow Melt	1	1	1	3
• Dam Failure	2	2	3	7
• Ice Jams	1	2	3	6
• Beavers	3	1	2	6
Atmospheric Related and Winter Related Hazards				
• High Winds	2	2	3	7
• Hurricanes	1	3	3	7
• Tornadoes	1	2	3	6
• Nor'easters	2	3	2	7
• Severe Thunderstorms	2	1	2	5
• Heavy Snow	3	2	3	8
• Ice Storms	2	2	3	7
• Blizzard	1	2	3	6
Other Natural Hazards				
• Major Urban Fires	1	1	3	5
• Wildland Fire	3	1	2	6
• Drought	1	3	2	6
• Extreme Temperatures	1	3	2	6
Geologic Hazards				
• Earthquakes	1	2	2	5
• Landslides	1	1	1	3
• Tsunami	NA	NA	NA	NA

Key

Highly likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
 Possible : 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.
 Unlikely: Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.
 Catastrophic: Immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.
 Critical: Fast speed of onset or long duration of event resulting in devastating damage and loss of services for weeks or months.
 Limited: Moderate speed of onset or moderate duration of event, resulting in some damage.
 Negligible: Slow speed of onset or short duration of event resulting in little to no damage.

Flood Hazards

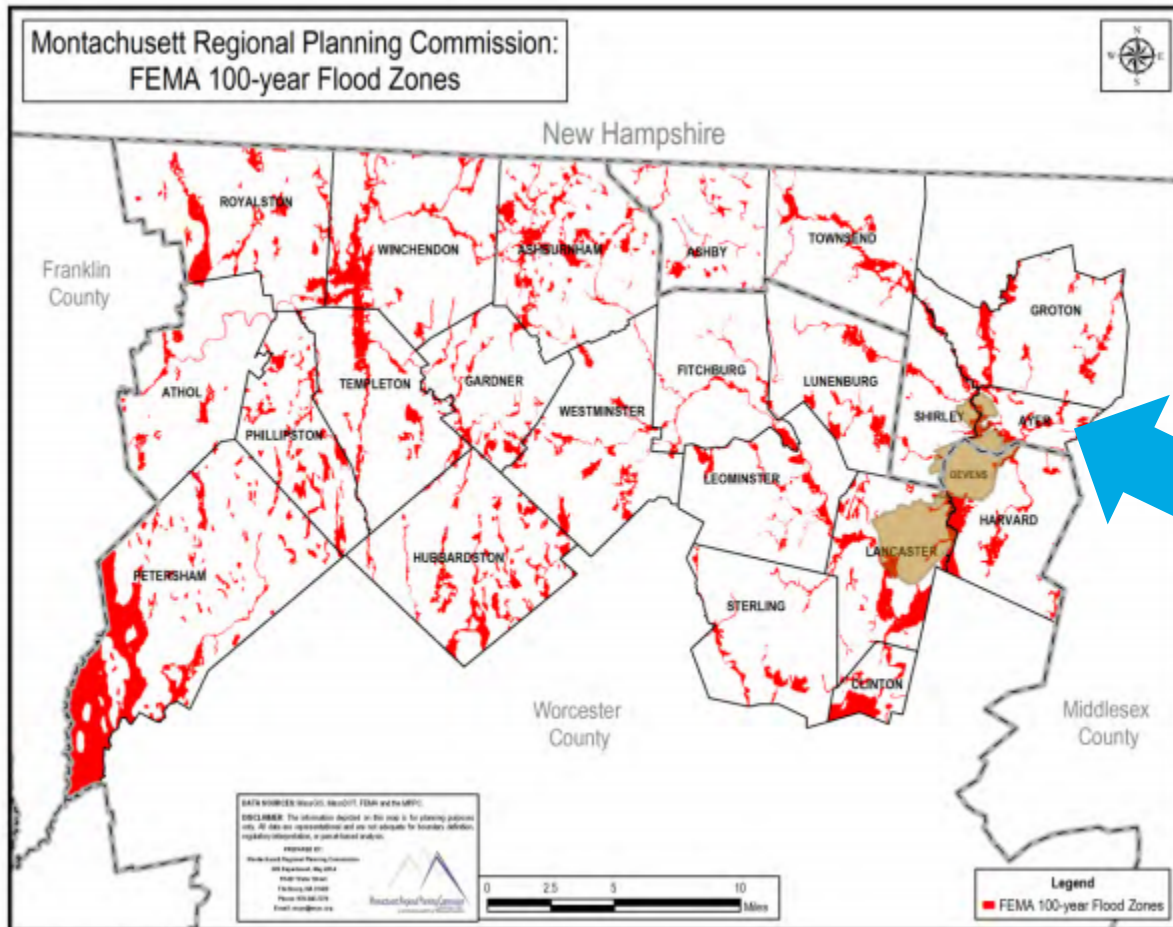


Table 6: Acreage of Community within the 100 year Flood Plan And Flood Plain Development

Community	Acres in Community	Acres in 100-year Floodplain	Percent of Community in 100-year Floodplain	Acres of Floodplain that are developed	Percent of Floodplain Developed
Ashburnham	26,208.81	3434.38	13.10%	65.54	1.91%
Ashby	15,406.70	911.63	5.92%	12.09	1.33%
Athol	21,352.00	1299.58	6.09%	65.77	5.06%
Ayer	6,082.06	1175.61	19.33%	82.32	7.00%
Clinton	4,646.91	1358.09	29.23%	58.93	4.34%
Devens	4,469.63	628.20	14.05%	11.70	1.86%
Fitchburg	17,994.55	876.54	4.87%	244.02	20.25%

Ayer Implements:

MA Wetlands Protection Act/Town Wetlands Bylaw

Town Flood Plain District Bylaw

Maintenance of stormwater system

Maintenance of dams, dikes, and public waterbodies

Cluster Development Bylaw (protected open space)

