Town of Hampden
Summary of Findings
Community Resilience Building Workshop

Prepared for
Town of Hampden, Massachusetts

Prepared by
Howard Stein Hudson

May 2021

HOWARD STEIN HUDSON

Engineers + Planners

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Community Resilience Building Workshop

Hampden's Need for Workshop

Threats associated with climate change are impacting residents, municipal staff, and visitors to the Town of Hampden. Challenges and opportunities discussed at Hampden's two Community Resilience Building Workshops include:

- Increased storm flows overwhelm existing, built infrastructure. The infrastructure fails to meet the capacity demands associated with increased energy and precipitation in a storm, which exacerbates existing flooding conditions.
- Changes in temperature increase the threat of vector-borne illnesses associated with increased tick and mosquito populations.
- Drought conditions increase the threat from wildfires, such as the 2020 summer forest fire, from the fallen trees and natural decay on the woodland floors.
- Increased energy in storm events creates new flooding situation where culverts, country drainage, and other stormwater conveyances fail.
- Renewable energy solutions are advocated for on the local level and there may be opportunities to consider solar.
- Dams contribute to fire suppression and flood management: some have failed, and others no longer serve their initial purpose.

The Town recognizes that the community is rich with wetlands and other natural conditions that provide opportunity for the Town to incorporate nature-based solutions to protect the community from climate change hazards. The Town of Hampden partnered with Howard Stein Hudson (HSH), Mary Louise Monahan, and Mass Audubon to develop a Community Resilience Building Workshop that allowed residents and staff to share their concerns about climate change threats, discuss existing strengths, and prioritize next steps to protect residents, infrastructure, and the environment from climate change impacts.

Municipal Vulnerability Preparedness (MVP) Core Team Meeting

Hampden's MVP Core Team meeting was held on December 16, 2020. Due to Covid restrictions, the initial meeting in the morning was a virtual event. A second meeting was convened for noon at the Laughing Brook Sanctuary. This discussion was held outdoors. Participants wore masks and practiced safe social distancing. Copies of the MVP Core Team Meeting agenda, afternoon sign-in sheet, presentation, and site walk and drone photographs are provided in **Appendices C and D**.

The MVP Core Team meeting took place at Laughing Brook Sanctuary.

Community Resilience Building (CRB) Workshops

Hampden's Community Resilience Building (CRB) Workshops were split into two sessions: January 21, 2021 from 12 p.m. to 4 p.m. and January 28, 2021 from 9 a.m. to 1 p.m. The CRB Workshop's central objectives were to:

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

The Town invited residents, staff, and officials who represented multiple sectors and interests in the community. Due to Covid restrictions, these workshops were also virtual. To encourage and maintain participation, the project team and the Town distributed Town maps (see **Appendix B**) in advance for participants to note climate change events and discussion points for the workshop. These maps were available online and they allowed the community to review and comment before, during, and after the CRB Workshops. The CRB Workshop agendas (see **Appendix C**) incorporated brief videos that informed on climate change matters locally, nationally, and globally. Workshop Day 2 included a detailed presentation from Mass Audubon on green infrastructure and nature-based solutions. The Workshop referenced and advanced recommendations in existing studies and reports: Hampden Hazard Mitigation Plan and Hampden Open Space and Recreation Plan.

The resulting Town of Hampden's Community Resilience Building Risk Matrix is provided in **Appendix A**. Supporting information, including maps, Agendas, invitation lists, sign in sheets maps, announcements, and presentations are included in the **Appendices B, C and D**, respectively.

WIKIMAPPING

The WikiMap was created to allow community members to contribute their comments, concerns, and project ideas. Wikimapping.com is an online, crowd-sourcing survey tool used to collect public input based on lived experience. Upon visiting the website, users were asked to select their category of input (for this process: Infrastructural, Societal, or Environmental), whether the comment being made is a strength or a weakness within the selected category, and to identify the specific location for their comment through the use of "pin drops." HSH collected seven comments via the WikiMap. **Appendix B** includes an image of the Hampden GIS WikiMap with comments left by residents.

MVP Listening Session

The MVP Listening Session was held on March 1, 2021 virtually before the Town of Hampden Board of Selectmen Meeting with available CRB participants also in attendance. Workshop participants expressed their support of the MVP prescriptive process that provided multiple departments, residents, and officials to learn more about their climate change concerns and shared opportunities to build resiliency.

Climate Change and Hampden: Summary of CRB Findings

Hampden is in the Connecticut Basin. At the Core Team meeting and the CRB Workshop, updated climate change projections from the Northeast Climate Science Center at the University of Massachusetts Amherst were presented. Discussion on climate change projections included the impacts of hotter summers, warmer winters, extended periods of drought, and higher intensity storm events. In discussions leading up to and including the CRB workshop, Hampden's Highway Department noted the change in winter storm response to address changes in winter storm patterns. Mixed precipitation – snow, sleet, and freezing rain – require sanding, plowing, and sanding again for single events. This results in accelerated roadway decay and additional maintenance costs. High intensity storms have exacerbated existing flooding conditions and created new areas of concern. Participants noted the summer 2020 wildfire and associated it with the extended summer drought conditions. The Board of Health noted that Hampden, located in Hampden County, was at a raised risk level by the Massachusetts Department of Public Health for Eastern Equine Encephalitis (EEE). The Schools noted increased concerns about the risks to students in playgrounds and fields from ticks and mosquitos. Highway acknowledged was the need for increased vigilance for crews working outside. EEE and Lyme disease are spread by mosquitoes and ticks whose populations are increasing and expanding due to milder weather.

Ted Zebert, member of the Hampden Conservation Commission, spoke about his additional role as a citizen volunteer weather watcher. He is logged in with the National Weather Service and is a

member of weather watch group out of the University of Colorado. He is a citizen recorder of what happens in rainfall and snowfall, and the water content of the snowfall. Volunteers have basic equipment at their homes; he has a semiofficial four-inch rain gauge and a three-foot by five-foot whiteboard in his backyard to take snow samples. Ted has been doing national weather reporting for 12 years. He stated that even though Hampden has had probably two years of drought, there is more rainwater out there. Ted presented photos and described the damage from the 1938 and 1955 floods. After the 1955 flood, Main Street had to be rebuilt. The bridge was replaced. Ted concluded that from his observations that "it's getting warmer. It's getting wetter. There is less snow and more liquid precipitation."

Hampden 1938 Flood Photos at East Brook

TOP HAZARDS AND VULNERABLE AREAS

Participants in Hampden's Day 1 CRB workshop identified Hampden's Top Hazards as:

- Flooding/Drought
- Extreme precipitation/wind/tornados
- Heat
- Wildfire

Participants identified the following Areas of Concern:

- Main Street near confluence of Big Brook, East Brook, and Scantic River
- Floodplains of the Scantic River, Watchaug Brook, Big Brook, and East Brook
- Town-wide brook and stream crossing flood and storm flow vulnerabilities
- The dam across from the Town House
- Town-wide Stormwater infrastructure
- Forests and wooded lots

CURRENT CONCERNS AND CHALLENGES PRESENTED BY HAZARDS AND CLIMATE CHANGE

The CRB Workshop process was designed to allow residents and staff to share their concerns about climate change threats, discuss existing strengths they recognize within the Town, and prioritize next steps to protect residents, infrastructure, and the environment from climate change impacts. Below, the findings of this discussion are grouped by topic area and summarized, including threats, strengths, and priorities that were identified by CRB participants under each topic area.

FLOODING AND INFRASTRUCTURE

Major storm events have been a recurring threat to Hampden throughout its history. In recent memory, the 1938, 1955, and 2005 floods have all significantly impacted the Town of Hampden. As such, flooding is also a major challenge in Hampden, and the threat from flooding has been growing with the increasing frequency of major storm events that deliver large amounts of precipitation over a short time. Workshop participants noted that storms which adversely impact emergency services and cause road closures and property damage seem to be occurring at greater frequencies than they have in the past. Historical flood data suggests that Federal Emergency Management Agency (FEMA) Flood Zone mapping, the de facto standard for determining flood risk, seems to be increasingly inadequate, as evidenced by the State flood map updates undertaken by FEMA.

The overall theme in Hampden is that flood events are becoming less predictable, more sporadic, are occurring more frequently and with more severe impacts. Participants noted increased flooding events throughout Town. Hampden's Highway Department noted that the change in storm events associated with climate change is not exclusive to winter operations. Year round, the Town is, at times, spending more time cleaning or repairing washout damage than they spend plowing snow. The Highway Department is trying to be proactive by addressing known and reported concerns, for example, by installing curbing in some areas to manage the water and divert it to catch basins or country drainage. The failure of existing infrastructure to handle these events is not apparent until the flooding and washouts occur. The Highway Superintendent noted that these washouts are

moving targets and that he often "does not know the issue or concern even exists until it pops up in the middle of, or immediately following, a storm event."

The Highway Department has seen an increase in calls from residents who are experiencing road and property flooding for the first time. Some of these residents have lived in that location 40 years or more. There were concerns expressed as to whether the Town is prepared for the projected 100-year flood – with or without climate change impacts. Flooding events have adversely impacted critical emergency response and evacuation routes, as well as access to schools, nursing homes, senior housing, as well as cutting off entire neighborhood access. A member of the Capital Planning Committee would like to see an assessment of bridges and culverts so that the Town can prioritize and fund according to threat level. The Highway Department would also like to have a comprehensive assessment of bridges and culverts performed for the above-noted reasons and to assist with implementing solutions before major problems and public safety concerns present themselves in the middle of a storm event.

Concern was expressed about the openness of the river flow. Debris, including fallen trees, shoreline runoff, trash, etc., accumulates and becomes a barrier to water flow. Cleanout costs can be prohibitive. As flood levels increase due to climate change, more debris will find its way into these waters. Dredging the Scantic River is an option that has frequently been discussed.

Participants and Hampden's *Hazard Mitigation Plan* (HMP) identify threats from flooding to roads, especially for emergency vehicles and evacuations, as a major concern. Previous flooding has required evacuation of five households on Main Street along the Scantic River. MVP Planning assistance is funding a separate assessment of the Main Street flooding threats at Big Brook and East Brook, on the eastern side of Town.

WINTER ROAD MAINTENCE

Winter storm maintenance is challenging the usual operational response. Rain, sleet, and snow all in one event requires plowing, sanding, salting, and resalting. When these winter storms end as rain events, they wash away all the road treatments and require additional applications when freezing returns. The mixed precipitation events and the required treatment accelerate the decline in the conditions of the roadways, and stormwater systems require more repairs and replacement at increased costs.

MAIN STREET FLOODING

The Town has consistently identified the Main Street flooding as a priority vulnerability in its HMP. Increases in precipitation and storm events will exacerbate the flooding issues on Main Street. The Town of Hampden's MVP project includes consideration of the threats and opportunities associated with built infrastructure (Main Street) and natural resources (Laughing Brook Wildlife Refuge) in

the project area. This initial assessment informs residents, officials, Mass Audubon, and others on opportunities to incorporate resiliency into their project planning within the project area and beyond.

The expanded Main Street flooding assessment scope evaluates, identifies, and educates stakeholders and others about nature-based solutions to alleviate flooding on Main Street. The Town of Hampden's Main Street flooding assessment project includes consideration of the vulnerabilities and strengths associated with built infrastructure (Main Street) and natural resources (Mass Audubon Laughing Brook Wildlife Sanctuary) in the project area.

The findings of the Main Street flooding assessment have been incorporated into the Town's MVP CRB workshops and Listening Session. The workshops and listening session agendas also included an introduction to nature-based solutions and green infrastructure. Not everyone understands the purpose and function of nature-based solutions, including swales, rain gardens, retention ponds, and more. A better understanding will likely contribute to increased stakeholder support.

Main Street, Hampden, MA – Looking east from Glendale Road

CULVERTS AND BRIDGES

Culverts and bridges are recognized as a potential concern town-wide. In addition to the Main Street flooding concerns, workshop participants also noted flooding concerns at bridge/culvert crossings including the South Branch of the Mill River, Watchaug Brook, Scantic River, West Brook, Big Brook, and East Brook, as well as many other unnamed tributary streams and crossings. No detailed inventory of town culverts has cataloged the size, condition or risk of damages to the environment and private property. Regardless of condition, culvert and bridge structures were designed to accommodate historic patterns of precipitation and runoff, which are rapidly transforming due to climate change. Inadequate or undersized road-stream crossings can create flooding and washout hazards and can be barriers to the passage of fish and other aquatic or amphibious organisms. As precipitation events become more intense and less predictable as a result of climate change, inadequate or undersized road-stream crossings throughout the Town of Hampden are expected to pose an increased threat of failure, increase potential flooding damage to homes and businesses, adversely impact transportation infrastructure (including emergency response capabilities and evacuation routes), impact utilities and services (i.e., water, sewer, electricity, gas, telecommunications, fiber, etc.), and cause stream channel erosion and other adverse impacts to the natural environment.

SCHOOLS: STUDENTS AND FACILITIES

The representative from the School Department noted the obvious concerns about climate change: increased snow removal and school closures due to snow events. He added that the changes and increase in weather events resulted in more wear and tear on buildings. Students are at increased risk from tick and mosquito bites. The schools are challenged in how best to protect students from associated vector-borne illnesses. They can't use harsh chemicals in the playgrounds. Schools are often used as emergency shelters or charging stations in times of weather emergencies. The schools want to know how the Town and schools can better prepare for these events.

MUNICIPAL FINANCE

Discussion included acknowledgment that the Town does not have the ability to fund all projects that are necessary to adapt to climate change impacts and protect residents, businesses, infrastructure, and the environment. Multiple funding strategies were discussed including MVP Action Grants, Massachusetts Department of Transportation (MassDOT) Municipal Small Bridge Program, Division of Ecological Restoration's (DER) Culvert Replacements grant, FEMA, and more. It was noted that Moody's and other financial institutions consider climate change planning when determining municipal bond ratings.

VECTOR-BORNE DISEASES AND HEALTH RISKS

The Board of Health recognizes the threats from Lyme disease, EEE, and other illnesses associated with climate change resulting in the increase in populations of ticks and mosquitoes. They acknowledged it is difficult to prioritize during addressing the COVID-19 pandemic. The Town experienced an increased risk in EEE outbreaks last year. The Board of Health has considered joining a mosquito control district and has identified the need for developing and expanding outreach opportunities to inform the public about threats and how to protect themselves from vector-borne illnesses. The Highway Department staff spray themselves before working outside and check for bites and ticks at the end of the workday. It was acknowledged that a prescriptive plan to help make sure staff and the public is aware of potential threats and necessary protective measures is needed.

EXCESSIVE HEAT

Highway Department staff are considering excessive heat when scheduling maintenance and operation activities. When excessive heat is forecasted, staff perform outdoor projects in the cooler morning hours and reserve indoor maintenance activities for the afternoon.

WATER QUALITY

Flooding in low-lying areas may threaten Title V systems. The Town discussed expansion of flooding to areas unaccustomed to flood events due to the increased intensity of storms. Also discussed were the summer drought conditions. Title V outbreaks may affect public health and water quality. Increased runoff from commercial operations, including a local golf course, was noted. Potential threats from fertilizer and other pollutants to both surface water and groundwater wells were discussed. It was noted that the golf course is being monitored by the Massachusetts Department of Environmental Protection (MassDEP) and the United States Army Corps of Engineers (USACE). There are two to three water monitoring stations associated with this operation.

GREEN INFRASTRUCTURE AND LOW IMPACT DEVELOPMENT

Nature-based solutions are about conserving, integrating, and restoring. For Hampden, green infrastructure and low-impact development are both a challenge and an opportunity. The Town recognizes they need to learn more about the opportunities to incorporate nature-based solutions in their planning and projects to address climate change threats. The CRB Workshop Day 2 committed significant time to a Green Infrastructure and Low-Impact Development (LID) program prepared and developed by Mass Audubon. See **Appendix D** for the full presentation.

DROUGHT

The extended drought in the summer of 2020 contributed to a large wildfire. Future drought conditions will increase these events. Forest and woodland conditions provide fuel. Fire suppression may be affected by the loss of the dam across from the Town House. This concern is currently being

investigated by the Town, who relies on private wells for drinking water. Excessive drought may impact groundwater supplies, both in yields and quality.

ENERGY EFFICIENCY AND RENEWABLE POWER GENERATION

The Hampden Free Public Library strives to be green. The Director is proud of the Library's focus on being environmentally conscious and a model for other municipal departments and residents. There is an opportunity for other municipal buildings to set an example by installing solar panels on rooftops or at other feasible locations. The proximity of the Town House, Highway Department, and Senior Center provides a campus setting that could be investigated for renewable power generation. Incinerated waste to generate power was also discussed. It was noted that Singapore and other countries use their waste as fuel.

TREES

The Highway Department noted that there is a significant increase in gypsy moth infestations and wondered if this is associated with climate change. There are lots of fallen trees and limbs located on private properties. This debris is fuel for wildfire, especially in drought conditions. The Town of Hampden responded to a large wildfire this past summer during the drought. The Town should consider a forest management plan. Other considerations include extending the time period for open burning. It was also noted that forest and woodland floor debris encourage regeneration and provide support for the animals. There is a natural balance that needs to be maintained.

WINDSTORMS AND TORNADOS

The Town's HMP prioritizes tree trimming to reduce chances of outages due to falling trees and limbs. This was completed by the local utility provider in those areas where trees presented a risk to overhead power lines. Central and Western Massachusetts have seen an increase in tornados and severe weather threats. Tornados were unique to this area and now they are becoming more common. The Town Administrator stated that more awareness and preparedness for these extreme events is important.

DAMS

The Dam across from the Town House failed almost two years ago. The dam held back water that was used by the Fire Department. More frequent drought conditions put increased pressure on fire response. There are ongoing discussions about whether the dam should be rebuilt. Existing studies indicate that replacement is cost prohibitive. The Town has consistently stated that there are many other dam locations town-wide that it does not have any information on to determine vulnerabilities, risks, and/or priorities in need of attention. Additional dam vulnerability assessments are needed.

CURRENT STRENGTHS AND ASSETS

The CRB Workshop process identified the following community strengths and assets associated with the implementation resiliency improvement measures:

- Increased and ongoing collaboration among Town departments;
- Support of green power generation (solar); and
- Investigation of multiple funding options to improve resiliency.

COMPREHENSIVE STORMWATER MANAGEMENT PROGRAM

A significant area in the Town of Hampden has been designated by the United States Environmental Protection Agency (EPA) as a regulated MS4 (Municipal Separate Storm Sewer System). The Town's *Comprehensive Stormwater Management Program* and the MVP planning provide opportunities for the Town to benefit and overlap efforts. Excessive rain events associated with climate change result in increased flows that exceed the capacity of existing grey and green infrastructure. These storm events may also increase the number of pollutants and contaminants in the flood waters and distribute these contaminants into receiving waters and nearby flooded areas including recreation lands, private properties, and agricultural operations. The Town recognizes the opportunity to enhance their MS4 stormwater management program and local resiliency by merging these discussions when applicable.

HAMPDEN'S HAZARD MITIGATION PLAN (HMP)

The Town of Hampden will be updating the HMP. The CRB workshop participants noted that many of the hazards identified and prioritized in the HMP are exacerbated by climate change impacts. The Town actively uses the HMP as a planning tool and has funded or addressed many priorities identified in the current plan. The MVP discussions and prioritization will be incorporated into the upcoming HMP planning process.

HAMPDEN'S HIGHWAY DEPARTMENT

The Highway Director and staff were recognized as doing a "fabulous job" in protecting the community. "They never, ever let us down, every storm, every problem, every crisis or anything that happens. Mark and his guys are there in a split second." The Department of Public Works (DPW) crew know what they are doing, when to respond, and have insight as to how and why what's occurring.

PROTECTION OF WETLANDS

The Conservation Commission noted that the Town of Hampden "has a lot of wetlands" which helps restrict building. Wetlands help buffer flooding and gives the water somewhere to go other than in someone's home. A member of the Conservation Commission added that wetlands are an important

part of climate change resiliency. Wetlands are a part of Hampden's toolbox when it comes to protecting property and water quality.

LAUGHING BROOK

Laughing Brook Wildlife Sanctuary in Hampden has 367 acres and four miles of walking trails. Mass Audubon is a 125-year-old non-profit organization that is focused on conserving the nature of Massachusetts for people and wildlife. In the Connecticut River Valley, they are focused on climate education built around middle and high school students. Mass Audubon is a partner to the Town in MVP planning.

Laughing Brook Wildlife Sanctuary, Hampden, MA

TOP RECOMMENDATIONS TO IMPROVE RESILIENCE

The Town of Hampden's Community Resilience Building Risk Matrix is provided in **Appendix A** and includes a brief overview of the top recommendations for the community as expressed by the participants.

TOWN-WIDE CULVERT/BRIDGE ASSESSMENT TO ADDRESS FLOODING, WATER QUALITY THREATS, PUBLIC HEALTH, AND SAFETY:

From the Highway Superintendent at the CRB workshop: "I don't know where the problems are until they pop up." Flooding and stormwater conveyance failures are becoming the norm. Like many communities, Hampden lacks awareness of the functionality of nature-based and built systems. The assessment will identify opportunities for immediate improvements and resiliency. These are small projects with substantial return and can usually be implemented by local staff independently or with the assistance of a contractor. As noted by CRB Workshop participants, Hampden has lots of land that could be used to build resiliency. This assessment will identify specific opportunities for green infrastructure and low impact development.

MAIN STREET FLOODING: ASSESSMENT OF BRIDGE STRUCTURE TO DETERMINE WHETHER BRIDGE REPAIR/REHAB WITH GREEN COMPONENTS OR REPLACEMENT IS BEST ALTERNATIVE.

As one of the next steps in the Main Street Flooding Assessment, the Town proposes to confer with MassDOT to secure their preference, recommendations, and commitment to assisting Hampden help secure funding and investigate opportunities for bridge project to incorporate Best Management Practices (BMPs) and LID elements that would complement structural improvements. The existing bridge structure, built in 1955, does not meet current or future capacity needs to address flooding. Flooding threatens emergency evacuation routes on one of the Town's major roadways and places nearby residents at risk (they have previously been evacuated). This project will address flooding, water quality threats, public health, and safety.

COMMUNITY EDUCATION WORKSHOP

Mass Audubon led a workshop for all Hampden residents virtually in March 2021. Participants learned how climate change is and will be affecting this region, what impacts it will have on their infrastructure, and how nature-based solutions are an effective tool for adapting to the changing climate. The presentation has been recorded and shared along with the slides so that community members who are unable to join will have access to the information. A copy of the agenda and community workshop presentation by Mass Audubon are provided in **Appendix C** and **Appendix D**, respectively.

WORKSHOP PARTICIPANTS

Table 1. Invitees

Name	Title/Organization
Robert Markel	Interim Town Administrator
Mark Langone	Highway Superintendent
Jeff Farnsworth	Police Chief
Ed Poulin	Fire Chief
Ted Zebert	Conservation Commission
Bonnie Geromini	Conservation Commission
Jane Budynkiewicz	Board of Health
Wendell Hubert	Building Inspector
Rebecca Moriarty	Council on Aging
Lisa DiFranco	Housing Authority
Eric Jacobson	Parks and Recreation
Richard Patullo	Treasurer
Dana Pixley	Tree Warden
Doug Boyd	Community Preservation
Connie Witt	Historical Commission
Robert Howarth	Planning Board
John Matthews	Ridgeline/Hillside Committee

Name	Title/Organization
Donna Hatch	Solar Bylaw Committee
Gary Weiner	Stormwater Committee
Ellen Moriarty	Library
John Plaster	Scantic Valley Water
Brian Ashe	State Representative
Eric Lesser	State Senator
Al Ganem	School District Superintendent
Andrew Smith	Municipal Vulnerability Preparedness Program
	Green Meadow Elementary
	Thornton Burgess School
	Temple Farm, 278 Scantic Road
	Ferrindino Maple, 284 Glendale Road
	Hampden Hills Alpacas, 487 Glendale Road
	Federated Community Church
	Pace Rehab & Home Care, 2 Allen Street
	Wingate, 34 Main Street

CITATION

- 2020 Community Resilience Building Workshop
- Summary of Findings
- Town of Hampden
  - Robert Markel, Town Administrator

- Core Team: Robert Markel, Town Administrator; Mark Langone, Highway Superintendent; and Theodore Zebert, Conservation Commission.

CRB WORKSHOP PROJECT TEAM

- Robert Markel, Town Administrator
- Mark Langone, Highway Superintendent
- Theodore Zebert, Conservation Commission
- Hampden Board of Selectmen
- Mary Monahan, MLMe, Municipal Programs Director
- Steve Tyler, Howard Stein Hudson (HSH), Project Manager
- Jonah Keane, Mass Audubon, Arcadia Sanctuary Director
- Taylor Miller, HSH Public Involvement Specialist
- Paul Berthiaume, HSH Structural Engineer/Culvert Inspections
- Chris Lyman, HSH Civil Engineer/Drone Pilot

ACKNOWLEDGEMENTS

- EOEEA MVP Grant
- Staff time

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Appendix A

Community Risk Building Matrix

Community Resilience Building Risk Matrix

Town of Hampden

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.)

Features	Location	Ownership	V or S	Flooding/Drought	Extreme precipitation events/wind/tornados	Heat	Wildfire	Priority H - M - L	Time Short Long Ongoing
Infrastructural									
Main Street culvert/bridge. Ongoing flooding is documented and prioritized in Hampden's Hazard Mitigation Plan. Recommended next steps: prioritize flooding issues associated with 1st culvert (size, not condition); prioritize action items replace/ repair bridge; continue assessment and recognize short time limit, look at locations to address flood storage on ROW and Mass Audubon.	Main Street	Town of Hampden	V	X	X			H	O
Culverts and bridges: due to increased rainfall/snow in individual weather events existing infrastucture, including bridges, culverts, country drainage are overwhelmed by stormwater flows. Highway Superintendent and other stakeholders noted new and increased flooding on private property leading to structural flooding. Regarding the failure of existing infrastructure to handle increased flows, the Highway Superintendent stated "We don't know where the problems are until they pop up." A priority for the Town is a bridge/culvert assessment which identifies problem locations, green infrastructure opportunities, and next steps.	Town wide	Town of Hampden	V	X	X			H	O
There are many dams in Hampden. In many cases the original function is no longer relevant. The dam across the street from the Town House supports fire suppression response. There are questions about the capacity of the dam to provide consistent, long term water for fire fighting needs. Additional study is needed into other sources of water if another is needed	Town wide and across from Town House	Town/private	V/S	X	X		X	M	O
Societal									

Students, residents, municipal workers are at risk from vector borne illnesses from outdoor sports, work, recreation, and other activities . Climate change has excacerbated the threats from Lyme disease, EEE, and other illnessess spread by ticks, mosquitoes, and potentially other pests migrating into the region as a result of winter warming trends and extended summer heat. Further assessment of town health records are needed to understand the extent of the threat and what can be done to protect town employees, residents, and students. Examine what other communities are doing and educational resources from professional associations including American Public Works, association of boards of health, and more.	Town wide		V	X		X		H	O
Integrity of private wells and Title V systems: see Environmental									
Schools and other public facilities may serve as emergency shelters, charging stations, cooling/warming facilities.	Town wide	Town	V/S	X	X	X	X	H	O
Environmental									
There are several solar fields in the Town of Hampden. The town should set an example for adopting renewable energy options for municipal facilities. The close proximity of the Town House, Green Meadows School, and Highway Department presents an opportunity to study the feasibility of providing green and emergency power generation. The Town will continueto explore becoming a Green Community. Consider hydropower sources from the rivers	Town Center	Town	V/S	X	X	X	X	M	
Tree and forest health is impacted by extended drought, temperature extremes, and wind events. In the Town's Hazard Mitigation Plan the Town prioritized tree trimming by the local utilty to reduce the threat of power outages from trees falling on power lines. That has been done. There is concern about the health of both public and private trees. The Town percieves an increase in gypsy moths, associated with changing climate conditions. Excessive tree decay from droughts, wind storms, and pests are creating a wildfire risk such as the one that the Town experienced during this summer's drought.	Town wide	Town/private	V	X	X	X	X	H	O
Private wells and Title V systems are at risk from drought and flooding conditions. Concerns include the impact of increased runoff on private wells due to increased preciptation associated with climate change, especially to those wells located in the proximity of Great Horse golf course. There are also concerns about Title V systems due to expanded flooding and groundwater breakouts already noted. Investigate existing problems. Investigate salinity.	Town wide	Town/private	V	X	X			M	

The Town of Hampden protects its wetlands through diligent stewardship provided by the Conservation Commission. These wetlands serve as buffers during flooding events. The river and other streams routinely receive debris such as fallen trees and other natural materials discharged as a result of runoff. An accumulation of this debris creates changes in shoreline and flooding. Better understand how they can serve as nature-based solutions	Town wide	Town/private	V/S	X	X			H	

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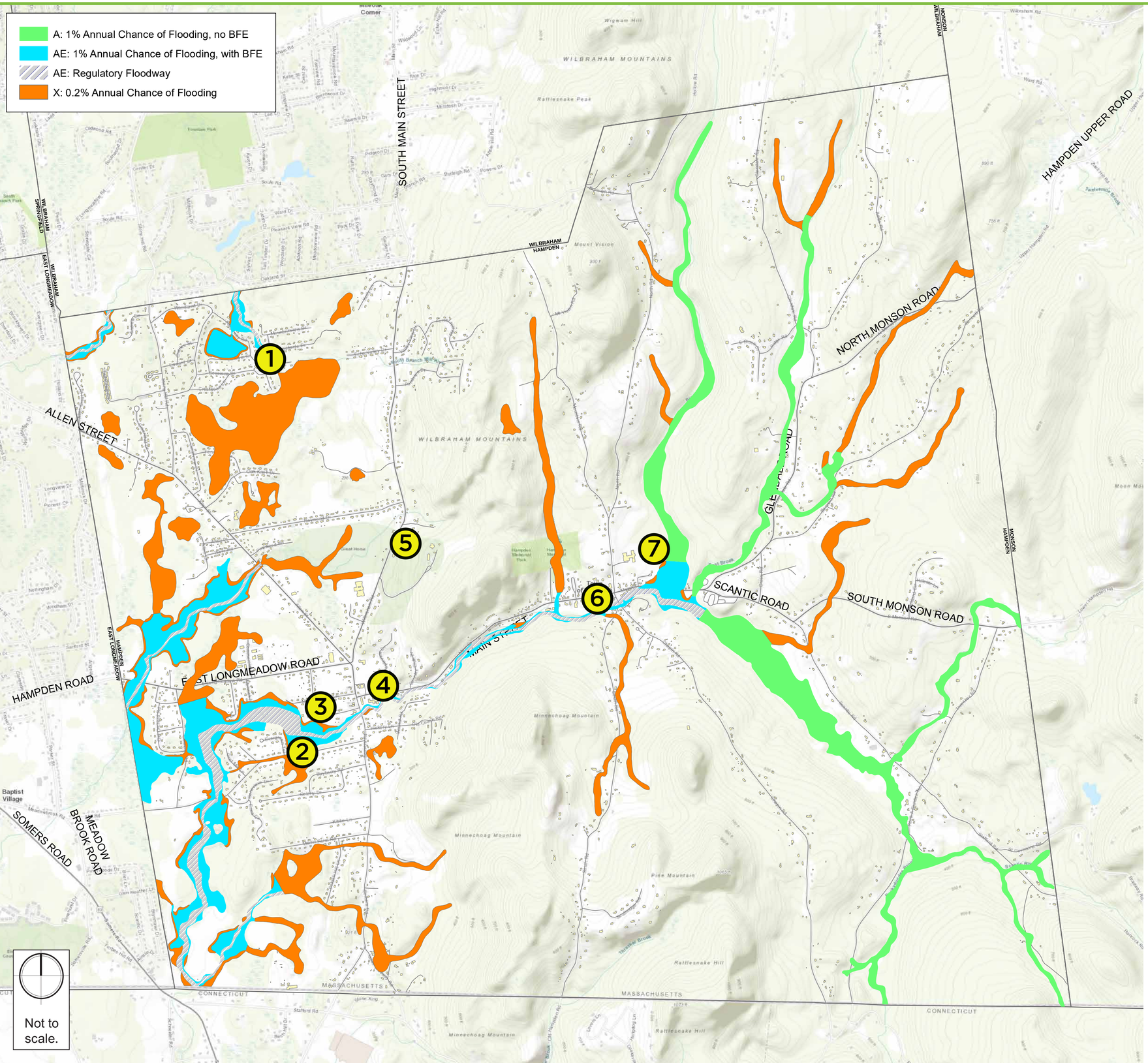
Appendix B

Maps

Town of Hampden | Municipal Vulnerability Preparedness (MVP) Program | Comments from Interactive Online Map



1 INFRASTRUCTURE VULNERABILITY

I happen to live on the other side of the culvert through which the South Branch of the Mill (Springfield) River flows. If that culver failed, anyone on the landlocked side would be stranded. There are about fifty homes once that is crossed. During the 2005 flood, the water may have been briefly over the top.

2 INFRASTRUCTURE STRENGTH

Some residents have voiced on social media that the overflow from the Scantic to feed this pond, is not being maintained. Besides it's scenic views, etc., it is a natural drainage buffer soaking up some of the excess flow of the Scantic during high water.

3 SOCIETY VULNERABILITY

The senior housing here is venerable to major Scantic River flooding

4 SOCIETY VULNERABILITY

The nursing home at this location is venerable to any major Scantic Rv flooding.

