

Town of Amherst

An aerial photograph of Amherst, Massachusetts, during autumn. The foreground shows a river with a dense line of trees displaying vibrant yellow and orange foliage. Beyond the river, there are green fields and a small cluster of buildings, including a barn. In the distance, a town with several tall buildings is visible, followed by a range of blue mountains under a clear sky.

Community Resilience Building Workshops
Summary of Findings / June 2019



Town of Amherst

Community Resilience Building Workshops

Summary of Findings

■ Amherst is seeing the heightened risks associated with climate change, and is taking action to build the resilience of our community.

I. Overview

The Town of Amherst, alongside communities across Massachusetts, is experiencing the impacts of climate change. Residents are already feeling the effects of longer heat waves, warmer winters, and more frequent and intense storms. We expect these patterns to only intensify moving forward, with significant implications for our local economy, town infrastructure, water resources, ecosystems, agriculture, and public health.

In response, Amherst has acknowledged the heightened risks associated with such extreme and variable weather, and is taking action to both reduce and respond to them in ways that build the resilience of our community. The Town has begun working with community members to proactively develop strategies for protecting local ecosystems and for strengthening the community's social and physical infrastructures—and hopes to expand on this collaboration over the course of the coming year. This model places both social equity and sustainability at the forefront of conversations about mitigating and responding to climate change, offering a framework for other municipalities in Massachusetts and across New England to follow.

In 2018, Amherst joined the Commonwealth of Massachusetts' Municipal Vulnerability Preparedness (MVP) program (<https://tinyurl.com/yys5kv8r>) to further the town's climate adaptation efforts. The MVP program offers support to Massachusetts municipalities through workshops that, first, identify the community's strengths and vulnerabilities in relationship to climate change and, second, generate prioritized actions to strengthen the municipality's resilience. After participating in these workshops, municipalities become eligible for funding to implement climate adaptation measures.

In accordance with the MVP framework, Amherst hosted two workshops on March 4th and 5th, 2019. These conversations were structured based on the Community Resilience Building (CRB) Planning Framework (www.communityresiliencebuilding.com), a community-driven process focused on shared dialogue, identifying community assets and challenges, and prioritizing actions moving forward. Amherst engaged MVP certified providers Linnean Solutions and the Pioneer Valley Planning Commission to facilitate this process.

The workshops' 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.

Town staff and the Linnean Team prepared a range of materials in advance of the MVP workshops to structure and animate small-group discussions. Participants were provided with a series of maps showing the town's flood vulnerability, as well as maps that highlighted many of Amherst's infrastructural, social, and environmental features. Additionally, each group received a large 'storyboard map' that participants pointed to, drew on, and marked up throughout the workshop, illustrating where the community's greatest assets and challenges were located. Finally, comments made

South Pleasant Street in Amherst, MA.

Photo credit: John Phelan



by community members during the workshops were recorded in the Community Resilience Building (CRB) “Risk Matrices,” which provide a template for organizing group observations, analyses, and priorities. Images of the maps and risk matrices are included in the appendix of this report.

Defining “Strengths” and “Vulnerabilities”

For the purpose of the workshop, “**vulnerabilities**” were considered to be aspects of the town that may lose function due to climate change hazards or that may feel the effects of climate change more acutely. “**Strengths**” were aspects of Amherst that would help the town adapt and thrive even in the face of climate change. Some features—such as the town’s transportation system—could be seen as both a strength and a vulnerability.

■ This process will continue to benefit from the inclusion of many voices, perspectives, and visions for creating a more resilient and equitable Amherst.

The purpose of this report is to compile and communicate the findings of the Amherst Community Resilience Building workshops. It documents the primary hazards, strengths, and vulnerabilities, as identified by community members participating in the workshops, as well as the proposed actions for bolstering community-wide resilience.

The content of this report is open to comments, corrections, and updates from workshop participants and the Amherst community. The Town’s progress towards climate change adaptation and mitigation is ongoing, and the process stands only to be strengthened by the participation of many community voices, inclusion of insights drawn from different perspectives, and the consideration of various visions for a more resilient and equitable Amherst.

II. Top Hazards and Vulnerable Areas

Each breakout group in the Community Resilience Building Workshop discussed four main climate change hazards in Amherst that had been identified in advance by a team of municipal staff representatives as the hazards with the greatest potential to affect the town. These top climate change hazards were increased heat, increased precipitation, drought, and extreme weather, and workshop participants identified community vulnerabilities, strengths, and possible action items with respect to each. Throughout their discussions, participants leveraged prior experience with symptoms of these four hazards, such as Hurricane Irene or the Halloween storm of 2011, to frame their understanding of how the hazards might affect Amherst moving forward.

Amherst's top climate hazards:

- Increased heat
- Increased precipitation
- Drought
- Extreme weather

A. Current Concerns and Challenges Presented by the Hazards



1. Increased Heat

Like municipalities statewide, Amherst has already witnessed warming as a result of climate change and will continue to see rising average annual temperatures in the years to come. With warmer temperatures, we are expected to experience extended heat waves, fewer days below freezing, and more days with extreme heat. The number of days per year with a temperature over 90°F is expected to increase from the 6 days averaged between 1971 and 2000 to 16-42 days in the 2050s, while the number of days per year with a temperature below 32°F is expected to dwindle from 159 days averaged between 1971 and 2000 to 121-140 in the 2050s. With these higher temperatures, Amherst faces several threats to its robust agricultural economy and local ecosystems. Plant species accustomed to colder climates will likely have trouble adjusting to warmer temperatures. Likewise, insect species traditionally

whittled down by the winter (such as ticks that carry vector-borne diseases) will increasingly survive and breed at higher rates. The larger number of days with extreme heat and prolonged heat waves will also pose greater risk for heat-related illnesses and fatalities, especially among community members with compromised immune systems or limited access to air conditioning. Such risks will be especially elevated for Amherst residents currently experiencing social isolation or limited access to transportation to cooling centers. As such, this hazard, in particular, holds potential to reveal underlying inequities in access to transportation or resources, exacerbating existing social inequalities.



2. Increased Precipitation

Amherst is expected to witness an increase in annual precipitation and, more significantly, greater frequency and intensity of major storms over the next fifty years. Annual precipitation is projected to increase from 46 inches averaged between 1971 and 2000 to 48-53 inches in the 2050s, with the majority of precipitation concentrated within periods of heavy rainfall in the winter and spring. As a result, the town will likely face greater risks of flooding from rivers and streams, localized flooding due to overburdened stormwater infrastructure, as well as higher rates of erosion and roadway surface deterioration. Infrastructure upgrades and maintenance, revised design standards, and innovative strategies for storing or absorbing water may prove crucial for preventing extreme flood damage to town buildings, roads, and other infrastructure systems.



3. Drought

Climate change is likely to introduce longer periods of drought into existing weather patterns, which may affect the health of Amherst's water supply. Currently, the town relies on seven sources: Atkins Reservoir, the Pelham Reservoir System, the South Amherst Wells (2), the Brown Well, the Lawrence Swamp Well, and the Bay Road Well. As of 2017, the Atkins Reservoir and Lawrence Swamp Well functioned as the town's primary water supplies, with the Pelham Reservoir System and the Bay Road Well operating only during high demand periods. Despite the capacity to rely on a number of sources, the town has already encountered instances in which the network of wells and reservoirs was incapable of meeting its water demand. In August 2016, for example, the town implemented a four-month mandatory water ban due to an extended period of dry weather and abnormally low recharge to groundwater. With such conditions poised to grow more frequent, it will become increasingly necessary for the Town of Amherst, adjacent municipalities, and large water users such as the local academic institutions to take part in collaborative and proactive planning to maintain a healthy water supply. In addition to public health concerns, extended dry periods stand to jeopardize the health and productivity of Amherst's farms, particularly those that do not use irrigation systems.



4. Extreme Weather

Due to climate change, Amherst will likely see more severe and more frequent extreme weather events in the next fifty years, including heavy rainfall, hurricanes, and snow-storms. With this increase in extreme weather comes an increase in vulnerability: without attention to systemic resilience interventions, Amherst will likely suffer a growing number of power outages, setbacks to business operations, interruptions in transportation services, and damage to local infrastructure and trees. Accounting for the existing inequities in access to resources and information, will be crucial to reducing the impact of such disruptions on residents' health and livelihoods.

Areas of Concern

In discussing the top climate hazards, a number of specific locations were identified as being particularly vulnerable. These locations include:

Road Segments

- East Hadley Road (flooding)
- Southeast Street (flooding)
- East Leverett Street Bridge (water flow over capacity)
- Greenleaves Drive (erosion)
- Beston Street (post-sewer overflow)
- Pomeroy Court (flooding)
- Station Road and Bridge (flooding)
- Meadow Street (flooding)
- Old Grist Mill Bridge (reliance)
- Stanley Street near the baseball fields (flooding)

Utility Infrastructure

- Dam near Puffer's Pond (reliance)
- Atkins Reservoir Dam and Water Treatment Plant (reliance)

Sites and/or Services

- South Amherst (flooding)
- Apartment complexes, in general (communication limitations)
- Farmington Road neighborhood (flooding)
- The Brook, Mill Valley Estates, the Boulders, Southpoint Townhouses and Apartments (lower income, high water table)
- Pufton Village, Village Park Apartments, Aspen Chase Apartments, Colonial Village, the Brook, Mill Valley Estates, the Boulders, Southpoint Townhouses and Apartments, Rolling Green Apartments, and Eagle Crest Apartments (high renter populations)

Natural Resources

- Cider Mill Pond Conservation Area (septic)
- Rivers, generally (water quality)
- Market Pond outfall (erosion)

B. Specific Categories of Concerns and Challenges

As in any community large or small, Amherst is not uniformly vulnerable to climate change, and certain sites, populations, and resources stand to be affected to a greater extent than others. Workshop participants identified the following items as their community's key vulnerabilities.

INFRASTRUCTURAL VULNERABILITIES

For example: Where might Amherst's communication, transportation, or stormwater infrastructure fail in a climate hazard?

Strained water supply:

- Water supply relies mostly on wells with limited storage, and is under significant strain from the large student population
- Water supply crosses town lines: both the Atkins Reservoir Dams are outside of Amherst, which requires increased coordination to protect the health of the water supply

Wastewater system performance:

- Forty-year-old wastewater treatment plant is overburdened due to stormwater leaking into its pipes
- Some pipes were connected illegally thirty years ago, leading to sewage back-up in house basements in the development directly north of Hampshire College

Aging housing stock:

- The town's housing stock, built primarily before the 1970s, tends to have older systems and in many cases may require significant maintenance

Inconsistent quality and distribution of municipal facilities and programs:

- Lack of public meeting facilities that are both ADA compliant and accessible by public transit; two out of three town schools, for example, are not ADA compliant
- Lack of fire department coverage and resources in South Amherst
- Lack of clearly identified heating or cooling centers
- Department of Public Works equipment is up to par, but its buildings are aging
- Backlogged services lead to lags in repair time for municipal buildings

- Poor coordination of waste-management services, lack of education about waste reduction and management, and no staff available to support the municipal recycling program
- Police and fire communication towers are located in Pelham, which could create a vulnerability if they are damaged or fail

Mobility limitations:

- Limited public transportation system has inefficient existing routes, which do not adequately service some key destinations or the town's east and west flanks, and are being cut both in terms of routes and hours of service
- Public transportation does not serve low income and minority communities outside of the downtown areas
- Public transportation is not financially accessible to everyone
- Few north/south arterial routes combined with the town's long, thin geography create a heavy reliance on a few specific roads and make it more difficult to centralize resources
- Inconsistent bike lane and sidewalk coverage prevents walking and biking from being safe or viable modes of transportation for many residents

Energy system vulnerabilities:

- Large student population creates high demand for electricity and heating fuels, which may limit availability for residents
- Power grid requires backup during cold snaps
- Most power lines are above-ground, which increases the risk of downed lines during storms
- Limited capacity and funds for renewable energy initiatives

Flooding of roads, properties, bridges, and dams:

- Erosion and overwhelmed culverts lead to flooding of roads and properties, particularly in South Amherst
- Residential units and potential meeting places in the apartment complexes off of E. Hadley Road and Pomeroy road have high water tables
- Both major traffic arteries and neighborhood roads are prone to flooding
- Flooding is exacerbated by beaver dams
- Dams and bridges are threatened by high water flow, particularly in South Amherst and near Puffers Pond
- Flooding at UMass affects not only Amherst residents, but also their neighbors in Hadley
- The UMass campus has a substantial amount of impervious surfaces

Proximity of freight rail line to natural resources:

- The freight rail line has experienced multiple derailments in recent years
- Comparable derailments moving forward could damage the Lawrence Swamp

Telecommunications and network security:

- There is uncertainty around the security of Amherst's communications infrastructure
- The town's emergency communications system is reliant on towers outside of Amherst

SOCIETAL VULNERABILITIES

For example: Which communities may feel the effects of extreme weather more than others? How does inequity affect our community resilience?

Exclusionary planning processes:

- Lack of understanding or trust between government and select resident populations, including renters, low-income, or non-English speaking residents, leads to less inclusive public meetings or civic engagement processes, as well as a lack of empowerment to contribute to community development efforts
- Lack of neighborhood cohesion: segregation prevents lower income and minority communities outside of the town center from fully accessing resources

Uneven access to resources:

- The town's significant renter population has little influence over energy efficiency and housing quality
- Existing homeless services in Amherst, particularly for those under the influence, may support the growth of those populations without providing adequate women-designated beds or around-the-clock services
- There is notable economic inequality in Amherst, largely along race lines: 40 percent of children in Amherst schools qualify for free and reduced lunch, 50 percent of whom are students of color, despite the population of Amherst being over 75 percent white
- The town's sizable elderly population may not have support networks or access to municipal emergency communication and social services, particularly for those who live alone

Transience and migration:

- The large transient population, composed of UMass, Amherst College, and Hampshire College students and renters, leads to significant seasonal fluctuations in the town's population, contributes to large turnover in who makes up Amherst's residents, and thus makes it harder for the town to engage consistently with its population

- Students constitute over 50 percent of the town's population, and yet only a portion are likely captured in the census data, making it more difficult to get an accurate sense of the town's population and demographics
- A high number of town infrastructure users and local business customers are not residents, but visiting for a day or weekend
- Amherst may witness an influx of residents due to climate change, especially as people migrate inland from coastal communities

Communication barriers:

- A large portion of the town population lacks knowledge of how to access services during an emergency
- Apartment complexes lack common meeting spaces, bulletin boards, and public access to individual apartment doors, rendering it difficult to identify channels for effective communication with and within such communities
- The Town's current routine engagement and emergency communication strategies do not consistently serve non-English speakers or residents without access to a phone or the internet
- The Town's current routine engagement and emergency communication strategies do not reach residents of surrounding towns who are dependent on Amherst's water and sewer infrastructure

Land ownership and development:

- Addressing systematic changes to land use/management and infrastructure systems requires significant coordination with the academic institutions, which own and use a large portion of the land and infrastructure systems within the town
- Due to the academic institutions and the town's conservation land, a high percentage of land in Amherst is not taxable
- A lack of incentives and policies facilitating sustainable development, outdated and prohibitive zoning, and a master plan that needs updating leaves large institutions and developers unaccountable to the needs of residents
- The uncertain future of Hampshire College creates a "large unknown" for Amherst's economy, land use, development, and community
- Discourse around development is marked by a tension between preservation and progress
- Residents feel a lack of power over big industry

Public health concerns:

- Amherst imports most of its food and could be cut-off from its supply if I-91 shuts down; the proportion of Amherst's food that is (or can be) produced locally in Amherst is unclear

- Air pollution from the concentration of cars around the universities is compounded by the geography of the valley that traps air from coal-burning plants
- Sections of Amherst are food deserts with limited grocery stores or other locations to buy healthy food, and food inaccessibility may be exacerbated during a climate hazard if certain roads are closed

ENVIRONMENTAL VULNERABILITIES

For example: How might changes in the climate affect the health of Amherst's tree canopy, agriculture, or native ecosystems?