Beaver diverters and trapping

Flood Hazards



Hurricanes & Tropical Storms

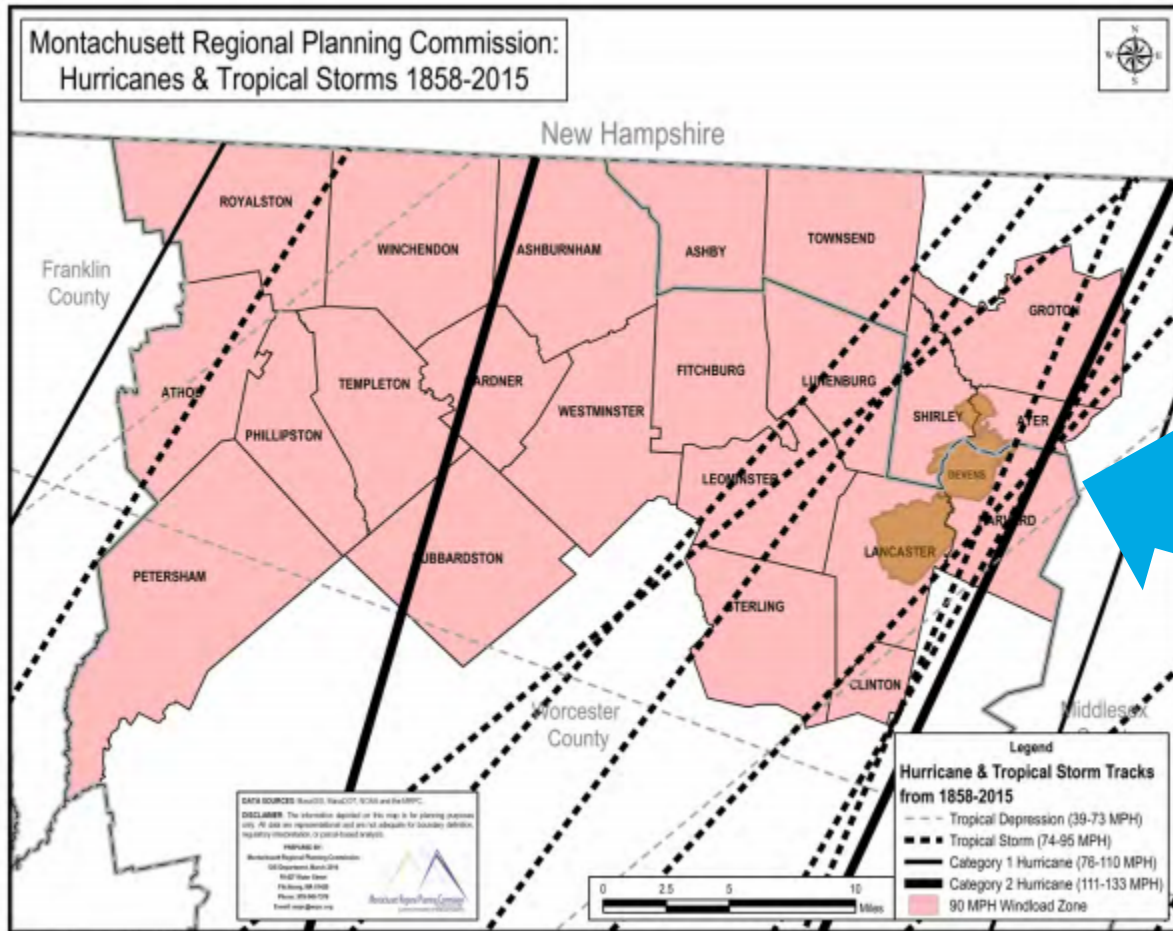


Table 11: Hurricanes and Tropical Storms that passed directly through the Montachusett Region (1858 – 2015)

Date	Type	Name	Wind Speed
9/28/1861	Tropical Storm	Unnamed	50
9/30/1874	Tropical Storm	Unnamed	60
10/10/1894	Tropical Storm	Unnamed	55
9/2/1952	Tropical Depression	Able	30
8/31/1954	Category 2	Carol	85
7/30/1960	Tropical Storm	Brenda	45
9/12/1960	Category 2	Donna	90
9/15/1961	Tropical Storm	Unnamed	35
9/27/1985	Category 1	Gloria	75
9/17/1999	Tropical Storm	Floyd	50
9/17/2004	Tropical Storm	Charley	50

Source: National Oceanic and Atmospheric Administration

Ayer Implements:

State Building Code enforced by Building Inspector

- Regular inspection and tree maintenance (National Grid)
- National Grid Staging Area during major storms