5 ENVIRONMENT VULNERABILITY

high groundwater well user. potential fertilizer runoff

6 INFRASTRUCTURE VULNERABILITY

partial breach of dam has impacted fire drafting location. other issues? remove? repair? TBD

7 INFRASTRUCTURE VULNERABILITY

man made pond reduces flood storage capacity and creates other issues per MassAudubon. naturalization of this area could improve flood storage

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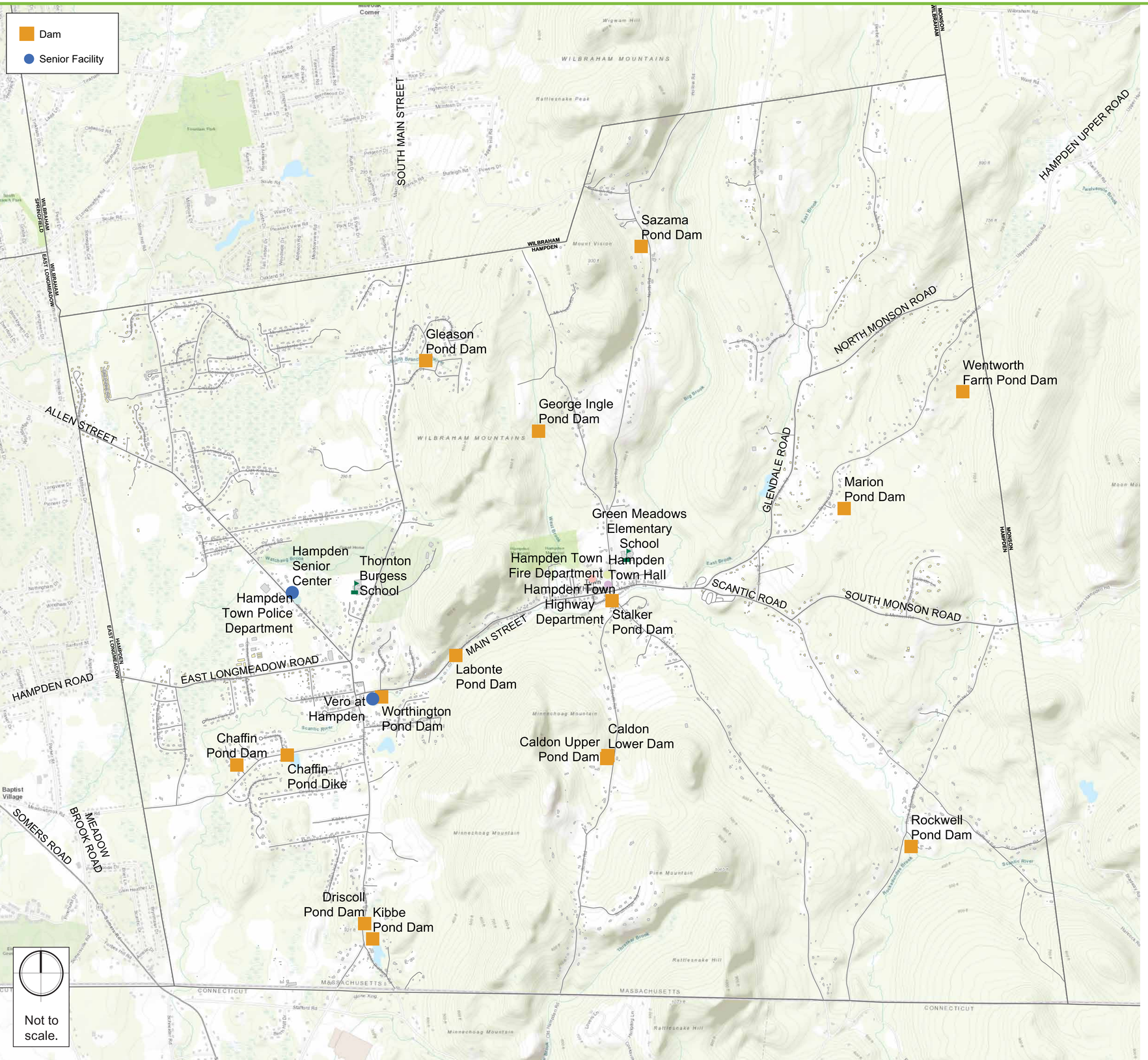
Town of Hampden | Municipal Vulnerability Preparedness (MVP) Program and Main Street Flooding Study



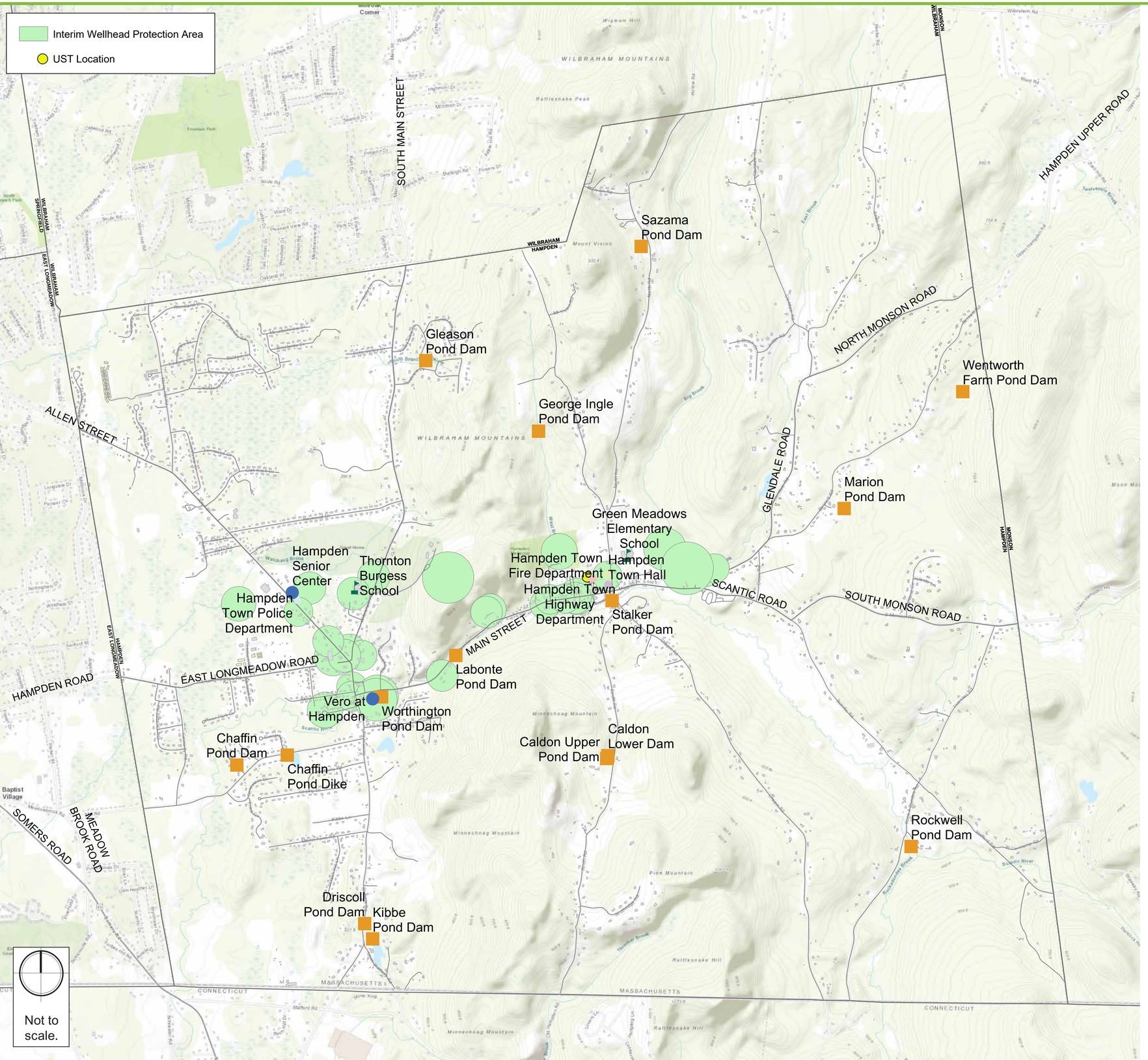
COMMUNITY FEEDBACK

HOWARD STEIN HUDSON

MLM(e) Mary Louise Monahan Enterprises

Mass Audubon

Town of Hampden | Municipal Vulnerability Preparedness (MVP) Program and Main Street Flooding Study



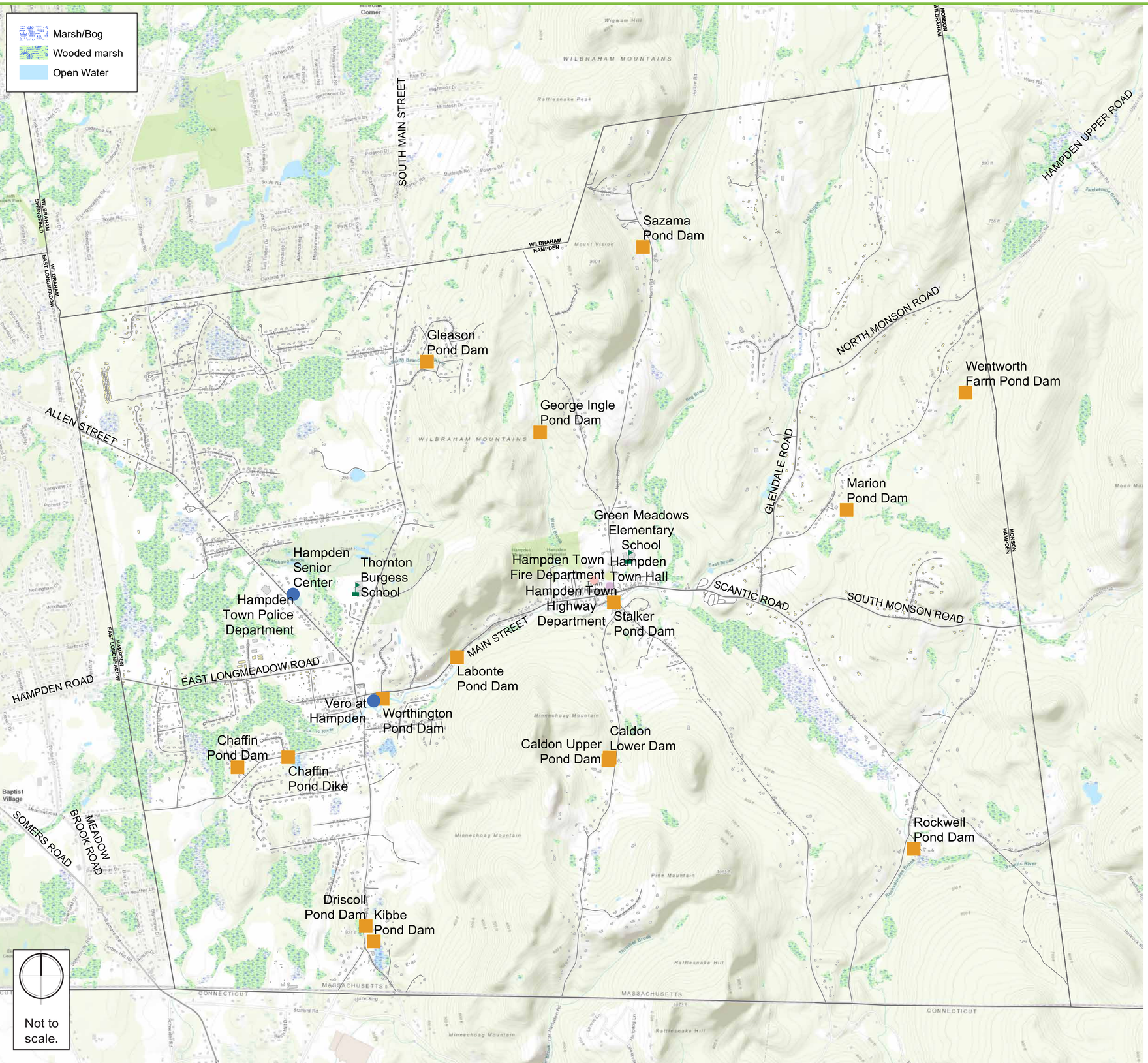
COMMUNITY FEEDBACK

HOWARD STEIN HUDSON

MLM(e) Mary Louise Monahan Enterprises

Mass Audubon

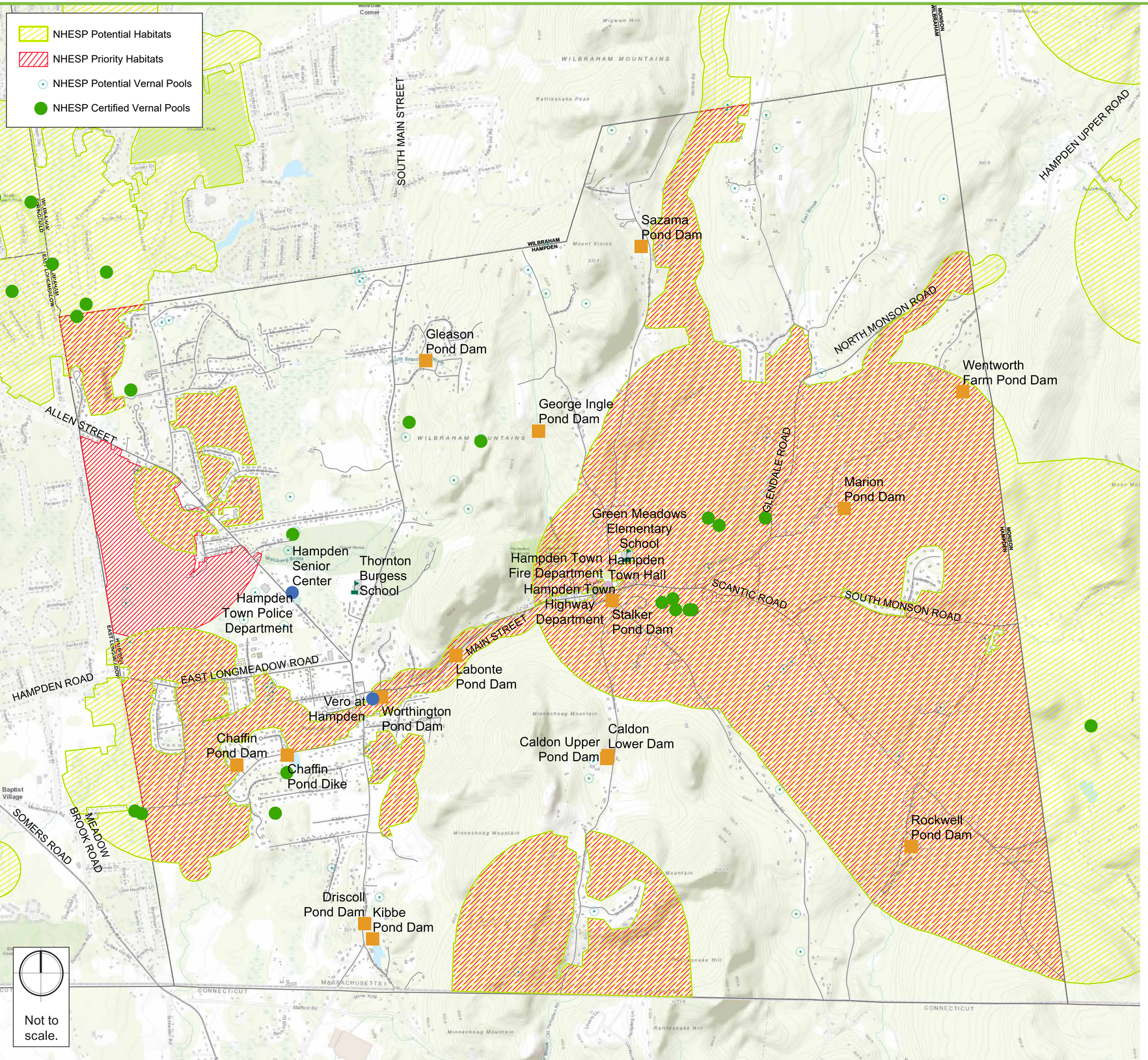
Town of Hampden | Municipal Vulnerability Preparedness (MVP) Program and Main Street Flooding Study



COMMUNITY FEEDBACK

HOWARD STEIN HUDSON

Town of Hampden | Municipal Vulnerability Preparedness (MVP) Program and Main Street Flooding Study



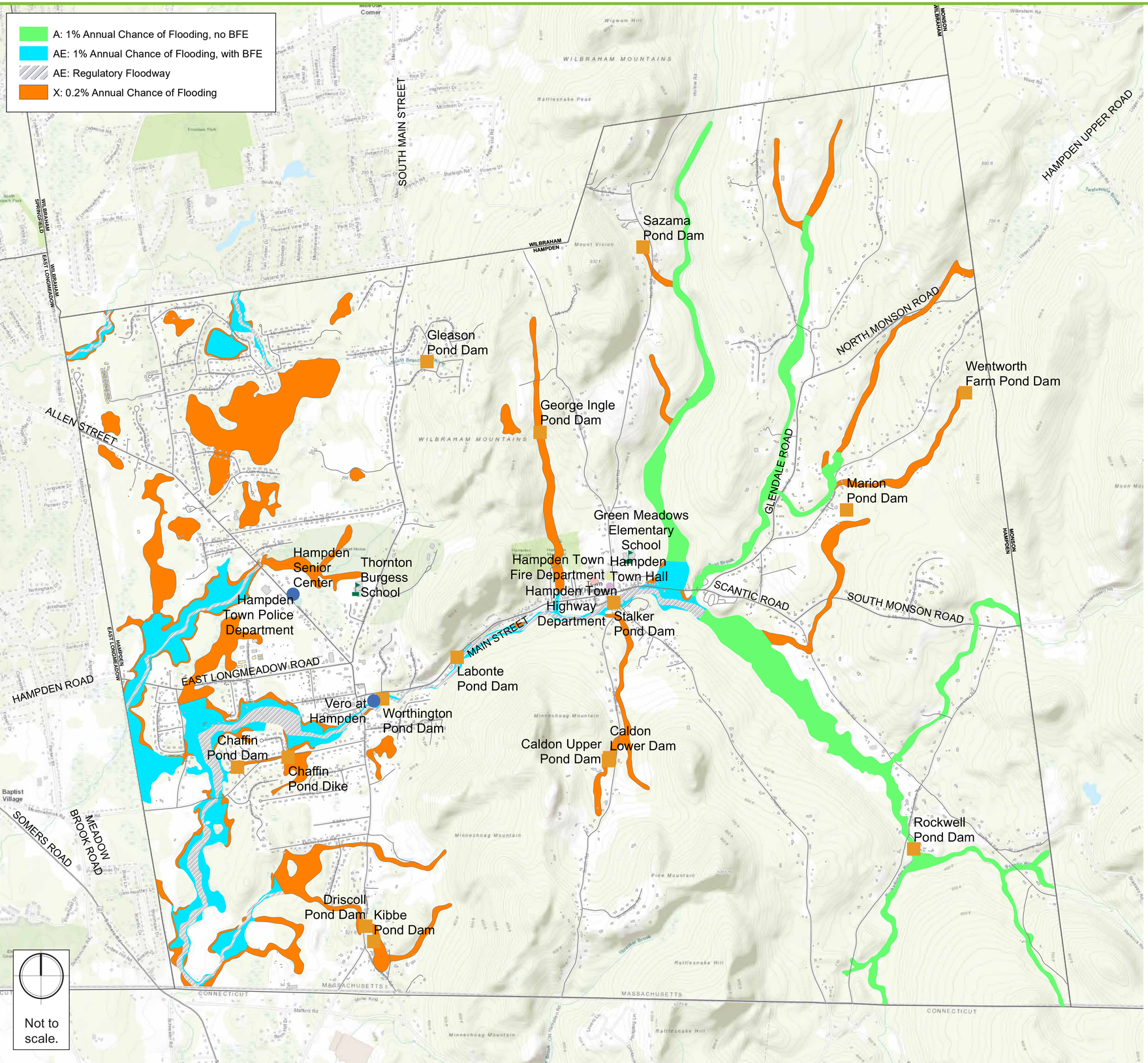
COMMUNITY FEEDBACK

HOWARD STEIN HUDSON

Mary Louise Monahan Enterprises

Mass Audubon

Town of Hampden | Municipal Vulnerability Preparedness (MVP) Program and Main Street Flooding Study



COMMUNITY FEEDBACK

HOWARD STEIN HUDSON

HOWARD STEIN HUDSON

Engineers + Planners

Appendix C

Agendas

Hampden Community Resilience Building Workshops Invitee List

January 21, 2021, 12PM to 4PM

January 28, 2021, 9AM to 1PM

Proposed Invitees

Name	Title/Org	Email
Robert Markel	Interim Town Administrator	townadmin@hampdenma.gov
Mark Langone	Highway Superintendent	Highway@hampdenma.gov
Jeff Farnsworth	Police Chief	chief@hampdenpolice.com
Ed Poulin	Fire Chief	epoulin8029@charter.net
Ted Zebert	Conservation Commission	shoestringj45@gmail.com
Bonnie Geromini	Conservation Commission	bgeromini@gmail.com
Jane Budynkiewicz	Board of Health	health@hampdenma.gov
Wendell Hubert	Building Inspector	building@hampdenma.gov
Rebecca Moriarty	Council on Aging	coa@hampdenma.gov
Lisa DiFranco	Housing Authority	hamphous@verizon.net
Eric Jacobson	Parks and Recreation	parks@hampdenma.gov
Richard Patullo	Treasurer	treasurer@hampden.org
Dana Pixley	Tree Warden	pixleyservices@gmail.com
Doug Boyd	Community Preservation	boydone@charter.net
Connie Witt	Historical Commission	ccwitt908@gmail.com
Robert Howarth	Planning Board	
John Matthews	Ridgeline/Hillside Committee	john.matthews3@verizon.net
Donna Hatch	Solar Bylaw Committee	

Hampden Community Resilience Building Workshops Invitee List

Gary Weiner	Stormwater Committee	m53hamp@gmail.com
Ellen Moriarty	Library	emoriarty@cwmars.org
John Plaster	Scantic Valley Water	jplaster085@charter.net
Brian Ashe	State Representative	Brian.Ashe@mahouse.gov
Eric Lesser	State Senator	**eric.lesser@masenate.gov**
Al Ganem	School District Superintendent	aganem@hwrsd.org
Andrew Smith	Municipal Vulnerability Preparedness Program	andrew.b.smith@state.ma.us
	Green Meadow Elementary	
	Thornton Burgess School	
	Temple Farm 278 Scantic Road	
	Ferrindino Maple 284 Glendale Road	
	Hampden Hills Alpacas 487 Glendale Road	
	Federated Community Church	
	Pace Rehab & Home Care 2 Allen Street	
	Wingate 34 Main Street	

Hampden MVP Internal Kickoff Meeting
November 20, 2020
Agenda

Brief project review including confirmation of positioning Town for April Action Grant application for priorities identified through Main Street assessment and CRB workshop. How does this affect schedule?

Review impact of virtual meetings on project execution. Confirm team capacity to develop and support virtual and remote engagement. Is this a change that substantially affects scope or fee?

MVP Planning

- Core Team Meeting (virtual or on site TBD)
  - Draft Agenda
  - Team participants
  - Recommended town participants
  - Initial base map
  - Proposed dates and times
  - Action Items (MLM lead with support)
    - Schedule with Town
    - Prepare and send invitations to participants
    - Prepare presentation
    - Prepare handouts and maps for advance distribution
- Community Resilience Building Workshops (virtual)
  - Incorporate videos, including from watershed assessment, others
  - HSH team preferences, ultimately the decision of the Town

Main Street Flooding Assessment

- Initial mapping
- Opportunity to review mapping and interview stakeholders within Core Team meeting

Watershed site visit and assessment

Schedule (day of Core Team meeting or is additional prep needed based on Core Team input?)

Team and Town participants

Action Items and Leads

- Schedule with Town
- Prepare and send invitations to participants
- Prepare presentation
- Prepare handouts and maps for advance distribution

Development and branding of project materials

Community Workshops

Is there an opportunity to combine proposed workshop for all Town residents with MVP Listening Session?

Other

Town of Hampden
Core Team Meeting and Watershed Assessment
December 16, 2020

Agenda

Hampden MVP Core Team Meeting
Webinar - Wed, Dec 16, 2020 9:00 AM - 11:00 AM EST

Core Team introductions

Introduction to Hampden's MVP Program

Introduction to Watershed Assessment

CRB Workshop Planning

https://www.communityresiliencebuilding.com/crbworkshopguide

- **Confirm stakeholders for CRB Workshop participation**
- **Identify Local Presenters for CRB Workshop**
- **Set date and times for CRB Virtual Workshops**
- **Invitations**
- **Presentation tools: video content**

Watershed Assessment Planning

Other

Site Meeting - Wed, Dec 16, 2020 12:00 PM - 3:00 PM EST
Mass Audubon Laughing Brook Wildlife Sanctuary
789 Main St, Hampden, MA 01036

Hampden CRB Agenda Outline

Day One
January 21, 2021, 12PM to 4PM

12PM

Technical Introduction

Welcome
- Hampden Officials
- State Senator
- State Representative

CRB Team Introductions

12:20PM

* Video: NASA Climate Change

Agenda Introduction

MVP Grant and Program Introduction
- MVP Planning (MLM)
- Main Street Flood Assessment (ST) drone video
- Public and student outreach (JK)

*Video: WWLP Climate Change Impacts in WMass

1:10PM

Participant Introduction
- When you think about climate change, what concerns you in your professional role and personally? (Contributes to risk matrix)

2:10PM

*Video: WMUR Climate Change and Infrastructure

Discussion by Hampden participants on status of current planning (good news) and risks
- Emergency Management Director
- Police/Fire
- Highway

ConCom
Planning
Board of Health
Others

2:40PM

*Video: Viral Watch: mosquito borne diseases

Introduction to Climate Change and the Town of Hampden (NE Climate Science Center Data and Ted weather data)

3:00PM

*Video: Climate Change and Internet

Introduction to Map (previously distributed for comments to be submitted by January 17)
Review, discuss, request additional comments for

3:25PM
*
Identify Hampden's Top Four Hazards

3:45PM

Introduction to Day Two Agenda

4:00
Conclusion

Day Two
January 28, 2021 9AM to 1PM

9:00AM

Welcome from Hampden Officials

Introduction and Day 1 Summary

9:20AM

*Video: Absorbing Risks

Introduction to Green Infrastructure and Low Impact Development Concepts
- Mass Audubon videos, slides
- Main Street Flood Assessment: green and grey solutions

*Video: Climate Change and Plants and Animals

Sector Impacts (gleaned from Day One intros, mapping updates, and available data)

11:00AM

Complete risk matrix (already populated with draft priorities)
- Consider all sectors

11:30AM

Report out and determine priorities for Hampden

12:45PM

Discussion on next steps including immediate opportunities
- Summary of Findings (MLM)
- Listening Session (MLM)
- Mass Audubon Program (JK)
- April MVP Action Grant and Additional Grant Opportunities (MLM and ST)

1:00PM

Conclusion

Hampden's Community Resilience Building Workshops

Taylor Miller <TMiller@hshassoc.com>

Thu 1/7/2021 3:04 PM

To: Taylor Miller <TMiller@hshassoc.com>
Bcc: andrew.b.smith@state.ma.us <andrew.b.smith@state.ma.us>; Bob Markel <townadmin@hampdenma.gov>; Highway <Highway@hampdenma.gov>; bgeromini@gmail.com <bgeromini@gmail.com>; aganem@hwrsd.org <aganem@hwrsd.org>; aosborne@hwrsd.org <aosborne@hwrsd.org>; dshatch@charter.net <dshatch@charter.net>; hturcotte@agrimark.net <hturcotte@agrimark.net>; lisajeanette58@gmail.com <lisajeanette58@gmail.com>; maura.a.ryan@gmail.com <maura.a.ryan@gmail.com>; progers1@charter.net <progers1@charter.net>; clavette@prodigy.net <clavette@prodigy.net>; rwolanin@massaudubon.org <rwolanin@massaudubon.org>; tlautzenheiser@massaudubon.org <tlautzenheiser@massaudubon.org>; shoestringj45@gmail.com <shoestringj45@gmail.com>; Mary Monahan <marylmonahan@gmail.com>; Steven Tyler <STyler@hshassoc.com>

Good Afternoon,

The Town of Hampden has received a **Municipal Vulnerability Preparedness (MVP) grant** from the Massachuses Office of Ener gy and Environmental Affairs to idenf y and prioriz e acons t o protect the health and safety of Hampden residents from climate change impacts.

The key component of the MVP program is the **Community Resilience Building Workshops** which bring together community members like you to idenf y and prioriz e steps to reduce risk and improve resilience across the Town of Hampden.

You are invited to join other community leaders and stakeholders to parcipa te in two half-day, Community Resilience Building Workshops on **Thursday, January 21 at noon to 4PM** and **Thursday, January 28 at 9AM to 1PM**.

Please follow the links below to register for the CRB workshops:

hp s://a endee.gotowebinar.com/register/5751227978186143244

These workshops will focus on idenf ying priority acons tha t address threats to Hampden's infrastructure, residents, and environment and prioriz e acons t o reduce these threats specific to your operaons and r esponsibilies.

The Workshops' objecv es are:

- Understand connecons be tween natural hazards and local planning/mig aon e fforts
- Evaluate strengths and vulnerabilies of r esidents, infrastructure, and natural resources
- Develop and prioriz e resilient acons f or the municipality, local organizaons, ins tuons businesses, private ciz ens, neighborhoods, and community groups
- Idenf y immediate opportunies t o advance acons tha t reduce the impact of hazards and increase resilience in Hampden

I hope you or a designee can join us for these important workshops. Thank you for your consideraon!

The Town of Hampden is partnering with Howard Stein Hudson, Municipal Vulnerability Specialist Mary L. Monahan, and Massachuses Audubon t o facilitate these workshops. If you have any quesons about the program, please contact Mary Monahan at marylmonahan@gmail.com

The Town of Hampden Requests Your Participation

Taylor Miller <TMiller@hshassoc.com>

Mon 1/18/2021 11:14 AM

To: Taylor Miller <TMiller@hshassoc.com>
Bcc: epoulin8029@charter.net <epoulin8029@charter.net>; health@hampdenma.gov <health@hampdenma.gov>; building@hampdenma.gov <building@hampdenma.gov>; coa@hampdenma.gov <coa@hampdenma.gov>; hamphous@verizon.net <hamphous@verizon.net>; parks@hampdenma.gov <parks@hampdenma.gov>; treasurer@hampden.org <treasurer@hampden.org>; pixleyservices@gmail.com <pixleyservices@gmail.com>; boydone@charter.net <boydone@charter.net>; ccwitt908@gmail.com <ccwitt908@gmail.com>; john.matthews3@verizon.net <john.matthews3@verizon.net>; m53hamp@gmail.com <m53hamp@gmail.com>; emoriarty@cwmars.org <emoriarty@cwmars.org>; jplaster085@charter.net <jplaster085@charter.net>; aganem@hwrsd.org <aganem@hwrsd.org>; Highway <Highway@hampdenma.gov>; bgeromini@gmail.com <bgeromini@gmail.com>; aganem@hwrsd.org <aganem@hwrsd.org>; aosborne@hwrsd.org <aosborne@hwrsd.org>; dshatch@charter.net <dshatch@charter.net>

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Sincerely,

Taylor Miller
Public Involvement Specialist
HOWARD STEIN HUDSON
Engineers + Planners
Delivering Solutions for 30 Years
direct: 508.500.7162 office: 508.500.7041
370 Main Street, Suite 972, Worcester, MA 01608

Town of Hampden

Municipal Vulnerability Preparedness

Public Listening Session

Virtual

Monday, March 1, 2021
6:05 PM – 6:35PM
Board of Selectmen's Meeting

- The Town of Hampden received a $40,000 grant from the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA) to execute a community driven Municipal Vulnerability Preparedness Planning (MVP) process to identify risks and prioritize actions to reduce threats from climate change impacts and to build local resilience.

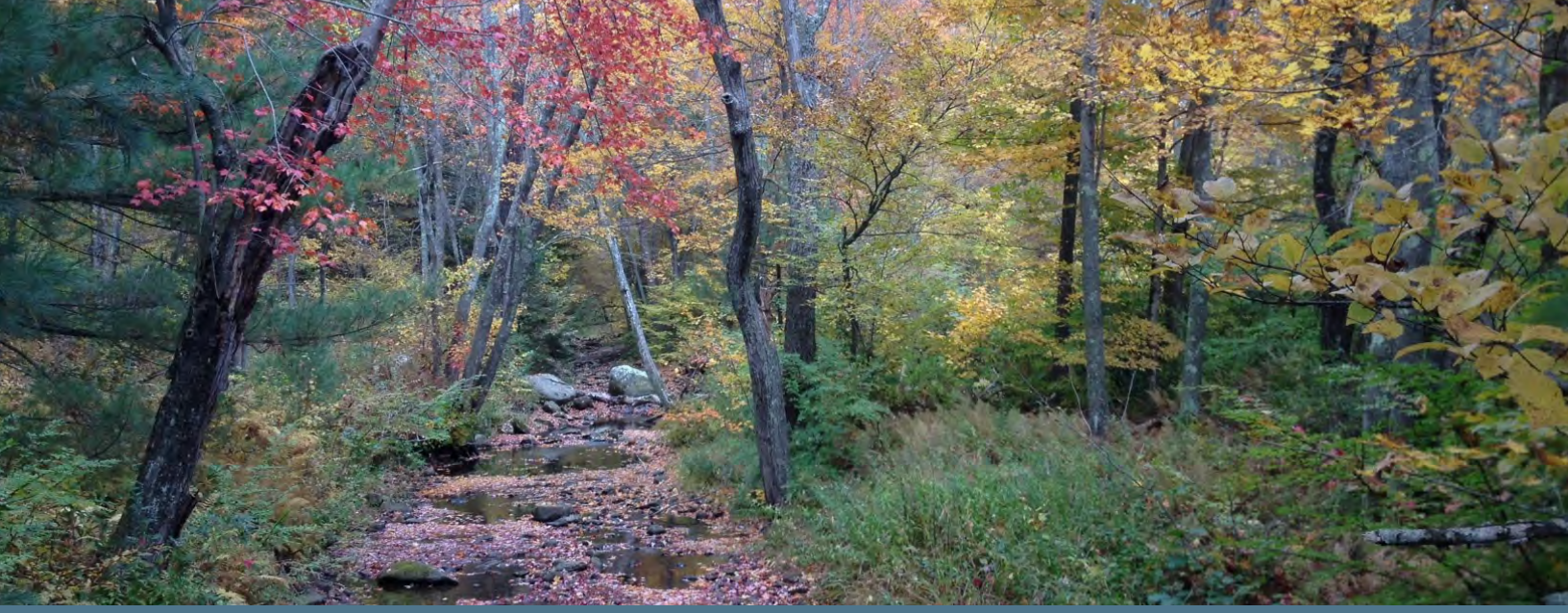
- The Town also received grant assistance to develop recommendations for green and grey infrastructure improvements within the watershed and at two brook crossings to address flooding along Main Street. This grant will also educate residents about the benefits of nature-based solutions and engage students in a mini-MVP Community Resilience Building Workshop.

- The Listening Session is an opportunity for members of the public to learn more about the MVP and Main Street Flooding Assessment process, review priorities established at the Community Resilience Building Workshops, and comment on the Town's draft list of priority actions.

Join Zoom Meeting
https://us02web.zoom.us/j/82671374813?pwd=K0ZpTTI4bkxPMG1tdFpkVnpRMlQ3QT09

Meeting ID: 826 7137 4813
Passcode: 457019

Dial by your location
+1 312 626 6799 US (Chicago)
+1 646 876 9923 US (New York)



Climate Change in Hampden

Understanding Local Impacts and How to Adapt

Via Zoom

Monday, March 22, 4:00pm

The Town of Hampden is participating in the state's Municipal Vulnerability Preparedness (MVP) Program. The MVP program works with towns to identify climate hazards, assess vulnerabilities and develop action plans to make communities more resilient.

Join Mass Audubon's Director for the Connecticut River Valley to learn more about the MVP program, how climate change will be affecting us locally, and how we can adapt.

Free program—registration required at the link below.

