Monterey, Massachusetts

Community Resilience Building Workshop Summary of Findings

June 2018

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Town of Monterey

Community Resilience Building Workshop

Summary of Findings

June 2018

1. Monterey Community Resilience-Building Process & Overview

The need for municipalities to increase resilience and adapt to extreme weather events and natural hazards is becoming more evident among the 32 municipalities in Berkshire County, MA. The rural Town of Monterey, Massachusetts, located in southeastern Berkshire County, has experienced more intense and frequent storm events, leading to flooding of roads, critical infrastructure and lakefront properties; endured prolonged power outages with blocked evacuation routes from downed trees during fierce winds, tornados and winter storms, and has seen an increased risk of forest fire during more frequent periods of drought. It is generally acknowledged that climate change is a reality and will continue to make its presence felt in the future. Regional climate data for western Massachusetts further reinforces this anecdotal evidence.

At an average elevation of about 1,200 feet in elevation, Monterey is a hilly, heavily forested, rural community with many streams, ponds, wetlands and open fields that make it a very desirable place to live and visit. Included within its 27.39 square miles are 4,500 acres of Beartown State Forest and two major lakes - Lake Buel and Lake Garfield - plus several smaller lakes and ponds, that provide residents and seasonal visitors with numerous outdoor recreational opportunities. Its natural beauty and rural charm have long made it a popular location for summer camps, second homeowners and retirees, mostly from the greater New York City area.

Monterey's population of approximately 957 persons (U.S. Census, 2010) swells to roughly 2,700 in the warmer months, due to an influx of second homeowners, youth campers, tourists and visitors to the Town's private camps, schools and cultural institutions. Each of these population groups may be perceived as potentially "vulnerable populations" that require different approaches by the municipality, in terms of preparedness and response, in the event of a severe weather emergency or other natural hazard event.

And though Monterey experienced a steady increase in population over the 20th century, that trend has been reversed in the 21st. The Town's population is expected to decrease by almost 5% by the next U.S. Census in 2020 to approximately 910 persons, mirroring a similar declining trend in the rest of Berkshire County and the state of Massachusetts as a whole. U.S. Census figures also predict that the number of residents above age 65 in Monterey is expected to increase, both in overall numbers and as a percentage of the Town's total population. This aging of the population and the significant influx of seasonal homeowners could increase the Town's vulnerability to natural hazards and severe weather unless specific actions are taken to reduce the risks.

The perceived increase in severe storm events, repeated flooding of roads, bridges, culverts and properties and the shift in Monterey's population toward older and seasonal adults, has prompted the Town's leadership to take a proactive approach to assessing their vulnerability to severe weather and other natural hazards that have impacted the Town in the past, or could impact the Town in the future. The Town of Monterey's Municipal Vulnerability Preparedness (MVP) efforts to protect and preserve their community's residents, properties and natural environment, are detailed below.

During the winter and spring of 2018, with funding from the MA Executive Office of Energy and Environmental Affairs (EOEEA), the Town of Monterey began a process to develop a Municipal Vulnerability Preparedness (MVP) assessment. With the Select Board as project lead, the Town formed the Monterey MVP Core Team, to begin the process of engaging residents and other community stakeholders in completing a comprehensive, baseline climate change and natural hazard vulnerability assessment. The goal of the Core Team's work was to develop a set of Actions to address Priority Hazards, using the Community Resilience Building (CRB) Workshop process and methodology as a guide. The Town hired Berkshire Regional Planning Commission, a state-certified MVP provider, to aid in the planning process.

The Monterey MVP Core Team held a series of facilitated meetings to assemble data on the Town's infrastructure, identify known hazards to residents, seasonal visitors and property, and review existing plans, procedures, bylaws and protections already in place. In addition, four of the key stakeholders on the MVP Team completed the detailed Community Resilience Building Survey, describing hazardous or potentially hazardous conditions from their professional perspectives (Council on Aging, Select Board, Summer Camp and Utility Company.) In addition, the MVP providers held a series of one-on-one interviews with key Town personnel and main stakeholders identified by the MVP Core Team to lean of their areas of main concern (Select Board, DPW, Fire Dept. and Police Dept.) The responses and collective wisdom received were used by the MVP providers to guide Core Team meeting discussions and mapping activities.

The Core Team developed a list of stakeholders whom they thought would be valuable in a day-long workshop: those who would provide information and input from a variety of perspectives, including elected town officials, business owners, town department heads, first responders, residents, and respected elders who, from personal experience, could provide their perspective of changes in Monterey through time and/or those who have served on a town board at some point.

On Saturday, May 19, 2018 an all-day Community Resilience-Building Workshop, attended by twenty-two residents, was held at the Monterey Town Hall. (See List of Workshop Invitees/Attendees on page 21). The central objective of the Workshop was to first, review regional weather events and climate change data,

then after breaking out into two groups, work with a facilitator from the MPV Provider to develop a climate-related Natural Hazard Risk Matrix for the Town, the results of which would be published in a Summary Report that:

- Defined the top natural and climate-related hazards in Monterey
- Identified existing or future strengths and vulnerabilities
- Developed Prioritized Actions for Town departments to take, working with the broader stakeholder network and
- Identified opportunities to collaboratively advance actions to increase resilience and reduce risk to persons, property and the natural environment, both now and in the future

On Tuesday, June 5, 2018 the Town of Monterey held a Public Information & Listening session at Town Hall, to display the results from the May 19th Workshop and receive additional input from residents. The event was advertised on the Town website, in the town newsletter (*The Monterey News*) and was open to the entire public. Materials resulting from the Workshop, including the completed Risk Matrices with prioritized Actions and mapped areas of concern, were displayed and discussed with the assembled residents. Residents who had not participated in the Workshop, had the opportunity to ask questions or make additional comments of both the Workshop attendees and the MVP providers. Their comments and additional detail about specific hazard impacts received at the session, are incorporated in this Summary Report.

2. Top Hazards and Vulnerable Areas of Concern

(a) Top Hazards

During the Community Resilience Building Workshop, participants were asked to confirm the top natural hazards to the Town as identified by the MVP Core Team in previous meetings and interviews. Specific events, identified as the most severe in recent memory were: Tropical Storm Irene of 2011, that caused multiple roads to flood in Monterey; the severe winter ice storm of 2008, where main Town roads were blocked and power out for over two weeks in some areas of the county, and the memorable F4 Tornado of 1995, that tore through Monterey directly, lifting a car on Rte. 23 up in the air and tossing it 1,000 feet (305 m) away into a wooded

area. Wherever possible, identified vulnerable "problem areas" were drawn onto maps for later use by the Town in hazard mitigation planning and budgeting.

The small groups identified these as being the events of most concern:

- Flooding of infrastructure, public facilities and homes
- Power Outage (Severe storms)
- Hight Winds/Tornados
- Forest Fire
- Winter Storms

(b) Vulnerable Areas

Each Workshop group was given a set of large maps that were developed during the MVP meetings, including a base map showing critical facilities, floodplain areas, and the areas identified by the Committee to be areas of concern for natural hazards, such as neighborhoods that flood chronically, and areas with vulnerable bridges and culverts.

Other large maps at each of the workshop tables included a topographic map showing slopes, enlarged sections of the main two lakes in Town showing FIRM floodplain boundaries and the buildings within them (see Figs. 1 & 2). Participants were invited and encouraged to draw and write on maps to facilitate their conversation and find exact locations where hazards are present. The geographic areas cited as being of most concern are as follows:

Bridges, Culverts, Roads and public and private properties located in floodplain in Town center, as well as around Lakes Buel and Garfield. *(See Lake Buel Flooding and Lake Garfield Flooding Maps and Critical Facilities & Areas of Concern Map in Appendix A.)*

Town Dams - Need assessments for all publicly-owned or private lake association dams, especially the Old Stone Dam (*see Monterey Dams Inset Maps, Appendix A*.)

Private Well Water & Septic Systems: Aquifer capacity is unknown. Private wells in lakes areas have dried up during drought periods *(See Environmental Concerns Map, Appendix A.)*

Cell Telephone, Broadband & Emergency Communications Systems do not provide complete coverage, making emergency communications more challenging.

Seasonal and Vulnerable Populations – located throughout Town –including elders, medically-vulnerable persons, school children, seasonal tourists, hikers, campers, private schools and institutions. Coordination among these multiple populations in planning for emergent situations will require engagement and establishment of a formal process for two-way communications and cooperation.

Emergency Management & Sheltering Capability – throughout Town. There is no location in town, with the capacity to serve as an overnight shelter, though there is a regional shelter in Great Barrington. Limited backup power in several locations can provide short-term cooling/warming for small numbers of people.

Communications & Education about natural hazard issues – throughout Town. Transient populations are largely unaware of weather hazard risks and emergency procedures.

Environmental Integrity - Riverbanks and floodplains – Bank erosion, Water Quality Impairment from runoff were cited as concerns; the aging forest cover could be prone to insect infestation, tree and limb loss, and reduction in species diversity.

3. Current Concerns & Challenges Presented by Hazards

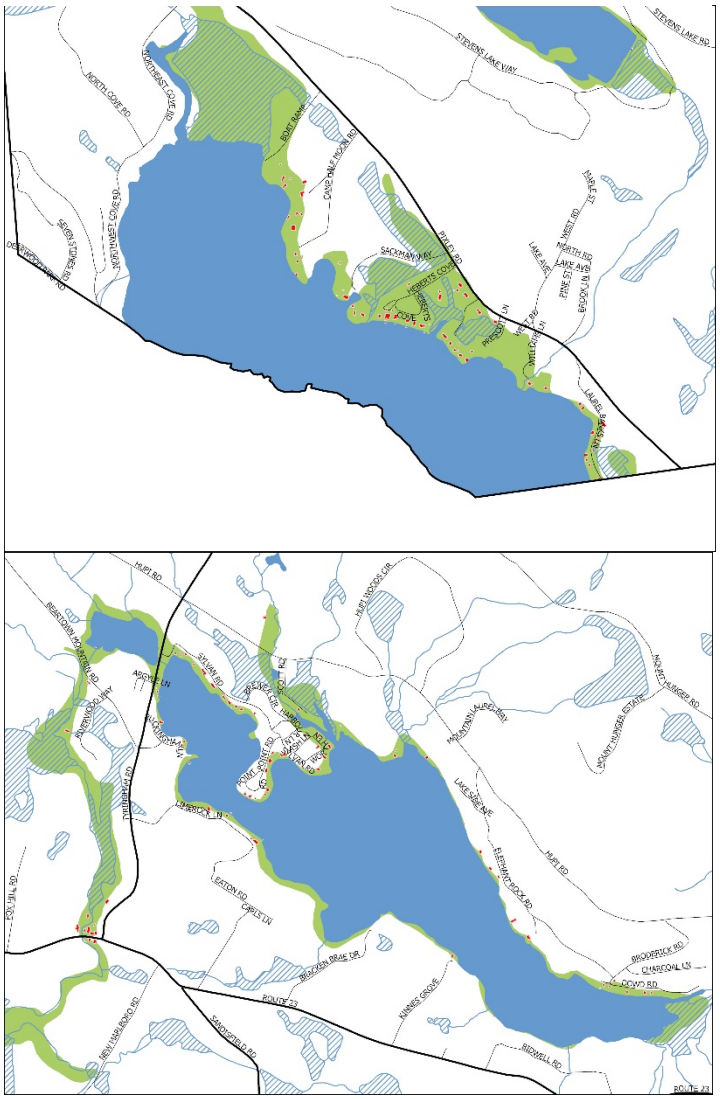
Flood and Severe Storm effects on Infrastructure & Buildings– The few main roads that traverse the Town of Monterey, (Route 23, River Road, Tyringham Road) are all Town-owned roads, so the municipality is responsible for maintaining them. All are identified as the main evacuation routes, as well. During severe storms, inundation, fallen branches and downed wires have blocked these evacuation routes, forcing emergency responders to use secondary roads into Town during times of mutual aid response. That delay during severe storm events or other natural hazard situations, could increase the severity of injury or contribute to a higher death toll.

Flooding from heavy rains or winter freezes with ice jams is an ongoing problem in Monterey. Undersized bridges and culverts, filled with sediment and debris from

floodwaters, has caused flooding of buildings in Town center and on Gould Road, among other places.

Lake Garfield and Lake Buel are ringed by private homes, with many built in the floodplain. The area around Lake Buel is a major concern when it comes to flooding. The outlet from Lake Garfield forms a brook (the Konkapot River) that meanders downstream almost a mile before it joins another brook formed by the outlet of Lake Buel. Just below the confluence of these two brooks, silt builds up and will cause water to backflow into Lake Buel. As a result, Lake Garfield water is in effect, draining into Lake Buel. This happens very frequently and causes nearby residences to flood on a regular basis. The area of the brook that is silted up is in the adjacent Town of New Marlborough. The lake, weir dam and roads that flood and upon which the homes are built, are privately owned by the Lake Buel District. The need for a cooperative solution between the Lake District and the two Towns, to solve this issue, was identified as an area of main concern at the Workshop.

Figs. 1 & 2. Homes within Floodplain on Lakes Buel and Garfield



Water quality, particularly in the largest lake, Garfield, has been impaired in recent years by storm water/snow melt runoff from the watershed area, causing algae blooms and siltation. Invasive plants are also present and are another threat, but removal is being managed by volunteers from the community. Other deleterious effects, like the presence of coliform and other pollutants, has not been fully studied. At present, Monterey does not have a storm water nor floodplain by-law in effect, nor have residents and developers been asked to adopt best

management practices and low impact development methods to reduce or eliminate sources of runoff into the lake and feeder streams.

