



# MUNICIPAL VULNERABILITY PREPAREDNESS WORKSHOP

## DAY 1

January 9, 2020



# Health and Safety Moment – Winter Driving Safety

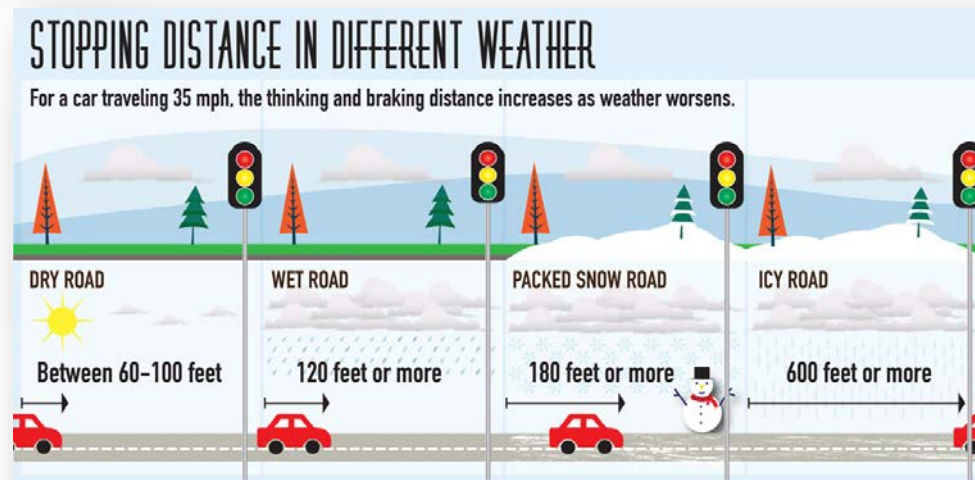


Maintain your car by checking...

- Battery
- Tire tread
- Windshield wipers
- Antifreeze levels



Allow additional travel time and take safer routes, even if they are out of the way



Always have...

- Flashlight
- Jumper cables
- Sand/kitty litter for ice
- Shovel & snowbrush,
- Water/food
- Cellphone

In preparation for an emergency!

# Welcome & Introductions

VIP - Town Manager or Assistant Town Manager (TBD)

Mark Wetzel – Town of Ayer, Superintendent, Department of Public Works

Trevor Johnson - Arcadis, Resilience Planner / Lead Facilitator

Kate Edward – Arcadis, Senior Engineer

Seth MacDonald – Arcadis, Engineer

Sheila Joyce – Arcadis, Engineering Intern

# Welcome & Introductions

Dan Van Schalkwyk – Town Engineer

Robert Pedrazzi – Fire Chief / Emergency Management Director

Brian Gill – Deputy Chief of Police

Carly Antonellis – Assistant Town Manager

Mark Archambault – Town Planner

# Agenda



**Health & Safety Moment / Welcome, Introductions, and Workshop Overview ~ 4:00 PM / 4:10 PM**

**Overview Presentation ~ 4:30 PM**

**Small Team Exercise – Hazard, Vulnerability, and Strength Identification ~ 5:00 PM**

**Break / Dinner ~ 6:30 PM**

**Working Dinner with Report Out ~ 6:45 PM**

**Summary Discussion ~ 7:15 PM**

**Wrap up and Introduce CRB Workshop #2 ~ 7:45 PM**

# Workshop Objectives



Understand connections between ongoing issues, hazards, and local planning and actions in Ayer and define the top hazards in the community.



Identify and map vulnerabilities and strengths to develop infrastructure, societal and environmental risk profiles for Ayer.



# MA Municipality Vulnerability Preparedness (MVP)

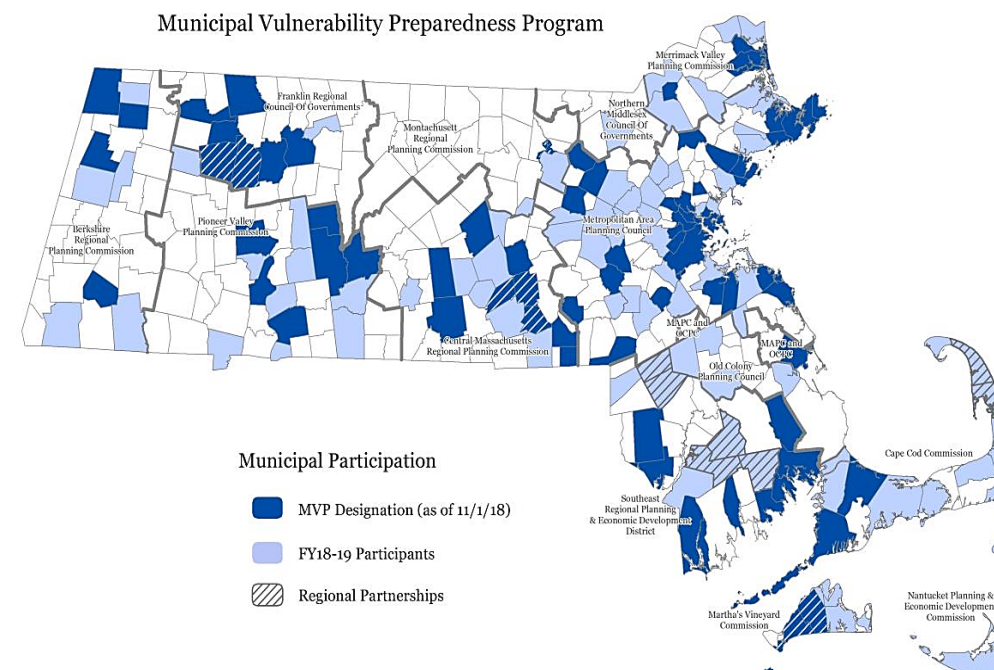
MA Executive Order 569 (September 2016)

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>

# MVP Planning Process



## MVP Principles

- **Community-led process** that employs local knowledge & requires local support
- **Accessible**
- **Utilizes partnerships** and leverages existing efforts
- **Mainstreams** climate change
- See communities as **local innovators**
- Frames **coordinated state efforts**



## MA Municipal Vulnerability Preparedness Program

# CRB Workshops / Matrix

Community Resilience Building Risk Matrix				www.CommunityResilienceBuilding.org					
<b>H-M-L</b> priority for action over the <b>S</b> hort or <b>L</b> ong term (and <b>Q</b> ngoing) <b>V</b> = Vulnerability <b>S</b> = Strength				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
<b>Infrastructural</b>									
<b>Societal</b>									
<b>Environmental</b>									