Conservation:

- Large, continuous swaths of conservation land render one third of the town vulnerable to pest outbreaks as well as temperature and precipitation changes that will likely harm the health of plant species
- Endangered salamander population limits development potential

Ecological stresses:

- An increase in pollen has led to health problems related to allergens, which are exacerbated seasonally
- Rates of Eastern Equine Encephalitis (EEE) and mosquito-borne and tick-borne illnesses are especially high during particularly wet years
- Large beaver population leads to increased flooding

Tree canopy vulnerability:

- The tree canopy has suffered as a result of storms and requires significant maintenance, both to ensure the ongoing health of the trees and to prevent future storm damage
- The tree canopy is under threat from an increasing number of invasive species like Gypsy Moths and Emerald Ash Borers

Natural water systems vulnerability:

- Poor water quality of local rivers may be further compromised by climate change
- Stormwater runoff threatens water quality

III. Current Strengths and Assets

Just as certain sites, populations, and resources in Amherst stand out as particularly vulnerable to the effects of climate change, other town features are notable for their potential to serve as assets to Amherst's climate adaptation efforts. Workshop participants identified the following items as their community's core strengths, and expressed interest in using them as a basis in future resilience planning interventions.

INFRASTRUCTURAL STRENGTHS

For example: How can Amherst's transportation systems, like ValleyBike, UMass Transit, and the PVRTA, be expanded to better help residents access resources?

University/college and private energy resources:

- UMass has 5.5 megawatts of solar on campus, a micro-grid, and battery storage
- Hampshire College has a system of 15,000 solar panels with battery storage
- UMass is building a facility that will serve as an emergency shelter for the town
- Applewood has backup power and can serve food during outages

Transportation and mobility:

- ValleyBike Share infrastructure will be expanded, though it is largely oriented towards students
- UMass Transit, the PVRTA, and school buses are routinely used, particularly by low-income residents and students, and could be leveraged in an emergency
- Underutilized railway line running through the center of town may offer development opportunity
- State-owned bike trail near Amherst College is a primary mode of commuting

Facilities and amenities:

- The town has multiple locations for swimming and cooling off during periods of extreme heat, including Puffers Pond, the Splash Pad, Memorial Pool, and Atkins Center (pools have an income-based entry fee, and the Splash Pad is free)
- Bangs Community Center, Town Hall, and Amherst Regional High School can be activated by town staff to serve as heating and cooling centers
- Multiple new municipal buildings will be constructed in the near future
- Police station has a generator for its building and a community meeting space
- Downtown Amherst has free wifi

Green energy potential:

- Amherst is a part of a three-town task force to create a community choice energy option

Public health facilities:

- An urgent care facility is located near Stop n' Shop
- University and college campuses have basic health center facilities
- Cooley Dickinson Hospital is 15 minutes from the center of town

SOCIETAL STRENGTHS

For example: How can Amherst's strong social service organizations and worship communities serve as hubs for building community resilience?

Community networks and resources:

- Craig's Doors serves the homeless and welcomes people seeking shelter under the influence
- Municipal district system could serve as a building block for neighborhood organization
- Worship communities could serve as a starting point for larger faith-based community organization in connecting residents to the town government
- The Family Center, Survival Center, and Casa Latina are community hubs
- Apartment developments are existing, small-scale units of community organization, often with a distinct culture and set of resources
- Academic institutions offer knowledge repositories, a positive mindset about resilience, and testing grounds for innovative sustainability strategies and green infrastructure

Culture:

- Amherst generally has a culture of activism, collaboration, and open-mindedness about climate mitigation
- Town has weathered extreme weather events like the storm of October 2011 and may have learned from those experiences

Municipal resources:

- The town's new emergency alert system sends mass alerts to everyone who subscribes and is accessible in multiple languages
- Amherst has a committed Town staff with significant GIS mapping skills, and a recently updated master plan
- The Building Commissioner has dedicated time towards building a relationship with landlords

Regional stability:

- Amherst is surrounded by stable communities and has not witnessed large swings in its population

ENVIRONMENTAL STRENGTHS

For example: How will Amherst’s farms and open space be an asset when facing climate change?

Agricultural hub:

- Large amounts of high quality agricultural land in the immediate environment
- Educational programs in Amherst schools and UMass build on the town’s agricultural resources

Programs that protect and maintain trees and open space:

- A robust tree canopy that can only be expected to grow, given the 2,000 street trees planted in recent years as a result of a grant to mitigate storm damage
- Protected open space around Atkins Reservoir and Lawrence Swamp
- Eversource tree pruning service offers a low-barrier maintenance service

Access to composting:

- A widespread composting program picks up curbside compost for \$11 each month

Amherst Town Common. Amherst’s robust tree canopy and open spaces were seen as a town strength.

Photo credit: John Phelan



IV. Recommendations to Improve Resilience

After taking stock of Amherst's vulnerabilities and assets, participants worked in small groups to collectively identify actions that would address the community's challenges and build upon its strengths. The groups generated ideas for policy interventions, outreach and empowerment strategies, and key areas of investment to enhance Amherst's climate resilience.

How can we create a **more equitable Amherst**?

How could we work with landlords to increase the sustainability and **resilience of Amherst's rental housing**?

How can we create more **resilient food systems** in Amherst, including agriculture, food production, food distribution, and food access?

A. Top Areas of Focus / Cross-Cutting Themes:

1. Equity and empowerment:

Amherst is home to both longtime residents and growing immigrant communities, retirees and college students, renters and homeowners, with each group representing varying degrees of access to emergency alerts, public transportation, shared services, and political representation. Throughout the two-day workshop, many conversations revolved around inequitable access to community resources, with renters, racial minorities, and low-income residents most commonly cited as underserved communities, as well as methods to address that inequity and empower communities currently lacking political power. Suggestions included new models for public participation and community meetings, and addressed both the acute need for effective communication in emergencies and the long-term benefits of equitable access and empowerment.

2. Sustainable land use and development:

Recognizing the desirability of Amherst as a place to live, participants repeatedly discussed strategies for development in a community with one-third of its land

dedicated to conservation as well as an aging housing stock. Participants suggested greater density near existing infrastructure systems, revealed a clear appreciation for the conservation of natural resources, pointed to the town’s housing shortage, and highlighted the tension between preserving Amherst’s character and facilitating new development. Participants also devoted significant time to discussing the town’s master plan, brainstorming ways to update, improve, and build upon the completed document to forefront equity and sustainability.

3. Collaborative climate adaptation planning:

A third thread that emerged from the workshops was the need for a participatory planning process to generate a town plan for climate action and adaptation—a theme that combines the aforementioned calls for greater equity and sustainable use of resources. Workshop participants emphasized that the compilation of a town-wide climate action and adaptation plan should integrate these core and complementary areas of focus. To this end, they suggested engaging two consultants to work on the plan’s development: one who would focus primarily on climate planning, and another who would ensure that equity was fronted at each step of the way and in each section of the plan. Such a planning process would weave and advance these two core community priorities, as well as move several of the individual actions brought up in the workshops towards a comprehensive strategy for implementation.

Pioneer Valley Transit Authority (PVTA) bus, picking up passengers near the Hampshire College campus. Rethinking transportation routes from an equity standpoint was a topic focused on in the workshops.

Photo credit: Newflyer504



B. High Priorities

INFRASTRUCTURAL HIGH PRIORITIES

Ideas include upgrades to stormwater infrastructure, investment in bike and pedestrian infrastructure, as well as incentives for more sustainable and resilient development.

Water infrastructure and water security:

- Conduct consistent and routinely funded inspections and exercises of the dam
- Assess the distribution of aging pipes to determine where repairs are most urgent
- Incorporate redundancies in future plans to prepare for emergency situations
- Consider water resources at a watershed scale
- Modify building codes to better address energy, water use, and sewer impact
- Reduce resource consumption through encouraging local academic institutions to limit water use, and through providing incentives and educational programs for water conservation and reuse

Environmentally friendly transportation:

- Increase the number of electric vehicle charging stations
- Charge more for parking downtown to discourage driving
- Create a bike culture through bike maintenance and incentive programs
- Provide incentives for ride-sharing and create a network for carpooling
- Increase the connectivity of trails and bike paths
- Apply recent grant from the Pioneer Valley Planning Commission (PVPC) to evaluate the town's bike and pedestrian infrastructure

Reducing vulnerability of electric grid:

- Task the Energy Commission with developing principles and goals for the community's target energy consumption and necessary infrastructure moving forward (in partnership with a consultant)
- Continue to support programs like Community Choice Energy 3.0
- Invest in renewable energy storage and community-level energy generation
- Consider partnering with Community Solar

Flooding resilience and green infrastructure:

- Continue to work towards Municipal Separate Storm Sewer Systems (MS4) compliance
- Include new technologies to address the effects of climate change in all infrastructure repairs or new roadway construction

- Create a capital improvement plan addressing frequently-flooded roadways to account for increased frequency and intensity of storms

Sustainable and resilient buildings and development:

- Create proactive, positive channels of communication between the town and developers about the inclusion of green infrastructure, stormwater management, and energy efficiency
- Provide incentives for developers to incorporate green infrastructure, stormwater management, and energy efficiency
- Disseminate information to landlords about how to improve the energy efficiency of their buildings
- Create time-sensitive education requirements on sustainable building upgrades when landlords open their escrow accounts
- Ensure rebate programs provide enough incentive to incur the costs of upgrades
- Revise the building code with a more rigorous review process for new buildings, requirements for incorporating resilience strategies, and greater attention to energy efficiency, water use, and sewer impact

SOCIETAL HIGH PRIORITIES

Ideas include creating more community-driven and equitable planning processes, as well as more equitable access to information and resources.

Empowerment of vulnerable populations in political and planning processes:

- Focus on immediate crisis-based communication while developing community-based leadership
- Equitably compensate residents and business owners participating in community improvement processes and sitting on town committees
- Consider identifying a neighborhood captain to serve as a community representative and liaison in emergency situations
- Leverage the town council’s district framework to build relationships at a neighborhood scale, and to improve access to government resources and power

New models for all levels of public participation:

- Focus on working within existing community networks, rather than forcing active groups to fit a new framework for community engagement; take stock of existing groups working towards a resilient Amherst and bring them together; and allow community members to set the agenda

- Structure meetings in a manner sensitive to cultural differences and resident schedules, and incorporate a variety of activities to accommodate various engagement preferences, perhaps with a ‘Collaborating for Equity and Justice’ framework
- Work with schools and parent groups, tapping the knowledge of the school district
- Engage the transient population by connecting community efforts with student groups and clubs at UMass, Amherst College, and Hampshire College
- Incorporate channels for remote participation, such as online or paper comment submissions, and communicate that feedback to the community at large

Ensure thorough distribution of resources and information:

- Use multi-lingual written, verbal, digital, print, and face-to-face communications for town communications with residents
- Expand the current emergency communications system to reach areas of non-English speaking residents, undocumented residents, and other vulnerable populations that may not receive notice through social media or Reverse 911
- Provide multi-lingual education on how to access services during an emergency
- Compare Amherst’s emergency resources and procedures to other towns in Massachusetts
- Coordinate with neighboring municipalities to ensure residents of nearby towns affected by infrastructure located within Amherst are notified of relevant emergencies

Foster new community connections:

- Recognize the inherent relationship-building value in community gatherings
- Forge connections with the young professional community in Amherst
- Engage student groups in planning processes
- Provide funds for community block parties to engender two-way conversations that build access and connections
- Leverage the Family Center, the Survival Center, and Casa Latina to build connectivity
- Integrate formal meeting spaces into apartment complexes
- Educate landlords about their responsibilities to their tenants, and incentivize landlords to build connections among their tenants through activities

Master planning and zoning that reflect community values:

- Prioritize implementing outstanding relevant recommendations
- Include measures to increase the amount of moderately-priced housing
- Modify the master plan to incorporate a commitment to climate change adaptation and equity, and move the updated plan towards implementation
- Hire one paid consultant to draft a climate action plan or portion of the master plan, and another paid consultant to ensure that equity is at the forefront of each step of the development of the plan

ENVIRONMENTAL HIGH PRIORITIES

Ideas include building the resilience of Amherst's food systems, and ensuring that new development does not impact the resilience of the town's ecosystems.

Create more resilient food production and distribution approaches:

- Ensure that amenities like grocery stores are accessible by foot or bus, and consider the creation of a mobile market
- Research alternative methods for growing, harvesting, and distributing food sustainably, focusing on hydroponic agriculture in dense areas
- Promote policy that reduces the use of pesticides and protects pollinator populations
- Invest in more storage and distribution centers

Sustainable development:

- Concentrate development near the town center, on sites connected to existing water and sewer systems, to protect forest and farmland
- Coordinate on a regional scale to protect water systems from a wide range of threats, including pollutants, debris, and development
- Consider alternative municipal revenue streams to compensate for untaxed conservation land

Aerial view of Amherst, with the UMass campus in the foreground. Workshop participants discussed the future of sustainable development in Amherst, including how to develop more housing while protecting healthy ecosystems.

Photo credit: Lion Hirth



C. Moderate Priorities

INFRASTRUCTURAL MODERATE PRIORITIES

Equitable mobility:

- Consider bilingual public transportation signage
- Add heating and shelter to bus stops

Home improvements program:

- Create a program to support house maintenance and repairs as the housing stock ages and requires greater attention

Maintenance of infrastructure and impervious and permeable surfaces:

- Conduct regular maintenance on municipal infrastructure with greater awareness of the 'invisible issues' associated with subsurface systems
- Direct more funds towards infrastructure maintenance
- Keep Mill Lane "dirty"
- Increase funding for the local trail network, allow trails to flood in storms, and keep up with the necessary maintenance afterwards, building out as needed
- Advocate for more green space and permeable surfaces

Improving municipal facilities, information, and resources:

- Add an additional fire station or relocate the current fire station to South Amherst
- Include an ADA-compliant community space in any new municipal facility
- Ensure consistent assessment, repair, and redundancy plans for police and fire towers
- Ensure that new facilities meet the town's Zero Energy Bylaw
- Take stock of which campus health facilities are accessible to the public and raise public awareness about such existing health resources
- Facilitate a coordinated plan for waste management among contractors

SOCIETAL MODERATE PRIORITIES

Enhance coordination between institutions and Town:

- Expand University-Town Amherst Collaborative (UTAC) to include Amherst College and Hampshire College
- Research and align each institution's emergency and resilience plans
- Facilitate conversations through which schools can learn from one another and coordinate plans

- Enable UTAC to assume greater responsibility for community-wide emergency planning

Harness existing capacity of municipal staff:

- Continue to leverage GIS mapping tools, in particular, which are not accessible to many peer communities
- Build off the Building Commissioner’s recent work to strengthen relationships between town government and residents

ENVIRONMENTAL MODERATE PRIORITIES

Combat insect-borne illnesses:

- Assess rates of vector-borne illnesses and identify sites with high rates of incidence

Protect land and water resources:

- Ensure farmland remains protected and incentivize active farming
- Coordinate on a regional scale to protect water from a wide range of threats, including pollutants, debris, and development
- Ensure there is a plan in place to protect water sources from overuse and threats to water quality, such as train derailment in the Lawrence Swamp

Work towards a more robust tree canopy:

- Use Eversource tree pruning service to keep trees healthy and properly maintained
- Minimize the risk of trees damaging electrical wires in storms

Amherst Fire Department on N. Pleasant Street. The capacity and distribution of municipal resources, including fire stations, served as a point of discussion at the workshops.