In 2016, a Lake Garfield Working Group was formed to study water quality issues at the Lake. In March of 2018, the group published the *Phosphorus Loading Assessment for Lake Garfield*, written by consulting engineers, Water Resource Services, LLC. The actions recommended in the report have yet to be implemented, as the working group is still assessing the various remediation strategies and costs involved. Control of sediment and phosphorus inputs to the lake was listed as main priorities.

Municipally-owned critical facilities, including Town Hall, which includes the Police Department, and adjacent core properties - the Monterey Public Library, the Monterey General Store (now closed), the United Church of Christ and several private homes and businesses - are located on Main Road, in the floodplain area of the Konkapot River. While the Emergency Operations Center for all hazard emergencies is located at the Fire Station out of the floodplain, there remains a significant risk to municipal critical facilities, with no provision currently for redundancy operations, in the event of a deluge.

Additionally, there is a bridge located directly beside Town Hall with a 6' culvert beneath it, that channels the Konkapot under Main Road/Route 23. This culvert has recently clogged and caused flooding to two adjacent homes and only narrowly missed flooding Town Hall itself. This and other culverts located throughout Town, will appear on a list of priority hazards currently being developed by the Monterey Highway Department.

Another important part of Monterey's infrastructure are the nine dams, located on various water bodies throughout Town. *(See Critical Facilities Map, Appendix B.)* The dams that are publicly owned or managed by the lake associations for public benefit, were identified by the MVP Committee as being of concern because they all are aging and have not had engineering assessments recently, plus maintenance and repair has been irregular.

Power Outage often accompanies storm events throughout the year. High elevation and the locations of utility poles and lines exposes the Town to the impact of frequent High Winds, heavy rain, snow and ice storm events. Electrical

infrastructure in Monterey is largely exposed to the elements, making it vulnerable to falling trees, branches or coatings with ice. The threat of prolonged power outage, particularly during more frequent winter freezes, is a growing concern. While some residents are prepared with backup heat sources and generators, most others must make other arrangements, on their own. It was suggested at the Workshop that the lack of sheltering locations might be mitigated by asking residents to share the use of their generators or make spare room available to friends or near neighbors, during power outages. Town Hall as well as a few other locations, have backup generators for short-term warming or cooling, but currently, Monterey lacks a location with longer-term sheltering capability.

Tornadoes: According to Workshop attendees, the town's historic structures and extensive forest cover are at risk from Tornados. The National Climatic Data Center information confirms that Monterey has been the victim of multiple tornados, including in 1995, 1997 and 2005. Residents and others have identified a "Tornado Alley," between Great Barrington and Monterey, because multiple Tornados seem to have taken the same west-to-east trajectory, north of the Route 23 corridor. Tornado warnings are becoming more frequent than ever before. One of the recommendations from Workshop participants was to educate residents and visitors alike, on how and where to take shelter in the event of a Tornado.

Drought/Forest Fire: Drought is seen as a threat, even in this Town of ample surface water resources. Weather pattern changes bringing extreme temperatures and variable precipitation are likely to increase, according to Massachusetts Climate Change Projections. The Monterey Water Company, which provides water to residents and businesses in the town center, is privately owned and managed, and its aquifer capacity is unknown. There are also many private properties served by private wells, some of which have dried up during periods of low precipitation. At the CRB Workshop, one long-time resident recalled when private wells dried up and expressed the fear that a forest fire might quickly get out of control if the water supply is not fully assessed and backup sources made available.

(a) Specific Categories of Concerns & Challenges

After identifying the top hazards that pose a risk to the Town of Monterey, Workshop attendees were asked to focus on the features of Monterey's infrastructure, society and natural environment that have been or could be directly

impacted during storms events. They were asked to identify the most vulnerable, and list which were in need of further assessment, improvement, replacement or mitigation, in the near or long-term. The results are as follows:

Infrastructure Vulnerabilities

- Bridges & Culverts at risk of damage by storms/ice
- Road washouts occur frequently along main evacuation routes, due to clogged culverts and to beaver activity
- Dirt roads are muddy and rutted, impeding access by emergency vehicles
- Old Stone Dam, Lakes Buel, Garfield, and Stevens Pond need engineering assessments
- Sheltering capability is limited
- Backup power generators limited
- Historic Town buildings including critical facilities located in floodplain
- Lakefront homes experience repeated flooding
- Town Water supply is privately owned/managed; Aquifer capacity unknown
- Residential wells are shallow, at risk of running dry in drought
- Utility lines downed frequently, especially in exposed or upland areas
- Mix of communications infrastructure provides incomplete coverage (Cell service, landlines, broadband, satellite, antennae, etc.)

Societal Vulnerabilities

- Vulnerable populations, including Elders, Medically vulnerable, second homeowners, private Camps and other Institutions
- Inadequate Community-wide Communications Overall communications "system" to residents and seasonal population is mixed and incomplete Inadequate Volunteer & First Responder Staff including Doctors
- Emergency Preparedness and Planning incomplete

Environmental Vulnerabilities

- Degraded Water Quality - Lake water quality negatively impacted by runoff from lakeside homes and roads (education, bylaw)
- Bank erosion on Konkapot at Avalon School area causing falling trees and siltation
- Septic systems in floodplain risk failure

- Need for Forest Management & Replanting Plan, as Aging forest cover susceptible to fire, infestations and tree/limb loss
- Drought & Burning Season pose increased Fire risk
- Beaver dams cause road flooding/washouts with little or no warning

4. Current Strengths & Assets in Monterey

Because of the many recent experiences with extreme weather, and the generally tightknit community character, Workshop attendees were quick to point out the existing strengths in the community. Long-term cooperative practices developed over many years in this rural region with no regional government, have resulted in a well-functioning emergency response routine – including mutual aid, to good effect. The National Incident Management System (NIMS) is available, but town leaders are not well-versed and should be encouraged to attend training. Reinforcing and expanding supportive practices, education and emergency drills for the entire community, especially among the more vulnerable populations, will help ensure increased preparedness and improved resiliency to seasonal storm events.

Monterey's Town staff is proactive – always wishing to 'stay on top' of roads, bridges, dams and culverts that can pose a problem during severe weather. Financial constraints make prioritization of such projects mandatory. Bridge replacements that have been completed in the last six years include structures on Beartown Mountain Road, Wellman Road, New Marlborough Road at Harmon Road, with another at Curtis Road planned for completion during FY 2019 (see Appendix B for list). Recently residents voted at Town Meeting in May 2018 to commit funds to complete major bridge and road infrastructural repairs at Curtis Road from Town funds. The Police Department routinely works with the Council on Aging to perform safety and wellness checks on frail elders and to ensure that seasonally-vacant properties are secure.

The residents of Monterey look out for one another too, often reaching out to neighbors to check on well-being or to share food and shelter with neighbors during the long winter months. In addition, in March 2018 the Friends of Lake Garfield completed a 604(b) water quality assessment study, to address the growing eutrophication issue in Lake Garfield. And the Town Library on Main Road, is beginning a $1.85 million expansion project that will include site work

adjacent to the Konkapot to further protect this valued community asset. Other strengths identified include:

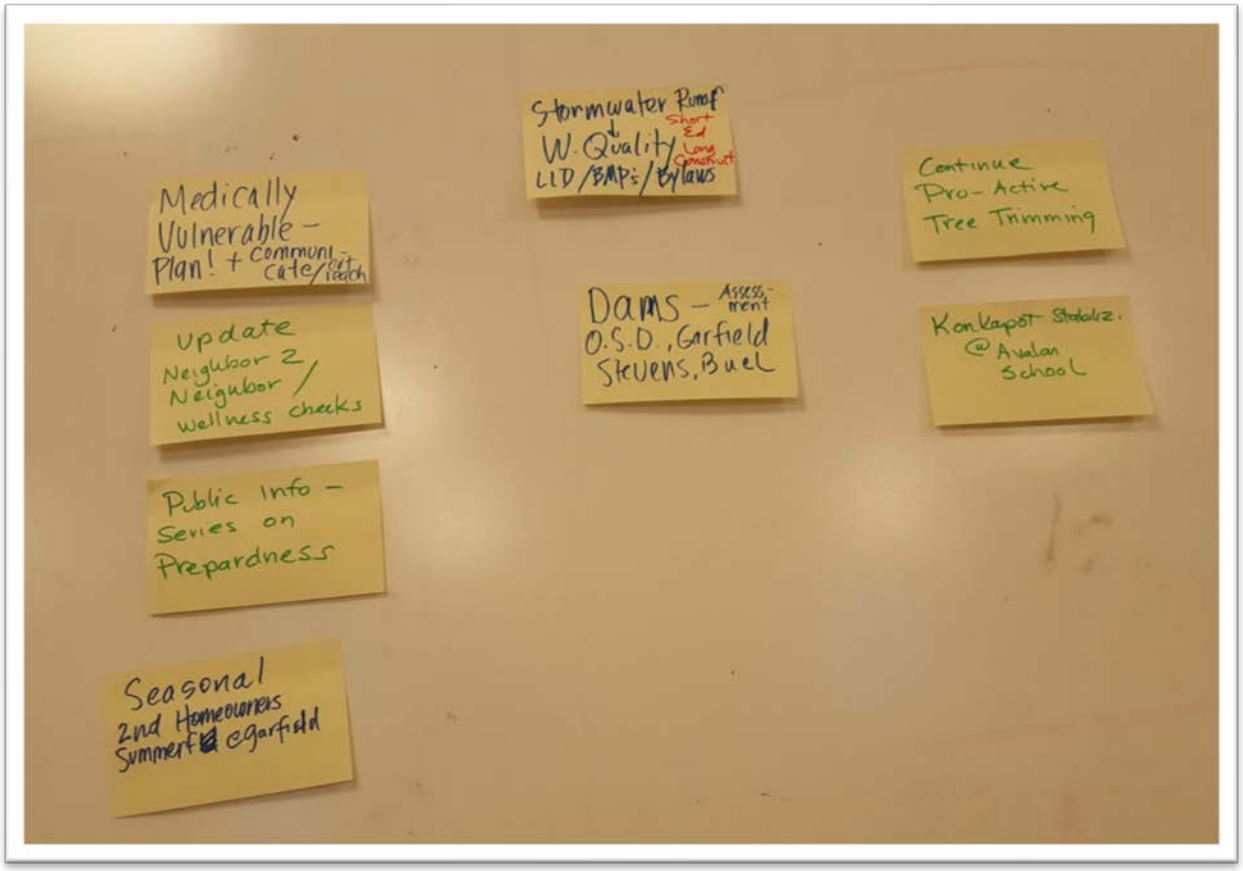
- Municipal staff is dedicated, proactive and quick to address infrastructural, maintenance and resident's safety needs
- Utility Companies and contractors cooperate with Town Highway Department and Fire Department to increase tree trimming near power lines
- Small, cohesive community in which residents look out for one another
- Residents are supportive of Town government and willing to commit Town funds to advance protection and mitigation strategies
- Police, Fire, Highway Departments work together frequently and effectively
- Vulnerable populations are monitored
- Lakes, streams and forests provides habitat and a cooling effect for a large variety of wildlife and residents
- Rural character of the Town has broad appeal, making Monterey a very attractive community in which to live
- Regional mutual aid is effective - good coordination between Town and regional first responder community

Following the exercise of identifying the Town's top Vulnerabilities and Strengths, Workshop attendees were asked to formulate and suggest possible actions or solutions to address each identified vulnerability.

Suggestions ranged from of identifying the need for further research or professional assessments (i.e. engineering studies, water quality testing, researching model floodplain or storm water bylaws, identifying best management practices for reducing storm water runoff, etc.), to practical suggestions for forming committees to focus on improving town communications, or to develop educational programs on safe brush burning, environmentally-friendly lawn care and rain storage, or to initiate conversations with Monterey's private institutions to integrate their emergency preparedness plans with that of the Town.
The small groups then prioritized the recommended actions they had developed as either high, medium, or low priorities and to determine a time-frame for taking action (short, long, or ongoing.) As a last step each group was directed to choose four top priority actions to bring to the full, reconvened group to discuss and further prioritize. The results of those ranking activities can be found on the

completed Master Matrix Tables found in Appendix A and as summarized herein. Fig. 3 shows the final eight priority actions that were discussed by the reconvened group.

Fig. 3. Top Eight Priorities from the Workshop



5. Top Recommendations to Improve Resilience in Monterey

(a) Top Eight Recommendations:

- Enact measures to manage storm water runoff to improve water quality – Low Impact Development, Best Mgmt. Practices, storm water and floodplain By-laws
- Engineering Assessments needed on all dams, but especially at Old Stone Dam, Lake Buel weir, Stevens Pond & Lake Garfield
- Continue proactive tree trimming and consider a replanting program with diverse species to increase resistance to infestation and to stabilize soils

- Conduct Konkapot River bank stabilization at Avalon School area
- Develop communications plan for seasonal, second homeowners, tourists, campers & medically vulnerable populations
- Update Neighbor 2 Neighbor and Wellness Checks, especially for medically vulnerable persons
- Develop Public Awareness & Educational series for preparedness and safety
- Use local events, like Summerfest at Lake Garfield, as an opportunity for public awareness and education on community issues and procedures around weather hazards -- Code Red sign-ups, Neighbor to Neighbor, Fire safety, etc.

