

# TOWN OF HATFIELD



COMMUNITY RESILIENCE BUILDING WORKSHOP

SUMMARY OF FINDINGS

JUNE 25, 2021



*1936 Flood, North Hatfield (Source: Library of Congress)*

**Cover Photo**

*Hatfield, MA (Source: Rusty Clark)*

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# 1. OVERVIEW

As the effects of climate change become more apparent globally and locally, the Town of Hatfield—like communities across the Commonwealth of Massachusetts—has begun to plan for the unavoidable impacts of climate change. In recent decades, the impacts of climate change have become widely evident. Average annual temperatures in Massachusetts have increased by about 3°F over the past century<sup>1</sup> with greater increases in more recent decades—half of a degree per decade since the 1970s. Meanwhile Massachusetts has seen an 81% increase in extreme precipitation events since 1948<sup>2</sup>.

Mindful that its future will be shaped by climate change, Hatfield applied for and was awarded a grant for Municipal Vulnerability Preparedness (MVP) Planning from the Executive Office of Energy and Environmental Affairs (EOEEA) MVP program. The MVP program is Massachusetts’ flagship effort to support towns and cities in building local resilience and preparing for climate change. Municipalities that complete the MVP Planning process become “MVP-certified” which makes them eligible for MVP Action grants to implement projects identified during the planning process. Communities across the state have received millions of dollars in recent years to protect or update local infrastructure, harness natural processes to reduce flooding and its impacts, update local bylaws, improve emergency communication, and more.

This report describes Hatfield’s MVP planning process, records the key information that it gathered, and presents recommendations for increasing resilience in Hatfield.

This plan is focused on climate change adaptation—moderating the harm caused by climate change. It does not address climate change mitigation—the long-term reduction of climate change by reducing greenhouse gas emissions and sequestering atmospheric carbon. Both climate change mitigation and adaptation will be required to secure a livable future for Hatfield.

## Top Priority Climate-Resilience Actions for Hatfield

**The MVP planning process identified the following top actions for building Hatfield’s climate resilience:**

- Assess Conditions at the Connecticut River Dike and at the Wastewater Treatment Plant
- Plan for Relocation of Town Center Critical Facilities out of the Floodplain
- Conduct a Town-Wide Drainage and Stormwater Study and Strategy
- Incentivize Climate Resilient Farming
- Plan for Future Climate-Resilient Development
- Create a Climate Resilient Town Master Plan

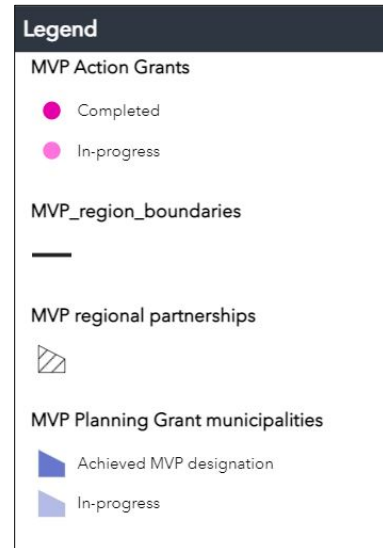
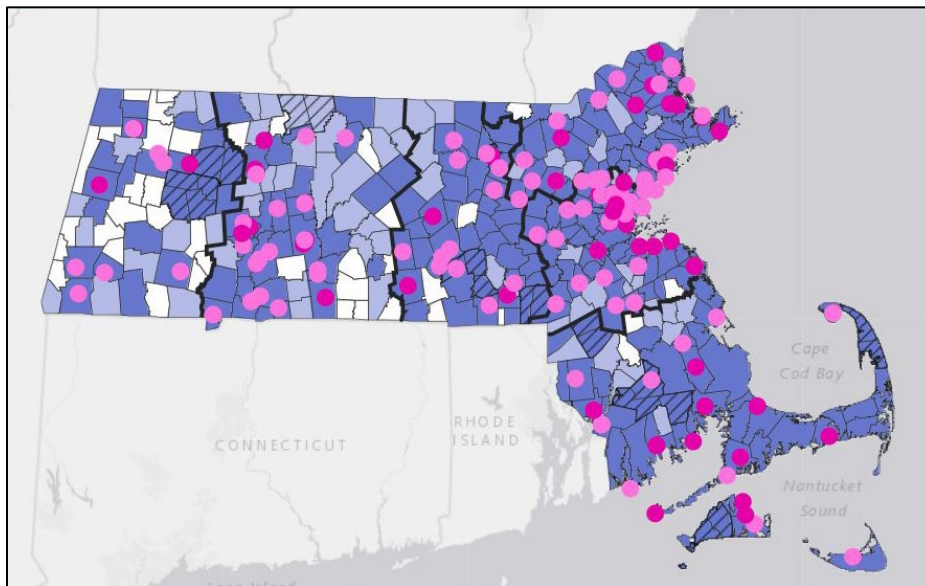
<sup>1</sup> Northeast Climate Adaptation Science Center, “Massachusetts Climate Change Projections.”

<sup>2</sup> Madsen and Wilcox, “When It Rains, It Pours: Global Warming and the Increase in Extreme Precipitation from 1948 to 2011.”

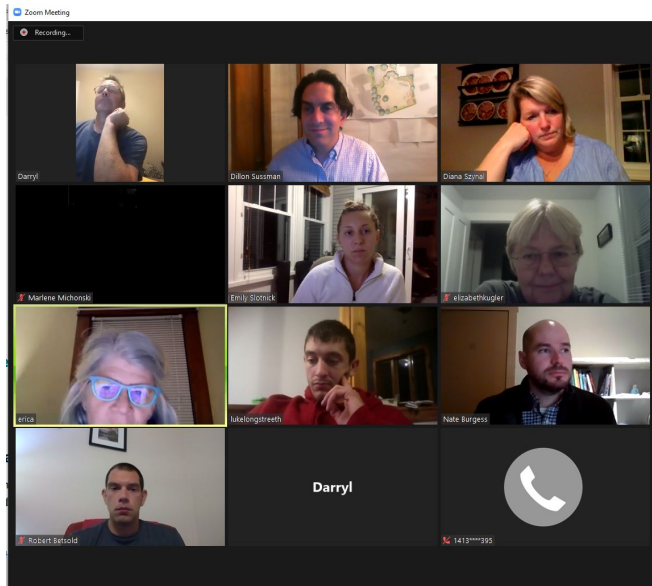
## 2. COMMUNITY RESILIENCE BUILDING WORKSHOP

Hatfield received a Municipal Vulnerability Preparedness (MVP) grant in 2020. The project was led by a core team that included: Marlene Michonski, Town Administrator; Bob Flaherty, Fire Chief; Mike Dekoschak, Police Chief; Phil Genovese, DPW Director; Bob Wagner, Chair, Agricultural Advisory Commission and Planning Board; Liz Kugler, Board of Health member.

The Core Team selected MVP-certified provider Dodson & Flinker of Florence, Massachusetts to facilitate the process. The planning process began with a kick-off meeting on March 18, 2020, which introduced the MVP planning processes. Core group members discussed Hatfield's key natural hazards, and its strengths and vulnerabilities. They discussed local priorities for the MVP planning process, identified key groups to invite to the workshop, and wrestled with how to conduct the project in light of COVID restrictions, which had just been put in place.

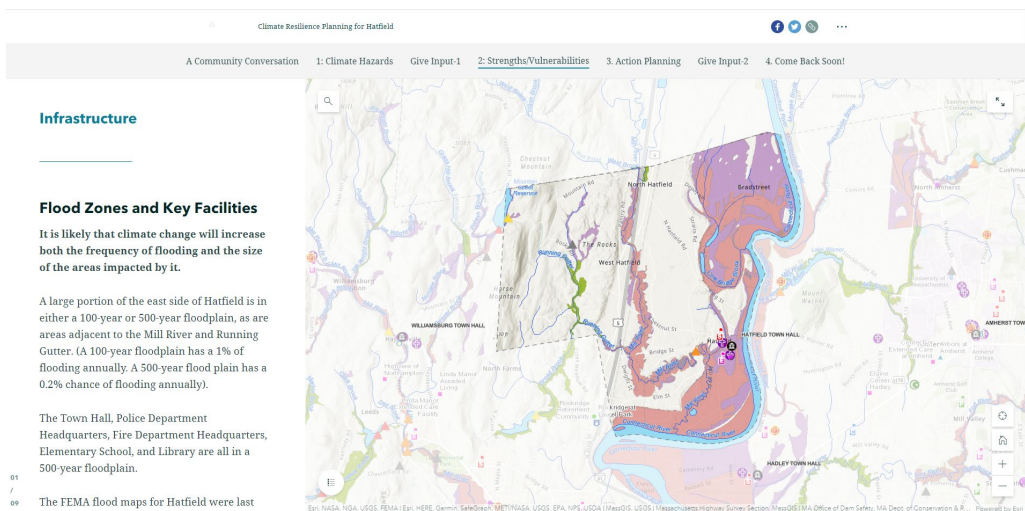


*MVP communities in Massachusetts, June 2021 (source: MA EEA)*



The Community Resilience Building workshop was held as a series of online Zoom meetings since in-person workshops were not possible during the COVID-19 pandemic. Breakout groups were still possible in online meetings. (Source: Dodson & Flinker)

Meanwhile, the core team and the consultants prepared for the Community Resilience Building (CRB) workshop. The CRB workshop is the heart of the MVP planning process. The workshop is typically one full-day session, or a series of shorter workshops. In this case, the COVID-19 pandemic made in-person large gatherings impossible, so the team agreed on a series of online workshops using Zoom. In preparation for the workshop, the project team gathered background information, developed a schedule and agenda for the workshop, and recruited a group of invited stakeholders. The project team developed a website to explain the project process, share background data and maps, and solicit information from the community through a survey and interactive webmap. The website is located at: <https://storymaps.arcgis.com/stories/bf9095aa395441e68d0bd40fc6c4730e>.



Screenshot from the project website

Stakeholders were selected to represent a variety of Town departments, boards, and committees, as well as local businesses and regional organizations. See the full list of participants at the end of this report.

The Community Resilience Building (CRB) workshops were held on October 19, October 26, and November 2, 2020. The workshops followed a community-driven planning process that has been tested and refined in dozens of communities throughout Massachusetts and beyond (see the CRB Workshop guide available at [www.communityresiliencebuilding.com](http://www.communityresiliencebuilding.com)).

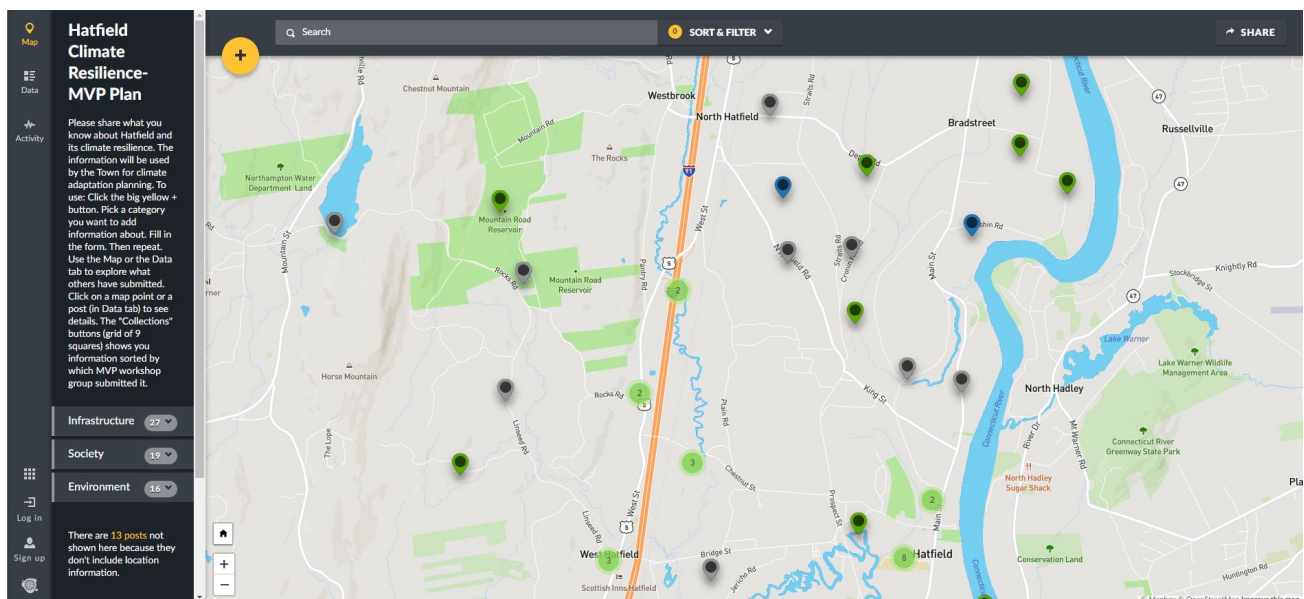
The workshop's central objectives were to:

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



*The MVP planning process. Most of the process occurs during the CRB workshop.*

The first workshop began with a presentation that explained the workshop process and terminology, gave background information on climate change including watershed-level projections of climate change in Massachusetts, described past climate-related natural hazard events in Hatfield, and provided background information about Hatfield's infrastructural, societal, and environmental strengths and vulnerabilities. See the Appendix for the full presentation. The presentation was followed by a group discussion of how climate change might influence natural hazards in Hatfield and which hazards would be most important to evaluate. For the next hour, participants worked to identify Hatfield's top hazards using an online mapping application.