Photo credit: Holly Jacobson



INFRASTRUCTURAL LOWER PRIORITIES

Energy-efficient municipal facilities:

- Take inventory of buildings' current resource consumption to identify potential opportunity for greater efficiency

Intentional supply line and distribution of resources:

- Leverage existing transportation resources, such as the Pioneer Valley Transit Authority and rail line, for a supply line
- Use the Family Center as a facility to distribute necessary goods in an emergency

Water security:

- Explore alternative water sources and consider using more reclaimed water
- Set goals for the percentage of toilets in town that are composting to reduce water use through the sewer system and to take advantage of the environmental benefits of compost
- Conduct additional studies on water quality and a comprehensive study on methods for cleaning and storing water

Telecommunications and network security:

- Take stock of possible threats to cell towers and network
- Research how such threats are being addressed across different communities and scales

SOCIETAL LOWER PRIORITIES

Climate-induced in-migration:

- Coordinate with neighboring municipalities to navigate potential population growth from people fleeing coastal communities
- Focus on ensuring the wellbeing of existing residents while accommodating changes

ENVIRONMENTAL LOWER PRIORITIES

Small-scale and community-oriented farming:

- Leverage underutilized resources like vacant lots and rooftops for local food production
- Select plant species that consume less water
- Charge town agencies with researching alternative options to large lawns
- Consider replicating the North Amherst Community Farm's model for integrating farming, housing, and local produce consumption
- Create workforce development programs to build on the strength of the agriculture industry

■ At two Gathering Sessions, community members and Town staff gathered for a meal and to share stories about how we're being affected by climate change.

V. Community Gathering Sessions

Following the Community Resilience Building Workshop, the Town of Amherst hosted two public Listening Sessions (“Gathering Sessions”) in partnership with community members. These gatherings were centered around a shared meal and focused on creating a space for community members to share stories about how climate change or extreme weather already impacts their lives. Participants discussed future concerns related to climate change and ways the Town and residents could collaborate in building a prepared and resilient community.

Outreach

For both Gathering Sessions, details about the meetings were posted in four languages (English, Spanish, Mandarin, and Portuguese) on the Town’s website, Community Calendar, social media, and physically posted in large apartment complexes with diverse populations and income levels.

Interpretation

Interpretation was provided at both events for Spanish, Mandarin, and Portuguese speaking community members.

Meeting Format

Both meetings were centered around a free meal, and included children’s activities. The format for both meetings included:

A. Welcome

B. Ice breaker (Human Bingo)

C. Community Meal

D. Review of MVP Workshop Highlights

Eight posters summarized major highlights from the MVP workshop; Attendees were asked to put post-its on those vulnerabilities/topics/issues that most resonated with them. The eight posters included:

1. The MVP process
2. Climate Vulnerability #1 – Increased Precipitation
3. Climate Vulnerability #2 – Increased Heat
4. Climate Vulnerability #3 – Extreme Weather
5. Climate Vulnerability #4 – Drought
6. Community Strengths
7. Highest Priorities
8. Next Steps

E. Re-Convene as a Group

Attendees discussed their thoughts, town vulnerabilities, and where individuals and families felt the greatest personal vulnerability related to climate change.

F. Thank You and Adjourn

Below includes further details on the two Gathering Sessions, as well as notes on what was shared and learned.

A. Gathering Session #1: First Congregational Church

Date and Time

The first Gathering Session was held from 6:00pm–8:00pm on Wednesday, May 29, 2019. It was held at First Congregational Church in the Chapel Lounge (165 Main Street). First Congregational Church is accessible by public transportation in Amherst, which was one of the reasons this site was chosen.

Attendees

Approximately 35-40 community members attended, including families, individuals, and town officials.

Discussion Notes

Extreme Weather:

- Major wind
- Tree crashed onto a swing set at an apartment complex that could have been devastating had a child been there

Increased Precipitation:

- Lots of rain – too much
- Flooding in houses/basements
- Mold concerns and leaking roofs/ceilings

Increased Heat:

- Diseased crops
- Maple trees will not be able to survive
- More pollen/allergies/asthma
- More ticks/mosquitoes and disease
- People working/playing outside in danger of overheating/heat stroke
- No air conditioning
- Limited ability to be outdoors

Drought:

- Food shortage
- Dust
- Increasing cost of food – what happens in the rest of country impacts us
- Water shortage

Communications:

- Seen as a strength, but the Town's emergency communication system isn't accessible to everyone – those with language barriers, challenges with literacy, no available technology

- How do we check in on people?
- How do we find out who lost heat in the winter?
- Community member's mother passed away in another community during the Halloween Storm because of no heat and loss of power (no phone) – no ability to communicate with family

Needs:

- Safe water
- Transportation – more bus routes/greater frequency
- Drainage for flooding (improved stormwater management)
- Improved communications
- Central locations for playgrounds
- Water park (centrally located)
- Tree maintenance

B. Gathering Session #2: Crocker Farm Elementary

Date and Time

The second Gathering Session was held from 9:00am–11:00am on Saturday, June 8, 2019. It was held at Crocker Farm Elementary School (280 West Street). Crocker Farm Elementary is accessible by public transportation in Amherst, which was one of the reasons this site was chosen.

Attendees

Approximately 20-25 community members attended, including families, individuals, and town officials.

Discussion Notes

Increased Heat:

- Increased ticks/disease
- Poisonous plants
- Not able to go outside as much

Increased Precipitation:

- More comes at once, rains harder, affects the soil for farmers (erosion)
- Road damage
- Sewer/septic systems back up
- Flooding (houses and roads)
- Rain is not when we need it
- Increased mold

Drought:

- Lawns are vulnerable

- Suggest use of greywater to help water lawns
- Need help following disasters – better communication

Extreme Weather:

- Access to safe spaces (community shelters)
- Generators for apartment complexes
- Transportation to emergency locations
- Have interpretation in many languages for emergency notifications

Primary Discussion Points - Social Resilience and Relationships:

- What actions are we taking to make community engagement a priority?
- Actions by the Town need to be taken after community members share their experiences – not continued sharing of experiences with no action
- The Town should collaborate with existing agencies who already work with families to help support the town in valuing equity
- There’s a need for increased representation of renters in Town decision-making
- How will Amherst open its doors to climate refugees and welcome asylum seekers?
- Use the Town’s GIS system to understand where elderly populations live
- Food Justice project – empower the voices of residents
- Residents’ voices need to be valued the same as the “professionals”
- Funding is needed to make all Town events into opportunities for engaging the entire community
- Create policies like the equity-based planning principles developed in Providence, RI – change the way we currently do things in Amherst so that it is more inclusive

Primary Discussion Points - Housing, Energy, and Transportation:

- How do we start water storage in community complexes now? How do we create a safety net now?
- There’s a need for apartment complex management that values sustainable choices
- There’s a need for better building codes and architects and contractors who are better informed about sustainability
- Create landlord incentives – more direct collaboration with the Town
- Lack of adequate transportation – bag limits, too few buses to stores, lack of direct routes
- Energy generation – encourage more solar on south facing rooftops

Primary Discussion Points - Access to Information and Resources:

- How can the Town organize its resources and their locations/create a database of folks who have resources and share that information?
- Give information to community members on how to engage with state and federal governments
- Food scarcity and access – sections of the town are food deserts
- Communication is a big challenge – most are unaware of the emergency contact system or don’t know how to find information

- Create community captains – use groups that are already formed to get the information out: schools, churches, etc.
- Use the school robocalls for emergencies

Primary Discussion Points - Waste Management:

- We send our waste out – disorganized system and unfair burden to other communities
- Council members are looking at legislation for composting
- Solid Waste Master Plan – will it be used?

■ The findings from these conversations will serve as the basis for Amherst’s MVP Action Grant application, an opportunity to take the community ideas in this process and translate them into action.

VI. Next Steps

Conversations held throughout the MVP Community Resilience Building Workshop and the Gathering Sessions highlighted climate-related challenges facing Amherst, as well as community assets that might be leveraged to address them. Participants identified numerous possible short-term and long-term strategies for adapting to the changing climate, including action items for the Town, its institutions, its businesses, and residents in making Amherst more resilient.

The findings from these conversations will serve as the basis for Amherst’s MVP Action Grant application, an opportunity to take the community ideas in this process and translate them into action. In the end, the comments voiced throughout the process will function as the building blocks for Amherst’s continued efforts to mitigate climate change impacts and build the resilience of its infrastructure, ecosystems, and communities. The initial steps in this process are outlined in greater detail below.

MVP Action Grants

The Town of Amherst’s participation in the MVP planning process renders the municipality eligible for an MVP Action Grant from the Commonwealth of Massachusetts’ Executive Office of Energy and Environmental Affairs. In Summer 2019, Amherst will apply for an action grant to support an equity-centered climate action and adaptation plan, which will serve as a coordinated way to address many of the concerns and ideas generated in this planning process.

Energy and Climate-Action Committee

In light of the pressing challenges facing Amherst as a result of climate change, the Town called for the formation of an Energy and Climate Action Committee (ECAC) on February 11, 2019. The purpose of the Committee will be to guide the Town towards meeting its climate mitigation and resilience goals, and it will be composed of nine voting members, two of whom will be current Town Councilors and seven of whom will be residents with experience in net zero energy building; energy efficient retrofits; climate change mitigation/advocacy/research; clean energy practice/policy/infrastructure; community choice energy; green infrastructure for climate adaptation; sustainable transportation; sustainable farming and forestry; waste reduction; and environmental or climate justice, or other relevant areas. Town staff are currently reviewing applications from residents interested in participating in the Committee.

VII. Appendix

A. CRB Workshop Participants

Christine Brestrup, Town of Amherst, Planning Department
Stephanie Ciccarello, Town of Amherst, Conservation and Development
Robert Claflin, Applewood - Loomis Communities
Bruce Coldman, Architect
Sara Draper, Hampshire College R. W. Kern Center
Darcy DuMont, Amherst Town Council
Laura Draucker, Amherst College
Julie Federman, Town of Amherst, Health Department
Jeff Hescoock, UMass Amherst, Environmental Health and Safety
Cinda Jones, WD Cows, Inc. Land Co.
Sarah la Cour, Amherst Business Improvement District
Caitlin Marquis, Healthy Hampshire and Collaborative for Educational Services
Robert Morra, Town of Amherst, Inspections/Conservation and Development
Gazit Chaya Nkosi, Mom's Clean Air Force
Tim Nelson, Town of Amherst, Fire Department
Claudia Pazmany, Amherst Area Chamber of Commerce
Chris Riddle, Zero Energy Task Force and Mothers Out Front
Steve Roof, Hampshire College
John Root, Naturalist
Andra Rose, Mothers Out Front
Amy Rusiecki, Town of Amherst, Public Works
Bryan Sansouci, Applewood - Loomis Communities
Ezra Small, UMass Amherst, Sustainability
Brianna Sunryd, Town of Amherst, Communications/IT
Lydia Vernon-Jones, C.A.N. / First Congregational
David Ziomek, Conservation and Development

B. CRB Workshop Project Team

Amherst Core Team

Amy Rusiecki, Public Works
Brianna Sunryd, Communications/IT
Christine Brestrup, Planning Department
David Ziomek, Assistant Town Manager/Conservation & Development
Geoff Kravitz, Economic Development
Guilford Mooring, Public Works
Julie Federman, Health Department
Lindsay Stromgren, Fire Department
Paul Bockelman, Town Manager
Robert Morra, Inspections/Conservation & Development
Scott Livingstone, Police Department
Stephanie Ciccarello, Sustainability/Conservation & Development
Tim Nelson, Fire Department

Facilitation Team

Jim Newman, Principal, Linnean Solutions (Lead Facilitator)
Holly Jacobson, Resilience Consultant, Linnean Solutions (Facilitator)
Ellie Hoyt, Sustainability Consultant, Linnean Solutions (Facilitator)
Emily Slotnick, Senior Planner, Pioneer Valley Planning Commission (Facilitator)
Kelsey Powers, Sustainability Consultant, Linnean Solutions (Notetaker)
Ian Johnson, Senior Director, Linnean Solutions (Notetaker)
Abigail Bliss, Intern, Linnean Solutions (Notetaker)

C. Acknowledgments

Special thanks to the Town of Amherst and the Amherst Core Team for their work in supporting, developing, and executing the MVP Program. Thank you also to the Munson Library for providing space to convene. These workshops were made possible through funding from the Massachusetts Municipal Vulnerability Preparedness Program.

D. Recommended Citation

Ciccarello, S., Jacobson, H., and Newman, J. (2019). Community Resilience Building Workshop Summary of Findings. Town of Amherst, Linnean Solutions, Pioneer Valley Planning Commission. Amherst, MA.

E. Workshop Maps and Resources

Base Storyboard Map

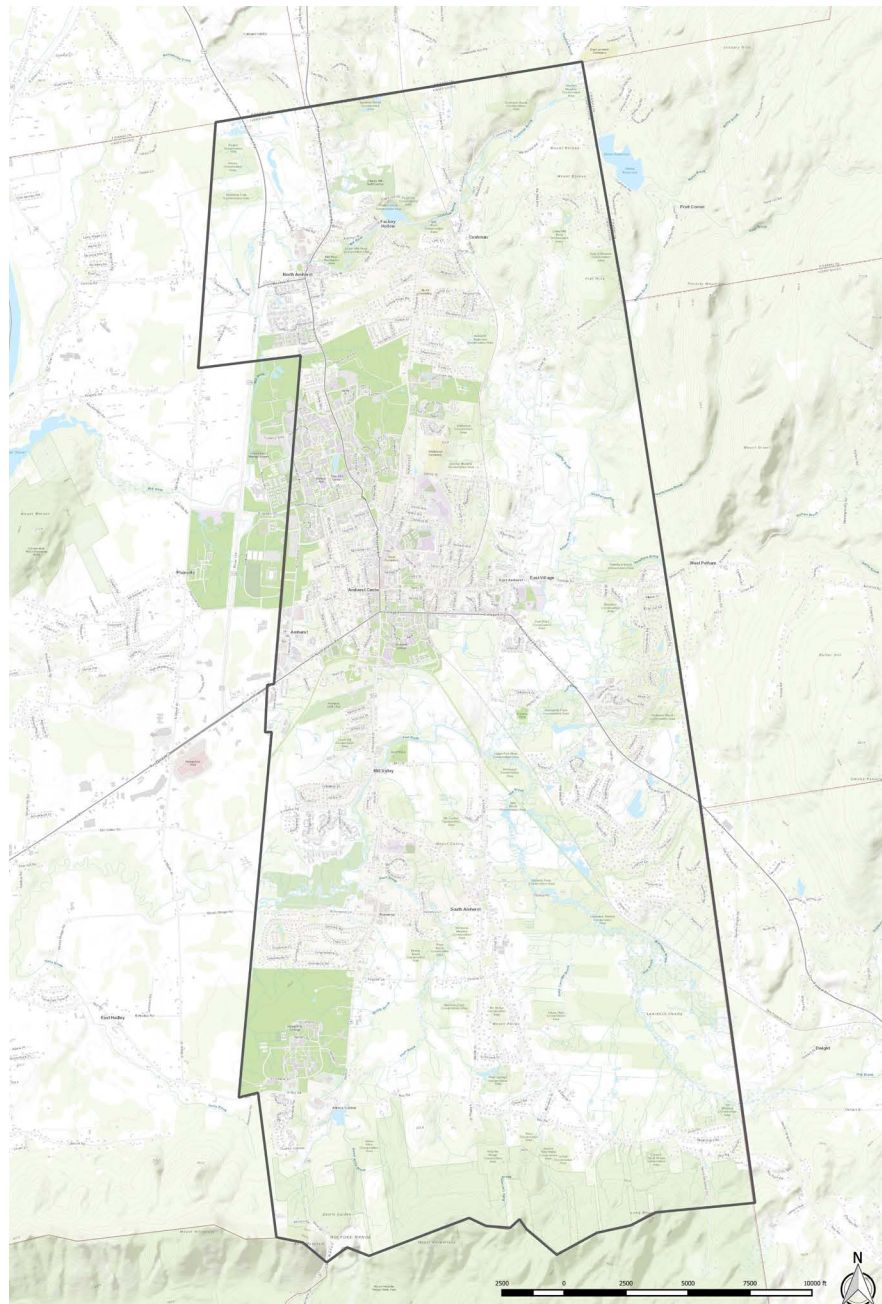
The base “storybook map” facilitated participatory mapping during the workshop. Workshop participants annotated this map as a way to visually represent their thoughts, tell stories of past experiences, flag particularly vulnerable locations, and highlight areas that might serve as strengths.