(b) Top Priorities for Monterey (*See also Master Risk Matrix Appendix A)*

Highest Priorities

- Identify Bridges, culverts, roads that require repair/replacement
- Apply for CIP and other funding as available to repair/replace critical infrastructure based on priority list.
- Town to encourage Lake Buel District and Friends of Lake Garfield and other private owners, to conduct engineering assessment of dams and establish plan for beaver control, dredging and repairs, as recommended. Town to order engineering assessment of Old Stone Dam, Brewer and other public dams and follow recommendations.
- NIMS – Make sure key officials, including Select Board, are up to date on. training requirements per FEMA.
- Encourage volunteerism for both Fire and Ambulance.
- Prioritize dams that need engineering assessment & repair; seek grant funds
- Work with National Grid & Fiber Connect to get full complement of cell towers; investigate town-owned tower as 'Plan B.'
- Develop in-town forest/tree management plan for selective tree removal, to reduce risks, pest control, replanting scheme to increase tree diversity.
- Develop Town-wide communications strategies for voluntary systems like Code Red/Reverse 911 and expand Neighbor 2 Neighbor.
- Town to investigate enactment of stormwater and floodplain by-laws.

Moderate Priorities

- Develop Shelter Plan and educate residents about sheltering-in-place and the creation of both short and long-term shelters, at various town locations.
- Town to work with Town of New Marlborough and Lake Buel District on dredging, flooding and weir issues.
- Town to work with Monterey Water Company and lake associations to determine private well and aquifer capacities, develop water conservation measures, conduct leak inspections and identify back-up water supplies, in event of drought or fire.
- Town Emergency Management Director (EMD) to initiate conversations with camps and private institutions to coordinate emergency preparedness and response plans.
- Create a formal system and plan to keep growing senior population safe and healthy, along with EMD, Fire and Ambulance services; target the frail and medically-vulnerable for special outreach; consider creation of senior housing complex in Town.
- Promote enrollment in Code Red/Reverse 911 system to transient community members, including second homeowners, campers/hikers, and including rental community.
- Create public education programs on home fire safety, water conservation, leak awareness, adoption of residential best management practices and low impact development techniques, to control and retain storm water; investigate educational and grant resources from appropriate state agencies, including DCR, DEP and etc.; use existing media and community events as outlets to reach multiple audiences.

Lower Priorities

- Set up annual inspections for wood frame, historic structures for fire safety.
- Establish redundancy for Town functions and record-keeping, in event Town Hall is compromised or inaccessible.
- Take full advantage of community cohesion/support by increasing town communications and ed programs on issues via website and other outlets

- Create education program for fire safety via burning-permitting process, including video and exam, prior to issuance of permit; seek grant funds.
- Expand NIMS structure and augment with other trainings for Town staff.

6. CRB Workshop Invitees and Attendees*

Below is a list of names of residents who were invited to participate in the Workshop. Those who attended are acknowledged with an asterisk (*).

Name	Affiliation
Joe Baker	Monterey Community Ctr. Bd.
Stan Ross	ZBA
Rob Hoogs	Partner, P.E., Land Use Consultant
Lisa Smyle	Monterey Library
George Hamm, Tom Ryan	Beartown State Forest
Henry Bouchard	Resident
Scott Jensen	Planning Board/ZBA
Wayne Dolby	Resident
Mary Makuc	Board of Health
Dennis Reagan	Housatonic Valley Assn.
Tom Sawyer	Planning Board
Steve Enoch	Gould Farm
Larry Klein	Planning Board
Mark Little	Gould Farm
Tim Lovett	Resident
Don Clawson	Assessor
Bill Johnson	Resident
George Cain	Resident
Carol Edelman	Select Board
Kyle Pierce*	Lake Buel Association, Council on Aging
Peter Grealish*	National Grid, Monterey United Church of Christ
Gary Shaw*	Zoning Board of Appeals
Steve Weisz	Former Select Board
Julio Rodriguez	Council on Aging
Mari Enoch	Monterey Library

Melissa Noe	Town Administrative Assistant
Lee Tryon	Business owner (downtown)
Rev. Elizabeth Goodman	United Church of Christ
Sue and Tom Protheroe	Residents
Ric Fritch, Gretchen Mann Fritch	Camp Half Moon
Michael & Hillary Gilburg	KSA Camp
John Szablowski	Hume Lake Assn.
Lisanne Finston, Director	Gould Farm
Brian Layton, Assistant Mgr.	US Fish & Wildlife Svce.
Steve & Sally Pullam	Greenhaven Farm
Heather Kowalski	Director, Bidwell House
Gareth Backhaus*	Police Chief & EMD
Roy Carwile*	Monterey Fire Dept. & Health Dept.
Kay Purcell*	Council on Aging
Roz Helberstadter*	Council on Aging
Shawn Tryon*	Highway Dept. & Fire Chief
Dennis J. Lynch*	Monterey Community Center Bd., Lake Garfield Working Group
Raymond Tryon*	Monterey Fire Chief/Hwy. (Retired)
Meagan Duffy*	Town Clerk Assistant
Ray Coddington*	Coffee Club
Joe Wasiuk*	Coffee Club
S. Dube*	Coffee Club
Ed Bagg*	Coffee Club
Michael Wilewski*	Coffee Club
Don Pierce*	Lake Buel Assn.
Liz Pierce*	Lake Buel Assn.
George Cain*	Finance Committee
Kevin Fitzpatrick*	Tree Warden/Fire Dept.
Peter Chait*	Retired Business Owner/Coffee Club
Lauren Gaherty, Senior Planner Margaret McDonough, Planner	Berkshire Regional Planning Commission/MVP Providers

7. Town of Monterey Municipal Vulnerability Preparedness Core Team

Name/Title	Monterey Town Board or Affiliation
Steven Weisz	Select Board; Lake Garfield Working Group; Historical Commission
Gareth Backhaus, Chief	Police Department & Emergency Mgmt. Director
Shawn Tryon, Director of Operations and Fire Chief	Public Works, Dept. of Highways Buildings & Properties; Fire Department
Kay Purcell, Clerk	Council on Aging
Larry Klein	Planning Board
Bill Johnson	Stevens Lake Association & Monterey Finance Committee
Dennis J. Lynch	Community Center Board & Coffee Club member
Kyle Pierce	Lake Buel District & COA Board
Ken Wagner and John Szablowski	Camp Hume
Adam Chait	Business Owner - Fiber Connect
Peter Grealish	Resident/ National Grid employee
Rev. Elizabeth Goodman, Pastor	United Church of Christ
Donald Clawson	Principal Assessor & Monterey Water Company
Carol Edelman	Select Board
Jon Sylbert	Finance Committee
Julio Rodriguez	Board of Health, Parks&Rec, COA
Lisa Smyle	Library Trustee
Lisanne Finston & Steve Enoch	Gould Farm
Mari Enoch	Tax Collector
Mark Little	Conservation Commission & Agricultural Commission
Mary Makuc	Wilson Laughlin House Committee
Melissa Noe	Monterey Administrative Assistant
Lauren Gaherty, Senior Planner Margaret McDonough, Planner	Berkshire Regional Planning Commission (MVP Provider)

8. Acknowledgements

This project was made possible by a grant from the Massachusetts Executive Office of Energy and Environmental Affairs. Many thanks to the Monterey Municipal Vulnerability Preparedness Core Team and the residents of Monterey, for pulling together to make the Community Resilience Building Workshop and Municipal Vulnerability Planning process a success.

Special thanks to Melissa Noe at Monterey Town Hall, for coordinating the use of the facilities and kind assistance with the myriad details, promotion and coordination of the MVP planning process, the Workshop and follow up Public Listening session. Extra-special thanks to Dennis Lynch and Kyle Pierce of the MVP Core Team, who acted as co-facilitators for the Workshop and Listening Session and helped to successfully complete the MVP process.

9. Citation

Monterey MVP Advisory Committee, 2018. *Monterey Community Resilience Building Workshop Summary of Findings*, Monterey, MA.

Appendix A – Workshop Materials

Town of Monterey
Community Resilience Building Workshop, May 19, 2018
~ Workshop Objectives ~

1) Understand connections between ongoing issues, hazard, and local planning and actions in your Community. Define top hazards.
2) Identify and map vulnerabilities and strengths to develop infrastructure, societal and environmental risk profiles for your Community.
3) Develop and prioritize actions that reduce vulnerabilities and reinforce strengths for your community - local organizations, academic institutions, businesses, private citizens, neighborhoods, and community groups.
4) Identify opportunities to advance actions that further reduce the impact of hazards and increase resilience in your Community.

ACTIVITIES and OBJECTIVES
9:00 a.m. -- Welcome, Workshop Overview, Introductions, Posters *Objective: Workshop purpose*
9:15 a.m. -- Overview Presentation on Hazards and Vulnerability *Objective: Identify risks – What has already been identified? What is the data telling us?*
10:30 a.m. – Small Team Exercise *Objective: List Top 4 Hazards in the Town and List Community Vulnerabilities and Strengths*
11:30 – 12:30 p.m. – Lunch! Please View Posters
12:30 p.m. – Reconvene Small Teams – List and Prioritize Actions *Objective: List and Prioritize Actions – Choose Top 4 Actions*
1:30 p.m. – Small Teams Report Out to the Full Group *Objective: Present findings and Prioritization of Top 4 Actions*
2:00 p.m. – Top Priorities *Objective: Collectively Prioritize Central Action List*
3:00 p.m. -- Wrap up and Next Steps

A FEW KEY TERMS FOR TODAY

Natural Hazard – Source of harm or difficulty created by a meteorological, environmental or geological event

Risk – Potential for damage, loss, or other impacts created by the interaction of natural hazards with people, structures, facilities and systems that have value to the community

Vulnerability – Characteristics of people, structures, facilities and systems that make them susceptible to damage from a given hazard

Preparedness – Actions taken to plan, organize, equip, train and exercise to build and sustain the capabilities necessary to prevent, protect against, mitigate the effects of, respond to, and recover from those threats that pose the greatest risk

Mitigation – Sustained actions taken to reduce or eliminate long-term risk to life and property from hazards; *the work done up front to reduce the impacts of a hazard*

100-Year Flood Event – one that has a 1% annual chance of occurring, commonly called 100-yr flood event; this is statistical occurrence only – a town could experience two 100-yr flood events in a short period of time (or conversely not experience any within 100 years or more)

100-Year Floodplain – area of flooding associated with a 1% annual probability of occurrence; the boundary of the 100-yr floodplain is used by many agencies to assign flood risk, including FEMA and the National Flood Insurance Program

Municipal Vulnerability Preparedness



Town of Monterey
May 19, 2018

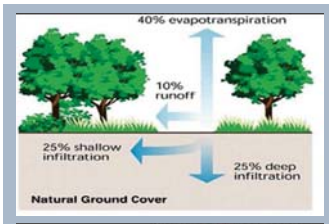
Municipal Vulnerability Preparedness Program 2017

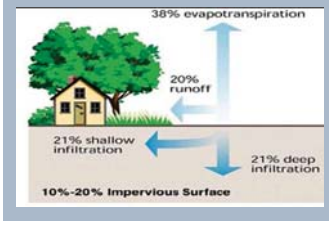
Why MVP?

- Consider weather pattern observations and climate change projections
- MVP certified communities will have priority status for some state grant opportunities
- MVP grant funds may be more flexible than FEMA for local mitigation projects

State and local partnership to build resiliency to climate change

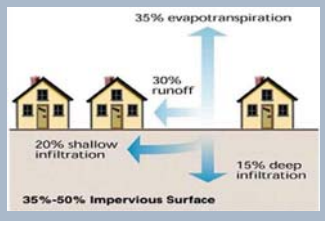
1. Engage Community
2. Identify CC impacts and hazards
3. Complete assessment of vulnerabilities & strengths
4. Develop and prioritize actions
5. Take Action



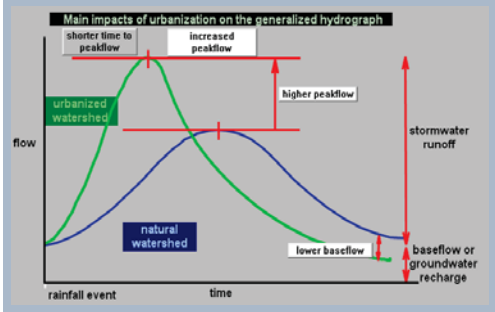


Changes in water patterns:

Impervious Surface = Increased Runoff

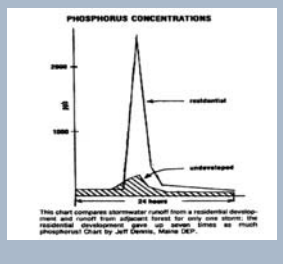


= Quicker, higher peak flow volumes

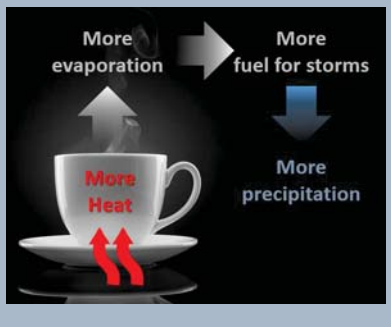


http://ubcifs-wmc.landfood.ubc.ca/webapp/WID/course/land-use-impacts-on-water-3/urban-impacts-13/

(And higher pollutant loads)