Mass Audubon
Laughing Brook Wildlife Sanctuary
Jonah Keane—Director
jkeane@massaudubon.org | massaudubon.org

FREE COMMUNITY WORKSHOP

www.massaudubon.org/hampdenclimate

HOWARD STEIN HUDSON

Engineers + Planners

Appendix D

Presentations

Municipal Vulnerability Preparedness Program

Town of Hampden

Presented by

Mary Monahan

Steven Tyler

Jonah Keane

Presented to

Core Team

December 16, 2020

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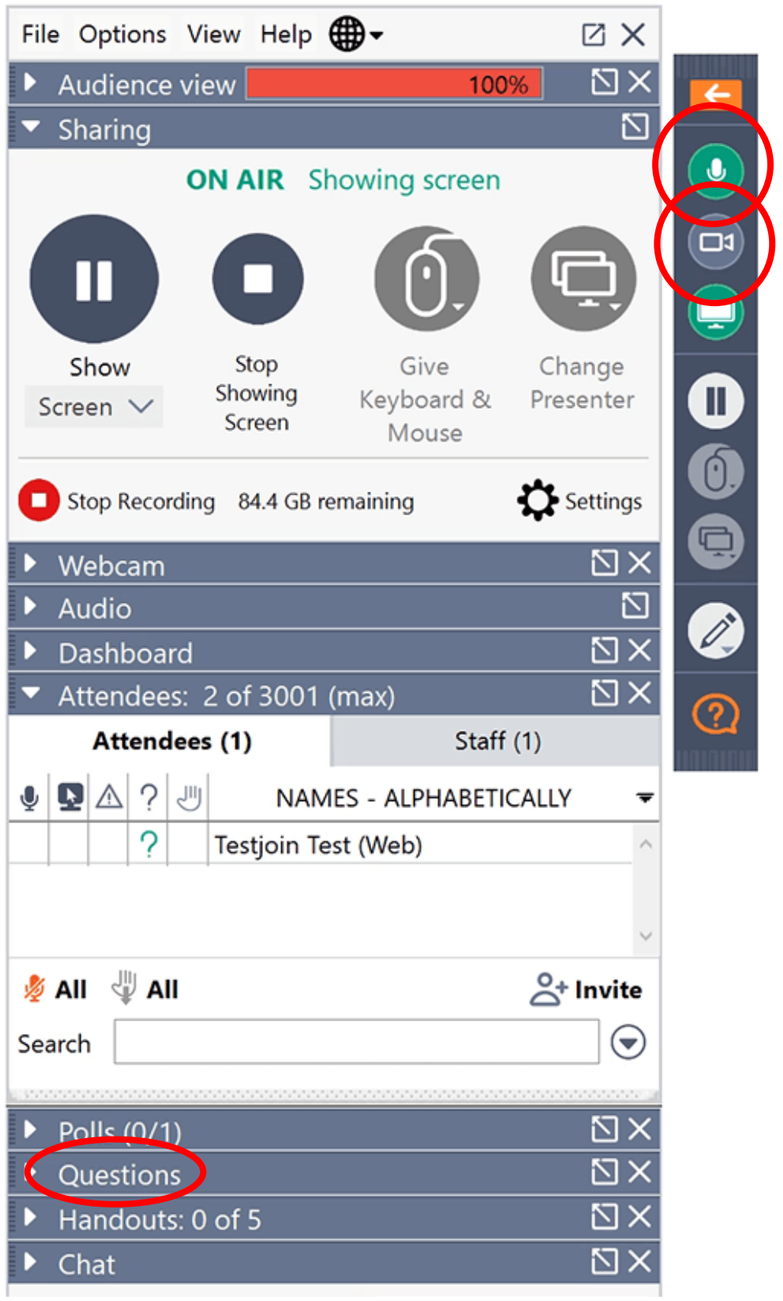
Engineers + Planners

Control Panel

Engineers + Planners



Unmute to speak

Turn camera on/off

Questions **Send a question**

Note: Today's presentation is being recorded

HOWARD STEIN HUDSON

Agenda

- Welcome & Introductions
- Municipal Vulnerabilities Preparedness (MVP) Planning Grant
- Climate Change
- Stakeholder Discussion
- Community Resilience Building
- Main Street Flooding Assessment
- Mass Audubon
- Next Steps

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Project Team

Engineers + Planners

- **Mary Monahan**
  - Public Works Consultant
    - *Municipal Vulnerability Planning*

MLM(e)
Mary Louise Monahan Enterprises

- **Steven Tyler, P.E.**
  - Civil Engineer
    - *Main Street Flooding Assessment*

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- **Jonah Keane**
  - CT Valley Sanctuaries Director
    - *Workshops in Green Infrastructure*

Mass Audubon

HOWARD STEIN HUDSON

Municipal Vulnerabilities Preparedness (MVP) $40,000 Planning Grant

Engineers + Planners

- **Municipal Vulnerability Planning Process**
  - Community-led planning process to develop and prioritize actions and opportunities to reduce climate change risks and build resilience
- **Main Street Flood Assessment**
  - Watershed approach to evaluate, identify, and educate stakeholders and others about nature-based solutions to alleviate flooding on Main Street

Executive Office of Energy and Environmental Affairs

HOWARD STEIN HUDSON

MVP Planning Process

Community Resilience Building Workshop

- Core team meeting
- Community Resilience Building Workshop
- Summary of findings
- Listening session
- Implementation

HOWARD STEIN HUDSON

Climate Change

- Rising temperature
- Changing precipitation – rainfall amount and intensity
- Sea level rise

Rising Temperature

Town of Hampden – Connecticut Basin

Westfield Basin	Observed Baseline 1971-2000	Projected Change in 2030s	Projected Change in 2050s	Projected Change in 2070s	Projected Change in 2090s
Average Annual Temperature (°F)	45.01	2.27 to 4.55	3.08 to 6.63	3.64 to 9.18	4.16 to 11.18
Annual Days with Maximum Temperature over 90°F (Days)	2.75	3.90 to 12.64	5.70 to 24.05	7.18 to 42.37	8.76 to 59.56
Annual Days with Minimum Temperature below 32°F (Days)	166.59	-10.89 to -27.83	-20.14 to -38.37	-22.41 to -52.99	-24.19 to -62.16

Changing Precipitation

Engineers + Planners

Town of Hampden – Connecticut Basin

Westfield Basin	Observed Baseline 1971-2000	Projected Change in 2030s	Projected Change in 2050s	Projected Change in 2070s	Projected Change in 2090s
Total Annual Precipitation (Inches)	50.70	-0.24 to 5.11	1.18 to 6.85	2.04 to 8.06	2.08 to 9.10
Annual Consecutive Dry Days (Days)	16.80	-0.26 to 1.40	-0.28 to 2.17	-0.65 to 2.27	-0.47 to 2.64

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What Does Climate Change Mean to You?

- Flooding
- Extreme precipitation events
- Heat waves
- Wind
- Tornados
- Drought
- Ice
- Wildfires

Climate Change and Hampden

Engineers + Planners

Wildfire on Minnechaug Mountain, Hampden, MA September 2020

- **Infrastructure**
  - Snow and ice
  - Flooding
  - Power outages
- **Society**
  - Vector born diseases
  - Heat stroke
- **Environment**
  - Water quantity and quality
  - Woodlands and vegetation

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Hampden's Top Four Hazards

Engineers + Planners

Community Resilience Building Risk Matrix www.CommunityResilienceBuilding.com

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.)

Features	Location	Ownership	V or S					Priority H - M - L	Time S Short L Long O Ongoing
Infrastructural									
Societal									
Environmental									

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Community Resilience Building Workshop

Engineers + Planners

Community Resilience Building Workshop

- **Two four-hour video sessions**
  - Late January 2021
- **Invitees**
  - Public and private sector stakeholders

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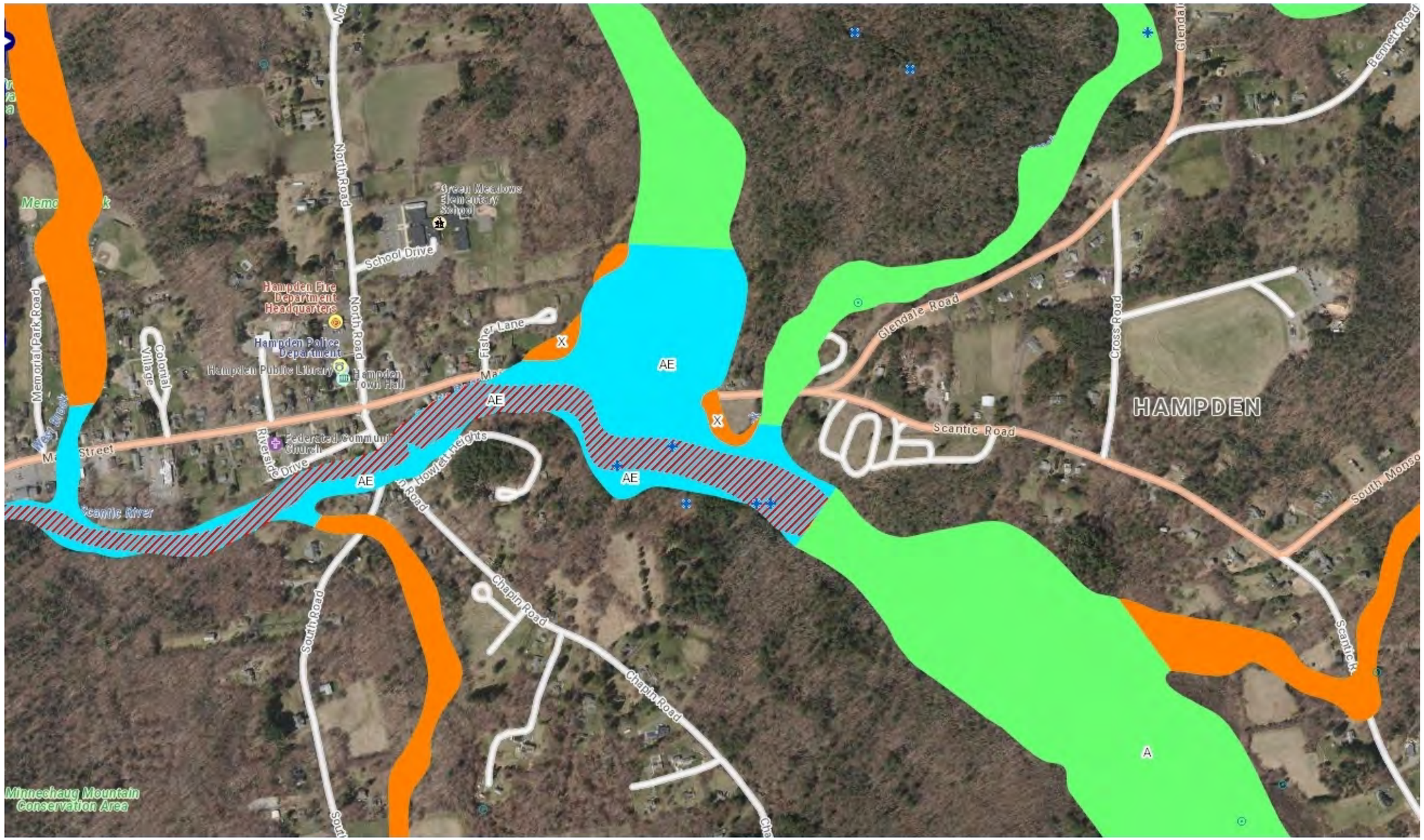
Main Street Flood Map

Engineers + Planners



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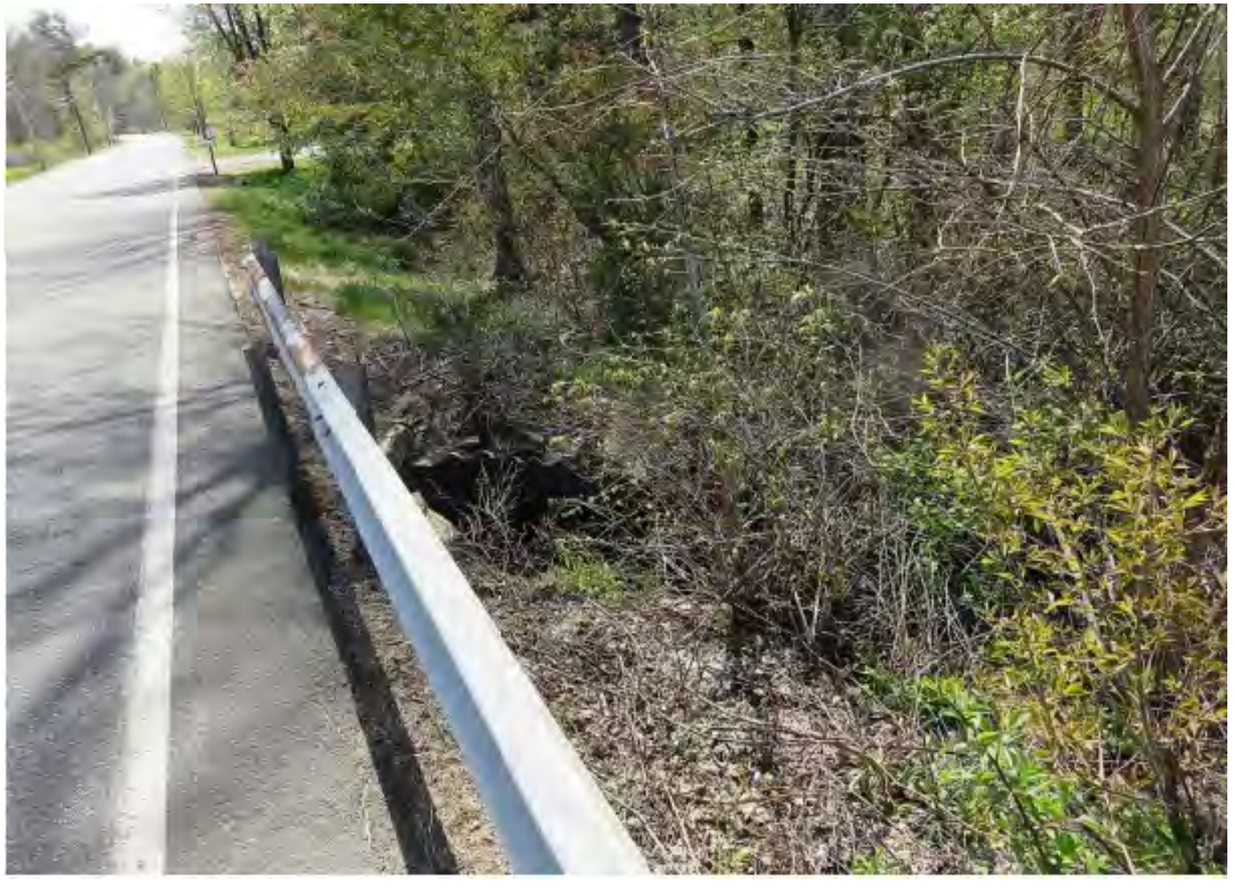
Hampden Main Street over Big Brook Culvert

Engineers + Planners



HOWARD STEIN HUDSON

Hampden Main Street over East Brook Culvert (Bridge No. H-04-008)

Engineers + Planners

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Main Street Flooding Assessment

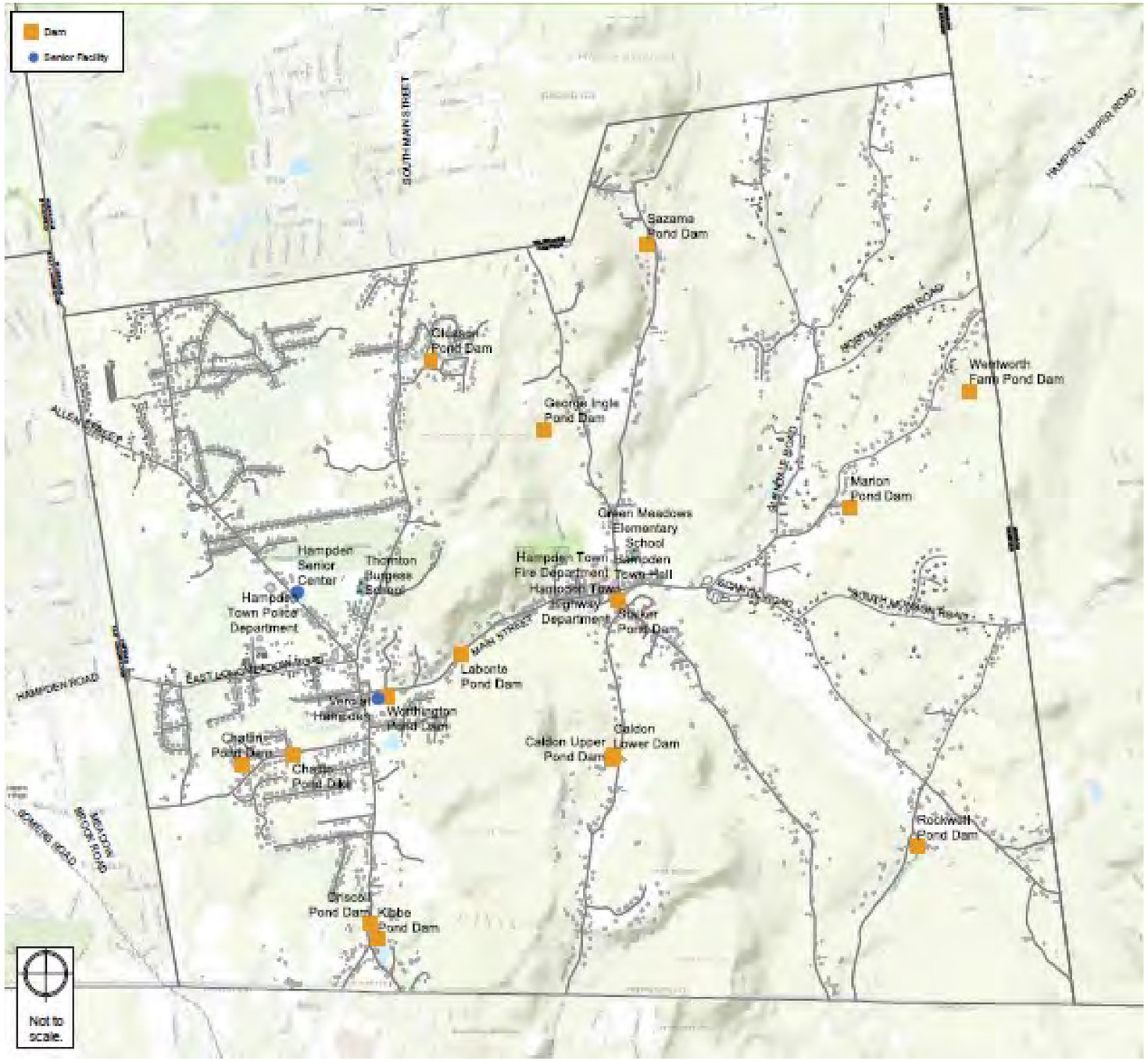
Engineers + Planners

- Identify opportunities to address Main Street flooding concerns
- Educate residents and stakeholders about the benefits of nature-based solutions
- Engage students in a mini-MVP Community Resilience Building Workshop
- Develop recommendations for green and grey infrastructure improvements within the watershed and at two brook crossings along Main Street

HOWARD STEIN HUDSON

Hampden Base Map

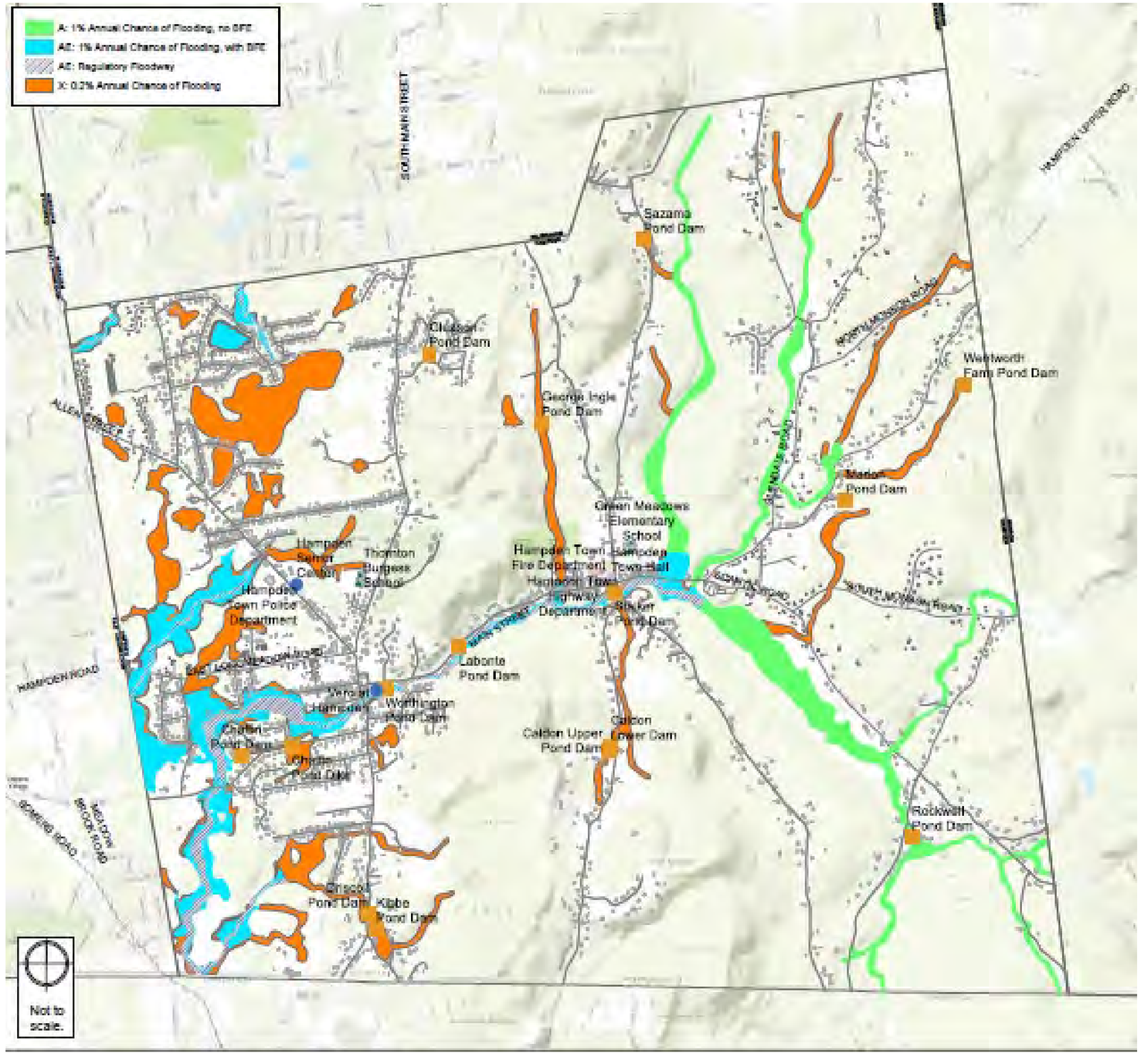
Engineers + Planners



HOWARD STEIN HUDSON

Hampden Flood Map

Engineers + Planners



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Mass Audubon

Outdoor education at Mass Audubon

- **Workshops and school lessons**
- **Green Infrastructure and Low Impact Development**

Next Steps

- Main Street Flooding Assessment
- Community Resiliency Building Workshop
- Identify green solutions for flood mitigation
- Municipal Vulnerability Preparedness Action Grant April 2021

Contact Information

Engineers + Planners

Thank you!

Mary Monahan

(413) 313-6901

marylmonahan@gmail.com

Steven Tyler

(508) 500-7160

styler@hshassoc.com

Jonah Keane

(413) 276-7611

jkeane@massaudubon.org

HOWARD STEIN HUDSON

First Name	Last Name	Email	Affiliation
Jonah	Keane	jkeane@massaudubon.org	Mass Audubon
Robert	Markel	Townadmin@hampdenma.gov	Town Administrator
Taylor	Miller	tmiller@hshassoc.com	Howard Stein Hudson
Mary	Monahan	marylmonahan@gmail.com	MLM Enterprises
Steven	Tyler	styler@hshassoc.com	Howard Stein Hudson

HOWARD STEIN HUDSON

Core Team Meeting
Municipal Vulnerability Preparedness (MVP) Program

Town House Auditorium
Wednesday, December 16, 2020

Please print the requested information below

Name	Email	Affiliation
[illegible]	[illegible]	CONCOMM
Jonah Keane	jkeane@massaudubon.org	Mass Audubon
Tom Lautzenheiser	tlautzenheiser@massaudubon.org	"
Ron Wadanny	rwadanny@massaudubon.org	"
Chris Lyman	clyman@hshassoc.com	HSH
Paul Beitheaume	pbeithaume@hshassoc.com	HSH
MARY MONAHAN	marymonahan@gmail.com	MLME Hampden
Bonnie Geremini	bgeremini@gmail.com	Con. Comm.
Steven Tyler	styler@hshassoc.com	HSH
Mark Lanzone	highway@hampdenma.gov	

2020-12-16 Hampden MVP Kick-off Meeting 01.jpg

2020-12-16 Hampden MVP Kick-off Meeting 02.jpg

2020-12-16 Hampden MVP Kick-off Meeting 07.jpg

2020-12-16 Hampden MVP Kick-off Meeting 09.jpg

2020-12-16 Hampden MVP Kick-off Meeting 10.jpg

2020-12-16 Hampden MVP Kick-off Meeting 11.jpg

2020-12-16 Hampden MVP Kick-off Meeting 13.jpg

2020-12-16 Hampden MVP Kick-off Meeting 26.jpg

2020 12 Hamden Drone Photos 001.JPG

2020 12 Hamden Drone Photos 002.JPG

2020 12 Hamden Drone Photos 004.JPG

2020 12 Hamden Drone Photos 006.JPG

2020 12 Hamden Drone Photos 007.JPG

2020 12 Hamden Drone Photos 011.JPG

2020 12 Hamden Drone Photos 014.JPG

2020 12 Hamden Drone Photos 015.JPG

2020 12 Hamden Drone Photos 016.JPG

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2020 12 Hamden Drone Photos 020.JPG

2020 12 Hamden Drone Photos 025.JPG

2020 12 Hamden Drone Photos 029.JPG

Community Resilience Building Workshop
Day 1

Presented by

Mary Monahan

Steven Tyler

Jonah Keane

Presented to

Town of Hampden

January 21, 2021 | 12 PM – 4 PM

HOWARD STEIN HUDSON

Engineers + Planners

Hampden Community Resilience Building Workshops Invitee List

January 21, 2021, 12PM to 4PM

January 28, 2021, 9AM to 1PM

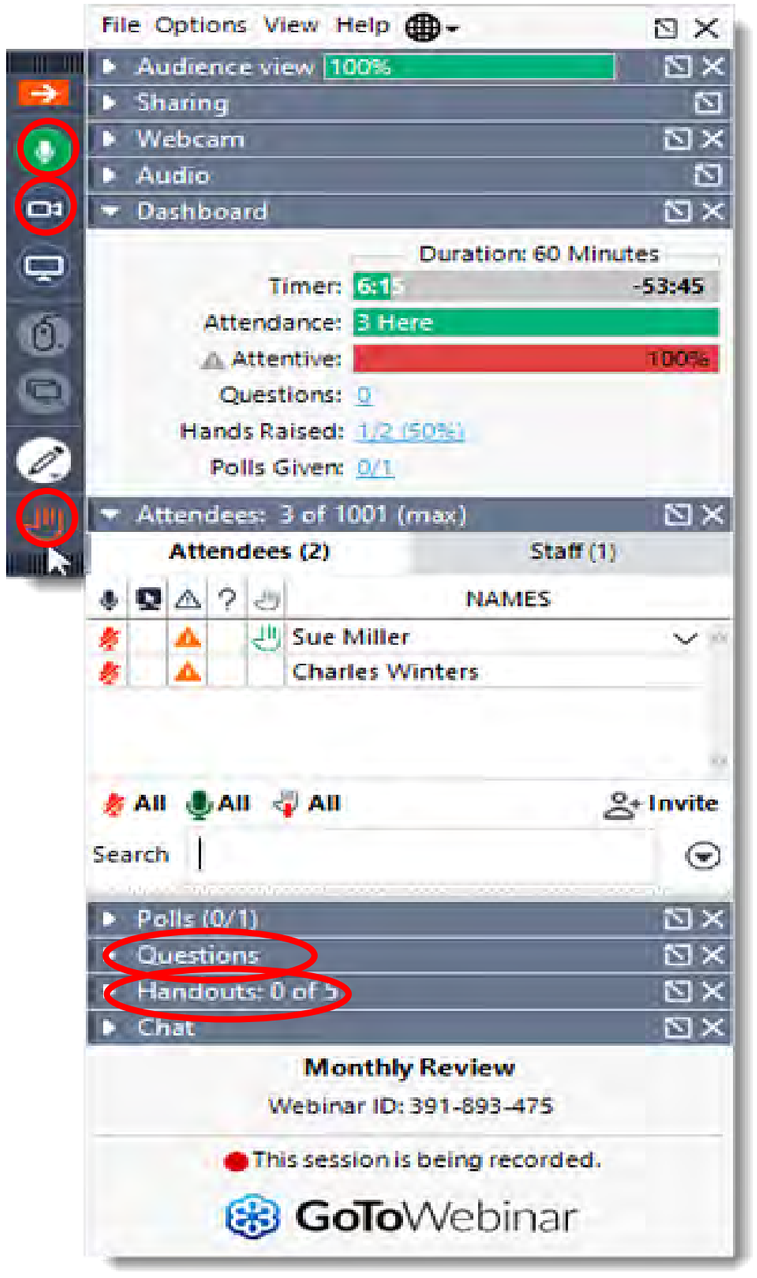
Proposed Invitees

Name	Title/Org	Email
Robert Markel	Interim Town Administrator	townadmin@hampdenma.gov
Mark Langone	Highway Superintendent	Highway@hampdenma.gov
Jeff Farnsworth	Police Chief	chief@hampdenpolice.com
Ed Poulin	Fire Chief	epoulin8029@charter.net
Ted Zebert	Conservation Commission	shoestringj45@gmail.com
Bonnie Geromini	Conservation Commission	bgeromini@gmail.com
Jane Budynkiewicz	Board of Health	health@hampdenma.gov
Wendell Hubert	Building Inspector	building@hampdenma.gov
Rebecca Moriarty	Council on Aging	coa@hampdenma.gov
Lisa DiFranco	Housing Authority	hamphous@verizon.net
Eric Jacobson	Parks and Recreation	parks@hampdenma.gov
Richard Patullo	Treasurer	treasurer@hampden.org
Dana Pixley	Tree Warden	pixleyservices@gmail.com
Doug Boyd	Community Preservation	boydone@charter.net
Connie Witt	Historical Commission	ccwitt908@gmail.com
Robert Howarth	Planning Board	
John Matthews	Ridgeline/Hillside Committee	john.matthews3@verizon.net
Donna Hatch	Solar Bylaw Committee	

Hampden Community Resilience Building Workshops Invitee List

Gary Weiner	Stormwater Committee	m53hamp@gmail.com
Ellen Moriarty	Library	emoriarty@cwmars.org
John Plaster	Scantic Valley Water	jplaster085@charter.net
Brian Ashe	State Representative	Brian.Ashe@mahouse.gov
Eric Lesser	State Senator	**eric.lesser@masenate.gov**
Al Ganem	School District Superintendent	aganem@hwrsd.org
Andrew Smith	Municipal Vulnerability Preparedness Program	andrew.b.smith@state.ma.us
	Green Meadow Elementary	
	Thornton Burgess School	
	Temple Farm 278 Scantic Road	
	Ferrindino Maple 284 Glendale Road	
	Hampden Hills Alpacas 487 Glendale Road	
	Federated Community Church	
	Pace Rehab & Home Care 2 Allen Street	
	Wingate 34 Main Street	

Control Panel



Raise your hand

Unmute to speak

Questions **Send a question**

Handouts **Access handouts**

Note: Today's presentation is being recorded

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Agenda

- **Welcome & Introductions**
- **Municipal Vulnerabilities Preparedness (MVP) Program**
  - Main Street Flood Assessment
  - Public and student outreach
- **Climate change and the Town of Hampden**
  - Participant discussion
  - Current environmental planning & risks
  - Strengths and vulnerabilities interactive map
  - Hampden’s Top Four Hazards
- **Next steps**

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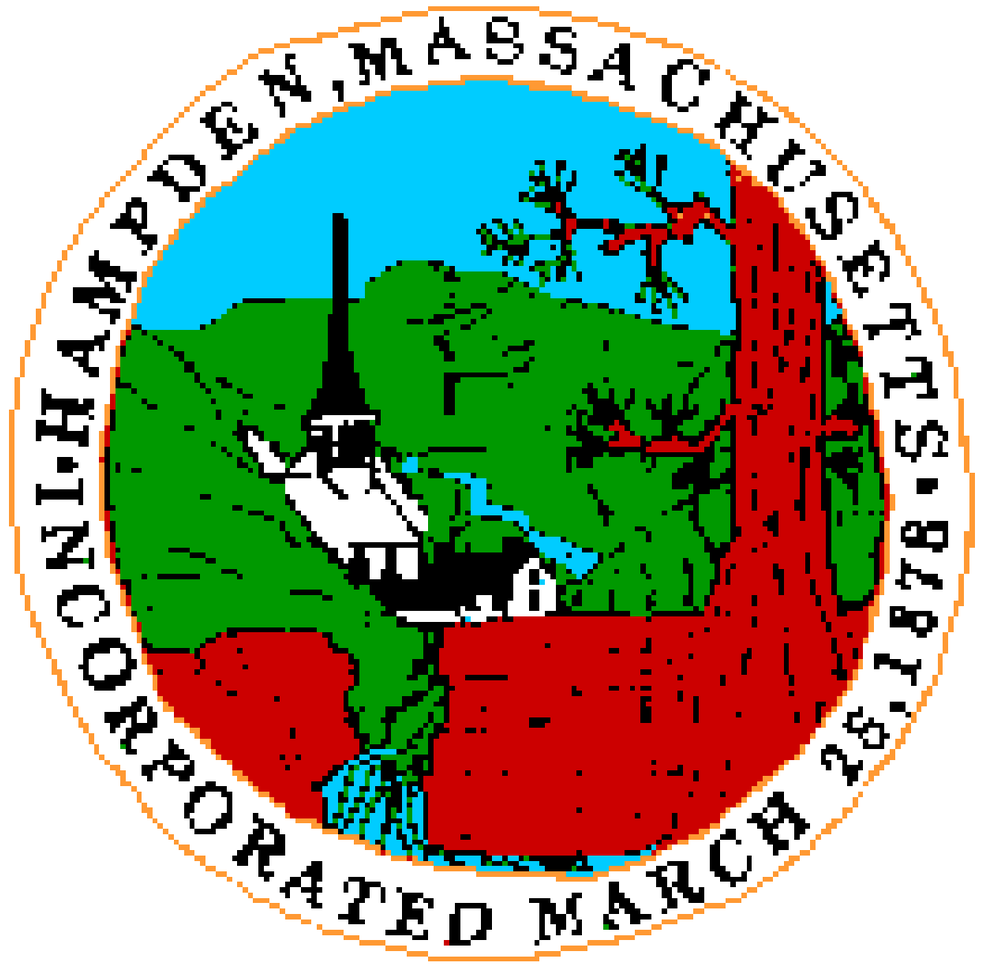
Welcome Elected & Appointed Officials