The annotated maps from each of the groups are included below the original.

Storyboard Map

[ORIGINAL]

Workshop participants used a copy of this map to visually record their thoughts.



BLUE TEAM

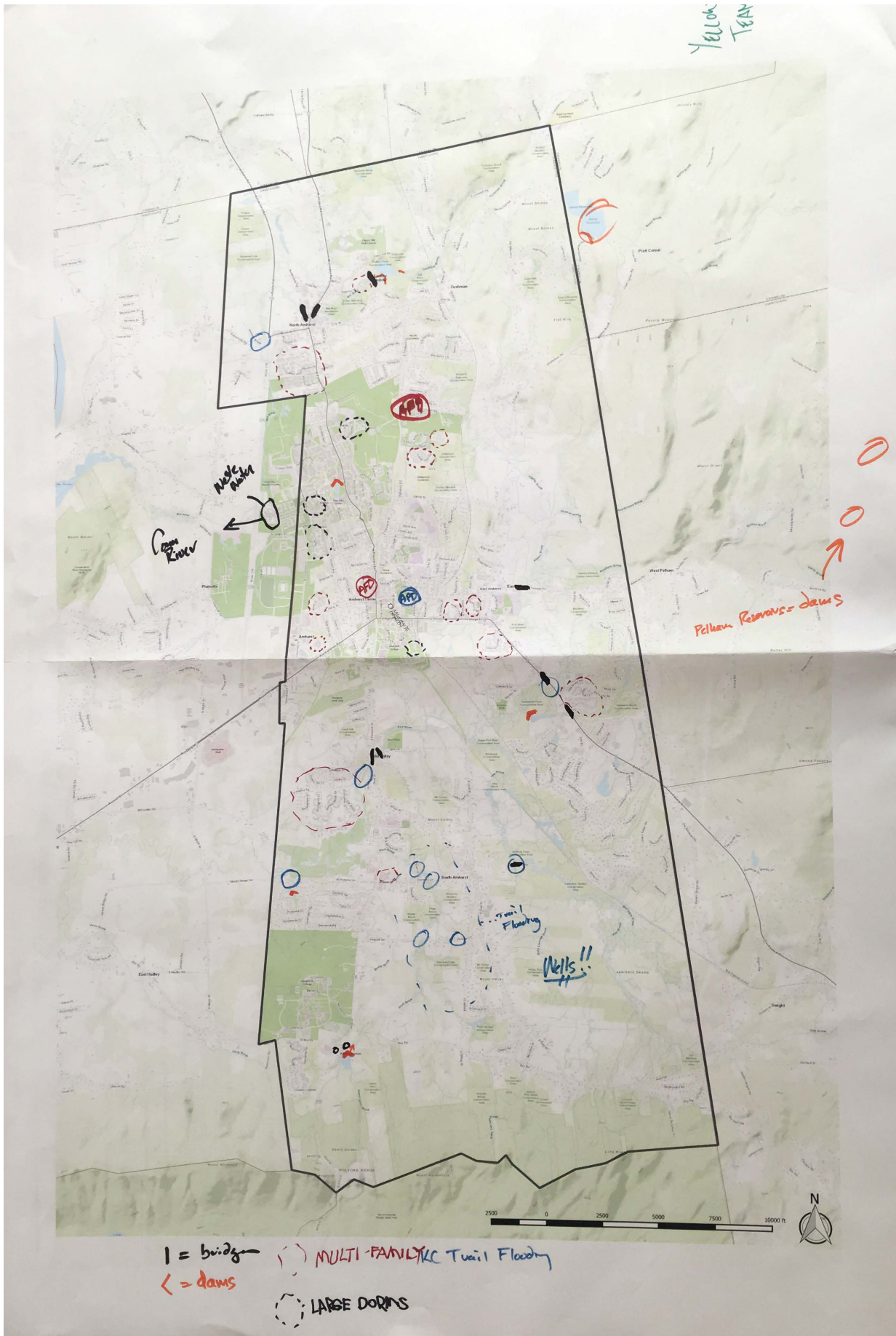


Storyboard Map
[BLUE GROUP]



Storyboard Map
[RED GROUP]





BLUE TABLE

www.CommunityResilienceBuilding.com

Community Resilience Building Risk Matrix

Priority: H - M - L, Ongoing

Features	Location	Ownership	V or S	Increased Heat	Increased Precipitation	Drought	Extreme Weather	Time
Infrastructure Water supply → water towers, reservoirs, etc. Evacuation routes Fire prevention	SE of town	town	S	explore opportunities for new water sources, additional water storage → water tower, water storage, water treatment plant				Short Long Ongoing
1,2,4 lack of green infra → lack of pervious surf priority for action over the short or long term (and ongoing) V = Vulnerability S = Strength	SE of town	town	V	explore opportunities for new water sources, additional water storage → water tower, water storage, water treatment plant				L
1,2,4 residential storage for season pop single family homes pre-1970	center of town	private home owners utility, town	V	new construction: new rule to encourage water usage, water storage, water treatment plant → water tower, water storage, water treatment plant				L
1,2,4 transformation → lack of public transit out town Valley bike share (S) on way to shuttles	near town	PUTA	V/S	improve bike infrastructure to support this → bike share network → water tower, water storage, water treatment plant				0-5
4 Access during spurs on road (widespread) or windstorm (food, fuel) to shuttles	near town	PUTA	V/S	improve bike infrastructure to support this → bike share network → water tower, water storage, water treatment plant				S
4 Heating demand Solar development Homeshiping, utilities, etc.	near town	PUTA	S	improve bike infrastructure to support this → bike share network → water tower, water storage, water treatment plant				L
Societal Community for underserved, of deep student pop / remote pop / multi-ethnicity People who influence our electricity	town	town	V	education, information to landlady about appropriate strategies, etc. to improve security → water tower, water storage, water treatment plant				L
1,4 segregation EJ pops. in isolated areas utilities shelter (w/ no heat) in bath	Schools	landlord	V	education, information to landlady about appropriate strategies, etc. to improve security → water tower, water storage, water treatment plant				S
1,2,4 Apple wood → back up power (S) Student pop → draws on water / energy	town wide	UMASS / State	S	collaborate for equity + justice train-work → use this program work → water tower, water storage, water treatment plant				S
1,4 Communication → non-English pop → vulnerable to power, how do you access?	town wide	town wide	S/V	collaborate for equity + justice train-work → use this program work → water tower, water storage, water treatment plant				S
1,4 Active collaboration, strength in numbers Student pop, IP	town	town	S	collaborate for equity + justice train-work → use this program work → water tower, water storage, water treatment plant				S
Environmental lots of conservation land / pres.	town	town	V	collaborate for equity + justice train-work → use this program work → water tower, water storage, water treatment plant				S
1,2,4 EEE → wet years insect-borne illnesses / ticks increase in allergen health prob.	town	town	S	collaborate for equity + justice train-work → use this program work → water tower, water storage, water treatment plant				M
1,3 endangered salamander pop	town	town	S	collaborate for equity + justice train-work → use this program work → water tower, water storage, water treatment plant				M
1,2 Street trees → shading, canopy Take down vulnerable dead trees (W) Farm land → potential for food systems recovery	town / East	town	S	collaborate for equity + justice train-work → use this program work → water tower, water storage, water treatment plant				M/L

Risk Matrix [BLUE GROUP]

Master Plan Development
 - D. Organized (3 Private Com's)
 - Recycling (No Love)
 - SOLID WASTE

INCLUDING THIS INTO MASTER PLAN
 • Transportation - Bike/Pedestrian Network
 • Equity Especially in a Capitalist → Equity Learning
 • www.CommunityResilienceBuilding.com
 • Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)
 • www.CommunityResilienceBuilding.com
 • Home Based Project (Priority)
 • Charges for Building (Priority)
 • Community as a Resource

Community Resilience Building Risk Matrix
 Most food is from elsewhere
 food local food system
 priority for action over the short or long term (and ongoing)
 V = Vulnerability S = Strength
 SOLAR STORAGE TOWER
 Features Community Choice + Location Ownership V or S
 Infrastructural Open Space Community Development by Law
 LAW ENFORCE SWAMP/ATKINS
 PROTECTED WATERSHED
 WATER SOURCE LEAKS
 Atkins / Highpoint De. Development
 GR'S Mapping Capability
 PUBLIC TRAILS
 Planning in S. Amherst
 (Pomeroy + others)
 - Does well
 - When Pomeroy is BAD (highly vulnerable)
 Societal 40% of school age kids follow family level strength + lots of housing
 3 UNIVERSITIES
 Transition Staff
 SUBFOUNDER BY STABLE COMMUNITIES
 Move west to from the Brook
 Heat to support vulnerable
 Potential influx of US Climate
 Half of population is transitory
 Young Educated Career Lots
 Environmental
 3 UNIVERSITIES
 Three University Suburban
 TO HIGH WATER TABLE
 32 000 Acres of conserved land
 1/3 of town is conserved
 (NOT TAKEN) POTENTIAL FUTURE
 ARE EXTREMELY VULNERABLE TO CARBON
 VERY LOCAL
 EMISSIONS LOCALIZED TO
 ONLY 2 RAILS GOING N/S THROUGH
 RAIL LINE THROUGH TOWN
 → Strength?

Features	Community Choice + Location Ownership V or S	Increased Heat	Increased Precipitation	Drought	Extreme Weather	Priority	
						H - M - L	Short Long Ongoing
<p>Master Plan Development - D. Organized (3 Private Com's) - Recycling (No Love) - SOLID WASTE</p> <p>Community Resilience Building Risk Matrix Most food is from elsewhere food local food system priority for action over the short or long term (and ongoing) V = Vulnerability S = Strength SOLAR STORAGE TOWER</p> <p>Features Community Choice + Location Ownership V or S Infrastructural Open Space Community Development by Law LAW ENFORCE SWAMP/ATKINS PROTECTED WATERSHED WATER SOURCE LEAKS Atkins / Highpoint De. Development GR'S Mapping Capability PUBLIC TRAILS Planning in S. Amherst (Pomeroy + others) - Does well - When Pomeroy is BAD (highly vulnerable) Societal 40% of school age kids follow family level strength + lots of housing 3 UNIVERSITIES Transition Staff SUBFOUNDER BY STABLE COMMUNITIES Move west to from the Brook Heat to support vulnerable Potential influx of US Climate Half of population is transitory Young Educated Career Lots Environmental 3 UNIVERSITIES Three University Suburban TO HIGH WATER TABLE 32 000 Acres of conserved land 1/3 of town is conserved (NOT TAKEN) POTENTIAL FUTURE ARE EXTREMELY VULNERABLE TO CARBON VERY LOCAL EMISSIONS LOCALIZED TO ONLY 2 RAILS GOING N/S THROUGH RAIL LINE THROUGH TOWN → Strength?</p>	S	S	S	S	S	S	S
<p>NEED NEW BRACK NEW STUDY TO DESIGN BRACK NEW STUDY TO DESIGN → HAVE COMMUNITY CLINE → HIGHER CAPITALIZATION 3.0 FORMULA</p>	S	S	S	S	S	S	S
<p>PHOTOGRAPHS SUPPORT SMALL HOUSES TO UPDATE PROVISIONS OF HOUSES</p>	S	S	S	S	S	S	S
<p>TWO STUDIES TO INCREASE TO STRONGER LEADERS TO STRONGER LEADERS</p>	S	S	S	S	S	S	S
<p>CLIMATE MITIGATION & ADAPTATION PLAN W/ SOCIAL EQUITY CONSULTANT</p> <p>LOCAL AT WITH COMMUNITIES ARE IDENTIFIYING STRONG SUPPORT STRONG BUILDING IDENTIFICATION → RESILIENT ACTION → ACTION CHAMPIONS</p> <p>EXPANDED COMMUNICATION THROUGH TOWN</p> <p>CYNDIA'S EMERGENCY PLAN MATRIX OF ACTIONS</p>	S	S	S	S	S	S	S
<p>Water-Plan Social Justice is successful COMMUNITY OF TOWNS</p>	S	S	S	S	S	S	S

*1 Does town have contingency plan for train derailment - Lawrence
 *2 Water supply -> drought (send the students home?)
 *3 Impacts on infrastructure (water, sewer, gas, electric, etc.)
 *4 Lot of expertise - Universities; institutional structures can tap into
 *5 Housing shortage; potentially not maintained to the degree if owner lived there
 *6 Food deserts
 *7 Tools for mass communication (S) + pockets of community not subscribed (stud)