*Online interactive map used during Hatfield's MVP Workshop to gather information about Hatfield's strengths, vulnerabilities, and potential actions. Color coded pins indicate strengths and vulnerabilities identified by workshop participants: gray for infrastructure, blue for society, green for environment.*

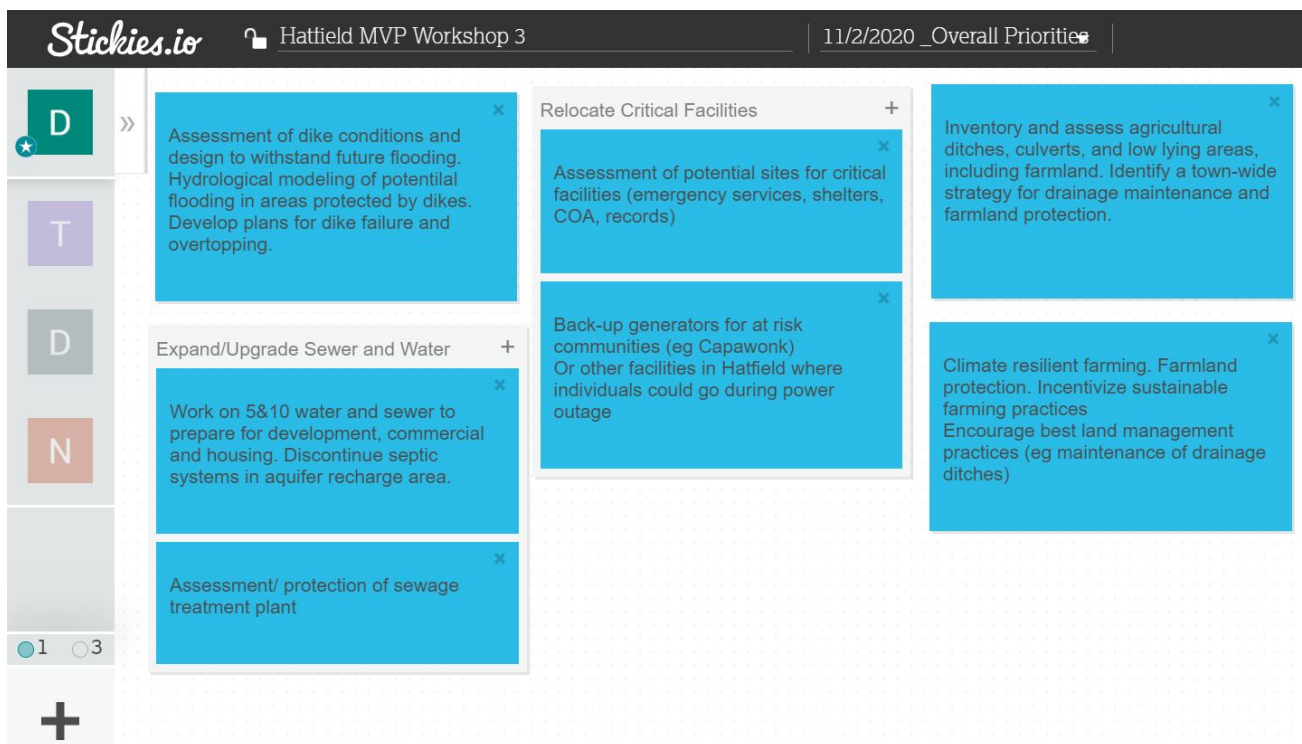
After the first workshop, participants were asked to complete homework, identifying important infrastructural, societal, and environmental features on a collaborative online mapping platform. The locations of specific features could be pinned on the map, along with any associated notes. Features that were non-location specific could be added as well.

During the second workshop, participants discussed the strengths and vulnerabilities that they had started to identify, and added others using the shared online map. After the second workshop, participants were again asked to complete a brief "homework assignment" by thinking of their personal top action items or highest priority issues that should be identified through this project. Participants were also given the opportunity to add any final items to the shared online map, and to review and give input to the in-progress MVP matrix which was in a shared online spreadsheet.

The third online workshop began with a presentation about how to craft effective actions for building local resilience, based on available climate change predictions, with a focus on nature-based solutions (see the Appendix). Workshop participants then worked in small groups to brainstorm and prioritize actions that could build on Hatfield's strengths or mitigate its vulnerabilities to climate change.

At the end of the third workshop, the full group assembled again. Each small group shared their priority actions, as facilitators summarized them on moveable "stickies" on a shared screen using the Stickies.io app. Actions were then arranged on screen and grouped into categories. The full group discussed the priority actions and by the conclusion of the meeting had agreed upon a ranking of the top five actions.





*Screenshot of application used to group and prioritize action items during virtual workshop*

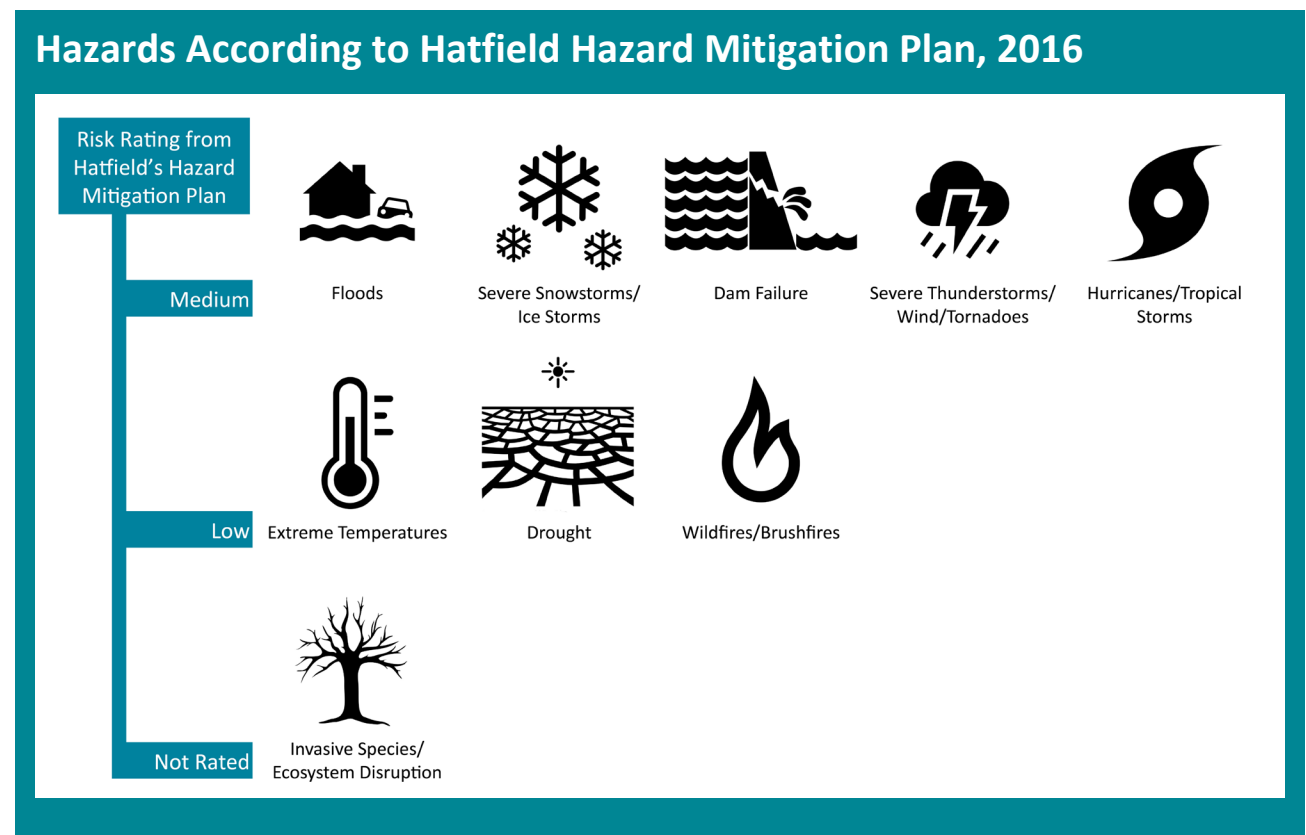
This report captures the wealth of information and ideas that were generated during the CRB workshop. It highlights the top hazards, the key infrastructural, societal, and environmental vulnerabilities and strengths identified by workshop participants, and the key actions that Hatfield could take to build on its strengths and, to the extent feasible, reduce its vulnerabilities.

This report incorporates comments from the MVP core team and input from community members that attended a virtual listening session held on May 24, 2021 or provided comments on the public review draft which was posted on the Town’s website.

### 3. TOP HAZARDS & VULNERABLE AREAS

Natural hazards are natural events that threaten lives, property, and other assets. Often, natural hazards can be predicted. They tend to occur repeatedly in the same geographical locations because they are related to weather patterns or physical characteristics of an area.

The Hatfield Hazard Mitigation Plan 2016 Update is Hatfield’s most recent approved hazard mitigation plan. The 2016 hazard mitigation plan evaluated Hatfield’s risk from various hazards. It concluded that the following are **moderate risk hazards**: flooding, severe snowstorms / ice storms, dam failure, severe thunderstorms/ winds/ tornadoes, hurricanes/ tropical storms. It found the following are low risk hazards: extreme temperatures, drought, wildfires/ brush fires. The plan did not rate invasive species/ecosystem disruption—a hazard which is included in the latest Massachusetts Integrated State Hazard Mitigation and Climate Adaptation Plan and in the MVP plans of some western Massachusetts communities.







The hazard risk evaluation above was the starting point for the assessment of hazards at the MVP workshop. It was augmented by climate change projections provided by the MVP program, information from the Massachusetts Integrated State Hazard Mitigation and Climate Adaptation Plan about climate change and its interactions with natural hazards, and the knowledge, wisdom and experience of Hatfield’s staff and citizens who participated in the process.

At the CRB workshop, the group identified the following as top hazards that Hatfield faces:

- Flooding
- Severe storms (storms in all seasons)
- Ecosystem Disruption
- Average and Extreme Temperatures and Drought

**Priority Climate-Related Hazards for MVP Planning**

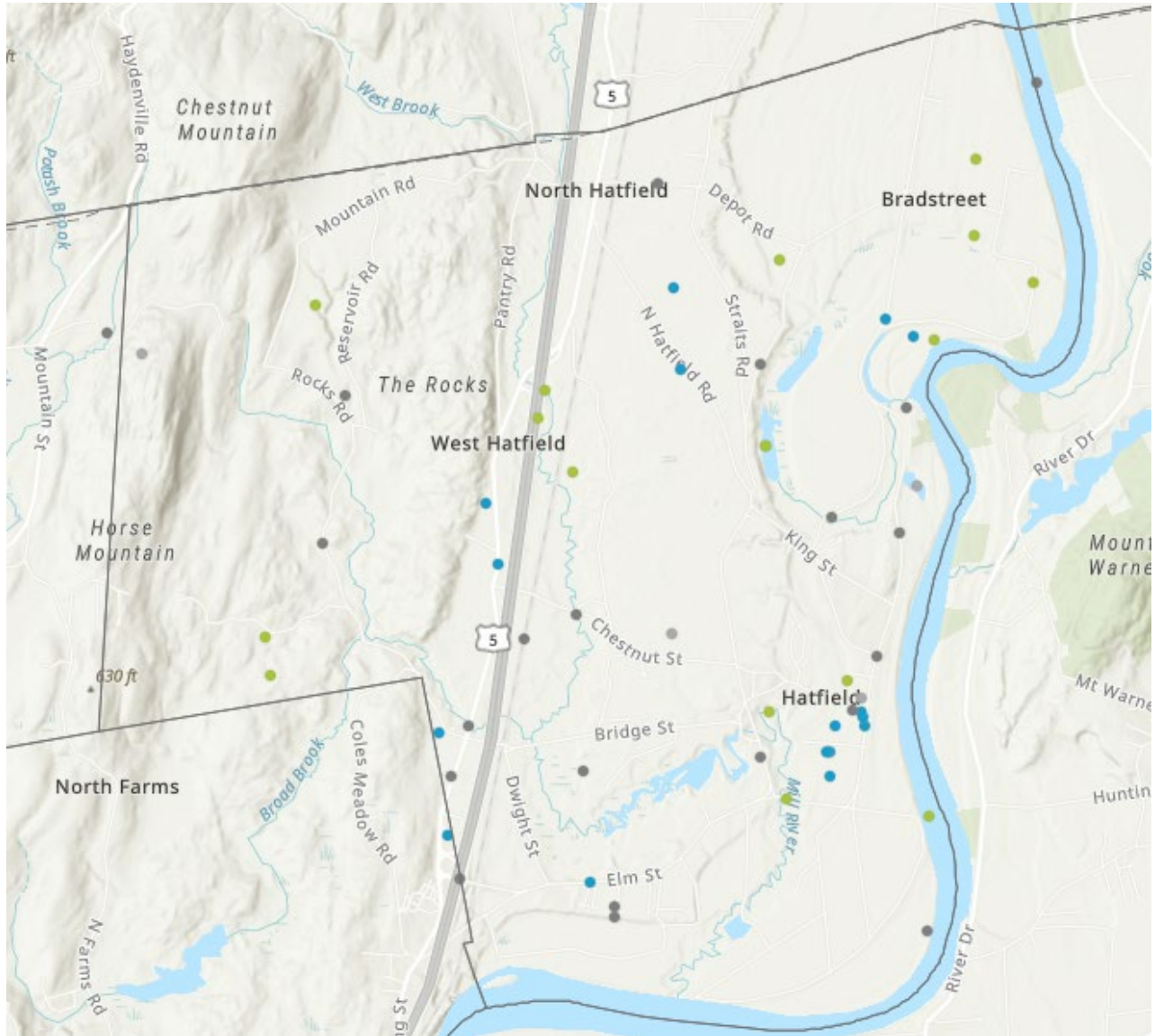
			
<b>Flooding</b>	<b>Severe Storms</b>	<b>Ecosystem Disruption</b>	<b>Average &amp; Extreme Temperatures and Drought</b>

*Flooding, Severe Storms, Ecosystem Change, and Average and Extreme Temperatures and Drought are the town's top climate-related natural hazards according to participants in Hatfield's MVP Workshop (Sources, left to right: Flood by Iconathon US from Noun Project, Storm by Alexis from the Noun Project, Tree by Liane Kirschner from the Noun Project, Temperature by Vectors Market from Noun Project)*

## Areas of Concern (Specific Locations)

Workshop groups mapped specific locations where natural hazards may be particularly problematic. The locations of these strengths and vulnerabilities are shown below. The information is also available on a webmap at:

<https://dodsonflinker.maps.arcgis.com/apps/instant/minimalist/index.html?appid=442f6604871d43ca9fc6e2ac8803eab8>. This webmap contains information about each location, including a description of the strength or vulnerability at that location, related hazards, and potential actions linked to the location.



Map of climate-related strengths and vulnerabilities gathered during Hatfield's MVP Workshops. View this map online at: <https://dodsonflinker.maps.arcgis.com/apps/instant/minimalist/index.html?appid=442f6604871d43ca9fc6e2ac8803eab8>.