- Hampden Officials
- State Senator
- State Representative



Project Team

Engineers + Planners

- **Mary Monahan**
  - Public Works Consultant
    - *Municipal Vulnerability Planning*

MLM(e)
Mary Louise Monahan Enterprises

- **Steven Tyler, P.E.**
  - Senior Civil Engineer
    - *Main Street Flooding Assessment*

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- **Jonah Keane**
  - CT Valley Sanctuaries Director
    - *Workshops in Green Infrastructure*

Mass Audubon

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Weather and Climate Change

Municipal Vulnerabilities Preparedness (MVP) $40,000 Planning Grant

Engineers + Planners

- **Municipal Vulnerability Planning Process**
  - Community-led planning process to develop and prioritize actions and opportunities to reduce climate change risks and build resilience
- **Main Street Flood Assessment**
  - Watershed approach to evaluate, identify, and educate stakeholders and others about nature-based solutions to alleviate flooding on Main Street

Executive Office of Energy and Environmental Affairs

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MVP Planning Process

Community Resilience Building Workshop

- Core team meeting
- Community Resilience Building Workshop
- Summary of findings
- Listening session
- Implementation

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Main Street Flooding Assessment

Engineers + Planners

- Identify opportunities to address Main Street flooding concerns
- Educate residents and stakeholders about the benefits of nature-based solutions
- Engage students in a mini-MVP Community Resilience Building Workshop
- Develop recommendations for green and grey infrastructure improvements within the watershed and at two brook crossings along Main Street

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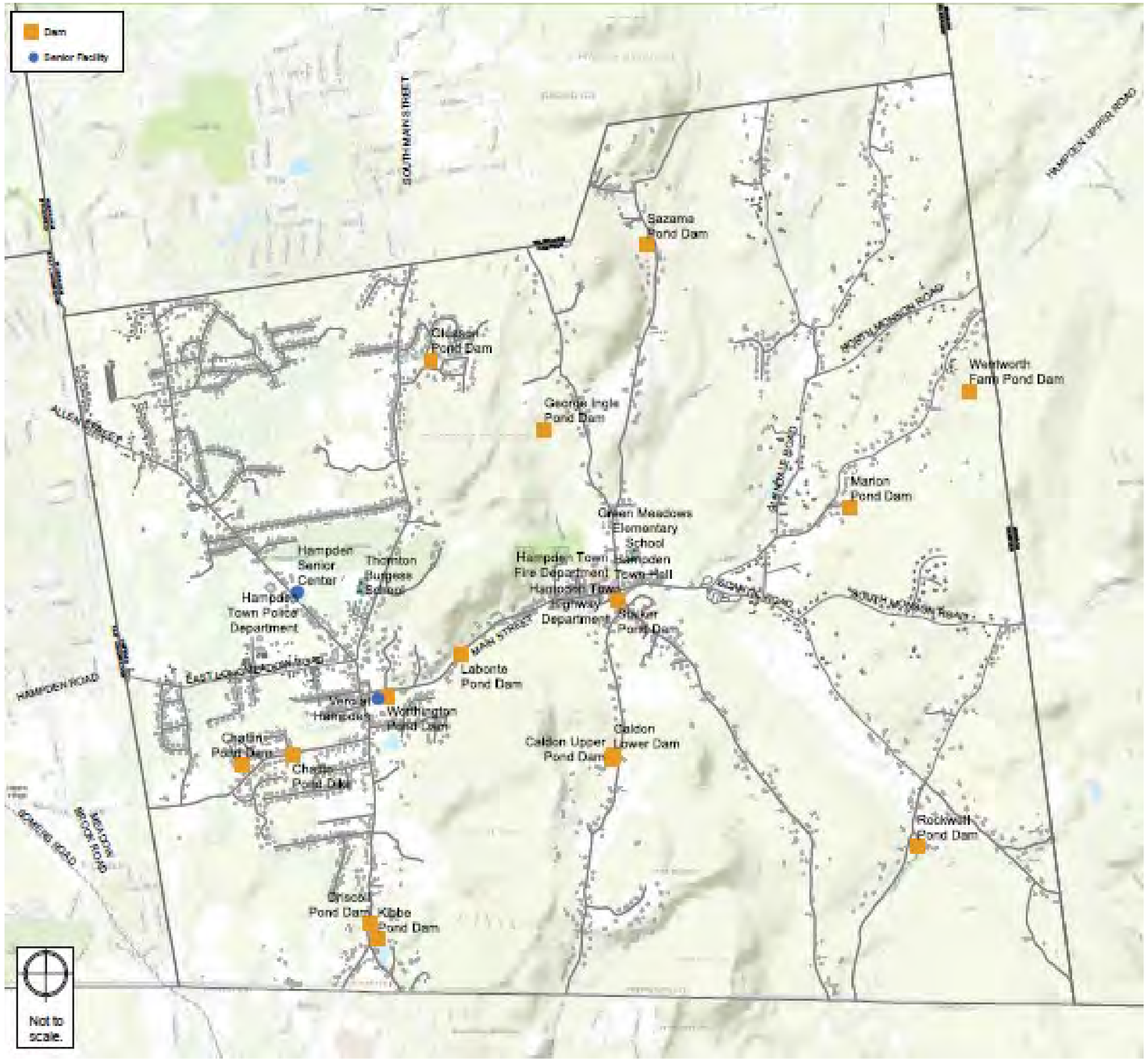
Hampden Base Map

Engineers + Planners



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2020-12 Hampden MVP Main St Flyover

Engineers + Planners

- **2020-12 Hampden MVP Main St Flyover from Monson Rd to North Rd**

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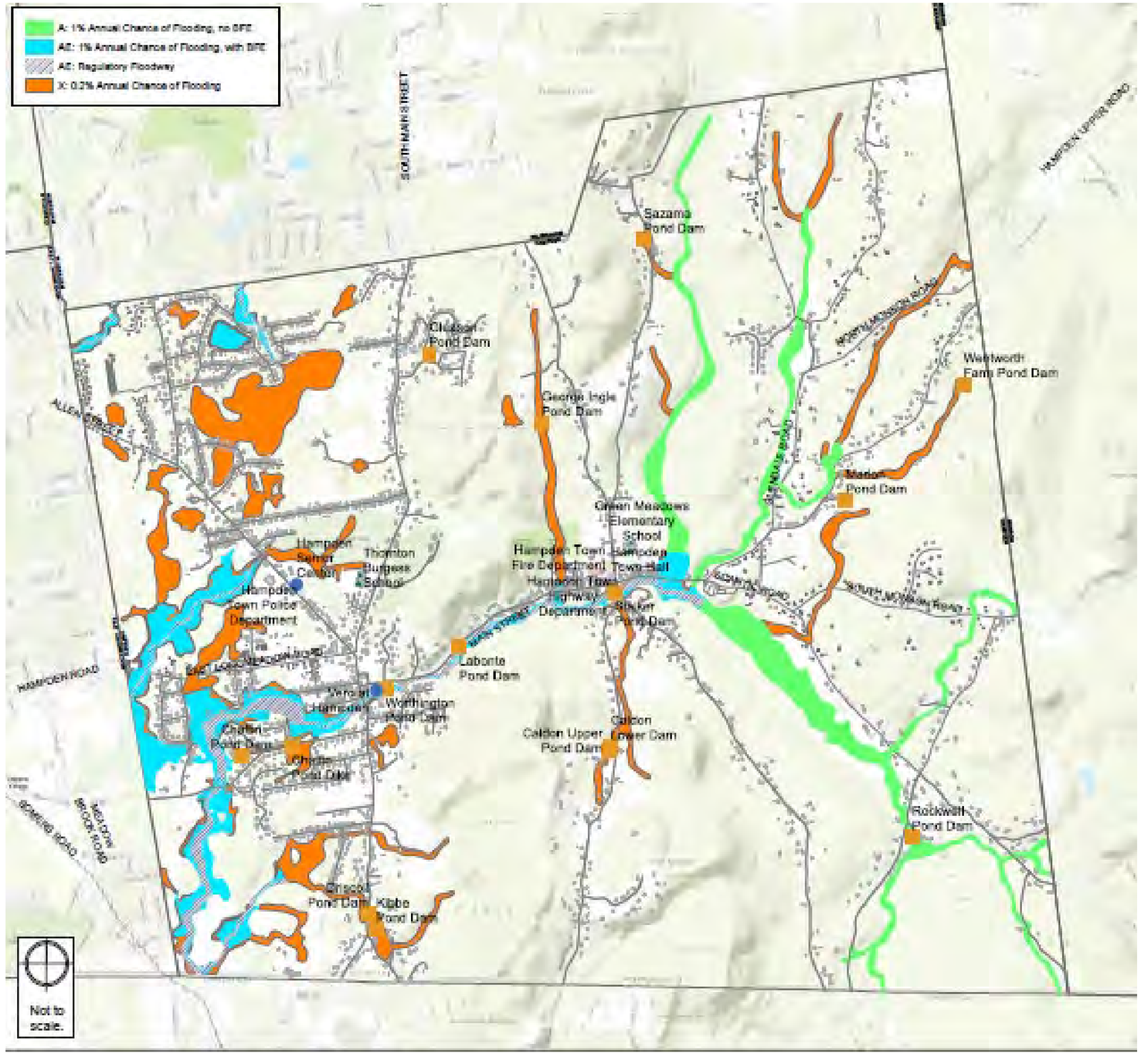
Hampden Flood Map

Engineers + Planners



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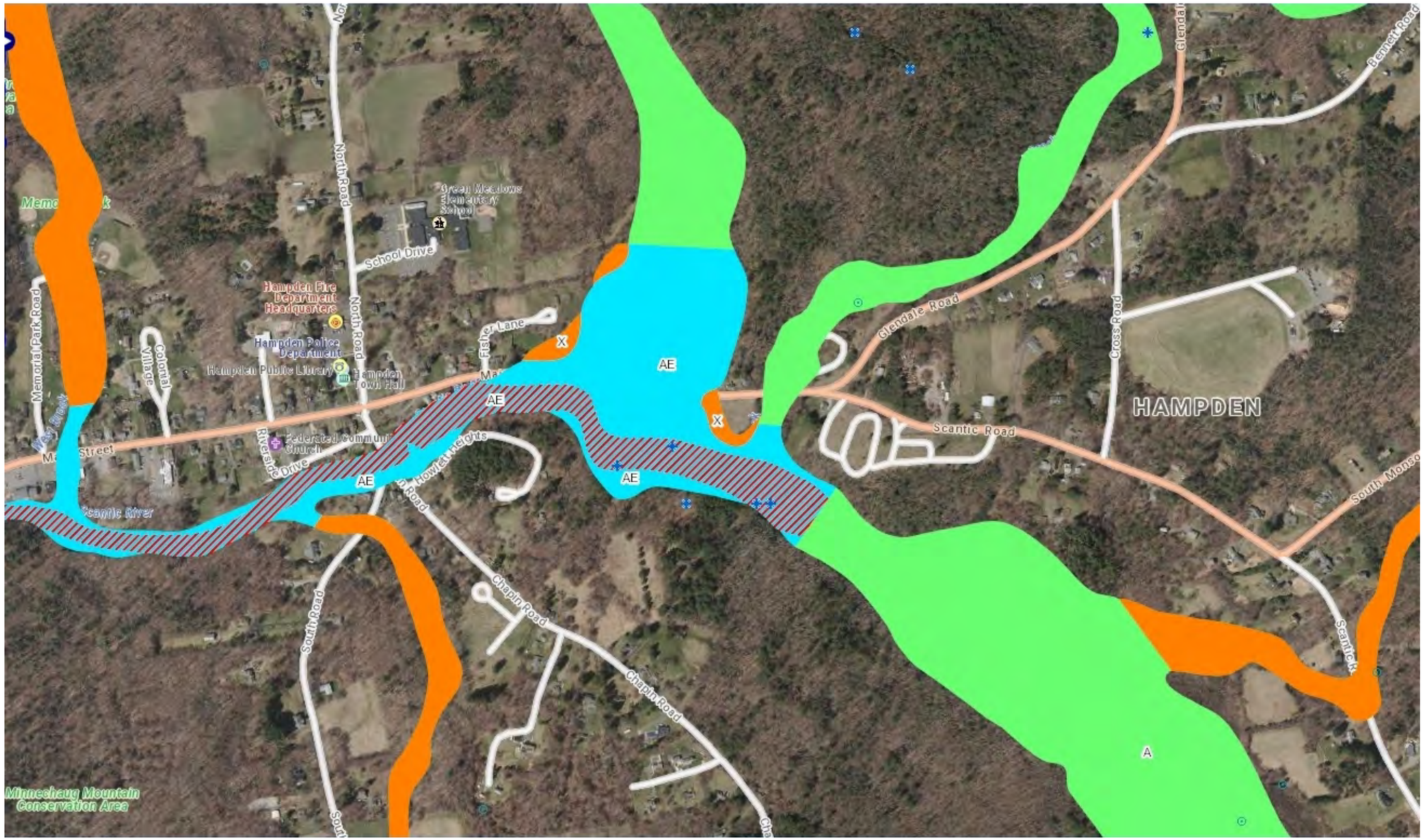
Main Street Flood Map

Engineers + Planners



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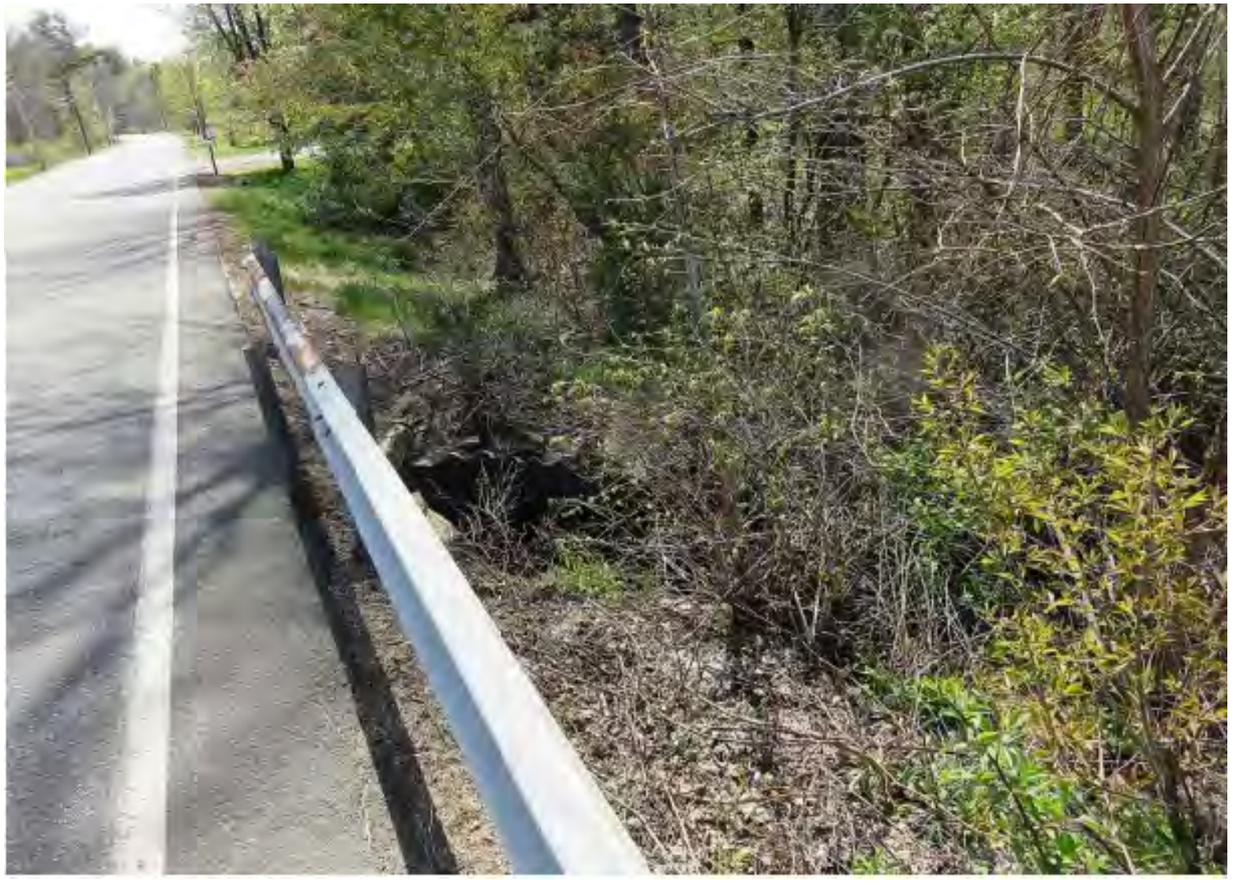
Hampden Main Street over Big Brook Culvert

Engineers + Planners



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Hampden Main Street over East Brook Culvert (Bridge No. H-04-008)

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Freeport Road Collapse

Public & Student Outreach

Outdoor education at Mass Audubon

Climate Change and Western Massachusetts

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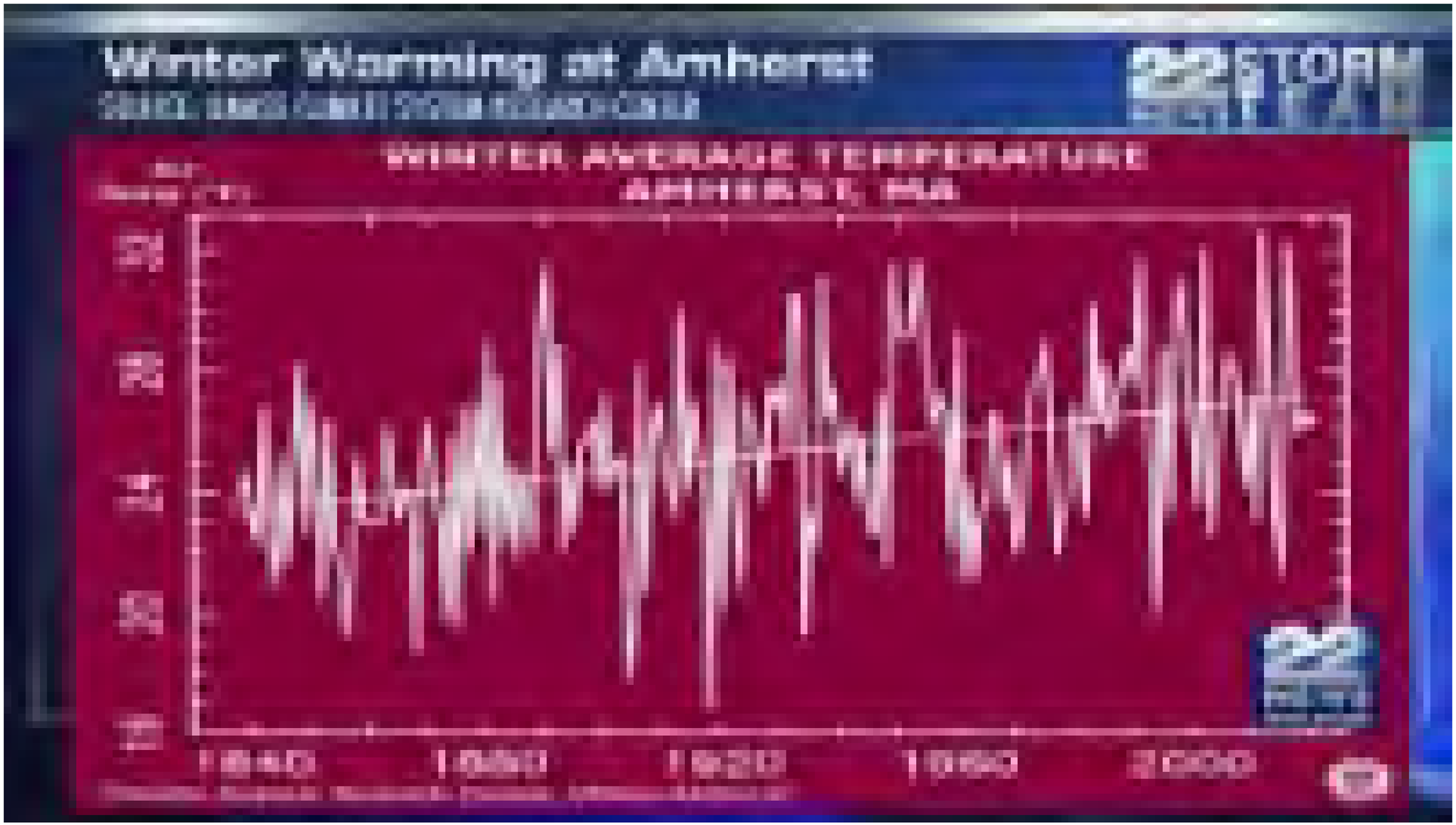

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Participant Introductions

- Name
- Job
- When you think about climate change, what concerns you in your professional role and personally?

Climate Change and Infrastructure

Engineers + Planners

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Current Environmental Planning & Risks

- Emergency Management Director
- Police/ Fire
- Highway
- Conservation Commission
- Planning Board
- Board of Health
- Others

Climate Change and Public Health

Engineers + Planners

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Climate Change

- Rising temperature
- Changing precipitation – rainfall amount and intensity
- Sea level rise

Rising Temperature

Town of Hampden – Connecticut Basin

Westfield Basin	Observed Baseline 1971-2000	Projected Change in 2030s	Projected Change in 2050s	Projected Change in 2070s	Projected Change in 2090s
Average Annual Temperature (°F)	45.01	2.27 to 4.55	3.08 to 6.63	3.64 to 9.18	4.16 to 11.18
Annual Days with Maximum Temperature over 90°F (Days)	2.75	3.90 to 12.64	5.70 to 24.05	7.18 to 42.37	8.76 to 59.56
Annual Days with Minimum Temperature below 32°F (Days)	166.59	-10.89 to -27.83	-20.14 to -38.37	-22.41 to -52.99	-24.19 to -62.16

Changing Precipitation

Engineers + Planners

Town of Hampden – Connecticut Basin

Westfield Basin	Observed Baseline 1971-2000	Projected Change in 2030s	Projected Change in 2050s	Projected Change in 2070s	Projected Change in 2090s
Total Annual Precipitation (Inches)	50.70	-0.24 to 5.11	1.18 to 6.85	2.04 to 8.06	2.08 to 9.10
Annual Consecutive Dry Days (Days)	16.80	-0.26 to 1.40	-0.28 to 2.17	-0.65 to 2.27	-0.47 to 2.64

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Climate Change and Hampden

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Wildfire on Minnechaug Mountain, Hampden, MA September 2020

- **Infrastructure**
  - Snow and ice
  - Flooding
  - Power outages
- **Society**
  - Vector born diseases
  - Heat stroke
- **Environment**
  - Water quantity and quality
  - Woodlands and vegetation

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Local Weather Data

1938 flood looking west from Thornton Burgess's house toward where Lanc

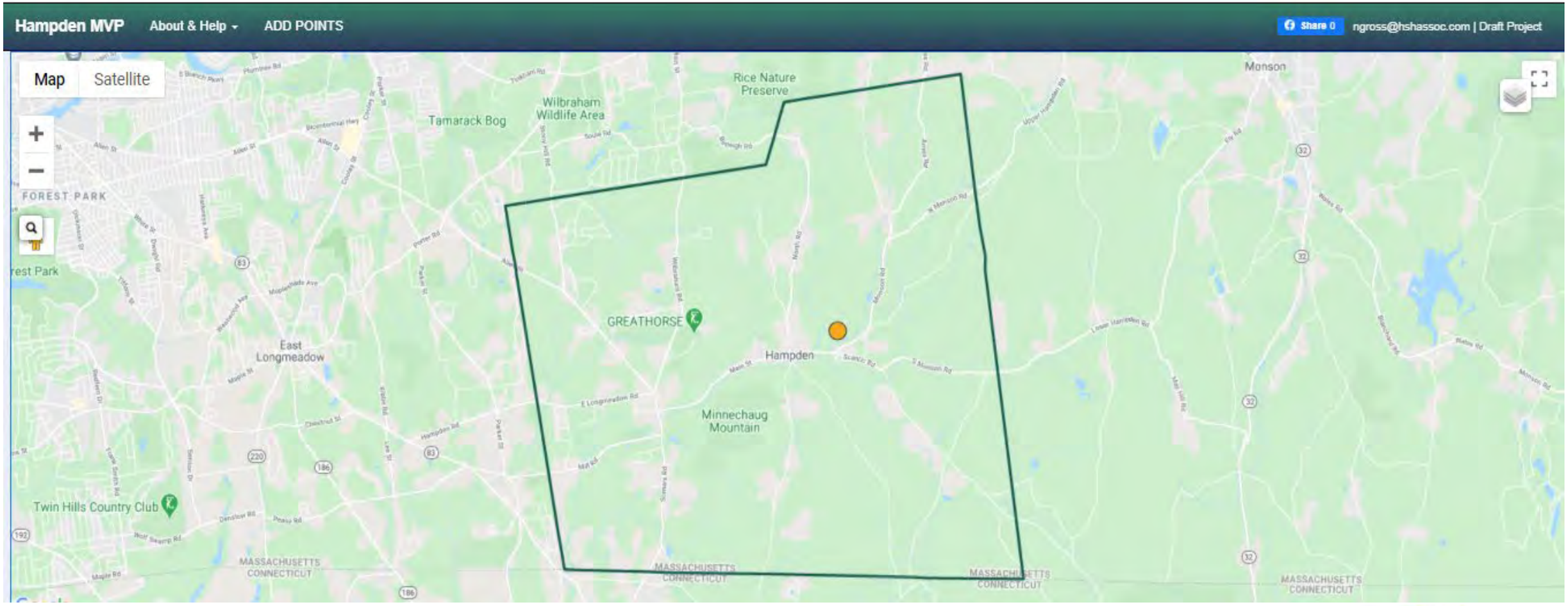
Local Weather Data

Strengths and Vulnerabilities Interactive Map

Engineers + Planners

Municipal Vulnerability Preparedness (MVP) WikiMap

Share your experiences and help the Town of Hampden assess their vulnerability, prepare for climate change impacts, build community resilience, and receive designation as a Climate Change MVP program municipality.



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What Does Climate Change Mean to You?

- Flooding
- Extreme precipitation events
- Heat waves
- Wind
- Tornados
- Drought
- Ice
- Wildfires

Risk Matrix

Community Resilience Building Risk Matrix www.CommunityResilienceBuilding.com

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

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

Features	Location	Ownership	V or S					Priority H - M - L	Time Short Long Ongoing
Infrastructural									
Societal									
Environmental									

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Next Steps

- **CRB Workshop Day 2**
  - Introduction to Green Infrastructure and Low Impact Development
  - Sector impacts
  - Complete Risk Matrix
  - Determine priorities for Hampden
- **Listening Session**
- **Student and Public Outreach**
- **Municipal Vulnerability Preparedness Action Grant April 2021**

Contact Information

Engineers + Planners

Thank you!

Mary Monahan

(413) 313-6901

marylmonahan@gmail.com

Steven Tyler

(508) 500-7160

styler@hshassoc.com

Jonah Keane

(413) 276-7611

jkeane@massaudubon.org

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Community Resilience Building Workshop *Day 2*

Presented by

Mary Monahan
Steven Tyler
Jonah Keane

Presented to

Town of Hampden

January 28, 2021 | 9AM – 1PM

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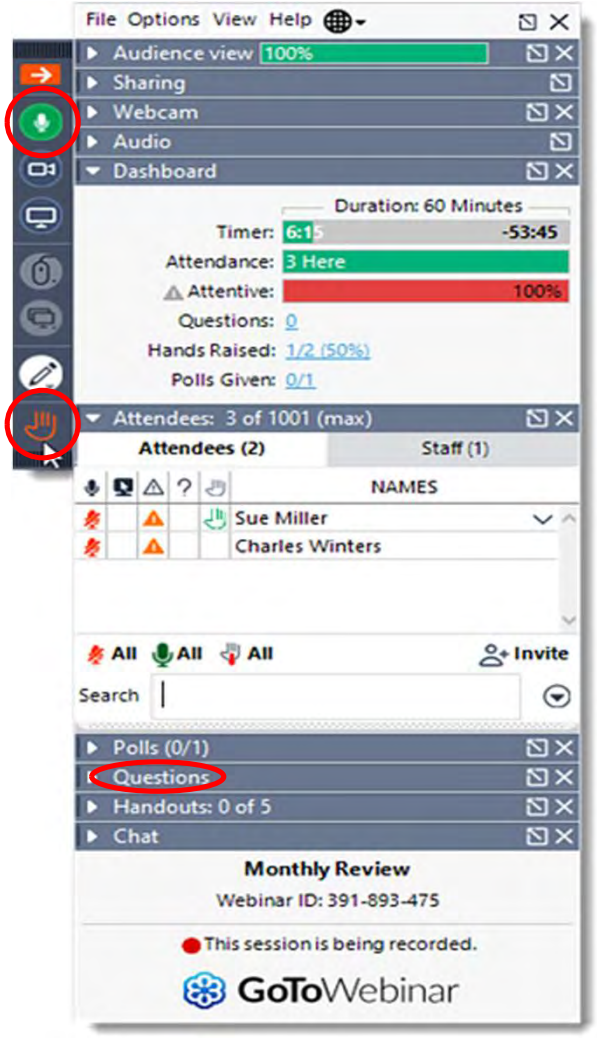
Engineers + Planners

Control Panel

Engineers + Planners



Raise your hand

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Questions Send a question

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HOWARD STEIN HUDSON

Agenda

- Welcome and Reintroductions
- Summary of Workshop Day 1
- Green Infrastructure and Low Impact Development
- Sector impacts
- Completed Risk Matrix
- Climate change priorities for Hampden
- Next steps

Welcome Elected & Appointed Officials

Engineers + Planners

- Hampden Officials
- State Senator
- State Representative

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Mass Audubon

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Municipal Vulnerabilities Preparedness (MVP) $40,000 Planning Grant

Engineers + Planners

- **Municipal Vulnerability Planning Process**
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Summary of Workshop Day 1

- Great Job!