GREEN TABLE

Community Resilience Building Risk Matrix

www.CommunityResilienceBuilding.com
 Transient Population (V) + pockets of community not subscribed (stud)
 Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Features	Location	Ownership	V or S	Increased Heat	Increased Precipitation	Drought	Extreme Weather	Priority	Time
Infrastructure								H-M-L	Short Long Ongoing
lan Brook - culverted + daylight potential to be overcooled Gutters run into it, basements Impervious surfaces in UMass area Electrical substation 116 - wet area (?) - slightly raised + lousy drainage Aging main lines (water, NW, stormwater) - impact on water quality Bridges - undermined with high water flow (+ other surface water flow) Rail line - 3-4 derailments in past infro Few years (resilient)	Private + Public (part) UMass Private - Eversource TOA TOA Private	✓ ✓ ✓ ✓ ✓ ✓ ✓		• Town/developer communication - proactive, positive, early on, creating incentives, more innovative, less traditional approach • Zoning relative -> framework for resilience thinking • Community Choice Energy 3.0 (example) • Ongoing maintenance w/ bigger awareness of "invisible issues" -> subsurface design standards subsurface systems -> increased funds	H O-L H S-O				
Societal									
Apartment complexes off E Hadley Rd - high water Mixed Table, lower income communities Half of housing = rentals (not necessarily local owners, harder to engage) -> working email list, local representative for communications English (limited proficiency) - challenge for communication -> Spanish and Cambodian Transient population (and transient ownership issues) Elder population (large) - fixed incomes, but not for water Homeless populations (Amherst has shelter)	Private Private TOA Town-wide Town-wide Town-wide	✓ ✓ S ✓ ✓ ✓		• Reach communities, where they are, focused on issues defined by communities + starting there • Leveraging town council, building relationships w/ constituents • Creating new models of "meetings" - in meetings, conversations, variety of activities, times + models, working with schools @ parents meetings; block parties; two-way conversations; building access and connections • Incentivizing land leads to build connection					
Environmental									
Lawrence Swamp - good functions (protected land (S) large portion) Reservoirs - vulnerability in tax base Hampshire Gate - fiscal sustainability - big swath of land Trees - threatening electrical infra made no longer invasive pests + species Beavers - increasing flooding	Private/public public public private public + private	✓ S S V/S ✓		• Ensuring farmland remains protected, incentivizing active farming • Plan in place for awareness/policies for protecting water in many ways (ie drain derelict in swamp) Regional coordinating • Planning - supply line; how can we leverage resources (MTA, rail line)	L L M O				

→ tests set up on conservation land behind big V, celebrities, behind railroad station
 → relatively robust to turn to in emergency

*8 solar over parking lots banks Temp
 may be able to set it up like Amber Alerts (need to get certified)
 *9 Disconnect between tenant and landlord
 *10 large swaths of institutional land (takes coordination)
 *11 Different priorities
 *12 Transit System free for, but policies in order in system

Final Risk Matrix

Community Resilience Building Risk Matrix		www.CommunityResilienceBuilding.org					
H-M-L priority for action over the Short or Long term (and Ongoing)		Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)					
V = Vulnerability S = Strength		Priority H - M - L					
Features		Location		Ownership		V or S	
Infrastructural		Floodings		Increased Temperatures		Drought	
		Extreme Weather		Priority H - M - L		Short Long Ongoing	
Water supply - The town has a limited and diffuse water supply that is used heavily by student populations.	Throughout; Southeast Amherst, especially	Town	V	Encourage local academic institutions to reduce water consumption, explore opportunities for more water sources, conduct additional studies on how to clean and store water, develop educational outreach about conservation, use more reclaimed water, move towards a greater proportion of composting toilets, explore the possibilities of water filters, create plans and redundancies to prepare for emergency situations, focus conversations between the universities and the town on resilience and sustainability, broaden such conversations to include more stakeholders, and encourage the University-Town of Amherst Collaborative (UTAC) to take a leadership role in such a process. [Increased Heat; Drought]	H	L-0	
Energy systems - The town is heavily dependent on the grid for power, with limited islandable or distributed systems that can be used as backup. The town relies on a substation on Route 116 that has poor drainage, and most of the town's power lines are above ground and vulnerable to storm damage.	Route 116 (North Amherst)	Eversource	V	Task the Energy Commission with developing principles and goals for the community's target energy consumption and necessary infrastructure moving forward (in partnership with a consultant); continue to support programs like Community Choice Energy 3.0; invest in renewable energy storage and community-level energy generation; and consider partnering with Community Solar. [Increased Heat; Extreme Weather]	H	S-0	
Road and stormwater infrastructure - Town roads are plagued by overwhelmed culverts and erosion. The flooding at UMass, in particular, affects not only residents of Amherst, but of Hadley, too.	Throughout; UMass, Tan Brook at North Hadley Road, near the soccer fields	Private & Public	V	Proactively engage developers early in the development process to create incentives for stormwater management, consider modifying town zoning to include a resilience framework, ensure repairs or new roadways include new technologies to address climate change, and launch a capital improvement plan to improve flooded roadway areas to account for increased rainfall/intensity. [Increased Precipitation, Extreme Weather]	H	L	
Dams and bridges - Dams and bridges are threatened by high water flow.	South Amherst, Puffers Pond below the dam	Town	V	Conduct ongoing maintenance with a greater awareness of 'invisible issues' and greater funds for subsurface systems, and conduct consistently and regularly funded inspections and exercises of the dam. [Increased Precipitation, Extreme Weather]	H	S-0	
Food systems - Amherst imports most of its food and could be cut-off from its supply if I-91 shuts down; the proportion of Amherst's food that is (or can be) produced locally in Amherst is unclear. Sections of Amherst are food deserts with limited grocery stores or other locations to procure healthy food, and food inaccessibility may be exacerbated during a climate hazard if certain roads are closed.	I-91	Public	V	Ensure that amenities like grocery stores are accessible by foot or bus. [Resilience, general]	H	L	

[CONTINUED]

<p>Water and wastewater infrastructure - The town's aging mainlines affect the reliability of Amherst's water quality, wastewater management, and stormwater management. The wastewater treatment plant is 40-years-old, and some pipes were connected illegally thirty years ago, leading to sewage back-up in house basements in the development directly north of Hampshire College.</p>	<p>Throughout; Hadley, apartment complexes north of Hampshire</p>	<p>Town</p>	<p>V</p>	<p>Assess the distribution system and determine where repairs may be needed; incentivize water reuse; modify building codes to better address energy, water use, and sewer impact; conduct ongoing maintenance with a greater awareness of 'invisible issues' and greater funds for subsurface systems, and continue to work towards Municipal Separate Storm Sewer Systems (MS4) compliance. [Increased Precipitation, Extreme Weather]</p>	<p>H/M</p>	<p>S-O</p>
<p>Housing stock - Amherst's housing stock is aging, leading to higher maintenance costs and more difficulty implementing energy efficient features.</p>	<p>Throughout; town center, especially</p>	<p>Homeowners</p>	<p>V</p>	<p>Incentivize landlords to improve building efficiencies, create a program to provide financial and technical assistance to homeowners to carry out necessary repairs. [Increased Temperatures, Extreme Weather]</p>	<p>M</p>	<p>S-O</p>
<p>Bus system - Pioneer Valley Transit Authority's (PVTa) routes do not serve low income and minority communities outside of the downtown areas or select key destinations.</p>	<p>Throughout</p>	<p>PVTa</p>	<p>V</p>	<p>Verify that public transportation signage is bilingual, and shift route locations and frequency to service popular and necessary destinations, such as grocery stores. [Resilience, general]</p>	<p>M</p>	<p>S-O</p>
<p>Bike and pedestrian infrastructure - Bike lanes and side walks are inconsistently maintained, do not equitably serve various communities, and often create dangerous pedestrian-vehicular interactions.</p>	<p>East Hadley Road</p>	<p>Town</p>	<p>V</p>	<p>A Community Development Block Grant plan is currently being carried out to address the East Hadley Road, in particular, and the town should take stock of comparably dangerous interactions elsewhere, as well as allow peripheral walking trails to flood and keep up with maintenance and increase budget for walking trails. [Resilience, general; Increased Precipitation]</p>	<p>M</p>	<p>S-O</p>
<p>Impervious surfaces - The UMass campus has a significant amount of impervious surfaces.</p>	<p>UMass</p>	<p>UMass</p>	<p>V</p>	<p>Increase funding for the local trail network, advocate for more green space and permeable surfaces, allow trails to flood in storms, and keep up with the necessary maintenance afterwards, building out as needed. [Increased Precipitation, Extreme Weather]</p>	<p>M</p>	<p>O</p>
<p>Waste management - The town's waste management services do not coordinate efficiently, and residents are not always aware of waste management and recycling services.</p>	<p>Throughout</p>	<p>Private & Public</p>	<p>V</p>	<p>Facilitate a combined plan for waste management, and create and distribute educational materials outlining the recycling, composting, waste management services, and the importance of reducing waste.</p>	<p>M</p>	<p>S</p>
<p>Municipal facilities - Municipal facilities are aging, unevenly distributed, and may require updates or maintenance.</p>	<p>Throughout; South Amherst, especially</p>	<p>Town</p>	<p>V</p>	<p>Ensure that new facilities meet the town's Zero Energy Bylaw; relocate or add an Amherst Fire Department location near South Amherst; include an ADA-compliant community space in any new facility; take inventory of buildings' current resource consumption to identify potential opportunities for greater efficiency; and ensure consistent assessment, repair, and redundancy plans for police and fire towers. [Resilience, general]</p>	<p>M/L</p>	<p>L</p>
<p>Heating and cooling centers - The town lacks clearly identified heating or cooling centers, though Bangs Community Center, Town Hall, and Amherst Regional High School can serve those functions if the municipal staff 'activates' them in extreme weather conditions, and Puffers Pond, the Splash Pad, Memorial Pool, and Atkins Center provide additional opportunities for swimming or cooling off.</p>	<p>Throughout</p>	<p>Town</p>	<p>V/S</p>	<p>The town should ensure that notification of such activation, which currently happens through social media and reverse 911, reaches vulnerable populations. [Increased Heat, Extreme Weather]</p>	<p>L</p>	<p>S</p>
<p>Road infrastructure - The town's limited thoroughfares and elongated geography could limit mobility and access to resources in an emergency.</p>	<p>Throughout; North Amherst especially</p>	<p>Public</p>	<p>V</p>	<p>Acknowledge that this vulnerability is particularly acute for non-English-speaking residents or those without access to a vehicle, focus on regional collaboration for emergency support and exchange of existing resources, and use the Family Center as a facility to distribute necessary goods in an emergency. [Increased Heat, Increased Precipitation, Extreme Weather]</p>	<p>L</p>	<p>S-O</p>

[CONTINUED]

Freight rail line - The freight rail line has experienced multiple derailments in recent years, and comparable derailments moving forward could damage the Lawrence Swamp.	The Lawrence Swamp	Private	V	Ensure that there is a contingency plan in place in case of a derailment, and consider ways to leverage that existing infrastructure for new transportation uses. [Extreme Weather]	L	S-O
Communication infrastructure - There is uncertainty around the security of Amherst's communications infrastructure. The town's emergency communications system is reliant on towers outside Amherst, and the systems for emergency communication are susceptible to breakdown if towers are damaged in a storm or compromised by theft, vandalism, or terrorism.	Throughout	Private & Public	V	Take stock of possible threats to cell towers and network, research how such threats are being addressed across different communities and scales, and compare the town's resources and procedures to other towns in Massachusetts. [Resilience, general]	L	L
Multifamily buildings - Residential units and potential meeting places in residential buildings have high water tables.	Apartment complexes off of E. Hadley Road and Pomeroy Road	Private	V	No specific action identified.	N/A	N/A
Renewable energy - Despite limited capacity and funds for green energy initiatives, Amherst anticipates a more robust solar energy program and is a part of a 3-town task force to create a community choice energy option.	Throughout, particularly at Academic Institutions	Private & Public	V/S	Task the Energy Commission with developing principles and goals for the community's target energy consumption and necessary infrastructure moving forward (in partnership with a consultant); continue to support programs like Community Choice Energy 3.0; invest in renewable energy storage and community-level energy generation; and consider partnering with Community Solar. [Resilience, general]	H	L
Back-up power / energy resources - The student populations may be perceived to strain energy resources — back up power is required for the UMass' 30,000 students during cold snaps — but private stakeholders can provide the town back up power, food, and resources in an emergency that it would not have access to otherwise. For example, UMass has 5-1/2 megawatts of solar on campus, a micro-grid, and battery storage; Hampshire College has a system of 15,000 solar panels with battery storage; and Applewood has backup power and can serve food during outages.	UMass, Applewood, Hampshire	Private	V/S	No specific action identified.	N/A	N/A
Bike and pedestrian infrastructure - The Norwottuck Rail Trail is heavily used by commuting cyclists.	The Norwottuck Rail Trail	State	S	Increase the bike trail's connectivity to roads with bike infrastructure and other bike paths in Amherst. [Resilience, general]	H	L
Bike and pedestrian infrastructure - The community is moving forward with the ValleyBike Share program, which may increase bike ridership and safety in Amherst.	Throughout	Private & Public	S	Create a bike culture through bike maintenance and ownership incentives, apply recent grant from the Pioneer Valley Planning Commission (PVPC) to evaluate the town's bike and pedestrian infrastructure. [Resilience, general]	H	S-O
Health facilities - Routine and acute medical assistance can be accessed through campus medical centers, Cooley Dickinson Hospital, and the urgent care facility near Stop n' Shop.	Multiple	Private & Public	S	Take stock of which campus facilities are accessible to the public and raise public awareness about such existing health resources. [Resilience, general]	M	S
Public transportation - The robust fleet of UMass, public school, and PVTAs buses are routinely used by low-income residents and could be leveraged for transportation in the event of an emergency.	Throughout	Private & Public	S	Compose plan to leverage transportation resources, including PVTAs buses and the rail line, in the event of an emergency. [Resilience, general]	L	S
Municipal facilities - Multiple new municipal buildings will be constructed in the near future.	Throughout	Town	S	No specific action identified.	N/A	N/A

[CONTINUED]

<p>Municipal facilities - The police station has a generator for its building and a community meeting space.</p>	<p>Amherst Police Station</p>	<p>Town</p>	<p>S</p>	<p>No specific action identified.</p>	<p>N/A</p>	<p>N/A</p>
<p>Communications infrastructure - Downtown Amherst has free wifi.</p>	<p>Downtown</p>	<p>Town</p>	<p>S</p>	<p>No specific action identified.</p>	<p>N/A</p>	<p>N/A</p>
<p>Societal</p>						
<p>Political power and representation - Lower income, minority, and non-English speaking populations outside of the downtown area have had less access to political power and participation in planning processes.</p>	<p>Throughout</p>	<p>N/A</p>	<p>V</p>	<p>Focus on immediate crisis-based communication while developing community-based leadership; equitably compensate residents and business owners participating in community improvement processes and sitting on town committees; consider identifying a neighborhood captain to serve as a community representative and liaison in emergency situations; leverage the town council's district framework to build relationships at a neighborhood scale and to improve access to government resources and power; and identify people and organizations already working through language barriers and across communities of different backgrounds and means, striving to work within existing networks rather than forcing groups to use new tools. How do we connect and create power together? How do we give everyone useful communication tools? [Resilience, general]</p>	<p>H</p>	<p>S-O</p>
<p>Social segregation - Socially segregated neighborhoods lead to a lack of cohesion and uneven access to resources.</p>	<p>Throughout</p>	<p>N/A</p>	<p>V</p>	<p>Forge new connections across the community by tapping connections with the young professional community in Amherst, engaging student groups in planning processes, providing funds for community block parties to engender two-way conversations that build access and connections, and leveraging the Family Center, the Survival Center, and the Casa Latina to build connectivity. [Resilience, general]</p>	<p>H</p>	<p>S-O</p>
<p>Information access - Information and resources provided to the community from the municipal government, do not always reach lower income, minority, and non-English speaking populations outside of the downtown area. Apartment complexes lack common meeting spaces, bulletin boards, and public access to individual apartment doors, rendering it difficult to identify channels for effective communication with and within such communities.</p>	<p>Throughout, especially at apartment complexes</p>	<p>N/A</p>	<p>V</p>	<p>Use multi-lingual written, verbal, digital, print, and face-to-face communications for city communications with residents; engage student groups; integrate formal meeting spaces into apartment complexes; develop new models of public participation that function as two-way conversations between constituents and town staff; work with schools and parent groups, tapping the knowledge of the school district; engage the transient population by connecting community efforts with student groups and clubs at UMass, Amherst College, and Hampshire College; and incorporate channels for remote participation, such as online or paper comment submissions, and communicate that feedback to the community at large. [Resilience, general]</p>	<p>H</p>	<p>S-O</p>
<p>Renter / landlord relationship - Renters have less influence over the quality and the energy efficiency of their homes, an issue exacerbated by the housing shortage in Amherst.</p>	<p>Throughout, particularly around academic institutions and in apartment complexes (East Hadley Road, Colonial Village, Palmer Lane Co-Op)</p>	<p>Private</p>	<p>V</p>	<p>Disseminate information to landlords about how to improve the energy efficiency of their buildings, create time-sensitive education requirements when landlords open their escrow accounts, incorporate energy-efficient features to minimize greenhouse gases into building codes, ensure rebate programs provide enough incentive to incur the costs of upgrades, educate landlords about their responsibilities to their tenants, incentivize landlords to build connections among their tenants through activities. [Resilience, general]</p>	<p>H</p>	<p>S-O</p>