# Who are the Stakeholders?

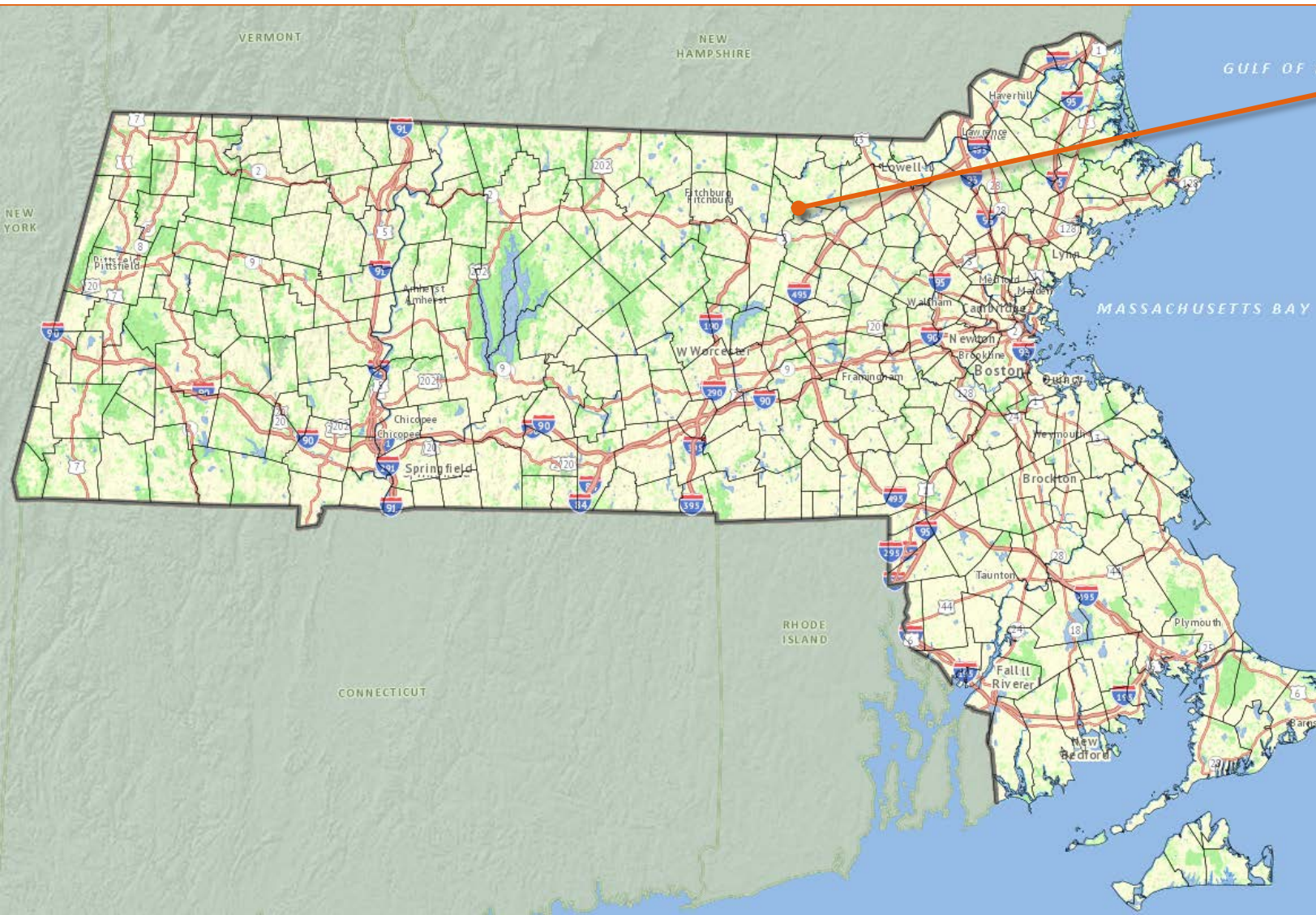
People impacted by hazards in the past & likely to be impacted in the future?

People who influence, guide, and/or have the authority to make decisions?

Key Community / Business Community Members?



# Community Overview



## Town of Ayer

### Location

- Most western town in Middlesex County

### Population

- 7,600

### Area

- Total: 9.6 mi<sup>2</sup>
- Land: 9.0 mi<sup>2</sup>
- Water: 0.6 mi<sup>2</sup> (5.75%)

### DPW Operations

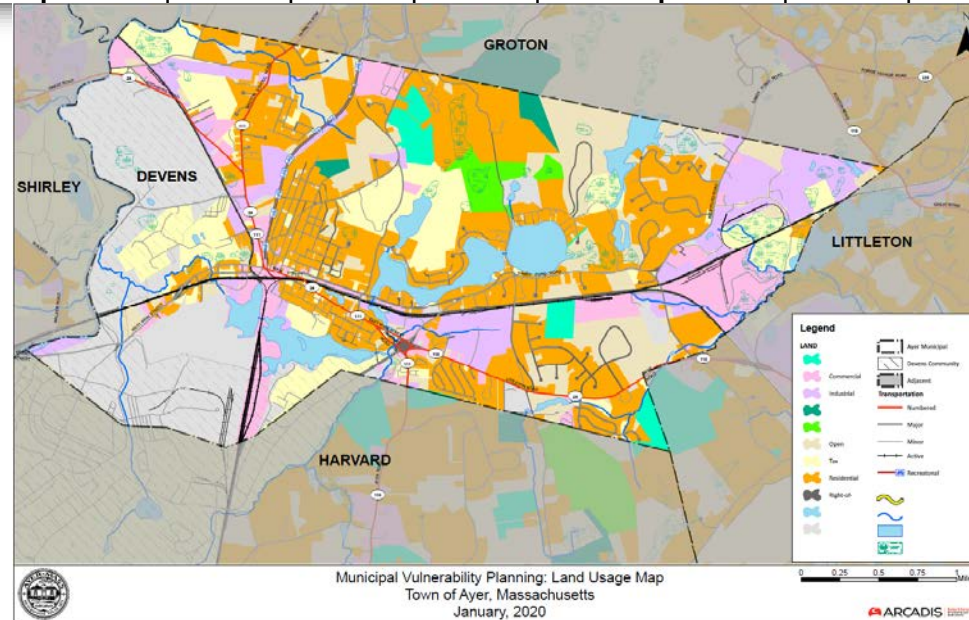
- Municipal water, wastewater, highway, stormwater and solid waste operations