Absorbing Risk

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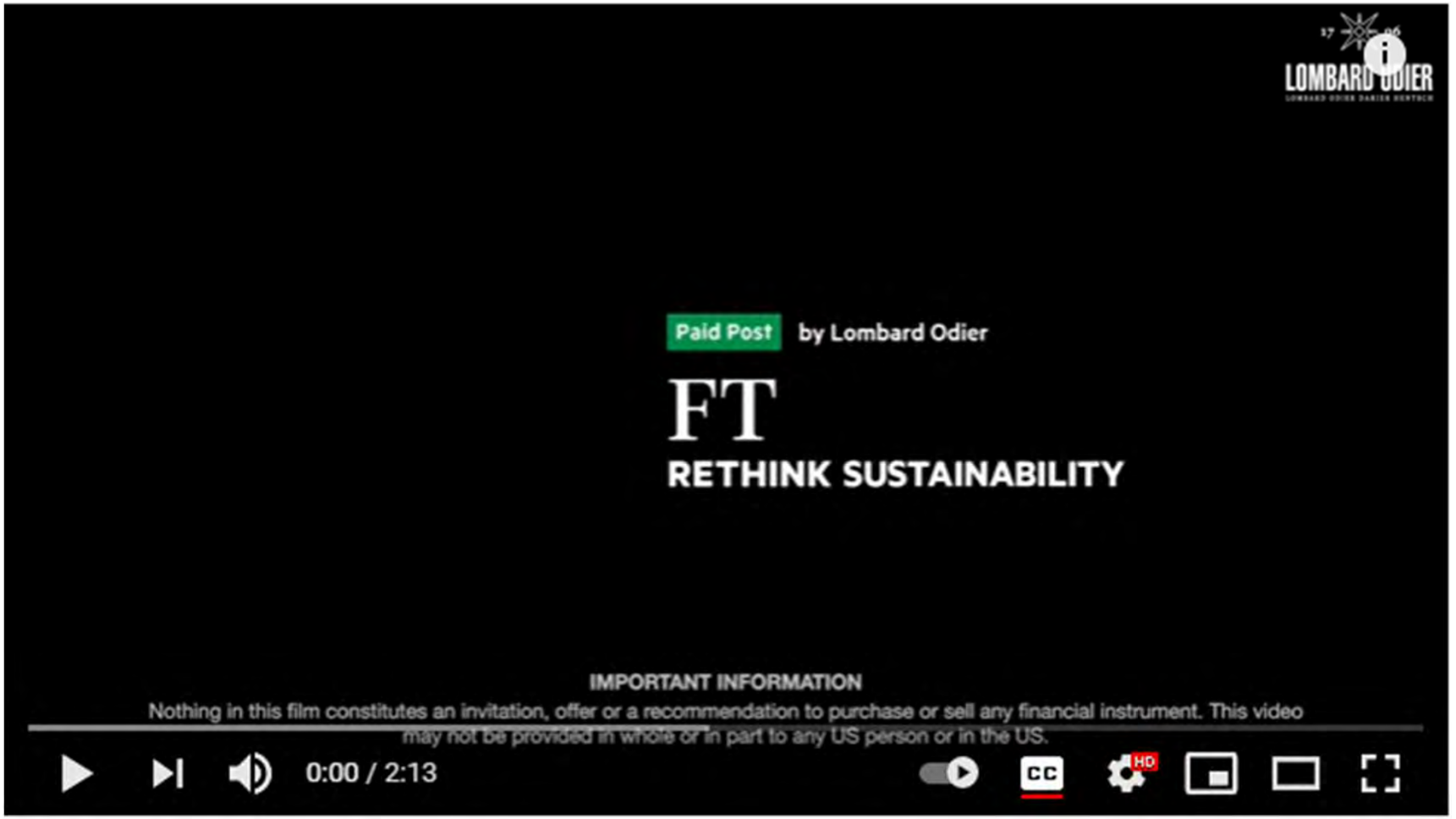

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Green Infrastructure and Low Impact Development

Engineers + Planners

- Jonah Keane from Mass Audubon
- Main Street Flood Assessment: green and grey solutions

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Green Infrastructure and Low Impact Development

Engineers + Planners

Sanctuaries with Nature Centers

Berkshires

1. **Pleasant Valley, Lenox**
2. Canoe Meadows, Pittsfield
3. Lime Kiln Farm, Sheffield

Connecticut River Valley

4. West Mountain, Plainfield
5. Road's End, Worthington
6. High Ledges, Shelburne
7. Conway Hills, Conway

Greater Boston

31. **Habitat Education Center, Belmont**


37 -051-001
37 -049-001
44 -022-001
44 -011-001
44 -129-001
44 -014-001
44 -030-001
44 -054-001
45 -018-001
38D-075-001
45 -031-001
45 -115-001
45 -019-001
45 -045-001
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STAFF

Youth Climate Summit

Engineers + Planners

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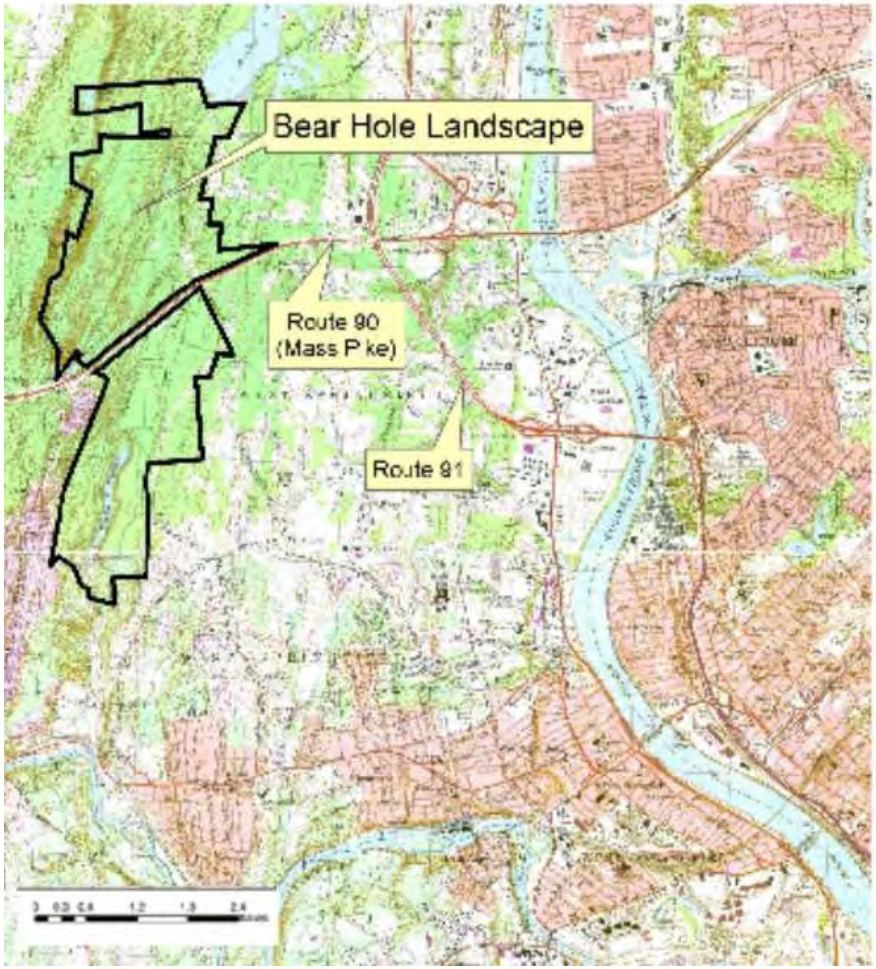
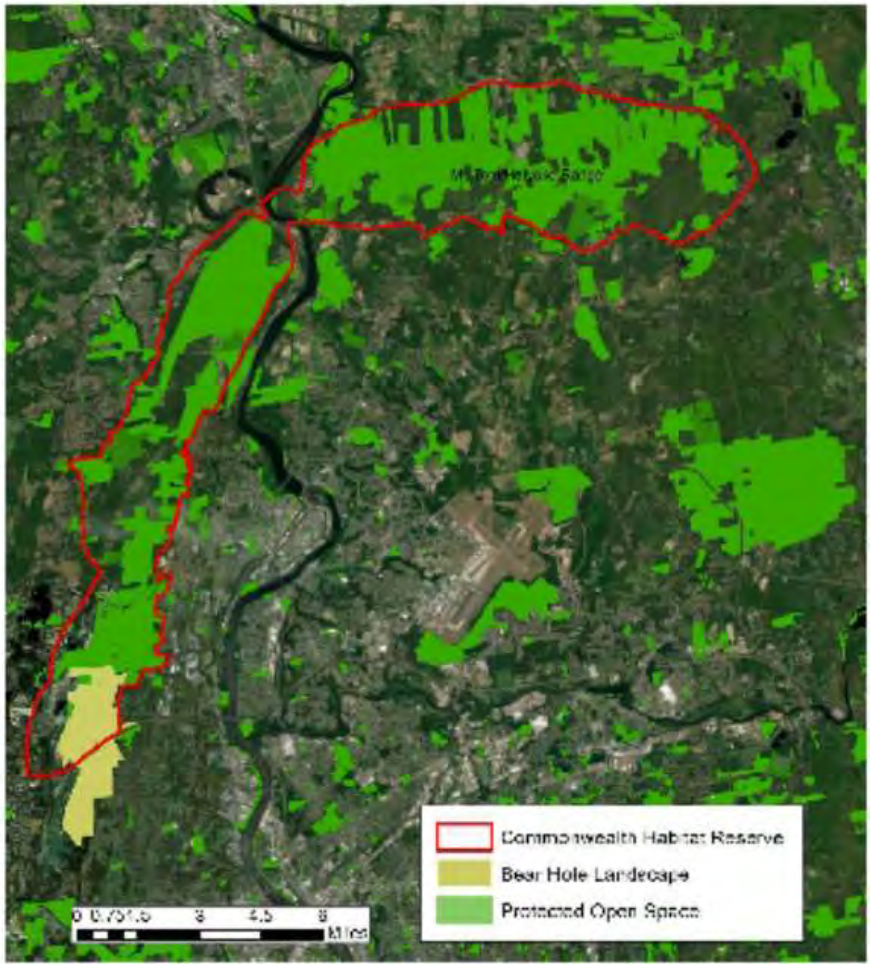
Bear Hole

Engineers + Planners





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Laughing Brook

Engineers + Planners

Laughing Brook

Engineers + Planners

Almost 400 Acres

Engineers + Planners

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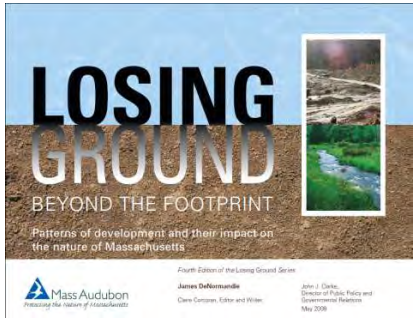
Recent Development Trends in MA (1999-2005)

Engineers + Planners



25 Miles

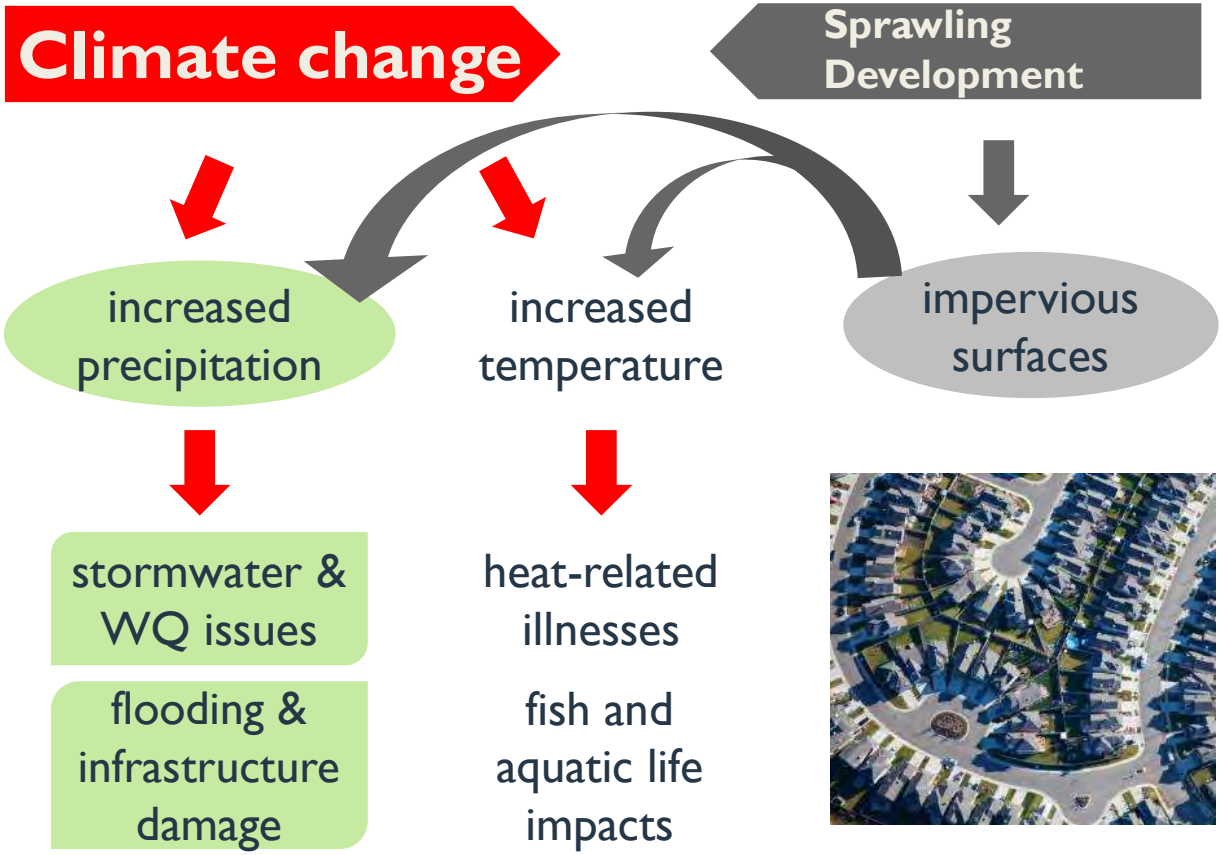
Sprawl Frontier

Acres of new development/square mile

- 0.2 - 3.0
- 3.1 - 5.4
- 5.5 - 7.4
- 7.5 - 10.3
- 10.4 - 17.0

Sprawling Development Impacts

Engineers + Planners



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Mitigation

- Actions to reduce or prevent emission of GHGs

Adaptation

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- Actions taken to help communities and ecosystems cope with actual/expected effects of climate change

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Green Infrastructure

- Natural features (forests, wetlands)
- Engineered landscapes that mimic natural features (rain gardens)

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Low Impact Development (LID)

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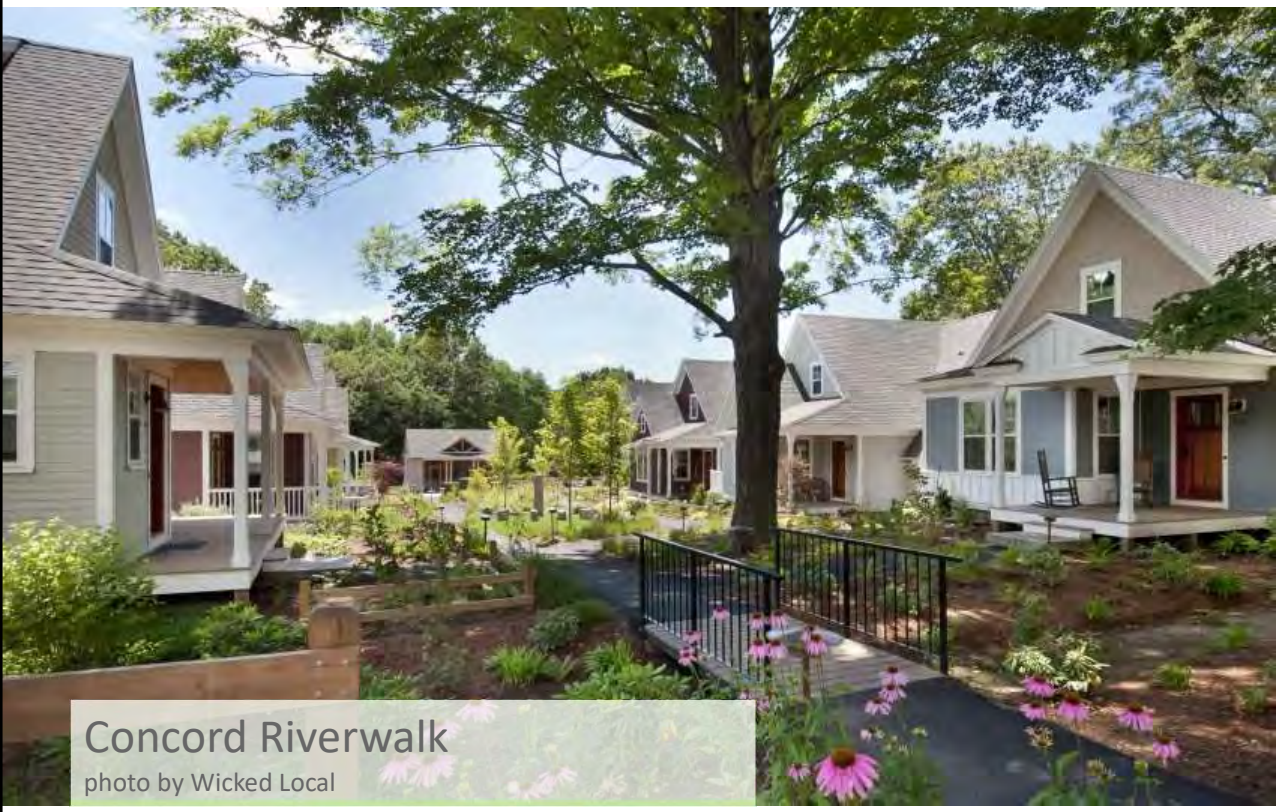

Concord Riverwalk
photo by Wicked Local

- Treats water as a resource, not just a waste product
- Manages stormwater as close to its source as possible
- Preserves natural landscape by recreating natural features

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LID Examples

Engineers + Planners

Rain gardens

This rain garden in Devens, MA gathers runoff from a curb-less road and sidewalk to infiltrate stormwater back into the ground while also offering beautiful home landscaping. Rain gardens can be made in any size and shape to fit your location.

Green roofs

U.S. General Services Administration

Boston, MA: John W. McCormack US Post Office and Courthouse. This 9,654 ft^2 green roof sits atop the EPA Region 1 Headquarters on a historic 1933 building.

EPA

A small, slanted green roof in Craftsbury, VT.

Permeable pavement

Horsley Witten Group

This parking lot in Narragansett, RI shows traditional asphalt on the left, where puddles have formed, and permeable pavement on the right, where it has soaked through.

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Nature-based Solutions

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Hazards

Nature-based solutions

- Open space preservation
- Low Impact Development
- Ecosystem Restoration

Municipal benefits

- Avoided Costs
- Enhanced Safety
- Environmental Services

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Nature-based Solutions at Every Scale

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1. Conserve the natural green infrastructure already providing free services
2. Integrate LID and green infrastructure design into development
3. Restore local resilience through LID in redevelopment

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Low Impact Development: Cost Savings & More

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- **Valuing Green Infrastructure**
  - How saving land saves water and money
- **Conservation Design**
  - Financial benefits and local examples
- **LID Techniques**
  - Costs and benefits of 5 LID techniques, site design to reduce pavement and costs
- **LID in Regulations**
  - Review municipal bylaws
- **Urban Waters**
  - Leominster stormwater case study

massaudubon.org/lidcost

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Case Study - LID Fact Sheet #5

Engineers + Planners

- **Leominster LID Project - Monoosnoc Brook**
  - Engaged wide variety of stakeholders
  - Numerous LID best management practices (BMPs) installed
  - Pollutant loading significantly reduced
  - Project significantly less expensive compared to cost of conventional stormwater practices

massaudubon.org/lidcost

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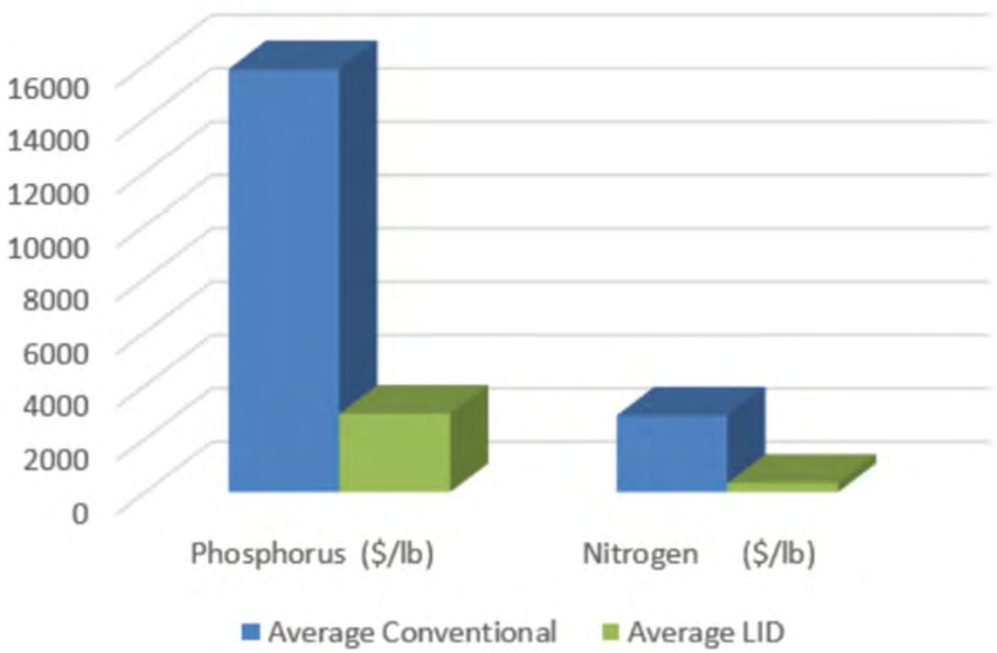
Case Study - LID Fact Sheet #5

Engineers + Planners

- **Comparison of Present Value Costs in Nitrogen and Phosphorus Reduction: LID vs. Conventional Detention Systems**



Cost comparison by Scott Horsley, Horsley Witten Group, Inc. based on comparison between a conventional detention basin vs. gravel wetland and bioretention. See supplemental information online for more details on how this was calculated.

massaudubon.org/lidcost

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Value of Nature Fact Sheets

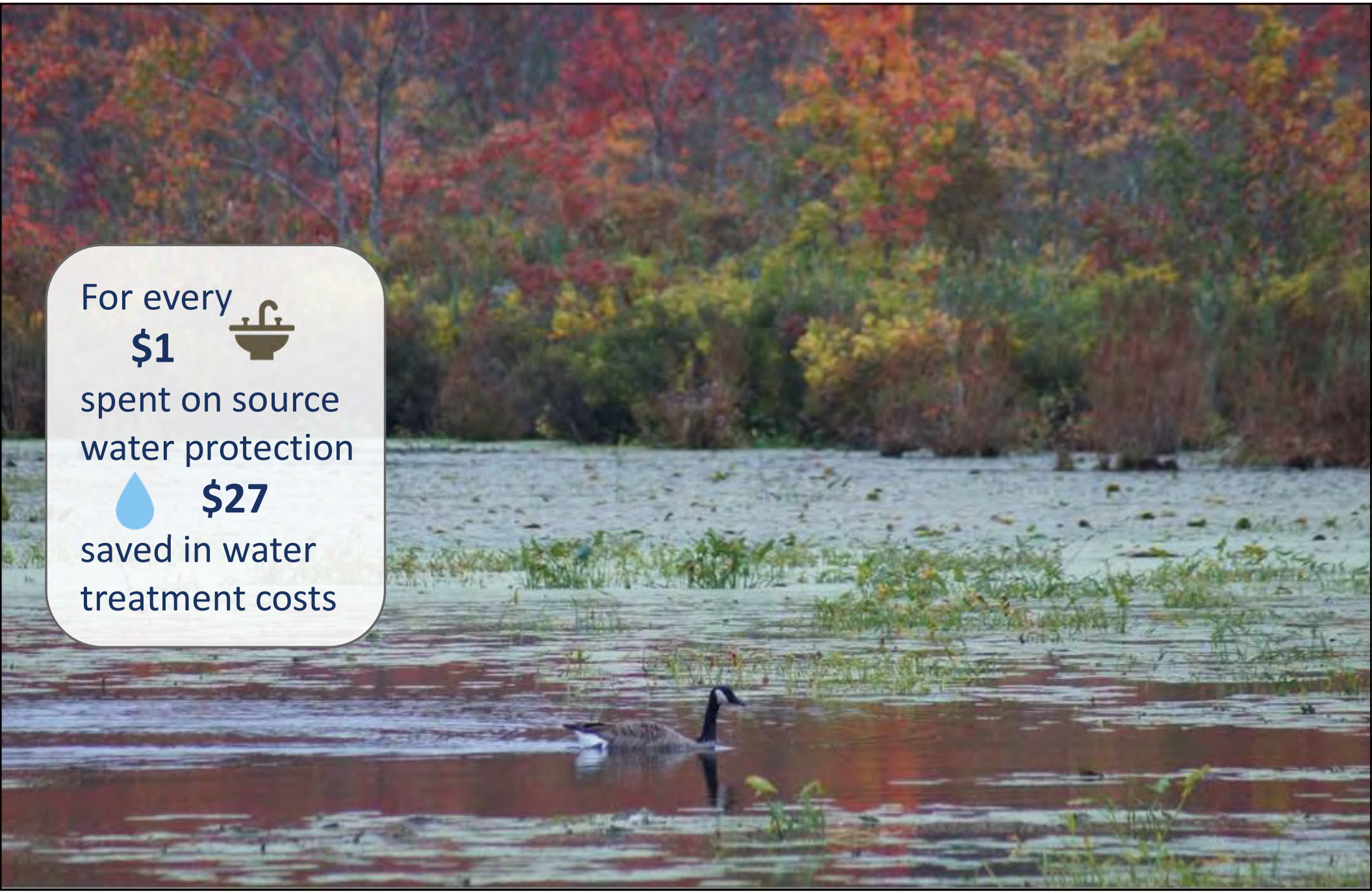
Engineers + Planners

- **Forests| Coastal | Wetlands & Waterways | Grasslands & Farmland | Urban Green Space**
  - Climate Resilience
  - Clean Air and Water
  - Carbon Capture & Storage
  - Economic & Health
  - Recreation & Tourism

massaudubon.org/valueofnature


7% of MA's greenhouse
gas emissions are offset by our forests


Coastal wetlands in the
northeastern U.S. saved
$625,000,000
in flooding damages
by Hurricane Sandy


For every
$1
spent on source water protection
$27
saved in water treatment costs


Pollinators contribute
$24 billion
to the U.S. economy
45% of our agricultural goods in Massachusetts rely on the rich diversity of pollinators for crop pollination

Every year, urban forests in the 15 communities of MetroWest Boston

BU Urban Climate Initiative

Source: Hong-Hanh et al. 2018

Remove
7.5 million
pounds of air pollutants

Help avoid
527 million gal.
of stormwater runoff, worth
$4.7 million

Store
962,000 tons
of carbon, worth
$125 million

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iTree

- Free, peer-reviewed, web-based tools
- Quantify the benefits of forests or single trees and set priorities for decision-making!

i-Tree

Tools for Assessing and Managing
Forests & Community Trees

FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE

iTreetools.org

iTree

Engineers + Planners

MyTree

Easily assess value of *one to several trees*

- input addresses
- describe each tree
- see values

i-Tree Design

Analyze current and future benefits of *up to 25 trees*

- input address
- describe trees
- place trees on map
- get estimate of benefits

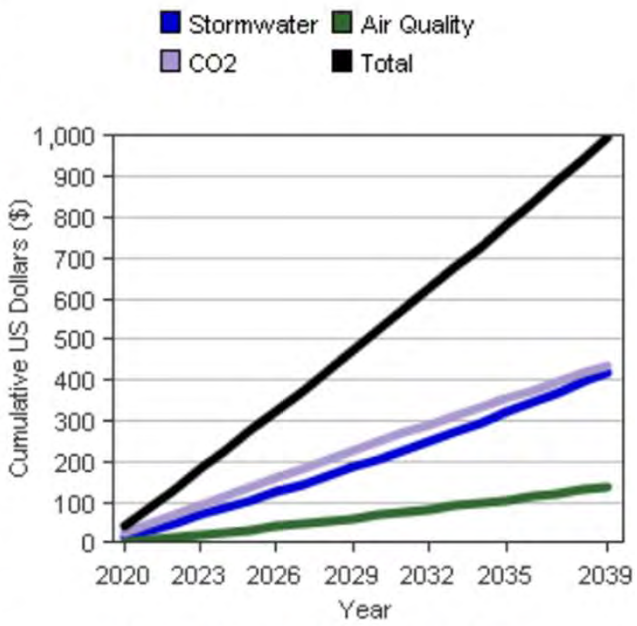
iTreetools.org

MyTree Benefits

Eastern white pine, *(Pinus strobus)*

Serving Size: 15.00 in. diameter
Condition: Good
Total benefits for this year: $77.88

Carbon Dioxide (CO_2) Sequestered	**$2.03**
Annual CO_2 equivalent of carbon[1]	192.33 lbs
Storm Water Runoff Avoided	**$1.32**
Runoff Avoided	147.79 gal
Rainfall Intercepted	887.38 gal
Air Pollution Removed Each Year	**$0.55**
Carbon Monoxide	0.24 oz
Ozone	22.85 oz
Nitrogen Dioxide	6.45 oz
Sulfur Dioxide	0.52 oz
$PM_{2.5}$	1.84 oz
Energy Usage Per Year[2]	**$62.94**
Electricity Savings (A/C)	172.82 kWh
Fuel Savings (natural gas, oil)	1.65 MMBtu
Avoided Energy Emissions	**$11.04**
Carbon Dioxide	205.75 lbs
Carbon Monoxide	14.6 oz
Nitrogen Dioxide	2.31 oz
Sulfur Dioxide	29.59 oz
$PM_{2.5}$	1.59 oz
CO_2 Stored To Date[3]	**$30.77**
Lifetime CO_2 equivalent of carbon[3]	2,916.42 lbs



Breakdown of tree benefits

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The “MVP” of Nature-Based Solutions

Engineers + Planners

- **The Municipal Vulnerability Preparedness (MVP) Program helps communities prepare for the impacts of climate change.**
  - Encourages nature-based solutions

Step 1. **Planning**

Step 2. **Action!**

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MVP Action: Mattapoisett, MA

Engineers + Planners

- **Land Acquisition**
  - Purchased 120 acres of forest, streams, freshwater wetlands and coastal salt marsh to prevent development in vulnerable areas

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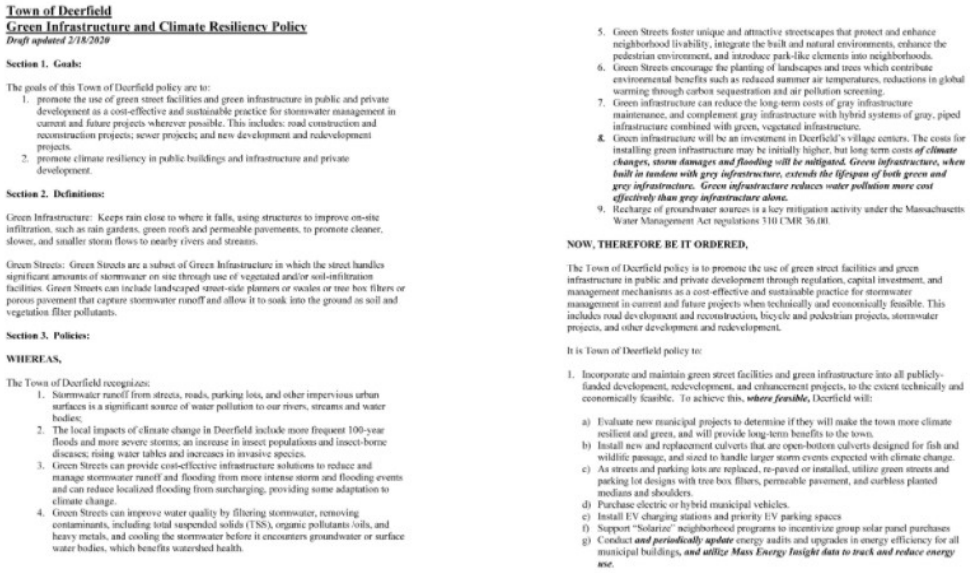
LID

- **Communities often unintentionally discourage LID by…**
  - Requiring large lots, strict dimensional requirements
  - Requiring wide, curbed roads
  - Requiring non-native species
  - Not prioritizing LID or preservation of natural features

MVP Action: Deerfield, MA

Engineers + Planners



Town of Deerfield
Green Infrastructure and Climate Resiliency Policy
Draft updated 2/18/2020

Section 1. Goals:

The goals of this Town of Deerfield policy are to:

1. promote the use of green street facilities and green infrastructure in public and private development as a cost-effective and sustainable practice for stormwater management in current and future projects whenever possible. This includes: road construction and reconstruction projects; sewer projects; and new development and redevelopment projects.
2. promote climate resiliency in public buildings and infrastructure and private development.

Section 2. Definitions:

Green Infrastructure: Keeps rain close to where it falls, using structures to improve on-site infiltration, such as rain gardens, green roofs and permeable pavements, to promote cleaner, slower, and smaller storm flows to nearby rivers and streams.

Green Streets: Green Streets are a subset of Green Infrastructure in which the street handles significant amounts of stormwater on site through use of vegetated and/or soil-infiltration facilities. Green Streets can include landscaped street-side planters or swales or tree box filters or porous pavement that capture stormwater runoff and allow it to soak into the ground as soil and vegetation filter pollutants.

Section 3. Policies:

WHEREAS,

The Town of Deerfield recognizes:

1. Stormwater runoff from streets, roads, parking lots, and other impervious urban surfaces is a significant source of water pollution to our rivers, streams and water bodies;
2. The local impacts of climate change in Deerfield include more frequent 100-year floods and more severe storms; an increase in insect populations and insect-borne diseases; rising water tables and increases in invasive species.
3. Green Streets can provide cost-effective infrastructure solutions to reduce and manage stormwater runoff and flooding from more intense storm and flooding events and can reduce localized flooding from surcharging, providing some adaptation to climate change.
4. Green Streets can improve water quality by filtering stormwater, removing contaminants, including total suspended solids (TSS), organic pollutants /oils, and heavy metals, and cooling the stormwater before it encounters groundwater or surface water bodies, which benefits watershed health.
5. Green Streets foster unique and attractive streetscapes that protect and enhance neighborhood livability, integrate the built and natural environments, enhance the pedestrian environment, and introduce park-like elements into neighborhoods.
6. Green Streets encourage the planting of landscapes and trees which contribute environmental benefits such as reduced summer air temperatures, reductions in global warming through carbon sequestration and air pollution screening.
7. Green infrastructure can reduce the long-term costs of gray infrastructure maintenance, and complement gray infrastructure with hybrid systems of gray, piped infrastructure combined with green, vegetated infrastructure.
8. Green infrastructure will be an investment in Deerfield's village centers. The costs for installing green infrastructure may be initially higher, but long term costs ***of climate changes, storm damages and flooding will be mitigated. Green infrastructure, when built in tandem with grey infrastructure, extends the lifespan of both green and grey infrastructure. Green infrastructure reduces water pollution more cost effectively than grey infrastructure alone.***
9. Recharge of groundwater sources is a key mitigation activity under the Massachusetts Water Management Act regulations 310 CMR 36.00.

NOW, THEREFORE BE IT ORDERED,

The Town of Deerfield policy is to promote the use of green street facilities and green infrastructure in public and private development through regulation, capital investment, and management mechanisms as a cost-effective and sustainable practice for stormwater management in current and future projects when technically and economically feasible. This includes road development and reconstruction, bicycle and pedestrian projects, stormwater projects, and other development and redevelopment.

It is Town of Deerfield policy to:

1. Incorporate and maintain green street facilities and green infrastructure into all publicly-funded development, redevelopment, and enhancement projects, to the extent technically and economically feasible. To achieve this, ***where feasible,*** Deerfield will:

   a) Evaluate new municipal projects to determine if they will make the town more climate resilient and green, and will provide long-term benefits to the town.
   b) Install new and replacement culverts that are open-bottom culverts designed for fish and wildlife passage, and sized to handle larger storm events expected with climate change.
   c) As streets and parking lots are replaced, re-paved or installed, utilize green streets and parking lot designs with tree box filters, permeable pavement, and curbless planted medians and shoulders.
   d) Purchase electric or hybrid municipal vehicles.
   e) Install EV charging stations and priority EV parking spaces
   f) Support "Solarize" neighborhood programs to incentivize group solar panel purchases
   g) Conduct ***and periodically update*** energy audits and upgrades in energy efficiency for all municipal buildings, ***and utilize Mass Energy Insight data to track and reduce energy use.***

Resilience Policy

- Updating zoning and development controls in the floodplain.
- Incorporating new flood maps into bylaw updates.
- Revising zoning/bylaws to promote climate resilience and low impact development.
- Creating a town-wide green infrastructure policy for public projects.
- Public climate awareness engagement.
- Emergency flood evacuation planning.
- Design, permitting and construction for replacing priority culverts.
- Installing green stormwater infrastructure.