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<p>Cost of living - The cost of living in Amherst is prohibitive or constraining to many of its residents. Amherst has a high cost of living, even as 40 percent of kids in the Amherst school system qualify for free and reduced lunch, and families in strained financial situations are more vulnerable to the effects of climate change.</p>	Throughout	N/A	V	Focus on issues defined by community members, who know their needs and preferences best, and meet communities where they are. [Resilience, general]	H	S-O
<p>Health - Air pollution from the concentration of cars around the universities is compounded by the geography of the valley that traps air from coal-burning plants</p>	Academic institutions	Private & Public	V	[Infrastructure-based solutions] Encourage alternative modes of transportation, install more electric charging stations, incentivize electric cars, transition to more sustainable transportation options, consider charging more for parking downtown, ensure that amenities like grocery stores are accessible by foot or bus, consider the creation of a mobile market, encourage ride sharing through a ride share network, encourage programs for discounted rent for electric vehicle owners. [Resilience, general]	H	L-O
<p>Homeless services - Existing homeless services in Amherst, particularly for those under the influence, may support the growth of those populations without providing adequate women-designated beds or around-the-clock services.</p>	Craig's Doors	Private	V	No specific action identified.	N/A	N/A
<p>Elderly population - The town's sizable elderly population may not have support networks or access to municipal emergency communication and social services, particularly for those who live alone.</p>	Throughout, especially at Applewood, the Senior Center, and on University Drive.	N/A	V	No specific action identified.	N/A	N/A
<p>Transient population - Due to the large transient student and renter populations and certain communities' reluctance to engage in U.S. Census questionnaires or contact with the government, the town's population and demographics are not always accurately captured in U.S. Census data or in local planning processes.</p>	Throughout, especially at academic institutions and in immigrant communities.	N/A	V	No specific action identified.	N/A	N/A
<p>Municipal resources - Municipal resources, including staff capacity and taxable land, are limited. Town departments may be understaffed, and there is a lot of land within Amherst that cannot be taxed, in large part due to the universities.</p>	Throughout	Town	V	No specific action identified.	N/A	N/A
<p>Future of Hampshire - Hampshire College's future is uncertain, which creates a large unknown in terms of the ownership and use of a large portion of the town. Having large swaths of consolidated land owned by institutions within the town could benefit from greater coordination between the town and its institutions.</p>	Hampshire College	Private	V	No specific action identified.	N/A	N/A

[CONTINUED]

Visitors - A large number of the people using Amherst's infrastructure or resources are not residents, but tourists or those in town for academic or professional conferences.	Throughout	N/A	V	No specific action identified.	N/A	N/A
Lack of power - Residents feel a lack of power over big industry.	Throughout	N/A	V	No specific action identified.	N/A	N/A
Master plan - The town has an existing master plan, but it lacks incentives and policies facilitating sustainable development, includes outdated and prohibitive zoning, and needs updating to hold large institutions and developers accountable to the needs of residents.	Throughout	Town	S/V	Prioritize implementing outstanding recommendations; include measures to increase the amount of moderately-priced housing; modify the master plan to incorporate a commitment to climate change adaptation and equity, and move the updated plan towards implementation; hire one paid consultant to draft a climate action plan or portion of the master plan, and another paid consultant to ensure that equity is at the forefront of each step of the development of the plan; revise the building code with a more rigorous review process for new buildings, requirements for incorporating resilience strategies, and greater attention to energy, water use, and sewer impact. [Resilience, general]	H	L-O
Emergency communication - While the Town's new emergency alert system sends mass alerts to everyone who subscribes and is accessible in multiple languages, it does not reach residents of surrounding towns who are dependent on Amherst's water and sewer infrastructure or Amherst residents who do not use telephones or the internet.	Pelham; Throughout	Town	S/V	Coordinate communications with neighboring municipalities; expand the current emergency communications system to reach areas of non-English speaking residents or undocumented residents; provide multi-lingual education on how to access services during an emergency; and compare Amherst's emergency resources and procedures to other towns in Massachusetts. [Resilience, general]	H	S
Regional stability - Amherst is surrounded by stable communities and has not witnessed large swings in its population.	Throughout	N/A	S	Continue to coordinate with neighboring municipalities, focus on ensuring the wellbeing of existing residents, and consider how larger migration patterns may shift as a result of climate change and, by extension, lead to population booms or losses in Amherst. [Resilience, general]	L	L
Social services - Existing community resources, such as Craig's Doors, the Family Center, the Survival Center, Casa Latina, and worship communities, provide food, shelter, and social spaces to residents, particularly vulnerable populations.	Throughout	Private	S	Leverage worship communities as a starting point for larger faith-based community organization in connecting residents to the town government; Meet communities where they are, instead of forcing them to adapt to new forms of community organization. [Resilience, general]	H	S-O
Apartment communities - Apartment developments are existing, small-scale units of community organization, often with a distinct culture and set of resources.	Throughout	Private	S	Meet communities where they are, instead of forcing them to adapt to new forms of community organization. [Resilience, general]	H	S-O
New political structure - Amherst debuted a new political structure in 2018, with a Town Council composed of thirteen members representing five districts.	Throughout	Town	S	Harness this new political structure to build more and stronger relationships between those in office and their constituents, and continue to build on its momentum (new Energy and Climate Action Committee). [Resilience, general]	H	S-O

[CONTINUED]

Academic institutions - Universities/colleges serve as a resource for knowledge and research capacity.	Academic institutions	Private & Public	S	Expand University-Town Amherst Collaborative (UTAC) to include Amherst College and Hampshire College; research and align each institution's emergency and resilience plans; facilitate conversations through which schools can learn from one another and coordinate plans; and enable UTAC to assume greater responsibility for community-wide emergency planning. [Resilience, general]	M	L
Municipal staff - The municipal staff members provide valuable insight into monitoring town infrastructure, and are committed, skilled (GIS), and engaged (Building Commissioner, in particular).	Throughout	Town	S	Continue to leverage GIS mapping tools, in particular, which are not accessible to many peer communities, and build off the Building Commissioner's recent work to strengthen relationships between City Hall and residents. [Resilience, general]	M	O
Culture - Amherst generally has a culture of activism, collaboration, and open-mindedness about climate mitigation informed by residents' experience of extreme weather events in recent years.	Throughout	N/A	S	No specific action identified.	N/A	N/A

Environmental

Vector-borne disease - Rates of Eastern Equine Encephalitis (EEE) and mosquito and tick-borne illnesses are especially high during particularly wet years.	Throughout	N/A	V	Assess rates of such illnesses, identify particularly susceptible areas in town. [Increased Heat, Increased Precipitation]	M	S-O
Tree damage - Many trees were damaged in recent storms and are under threat from invasive species like Gypsy Moths and Emerald Ash Borers, leading to a less robust tree canopy.	Throughout	Private & Public	V	Keep trees healthy and properly maintained to both ensure a more robust tree canopy and ensure they do not damage electrical wires in storms. [Increased Heat, Extreme Weather]	M	S-O
Beavers - Large beaver population leads to increased flooding.	Throughout	N/A	V	No specific action identified.	N/A	N/A
Conservation land - One third of the town is conservation land. The abundance of conservation land reduces the amount of taxable land in Amherst and constrains the municipality's funding for programs and interventions. At the same time, such zoning and regulation encourages development in concentrated areas, which conserves natural resources and reduces greenhouse gas emissions.	Throughout, notably at Lawrence Swamp	Public	S/V	Concentrate development near the town center on sites connected to existing water and sewer systems; coordinate on a regional scale to protect water from a wide range of threats, including pollutants, debris, and development; and consider alternative municipal revenue streams to compensate for the untaxed land. [Resilience, general]	H/M	L
Water quality - Atkins Reservoir and community wells are surrounded by protected land, but stormwater runoff threatens water quality and the water quality of local rivers may be further compromised by climate change.	Atkins Reservoir, Lawrence Swamp	Town	S/V	Ensure there is a plan in place to protect water sources from overuse and threats to water quality, such as train derailment in Lawrence Swamp. [Increased Precipitation, Drought]	M	L

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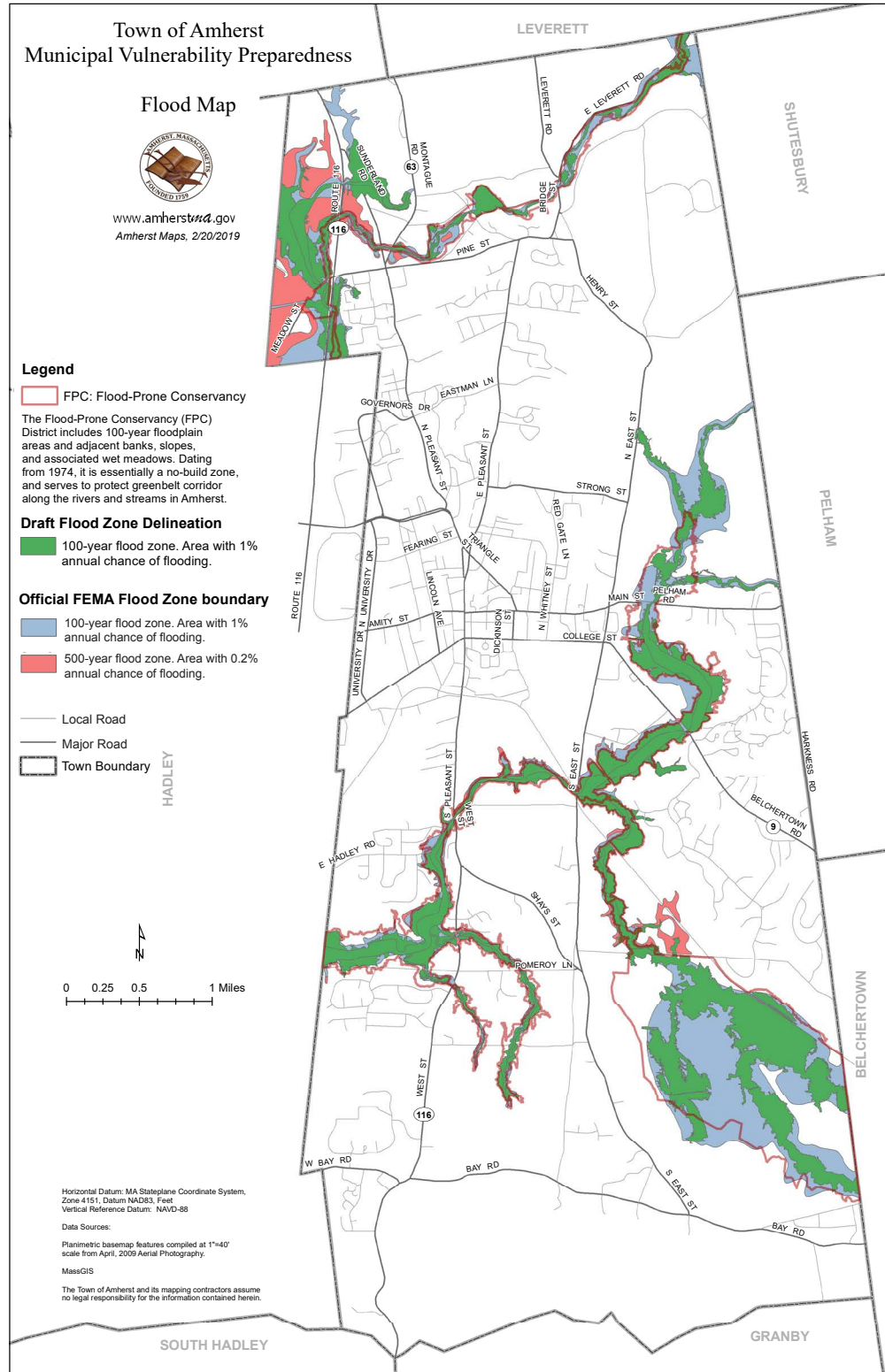
<p>Preservation vs. progress - There is a tension between preservation and progress indelible to public discourse in Amherst. For example, the endangered salamander population's habitat has received protection in the face of development, particularly of student housing.</p>	<p>North Amherst, Cushman</p>	<p>N/A</p>	<p>S/V</p>	<p>No specific action identified.</p>	<p>N/A</p>	<p>N/A</p>
<p>Pollen - Pollen-related allergies are exacerbated seasonally and growing increasingly prevalent year by year.</p>	<p>Throughout</p>	<p>N/A</p>	<p>V</p>	<p>No specific action identified.</p>	<p>N/A</p>	<p>N/A</p>
<p>Agriculture - Large amounts of high quality agricultural land in the immediate environment offer a range of options for local food sources, as well as opportunities for industry innovation, education, and employment. Partnerships between members of the agricultural community and educators at Amherst Public Schools and UMass build the basis for integrating two of Amherst's economic drivers.</p>	<p>Throughout</p>	<p>Private</p>	<p>S</p>	<p>1) Research alternative methods for growing, harvesting, and distributing food sustainably, focusing on hydroponic agriculture in dense areas (consult with Joe Schwartz); promote policy that reduces the use of pesticides and protects pollinator populations; and invest in more storage and distribution centers. [Increased Heat, Increased Precipitation, Drought] 2) Leverage currently underutilized spaces such as rooftops and vacant lots; plant regional species that need less water; consider replicating the North Amherst Community Farm's model for integrating farming, housing, and local produce consumption; create workforce development programs to build on this economic driver. [Resilience, general]</p>	<p>1) M 2) L</p>	<p>1) L 2) L</p>
<p>Tree canopy - Both private and public stakeholders have invested in the local tree canopy. Eversource will, in certain cases, trim or remove trees to prevent safety hazards and power outages caused by branches falling on power lines, and 2,000 street trees were planted in recent years as a result of a grant to mitigate storm damage.</p>	<p>Throughout</p>	<p>Private & Public</p>	<p>S</p>	<p>No specific action identified.</p>	<p>N/A</p>	<p>N/A</p>
<p>Composting - A widespread composting program picks up curbside compost for \$11 each month.</p>	<p>Throughout</p>	<p>Private</p>	<p>S</p>	<p>No specific action identified.</p>	<p>N/A</p>	<p>N/A</p>

Provided Resource Maps

The following maps were provided at the workshop tables to serve as resources for discussion.