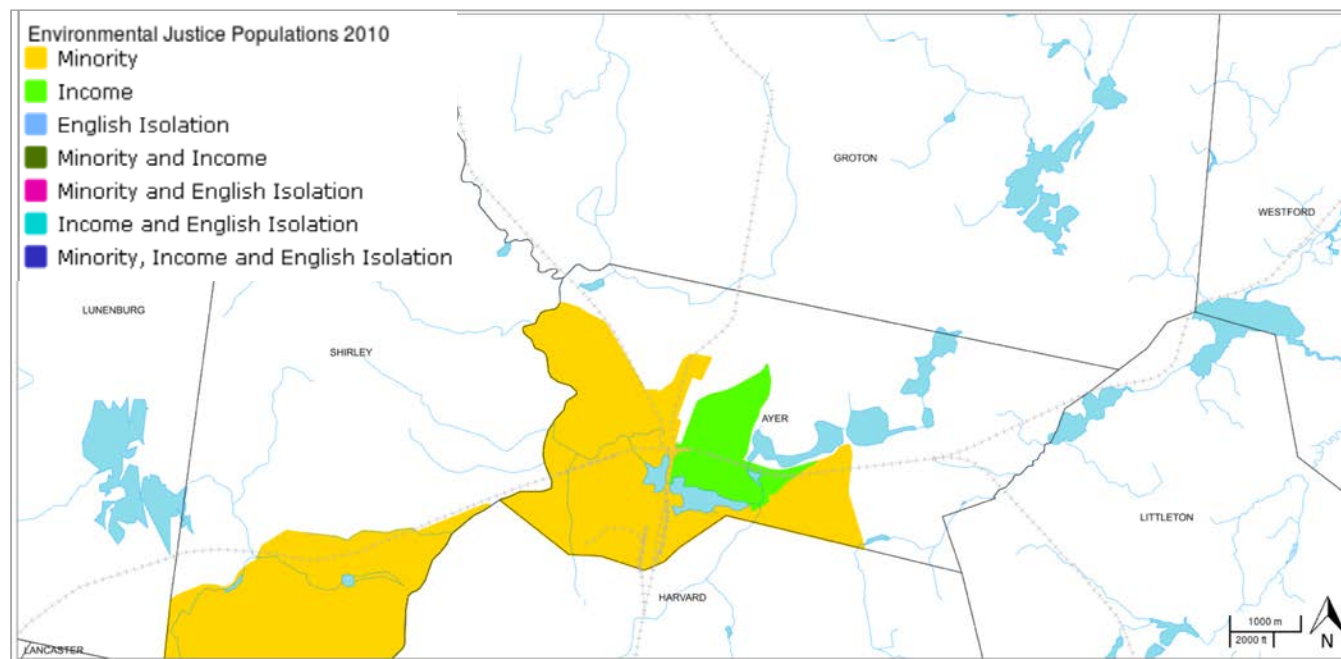
# Land Use in Ayer

**Table 3: Land Use by Community**

	Forest		Residential		Commercial & Industrial		Agricultural		Wetlands & Water		Transportation		Other		Total
Community	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



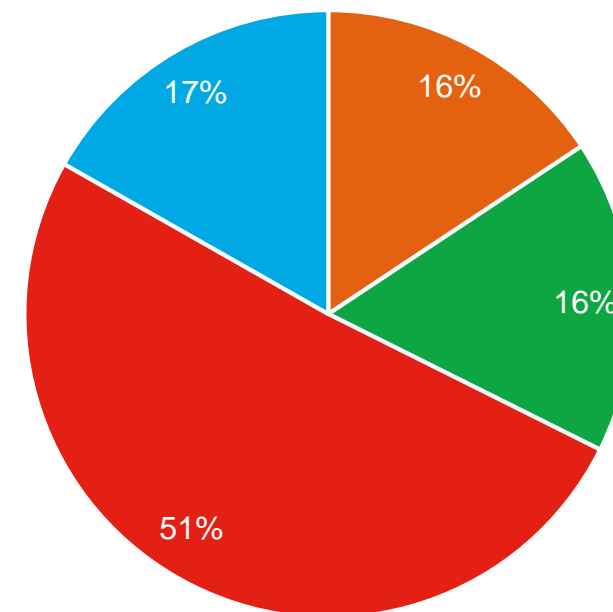
*In Massachusetts a community is identified as an Environmental Justice community if any of the following are true:*

- 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

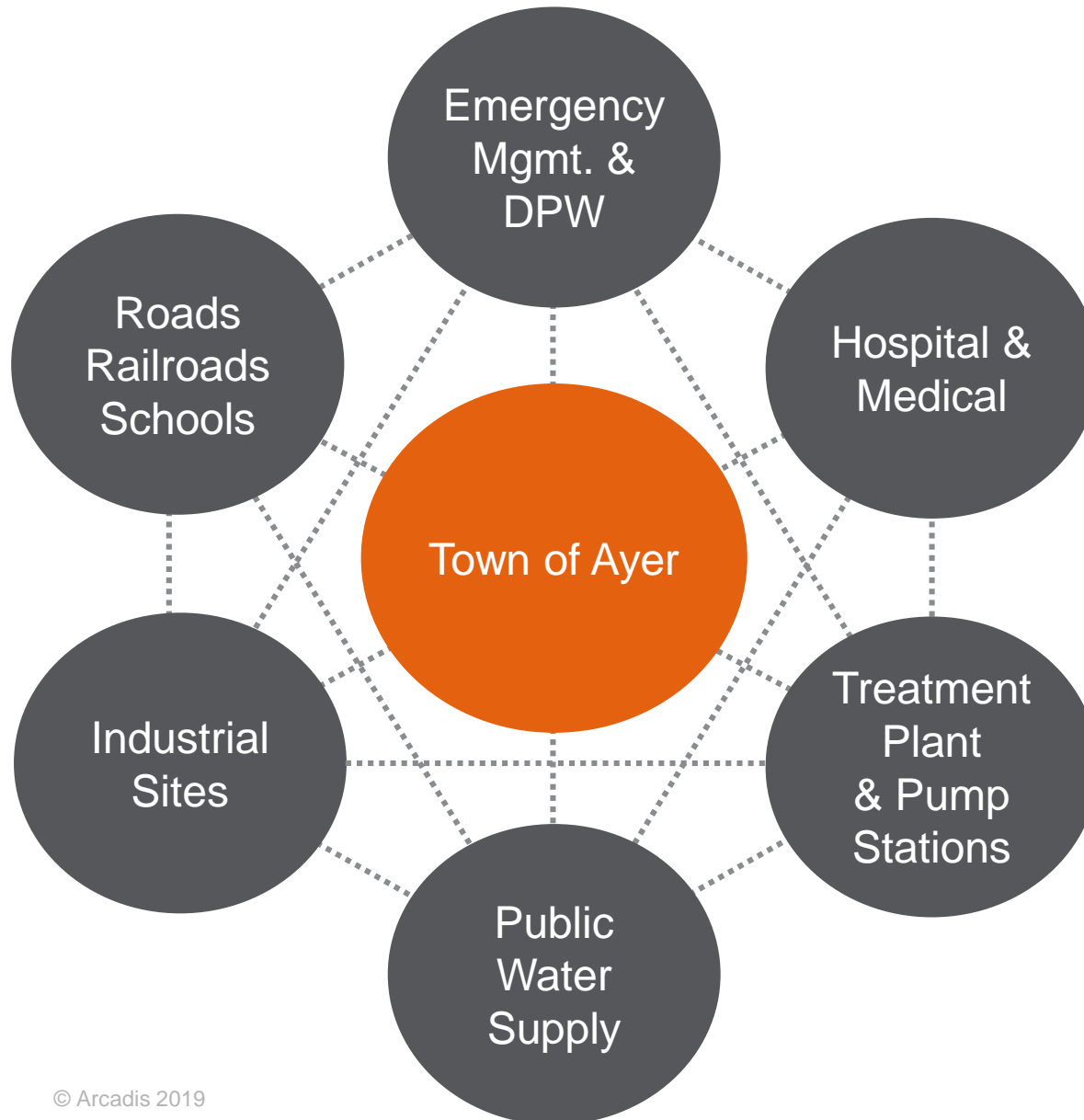
Source: <https://www.mass.gov/info-details/environmental-justice-communities-in-massachusetts>