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Bylaw Review

Engineers + Planners

- **Why?**
  - Are your resilience goals reflected in your bylaws?
  - If so, how?
  - If not, what might barriers be?
- **How?**
  - Review existing bylaws
  - ID conventional vs. best practices
  - ID administrative vs. town meeting changes
  - Draft summary and recommendations

massaudubon.org/bylawreview

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MVP Website: resilientma.org/mvp

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Main Street Flooding Assessment

Engineers + Planners

- Identify opportunities to address Main Street flooding concerns
- Educate residents and stakeholders about the benefits of nature-based solutions
- Engage students in a mini-MVP Community Resilience Building Workshop
- Develop recommendations for green and grey infrastructure improvements within the watershed and at two brook crossings along Main Street

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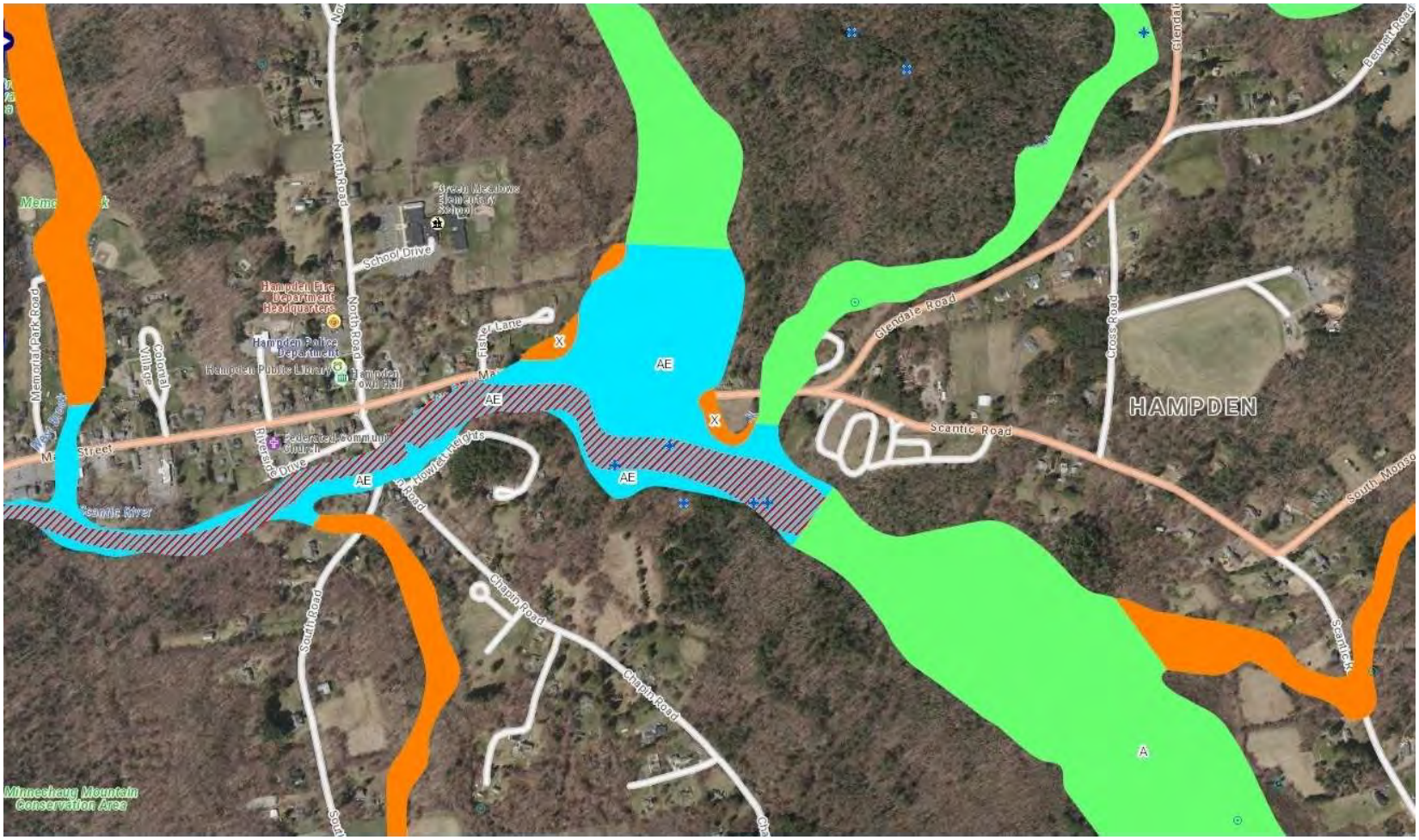
Main Street Flood Map

Engineers + Planners



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Big Brook Culvert – Main Street Looking East

Engineers + Planners

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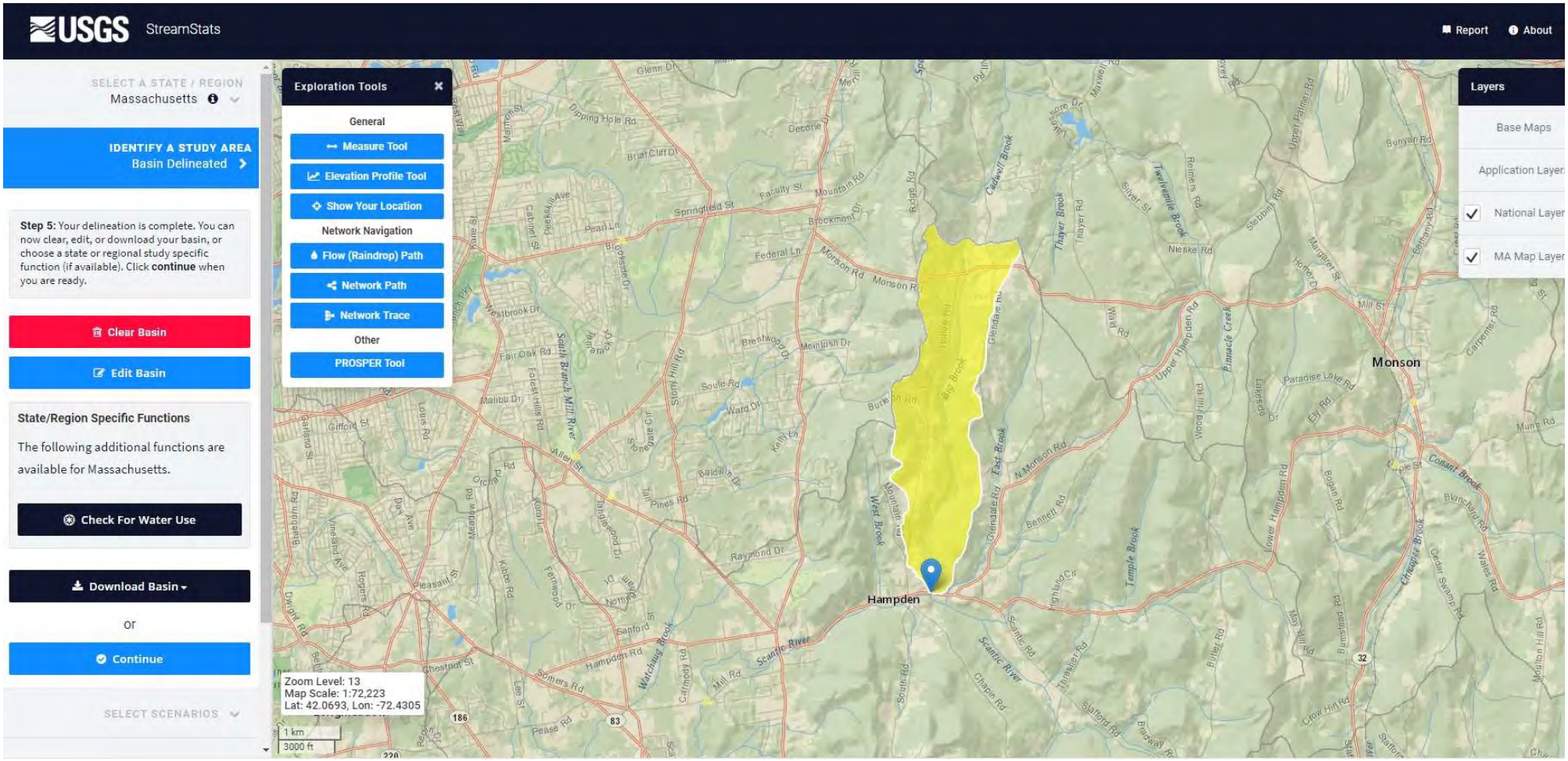
Big Brook Culvert Watershed – USGS StreamStats

Engineers + Planners



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Hampden Main Street over Big Brook Culvert

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Hampden Main Street over Big Brook Culvert

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Hampden Main Street over Big Brook Culvert

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East Brook Culvert (Bridge No. H-04-008)

Engineers + Planners

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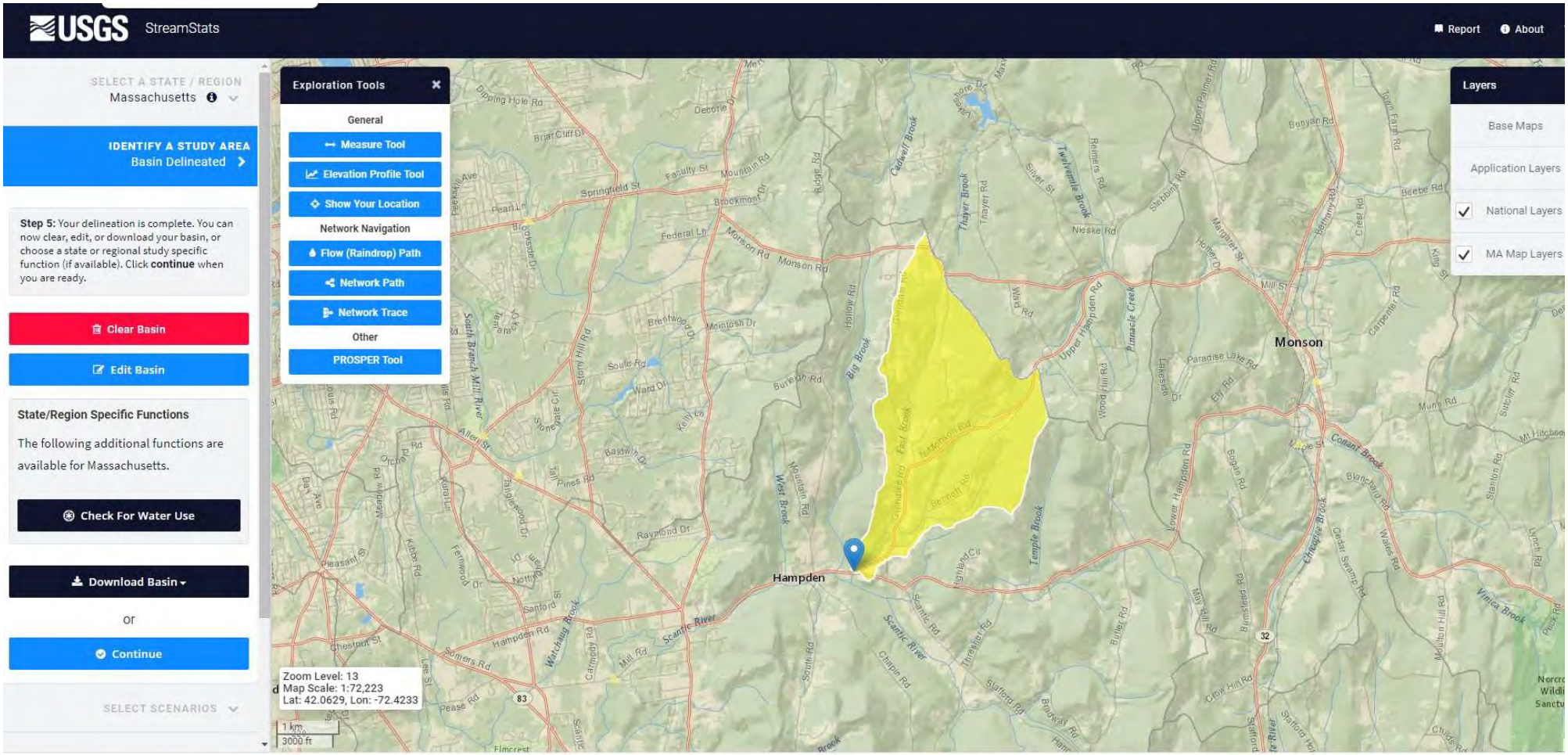
East Brook Culvert Watershed – USGS StreamStats

Engineers + Planners



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Hampden Main Street over East Brook Culvert (Bridge No. H-04-008)

Engineers + Planners

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Hampden Main Street over East Brook Culvert (Bridge No. H-04-008)

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Hampden Main Street over East Brook Culvert (Bridge No. H-04-008)

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MASSACHUSETTS DEPARTMENT OF TRANSPORTATION PAGE 1 OF 17

STRUCTURES INSPECTION FIELD REPORT

ROUTINE & SPECIAL MEMBER INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.
02	5MQ	H-04-008

CITY/TOWN	8.-STRUCTURE NO.	11-Kilo. POINT	41-STATUS	90-ROUTINE INSP. DATE
HAMPDEN	H04008-5MQ-MUN-BRI	000.000	A:OPEN	DEC 3, 2018

07-FACILITY CARRIED	MEMORIAL NAME/LOCAL NAME	27-YR BUILT	106-YR REBUILT	YR REHAB'D (NON 106)
HWY MAIN ST		1938	0000	0000

06-FEATURES INTERSECTED	26-FUNCTIONAL CLASS	DIST. BRIDGE INSPECTION ENGINEER
WATER EAST BROOK	Major Collector	D. Sund

43-STRUCTURE TYPE	22-OWNER	21-MAINTAINER	TEAM LEADER
302 : Steel Stringer/Girder	Town Agency	Town Agency	T. P. Penna

107-DECK TYPE	WEATHER	TEMP. (air)	TEAM MEMBERS
1 : Concrete Cast-in-Place	P: Sunny	7 C	[illegible]

ITEM 58 5

DECK

		DEF
1.Wearing surface	7	-
2.Deck Condition	5	S-A
3.Stay in place forms	N	-
4.Curbs	N	-
5.Median	N	-
6.Sidewalks	N	-
7.Parapets	N	-
8.Railing	5	S-A
9.Anti Missile Fence	N	-
10.Drainage System	N	-
11.Lighting Standards	N	-
12.Utilities	N	-

ITEM 59 4

SUPERSTRUCTURE

			DEF
1.Stringers		N	-
2.Floorbeams		N	-
3.Floor System Bracing		N	-
4.Girders or Beams		4	S-A
5.Trusses - General		N	-
a. Upper Chords	N		-
b. Lower Chords	N		-
c. Web Members	N		-
d. Lateral Bracing	N		-
e. Sway Bracings	N		-
f. Portals	N		-
g. End Posts	N		-
6.Pin & Hangers		N	-

ITEM 60 6

SUBSTRUCTURE

	Dive	Cur		DEF
1. Abutments			6	
a. Pedestals	N	6		-
b. Bridge Seats	N	6		M-P
c. Backwalls	N	6		M-P
d. Breastwalls	N	6		M-P
e. Wingwalls	N	5		S-A
f. Slope Paving/Rip-Rap	N	N		-
g. Pointing	N	N		-
h. Footings	N	N		-
i. Piles	N	N		-
j. Scour	N	7		-
k. Settlement	N	7		-
l.	N	N		-
m.	N	N		-
2. Piers or Bents			N	
a. Pedestals	N	N		-
b. Caps	N	N		-

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Hampden Main Street over East Brook Culvert (Bridge No. H-04-008) – Upstream / Downstream

Engineers + Planners

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Hampden Main Street over East Brook Culvert (Bridge No. H-04-008) - Upstream

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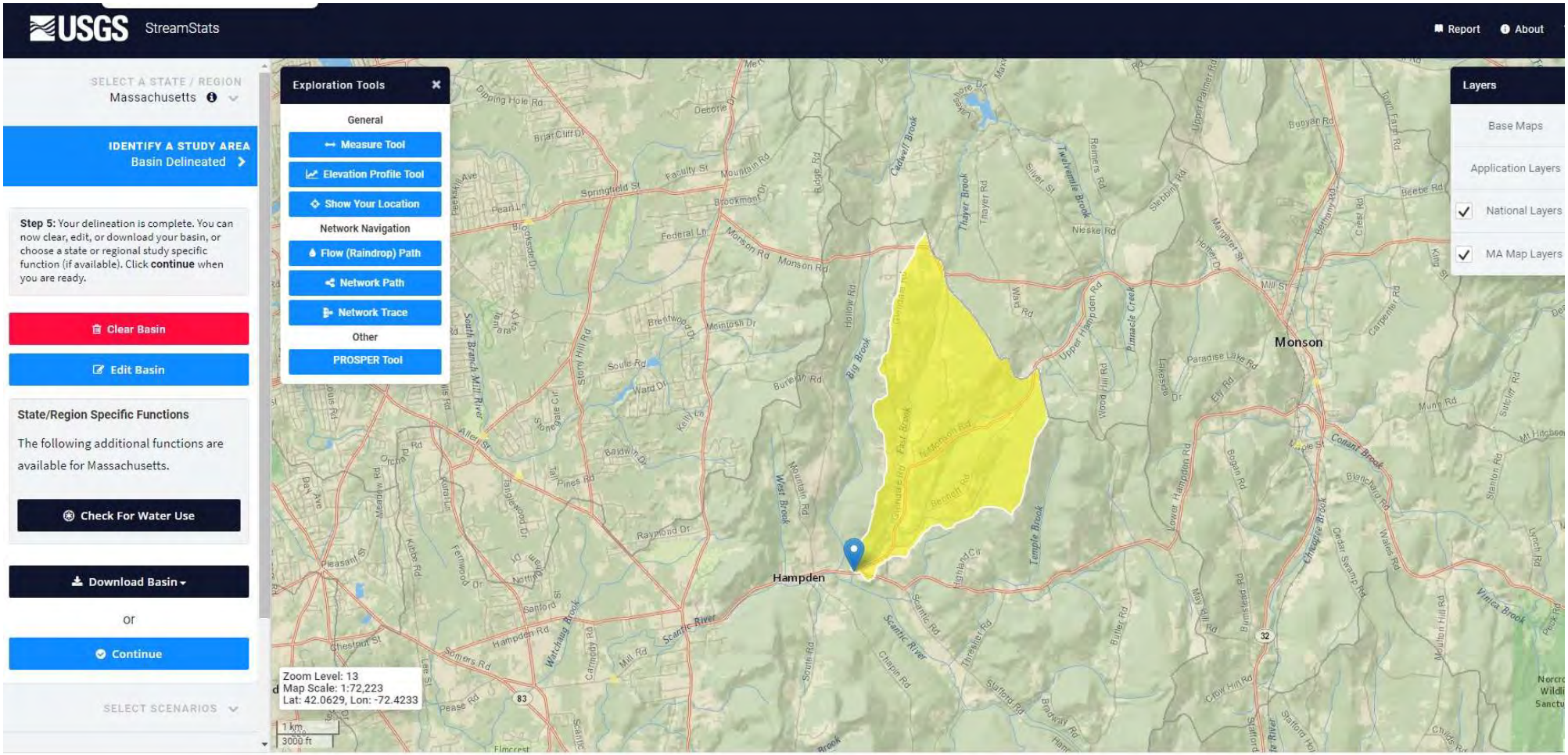
Mass Audubon Laughing Brook Wildlife Sanctuary

Engineers + Planners



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Mass Audubon Laughing Brook Wildlife Sanctuary

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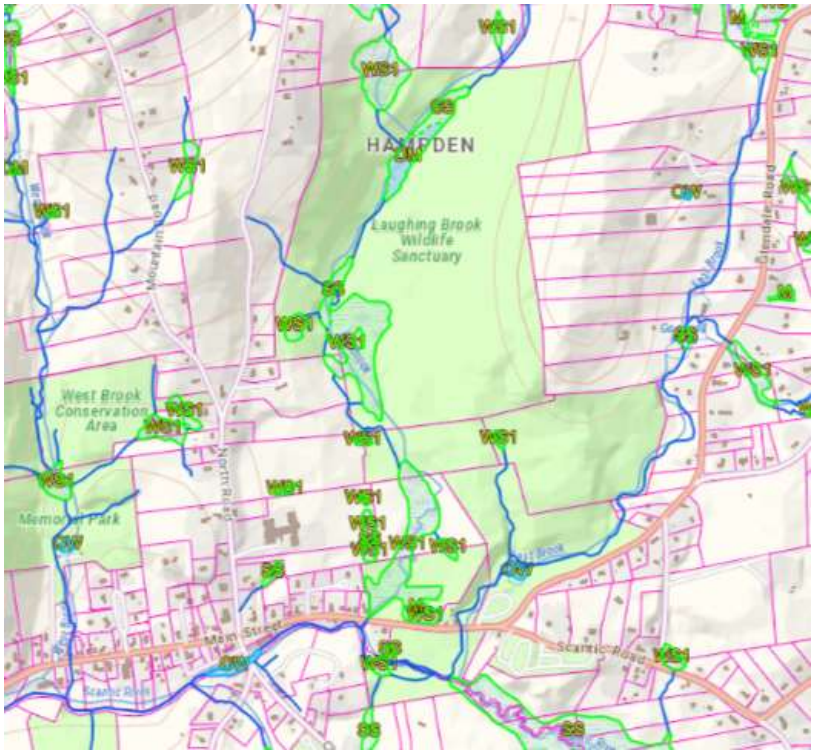
HOWARD STEIN HUDSON

Mass Audubon Laughing Brook Wildlife Sanctuary

Engineers + Planners



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12/16/2020 Hampden MVP Core Team Meeting

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2020-12 Hampden MVP Laughing Brook Flyover

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Mass Audubon Laughing Brook Wildlife Sanctuary
Potential Green Solution – Wetlands Restoration Site

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Mass Audubon Laughing Brook Wildlife Sanctuary
Potential Green Solution – Wetlands Restoration Site

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Mass Audubon Laughing Brook Wildlife Sanctuary
Potential Green / Gray Stormwater Treatment Solutions

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Mass Audubon Laughing Brook Wildlife Sanctuary
Potential Green / Gray Stormwater Treatment Solutions

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Mass Audubon Laughing Brook Wildlife Sanctuary
Potential Green / Gray Stormwater Treatment Solutions

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Town of Hampden, MA
Main Street Town Center Looking East

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Town of Hampden, MA
Main Street Town Center Looking West

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Stalker Pond Dam (MA02689), Hampden, MA

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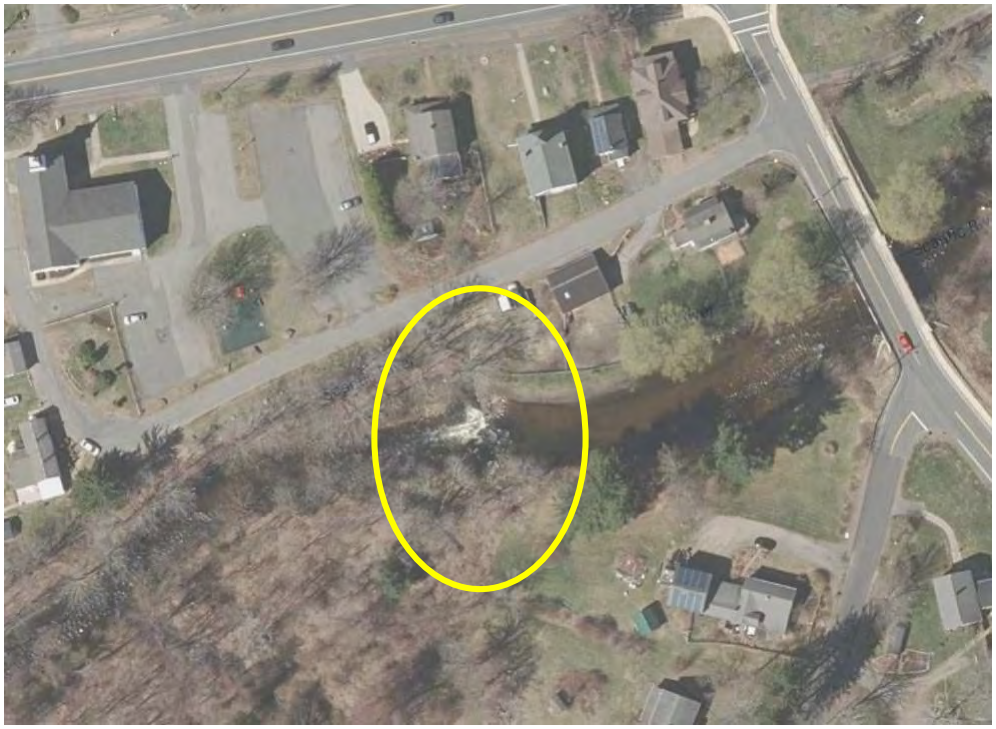

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Climate Change and Plants and Animals

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Sector Impacts

- Economic
- Agriculture
- Health
- Infrastructure
- Environment
- Natural Habitat

Hampden Base Map

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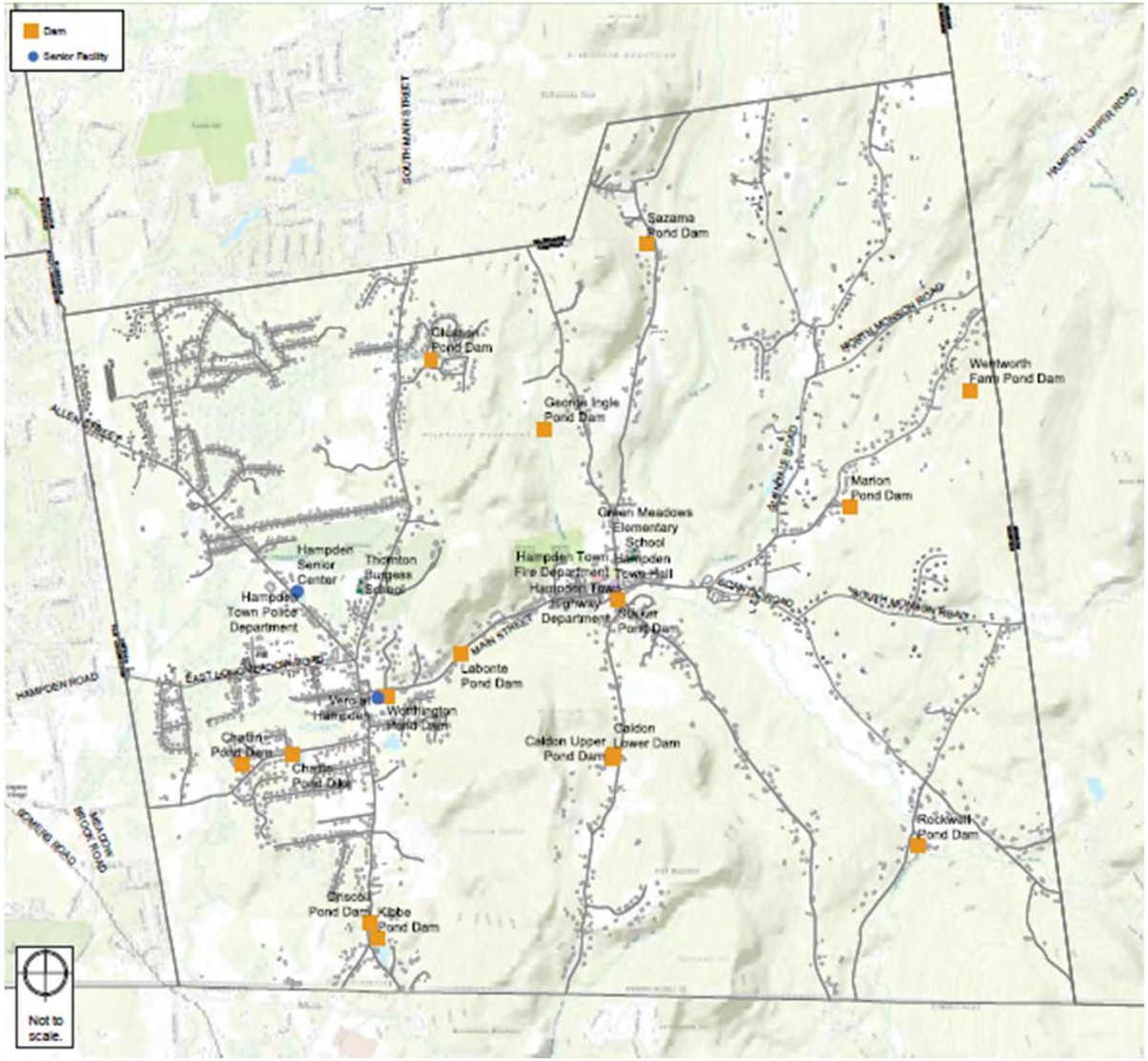

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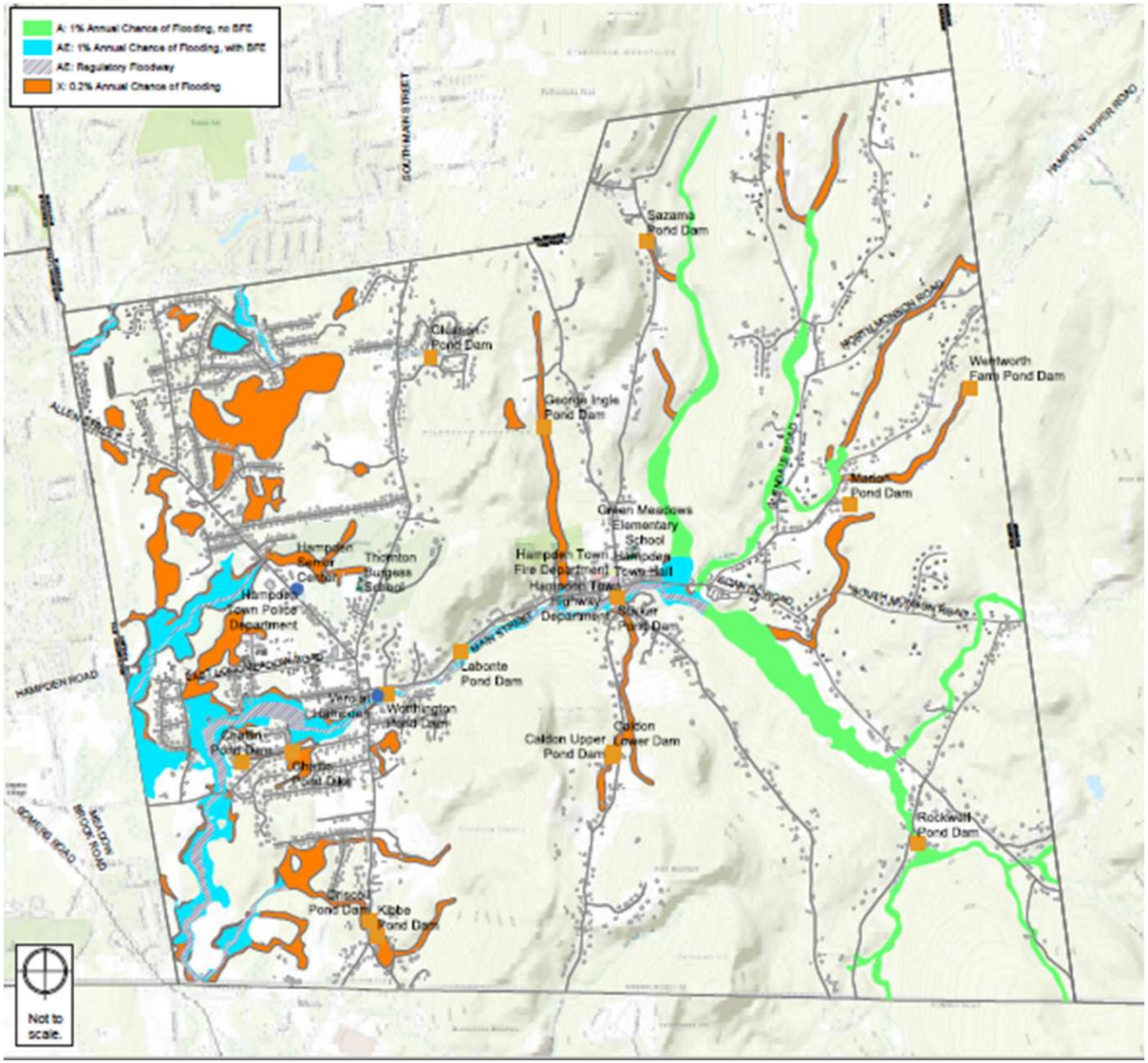
Hampden Flood Map

Engineers + Planners



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Complete Risk Matrix

Engineers + Planners

Community Resilience Building Risk Matrix www.CommunityResilienceBuilding.org

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

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

Features	Location	Ownership	V or S	Flooding/Drought	Extreme precipitation events/wind/tornados	Heat	Wildfire	Priority H - M - L	Time Short Long Ongoing
Infrastructural									
Main Stree culvert/bridge. Ongoing flooding is documented and prioritized in HMP. Town received MVP planning assistance to assess green solutions and recommend next steps:	Main Street	Town of Hampden	V	X	X			H	O
Culverts and bridges: due to increased rainfall/snow in individual weather events exiting infrastucture, inclusing bridges, culverts, country drainage are overwhelmed by stormwater flows. DPW Director and other stakeholders noted new and increased flooding on private property leading to structural flooding. Regarding the failure of existing infrastructur to handle increased flows, DPW Director stated "We don't know where the problems are until they pop up." A prioroty for the Town is a bridge/culvert assessment which identifies problem locations, green infrastructure opportunities, and next steps.	Town wide	Town of Hampden	V	X	X			H	O
There are many dams in Hampden. In many cases the original function is no longer relevant. The dam across the street from the Town House suppoirts fire suppression response. There are questions about the capcity of the dam to provide consistent, long term water for fire fighting needs.	Town wide and across from Town House	Town/private	V/S	X	X		X		

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Complete Risk Matrix

Societal									
Students, residents, municipal workers are at risk from vector borne illnesses from outdoor sports and other activities . Climate change has excacerbated the threats from Lyme disease, EEE, and other illnesses spread by ticks, mosquitoes, and potentially other pests migrating into the region as a result of winter warming trends and extended summer heat.	Town wide		V			X			
Integrity of private wells and Title V systems: see Environmental									
Schools and other public facilities may serve as emergency shelters, charging stations, cooling/warming facilities.	Town wide	Town	V/S	X	X	X			

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Complete Risk Matrix

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Environmental									
There are several solar fields in the Town of Hampden. The town shopuld set an example for adopting renewable energy options for municipal facilities. The close proximity of the Town House, Green Meadows School, and Highway Department present an opportunity to study the feasibility of providing green and emergency power generation. The Town is a designated Green Community	Town Center	Town	V		X				
Tree and forest health is impacted by extended drought, temperature extremes, and wind events. In the Town's Hazrd Mitigation Plan the Town prioritized tree trimming by the local utilty to reduce the threat of pwer outages from trees falling on power liones. That has been done. There is concern about the health of both public and provate trees. The Town percieves an increase in gypsy moths, associated with changing climate condiations. Excessive tree decay from droughts,m wind storms, and pests are creating a wildfire risk such as the one that the Town expereinced during this summer's drought	Town wide	Town/private	V	X	X	X	X		
Private wells ans Title V systems are at risk from driought and flooding conseditions. Concerns include the impact of increased runoff on provate wells due to increased preciptation associated with climate change, especially to those wells located in the proximity of Great Horse golf course. There are also concerns about Title V systems due to expanded flooding and grounwater breakouts already noted.	Town wide	Town/private	V	X	X				
The Town of Hampden protects its wetlands through diligent stwardship provided by the Conservation Commission. These wetlands serve as buffers during flooding events. The river and other streams routinely receive debris such as fallen trees and other natural materials discharged as a result of runoff. An accumulation of this dbris creates changes in shoreline and flooding.	Town wide	Town/private	V/S	X	X				

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Climate Change Priorities for Hampden

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- Confirm Matrix

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Next Steps

- Summary of findings
- Listening Session
- Mass Audubon Program
- Municipal Vulnerability Preparedness Action Grant April 2021

Contact Information

Engineers + Planners

Thank you!