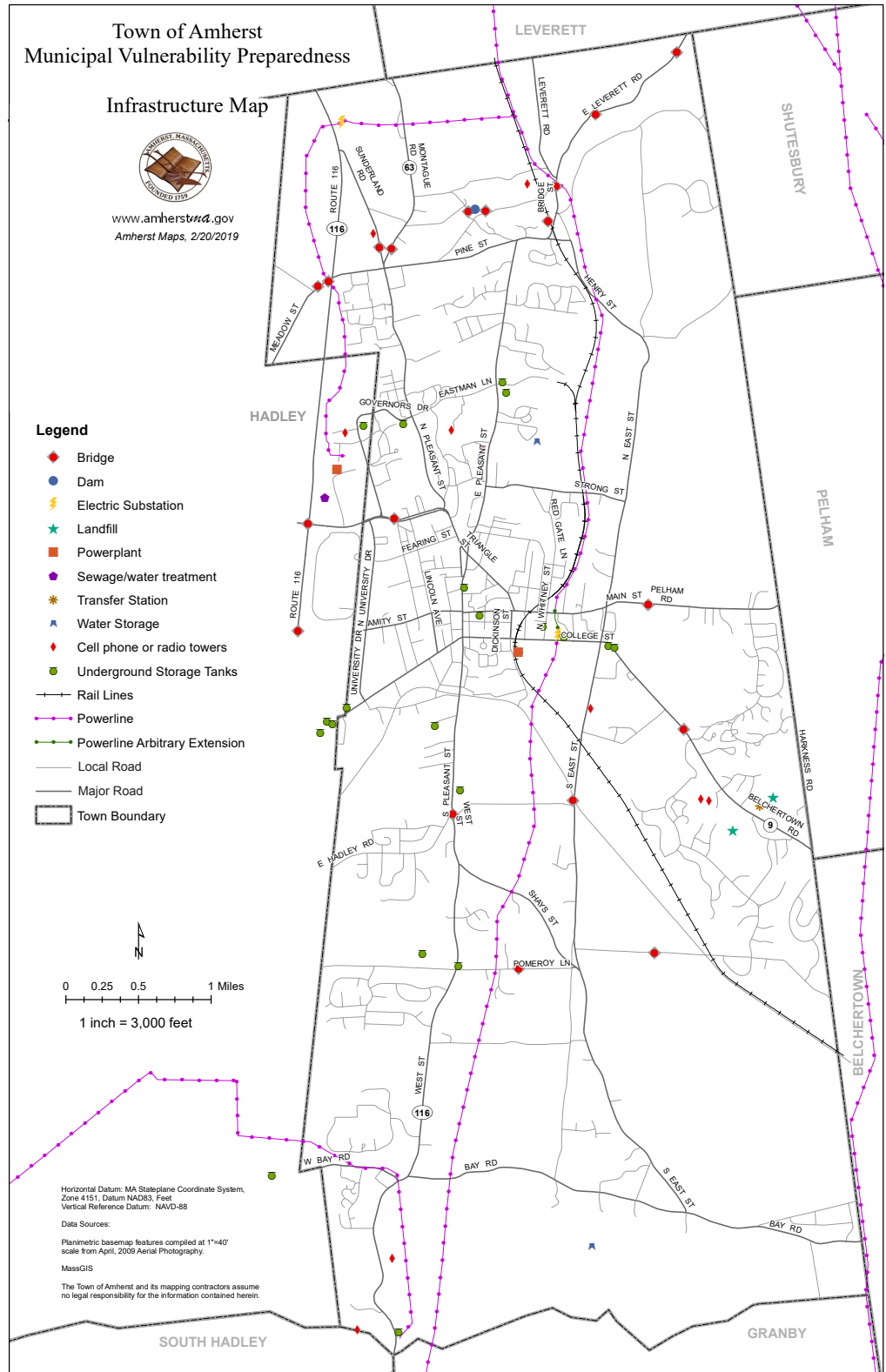
Flood Map

The following flood map shows the town's Flood-Prone Conservancy District, as well as the town's draft and official FEMA Flood Zone boundaries.



Reference Maps

The following maps show infrastructural, societal, and environmental features, respectively, within Amherst. They are designed to serve as a reference for discussion.



Reference Maps
CONTINUED

Town of Amherst
Municipal Vulnerability Preparedness

Social Map



www.amherstma.gov
Amherst Maps, 2/20/2019

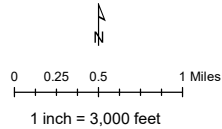
Legend

- Library
- Police Department
- Fire Station
- School
- College
- Town Hall
- Elderly Housing
- Assisted Living Facility
- Nursing Home
- Low Income Housing
- Homeless Services
- Medical Services
- Religious Services

Environmental Justice Populations

- Minority:** 25% or more residents are a racial or ethnic minority
- Income:** Median household income is below 65% of the statewide median income
- Income and minority:** Median household income is below 65% of the statewide median income and 25% or more of the residents are a racial or ethnic minority
- Income, minority, and English isolation:** Median household income is below 65% of the statewide median income and 25% or more of the residents are a racial or ethnic minority and 25% or more of the residents have limited English language proficiency

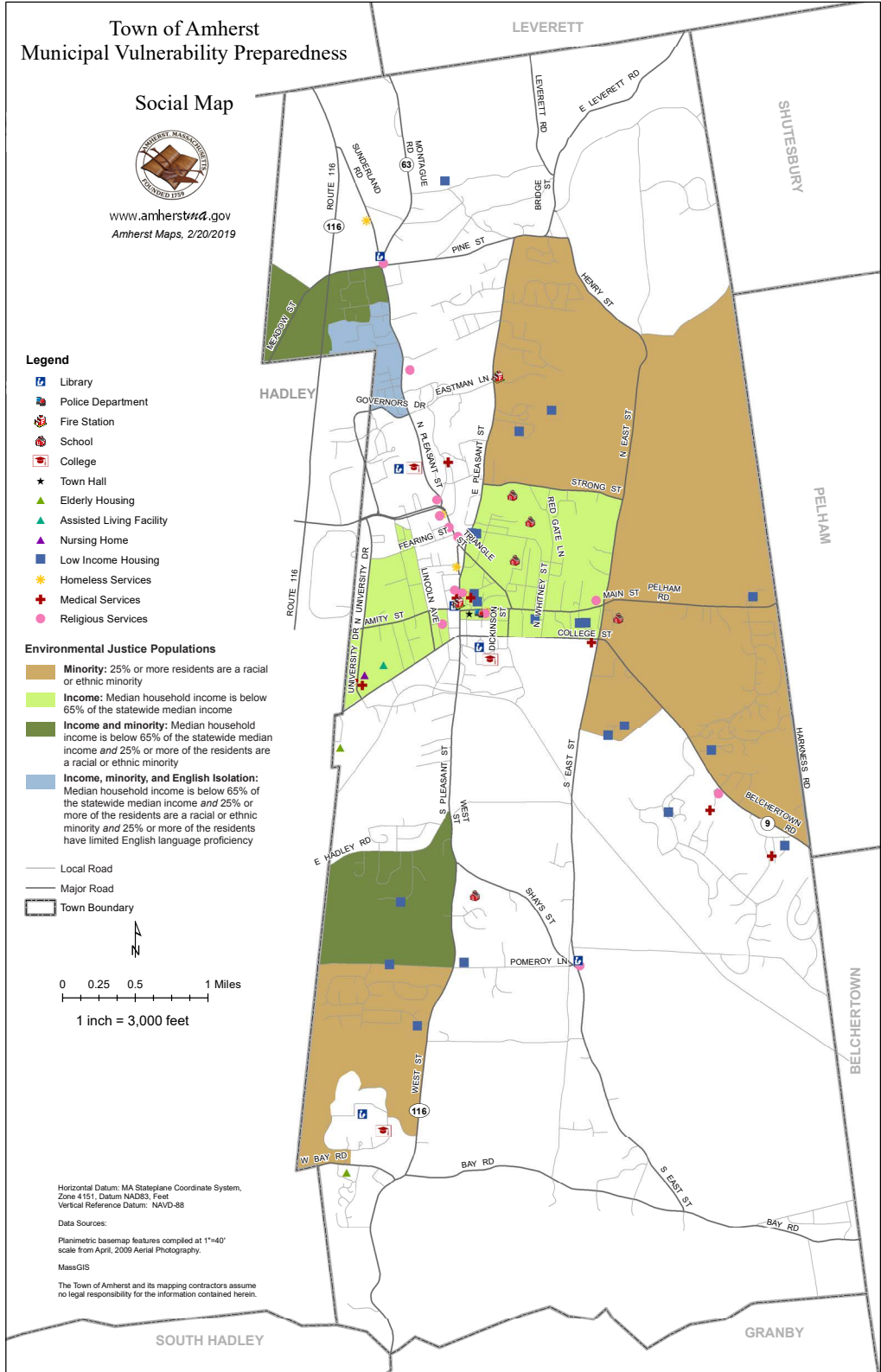
- Local Road
- Major Road
- Town Boundary



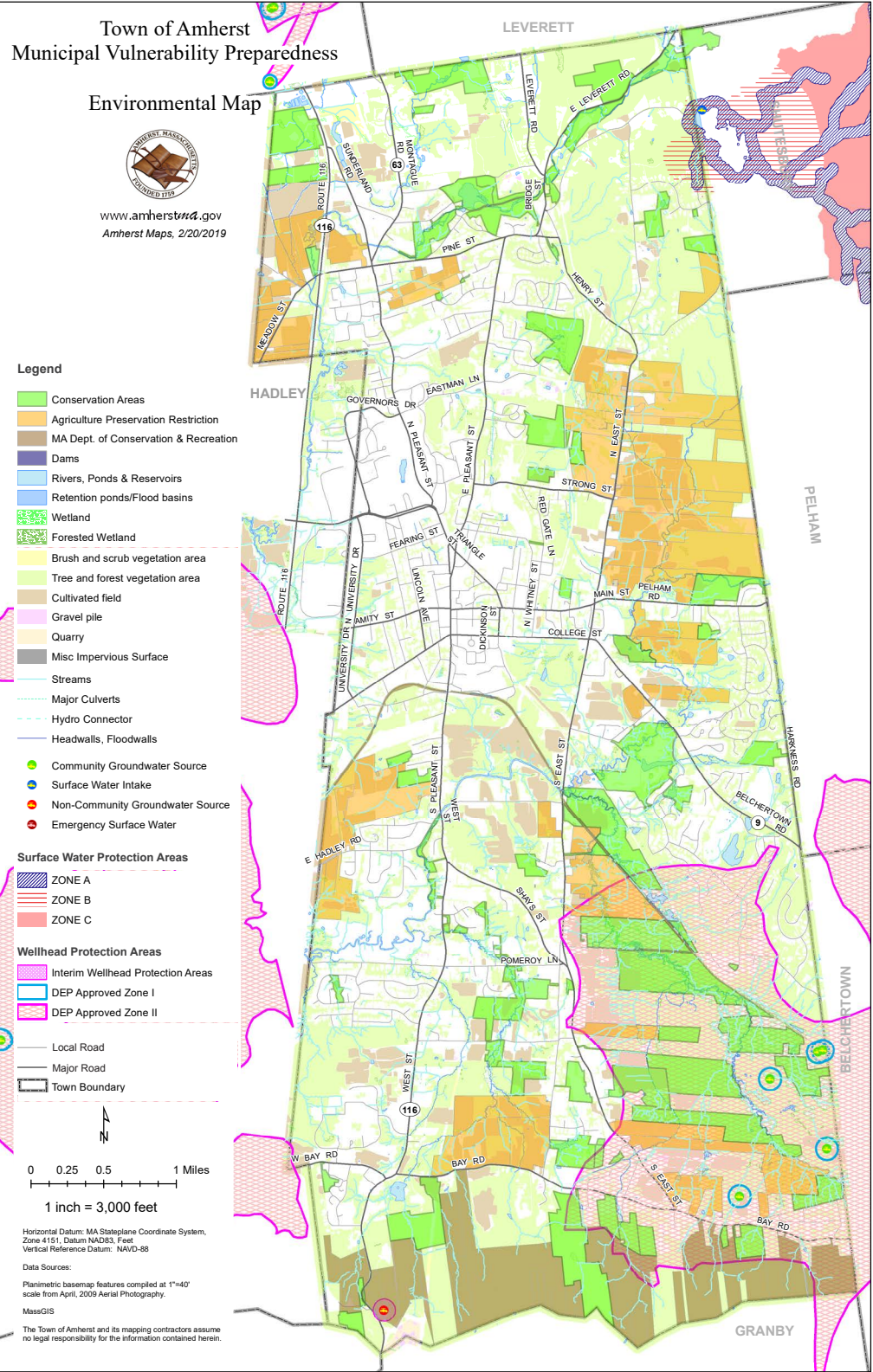
Horizontal Datum: MA Stateplane Coordinate System, Zone 4151, Datum NAD83, Feet
Vertical Reference Datum: NAVD-88

Data Sources:
Planimetric basemap features compiled at 1"=40' scale from April, 2009 Aerial Photography.

MassGIS
The Town of Amherst and its mapping contractors assume no legal responsibility for the information contained herein.



Reference Maps
CONTINUED



F. Downscaled Climate Data

Below are downscaled climate data for the Connecticut River Watershed, developed by the Northeast Climate Science Center at the University of Massachusetts Amherst with support from the Massachusetts Executive Office of Energy and Environmental Affairs. These standardized, peer-reviewed set of climate change projections show the changes in temperature and precipitation that we can expect due to climate change through the end of the century.

Changes in average, maximum, and minimum temperatures

Average temperatures for the Connecticut River Watershed are expected to increase throughout the 21st century, reaching a 2°–4°F increase by the 2030s, and a 4°–11°F increase by the 2090s (Figure 1). We are expected to see higher maximum temperatures in the summer, and higher minimum temperatures in the winter as well.

Connecticut Basin		Observed Baseline 1971-2000 (°F)	Projected Change in 2030s (°F)	Mid-Century Projected Change in 2050s (°F)	Projected Change in 2070s (°F)	End of Century Projected Change in 2090s (°F)
Average Temperature	Annual	46.98	+2.18 to +4.46	+3.00 to +6.43	+3.57 to +9.00	+4.04 to +10.94
	Winter	25.01	+2.36 to +5.37	+3.02 to +7.99	+3.95 to +9.54	+4.18 to +10.83
	Spring	45.35	+1.51 to +3.30	+2.26 to +5.21	+2.76 to +7.23	+3.11 to +8.81
	Summer	67.93	+2.19 to +4.54	+3.05 to +7.24	+3.44 to +10.52	+3.91 to +12.94
	Fall	49.24	+2.27 to +5.23	+3.81 to +6.81	+3.75 to +9.57	+4.21 to +11.69
Maximum Temperature	Annual	58.45	+2.03 to +4.24	+2.65 to +6.56	+3.18 to +9.13	+3.63 to +11.03
	Winter	35.23	+1.96 to +4.66	+2.61 to +7.11	+3.19 to +8.53	+3.43 to +9.63
	Spring	57.16	+1.38 to +3.23	+2.13 to +5.16	+2.66 to +7.53	+3.17 to +8.99
	Summer	80.18	+1.89 to +4.67	+2.75 to +7.45	+3.25 to +10.93	+3.76 to +13.41
	Fall	60.8	+2.47 to +5.04	+3.65 to +7.16	+3.54 to +9.91	+4.21 to +12.20
Minimum Temperature	Annual	35.51	+2.38 to +4.81	+3.35 to +6.64	+3.93 to +8.89	+4.37 to +10.89
	Winter	14.8	+2.63 to +6.03	+3.56 to +8.76	+4.51 to +10.54	+4.94 to +11.83
	Spring	33.53	+1.62 to +3.63	+2.38 to +5.64	+2.96 to +7.07	+3.29 to +8.59
	Summer	55.67	+2.34 to +4.62	+3.21 to +7.33	+3.63 to +10.13	+4.07 to +12.49
	Fall	37.68	+1.97 to +5.33	+3.58 to +6.64	+3.82 to +9.22	+4.21 to +11.37

Figure 1. Average, maximum, and minimum temperature projections for the Connecticut River Watershed.