Wildfire

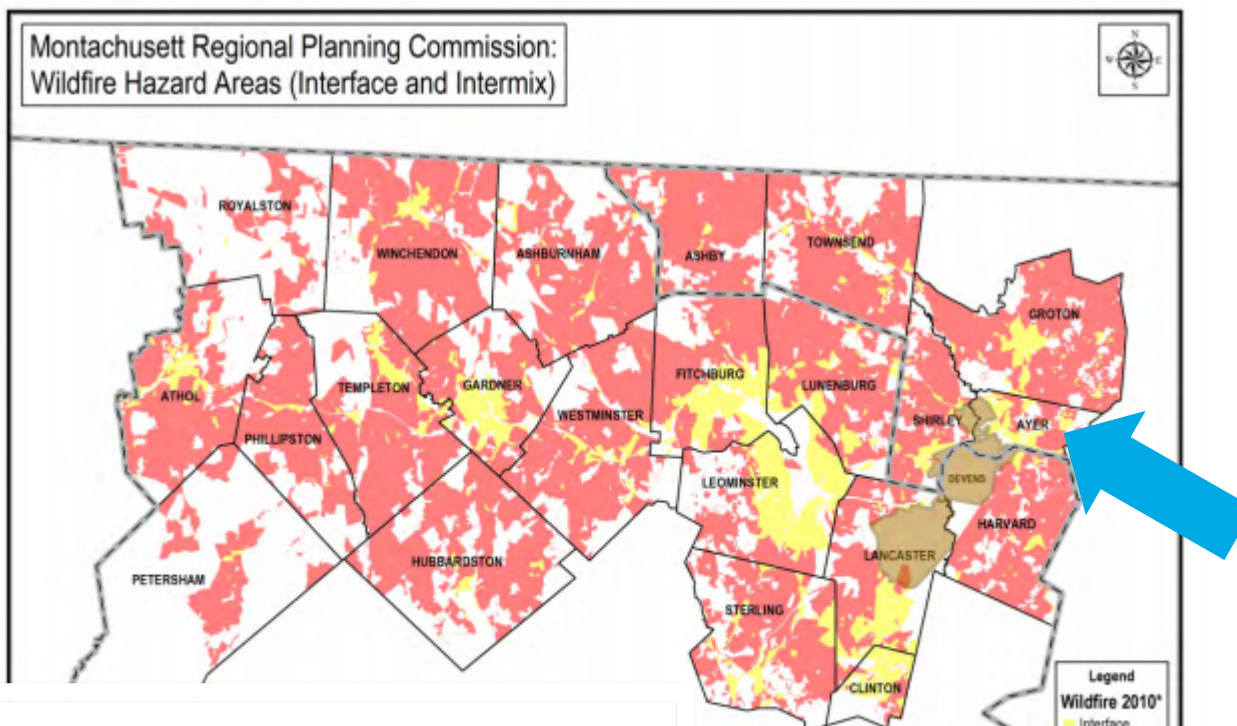


Table 20: Fire Totals and Acreage

Community	# of Fires	# of Acres Burned	# of Acres Per Fire
Ashburnham	13	16.2	1.2
Ashby	1	0.0	0.0
Athol	37	177.2	4.8
Ayer	37	70.4	1.9

*The WUI is composed of both interface and intermix communities. In both interface and intermix communities, housing must meet or exceed a minimum density of one structure per 40 acres (16 ha). Intermix communities are places where housing and vegetation intermingle. In intermix, wildland vegetation is continuous, more than 50 percent vegetation, in areas with more than 1 house per 10 ha. Interface communities are areas with housing in the vicinity of contiguous vegetation. Interface areas have more than 1 house per 40 acres, have less than 50 percent vegetation, and are within 1.5 mi of an area (made up of one or more contiguous Census blocks) over 1,325 acres (500 ha) that is more than 75 percent vegetated. The minimum size limit ensures that areas surrounding small urban parks are not classified as interface WUI.

Probability of Future Events: HIGHLY LIKELY

Readily Available Fuel

- 2008 ice storm brought down many trees
- Old growth
- Property owners do not clear brush

Weather Conditions

- Recent drought
- High wind
- Lightning strikes

- Lack of appropriate equipment
- Lack of personnel

- Trains nearby (sparks, work on tracks)
- Topography

Ability to Respond

Other Factors

Heavy Snow



Ayer Implements:

Residential Parking Bans

Clearing Snow from Major Arterial Routes

- Regular inspection and tree maintenance (National Grid)
- DPW Staff – (20) and 4 contractors available for storms
- DPW is Staging Area for National Grid Crews

Need Identified: Additional Personnel and Equipment

Infrastructure Concerns

Dam Failure

Fire

Loss of Power

Gas Explosion

Water Contamination

Water Main Break



Dams

Table 8: Dams in the Monachusett Region and Hazard Potential

Community	High Hazard	Significant Hazard	Low Hazard	Non-Jurisdictional*	Total # of Dams
Ashburnham	4	4	4	12	24
Ashby	2	0	4	1	7
Athol	2	6	4	8	20
Ayer	0	4	3	2	9
Clinton	2	3	0	1	6
Devens*					0



Actions at DPW Facilities

- Equipment Redundancy
- Back-up Power for all Water / Wastewater Facilities
- Water Supply Interconnections
- Member of MaWARN Mutual Aid Group
- Reverse 911 System (Code Red)
- On-call operators