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Steven Tyler

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styler@hshassoc.com

Jonah Keane

(413) 276-7611

jkeane@massaudubon.org

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Municipal Vulnerability Preparedness Listening Session

Presented by

Hampden's MVP Core Team

Presented to

Town of Hampden

March 1, 2021 | 6:35 PM

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Municipal Vulnerabilities Preparedness (MVP) $40,000 Planning Grant

Engineers + Planners

- **Municipal Vulnerability Planning Process**
  - Community-led planning process to develop and prioritize actions and opportunities to reduce climate change risks and build resilience
- **Main Street Flood Assessment**
  - Watershed approach to evaluate, identify, and educate stakeholders and others about nature-based solutions to alleviate flooding on Main Street

Executive Office of Energy and Environmental Affairs

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MVP Planning Process

Community Resilience Building Workshop

- Core team meeting
- Community Resilience Building Workshop
- Summary of findings
- Listening session
- Implementation

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Main Street Flooding Assessment

Engineers + Planners

- Identify opportunities to address Main Street flooding concerns
- Educate residents and stakeholders about the benefits of nature-based solutions
- Engage students in a mini-MVP Community Resilience Building Workshop
- Develop recommendations for green and grey infrastructure improvements within the watershed and at two brook crossings along Main Street

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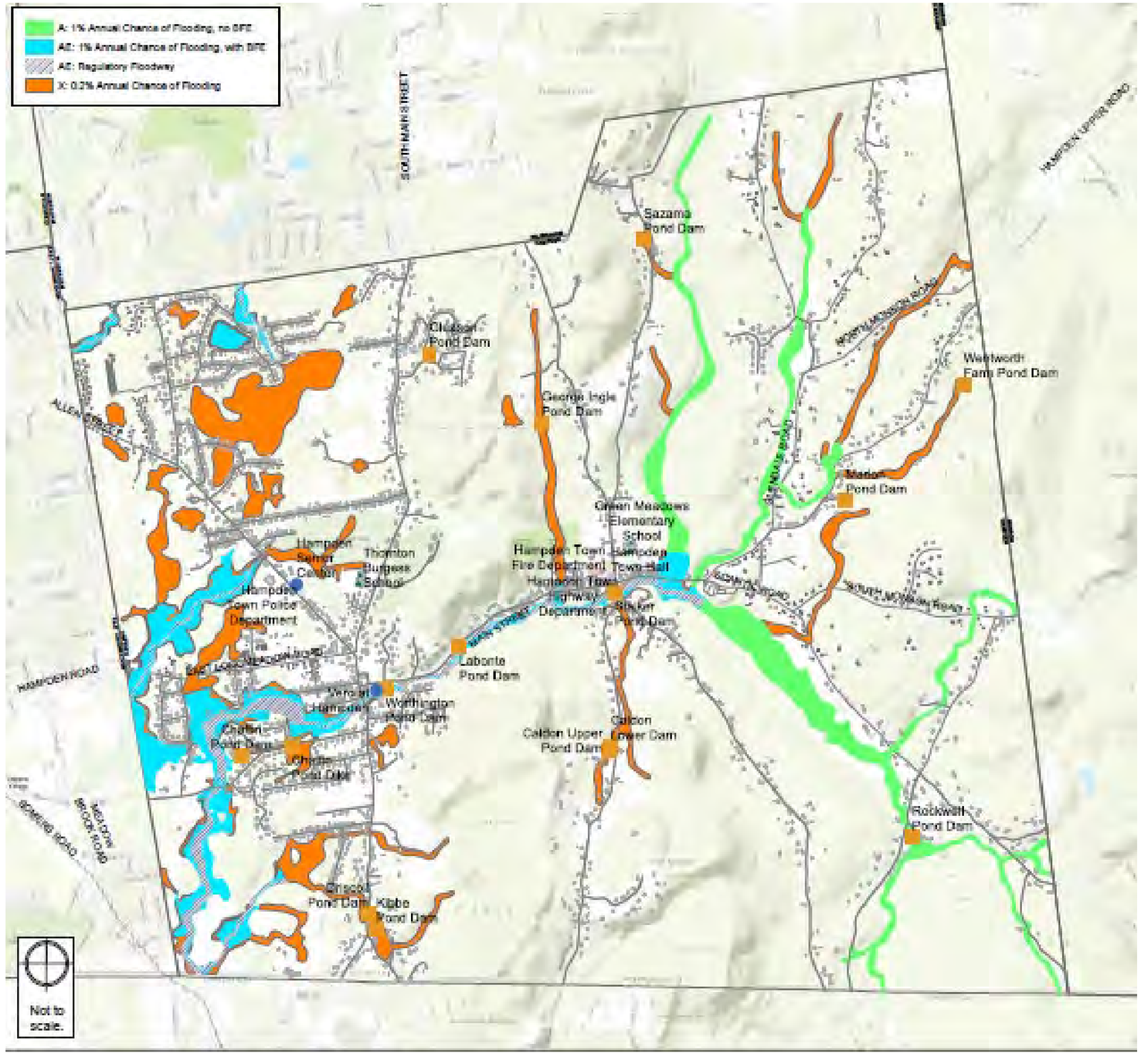
Hampden Flood Map

Engineers + Planners



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Climate Change

- Rising temperature
- Changing precipitation – rainfall amount and intensity
- Sea level rise

Risk Matrix

Community Resilience Building Risk Matrix
Town of Hampden

www.CommunityResilienceBuilding.org

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

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

Features	Location	Ownership	V or S	Flooding/Drought	Extreme precipitation events/wind/tornados	Heat	Wildfire	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
Main Street culvert/bridge. Ongoing flooding is documented and prioritized in Hampden's Hazard Mitigation Plan. Recommended next steps: prioritize flooding issues associated with 1st culvert (size, not condition); prioritize action items replace/ repair bridge; continue assessment and recognize short time limit, look at locations to address flood storage on ROW and Mass Audubon.	Main Street	Town of Hampden	V	X	X			H	O
Culverts and bridges: due to increased rainfall/snow in individual weather events existing infrastucture, including bridges, culverts, country drainage are overwhelmed by stormwater flows. Highway Superintendent and other stakeholders noted new and increased flooding on private property leading to structural flooding. Regarding the failure of existing infrastructure to handle increased flows, the Highway Superintendent stated "We don't know where the problems are until they pop up." A priority for the Town is a bridge/culvert assessment which identifies problem locations, green infrastructure opportunities, and next steps.	Town wide	Town of Hampden	V	X	X			H	O
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Societal									

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Overall Priority Actions

- Assess Main Street Bridge: rehab vs replacement; funding eligibility
- Assess Bridges & Culverts: identify immediate opportunities
- Assess dam functions: removal or retain
- Expand education/training about vector borne diseases
- Stay alert to issues in private wells and Title V
- Build off existing solar facilities to become a green energy model
- Maintain communication between emergency management and schools
- Develop a forest management plan
- Use MS4 as another tool to build local resiliency
- Incorporate MVP priorities into Hazard Mitigation Plan update

MVP Next Steps

- Summary of Findings
- MVP Certification for the Town of Hampden
- MVP Action Grant (April 2021)
- Annual Review

Contact Information

Engineers + Planners

Thank you!

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Steven Tyler

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styler@hshassoc.com

Jonah Keane

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jkeane@massaudubon.org

HOWARD STEIN HUDSON

Session Name: Climate Change in Hampden

Instructor Name(s): Jonah Keane

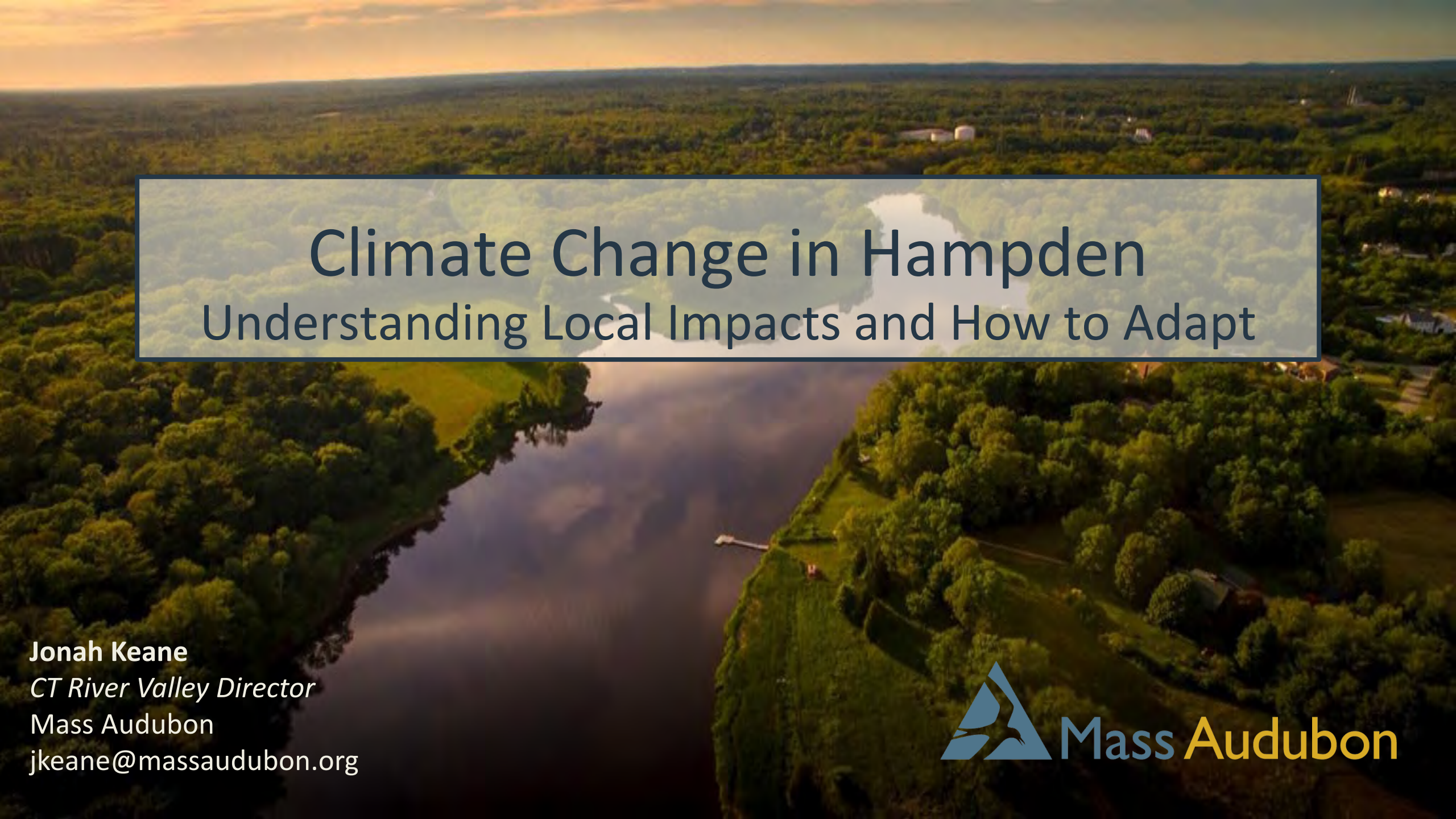
Date: 03/22/2021

Additional dates and times:

Date	Start Time
03/22/2021	4:00 pm

Total Registered: 9 adults, 0 children
Total Waitlisted: 0 adults, 0 children
Maximums: 100 overall, 0 children
Session Location: Online
Special Information:

Registrant's Name and Email	Adult M-NM-O Child M-NM-O
Ginger Burn gintravel@hotmail.com	2-0-0 0-0-0
Melissa Lail-Trecker trekface@aol.com	0-1-0 0-0-0
Ed Lamoureux lamoeff@gmail.com	0-1-0 0-0-0
Josh Markham joshua.markham@runimbl.c om	0-2-0 0-0-0
Christine O'Neill christineeoneill@yahoo.c om	1-0-0 0-0-0
Susan Rheaume suerheaume16@gmail.com	1-0-0 0-0-0
Kristi Tessier mysticalamour@gmail.com	0-1-0 0-0-0



Climate Change in Hampden

Understanding Local Impacts and How to Adapt

Jonah Keane
CT River Valley Director
Mass Audubon
jkeane@massaudubon.org

Mass Audubon

Sanctuaries with Nature Centers

Berkshires

1. **Pleasant Valley, Lenox**
2. Canoe Meadows, Pittsfield
3. Lime Kiln Farm, Sheffield

Connecticut River Valley

4. West Mountain, Plainfield
5. Road's End, Worthington

Greater Boston


37 -056-001
37 -120-001
37 -051-001
37 -049-001
45 -018-001
38D-075-001
45 -031-001
45 -019-001
45 -045-001
45 -010-001
44 -014-001
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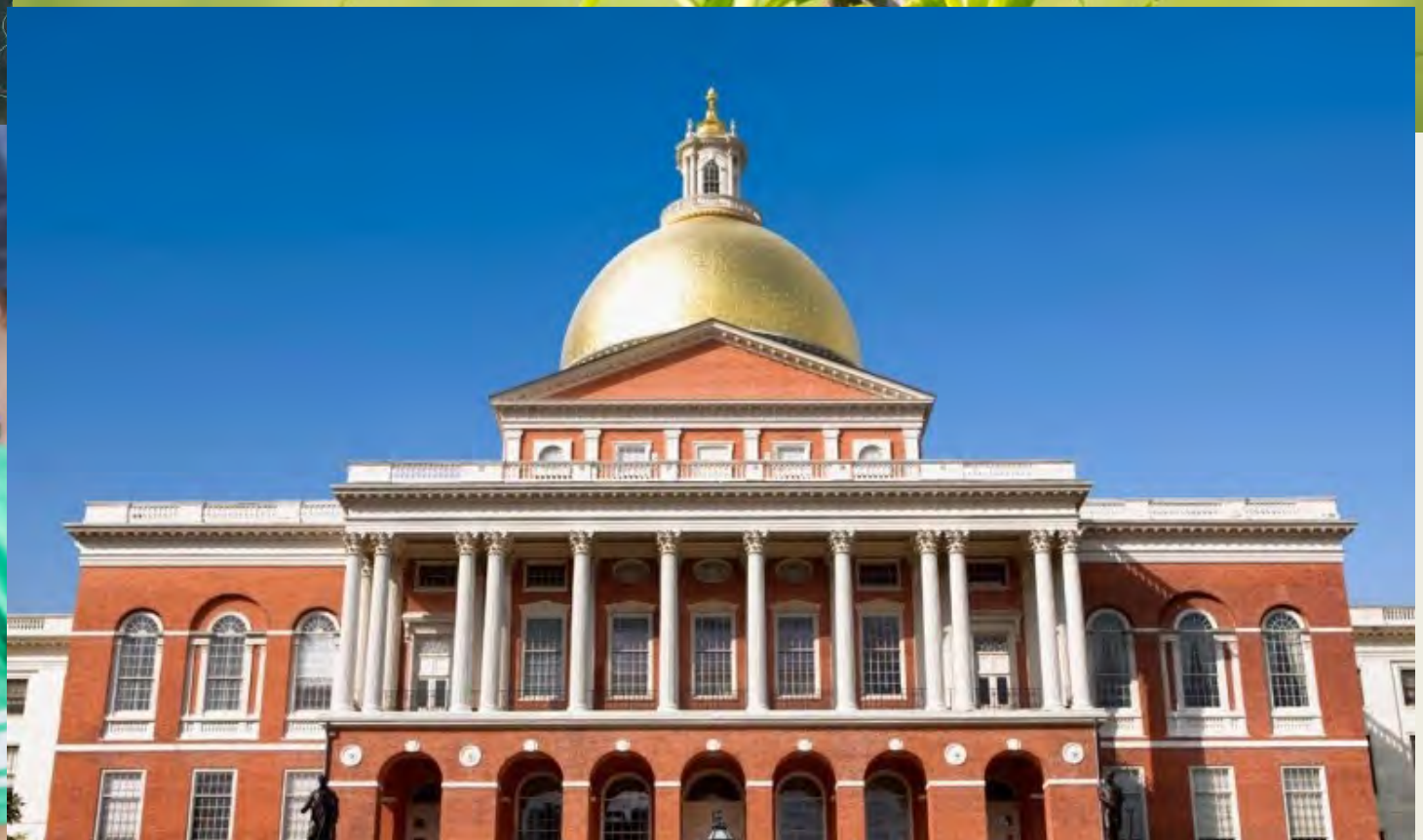
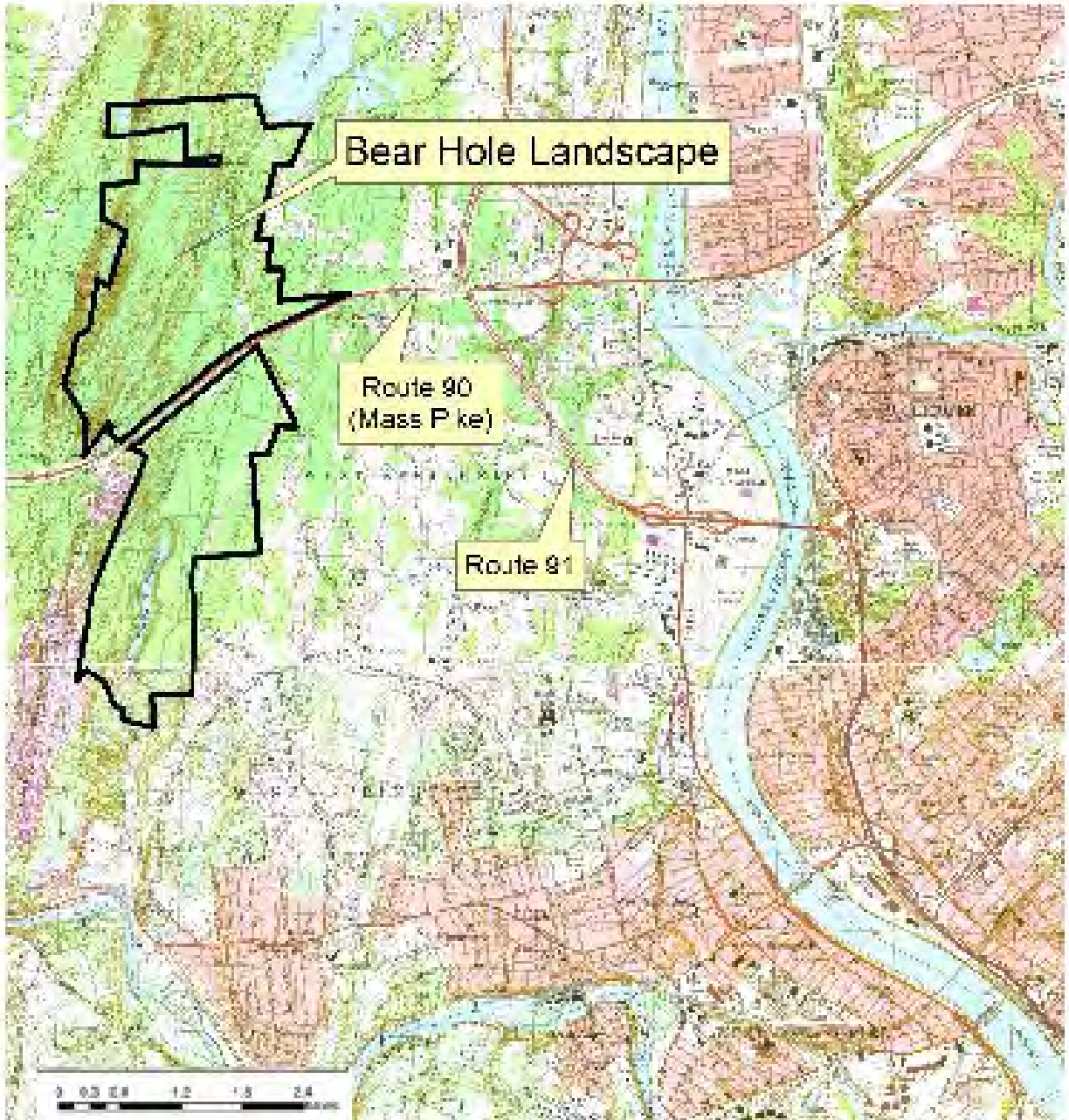
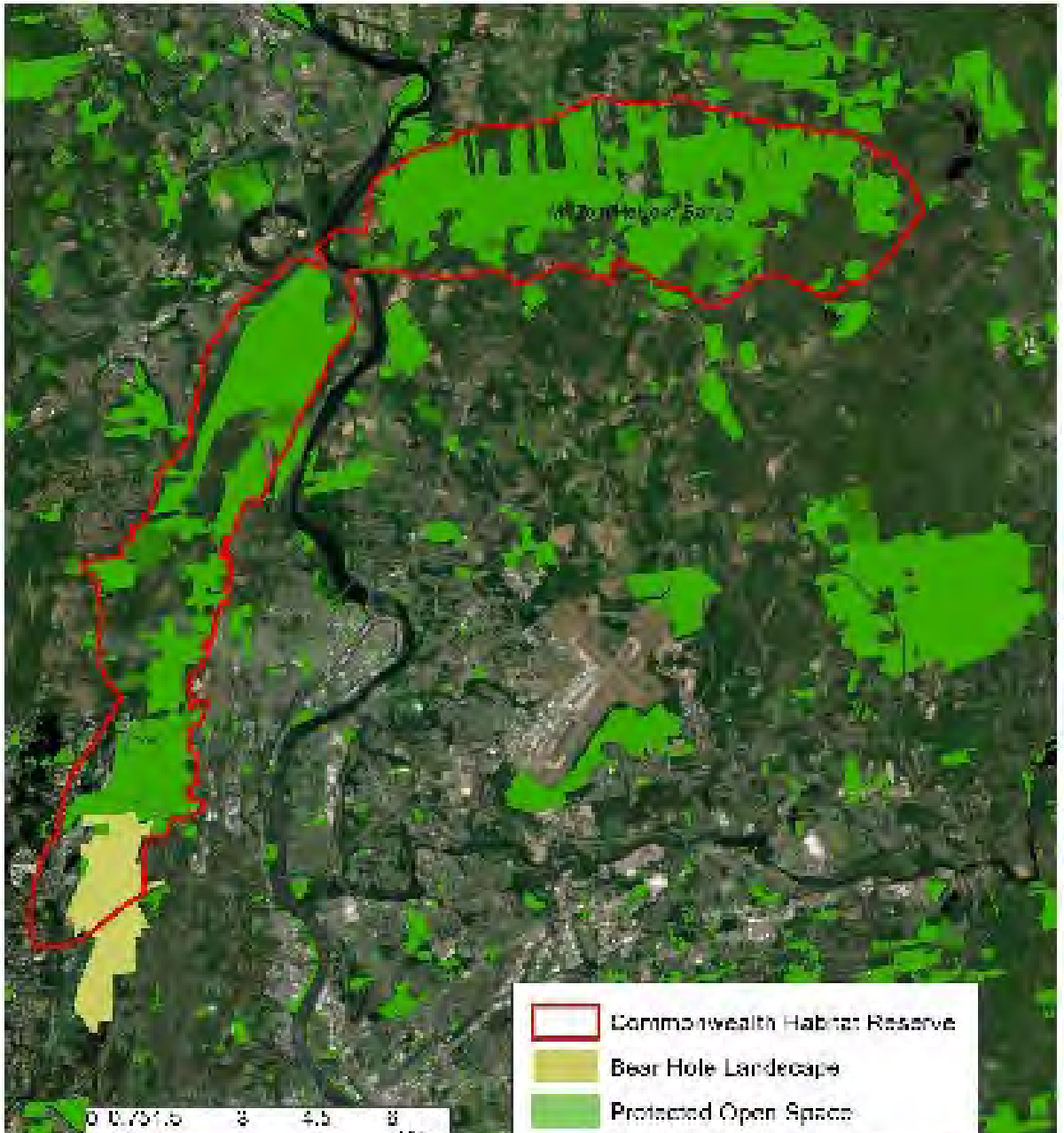
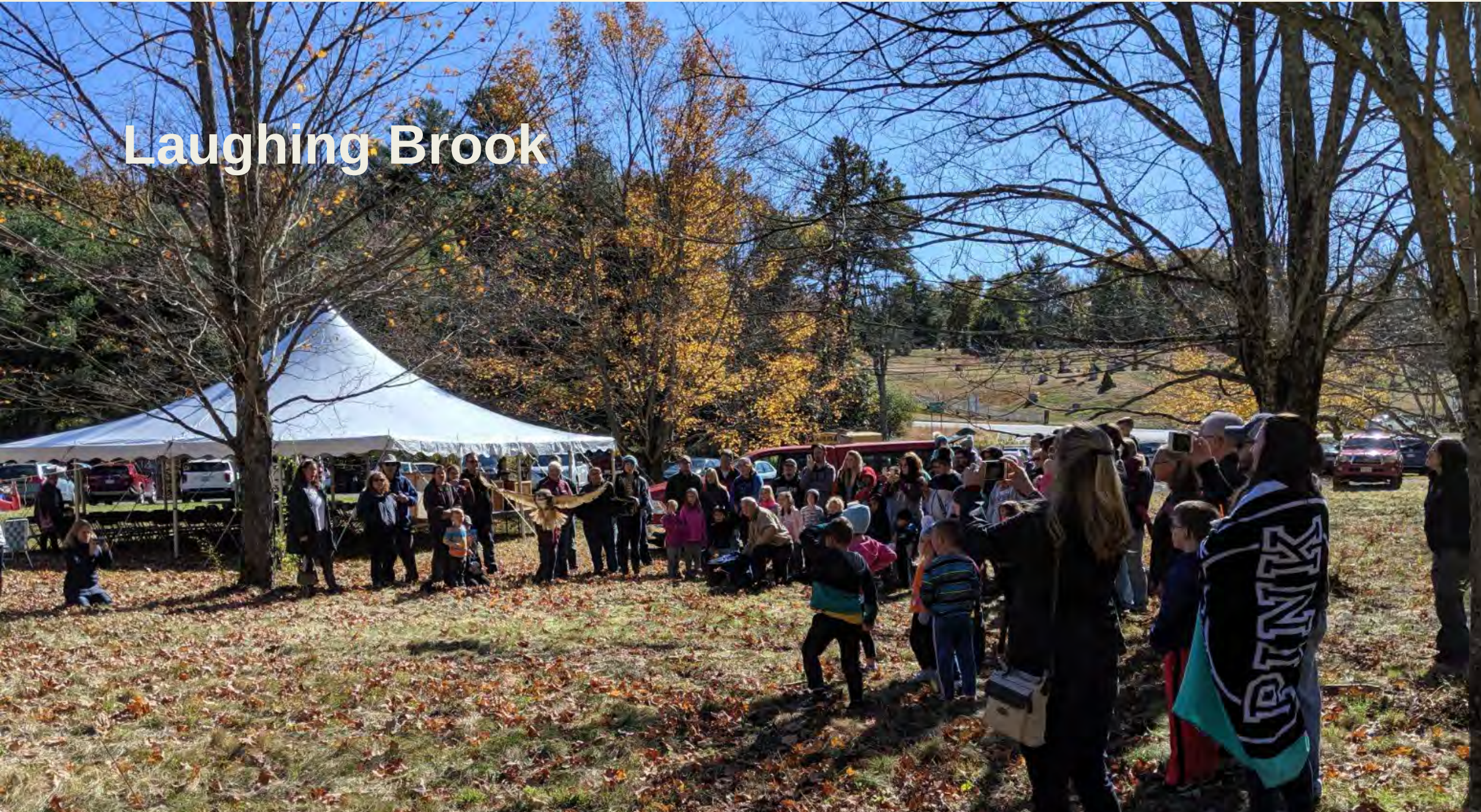


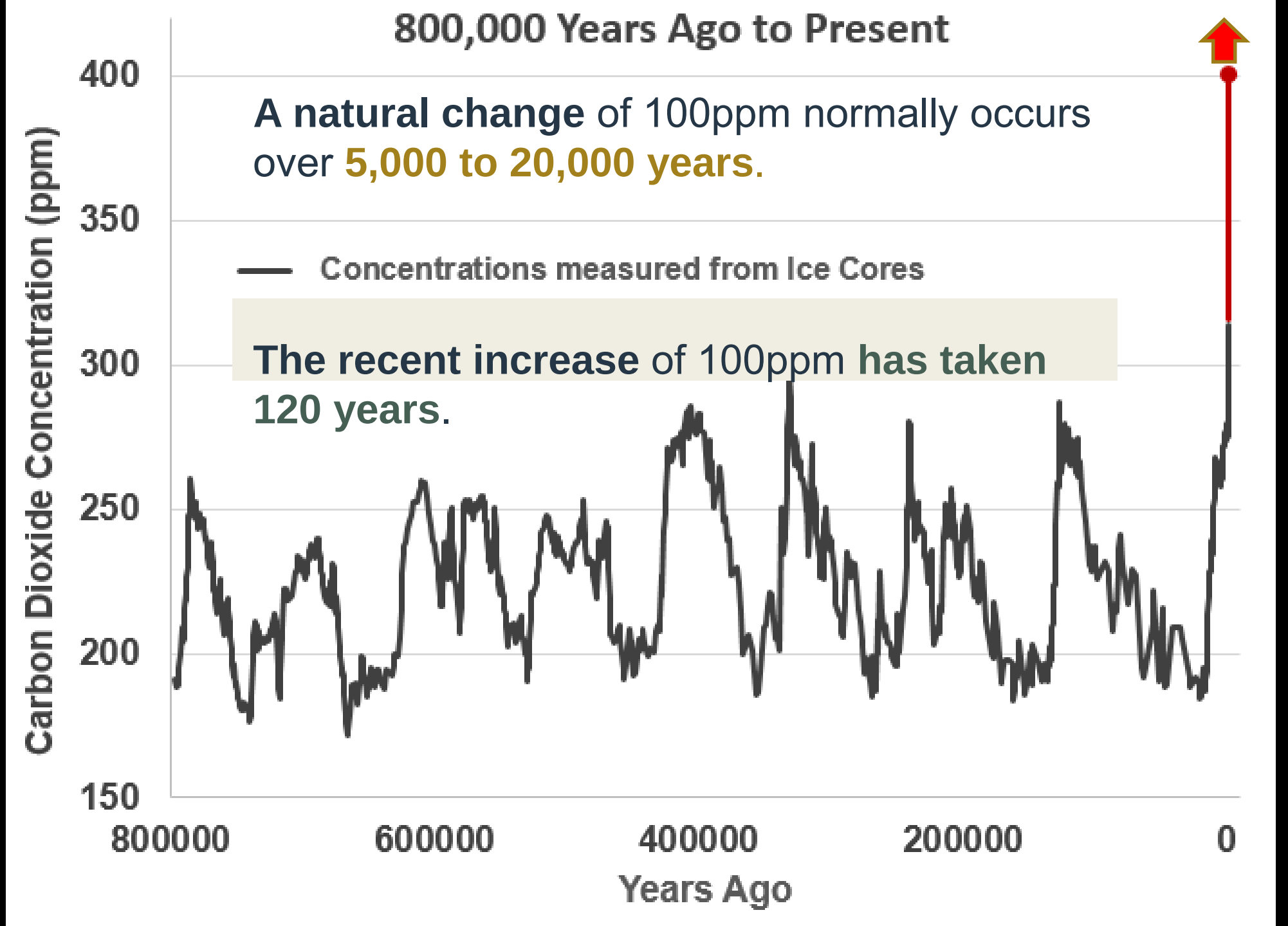
Youth Climate Summit

Bear Hole


Bear Hole Landscape
Route 90
(Mass Pike)
Route 91

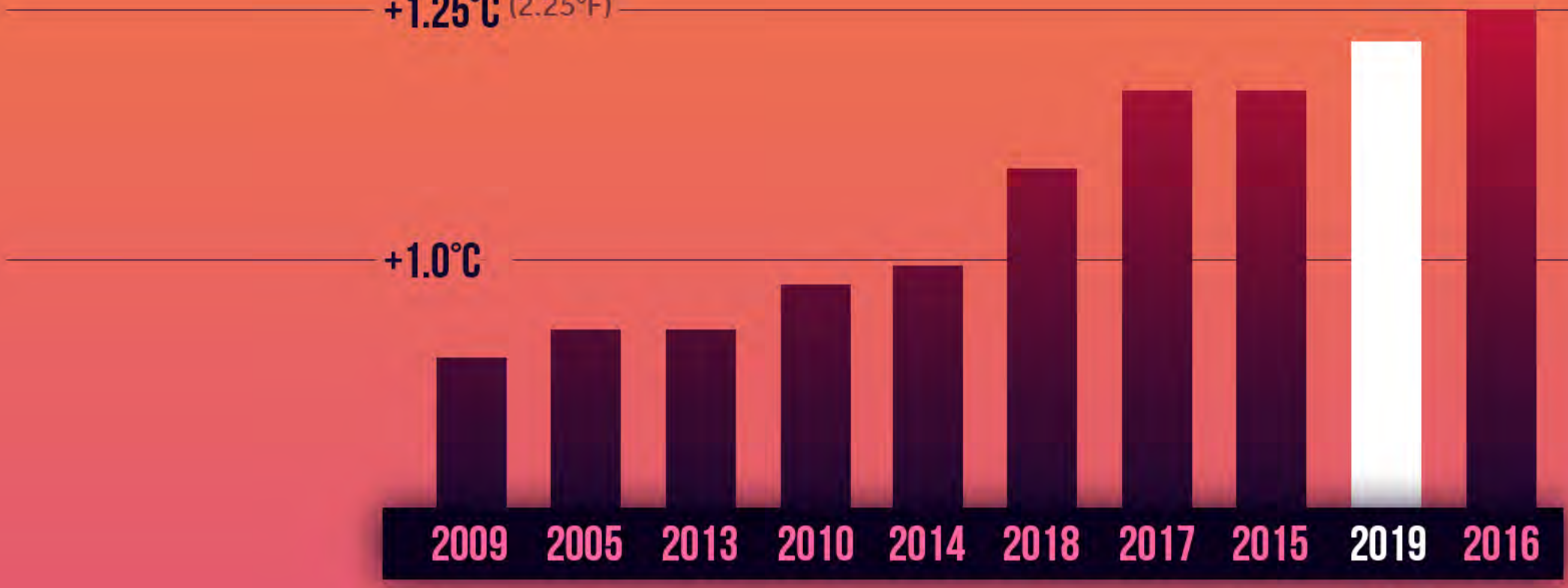

Commonwealth Habitat Reserve
Bear Hole Landscape
Protected Open Space


Laughing Brook


800,000 Years Ago to Present
A natural change of 100ppm normally occurs over 5,000 to 20,000 years.
Concentrations measured from Ice Cores
The recent increase of 100ppm has taken 120 years.
Carbon Dioxide Concentration (ppm)
400
350
300
250
200
150
800000
600000
400000
200000
0
Years Ago

10 HOTTEST YEARS ON RECORD GLOBALLY

Last 5 = Hottest 5

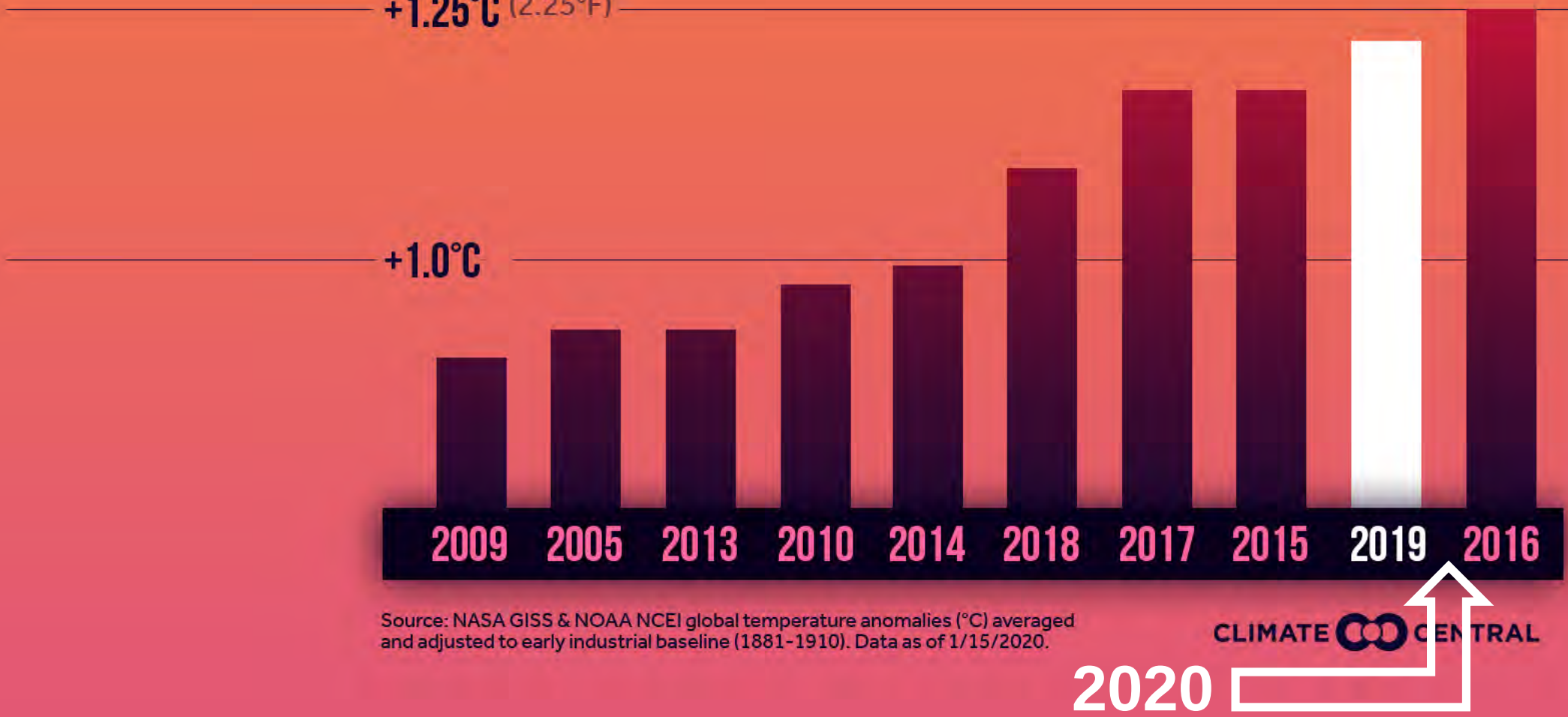


Source: NASA GISS & NOAA NCEI global temperature anomalies (°C) averaged and adjusted to early industrial baseline (1881-1910). Data as of 1/15/2020.