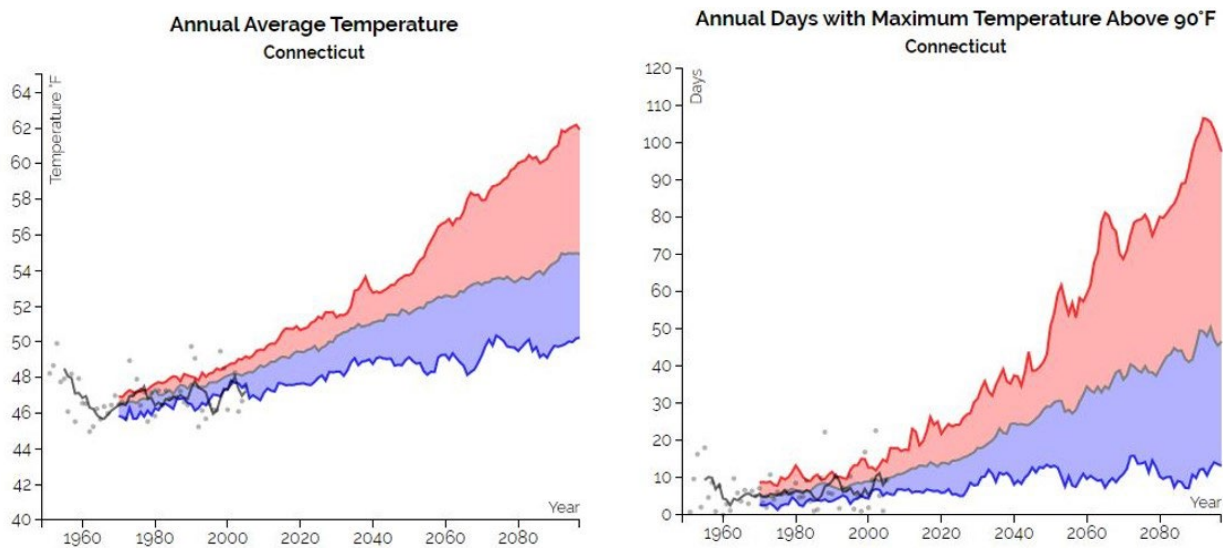
### **Specific areas of concern include:**

- Hatfield’s historic center, which is within the 500-year flood zone and contains critical Town facilities including Town Hall and the town’s historical records and archives, the police and fire stations, and the Capawonk Housing for the Elderly.
- Low lying areas throughout the town currently flood, see Infrastructure Vulnerabilities below.
- The bridge over the Mill River on Chestnut Street has an undersized box culvert. The bridge is in poor condition and routinely overtops during floods. Chestnut Street is a primary route in and out of the community—one of a handful that cross I-91.
- Flooding from the Mill River when the Connecticut River backs up into it.
- Agricultural ditches throughout the town. Some ditches are no longer maintained. The result is that areas that used to be drained are now flooding more frequently.
- Farmland throughout the town, which is comprised of some of the world’s highest quality agricultural soils.
- Route 5 & 10, the town’s primary commercial corridor and primary connection to communities north and south, would be impacted in the event of a dam failure upstream.
- Northampton Reservoir and Mountain Street Reservoir lie outside of Hatfield’s town lines, but lie uphill in watersheds that flow through Hatfield including across Route 5 & 10, posing a risk to Hatfield’s infrastructure in the event of a dam failure.
- Hatfield’s Connecticut River dike system protects much of the town from flooding. It is not known whether it is designed to handle larger storm events due to climate change.

## 4. CURRENT CONCERNS AND CHALLENGES PRESENTED BY HAZARDS AND CLIMATE CHANGE

### Projected Changes in Hatfield's Climate

To prepare for the future, Hatfield needs to know how the area's climate may change over the coming decades and how that will impact natural hazards. The workshop built on the following key information resources: The Hatfield Hazard Mitigation Plan 2016 Update, the 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan, and "Massachusetts Climate Change Projections" by Northeast Climate Science Center at the University of Massachusetts.



*Climate Change Projections for the Connecticut River Basin from the Northeast Climate Science Center at the University of Massachusetts (Source: Resilientma.org, <http://resilientma.org/dataqrapher/?c=Temp/basin/maxt/ANN/Connecticut/>)*

Although there is uncertainty about how rapidly the climate will change over the coming decades or how extreme the results will be, we do know the general direction of climate change. From that we can generally predict how climate change will influence natural hazards. We know that annual air temperatures in the Northeast have been warming at an average rate of 0.5°F (nearly 0.26°C) per decade since 1970. Winter temperatures have been rising at a faster rate of 0.9°F per decade on average.<sup>3</sup> Between 1991-2012 there has been an average of 10 more frost-free days per year than between 1901-1960. The increases in temperature are projected to accelerate over the coming decades. Climate projections for the Connecticut River Watershed that were produced by the Northeast Climate Science Center at the University of Massachusetts predict that by the 2050s:

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<sup>3</sup> Northeast Climate Adaptation Science Center, "Massachusetts Climate Change Projections."

- Average annual temperature will rise 6.4°F (6-13%)
- Average winter temperatures will rise from 25° to 28-33°
- Summer and Fall will see the biggest maximum temperature increases (2.8°-7.5° and 3.8°-13.4° respectively)

**Potential impacts of increased temperatures: a longer growing season, more vector-borne diseases, increased cooling costs and decreased heating costs, more invasive species, disruption of ecosystems and natural processes.**

Along with higher average temperatures there will also be more extremely hot days. By mid-century, Hatfield may experience the following increases in extremely hot days:

- Days Over 90°F: from 6 days to 16-41 days per year
- Days Over 95°F: From <1 day to 2-7 days per year
- 5-50 more days over 90° per year by end of century

**Potential impacts of extreme heat: increased risk for heat stroke, bigger storms, electrical grid failures.**

Extremely hot days can cause heat stress, especially for children, older adults, and those with chronic health conditions. Heat waves can be extremely dangerous and result in more deaths than cold snaps. Extreme heat can result in blackouts, stress pavement on the town's roads, and contribute to wildfire risk. Meanwhile, overall warmer temperatures can stress numerous species that have adapted to cooler conditions and can increase the prevalence of invasive species and vector-borne diseases which can devastate ecosystems and human health.

With climate change, more annual precipitation is expected. Precipitation patterns will likely shift across the seasons. Hatfield's winters will see the greatest increase (1%-25%) in precipitation—though with less snow. Precipitation in summer and fall could increase or decrease. Likewise, drought may increase or decrease. Overall, more precipitation will fall in large events.

**Potential impacts of precipitation changes: more flooding, more drought, overloaded stormwater system, culvert failures, less recharge of drinking water supplies**

Overall, changes in temperature and precipitation patterns will continue to disrupt the relatively stable and hospitable climate that Hatfield's residents, plants, and animals have historically enjoyed. Although New Englanders like to complain about the weather, we know how to deal with minor snowstorms and our summers are relatively bearable. In the coming decades, as in recent decades, Hatfield will continue to experience increasingly unpredictable and extreme weather patterns.

Winter may bring more crippling snowstorms, more ice storms, winter flooding due to rapid thaws or rain on frozen ground, and decreased snowpack. These changes will impact daily life, the lifecycle of plants and animals, stream flow, water levels in lakes and reservoirs, groundwater recharge, and drinking water supplies, etc.

Spring, summer, and fall may bring more extreme temperatures, larger and more frequent tropical storms and hurricanes, thunderstorms, tornados, and microbursts. While the growing season may be extended, unpredictable weather events like drought, intense storms, or sudden cold snaps can damage crops and pose serious challenges for farming in Hatfield. These larger storm events may exceed the design-capacity of some of Hatfield's road and stormwater infrastructure which were designed for more moderate events. For houses on septic systems, episodes of elevated ground water levels could inundate leach fields or cause septic tanks to 'float'. Larger storm events may result in erosion and may reduce the ability of natural systems to cleanse and infiltrate stormwater which could reduce aquifer recharge and impact water quality.

Already, some other communities have decided to consider the 500-year flood plain the new 100-year flood plain. Hatfield's town center lies within the 500-year floodplain, which includes Town Hall, most of the Town archives, police and fire stations, and the Capawonk Housing for the Elderly.

### Impacts of Climate Change on Hazards in Hatfield

The Town of Hatfield has been impacted by many natural hazards over the years. Flooding has been one of the most recurring events.

The Great Flood of 1936 severely impacted much of the Connecticut River valley when an unusually snowy winter was followed by a period of warm and rainy weather. Hatfield was hit hard by the ensuing flooding, as flood waters destroyed barns and houses and flooded farm fields. The Hatfield Dike, an earthen levee along the town's southeastern bank of the river, was constructed in 1938, and flooding at this scale has not occurred since.

Localized flooding is still a regular issue in Hatfield. Mill River flooding in 2005 and 2014 submerged Chestnut Street, temporarily blocking an important east-west connection within the town. Fields around South Street and Valley Street flood frequently during heavy rain events. And in May 1984 a period of prolonged rain caused such extensive flooding that Elm Street was the only main road in town not impacted by flooding.

Future weather patterns are likely to bring more frequent heavy rain events to the Northeast, and the kind of flooding Hatfield has regularly experienced is likely to increase. Workshop discussions also took into consideration the possibility of larger scale flooding from the Connecticut River, and the impact this would have on critical town facilities, farmland, and infrastructure. Flood waters from the Connecticut River overtop the dikes or could back up into the town by entering through the low point where the Mill River cuts through the dike and meets the Connecticut River.

Ecosystem disruption, extreme temperatures and prolonged droughts have fewer historical precedents in Hatfield, but are likely to become very significant factors impacting the town, especially its farms. These stresses will likely test the resilience of farms in the area and will highlight the importance of farming methods that promote biodiversity, soil health, water conservation, reduced or eliminated dependence on chemical applications, holistic management, and other climate resilient practices. Climate-resilient farming practices will not only protect the



rich asset of Hatfield’s high-quality farmland, but will also sequester atmospheric carbon, enabling Hatfield to lead the way in not just climate adaptation but also climate change mitigation. Workshop participants reported that some of Hatfield’s farmers are already adapting to climate change.

Workshop participants also discussed the possibility of increased development in Hatfield due to climate change. Climate disruptions elsewhere may lead climate refugees to move to communities like Hatfield, which would lead to increased development, increased development pressure on unprotected farmland, and increased demands on the town’s infrastructure.

## Key Hazards



**Flooding:** Flooding was cited as a top concern by workshop participants. Flooding will impact roads, farm fields, low lying areas, and areas near poorly maintained agricultural ditches. More severe flood events could impact specific areas such as the Route 5 & 10 corridor if the Northampton Reservoir and Mountain Street Reservoir overtopped, or the town’s historic center and municipal facilities in the event of a 500-year flood. Flooding can also damage homes and businesses, dislocate people, increase water contamination and water-borne illnesses, and result in illness from mold exposure after flood waters recede.<sup>4,5</sup> The network of agricultural ditches, wetlands and stream corridors throughout Hatfield can help mitigate flood severity if properly managed.



**Severe storms (all seasons):** Between 1958-2012, the Northeast experienced a 71% increase in precipitation that falls as part of a heavy precipitation event.<sup>6</sup> Severe storms create the risk of flood events, as highlighted above. They also can cause: falling or flying objects—resulting in injuries and damage to property; damage to roads—resulting in motor vehicle accidents and delayed emergency response; damage to water and sewer/septic infrastructure—resulting in water contamination and water-borne illnesses;<sup>7</sup> and power outages—resulting in increased falls and injuries in homes, carbon monoxide poisoning from improper use of generators or heating devices, and loss of power to life-sustaining medical devices.<sup>8</sup> Severe storms are particularly threatening to the elderly, people living alone, people with limited mobility, people with limited English proficiency,

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<sup>4</sup> American Public Health Association, “How Climate Change Affects Your Health.”

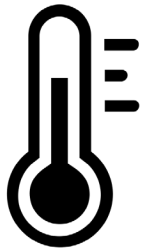
<sup>5</sup> Massachusetts Department of Public Health, Bureau of Environmental Health, “Climate and Health Pathways | MEPHT.”

<sup>6</sup> “National Climate Assessment.”

<sup>7</sup> American Public Health Association, “How Climate Change Affects Your Health.”

<sup>8</sup> Massachusetts Department of Public Health, Bureau of Environmental Health, “Climate and Health Pathways | MEPHT.”

people with chronic diseases, or compromised immune systems, children under five years old, and people who use electrically powered medical devices.<sup>9</sup>



**Average and Extreme Temperatures, Drought:** Current trends indicate that the climate in New England is steadily warming, with more extremes in both rainfall and drought. On average, the Northeast experienced 10 more frost-free winter days between 1991-2012 than it did from 1901-1960.<sup>10</sup> Current trends indicate there will be increasingly more days per year above 90 in the coming decades.<sup>11</sup> Older adults, children, and people with low incomes are especially vulnerable to heat related illness and death, including heat stroke, dehydration, aggravated cardiovascular disease, and aggravated respiratory disease.<sup>12</sup>



**Ecosystem Disruption:** Hatfield is fortunate to have large areas of forest, wetlands, and water bodies, that provide wildlife habitat, ecosystem services, recreational opportunities, and quality of life benefits for its residents. Changing temperature and precipitation patterns may stress or degrade these ecosystems. Climate change may worsen the impact of pests, such as the Hemlock Woolly Adelgid and, Emerald Ash Borer, and blights, such as beech bark disease. Heat and drought will stress agricultural crops, native plant species, and wildlife. In addition, heightened storm frequency and intensity increases the potential for destructive wind or ice storms to damage trees. Broadscale change in Hatfield's ecosystems would threaten numerous native species and key qualities that make the town what it is. Direct impacts on humans include the potential for increased risk of vector borne illness, fires, crop damage, and infrastructure damage from weakened or downed trees.