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

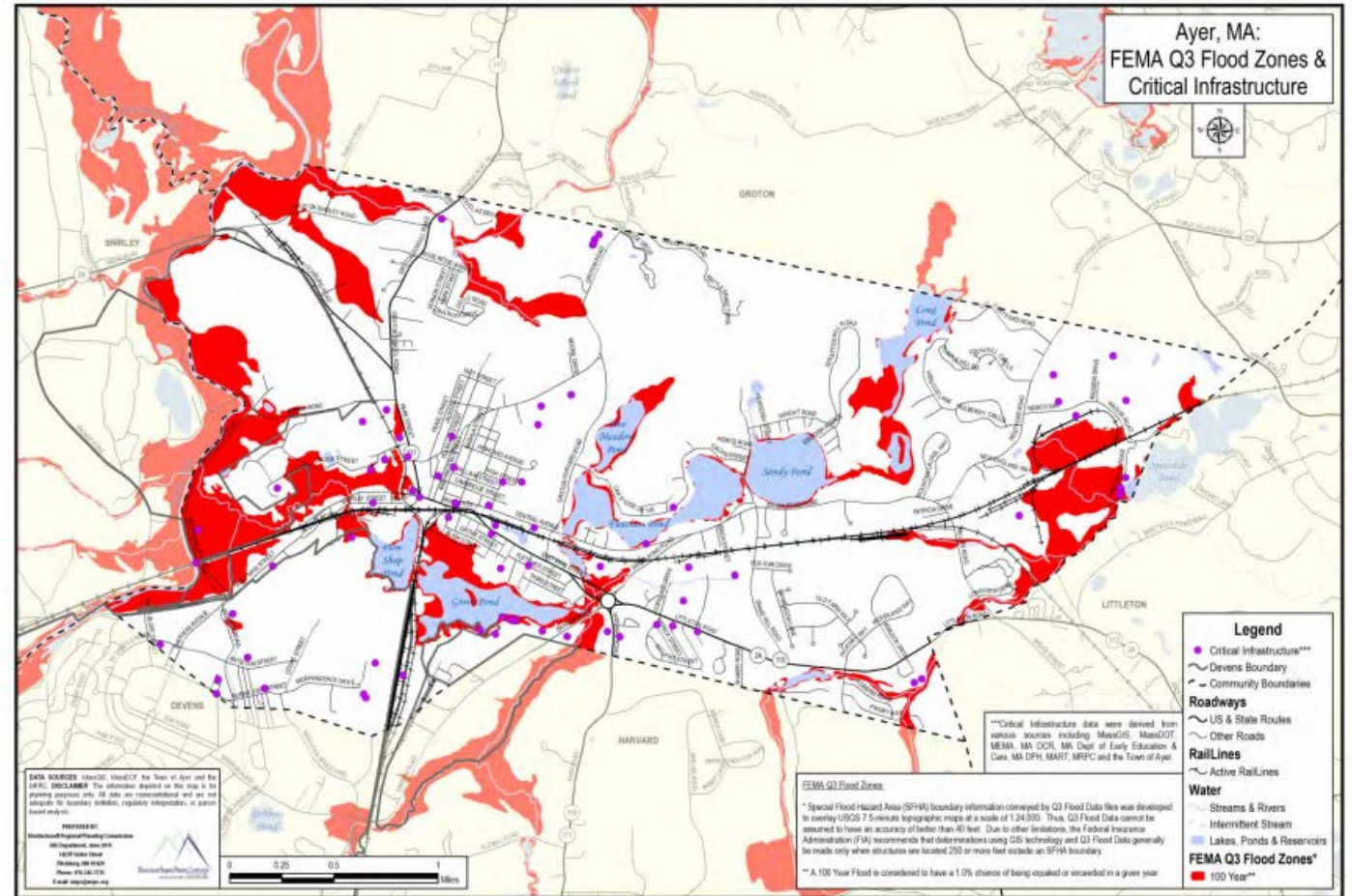
Hazard  
Mitigation Plan

Comprehensive  
Emergency  
Management  
Plan

Water Supply

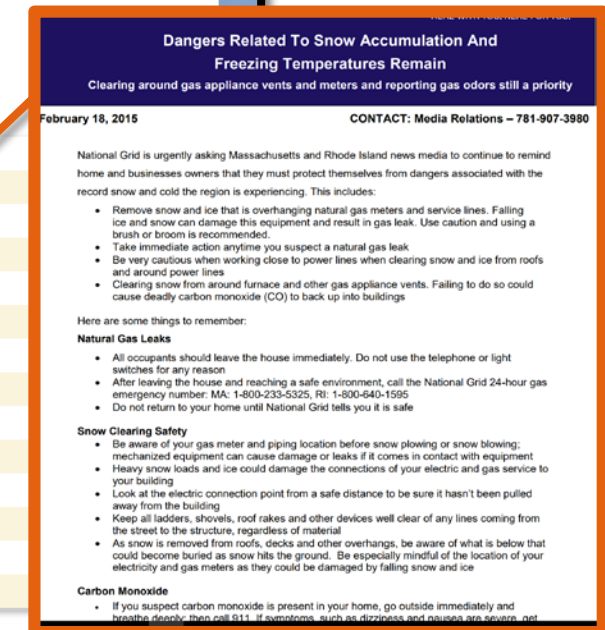
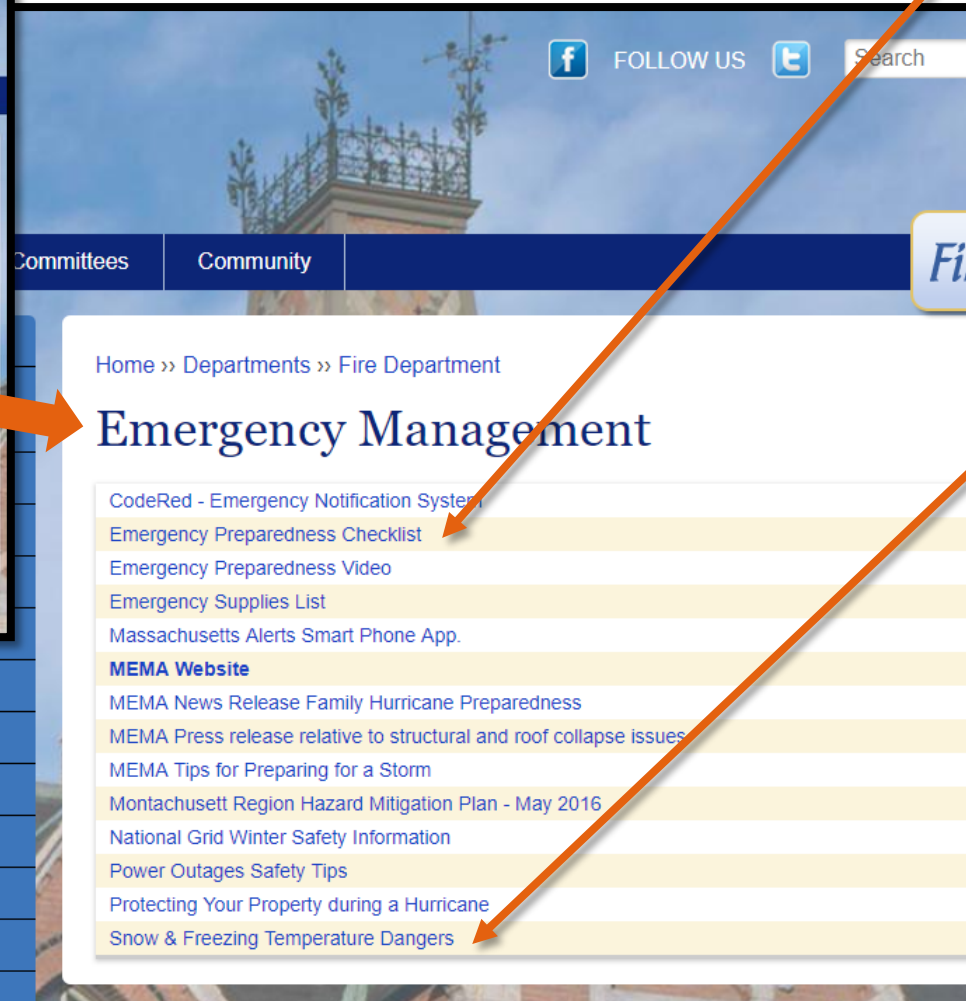
Joint Emergency  
Preparedness  
Committee

Emergency  
Planning Tools  
for Residents



## Ongoing MA Municipal Vulnerability Preparedness Program

# Existing Citizen Action Tools



# 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
<b>Flood-Related Hazards</b>				
• 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
<b>Atmospheric Related and Winter Related Hazards</b>				
• 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
<b>Other Natural Hazards</b>				
• Major Urban Fires	1	1	3	5
• Wildland Fire	3	1	2	6
• Drought	1	3	2	6
• Extreme Temperatures	1	3	2	6
<b>Geologic Hazards</b>				
• 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.



# Climate Change Impacts

	Climate Driver	Exposure	Health Outcome	Impact
 Extreme Heat	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
 Outdoor Air Quality	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.
 Flooding	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
 Vector-Borne Infection (Lyme Disease)	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.
 Water-Related Infection (Vibrio vulnificus)	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.
 Food-Related Infection (Salmonella)	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.
 Mental Health and Well-Being	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.