CLIMATE CENTRAL

10 HOTTEST YEARS ON RECORD GLOBALLY

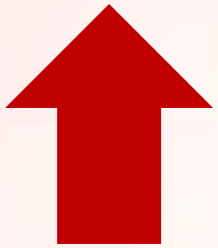
Last 5 = Hottest 5

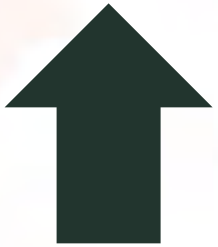


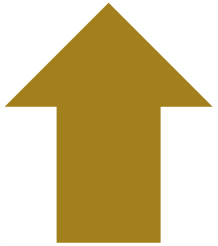
Source: NASA GISS & NOAA NCEI global temperature anomalies (°C) averaged and adjusted to early industrial baseline (1881-1910). Data as of 1/15/2020.

CLIMATE CENTRAL

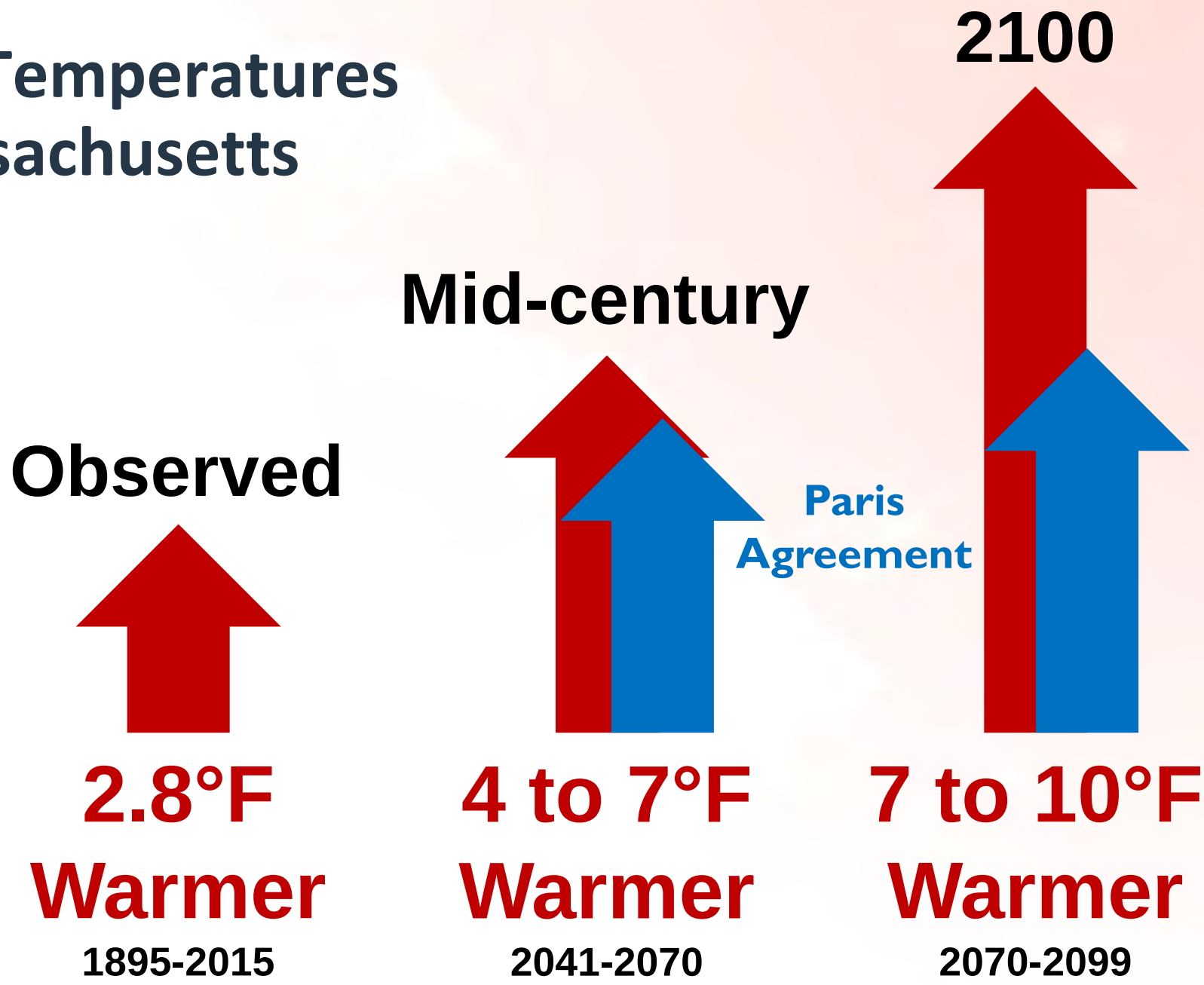
Impacts in Massachusetts

Temperature:  **2.8°F**
Since 1895

Growing Season:  **10 Days**
Since 1950

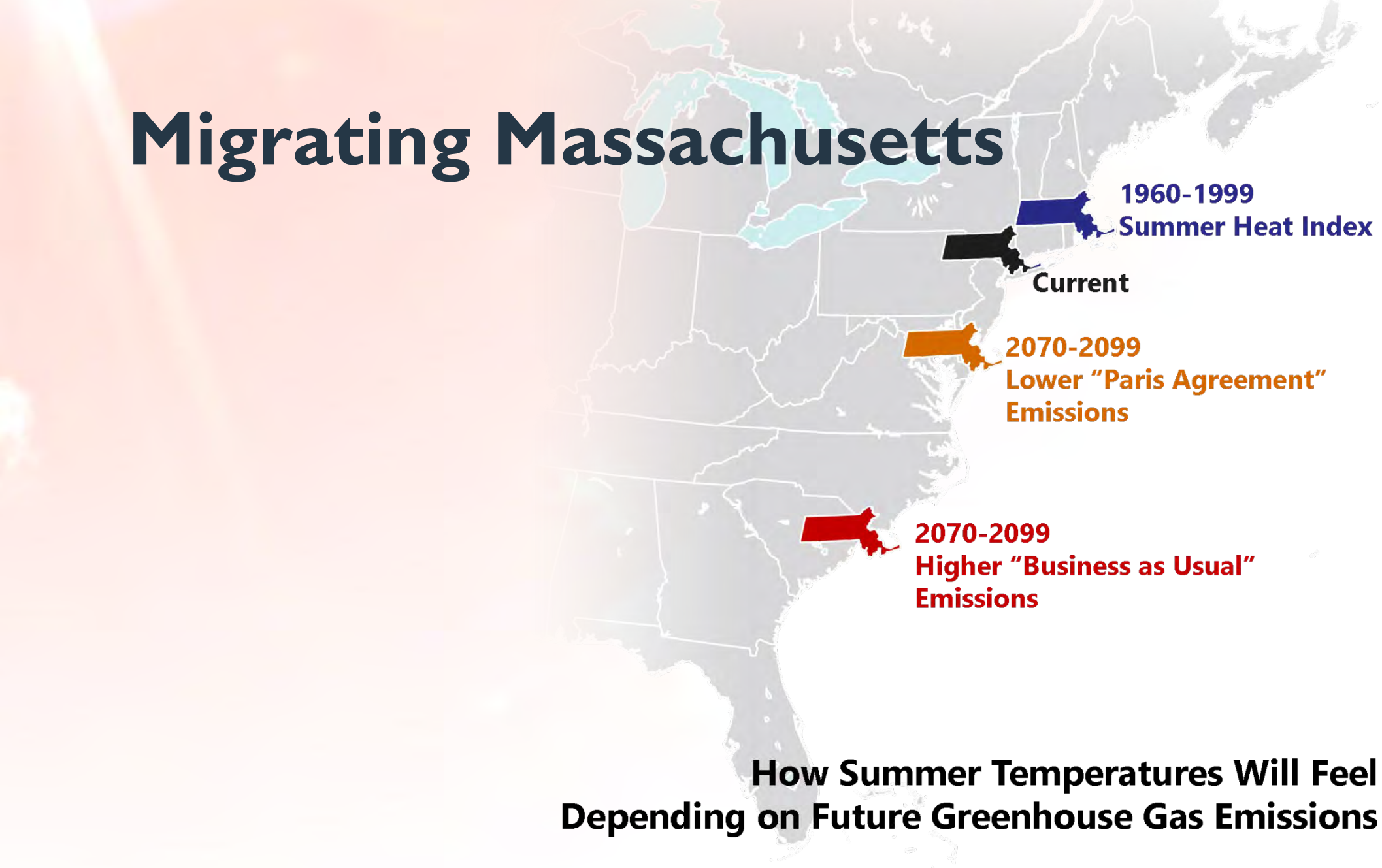
Strong Storms:  **71%**
Since 1958

Rising Temperatures in Massachusetts

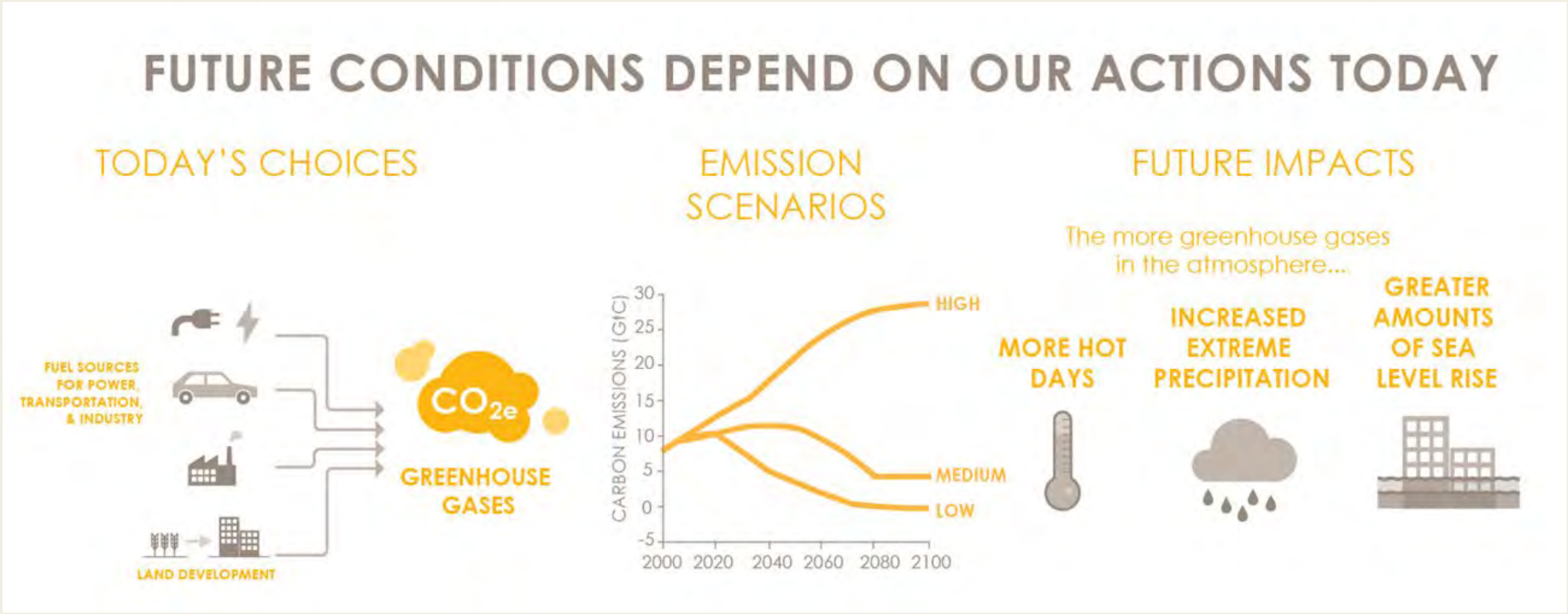


Sources: UMass-Amherst, Northeast Climate Science Center, Third National Climate Assessment, NOAA CLIMDIV dataset.

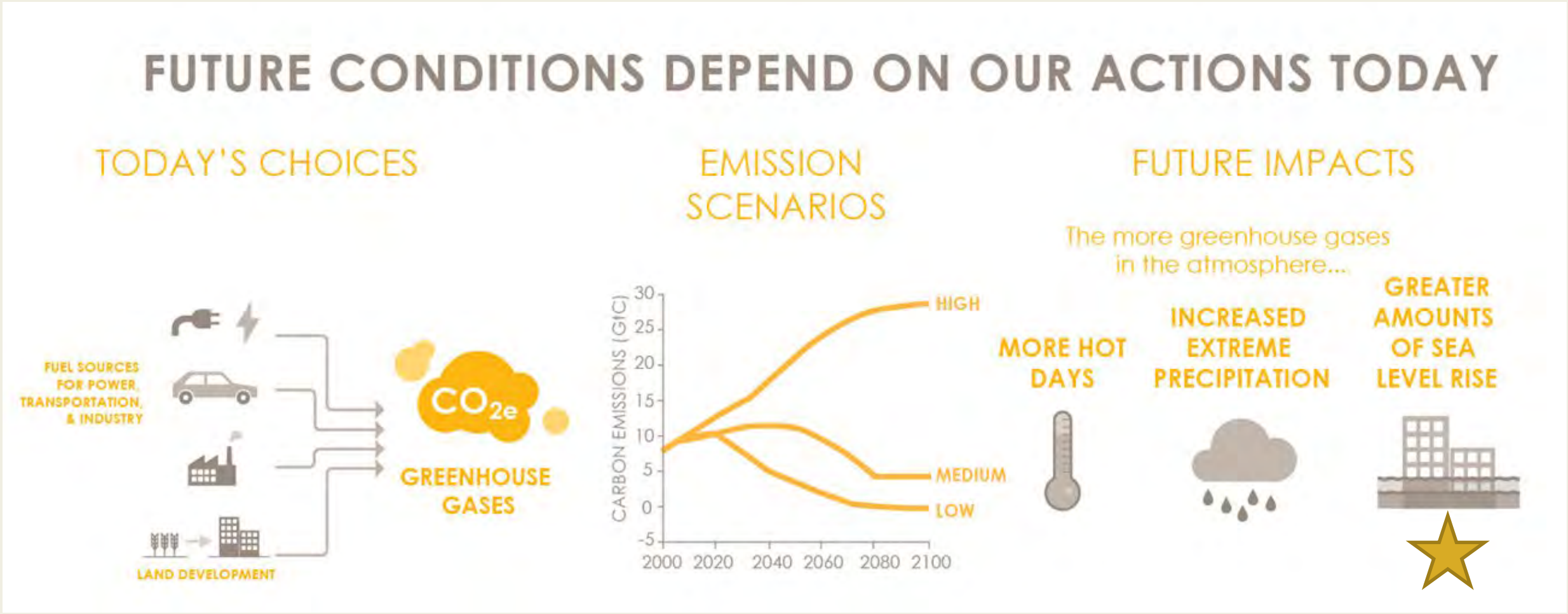
Migrating Massachusetts



How Summer Temperatures Will Feel Depending on Future Greenhouse Gas Emissions



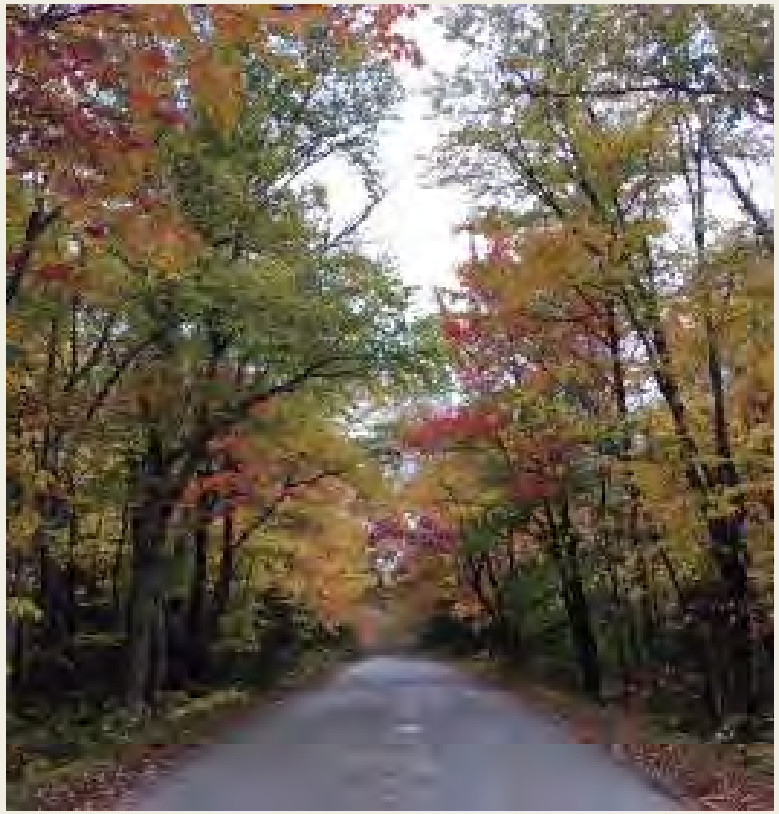
How Do We Affect Climate?



How Do We Affect Climate?

Mitigation: Actions to reduce or prevent emission of Greenhouse Gases

Adaptation: Actions taken to help communities and ecosystems cope with actual/expected effects of climate change



Lowell
Pittsfield
Boston
Worcester
Springfield
New Bedford
91
495
93
90
95
495
195

RATE OF DEVELOPMENT

slowest
0 acres/sq. mile

fastest
11.3 acres/sq. mile

Sprawl Frontier

Climate change

Sprawling Development

increased precipitation

increased temperature

impervious surfaces

stormwater & WQ issues

flooding & infrastructure damage

heat-related illnesses

fish and aquatic life impacts

Green Infrastructure

Natural features
(eg forests, wetlands)
and
Engineered landscapes that mimic natural features
(eg rain gardens)

Low Impact Development (LID)

Concord Riverwalk

photo by Wicked Local

- Treats **water as a resource**, not just a waste product
- Manages stormwater as **close to its source** as possible
- **Preserves** natural landscape by recreating natural features

Examples - LID

Rain gardens

This rain garden in Devens, MA gathers runoff from a curb-less road and sidewalk to infiltrate stormwater back into the ground while also offering beautiful home landscaping. Rain gardens can be made in any size and shape to fit your location.

Green roofs

U.S. General Services Administration

Boston, MA: John W. McCormack US Post Office and Courthouse. This 9,654 ft^2 green roof sits atop the EPA Region 1 Headquarters on a historic 1933 building.

EPA

A small, slanted green roof in Craftsbury, VT.

Permeable pavement

Horsley Witten Group

This parking lot in Narragansett, RI shows traditional asphalt on the left, where puddles have formed, and permeable pavement on the right, where it has soaked through.

Nature-based Solutions at Every Scale

1. **Conserve** the natural green infrastructure already providing free services
2. **Integrate** LID and green infrastructure design into development
3. **Restore** local resilience through LID in redevelopment

Low Impact Development: Cost Savings & More

1. **Valuing Green Infrastructure**
   - How saving land *saves water and money*
2. **Conservation Design**
   - *Financial benefits* and local examples
3. **LID Techniques**
   - *Costs and benefits* of 5 LID techniques, site design to reduce pavement and costs
4. **LID in Regulations**
   - Review municipal bylaws
5. **Urban Waters**
   - Leominster stormwater case study

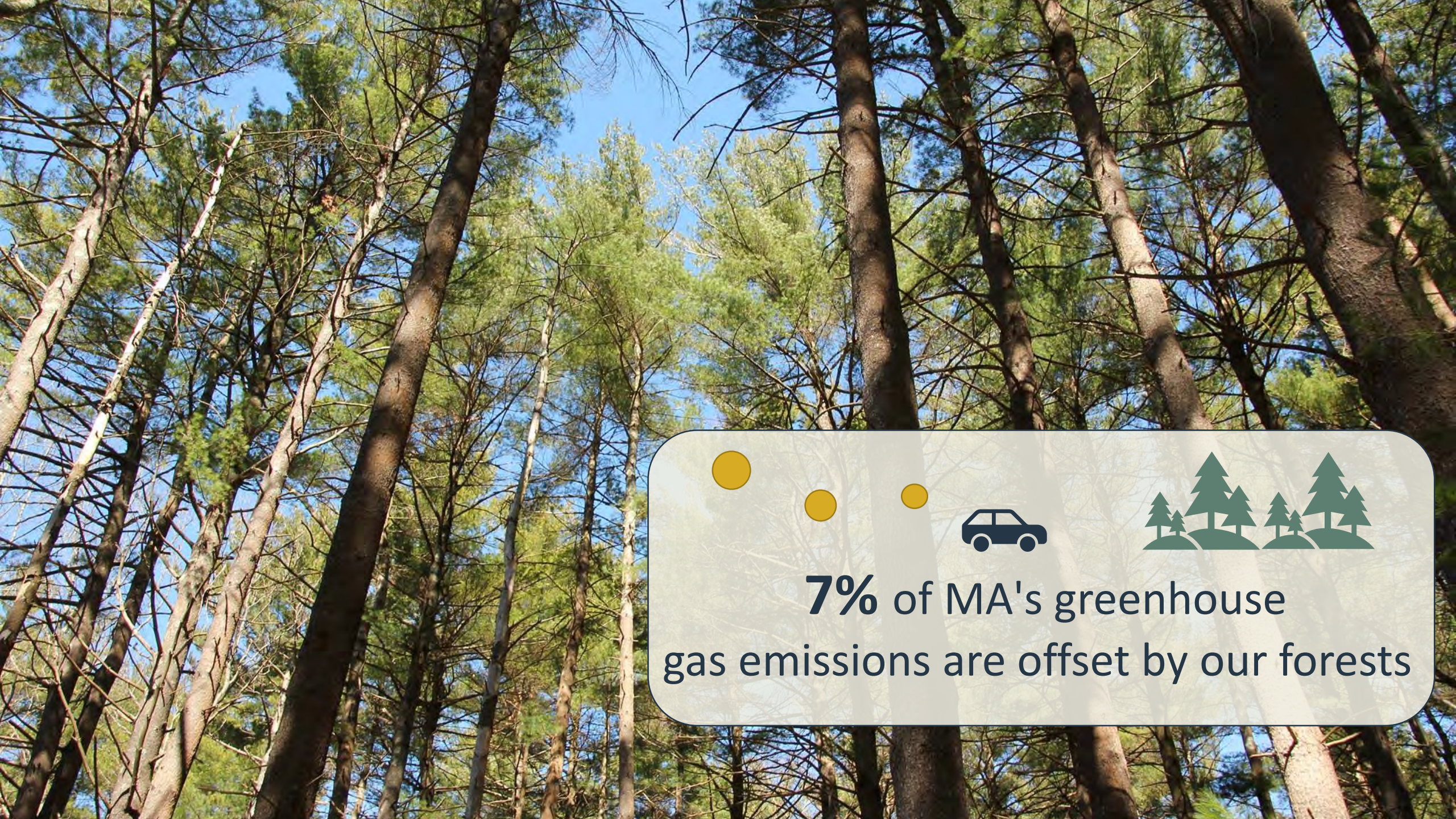
massaudubon.org/lidcost

Value of Nature fact sheets

Forests | Coastal | Wetlands & Waterways | Grasslands & Farmland | Urban Green Space

- *Climate Resilience*
- *Clean Air and Water*
- *Carbon Capture & Storage*
- *Economic & Health*
- *Recreation & Tourism*

massaudubon.org/valueofnature


7% of MA's greenhouse
gas emissions are offset by our forests


For every
$1
spent on source water protection
$27
saved in water treatment costs

Every year, urban forests in the 15 communities of MetroWest Boston

Source: Hong-Hanh et al. 2018

Remove
7.5 million
pounds of air pollutants

Help avoid
527 million gal.
of stormwater runoff, worth
$4.7 million

Store
962,000 tons
of carbon, worth
$125 million

The “MVP” of Nature-Based Solutions

The **Municipal Vulnerability Preparedness (MVP) Program** helps communities prepare for the impacts of climate change.

→ Encourages **nature-based solutions**

Step 1. **Planning**

The Harvard Gazette

Step 2. **Action!**

Municipal Vulnerability Preparedness (MVP) Program

Program Manager: Kara Runsten, (617) 312-1594, kara.runsten@mass.gov

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Carrieanne Petrik
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Greater CT River Valley Region:

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Central Region:

Hillary King
(617) 655-3913
hillary.king@mass.gov

Southeast Region:

Courtney Rocha
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courtney.rocha@mass.gov

MVP Program Status

- MVP Region Boundaries
- Completed Planning Grants
- Ongoing Planning Grants
- NEW Planning Grant Recipients (FY21)
- Regional Partnerships

MVP Action: Mattapoisett, MA

Land Acquisition

Buzzards Bay Coalition

Purchased 120 acres of forest, streams, freshwater wetlands and coastal salt marsh to prevent development in vulnerable areas

MVP Website: resilientma.org/mvp

MVP
Municipal Vulnerability Preparedness

MENU

MVP
Municipal Vulnerability

Improve resilience & adapt to climate change

The Municipal Vulnerability Preparedness (MVP) grant program created in 2017 as part of Governor Baker's Executive Order 569 provides support for cities and towns in Massachusetts to identify climate hazards, assess vulnerabilities, and develop action plans to improve resilience to climate change. Communities that complete the MVP Planning Grant process become designated as an MVP Community and are eligible for MVP Action Grant funding to implement the priority actions identified through the planning process.

WHAT'S ON THIS PAGE

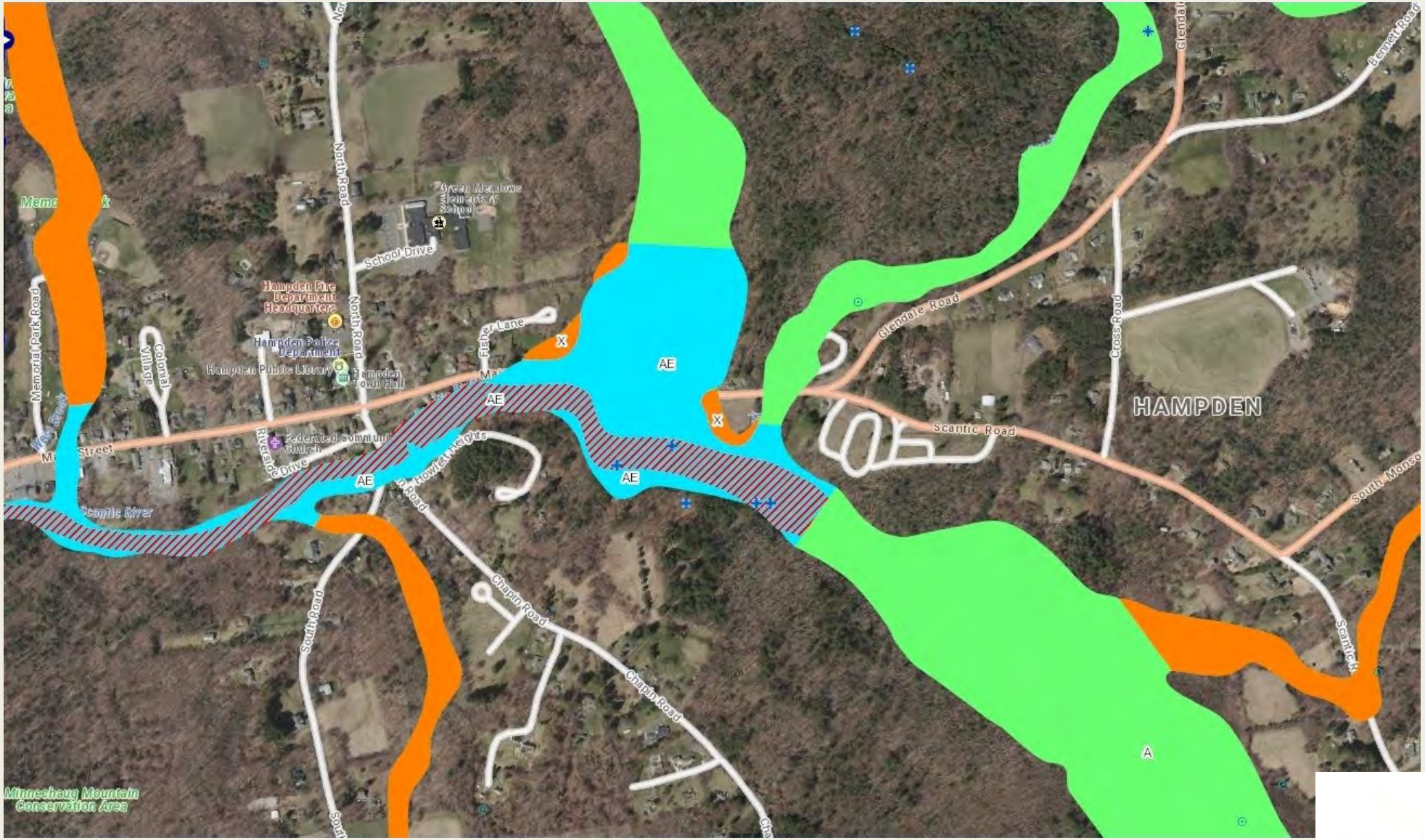
- Grant Map Viewer
- MVP Grant Types
- MVP Toolkits
- Stay Up-To-Date
- Other Funding
- Contact MVP Team

MVP Planning Process

Community Resilience Building Workshop

- Core team meeting
- Community Resilience Building Workshop
- Summary of findings
- Listening session
- Implementation

Main Street Flood Map



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Hampden Main Street over Big Brook Culvert

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Hampden Main Street over East Brook Culvert (Bridge No. H-04-008)

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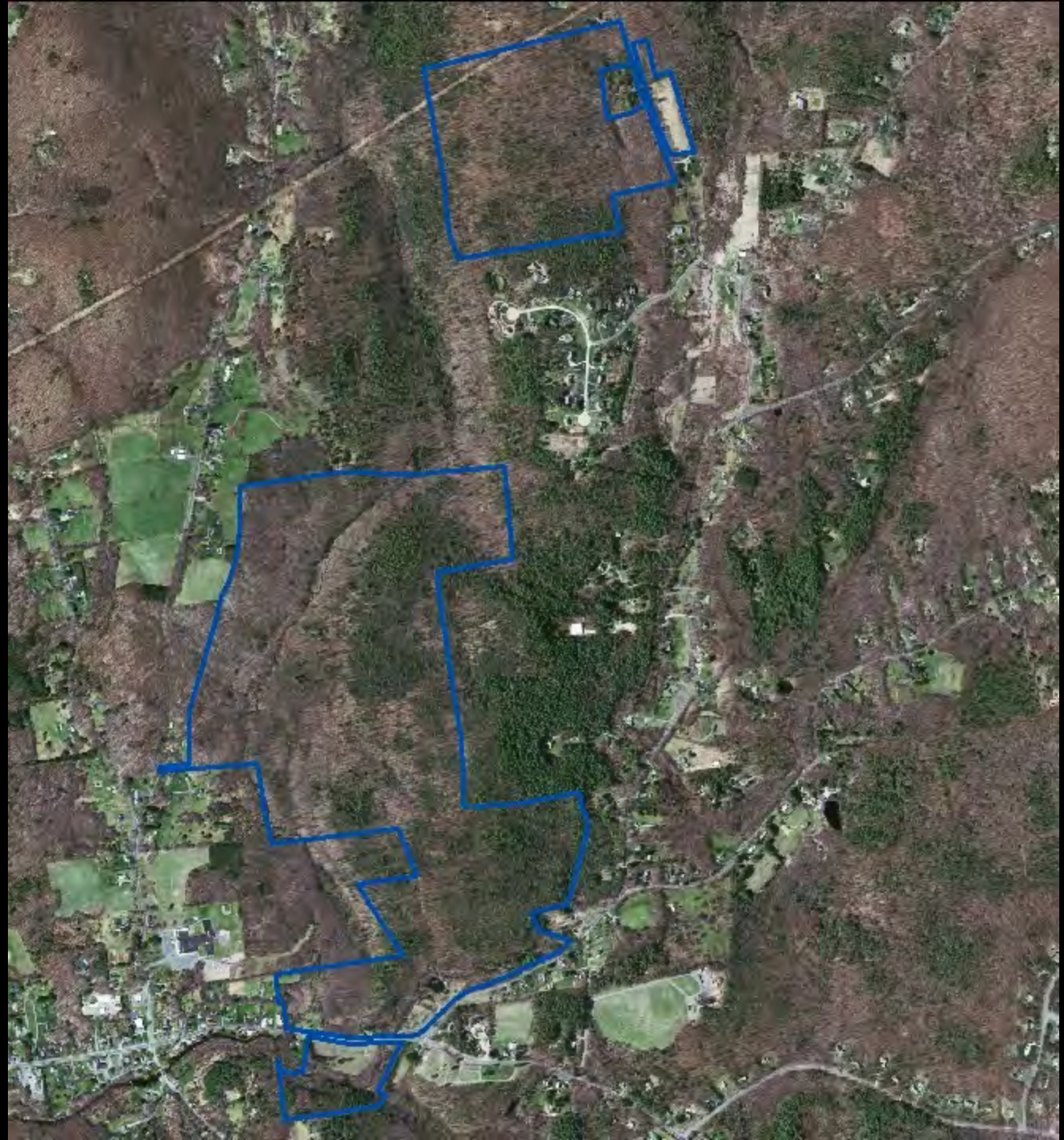
Questions?



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