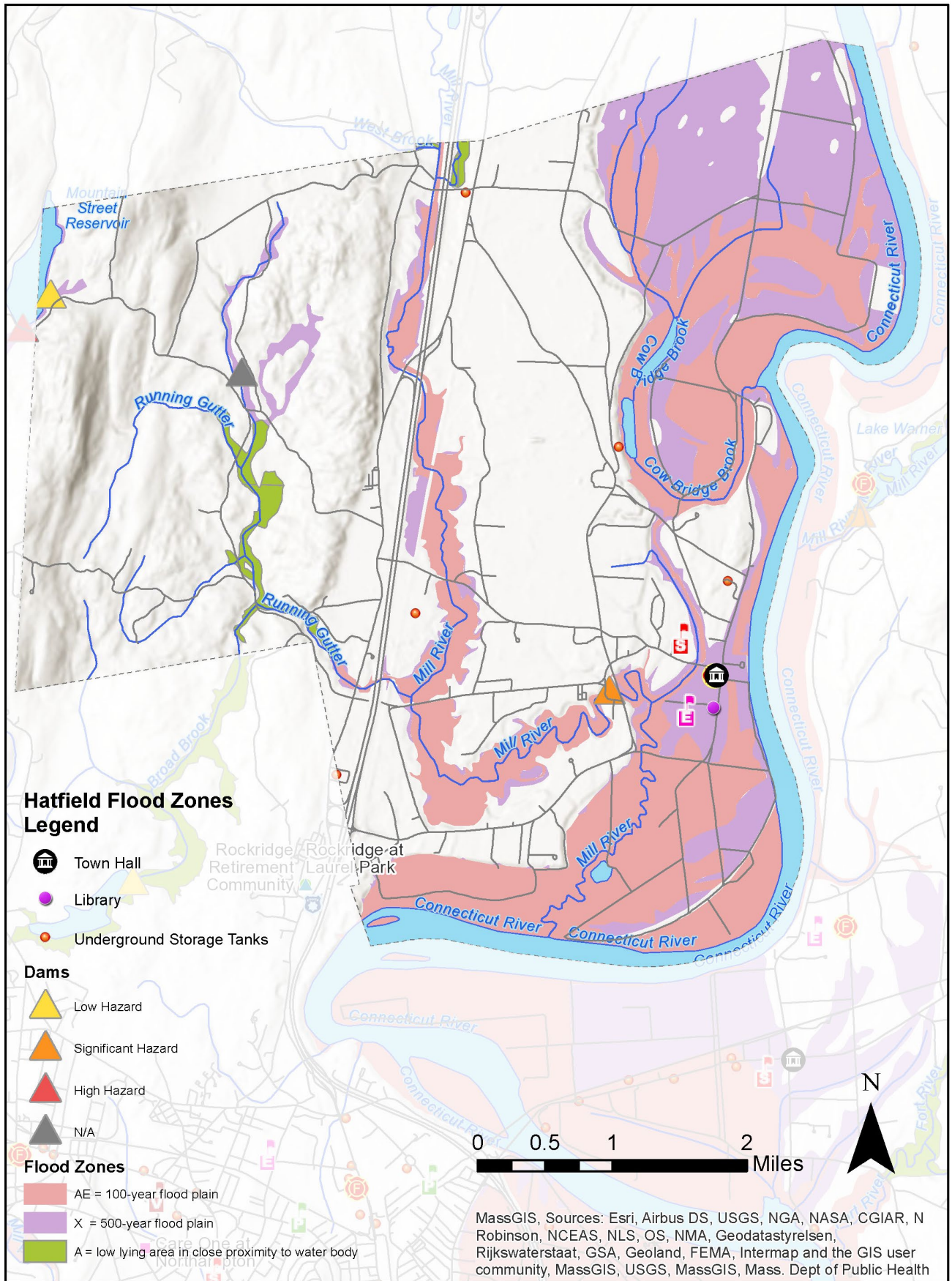
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<sup>9</sup> Massachusetts Department of Public Health, Bureau of Environmental Health.

<sup>10</sup> "National Climate Assessment."

<sup>11</sup> Northeast Climate Adaptation Science Center, "Massachusetts Climate Change Projections."

<sup>12</sup> American Public Health Association, "How Climate Change Affects Your Health."



## 5. SPECIFIC CATEGORIES OF CONCERNS AND CHALLENGES

### Infrastructural Vulnerabilities

#### Roads and Culverts

Climate change could damage roads through the following: larger storm events could cause road erosion, washouts, and blockages and damage from downed trees and power lines; increased erosion due to rain that follow periods of drought (rain on dry soil is more likely to run off than rain on moist soil); more frequent freeze-thaw cycles; extreme heat can soften asphalt leading to rutting and subsidence.<sup>13 14 15</sup>

The map shown below displays the structural rating of bridges (squares) and culverts (circles) in Hatfield. Two bridges on I-91 at the south end of Hatfield are rated as structurally deficient by MassDOT. None of the culverts that have been evaluated are rated as structurally deficient.

Culverts (diamonds) can also be a barrier to the movement of aquatic species. Eight culverts along the Running Gutter have been evaluated for wildlife barriers. Of those, one is a severe barrier and four are moderate barriers.

The majority of culverts (purple diamonds) in Hatfield have not been evaluated for either structural deficiency or wildlife connectivity.

- Participants at the CRB Workshop shared numerous locations where low-lying roads or undersized culverts risk road flooding. Examples include:
  - Maple Street flooding from the Mill river
  - Bridge on Chestnut Street
  - Main St's low-lying areas
  - North Street and King St's low-lying areas
  - Jericho Road
  - Cronin Hill Road
  - Depot Road
  - The bridge over the Mill River on Chestnut Street has an undersized box culvert. The bridge is in poor condition and routinely overtops during floods.
  - Culvert on Cow Bridge Road
  - Maple Street area could flood from Mill River

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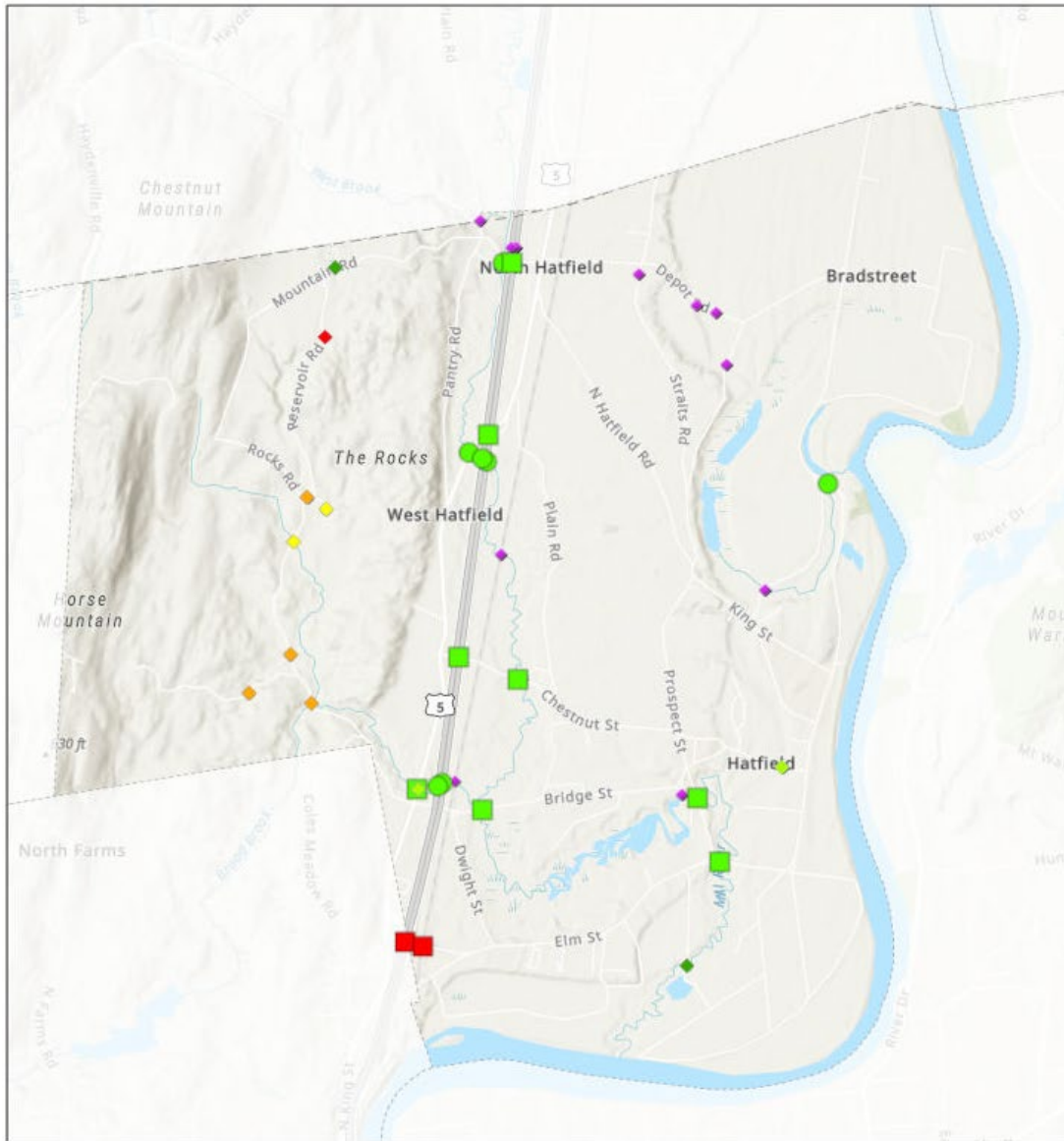
<sup>13</sup> "TechBrief: Climate Change Adaptation for Pavements, FHWA-HIF-15-015."

<sup>14</sup> "MA Climate Change Clearinghouse."

<sup>15</sup> Meyer and Weigel, "Climate Change and Transportation Engineering."

- Hatfield relies on Route 5&10 as its primary connection to surrounding communities. While flooding here has not regularly occurred, a flood large enough to cover this route would cause great damage throughout the town while blocking the most critical emergency evacuation route out of Hatfield. Such flooding could potentially be caused by dam failure or overtopping from one of the reservoirs upstream.

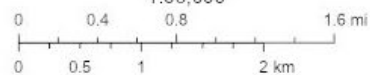
### Hatfield Culverts and Bridges



2/1/2021

1:63,000

- |  |  |
|--|--|
| <b>Culvert--Wildlife Connectivity Assessment</b> | <b>Bridges--Structural Assessment</b>  |
| ◆ No barrier                                     | ■ Not Structurally Deficient           |
| ◆ Insignificant barrier                          | ■ Structurally Deficient               |
| ◆ Minor barrier                                  |  |
| ◆ Moderate barrier                               | <b>Culverts--Structural Assessment</b> |
| ◆ Severe barrier                                 | ● Not Structurally Deficient           |
|  | ◆ Culverts--Not Assessed               |



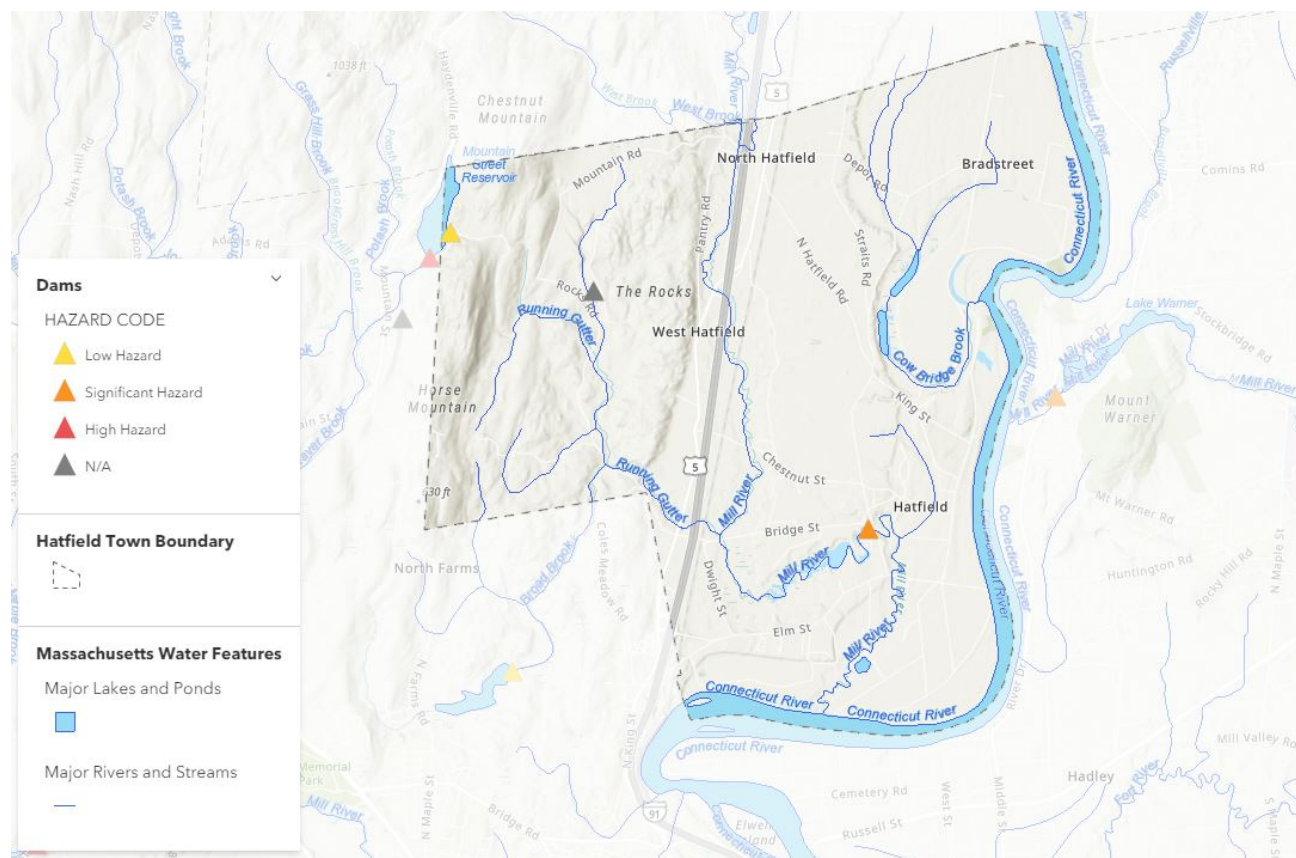
Esri, HERE, Garmin, SafeGraph, METINASA, USGS, EPA, NPS, USDA, Esri, NASA, NGA, USGS, FEMA, MassGIS, USGS

Map of known culverts and bridges in Hatfield

## Dams and Flood Control

Upstream in the Mill River watershed are the eastern dike for the Mountain Street Reservoir and the dam for the Northampton reservoir. Although these reservoirs are located in Williamsburg and Whately (respectively), flooding from overtopping of these structures would pass through Hatfield and cause significant impacts throughout the town since the Mill River passes through the middle of Hatfield geographically. The Mountain Street Reservoir dike sits just over the town line, in Hatfield.