# 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

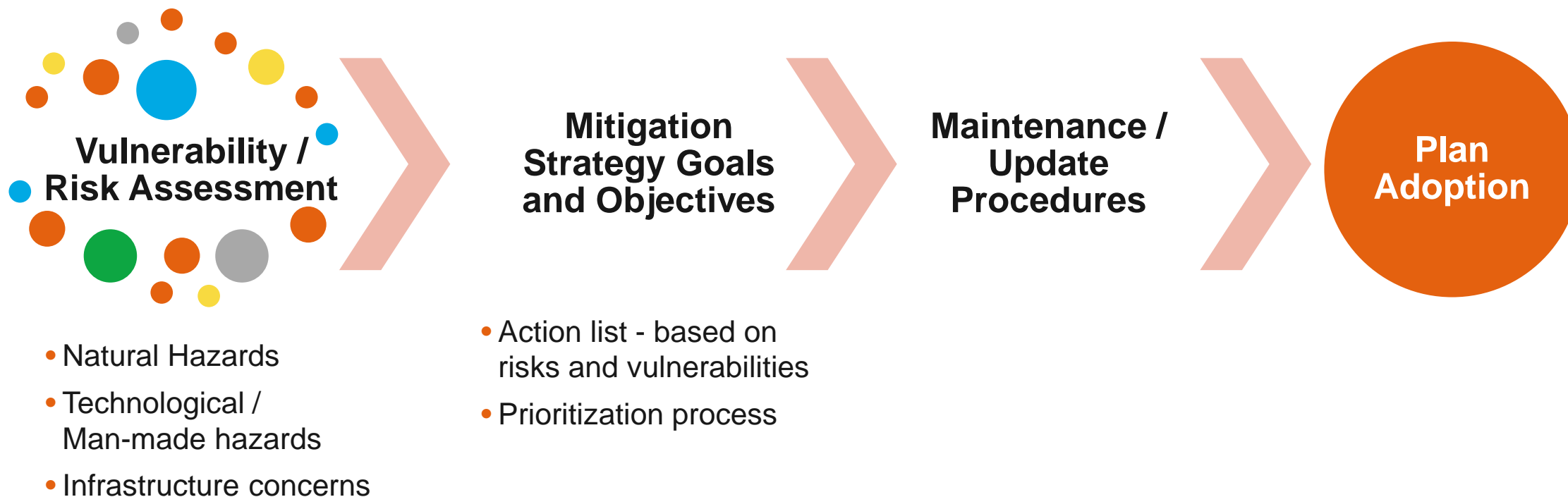


# Steps to Resilience

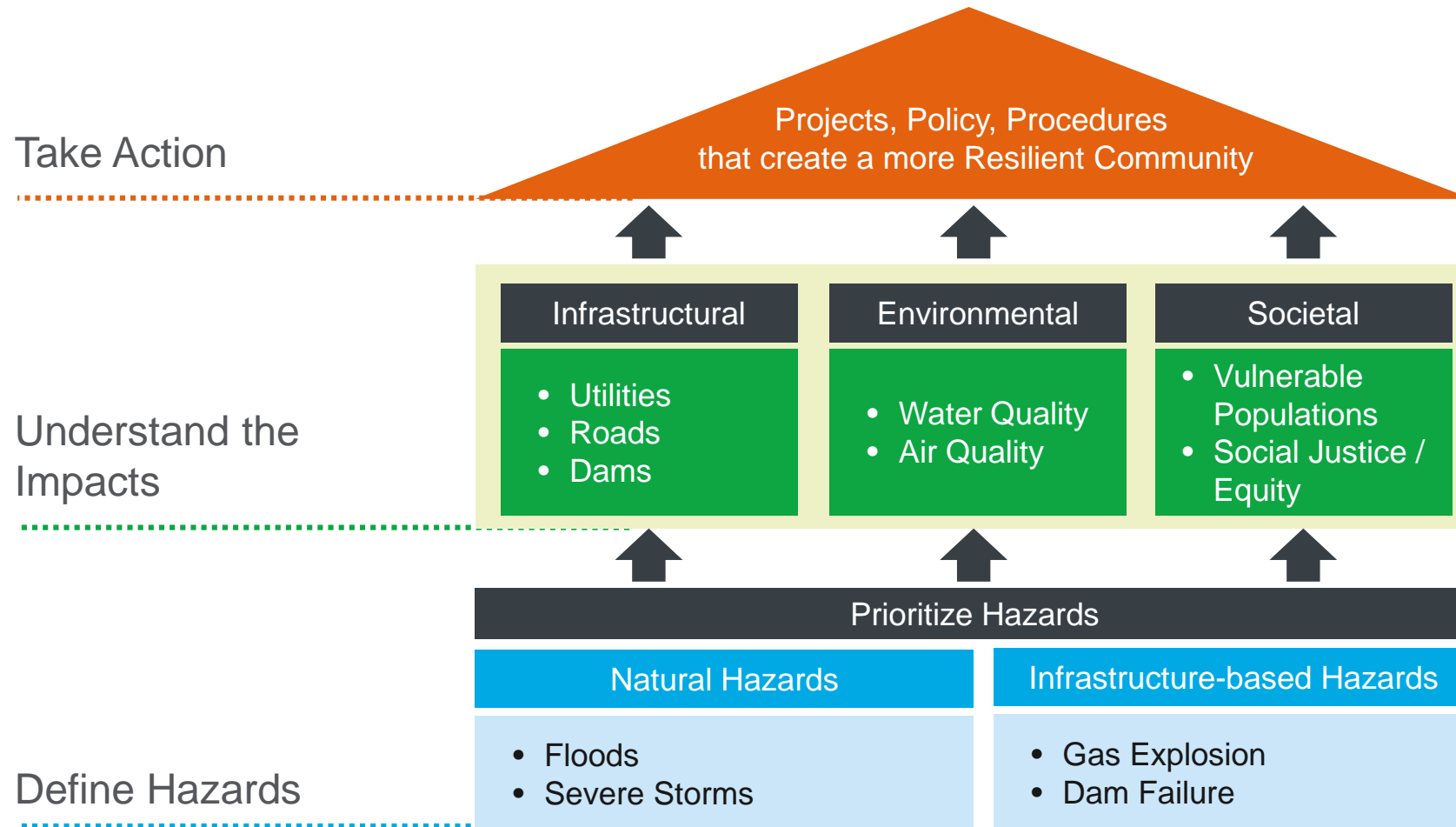




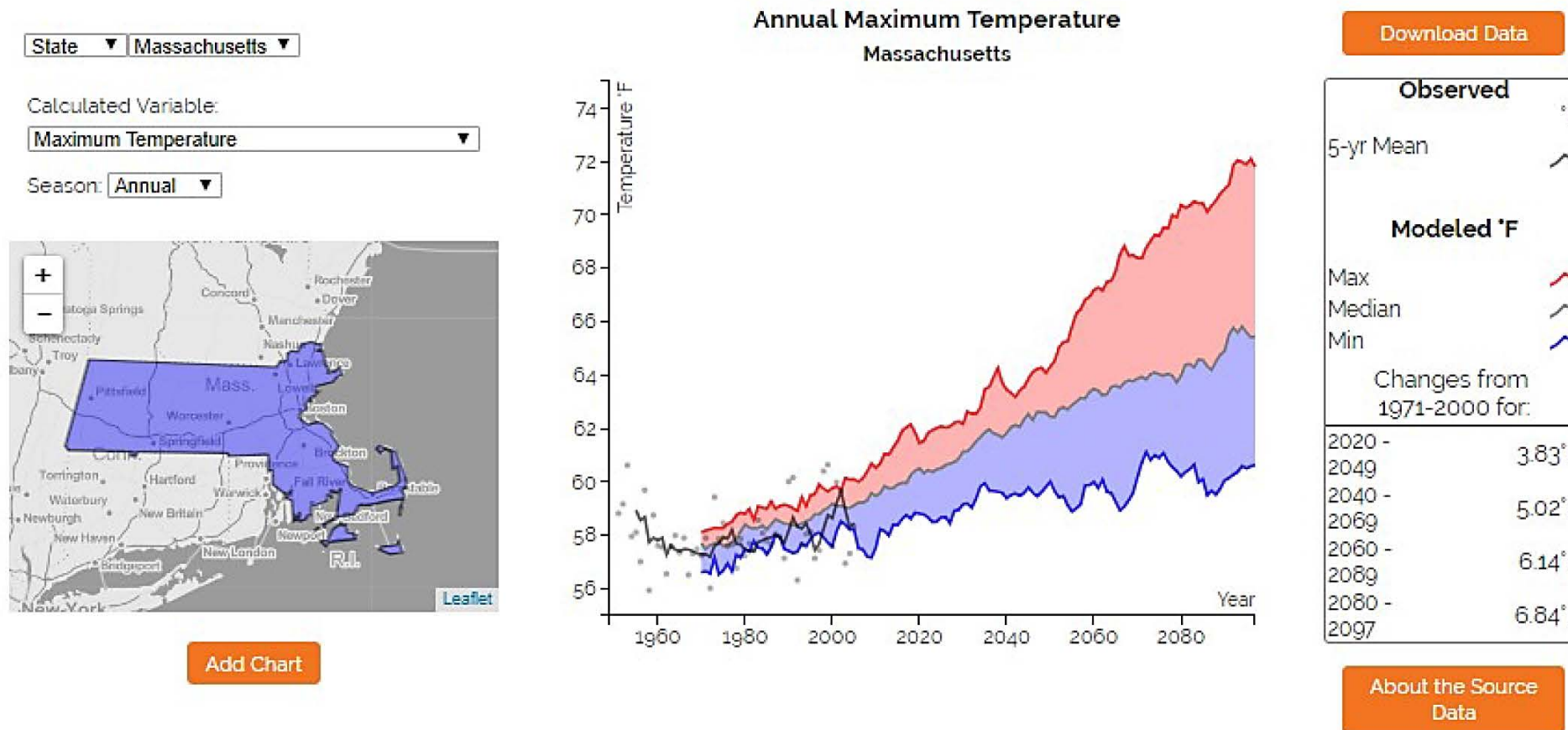
# Resiliency Planning Process



# Hazard and