Changes in the number of days above 90°, 95°, and 100°F

The number of days where maximum temperatures reach above 90°F in the Connecticut River Watershed is expected to increase throughout the 21st century, reaching a total of 13–26 days in the 2030s, and a total of 21–82 days by the 2090s (Figure 2). The number of days above 95° and 100°F are likewise expected to increase.

Connecticut Basin		Observed Baseline 1971-2000 (Days)	Projected Change in 2030s (Days)	Mid-Century Projected Change in 2050s (Days)	Projected Change in 2070s (Days)	End of Century Projected Change in 2090s (Days)
Days with Maximum Temperature Over 90°F	Annual	6.41	+6.36 to +19.72	+9.87 to +35.35	+11.98 to +57.07	+14.50 to +76.01
	Winter	0.00	+0.00 to +0.00	+0.00 to +0.00	+0.00 to +0.00	+0.00 to +0.00
	Spring	0.39	+0.14 to +0.91	+0.30 to +1.76	+0.37 to +3.31	+0.28 to +5.00
	Summer	5.73	+5.53 to +16.97	+8.31 to +29.50	10.37 to +46.30	+12.47 to +60.30
	Fall	0.29	+0.44 to +2.09	+0.51 to +4.58	+0.61 to +8.80	+1.02 to +11.94
Days with Maximum Temperature Over 95°F	Annual	0.46	+1.74 to +7.34	+2.77 to +16.31	+3.55 to +32.96	+4.56 to +49.67
	Winter	0.00	+0.00 to +0.00	+0.00 to +0.00	+0.00 to +0.00	+0.00 to +0.00
	Spring	0.00	+0.00 to +0.26	+0.02 to +0.49	+0.04 to +1.03	+0.03 to +1.93
	Summer	0.45	+1.71 to +6.53	+2.54 to +14.84	+3.05 to +28.97	+4.16 to +43.03
	Fall	0.01	+0.06 to +0.63	+0.09 to +1.19	+0.13 to +3.23	+0.20 to +4.87
Days with Maximum Temperature Over 100°F	Annual	0.00	+0.14 to +1.54	+0.22 to +4.35	+0.41 to +11.64	+0.38 to +23.33
	Winter	0.00	+0.00 to +0.00	+0.00 to +0.00	+0.00 to +0.00	+0.00 to +0.00
	Spring	0.00	+0.00 to +0.03	+0.00 to +0.06	+0.00 to +0.21	+0.00 to +0.45
	Summer	0.00	+0.13 to +1.45	+0.20 to +4.17	+0.36 to +10.72	+0.33 to +21.46
	Fall	0.00	+0.00 to +0.14	+0.00 to +0.37	+0.01 to +0.75	+0.00 to +1.29

Figure 2. Number of days above 90°, 95°, and 100°F for the Connecticut River Watershed.

Number of days with a minimum temperature below 0° and 32°F

The number of days where minimum temperatures are below 0°F in the Connecticut River Watershed is expected to decrease throughout the 21st century, dropping to a total of 4–7 days in the 2030s, and a total of 2–6 days by the 2090s (Figure 3). The total number of days below 32°F are likewise expected to decrease.

Connecticut Basin		Observed Baseline 1971-2000 (Days)	Projected Change in 2030s (Days)	Mid-Century Projected Change in 2050s (Days)	Projected Change in 2070s (Days)	End of Century Projected Change in 2090s (Days)
Days with Minimum Temperature Below 0°F	Annual	11.33	-4.01 to -7.02	-4.88 to -8.3	-5.42 to -8.76	-5.53 to -9.57
	Winter	11	-3.84 to -6.82	-4.67 to -7.96	-5.11 to -8.52	-5.33 to -9.1
	Spring	0.38	-0.08 to -0.44	-0.12 to -0.44	-0.18 to -0.49	-0.18 to -0.55
	Summer	0.00	-0.00 to -0.00	-0.00 to -0.00	-0.00 to -0.00	-0.00 to -0.00
	Fall	0.01	-0.02 to -0.00	-0.02 to -0.00	-0.02 to -0.00	-0.02 to -0.00
Days with Minimum Temperature Below 32°F	Annual	158.63	-10.58 to -28.13	-18.57 to -37.28	-22.18 to -50.76	-22.88 to -59.79
	Winter	85.33	-1.15 to -5.9	-2.37 to -8.5	-3.50 to -15.82	-4.26 to -19.49
	Spring	41.52	-3.47 to -9.56	-6.03 to -13.97	-6.70 to -17.87	-8.82 to -19.42
	Summer	0.02	-0.01 to -0.17	-0.01 to -0.27	-0.01 to -0.23	-0.01 to -0.26
	Fall	31.7	-4.87 to -12.57	-9.60 to -15.50	-8.89 to -19.96	-9.36 to -22.29

Figure 3. Number of days below 0° and 32°F for the Connecticut River Watershed.

Number of heating, cooling, and growing degree days

Over the 21st century, the number of heating degree days are expected to decrease, and the number of cooling degree days and growing degree days are predicted to increase in the Connecticut River Watershed (Figure 4). This suggests, in particular, that buildings will need to be heated less, but cooled more than they are currently on an annual basis. See the caption of Figure 4 for an explanation of these metrics.

Connecticut Basin		Observed Baseline 1971-2000 (Degree-Days)	Projected Change in 2030s (Degree-Days)	Mid-Century Projected Change in 2050s (Degree-Days)	Projected Change in 2070s (Degree-Days)	End of Century Projected Change in 2090s (Degree-Days)
Heating Degree-Days (Base 65°F)	Annual	7038.04	-579.08 to -1220.89	-807.65 to -1696.71	-932.31 to -2213.81	-1061.27 to -2563.22
	Winter	3617.34	-196.64 to -492.19	-267.53 to -731.67	-348.79 to -867.16	-385.45 to -997.60
	Spring	1827.32	-122.30 to -279.16	-188.81 to -436.93	-225.95 to -566.74	-272.18 to -666.52
	Summer	127	-45.72 to -80.45	-63.18 to -101.77	-66.76 to -116.60	-72.74 to -119.29
	Fall	1471.22	-176.19 to -404.39	-298.62 to -486.71	-283.22 to -674.74	-306.64 to -768.06
Cooling Degree-Days (Base 65°F)	Annual	459.27	+200.92 to +430.52	+272.64 to +749.47	+326.52 to +1142.40	+379.72 to +1504.58
	Winter	nan	-0.39 to +2.36	+0.05 to +6.58	-0.14 to +3.38	-0.29 to +7.15
	Spring	20.23	+10.02 to +28.89	+17.52 to +55.39	+21.11 to +92.67	+20.81 to +121.55
	Summer	396.24	+162.41 to +335.42	+204.13 to +564.51	+235.28 to +853.52	+270.64 to +1075.43
	Fall	37.72	+25.68 to +84.68	+40.57 to +136.51	+49.64 to +225.83	+63.95 to +304.46
Growing Degree-Days (Base 50°F)	Annual	2348.43	+392.37 to +801.41	+536.06 to +1252.31	+652.08 to +1894.77	+739.11 to +2379.52
	Winter	3.8	-0.26 to +8.95	+0.09 to +9.32	+0.51 to +14.24	+1.70 to +19.27
	Spring	278.98	+59.68 to +130.77	+91.58 to +225.48	+117.65 to +331.37	+117.61 to +434.70
	Summer	1649.87	+201.11 to +416.74	+279.05 to +664.79	+315.32 to +966.48	+358.57 to +1190.01
	Fall	403.13	+105.14 to +284.19	+169.55 to +395.11	+166.52 to +591.21	+211.39 to +734.09

Figure 4. Number of heating degree days (HDD), cooling degree days (CDD), and growing degree days (GDD) in the Connecticut River Watershed. Note: HDDs are defined as the number of degrees that a day's average temperature is below 65°F; CDDs are the number of degrees that a day's average temperature is above 65°F; and GDDs are the number of degrees that a day's average temperature is above 50°F.

Number of days with precipitation over 1 inch, 2 inches, and 4 inches

The number of days receiving over one inch of precipitation is expected to increase over the 21st century in the Connecticut River Watershed, with most of that increase coming in the winter and spring (summer and fall on the other hand may become drier) (Figure 5). The number of days with precipitation over two inches and over four inches may fluctuate, but are not projected to increase or decrease substantially.

Connecticut Basin		Observed Baseline 1971-2000 (Days)	Projected Change in 2030s (Days)	Mid-Century Projected Change in 2050s (Days)	Projected Change in 2070s (Days)	End of Century Projected Change in 2090s (Days)
Days with Precipitation Over 1"	Annual	6.5	+0.05 to +2.22	+0.52 to +3.15	+0.80 to +2.82	+0.67 to +4.35
	Winter	1.04	-0.04 to +0.74	+0.05 to +1.01	+0.06 to +1.30	+0.22 to +1.64
	Spring	1.56	-0.08 to +0.62	+0.08 to +0.81	+0.17 to +1.20	+0.21 to +1.62
	Summer	1.98	-0.37 to +0.57	-0.19 to +0.97	-0.34 to +0.66	-0.38 to +0.74
	Fall	1.89	-0.28 to +0.70	-0.17 to +0.82	-0.27 to +1.00	-0.40 to +1.17
Days with Precipitation Over 2"	Annual	0.55	-0.05 to +0.40	-0.01 to +0.39	+0.00 to +0.45	+0.04 to +0.58
	Winter	0.03	-0.02 to +0.05	-0.02 to +0.07	-0.01 to +0.08	-0.01 to +0.09
	Spring	0.1	-0.03 to +0.10	-0.03 to +0.09	-0.02 to +0.17	+0.00 to +0.25
	Summer	0.26	-0.06 to +0.16	-0.07 to +0.17	-0.06 to +0.17	-0.09 to +0.19
	Fall	0.16	-0.06 to +0.17	-0.06 to +0.16	-0.04 to +0.18	-0.05 to +0.19
Days with Precipitation Over 4"	Annual	0.00	-0.03 to +0.03	-0.02 to +0.03	-0.01 to +0.05	-0.01 to +0.05
	Winter	0.00	+0.00 to +0.00	+0.00 to +0.00	+0.00 to +0.00	+0.00 to +0.00
	Spring	0.00	+0.00 to +0.00	+0.00 to +0.00	+0.00 to +0.00	+0.00 to +0.00
	Summer	0.00	-0.02 to +0.02	-0.02 to +0.02	-0.02 to +0.03	-0.02 to +0.03
	Fall	0.00	-0.02 to +0.03	-0.01 to +0.03	-0.01 to +0.04	-0.01 to +0.04

Figure 5. Number of days with over one inch, two inches, and four inches of rain.

Total precipitation

Annual precipitation for the Connecticut River Watershed is expected to increase throughout the 21st century, increasing by 1–6 inches by the 2050s and by 2–8 inches by the 2090s (Figure 6). We are expected to see most of that increase occurring in the winter and spring (the summer and fall, in fact, may become drier).

Connecticut Basin		Observed Baseline 1971-2000 (Inches)	Projected Change in 2030s (Inches)	Mid-Century Projected Change in 2050s (Inches)	Projected Change in 2070s (Inches)	End of Century Projected Change in 2090s (Inches)
Total Precipitation	Annual	46.39	-0.40 to +4.99	+1.25 to +6.22	+1.95 to +7.26	+1.68 to +8.30
	Winter	10.34	-0.39 to +2.08	+0.07 to +2.59	+0.30 to +3.03	+0.73 to +3.87
	Spring	12.12	-0.05 to +2.09	+0.32 to +2.13	+0.57 to +2.80	+0.45 to +2.87
	Summer	11.98	-0.37 to +1.76	-0.17 to +2.13	-0.34 to +1.85	-1.03 to +1.90
	Fall	11.94	-1.20 to +1.48	-1.26 to +1.65	-1.50 to +1.78	-1.73 to +1.49

Figure 6. Total precipitation for the Connecticut River Watershed.

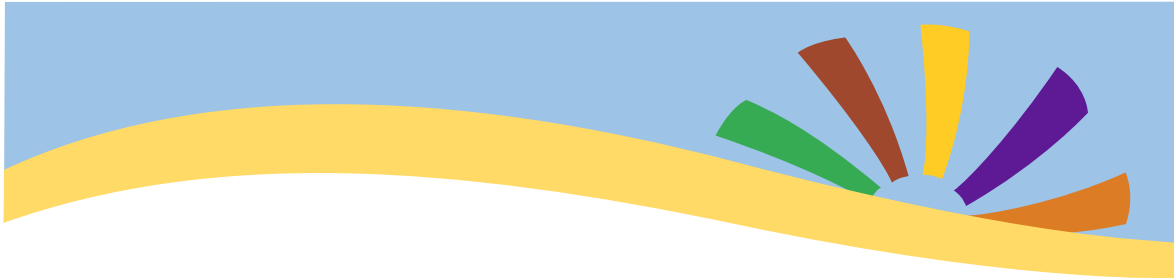
Consecutive dry days

Annual and seasonal projections for the number of consecutive dry days are variable for the Connecticut River Watershed throughout the 21st century (Figure 7). See the caption of Figure 7 for an explanation of the metric.

Connecticut Basin		Observed Baseline 1971-2000 (Days)	Projected Change in 2030s (Days)	Mid-Century Projected Change in 2050s (Days)	Projected Change in 2070s (Days)	End of Century Projected Change in 2090s (Days)
Consecutive Dry Days	Annual	16.41	-0.18 to +1.34	-0.42 to +1.75	-0.73 to +2.26	-0.35 to +2.44
	Winter	11.4	-0.77 to +1.14	-0.57 to +1.30	-0.80 to +1.18	-1.21 to +1.47
	Spring	11.95	-1.05 to +0.50	-0.91 to +1.05	-1.24 to +1.13	-1.24 to +0.76
	Summer	11.57	-0.70 to +1.46	-0.61 to +1.07	-0.91 to +1.61	-1.37 to +1.87
	Fall	12.03	-0.12 to +1.72	-0.21 to +2.35	-0.61 to +2.61	-0.13 to +2.78

Figure 7. Number of consecutive dry days for the Connecticut River Watershed. Consecutive dry days are defined as the largest number of consecutive days within a particular period with precipitation less than 1mm (approximately 0.04 inches).

G. Invitation to the Community Gathering Sessions (English version)



Community Gathering Sessions Regarding Climate Change Vulnerabilities

Please join us on either date to share a free meal and talk about what makes Amherst and its residents most vulnerable to climate change, how this may impact you and your family and ways we might address it. Free childcare provided.



Wednesday, May 29, 2019

6:00 PM

First Congregational Church

Chapel Lounge

165 Main Street, Amherst

Saturday, June 8, 2019

9:00 AM

Crocker Farm School

Auditorium

280 West Street, Amherst

For more information and to RSVP, please contact:

Stephanie Ciccarello, Sustainability Coordinator at ciccarellos@amherstma.gov or (413) 259-3149



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