The D.F. Riley Grist Mill Dam on the Mill River near Prospect Ct is privately owned and is rated a "Significant Hazard" by the Massachusetts Office of Dam Safety. These hazard potential ratings indicate how likely failure of the dam would lead to loss of life, damage to property, or interruption of important services. The ratings do not indicate likelihood of failure or structural integrity.



Hatfield's most significant flood control structure is the Hatfield Dike along the town's southeastern bank of the Connecticut River. Since its construction in 1938 this earthen levee has had to be maintained, but it has prevented Connecticut River flooding from reaching into the town. The dike is under the control of the US Army Corps of Engineers. Participants at the CRB workshop said the Mill River frequently backs up due to water from the Connecticut River. Participants also questioned whether a break in the levee near the Mill River poses a possibility of Connecticut River floodwaters of ever backing up into the town from the south. Workshop participants were also unsure of the extent of protection the dike provides as it moves farther north.

On a smaller but very extensive scale, agricultural ditches were historically constructed by farmers along the edges of fields as a flood control system, allowing farmers to then alter the landscape for

agricultural use without resulting in frequent flooding. Over time, as land has transitioned from farming to other uses, landowners have often been unaware of the function of these drainage ditches, or have been unable to maintain them due to wetlands regulations. As these ditches are abandoned the frequency of localized flooding increases. Hatfield has relatively flat topography with ample low lying land. The town does not have a comprehensive plan for assessing the long term impacts of the abandonment of drainage ditches or for managing stormwater as land transitions from drained agricultural uses to non-farm uses.

### **Critical Facilities, Town Facilities, Town Equipment**

The town center of Hatfield is located within the 500-year flood zone. Critical facilities here include the town hall, town records and historical archives, emergency management including the police and fire stations and associated vehicles, the library, elementary school, emergency shelter, and an elderly assisted care facility. The area also includes the historic architecture of Hatfield's oldest buildings. Some communities treat the 500-year floodplain as the new 100-year floodplain in climate change preparedness planning. In any scenario, the chance of Hatfield's town center flooding is only going to increase. The present concentration of critical facilities here means that in the event of a very large flood, much of the Town's hazard response infrastructure would itself be underwater, compounding the severity of what would already be a significant disaster.

### **Utilities and Energy Supply**

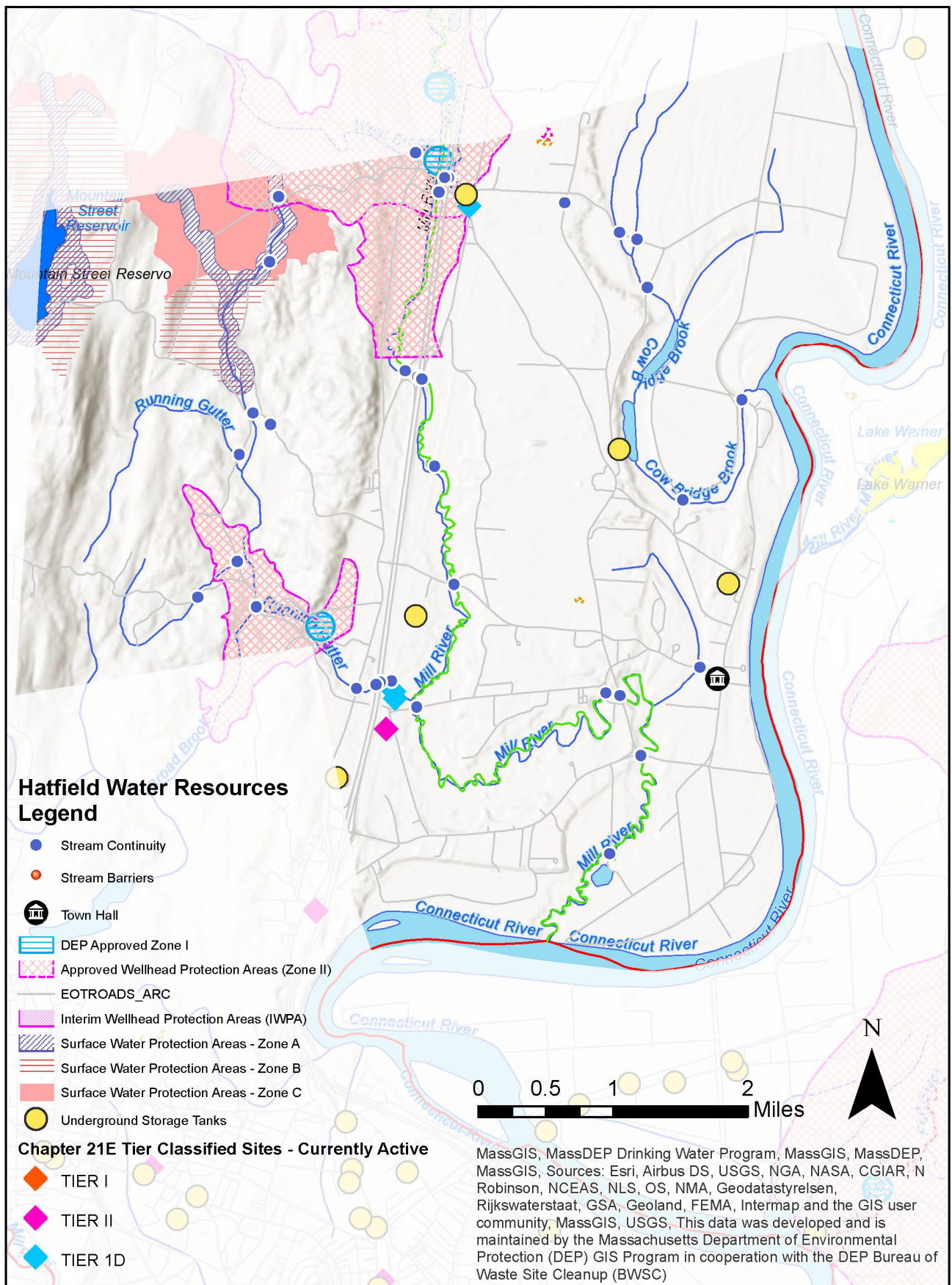
The large forested area of western Hatfield is one of the town's many great assets, but trees risk falling on power lines if not properly maintained. Severe storms and climate-related disruptions to ecosystem health will increase the chances of this happening. Individual houses on well water throughout west Hatfield could lose both water and electricity in the event of a power outage.

### **Wastewater**

About half of the town is connected to a municipal sewer system. Hatfield's wastewater treatment plant is located in the northeast part of town close to the Connecticut River, in an area within the current 500-year floodplain that has flooded historically. While the facility itself hasn't been impacted by flooding during its existence, the risk of the water treatment plant flooding will increase as severe weather becomes more frequent.

### **Drinking Water**

Hatfield's drinking water comes from three sources: the Hatfield Town reservoir, also known as the Running Gutter Brook Reservoir; the Omasta Well; and the West Hatfield Well. While these water supply sources were not greatly emphasized during the CRB workshop, they would be somewhat vulnerable to added demand from increased development and prolonged periods of drought and should continue to be protected from water contamination.





## **Chemical Facilities**

The Helena Chemical company's facility is located just above grade of the 500-year floodplain. Even though it is just out of the floodplain, flood waters would come very close to the facility in a 500-year flood, and flooding of this chemical storage facility would have serious consequences. Similarly, Turf Care Supply on Dwight St is not within the floodplain but is near the 500-year floodplain of the Mill River. Precautions should be taken at both chemical facilities to prevent flooding from causing a chemical spill.

Hazardous materials are carried on both I-91 and the railroads through Hatfield. A spill on either of these corridors could have far reaching impacts in Hatfield, especially if the spill occurred within the wellhead protection area in the northern part of the Town.

## **Societal Vulnerabilities**

### **Vulnerable Populations**

Oak Ledge, a 55 and older community of trailer homes on Route 5/10 in West Hatfield serves as an informal retirement community, according to some participants at the CRB workshop. As this housing is relatively inexpensive compared to other housing in the Town, it potentially contains a concentration of residents who many not have the resources to prepare for, or respond to, the impacts of climate change especially severe storms and extreme temperature. This area is not within the 500-year floodplain, but residents may still be impacted by disruptions caused by flooding elsewhere in Hatfield, including transportation disruptions and loss of power. In addition, the part of Hatfield has some apartments whose residents may have lower incomes than the average for Hatfield. If so, these residents may be more vulnerable to the impacts of climate change—this could be explored further through direct outreach to these residents.

More vulnerable is the Capawonk Housing for the Elderly. These income-restricted apartments for older adults are located in the center of Hatfield which is within the 500-year flood plain. In addition to the flood risk here, the facility does not have a generator and is vulnerable to power outages. This is a serious vulnerability since some residents depend on electricity for medical equipment.

### **Emergency Shelters and Communication**

The Smith Vocational School in Northampton serves as a backup and overflow shelter.

Cell phone coverage in the center of Hatfield is considered poor. This would make communication during a hazard difficult.

### **Community, Connectedness, and Social Networks**

Hatfield benefits by having many long-term residents who call this town home, which results in strong community ties that people can call on when the town faces challenges. This community connectedness can be an asset in building hazard preparedness. At the same time, CRB workshop

participants pointed out that Hatfield is gradually losing school-age children, since young families have not been able to easily move here due to limited housing and slow housing turnover.

Hatfield's center consists of historic architecture typical of the area's earliest colonial history, contributing to the town's sense of identity. The possibility of flooding through this area puts these structures at risk.

## **Housing**

Hatfield's zoning requires large lot sizes (45,000-60,000 square feet depending on district). This may slow the creation of new housing and increase its cost. This makes it difficult for young people and new residents to find homes in Hatfield, or for older adults to downsize and relocate within Hatfield. Overtime, this may result in a loss of population, erode community cohesion, and threaten the Town's school enrollment, due to insufficient enrollment.

## **Agriculture and Food Supply**

The farmland in Hatfield is rich Connecticut River valley bottom land, and Hatfield's soil in particular is considered some of the best agricultural soil in the world. While some farmland in Hatfield is under Agricultural Preservation Restriction, much of it remains unprotected, due in part to many small parcels not qualifying for APR. As populations shift due to climate migration, Hatfield should be prepared for the possibility of increased development pressures and continue efforts to protect as much of this irreplaceable farmland as possible.

Even when protected against development, farm soil itself is a fragile resource than can be degraded or lost through conventional farming practices. Increased flooding and drought will only intensify the rate of soil erosion unless care is taken to protect soil using no-till agriculture and other climate resilient practices. As an added bonus, agricultural practices that prioritize soil health tend to sequester atmospheric carbon, allowing a climate resilience measure to double as climate change mitigation. In aggregate, "carbon farming" could be a key strategy in slowing and reversing climate change globally, and with the right assistance Hatfield's farms could play an important role in slowing climate change while protecting themselves from its effects.<sup>16</sup>

Changing temperatures and weather patterns and shifting species distributions will pose new challenges to farmers in Hatfield. Farmers may need assistance transitioning to more climate resilient, integrated, and biodiverse practices in order to build soil moisture retention, incorporate greater biodiversity in their crops, manage increased pest pressure, and other climate resilient practices. Farmers often exist with slim margins for error, and the immediate financial risk of adopting new practices can outweigh the potential long-term benefits. For farms in Hatfield to adjust to the demands of climate change, some coordinated assistance to farmers will likely be necessary.

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<sup>16</sup> Kittredge, Jack "Soil Carbon Restoration: Can Biology do the Job?" Northeast Organic Farming Association/Massachusetts Chapter, Inc.

Farmers in Hatfield are well supported already by the Town and the community, and this support should be continued and enhanced for adapting to the area's future climate. Farming in Hatfield is not only important to the food supply and economy of the region, it is a central piece of Hatfield's identity as a town.

## Environmental Vulnerabilities

### Rivers, Ponds, and Wetlands

The Connecticut River has flooded in the past, most notably in 1936 (prior to construction of the Hatfield dike) when flood waters caused significant damage to homes and farms throughout most of the town. The levees that currently protect the town may not be designed for the scale of storms that could occur in the future and should be evaluated.

Great Pond, which is an important natural resource and home to a variety of wildlife, is adjacent to the Hatfield transfer station and materials storage facility. While these facilities are not within the 500-year flood plain, they are located on top of a bank perched immediately above the pond and flood plain, and bank erosion, storm damage to the facilities, or exceptionally severe flooding could cause materials from these facilities to contaminate floodwaters.