Impact Types



# Massachusetts Temperature Changes



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

# Flood Hazards

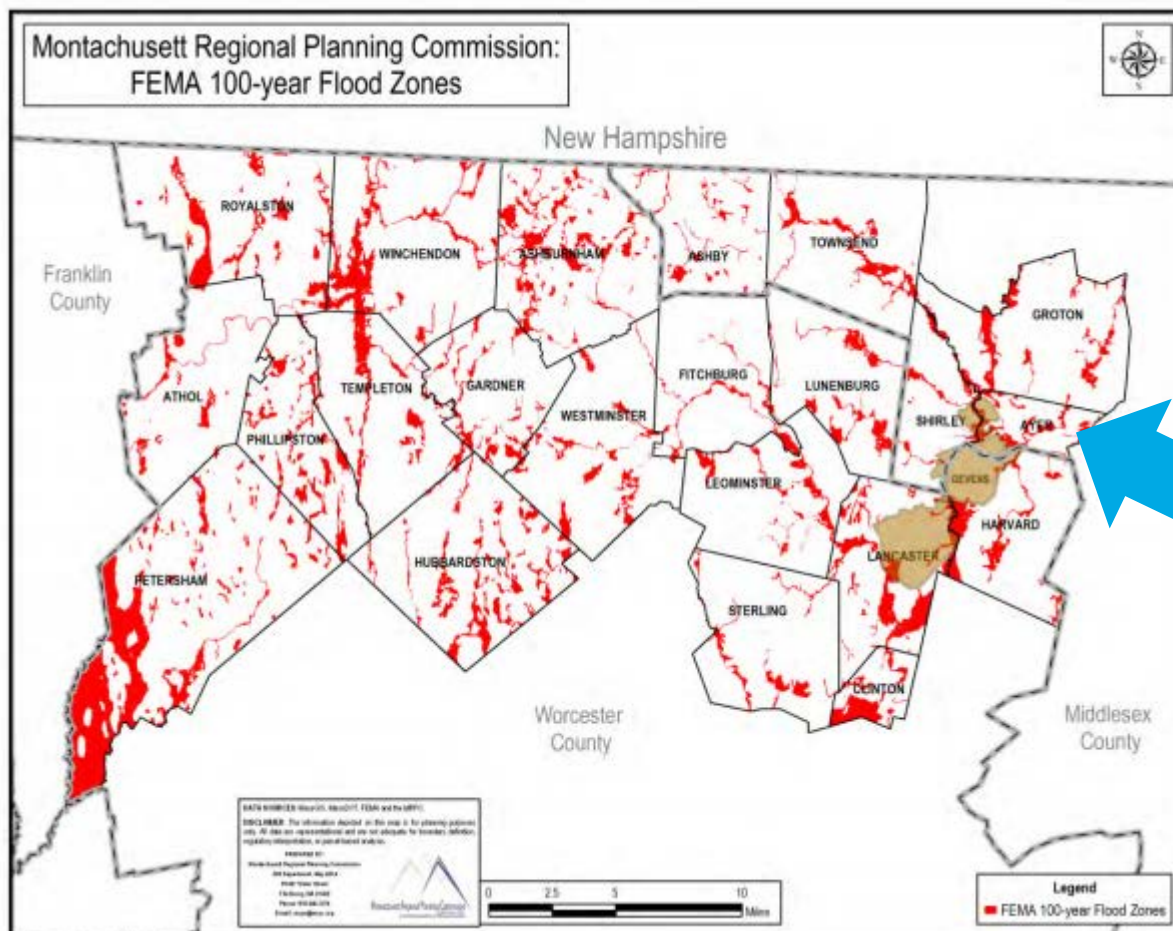


Table 6: Acreage of Community within the 100 year Flood Plan  
And Flood Plain Development