And Then There's Climate Change



Key Observed Climate Changes in MA

Temperature: **2.8°F** since 1895 (7-10°F by 2100)
Berk. temp. up 1.7°F since 1960

Growing Season: **10 Days**
Since 1950

Strong Storms: (heaviest 1% of annual) **71%**
Since 1958

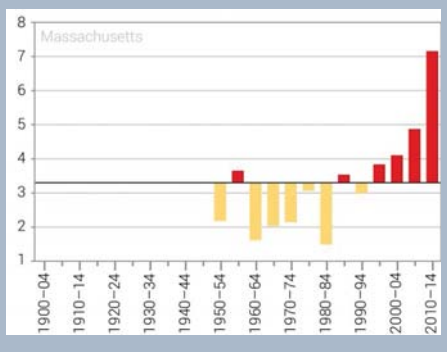
Extreme Heat Days in Housatonic Watershed

	Current		Projected by Mid-Century (2050s)	Projected by End Century (2090s)
Days per year above 90°F	~1	↑	+ 4 - 20	+ 7 - 57
Days per year above 95°F	0	↑	+ 0 - 6	+ 1 - 27
Degree Cooling Days		↑	+ 85 - 231%	+ 118 – 483%

Source: MA Climate Change Projections for Housatonic Watershed, 2018

Observed Number of Warm Nights

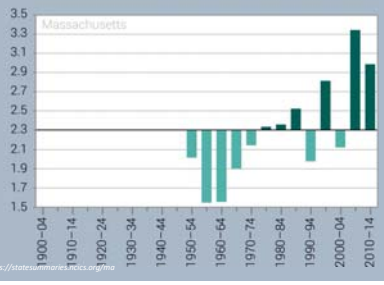
- Number of Nights where minimum temp. > 70° F



https://statesummaries.ncics.org/ma

Observed No. Extreme Precip. Events

- Number of Events w/ Precipitation > 2" in 1 day*
  "Stepped Increase" in 1970-80s



https://statesummaries.ncics.org/ma

More Extreme Precipitation

71% Observed 1958-2012

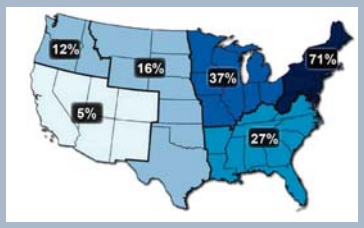



Photo: Ricci, NRCS

Change in 24-hour,100-year Design Storms (inches)

	NOAA TP-40	NOAA Atlas 14	Change
Boston	6.6	7.8	+1.2"
Worcester	6.5	7.6	+1.1"

Flood-plain Mapping

Source: Scott Horsley, Horsley Witten Group, Inc. Building Resilient Communities: With Low Impact Development: Addressing Climate Change, SWMI & MS4 Stormwater Program

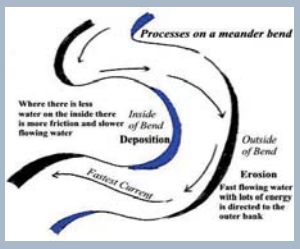
Flood-plain Mapping

Same building, March 2010 flood (approximately 40-year flood)

Rivers Move – Give 'em Room

Scour on the outside of meander bends.

Deposition on inside of bend



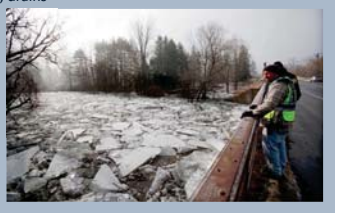
courtesy Carrie Banks, MA Division of Ecological Restoration

Leave that floodplain open for the Big Event

Winter Weather Changes

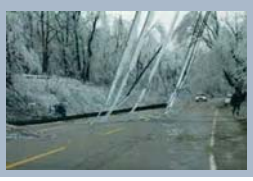
Cycles of cold and warm will increase, alter risks

- **Warmer temps:**
  - Less snow pack = altered water regimes and soil moisture
    - Less groundwater recharge = lower baseflow in streams, rivers, reservoirs
    - Loss of snow insulation = increased risk of frozen pipes, drains
    - Dryer spring soils
  - More rain-on-snow events
    - Increased runoff, risk of winter flood events
- **Ice Risks:**
  - Ice storms = potential loss of electricity
  - Ice jams



Ice Storm December 2008

- **Loss of electricity for 1+ million customers**
- **Some for more than 2 weeks**
- **FEMA obligates >$32 million in Mass.**
  - + State costs >$7 million
  - + Municipal costs >$5 million
  - + National Grid claims damages of >$30 million
  - + Small businesses without electricity "lose tens of millions of dollars"*



* MA Climate Change Action Plan

T.S. Irene 2011

- 500,000+ MA residents without electricity
- 6 out of 8 stream gages in Deerfield & Hoosic Rivers reach highest peaks of record
- Calculated as 100-year flood in Hoosic River in Adams
- Dubbed the "costliest Category 1 storm" ($15.8 billion in damages)
- Fed. Disaster: FEMA $5.6 million to MA households, $30 million for MA public assistance
- Fed. Highways: $46 million for roads and bridges, much of it for Rt 2

T.S. Irene and the Hoosic River

T.S. Irene and the Cold River

Irene and Shelburne Falls

Don't take Water for Granted

- Drought recurrence intervals may shorten
- Due to increased temp. and evaporation
- Lower groundwater recharge
- More water in summer/fall comes in extreme storm events with higher peak flows and more runoff
- Berkshires got off lightly this time

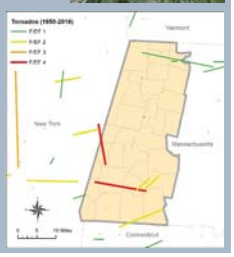
The Most Deadly Berkshire County Incidents

- **Hoosic River Floods**
  - 1938 -- Adams & North Adams – 2 deaths, many injuries
- **Dam failures**
  - 1886 -- Mud Pond Dam – Lee – 7 deaths
  - 1901 -- Basset/Dean's Dam – Adams – 1 death
  - 1968 -- Lee Lake Dam – Lee 2 deaths


Adams, 1938

The Most Deadly Berkshire County Incidents

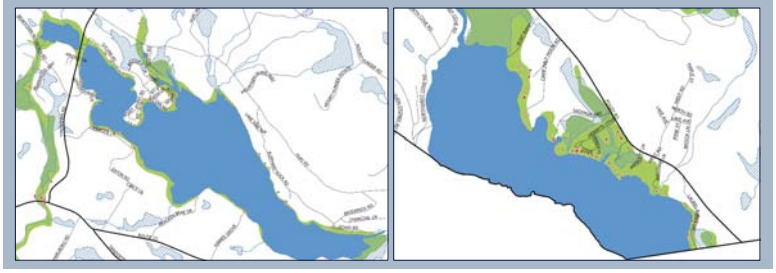
- **Tornadoes**
  - 1973 -- W. Stockbridge – 4 deaths, 36 injured
  - 1995 – Gt. Barrington, Monterey, Egremont – 3 killed, 24 injured



What is the most injurious or damaging incident that you have had to respond to in Monterey or a neighboring town?

Concerns around Monterey

- Floods risk homes around Lake Buel and Garfield



Concerns around Monterey

- **Flood Risks**
  - Critical facilities
    - town hall in floodplain
    - Fire station in floodplain?
  - Road flooding and washouts
    - Voted most vulnerable in Survey
  - Beaver activity
  - Sediment input = nutrient loading = excessive aquatic growth
- **Risk of Forest Fires**

Assessing Vulnerability in Monterey

- Approx. 2.5 miles of roadway travel through floodplain
- 122 Buildings in the Town are in the 100-yr floodplain (BRPC 2018)
  - Most located on Lakes Buel and Garfield; a few are in town center
  - Been 26 flood insurance claims in town since 1978 = $697,768
  - 5 homes have had repetitive loss claims, all at Buel = $411,039 total
    - 3 claims Oct 2005, 2 claims April 2007, 5 claims Aug. 2011 (TS Irene)
  - Only 20 properties have active flood insurance policies

Buildings in the 100-year Floodplain							
Residential		Commercial		Industrial		Total	
No. Bldgs.	Percent Res. Bldgs.	No. Bldgs.	Percent Com. Bldgs.	No. Bldgs.	Percent Ind. Bldgs.	No. Bldgs.	Percent Total Bldgs.
116	14%	6	60%	0	0%	122	15%

Assessing Vulnerability in Monterey

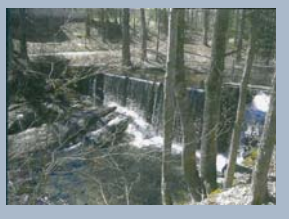
Property and building content values & potential damages in FIRM areas from 100-year flood (in millions)*

Residential Property Value	Res. Contents (50% Prop. Value)	Commercial Property Value	Com. Contents (100% Prop. Value)	Industrial Property Value	Ind. Contents (125% Prop. Value)	Total Loss Estimate
$33.9	$16.9	$1.9	$1.9	$0	$0	$54.5

*Source: *BRPC*

Concerns around Monterey

- **Old Stone Dam**
  - Probable "Low Hazard" = minimal property damage; loss of life not expected
  - "More than minor maintenance measures" needed to meet minimum level of safety (2005 report)
  - Study needed to determine plan of action
  - Loss of dam could result in:
    - Loss of some fire fighting capacity downtown
    - Sediment migration
    - Loss of aesthetics



Concerns around Monterey

- **Emergency Communications and Response**
  - Lack of complete cell phone coverage
  - Lack / slow internet
  - Large seasonal population
  - Vulnerable populations
    - Gould Farm and Camps
    - Seniors and other vulnerable scattered throughout the town
  - Power outage impacts = no water, reduced communications
  - Sheltering –
    - Town Hall holds ~20 people, has back up power, no facilities for overnight
  - Strengthening emergency services and public/private cooperation ranked high in Survey

Recent Accomplishments

- Replaced Bridge on Wellman Rd.
- Rebuilt bridge over Rawson Brook @ New Marlborough Rd.
- Replaced bridge on Beartown Mtn. Rd
- Established regular beaver removal program
- Lake Garfield 604b study completed in March 2018
  - submitting grant for improvements to drainage into the lake may 2018
- Voted to commit town funds to complete Curtis Rd. Bridge repair @2018 Town Meeting

Are you Ready for Electricity Outages?

The energy sector's three major climate change concerns:

1. Flooding (increased precipitation, flooding)
2. Extreme events (hurricanes, snow, ice storms)
3. Increased temperature (demand surge, heat damage to distribution system)

One projection: household summer peak demands increase 3 fold from that of 1960-2000

Are you Ready for Electricity Outages?

- **Do you know where vulnerable populations are that need electricity?**
  - Elderly (31% of town's pop. 65+ yrs*), disabled
  - Medical needs like oxygen, dialysis
- **Do you know where to bring them for their needed services?**
- **Are you prepared to shelter residents in extreme cold and heat?**

** ACS 5-yr estimates 2012-16*

Where can we reasonably focus our Mitigation Efforts?

- **Flooding is our prime target**
  - Several hazards result in flooding (hurricanes, thunderstorms, snow, ice jams, dam failure)
  - Severe rain events cause localized flooding
  - Predictable boundaries (but needs adjustment)
  - Relative ease of implementing mitigation measures
  - Focus of grant programs
  - Local bylaws and zoning offer local control

Bronson Brook, Worthington

- 2- 10 foot box culverts washed out in 2003. Road was closed to all traffic.
- Culvert had a history of clogging with debris

Bronson Brook Post Irene

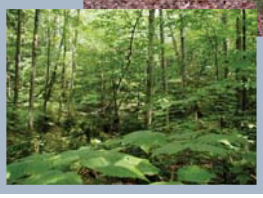
- A channel spanning tree located upstream of this culvert prior to the storm was mobilized and easily passed through this crossing.
- Road remained open and passable.

Examples of Mitigation Activities

- **Structural Projects**
  - Flood-proof, elevate or relocate buildings and infrastructure in floodplain or in flood zones
  - Stream Crossing Standards = 1.2 X bank width
  - Maintain and/or improve drainage systems
    - Can we disconnect or re-route the pipe?
    - Install beaver deceivers at culverts and beaver dams

Examples of Mitigation Activities

- **Maintain Natural Cover on Building Lots**
  - Minimize disturbance of natural vegetation and soils
  - Maintain natural tree and shrub cover
    - *A mature evergreen intercepts up to 4,000 gal. of water per year*
    - *A mature deciduous tree intercepts 500-2,000 gal/yr*
  - Natural cover especially important in water supply overlay district



Mitigation Policies

Guide Future Development –

- Floodplain & Stormwater bylaws – ***Monterey does not have any!***
- Revisit zoning – does the town:
  - *Require that stormwater runoff be retained on site*
  - *Encourage limited land disturbance and tree clearing during development*
  - *Restrict development on steep slopes*

Ongoing Monitoring

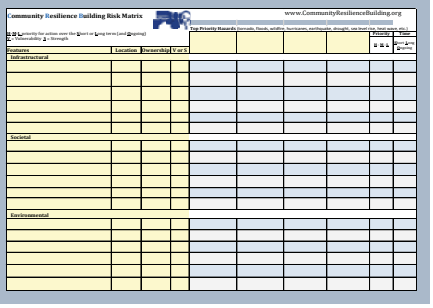
Incorporate New Data for Mitigation, Resilience, Adaptation

- Incorporate new floodplain data and boundaries when available
- Monitor data and climate change projections for infrastructure improvement projects

Now It's Your Turn

Identify the 4 Priority Hazards

- **Infrastructural:** municipal infrastructure, housing, utilities, commercial bldgs., municipal bldgs. and operations
- **Societal:** collective ability to respond – first responders, health services, goods and services
- **Environmental:** natural systems that protect, provide services or pose risk


Community Resilience Building Risk Matrix

www.CommunityResilienceBuilding.org

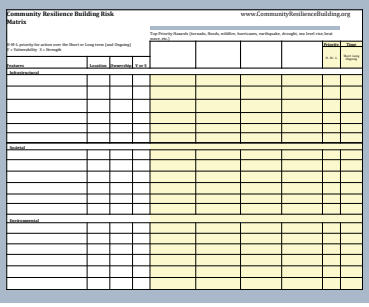
Top Priority Hazards (tornado, flood, wildfire, hurricane, earthquake, drought, sea level rise, heat wave, other)

Features	Location	Ownership	V or S							
Infrastructural										
Societal										
Environmental										

Actions and Priorities

List and Prioritize Actions to Address your vulnerabilities

1. **Develop Your Actions**
2. **Prioritize them H-M-L and Time**
3. **Choose the Top 4 Priorities that your think are the greatest risks and should be addressed**
4. **Bring your Top 4 to the Full Group**


Community Resilience Building Risk Matrix

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Top Priority Hazards [tornado, floods, wildfire, hurricane, earthquake, drought, sea level rise heat waves, etc.]