### Forests

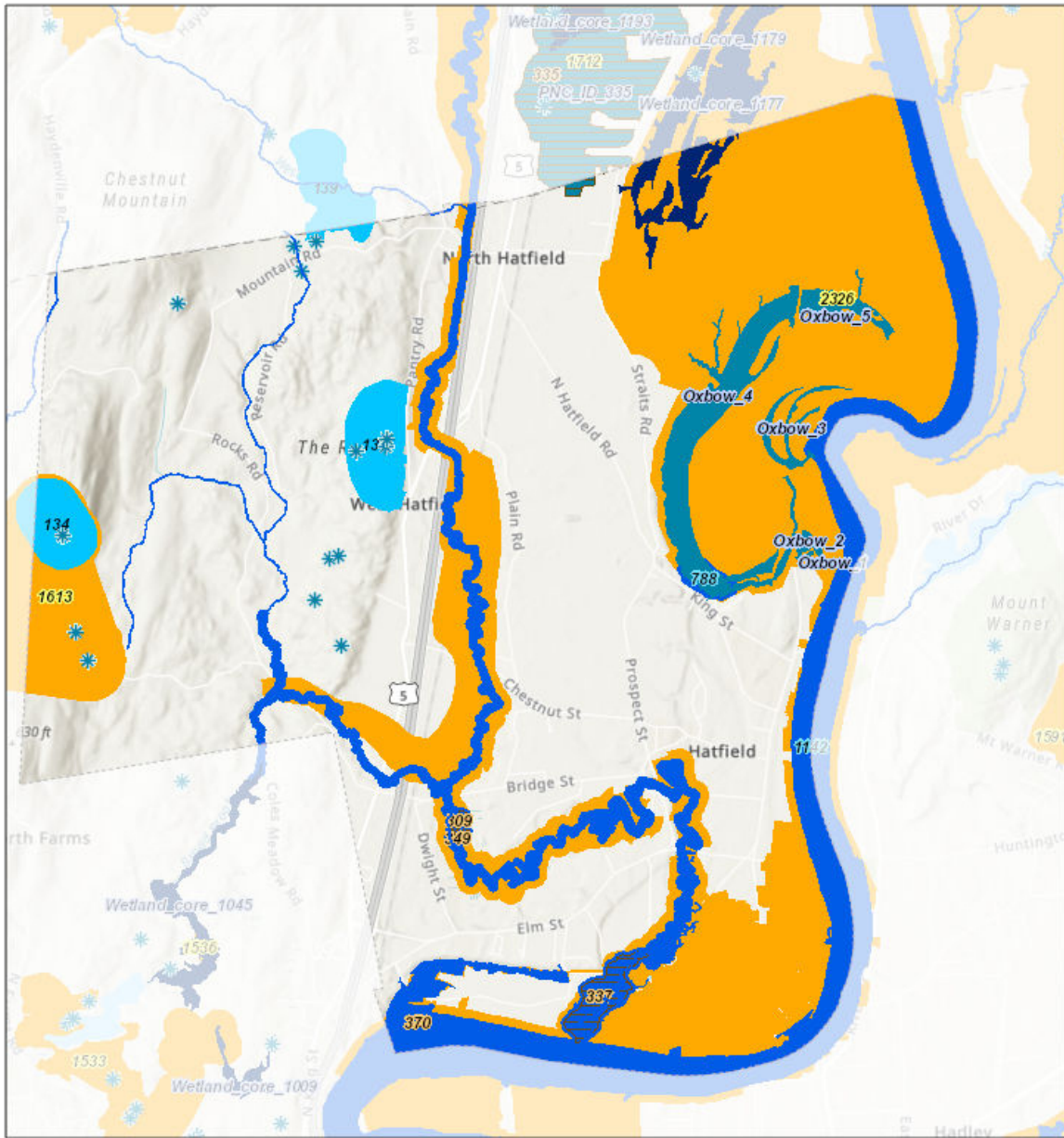
Some of Hatfield's open forested and aquatic lands are not protected from development (except by wetland restrictions). To further build a resilient landscape in Hatfield, the town should continue to conserve key properties that strengthen and expand existing ecological networks.

Forests in the town should be properly managed to prevent wildfires, protect water resources, and strengthen ecological resilience. This includes Town-owned forest land as well as riparian forest buffer land managed by farmers and private landowners.

### Conservation

West Hatfield is hilly and forested and contains transitional landscape from river to uplands. This area forms a key link in the wildlife corridor between Fitzgerald Lake in Northampton and the White Rock area to the north and should be further protected from development in order to strengthen the region's ecological resilience. In addition, selected land near the Connecticut River is a conservation priority. The second map below shows existing open space by level of protection in Hatfield overlaid on data from Mass Audubon's Mapping and Prioritizing Parcels for Resilience (MAPPR) tool. MAPPR shows parcels that are a priority for conservation based on a variety of factors including proximity to existing protected land, climate resilience, priority habitat, etc. MAPPR's "Balanced Model" is shown here.

# Hatfield Environmental Features



**BioMap2 Core Habitat Components**

BioMap2 CH Priority Natural Communities



BioMap2 CH Forest Core



BioMap2 CH Vernal Pool Core

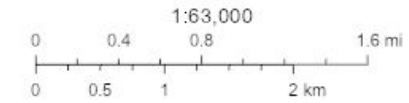


**BioMap2 CH BioMap2 Wetlands**

- Priority Natural Community Wetlands
- Wetland core - least disturbed wetlands

**BioMap2 CH Aquatic Core**

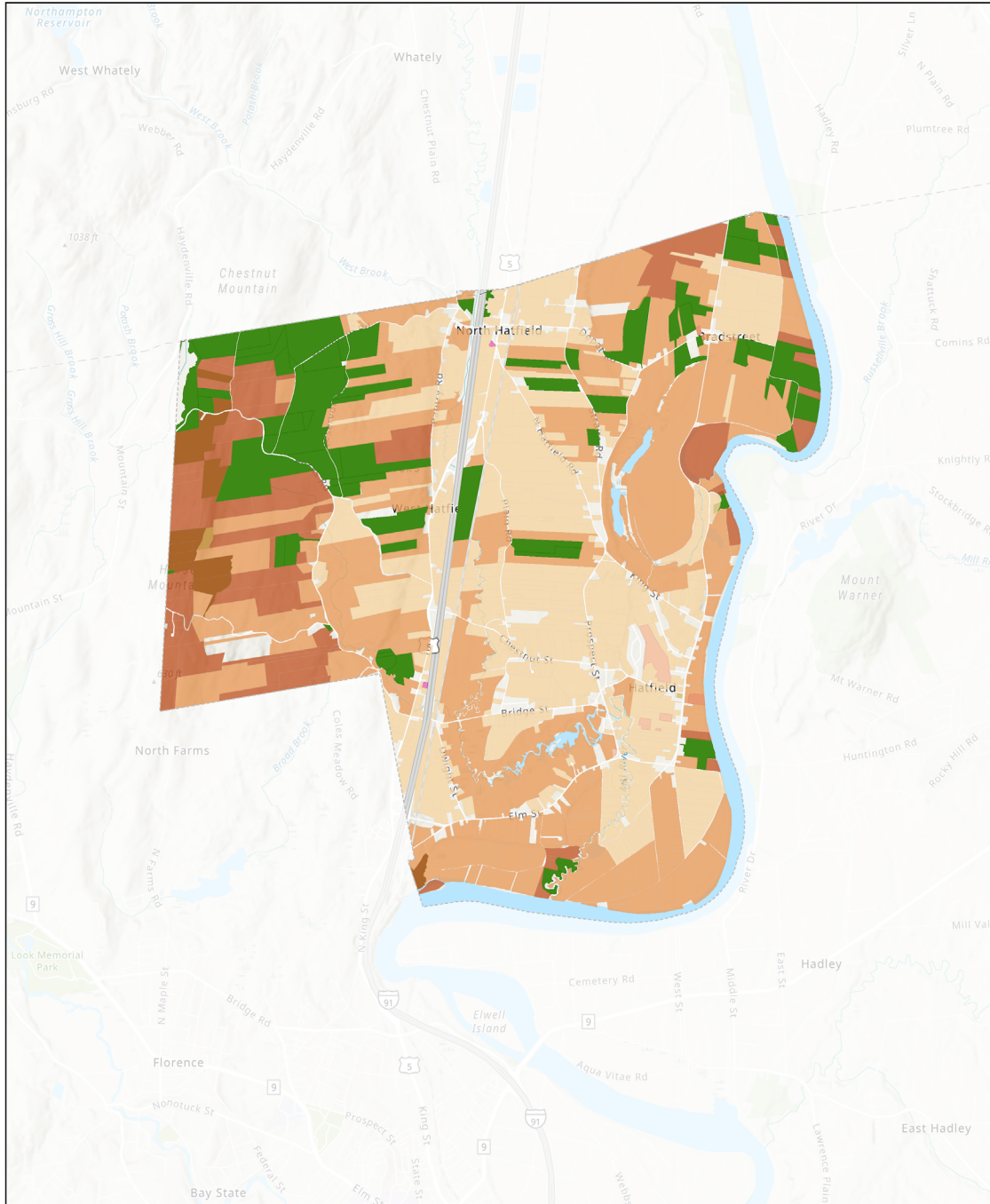
- Aquatic Core
- BioMap2 CH Species of Conservation Concern



**NHESP Certified Vernal Pools**

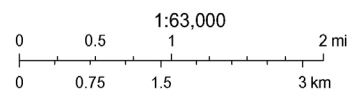


# Hatfield Open Space--Protection & Prioritization



3/4/2021

- Hatfield Town Boundary
- All Other Mass Cities and Towns (Grey)
- Mass Audubon MAPPR**
  - Low Priority for Conservation
  - Medium Priority for Conservation
  - High Priority for Conservation
- Open Space by Level of Protection**
  - In Perpetuity
  - Temporary
  - Limited (not by time)
  - None
  - Unknown



Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA  
Esri, NASA, NGA, USGS

## **Vector Borne Diseases**

Shorter winters will likely lead to an increase in tick populations as favorable conditions for their host species (deer, mice) expand. This may lead to an increase in tick-borne diseases like Lyme, babesiosis, and ehrlichiosis.

## 6. CURRENT STRENGTHS AND ASSETS

### Infrastructural Strengths

#### Transportation

- The town is bisected by Interstate 91 and Route 5 & 10. This gives Hatfield excellent connectivity to the region, especially to points north and south (Northampton, Springfield, I-90, and Connecticut to the south; Greenfield, Route 2, Vermont to the north).
- The town is bisected by railroad running north-south along the I-91/Route 5 & 10 corridor, allowing the potential for freight and passenger train stops. The C&S Grocers facility comes alongside the railroad and has its own railroad spur.

#### Housing

- Workshop participants report that Hatfield's housing stock is mostly in well maintained, and many residents can afford to prepare for climate change hazards at the home level—for example, by installing air conditioning or a backup generator.

### Societal Strengths

#### Emergency Services

- Smith Vocational School in Northampton is the regional shelter. This facility is adequately sized for Hatfield's needs.

#### Community

- Hatfield is home to many long-term residents who know the town and the community well. This builds a strong sense of community cohesion in Hatfield, which offers an opportunity for community generated activities such as preparedness.

#### Agriculture

- Hatfield's geographic setting in the Connecticut River valley floodplain has given it some of the highest quality agricultural soils in the world. Farming is an important part of Hatfield's economy and cultural identity.
- Town residents and town government have shown strong support for Hatfield's farmers, by reducing water supply rates for farmers, helping place Agricultural Preservation Restrictions on farmland, publishing an annual brochure of local farms, purchasing products from local farms, etc.
- Riquezas del Campo is a community farm in Hatfield that contributes to the food distribution network for vulnerable communities.
- The Food Bank of Western Massachusetts has its main distribution center in Hatfield. This organization provides a very important service to the region by distributing food to people in need.

## Environmental Strengths

### Water Resources

- The Connecticut River is a significant natural and recreational resource for Hatfield.
- Ponds and wetlands throughout the town provide important wildlife habitat.

### Forests

- Forested land in west Hatfield protects the quality of Hatfield's drinking water sources while providing a natural and recreational resource for Hatfield.
- Much of this forested land in west Hatfield forms a key linkage between the Fitzgerald Lake Conservation area to the south and the White rock area and beyond to the north.
- Riparian forests along the Connecticut River and Mill River protect these water bodies from agricultural runoff including excess nutrients and sedimentation.

### Soils

- As mentioned previously under "agricultural strengths", the agricultural soil in Hatfield is of extremely high quality and should be treated as a rare resource to be protected and enhanced. This is one of the main reasons why agriculture has been able to thrive in Hatfield.



## 7. TOP RECOMMENDATIONS TO IMPROVE RESILIENCE TO HAZARDS

Participants in the Community Resilience Building workshop identified dozens of potential actions to improve Hatfield's climate resilience. During the CRB workshop, workshop participants prioritized potential action and whittled them down to a smaller collection of top items. These priorities were reviewed during the Listening Session held on May 24, 2021. The top recommendations are described in detail below including recommended next steps, where appropriate. These are followed by lists of other recommended actions, which are organized by the workshop's three categories of infrastructural, societal, and environmental action items and classified into highest, moderate, and lower priority. The full list of recommended actions is included in the compiled matrix in the Appendix.

The top actions identified through the CRB workshop and listening session are:

- Assess Conditions Along Connecticut River Dike and at the Wastewater Treatment Plant
- Plan for Relocation of Town Center Critical Facilities out of the Floodplain
- Conduct a Town-Wide Drainage and Stormwater Study and Strategy
- Incentivize Climate Resilient Farming
- Plan for Future Climate-Resilient Development
- Create a Climate Resilient Master Plan

### **Assess Conditions Along the Connecticut River Dike and at the Wastewater Treatment Plant**

The top priority identified at the workshop is a comprehensive analysis of Hatfield's Connecticut River flood protection system. The dike is under the control of the US Army Corps of Engineers and any studies on the dike performed by the ACOE should be reviewed along with an assessment of conditions of any other flood control structures. All of the town's flood protection structures should be mapped, including contour lines of potential flood elevations as they relate to dike elevations. Hydrological modeling should be performed to illustrate future flooding scenarios, and critical points or contour lines where flood waters may enter the town should be identified (even if these lie along the Mill River or outside of the town's boundaries). Ownership and management of each flood control structure should be identified. From this analysis, additional needs or actions should be identified based on the current state of the town's flood control structures and the protection requirements against larger climate-change driven floods.

Flood control structures vary along the length of Hatfield's Connecticut River edge. The Hatfield Dike is an earthen levee built in 1938. According to Hatfield's Hazard Mitigation Plan, ongoing maintenance and repair is important for the proper functioning of the dike. In 2011 the Town received funding to re-surface the toe of the dike. It was not clear to the stakeholder group at the workshop how (or whether) the dike protects against flooding around its southern end where the dike ends and the low-lying Mill river cuts through the topography to meet the Connecticut River.

The question was raised whether Connecticut River flood waters might ever back up into Hatfield via this cut in the dike's topography. This stood out as a significant concern.

From this study, a list of priority actions should emerge. While it is already known that the town center lies between the 100-year and 500-year floodplain, the circumstances leading to that flood event could be better understood and protected against—or conversely, new priorities might emerge for relocation of critical infrastructure. A plan could be developed to prepare for the event of dike failure or overtopping. Infrastructural improvements could be identified, for possible coordination with the Army Corps of Engineers.