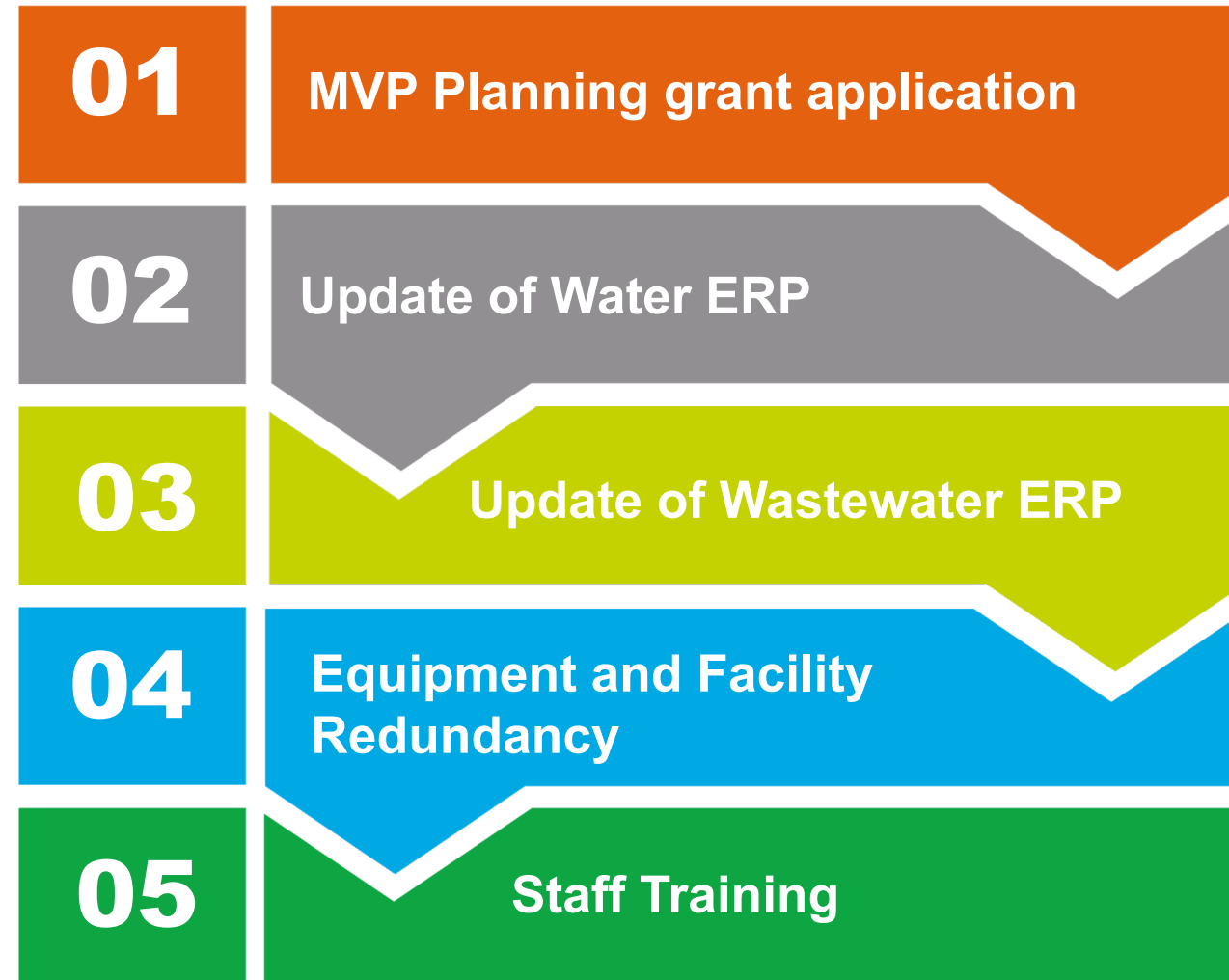


DPW Challenges

- Aging Infrastructure
- Aging Workforce
- Regional emergencies
- Consolidation of vendors
- Procurement laws
- Municipal budget / process



Next Steps



Contact Information



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