Factors	Location	Ownership	1 or 2					Priority H - M - L	Time Short (S) Long (L) Ongoing
Infrastructural									
Societal									
Environmental									

We Can Adapt

Snowshoe Hare *(Lepus americanus)*

Centuries ago, even decades ago, there would likely be some snow cover in December to provide camouflage for this species.

Picture taken Hoosac Range, Dec. 2012.

Horsley Witten Group
Sustainable Environmental Solutions

FEMA

Mass Audubon
Protecting the Nature of Massachusetts

Community Resilience Building Master Risk Matrix

MONTEREY, MASSACHUSETTS

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.)

	Location	Ownership	V or S	FLOODING	POWER OUTAGE	WINTER STORMS	HIGH WIND / TORNADO	Priority H - M - L	Time S Short L Long O Ongoing
Infrastructural Features									
Main Roads flood, washouts, culverts clog, bridge damage	Various	Town	V	Apply for CIP Grants --PRIORITIZE LIST of ROADS, BRIDGES, CULVERTS				H	O
Houses buildings flooding Lakes Buel & Garfield & Town Ctr	Various	Pvt & Lake Assns & Town	V	Buel #1 - Managing/Dredge outlet & beaver control	Garfield #2 -Flood risk evaluation for home owners	Involve New Marlboro in solutions at Buel	Best Mgmt. Practices & Low Impact Dev.& Bylaw	H	L
Potential loss of Historic Town buildings to storms or flood	Town Center	Town/Pvt.	V	Develop redundancy to protect vital records; Annual inspections & Drill w/ Fire Dept.				L	O
River Rd. / Konkapot streambank erosion (high risk)	Rvr Rd	Town	V	Coordinate with Housatonic Valley Assoc. for extra attention for this section during stream survey				H	S
Nat'l Incident Management System - Structure & Organizatio	All	Town - 1st Resp	S	Make sure key officials are trained in NIMS				L	O
1st Responders & Mutual Aid - good coordination	Regional	Town	S/V	Need more volunteers!				H	O
Water Supply is tight / owned by private company	Town Center	Pvt & Town	V	Back up wells? Assessment of aquifer needed?				M	L
Limited Shelter capability	n/a	Town	V	Develop Short-Term & Long-Term Sheltering Plan				M	L
Dams - OSD, Buel Weir, Garfield, Stevens, Brewer, etc.	various	Town/Pvt.	V	Prioritize, Engineering Assessments; Apply for funding				H	S
Communications Infrast - cell, landline, internet - spotty	All	Utilities/Town	V	Wk w/utilities to install cell towers; extend broadband and satellite; investigate town-owned PlanB				H	L
Residential private wells run dry	various	Pvt.	V	Water Conservation Education; Leak Inspections; Investigate extent of MWCo. resources				M	O

Community Resilience Building Master Risk Matrix

MONTEREY, MASSACHUSETTS

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.)

	Location	Ownership	V or S	FLOODING	POWER OUTAGE	WINTER STORMS	HIGH WIND/TORNADO	Priority H - M - L	Time S Short L Long O Ongoing
Societal Features									
Trees block main roads / evacuation routes in storms	All	Town	V&S	Proactive tree warden doing assess/removal of trees; National Grid also good; on BETA's list				H	S
Live wires in flood waters	All	National Grid	V	Review procedures for notifications w/Nat'l Grid; Article; Neighbor2Neighbor for all hazards				M	O
Limited Shelter capability	All	Town	V	Education - Preparedness for Shelter in Place; Get Volunteers To plan new shelter; Expand Neighbor2Nei				H	S
Vulnerable Populations - Elders, Medically Vulner.; 2nd Homeowners, Campers, Renters, etc.	All	Town/Pvt.	V	Develop messages & distrib thru media, web and events in town				M	S
Camps and private Institutions	Various	Pvt	V	No formal integration of pvt. Hazard plans with Town's; Engage with each to begin process				M	O
Strong Community Cohesion	All	All	S	Take full advantage of neighbor 2 neighbor and volunteers to help one another				M	S
Reverse 911, Code Red; Blackboard Connect - voluntary	All	Town	V&S	Promote enrollment via all available media and communication outlets				H	S

Community Resilience Building Master Risk Matrix

MONTEREY, MASSACHUSETTS

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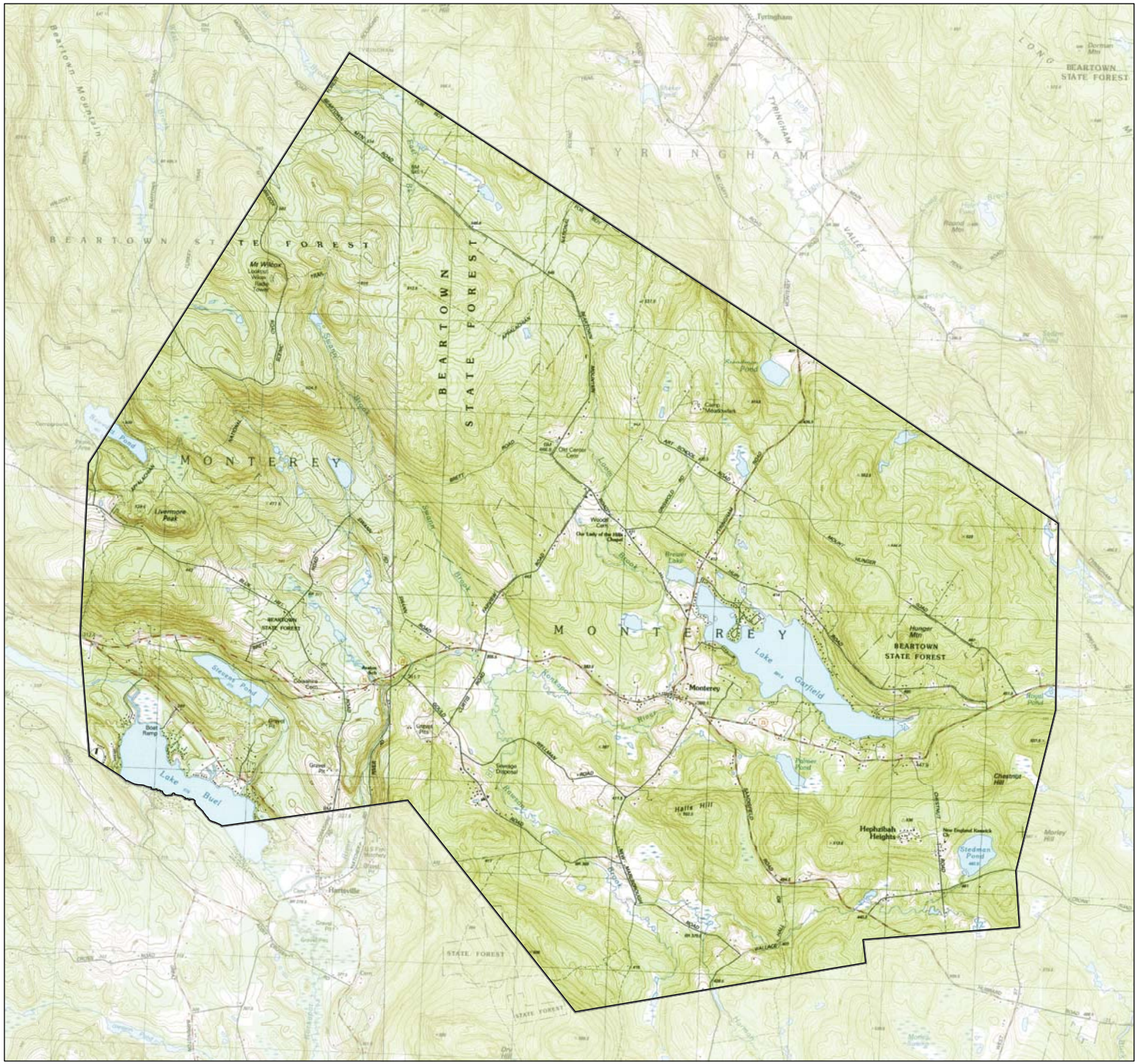
V = Vulnerability **S** = Strength

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

Environmental Features	Location	Ownership	V or S	FLOODING	POWER OUTAGE	WINTER STORMS	HIGH WIND/TORNADO	Priority H - M - L	Time Short Long Ongoing
River Rd. / Konkapot streambank erosion (high risk)	River Rd	Town	V	Coordinate with Housatonic Valley Assoc. for extra attention for this section during stream survey				H	S
Rte 23 - Evacuation route that floods in sections	Various	Town	V	Tree removal, Bridge & Culvert assessment				H	O
Konkapot streambank erosion	River Rd	Town	V	Tree removal and replanting				M	L
Monterey in "**Tornado Alley**"	All	Town	V	Public Education about Sheltering specific to Tornado threat w other outreach				L	L
Drought and "Burning season" poses forest fire hazard	Various	Pvt	V	Educate via burn permitting process -- video & pre-license test				L	O
Stormwater runoff neg. impacts Lake Water quality	Lakes	Pvt/Town/Assns	V	Floodplain & Stormwater Bylaws; Homeowner Education, Low Impact Development & BMP's				H	S
Septic failures	Lakes	Pvt/Town	V	Title 5 Enforcement? Water Quality testing at Lakes				H	O
Forest cover - Aging trees, pest infestation threat growing	All	Town	S	Proactive Warden & DPW; Augment with Re-planting & Treatment strategies				H	O

Town of Monterey
Topographic Map



0 0.5 1 Miles

N

Berkshire Regional Planning Commission

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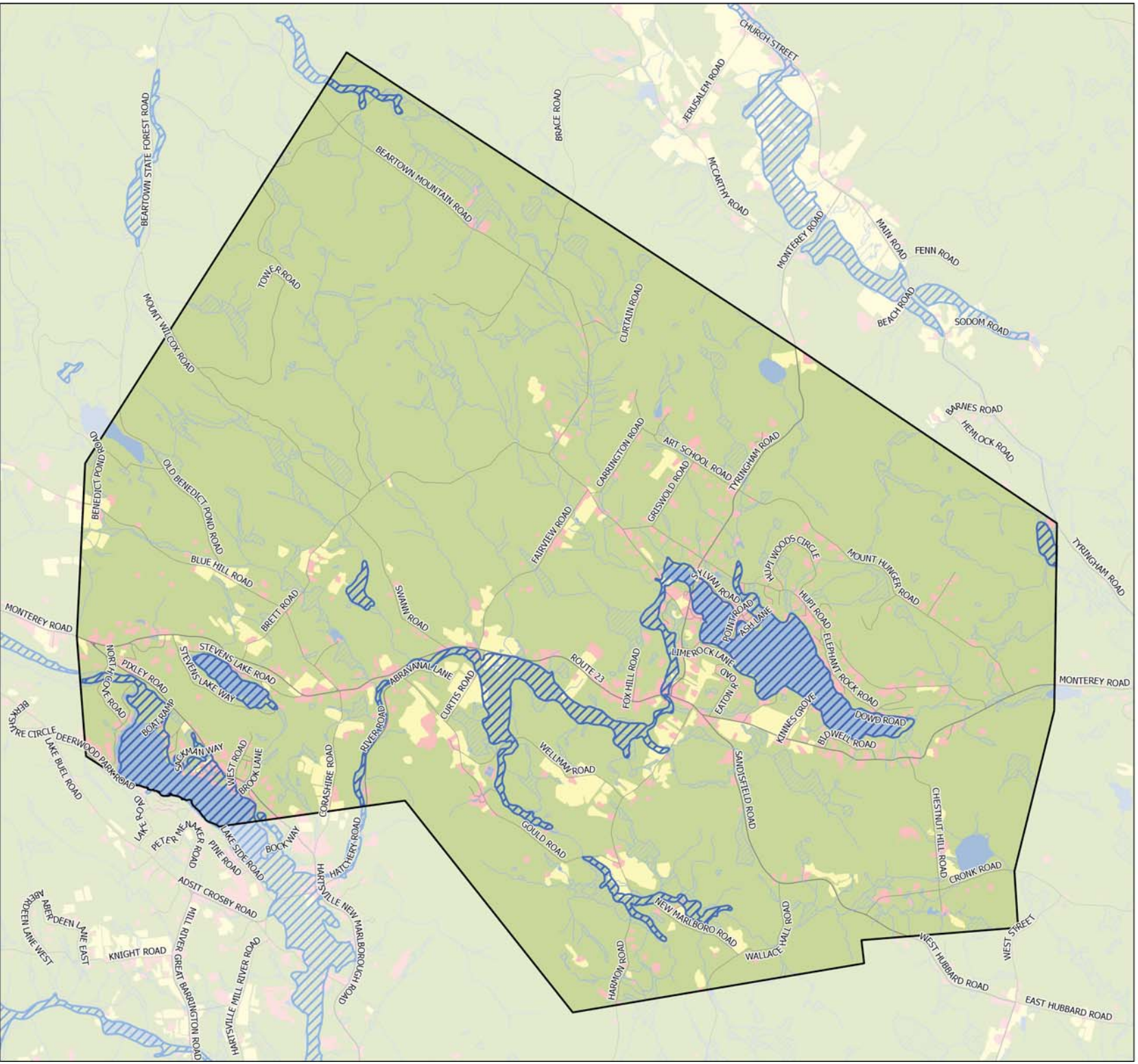