As part of this plan, flood protection for the Town's wastewater treatment plant along the Connecticut River should be examined, and improvements to its flood protection should be implemented. This would help Hatfield, and downstream communities, avoid the kind of damage that was caused when Hurricane Irene flooded Greenfield's wastewater treatment facility. Increased protection of the wastewater treatment plant could be paired with protection and restoration of floodplain forests and wetlands on adjacent parcels. These parcels are rated as a very high priority for conservation by Mass Audubon.

This action item was given the highest priority because, among other important reasons, it will help determine the urgency of completing the next action item: relocating critical facilities from the town center out of the 500-year flood plain.

### **Plan for Relocation of Town Center Critical Facilities out of the Floodplain**

A top concern among workshop participants was that the town center of Hatfield is located in the 500-year floodplain, and with the increasing frequency and severity of large storms, the chances of this storm event occurring will only increase. The town center includes the following critical facilities: Town Hall, Town historical records and archives, police department, fire department, Capawonk Housing for the Elderly, post office, and Hatfield Elementary School.

While the historical architecture of the current town center will remain in place, critical infrastructure vital to the town's functioning and emergency response should be considered for relocation. Potential sites should be identified where the town's servers, files, historical archives and other critical data can be safely located away from flood risk. This could include finding a location for an altogether new Town Hall. Likewise, this new location should include the police and fire departments, since an emergency event like a 500-year flood is exactly the kind of situation where the town's emergency responders would need to be mobilized; in its current location, the town's emergency response infrastructure would itself be a victim of the flooding.

The Capawonk Housing for the Elderly is also in the town center and in the 500-year flood plain and should be considered for relocation as well. In the short term, this facility needs backup generators because many of its residents rely on medical equipment, making power outages especially dangerous for them.

This action item could potentially be coordinated with another of the top action items, "prepare for future climate-resilient development", as a combined planning effort. In any case, the outcome of this action would be an analysis of infrastructure, flood risk, and available land to designate for a

new Town facilities center. Again, whether and how to complete this action item will be informed by findings of the flood protection assessment described above.

### **Conduct a Town-Wide Drainage and Stormwater Study and Strategy**

Hatfield should inventory and assess agricultural ditches, culverts, and low-lying areas as one connected system, and develop a town-wide strategy for drainage, stormwater management, and farmland protection. Drainage ditches were constructed on Hatfield's farm fields generations ago. They move stormwater off the fields, into waterways, and ultimately into the Connecticut River. Over generations, the people of Hatfield relied on these drainage ditches to move water along and prevent flooding. They were able to farm, and later develop, land that would otherwise have been wet. However, CRB workshop participants shared that, in recent years, many of these agricultural drainage systems have been neglected. Drainage tile may be broken. Ditches are silting in and becoming overgrown with vegetation. This is leading to localized flooding in places that previously stayed dry. Areas with localized flooding identified at the CRB workshop include farms near the wastewater treatment plant and loading docks at commercial facilities in low lying areas.

Maintenance of agricultural ditches is allowed under the Massachusetts Wetlands Protection Act, but when farming ceases, it may no longer be allowed. The result is that some of Hatfield's land is becoming unsuitable for the uses it has been put to, like housing or commercial development. Property owners may be unaware of the cause of their land becoming wet and may be unable to shoulder the financial burdens that may result.

The Town needs an assessment of which lands are likely to become wet over time and which uses will no longer be suitable. The Town also needs a strategy for assisting current and prospective property owners with evaluating the impacts of the transition and preparing for it.

Meanwhile, like communities across the commonwealth, Hatfield has numerous culverts and stormwater facilities that may be undersized in the face of climate change. The town needs a systematic inventory and assessment of these facilities and a plan for upgrading them, as needed. This study should include consideration of the use of nature-based solutions for managing stormwater. It could also include a review of Hatfield's bylaws and regulations related to stormwater management and low impact development, including the zoning bylaw and subdivision regulations.

This study should be conducted at a town-wide level and implemented in collaboration with farmers, landowners, and the conservation commission, in order to alleviate the risk of localized flooding in a way that also protects the town's water quality and aquatic resources and helps it prepare for climate change. As agricultural runoff into waterways is an important concern, the evaluation of drainage ditches could be conducted in coordination with the next action item: incentivizing climate resilient farming.

## Incentivize Climate Resilient Farming

Soil health is the key to not just the production of nutritious food and farm income, but to resilience against weather-related hazards such as drought and ecosystem disruption; and further, agricultural soil health is a potentially powerful tool in the sequestration of atmospheric carbon. This valuable resource can be protected and enhanced by using no-till planting, cover cropping, enhancing soil biota, moving away from monocropping, and eliminating dependence on herbicides and pesticides. All of these measures allow the soil to grow into a rich fertile environment that draws down carbon dioxide from the atmosphere by storing it as plant and microbial matter in the soil. If applied on a wide scale globally, such practices could start to reverse our modern-day build-up of atmospheric carbon.<sup>1718</sup>

Hatfield could help lead the way in “carbon farming”, initially using these techniques for their more immediate benefits: reduced soil erosion, enhanced soil fertility, and enhanced crop resilience. By maintaining plant cover on the soil year-round and never breaking the soil by tilling it, rain water tends to soak into the soil rather than washing over it and causing erosion. Tilled fields with bare soil can have similar runoff coefficients to paved parking lots. Globally, soil loss through erosion is a growing problem, and Hatfield’s soil is of such uniquely high quality that the community should endeavor to put itself on the cutting edge of soil protection and enhancement through farming methods.

By planting biodiverse crop systems instead of monocultures, the farm’s production becomes less susceptible to individual pests, weeds, diseases, or weather events that can wipe out a monoculture in one stroke; and all of these threats will become increasingly severe as climate change progresses.

Most farmers understand the benefits of these principles but quite often the production-oriented economics of farming do not incentivize transitioning to other ways of operating. Concern over short-term risks can easily outweigh the possibility of long-term benefits. Carbon offset credits purchased by large companies are sometimes applied to help financially ease farmers’ transition towards carbon farming. Hatfield could potentially set up direct transition assistance for farmers using MVP and other grant funds without the transaction entailing higher carbon emissions elsewhere.

Hatfield could protect the rare resource of its high-quality soils, the cultural identity of its residents and local farming economy by helping its farmers transition to climate resilient farming practices. An MVP action grant could enable the town to set up direct assistance in helping farmers make this transition, or to create a plan to incentivize climate resilient and carbon farming in other ways.

The plan should also expand farmland protection by getting key parcels protected under state APR on the basis of their significant soil quality, where small lot size might otherwise exclude them. Farmland is typically protected by purchasing development rights that are valued based on the land’s development potential, which overlooks the ecological and agricultural value of the land.

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<sup>17</sup> Kittredge, Jack “Soil Carbon Restoration: Can Biology do the Job?” Northeast Organic Farming Association/ Massachusetts Chapter, Inc.

<sup>18</sup> Rodale Institute “Regenerative Organic Agriculture and Climate Change: A Down-to-Earth Solution to Global Warming”

Communities like Hatfield could coordinate at a statewide level to enhance farmland protection mechanisms like APR to include a climate resiliency component that targets lands on an ecological and climate mitigation basis. Areas of prime farmland that are not under APR and are not protected by wetland buffers or floodplains should be considered high-priority for farmland preservation.

### **Plan for Future Climate-Resilient Development**

To prepare for climate change in Hatfield, the town should identify areas for future development and then develop area plans for those locations. The identification of areas could be based on climate resilience, existing infrastructure, preservation of farmland, and other town goals. Area plans would include the desired development pattern, preferred uses, densities, locations and types of infrastructure, open spaces, town facilities, and stormwater management strategies. Area plans could be followed by an action plan for regulatory changes and infrastructure investments. This planning activity would meet several town needs: 1. It would help the Town to steer development toward preferred locations and away from valuable farmland and climate vulnerable locations (potentially including transfer of development rights and/or conservation of vulnerable locations), 2. it would enable the town to identify the best location for relocating critical facilities out of the 500-year floodplain while avoiding the problem of siting them in an isolate location far from residents, 3. It would help the town prioritize infrastructure improvements for climate resilience, 4. it would prepare the town for potential climate migrants, by providing a location for future growth.

The most likely suitable area for future development is along Route 5 & 10. This area is already a focus of development for Hatfield, including commercial and multi-family development. It has good transportation access, and some parts of the corridor have town water and sewer. The Town recently received a MassWorks grant for improvements, but additional upgrades and expansion of infrastructure is warranted. In particular, the area, which has some of Hatfield's most vulnerable residents, is served by a water main that dates from the 1800's. The water main frequently breaks due to frost movement. More frequent freeze/thaw cycles is a potential outcome of climate change and so climate change could increase the risk of the vulnerable populations in this area not having access to drinking water.

Locations for future development served by expanded water and sewer must be chosen to avoid the potential flood path of dam failures upstream from the Northampton and Mountain Street reservoirs. Dam failures of these reservoirs, while estimated to be an unlikely occurrence even in future climate scenarios, would still cause catastrophic flooding to anything in its path, which includes the Mill River corridor where it crosses Route 5 & 10.

### **Create a Climate Resilient Town Master Plan**

Because the top actions described above are interrelated and could have far-reaching impacts on Hatfield, the town would benefit from an update of its Master Plan with a focus on climate resilience. A Climate Resilient Master Plan would enable the town to plan for climate impacts on major infrastructure, town facilities, the town center, housing, agriculture, economic development, transportation, and stormwater management in a comprehensive way with a robust public input

process. The Master Plan could include more detailed studies related to the other top priority actions, for example creation of area plans for a new village center that is suitable for critical facilities and/or future development, a regulatory review for climate resilience, or development of incentives for climate resilient farming. Hatfield last adopted a Master Plan over twenty years ago. It is time to evaluate how the town has changed over the last few decades, identify the trends that will impact it going forward, and establish a town-wide vision and action plan for the coming decades.

## Additional Priorities

### High Priorities

- Culverts and stream crossings should be evaluated for accommodating increased flows. This should happen as part of a coordinated town wide drainage plan, but individual culvert upgrades could become individual high priority projects on their own if the need to upgrade is immediate. Roads that were identified by CRB workshop participants include: Main St, Jericho Rd, Cronin Hill Rd, Chestnut St, Depot Rd, and Maple St.
- Provide backup generators to the Capawonk Housing for the Elderly so that medical equipment and other critical infrastructure can still function during a power outage.
- The town center historic district cannot be relocated, so potential flood protection measures should be studied for reducing the impact of flooding on these historic buildings. A town wide drainage plan, levee assessment, and resulting infrastructure upgrades would help protect this district as well.
- Management plans for town owned forest lands will reduce the impact of invasive species and overall forest resiliency.
- Improve and incentivize use of open space development bylaw and other means of appropriately clustering development and creating diverse housing types, while protecting and improving farmland and open space.

### Moderate Priority

- Conduct routine culvert inspections and maintenance.
- Participate in regional planning to prepare for downstream impacts of the potential failure of Harriman Dam (in Vermont).
- Management of timing and flow of discharge from Hatfield Town Reservoir Dam on downstream environment and nearby septic systems.
- Continue to maintain trees near power lines.
- Ensure that Helena Chemical Company, Turf Care Supply, and other facilities with toxic or hazardous chemicals have safeguards against flooding and other climate-driven hazards. Ensure that local emergency responders are aware of facility's emergency response plans. For more information including a map of toxics users, see this website: <https://www.mass.gov/guides/chemical-safety-and-climate-change-preparedness->

resources-for-local-governments#-sample-emergency-planning-and-continuity-planning-tools-

- Identify residents who are unable to upgrade housing to adapt to climate change and develop programs to help them meet their needs. This may include renters, people with disabilities or health challenges, migrant farmworkers, elderly, etc.
- Identify geographically isolated residents and communities and determine if they need assistance adapting to extreme heat.
- Improve communication infrastructure in Hatfield center. Investigate locations for a cell phone tower, create plans for alternative methods for broadcasting crucial emergency information.
- Continue to support community driven farms like Riquezas del Campo.
- Conserve wetlands, forested land near water supply areas, forested lands that connect existing open space corridors, and riparian areas.
- Conduct a study of land and wildlife management practices to reduce tick populations, implement practices.

### **Lower Priority**

- Consider removal of the dam on the Mill River tributary near Smith Academy and ecological restoration of the stream.
- Explore repair of the Grist Mill. Massachusetts Office of Dam Safety ranks the Grist Mill dam as a significant hazard due to the potential downstream damage if it were to fail. The dam has high historic value because it was the site of one of the first buildings in Hatfield and a Native American crossing. According to a participant in the Listening Session, keeping the dam has more ecological value than removing it because there are rare species behind the dam that would be damaged by its removal.
- Coordinate with neighboring towns to ensure that the Northampton Reservoir does not overtop or fail and causing flooding.
- Replace and extend water mains on Rt 5 & 10, which have a history of breaking due to frost and other factors as they age.
- Ensure homeless population has access to shelter and resources, participate in regional housing efforts.
- Create an annual community wide event focused on resilience and preparedness, offering education, providing resources, and leveraging volunteers for work days.
- Increase FRTA transit frequency through Hatfield.
- Address repeated beaver blockage of culvert on stream by Depot Rd and Cronin Rd.
- Publicize the oral history collection at the Library that documents first-hand accounts of the flood of 1936.