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%	244.92	28.25%

## 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

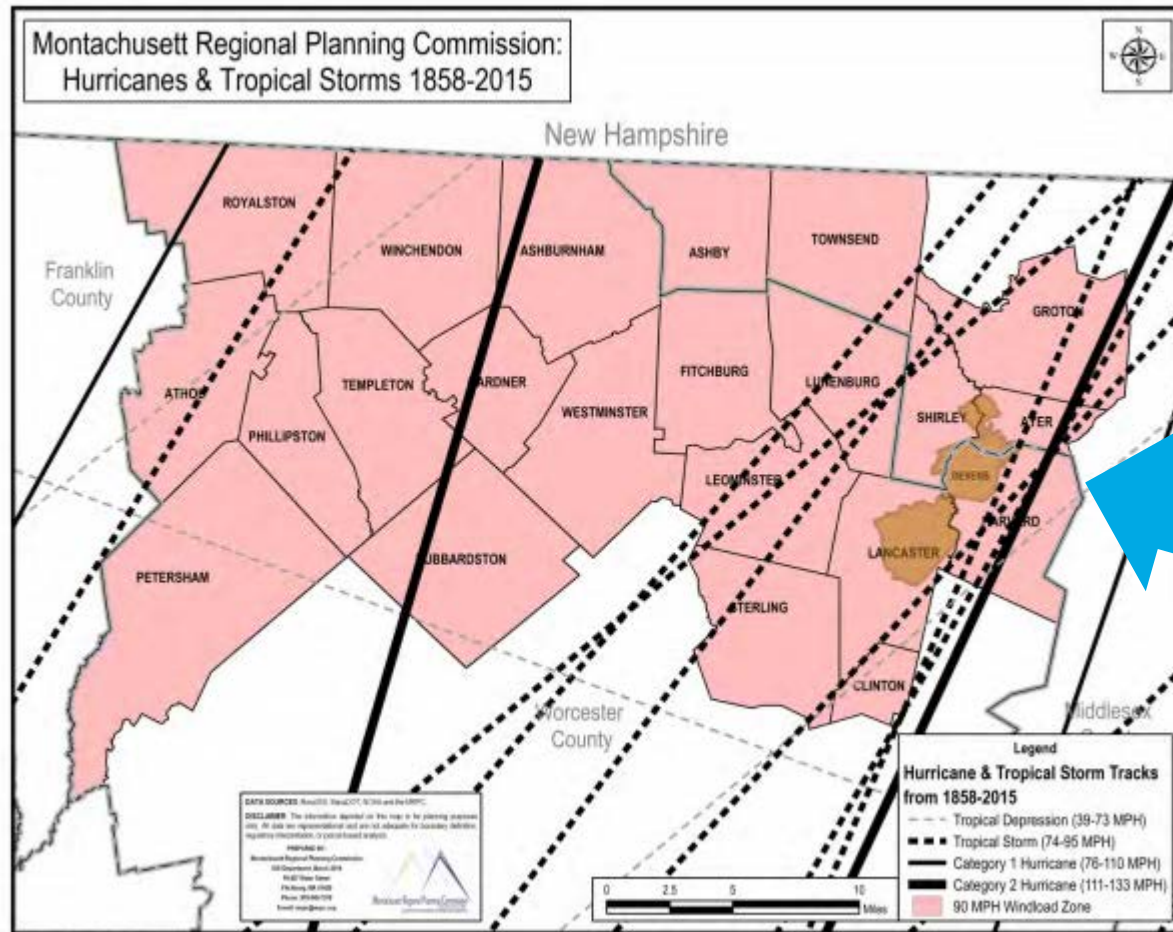


Table 11: Hurricanes and Tropical Storms  
that passed directly through the Montachusett Region (1858 – 2015)

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

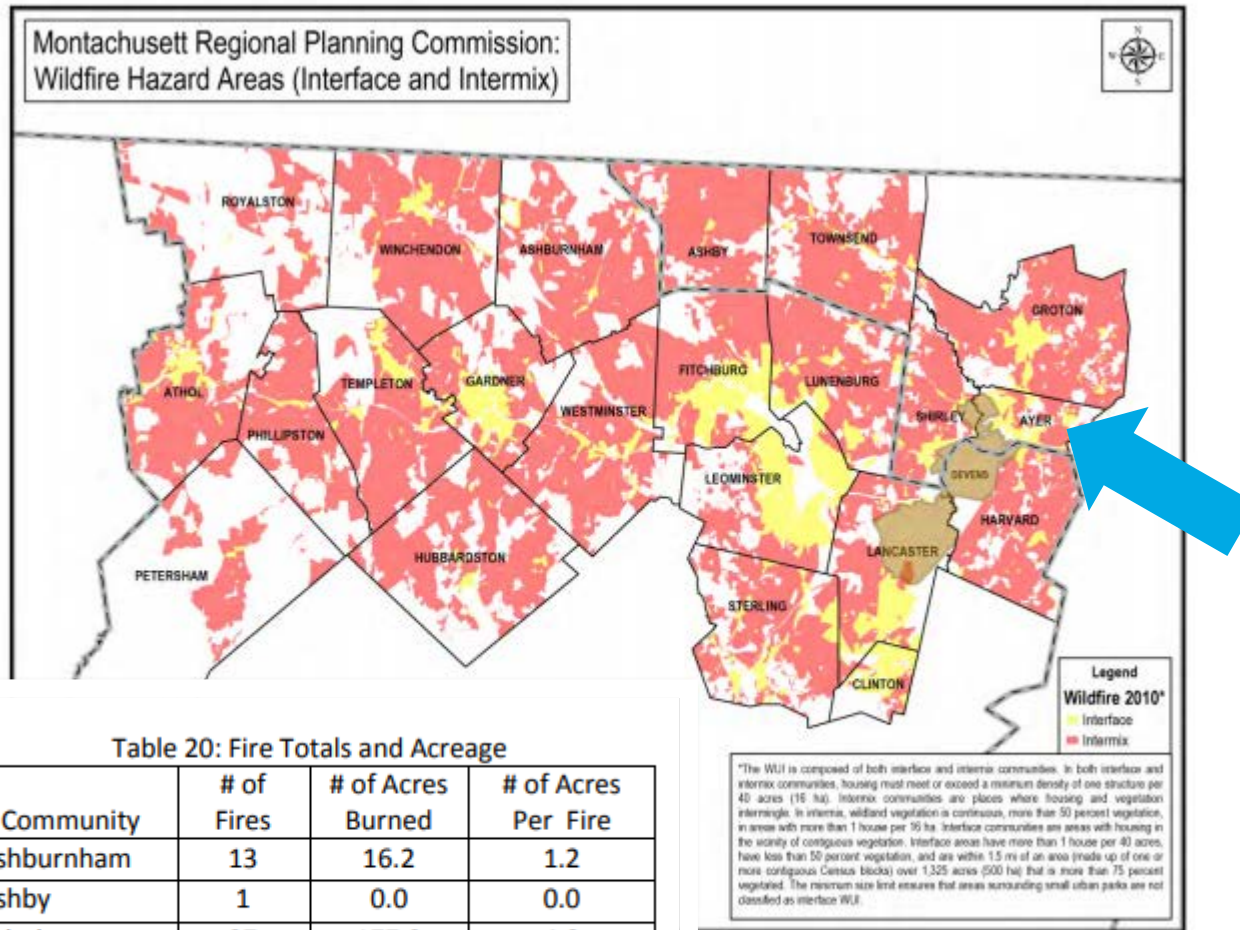


Table 20: Fire Totals and Acreage

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

## 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

Road Washouts & Culverts





# 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





# Instructions for Group Exercise

1. Please divide into small groups based on colored dot sticker on your name tag.
2. In small groups, identify past, current, and future hazards in your community.
  - Determine top 3-4 **priority hazards** from the hazards discussed previously within your group and write those in the top row of your **Risk Matrix**.
3. Identify **community vulnerabilities and strengths** and categorize them based on the themes of infrastructure, society, or environment.

**Community Resilience Building Risk Matrix**  [www.CommunityResilienceBuilding.org](http://www.CommunityResilienceBuilding.org)

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

				Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)				Priority	
								H - M - L	Short Long
								Ongoing	
<b>Features</b>				Location	Ownership	V or S			
<b>Infrastructural</b>									
<b>Societal</b>									
<b>Environmental</b>									