Town of Monterey Floodplain

- FEMA 100yr Floodplain
- Developed
- Agriculture
- Non developed
- Railroad
- Interstate
- Major Road
- Minor Road
- Local Road
- Stream
- Wetland
- Open Water

0 0.5 1 Miles

N

Berkshire Regional Planning Commission

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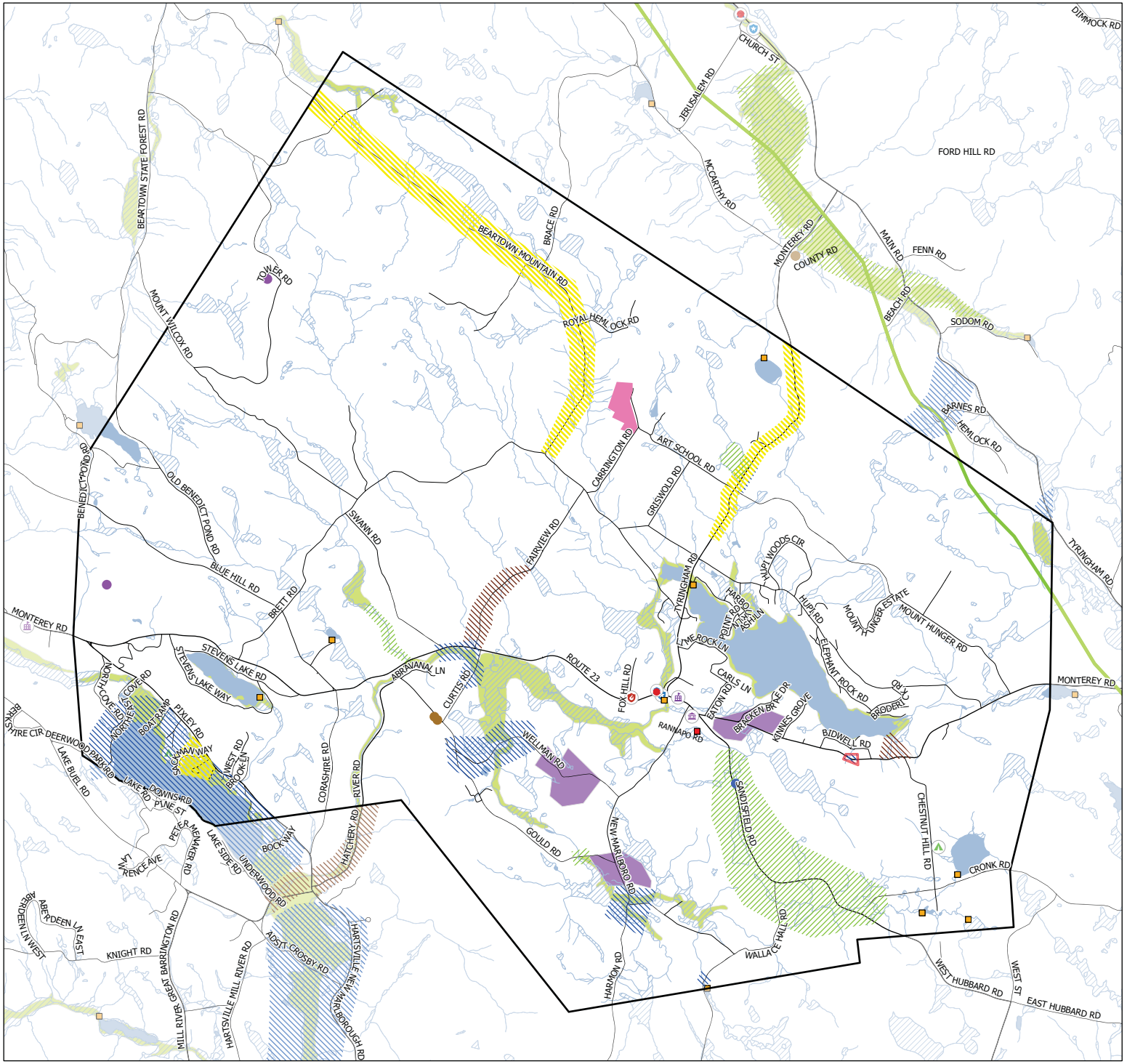
Town of Monterey Critical Facilities and Areas of Concern



- Beaver Activity
- Flooding
- Runoff / Landslide
- Power Outage
- FEMA 100yr Floodplain
- Dam
- Dam of Concern
- Town Hall
- Fire Station
- Police Station
- DPW
- Shelter
- Community Center
- School
- Camp
- Well
- Communications Facility
- Interstate
- Major Road
- Minor Road
- Local Road
- Railroad
- Stream
- Wetland
- Open Water
- Pipeline
- Farms
- Bidwell House

0 0.5 1 Miles

N

Berkshire Regional Planning Commission

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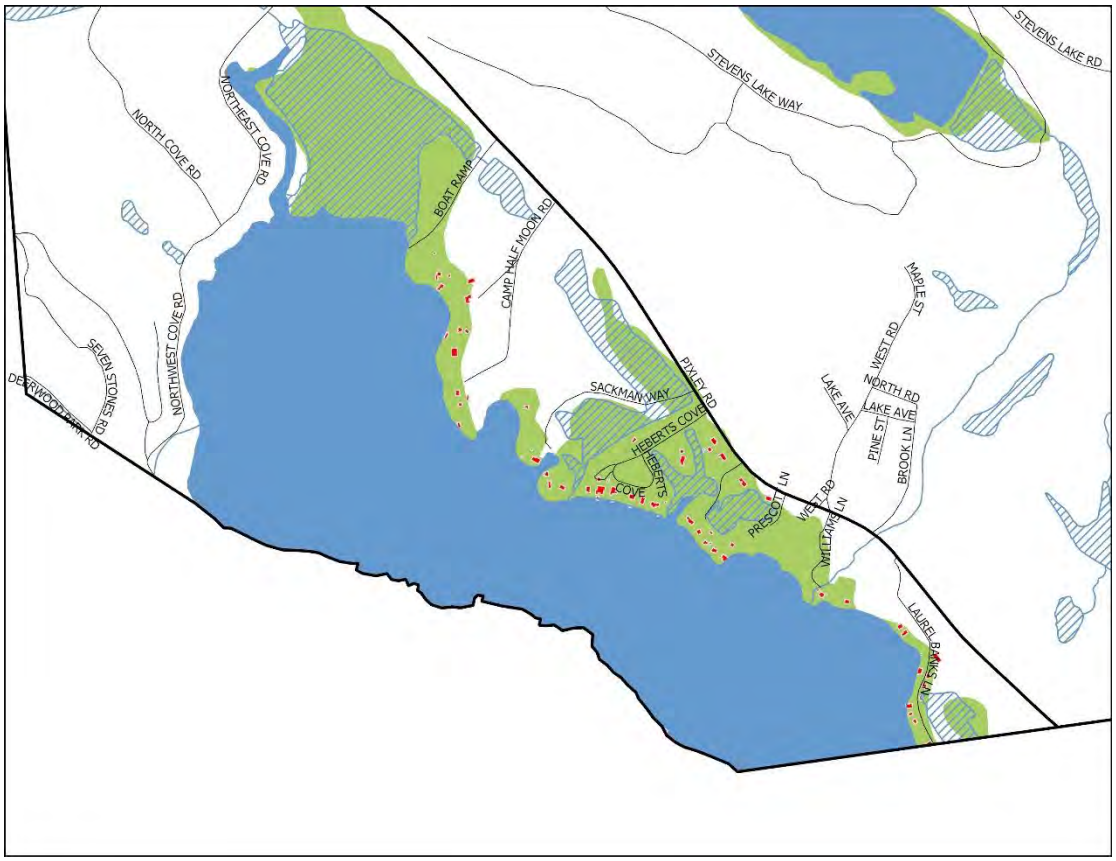
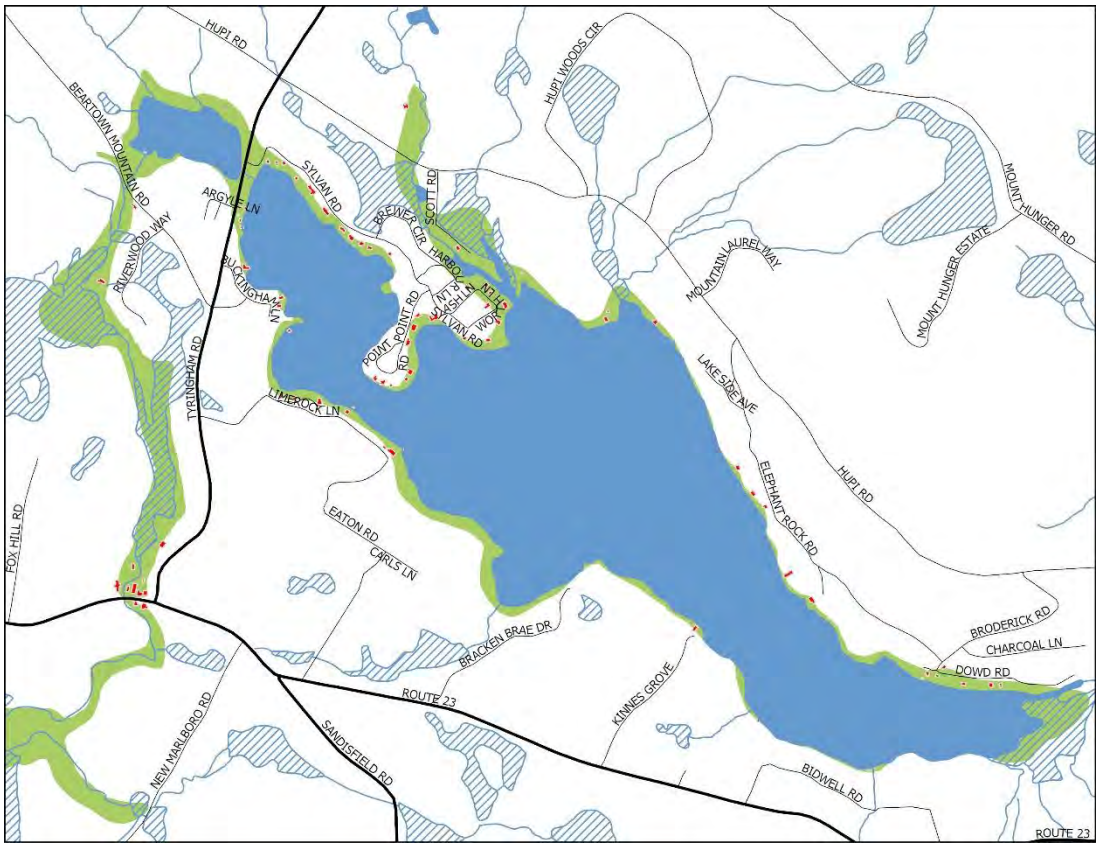
Lake Buel Floodplain buildings – Map inset

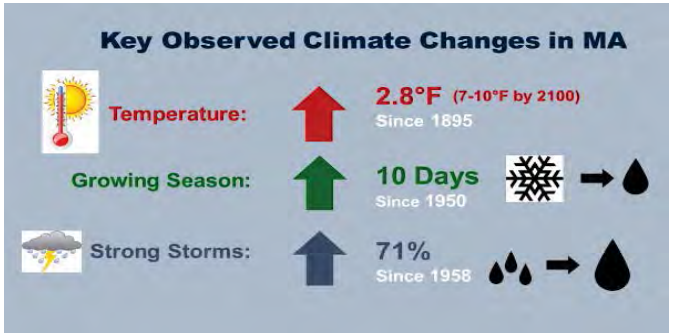


Lake Garfield Floodplain buildings – Map inset

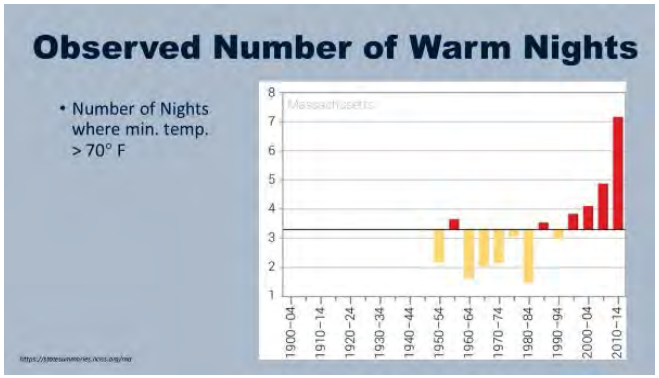


CLIMATE CHANGE OBSERVATIONS

The Basics for the Berkshires

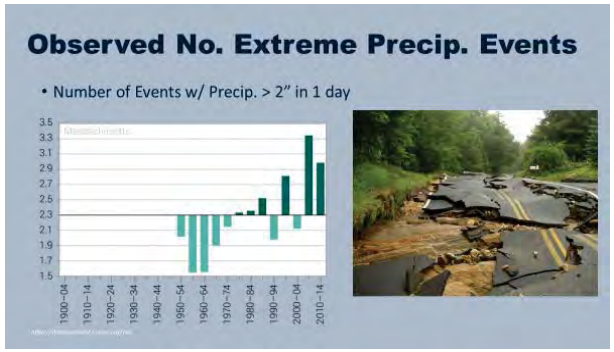


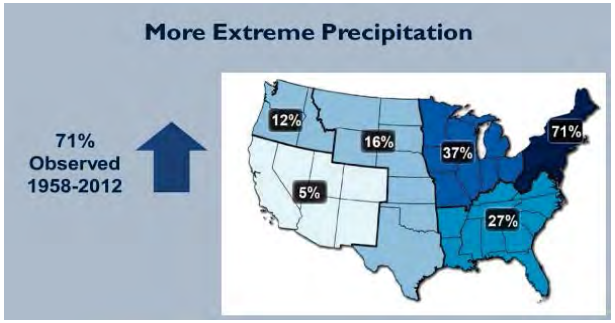
- **Warmer Temperatures** –
  - More evaporation, less soil moisture, increased risk for fire, drought, human health risks (particularly for elderly, other vulnerable pops.)
  - Greater temp. increases in winter
    - Less snow, but still cycles of freezing temperatures = infrastructure vulnerability
    - Rain-on-Snow = more overland winter flooding, ice jams
  - Increased temps. = increased heat stress for people, livestock, wildlife
  - Great evening temps. = inability for people and homes to cool down and "catch up" to normal temps.
  - Increased risk of thunderstorms and other severe rain events
  - New and expanding pests: ticks, mosquitos, forest and crops
  - Increased growing season
    - Pros: new farming opportunities
    - Cons: increased allergen season and increased potency



Precipitation Trends

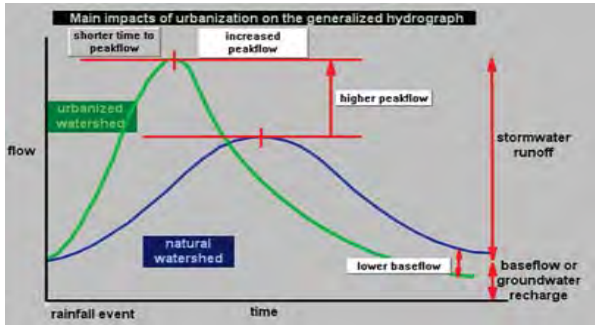
- **Increase in Extreme Rain Events** = increased risks and damages to municipal infrastructure
- **Engineering Standards** -- engineers now directed to use new data sets that include post-1970s precipitation data





Development = Altered Flows

Greater surface runoff leads to accelerated and higher peak stream and river flows = more severe flooding



Reconsider Floodplain Development

Berkshire County floodplain maps are from the 1980s

- **Urban Infill Example**
  new residential building on corner lot, outside of 100-yr floodplain

- **New FEMA floodplain Study**
  new building now inside floodplain recharge

- **Same building**
  March 2010 flood
  (approx. 40-year flood)

A Last Thought

Pity the Snowshoe Hare
December 2012

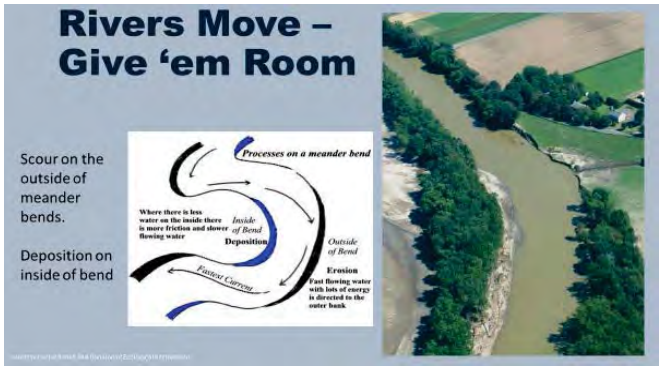
Its instinct is to sit still when danger approaches, thinking it blends in with its surroundings .

Centuries ago, even decades ago, there would likely be some snow cover to provide camouflage for this species.

Humans have the ability to adapt, unlike our hare.

OPPORTUNITIES TO REDUCE RISK

Water Movement



Above: Housatonic River at New Lenox Rd, Lenox

Right:

Sediment deposition dur to flood waters in floodplain area

Potential Mitigation Action

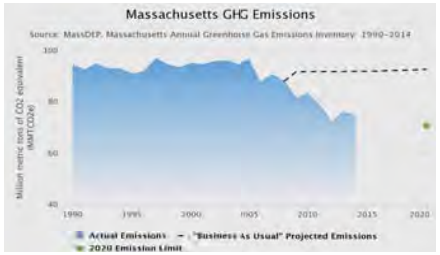
- **Protect and Restore Natural "Green Infrastructure"** –
  - Maintain or restore floodplain functions
- **Structural Protections & Improvements** –
  - Stabilize roads
  - Improve stream and river crossings; prioritize highest risks
  - Elevate structures above flood level
  - Monitor and maintain dams
- **Guide Future Development –**
  - Strictly enforce floodplain bylaws
  - Revisit zoning – does the town:
    - *Require that stormwater runoff be retained on site*
    - *Encourage Low Impact Development techniques*
    - *Restrict development on steep slopes*
- **Incorporate New Data for Mitigation, Resilience, Adaptation–**
  - Incorporate new floodplain data and boundaries when available
  - Monitor data and climate change projections

Why Focus on Flood Risks?

- **Flood events and recurrence intervals calculated (even if they need to be adjusted)**
- **Floodplain boundaries delineated (even if they need to be adjusted)**
- **Benefits of keeping development out of floodplains well documented**
- **Predicting large storm events and warning times are fairly reliable**
- **Mitigation techniques are feasible and benefits tangible**

MA Energy Reduction

MA GHG Emissions dropped 21% while Gross State Product increased 70% in same time period



Reduce Runoff from New Development

- **Minimize disturbance of natural vegetation and soils**
  - Maintain natural tree and shrub cover
- **Reduce the amount of hard, impervious surface areas**
  - Pervious pavers
- **Capture runoff that is generated by homes, driveways, patios**
  - Retention basins, rain gardens

A mature deciduous tree intercepts 500-2,000 gal. of water per year.

A mature evergreen intercepts up to 4,000 gal/yr.

Bridges and Culvert Improvements

Bronson Brook, Worthington

Left:

- *Box culvert washed out in 2003, closing road to all traffic.*
- *Had a history of clogging with debris.*

Left:

- *Post-T.S. Irene*
- *Channel-spanning tree was mobilized above this bridge, but passed through this upgraded design.*
- *Road remained open and passable.*

TROPICAL STORM IRENE: an inland storm of reference for the Berkshires

The Basics

- Tropical Storm (39-73 mph) hit the Berkshires August 28-29
- Eye of the storm travels over Berkshires approx. winds of ~50 mph
- “Catastrophic floods” in NYS and New England, with rain totals of 5”-10” in Western Mass., 7”-10”+ in VT and NYS; this rain fell on already saturated soils from previous rainstorm events
- Devastating flash flooding across mountain valleys ranking second worst in history; entire villages in Catskills uninhabitable and VT residents stranded for days by washed out bridges and roads; 500,000+ MA residents without electricity
- 6 out of 8 stream gages in Deerfield & Hoosic Rivers reach highest peaks of record
- Calculated as >100-year but <500-year flood in Hoosic River
- 50-year storm (2% chance flood event) in central Berkshire County
- Roads washed out, bridges damaged or washed out across many towns in Berkshire County; Rt. 2 is closed for 3 ½ months for repairs
- Dubbed the “costliest Category 1 storm” ($15.8 billion in damages)
- Fed. Disaster DR 4028: FEMA $5.6 million to households, $30 million for public assistance
- Fed. Highways: $46 million for roads and bridges, cost $23 million o repair 6 miles of Rt 2

Rain Totals

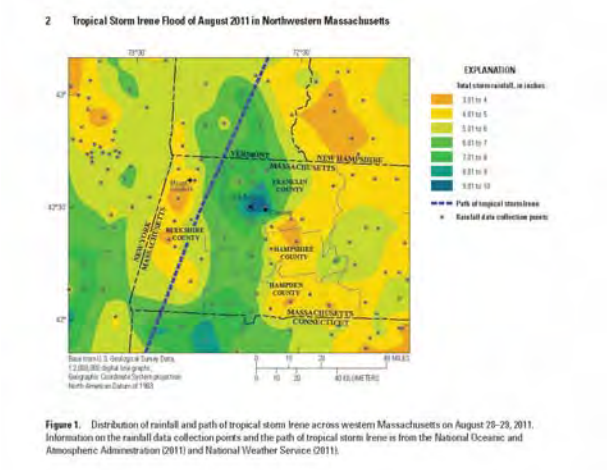


Figure 1. Distribution of rainfall and path of tropical storm Irene across western Massachusetts on August 28–29, 2011. Information on the rainfall data collection points and the path of tropical storm Irene is from the National Oceanic and Atmospheric Administration (2011) and National Weather Service (2011).

Raging Rivers and Streams

T.S. Irene estimated to be near or more than the 100-yr storm along the Hoosic River

Shelburne Falls

Deerfield River in Shelburne Falls flowed at 30,000 cubic feet per second – 40 times normal flow

Left – Bridge of Flowers during storm and under normal conditions.

Below – Bridge Street bridge – critical link to town

The Spruces, Williamstown

- Building and health inspectors declare 75% of homes uninhabitable
- If >50% of home value is damaged, current building codes must be met
- If FEMA funds used to repair or replace homes it must be elevated 6’–10’ above floodplain elevation + additional 2’ clearance; this requires that some homes to be placed 12’ above ground level
- Residents in all 225 mobile home units permanently displaced

Route 2 and Green River Dam

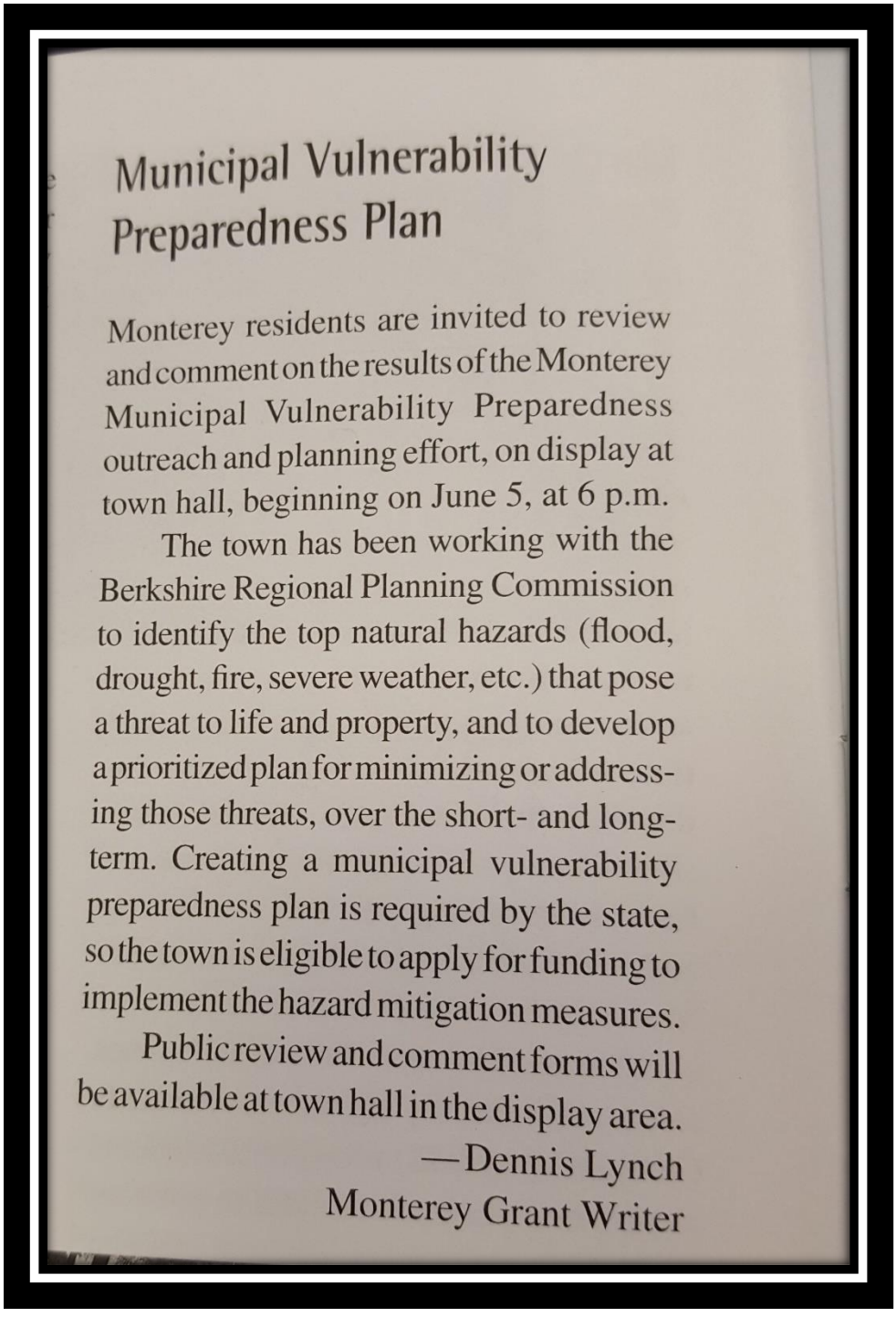
Left: Historic covered bridge in Greenfield damaged by dam failure upstream

Right, below: Rt. 2 road collapse and landslide along Cold River in Florida & Charlemont

Dalton – 50-year storm

Evacuations at Pomeroy Manor and risks to water, sewer, gas lines on Main St Bridge

Appendix B – Public Listening Session Materials



Municipal Vulnerability Preparedness Plan

Monterey residents are invited to review and comment on the results of the Monterey Municipal Vulnerability Preparedness outreach and planning effort, on display at town hall, beginning on June 5, at 6 p.m.

The town has been working with the Berkshire Regional Planning Commission to identify the top natural hazards (flood, drought, fire, severe weather, etc.) that pose a threat to life and property, and to develop a prioritized plan for minimizing or addressing those threats, over the short- and long-term. Creating a municipal vulnerability preparedness plan is required by the state, so the town is eligible to apply for funding to implement the hazard mitigation measures.

Public review and comment forms will be available at town hall in the display area.

—Dennis Lynch
Monterey Grant Writer

News Clip – Monterey News, June 2018

MONTEREY MUNICIPAL VULNERABILITY PREPAREDNESS

Building Community Resilience

The need for Monterey to increase resilience and adapt to extreme weather events is a Town priority.

The **Monterey Municipal Vulnerability Preparedness Team** has been working to assess the Town's overall vulnerability and to identify the top threats to life, property and the environment. The team has developed a recommended set of Action steps to mitigate natural hazard and weather threats and protect Monterey from future events, to the greatest extent possible.

Municipal Vulnerability Preparedness Workshop, May 19, 2018

1. **Identify Top Natural Hazards**
2. **Assess impact of hazards on Infrastructure, Residents & the Environment**
3. **Develop a set of Recommended Actions to reduce future risk**
4. **Prioritize – High, Medium, or Low**
5. **Estimate Time Frame to Complete – Short term, Long term or Ongoing**

Top 4 Hazards Identified

Homes within 100-year floodplain at Lake Buel

FLOODING

- Lakefront properties & Town buildings in floodplain
- Bridges, Culverts and Roads risk washout / ice dams
- Dam Assessments needed for all dams
- Stormwater runoff impacts water quality at Lakes & Streams

POWER OUTAGE

- Vulnerable populations – Seasonal residents, Elders, Medically vulnerable
- Back-up Power limited; Town Shelter capacity limited

Downed trees and power lines block roads

HIGH WINDS/TORNADO

- Downed trees & branches more frequent
- Older properties / upland areas at risk

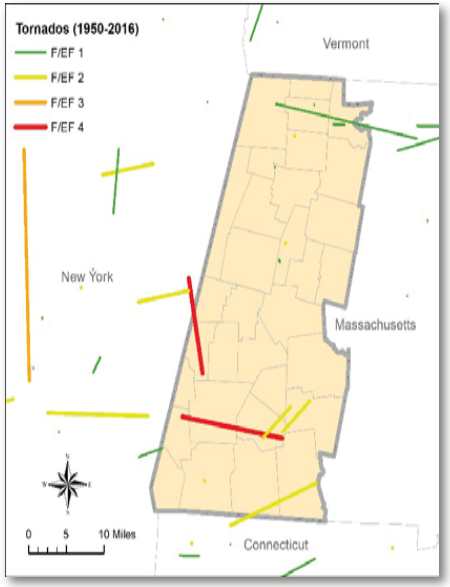
FOREST FIRE

- Drought and "burning season" risk
- Water supplies limited; unknown aquifer capacity

Monterey FD responding to fire at Gould Farm

Recommended Actions & Priorities

- ✓ Enact measures to manage stormwater runoff to improve water quality – Low Impact Development, Best Mgmt. Practices, stormwater and floodplain By-laws
- ✓ Engineering Assessments needed at Old Stone Dam, Lake Buel weir, Stevens Pond & Lake Garfield
- ✓ Continue proactive Tree Trimming; consider Replanting Program
- ✓ Konkapot River bank Stabilization at Avalon School area
- ✓ Develop communications plan for seasonal & medically vulnerable populations
- ✓ Update Neighbor 2 Neighbor & Wellness Checks
- ✓ Develop Public Awareness & Educational series for preparedness & safety



Historic Tornado tracks in Berkshire County

NATURAL HAZARD CONCERNS AROUND MONTEREY

Flooding

- **122 Buildings in Monterey are in the 100-year floodplain**
  - Most are around Lakes Buel and Garfield
  - Been 26 flood insurance claims in town since 1978 = approx. $700,000
  - 5 homes have ad repetitive loss claims, all at Buel = approx. $411,000
  - Only 20 properties have active flood insurance policies

Buildings in the 100-year Floodplain

Residential		Commercial		Industrial		Total	
No. Bldgs.	Percent Res. Bldgs.	No. Bldgs.	Percent Com. Bldgs.	No. Bldgs.	Percent Ind. Bldgs.	No. Bldgs.	Percent Total Bldgs.
116	14%	6	60%	0	0%	122	15%

- **Other flood risks are for buildings in the town center**
  - Town Hall appears to be in floodplain
- **Several important travel routes are prone to flooding and washouts**
- **Floods erode stream banks and threaten undersized culverts and bridges**
- **Sediment inputs during storms impact water quality of lakes and streams**
  - Sediment carries phosphorus, which feed invasive aquatic plants
  - Sediment buildup = reduced storage capacity
- **Beaver controls are an ongoing maintenance activity**

Old Stone Dam Condition

- **Probable "Low Hazard" = minimal property damage; loss of life not expected**
- "More than minor maintenance measures" needed to meet minimum level of safety
- Study needed to determine plan of action
- Loss of dam could result in:
  - Loss of some fire fighting capacity for town center
  - Sediment migration
  - Loss of aesthetics

Emergency Preparedness

- **Emergency Communications and Response**
  - Lack of complete cell phone coverage
  - Lack of / slow internet
  - Large seasonal population
  - Vulnerable populations:
    - Gould Farm and Camps
    - Seniors and other vulnerable scattered throughout the town
  - Power outages = no water, reduced communications
  - Sheltering –
    - Town Halls holds ~20 people, has back up power, no facilities for overnight
- **Strengthening emergency services and public / private cooperation ranked high in committee survey**

Protective Future Actions

- **Protect and Restore Natural "Green Infrastructure"** –
  - Maintain or restore floodplain functions
- **Structural Protections & Improvements** –
  - Stabilize roads
  - Improve stream and river crossings; prioritize highest risks
  - Elevate structures above flood level
  - Monitor and maintain dams
- **Guide Future Development –**
  - **Develop a Floodplain Bylaw!**
  - Revisit zoning – consider:
    - *Require that stormwater runoff be retained on site*
    - *Encourage Low Impact Development techniques*
    - *Restrict development on steep slopes*

Reduce Runoff in New Development

- **Minimize disturbance of natural vegetation and soils**
  - Maintain natural tree and shrub cover
- **Reduce the amount of hard, impervious surface areas**
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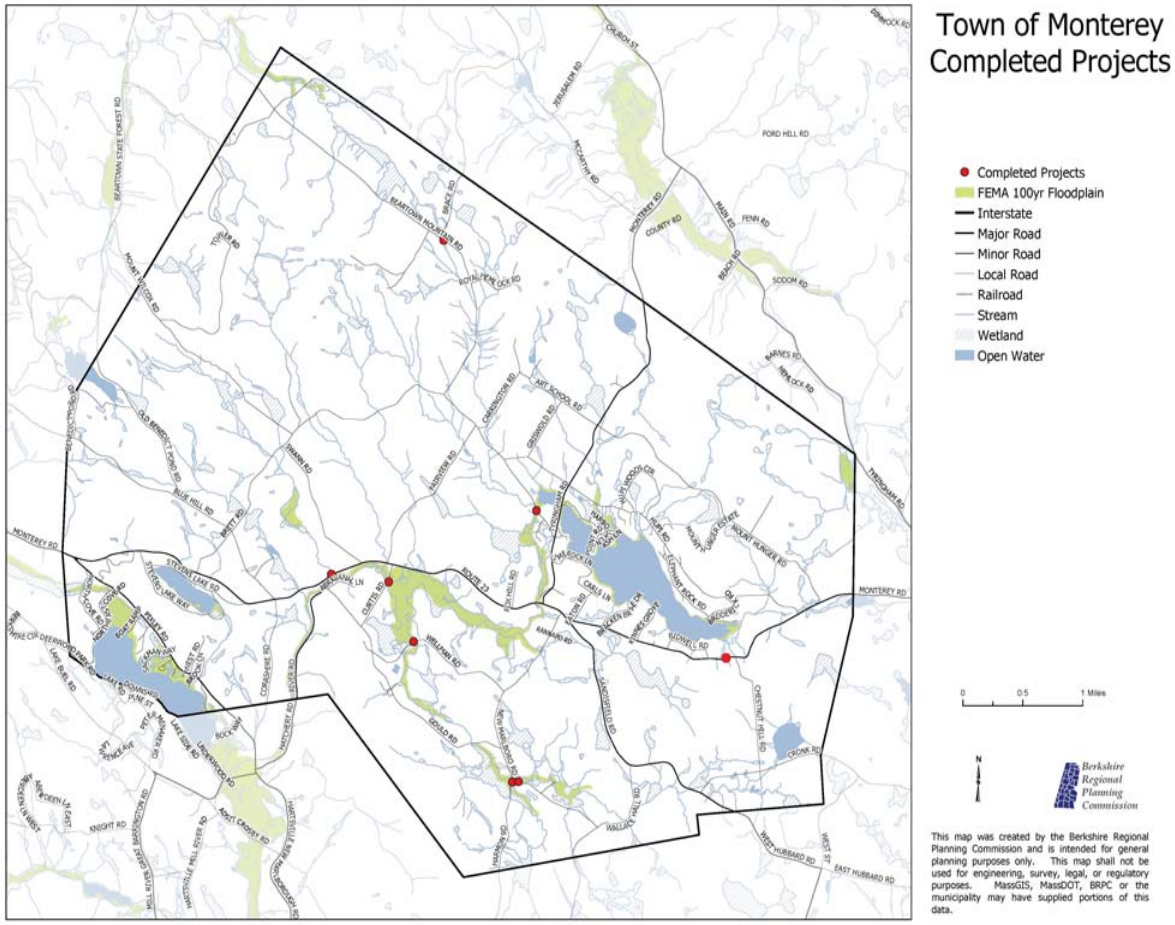
MONTEREY HAZARD MITIGATION PLAN UPDATE

Existing Action Plan with Action Status

Monterey Taking Action

Monterey's Hazard Mitigation Plan was part of a regional plan that included 19 Berkshire County communities. During that process, Town officials and residents developed a series of actions to address natural hazard impacts. Some actions are complete, some in progress and some are still outstanding. A summary is shown to the right and completed projects are shown on the map below.



Actions from Monterey Hazard Mitigation Plan of 2012	Actions Taken since 2012
Commission study to look at flooding issues at Lakes Buel and Garfield and implement findings	No Action Taken.
Replace bridge on Wellman Road with a larger bridge to reduce flooding	Done 2016.
Replace bridge at Harmon Road with a larger bridge to reduce flooding	Done 2015.
Rehab Curtis Rd. bridge to reduce flooding	In Progress – Design done; *2018 ATM approval?*
Install a better drainage system on Fairview Road and pave surface to prevent erosion	Incomplete – Actions taken but not up to standards; need to re-prioritize.
Research grant funds to remove blockages in waterways caused by trees/stumps/logs/silt	In Progress. Trees removed upstream at New Marlborough/Harmon Rd.
Create a floodplain bylaw to control development within the floodplain	No Action Taken.
Create stormwater bylaw to limit discharges into stormwater system	No Action Taken.
Improve bridges on Beartown Mountain Rd. to alleviate flooding	In Progress – One bridge replaced
Identify historic structures, businesses and critical facilities located in flood hazard-prone areas	In progress – Emerg. Command Center at Fire Dept.; more work needed to assess Town Hall.
Work on controlling beaver populations throughout town	Ongoing.

Additional Actions

- **River Rd. / Rt. 23 -- 2016 replaced culvert with larger open bottom**
- **Chestnut Hill Rd. – 2016 replaced old culvert with larger size**
- **Water quality study conducted at Lake Garfield; grant application to address runoff submitted May 2018**