## 8. POSSIBLE FUNDING SOURCES

Funding for implementation from public sector sources could include:

- MVP Implementation grants from Massachusetts Executive Office of Energy and Environmental Affairs, ranging from \$10,000 - \$2,000,000 are available to municipalities upon completion of the MVP planning process. The Grant RFR is typically released in spring.
- Massachusetts Emergency Management Agency (MEMA) grants
- FEMA's Hazard Mitigation Grant Program (HMGP)
- MassWorks Infrastructure grants from Massachusetts Executive Office of Housing and Economic Development
- Massachusetts Division of Ecological Restoration's Culvert Replacement Municipal Assistance grants
- Dam and Seawall Repair or Removal grants from Massachusetts Executive Office of Energy and Environmental Affairs, which addresses inland flood control infrastructure as well as coastal features
- Massachusetts Department of Environmental Protection 604b Water Quality Management Planning Grants
- Other state funds for land conservation
- EPA grants
- See additional grant opportunities on the Massachusetts Community Grant Finder at <https://www.mass.gov/lists/community-grant-finder>



## 9. CRB WORKSHOP PARTICIPANTS

<b>Community Role</b>	<b>Title/Affiliation</b>	<b>Name</b>
Residents	Resident	Bobby Betsold
Fire Department	Fire Chief	Chief Flaherty
Stiebel Eltron heating	Architect/planner	Erica Gees
Department of Public Works	Director	Phil Genovese
Historical Commission	Commission Member	Amy Hahn
Board of Selectmen	Member	Edmund Jaworski
Police Department	Officer	Officer Kennedy
Board of Health	Member	Liz Kugler
Fire Department	Captain/Training Officer	Luke Longstreeth
Other Town Staff	School Superintendent	Martin McEvoy
Town Administrator	Town Administrator	Marlene Michonski
Black Birch Vineyard	Owner	Ian Modesto
Municipal Vulnerability Preparedness Program	Greater CT River Valley Regional Coordinator	Andrew Smith
PVPC	Senior Planner	Emily Slotnick
Planning Board	Chair	Stephanie Slys
Stiebel Eltron heating	Owner	Frank Stiebel
Board of Selectmen	Chair	Diana Szynal
Kestrel Land Trust	Conservation & Stewardship Manager	Mark Wamsley
Belden Farm	Farmer, owner	Darryl Williams

## 10. MVP PROJECT TEAM

<b>Name</b>	<b>Title/Role</b>	<b>Affiliation</b>
Mike Dekoschak	Police Chief	Town of Hatfield
Robert Flaherty	Fire Chief	Town of Hatfield
Phil Genovese	Department of Public Works Director	Town of Hatfield
Marlene Michonski	Town Administrator	Town of Hatfield
Bob Wagner	Chair, Agricultural Advisory Commission and Planning Board	Town of Hatfield
Andrew Smith	Greater Connecticut River Valley Area Coordinator	MVP Program
Peter Flinker	Principal-in-Charge	Dodson & Flinker
Nate Burgess	Facilitator	Dodson & Flinker
Tia Novak	Facilitator	Dodson & Flinker
Dan Shaw	Project Lead, Facilitator	Dodson & Flinker
Dillon Sussman	Project Lead, Facilitator	Dodson & Flinker

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# 13. APPENDICES

## 1. Combined Workshop Matrix

# Community Resilience Building Risk Matrix

Hatfield, Massachusetts



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

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

Features	Hazards	Lat	Lon	Location	Ownership	V or S	Flooding	Severe Storms	Average & Extreme Temperatures / Drought	Ecosystem Disruption	Priority		Time	
											H - M - L	H - M - L	Short	Long Ongoing
<b>Infrastructural</b>														
<b>Transportation (Roads, Sidewalks, Transit)</b>														
Proximity to Transportation Network Provides ability to move out of harms way and connection to regional resources. I-91, Route 5&10, train tracks	Flooding,Average and Extreme Temperatures,Severe Storms,Ecosystem Disruption,Invasive Species/Pests/Vector-Borne Diseases,Drought,Wildfire	42.360637	-72.636403				Strength							
Localized road flooding (frequent but with low impact)-various locations	Flooding						Vulnerability	Routine maintenance: make sure culverts, ditches, stormwater drainage is working correctly. Protect soil, increase infiltration, slow runoff.	Collect local info on flooding (history and projected), map problem areas, develop a suite of potential responses and prioritize.			M		S/O
Maple street flooding from Mill river The Mill River could flood Maple Street and houses in the area.	Flooding,Severe Storms	42.366471	-72.604265				Vulnerability	Study, upgrade culverts				H		S
Main Street Flood. Low-lying	Flooding	42.38581	-72.593022				Vulnerability	Study, upgrade culverts				M		S
North Street and King Street Flooding Flood. Low-lying	Flooding	42.376776	-72.595211				Vulnerability	Study, upgrade culverts				M		S
Low Lying Floodable Jericho Road Area often floods	Flooding	42.368501	-72.624325				Vulnerability	Routine maintenance: make sure culverts, stormwater drainage is working correctly.				M		S/O
Cronin Hill Road Flood . Houses Damaged. Low-lying.		42.3982	-72.606734				Vulnerability	Study, upgrade culverts				M		S
Swampy area on 5&10 Route 5&10 is the main artery through our town. It is filled with businesses. There could be a problem if this area floods and makes the road impassable.	Flooding,Severe Storms	42.383555	-72.632629				Vulnerability	Study, upgrade stream crossings and culverts				M		S
Springfield Terminal Railroad Lines Previously, trains moved around Hatfield. The state purchased the tracks and repaired them, now trains freight and passenger trains travel through Hatfield at speeds 50-70 mph. Sometimes trains are carrying hazardous waste. Derailments have occurred in past. Rail lines pass through Hatfield's Zone II wellhead protection area at the north end of town.	Flooding,Average and Extreme Temperatures,Severe Storms,Wildfire	42.378044	-72.630174				Vulnerability					L		L
<b>Bridges/Culverts</b>														
Culverts - whether aging or undersized, high intensity rainfall events will strain the capacity If culverts have recently been upgraded and designed to Mass Stream Crossing Standards, they are a strength. Those that can accommoate increased flows are a strength. Those that are undersized, aged, or undermined, are a vulnerability. I picked a point representing a culvert on Cow Bridge Rd, just as an example.	Flooding	42.387009	-72.599825	various			Strength,Vulnerability	Study to determine needs in terms of culvert replacement.				H		S
Culverts Undersized Location		42.396191	-72.628115				Vulnerability	Study to determine needs in terms of culvert replacement.				H		S
Bridge on Chestnut Street Bridge in poor shape, and also floods. Small box culvert. Main way in and out of town. Overtops in flood. Spring flooding on Chestnut St.	Flooding	42.379882	-72.624991				Vulnerability	Study, upgrade culvert.				M		S
Depot Road floods related to culverts, also former farm fields that have been developed. Also beavers block culverts on Depot Road.	Flooding	42.411291	-72.616964				Vulnerability	Study, upgrade culvert.				M		S

# Community Resilience Building Risk Matrix

Hatfield, Massachusetts



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

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

Features	Hazards	Lat	Lon	Location	Ownership	V or S	Flooding	Severe Storms	Average & Extreme Temperatures / Drought	Ecosystem Disruption	Priority		Time		
											H - M - L	H - M - L	Short	Long Ongoing	
<b>Dams and Flood Control</b>															
Vulnerability to Floods and Dike Failure Vulnerable to Failure -- both dike along the CT river. Recent USACE work. Dike failure in 1984 and more recent work to fix things up. Dike, on southeast edge of town. Extent of dikes, extent of flood protection/ flood elevation is not completely clear	Flooding	42.356768	-72.59033			Strength,Vulnerability	Assessment of existing dikes, assemble studies that have been done (by Army Corps of Engineers, others, current and projected flooding impacts, and potential improvements.	See dike assessment.				H		S	
Agricultural Drainage Ditches These drainage channels were installed by farmers throughout the town. Farmers used to burn vegetation to keep them clear, now many are no longer maintained and might not provide flood protection. Some of them are regularly maintained but some are not. When the property changes hands, the new owners often do not properly maintain this infrastructure.	Flooding,Invasive Species/Pests/Vector-Borne Diseases	42.368057	-72.637417		Private	Vulnerability	Outreach and information to the public about these structures, the potential impacts of their abandonment, and nature-based methods for localized flooding. Analyze townwide system of drainage ditches, survey of culverts connected to this network. Identify locations where drainage ditches have been abandoned. Create a townwide plan that considers climate change and land use change. Repair or upgrade facilities as needed. Replace with nature-based approaches where possible. Allow, incentivize, assist farmers and landowners to clear and maintain historic drainage ditches.					H		S, O	
Dam on Mill River tributary Vulnerability. This earthen dam blocks a tributary to the Mill River. It contributes to flooding, disruption of wetlands, and has become a breeding ground for mosquito-borne infection.	Flooding,Severe Storms,Ecosystem Disruption,Drought	42.375119	-72.598185			Vulnerability						L		Short	
Harriman Dam Failure of this dam in Vermont could cause catastrophic flooding in Hatfield. A controlled release during tropical storm Irene caused flooding in Deerfield.	Flooding					Vulnerability	Plan regionally for catastrophic dam failure on Connecticut River. Make sure Hatfield is tied into regional emergency response plans.	Develop a local plan for catastrophic failure and disseminate information in Town. Look at addressing larger issue of Town services relocation out of low-lying areas.				M		Ongoing	
Town Reservoir Dam Management of flow from town reservoir impacting downstream environment and threatening nearby septic systems.	Flooding,Ecosystem Disruption	42.395805	-72.647759			Vulnerability	Better management of discharge flow from reservoir -- timing and volume.					M/L		Short	

# Community Resilience Building Risk Matrix

Hatfield, Massachusetts



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

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

Features	Hazards	Lat	Lon	Location	Ownership	V or S	Flooding	Severe Storms	Average & Extreme Temperatures / Drought	Ecosystem Disruption	Priority		Time	
											H - M - L	H - M - L	Short	Long Ongoing
Mountain Street Reservoir Dam Vulnerable to break/flooding	Flooding	42.40039	-72.671362			Vulnerability								
Potential Dam Failure flooding would occur downstream and cause bank erosion. Need regular dam inspections	Flooding, Severe Storms	42.372749	-72.605904			Vulnerability	Ensure that there are regular dam inspections and that Town knows the results of inspections					H		Ongoing
Northampton Reservoir/Francis Ryan Reservoir Dam Northampton Reservoir dam could cause flooding. Would likely affect homes. Would affect at least one, if not two, of the major evacuation routes in town (5 and 10).	Flooding	42.446356	-72.68827			Vulnerability	Look at city wide improvements to waterways in tandem with neighboring cities and town (like Northampton and Whatley). For now, rain events that might cause reservoirs to overtop can be forecasted enough in advance to alert people in flood path to evacuate.					L		L
<b>Critical Facilities, Town Facilities, Town Equipment</b>														
Town hall, emergency management/fire station + vehicles, school, library, shelter, elderly housing are all within 500-year flood plain. Town needs to consider other locations for these facilities	Flooding	42.37294	-72.597695			Vulnerability	Assess long-term vulnerability. Identify what can/should be moved and what we can/should stay. Single or multiple buildings? Begin to identify alternative locations for these facilities so they can be moved when necessary. Relocate buildings to higher ground. Emergency Services or Council on Aging that functions as an emergency center. Relocate town historical documents to more secure location. There was a grant for digitizing files (ask town clerk). Inspect levees. Have plan for flooding (eg.	Identify shelter location(s) in existing buildings.	Identify shelter location(s) in existing buildings.			H		S
<b>Utilities &amp; Energy Supply</b>														
Mature Trees Trees by Primary Power Lines--there has been a good effort to maintain street trees. Also a strength.--beauty, co-benefits. Rock maples, sugar maples.	Severe Storms, Invasive Species/Pests/Vector-Borne Diseases	42.369515	-72.60671			Strength, Vulnerability	Continue to maintain street trees and actively plant new trees					M		Ongoing
Power/Water for Individuals in West Hatfield No plan for multiple day power outage for individuals on well water	Severe Storms	42.38505	-72.650053			Vulnerability						L		L
<b>Drinking Water, Waste Water, Stormwater</b>														



# Community Resilience Building Risk Matrix

Hatfield, Massachusetts



**H-M-L** priority for action over the **Short** or **Long** term (and **Ongoing**)  
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**Top Priority Hazards** (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Features	Hazards	Lat	Lon	Location	Ownership	V or S	Flooding	Severe Storms	Average & Extreme Temperatures / Drought	Ecosystem Disruption	Priority		Time	
											H - M - L		Short	Long
Water Main Breaks History of water main breaks, generally driven by frost movement. Pipe on Route 5 for example, is from the 1800s.	Average and Extreme Temperatures,Drought	42.371719	-72.635539			Vulnerability			Replace and extend water mains and sewer, particularly to areas of existing multi-unit housing or future centers. Already identified as a project and needs time and funding. Underutilized commercial property also will become more viable through this project.	Sewer/water extension	M		Ongoing	
Wastewater Treatment Plant Vulnerability. Right on the river. Hasn't flooded in recent memory, but has flooded in distant past and probably is vulnerable to flooding. Farm fields nearby flood regularly.	Flooding,Severe Storms						Study of facility along with other low lying areas to assess vulnerability to flooding and identify opportunities to protect the facility, alongside potential for nature-based solutions. Update the infrastructure to withstand extreme weather events.		Bylaw for low-flow toilets and water-sense fixtures to reduce? (Low Priority)		H		Ongoing	
<b>Other Structures and Facilities</b>														
Helena Chemical Company Chemical company is within floodplain. If flooding occurred, contamination is possible.	Flooding	42.358631	-72.621146		Private business	Vulnerability	Ensure building and company has necessary protections in place to prevent a chemical contamination disaster.					M		S
Fertilizer Business If the two fertilizer plants in town spark or leak, it would devastate waterways, environments and homes.	Flooding,Average and Extreme Temperatures,Severe Storms,Wildfire	42.35782	-72.6212		Private business	Vulnerability						M		S
Housing stock Hatfield's housing stock is generally well maintained. Overall, most people in Hatfield can afford to prepare for climate change through measures like installing air conditioning.	Flooding,Average and Extreme Temperatures,Severe Storms					Strength		Identify people in Hatfield who are not able to upgrade housing to prepare for climate change and develop programs to meet their needs. Consider, renters, people with disabilities and other health challenges that may be exacerbated by climate change, and people with fixed incomes (especially older adults).			M		Ongoing	
<b>Societal</b>														
Vulnerable Populations														

# Community Resilience Building Risk Matrix

Hatfield, Massachusetts



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

Features	Hazards	Lat	Lon	Location	Ownership	V or S	Flooding	Severe Storms	Average & Extreme Temperatures / Drought	Ecosystem Disruption	Priority		Time	
											H - M - L	H - M - L	Short	Long Ongoing
West Hatfield, residents of lower cost housing along Route 10 There are some apartment and a 55 and older mobile home community (Oak Ledge Estates) in this part of town. Some residents may have a lower income than the average for Hatfield as a whole (presumed because renters and residents of mobile homes often have lower incomes). If so, these residents may lack the resources to prepare for or bounce back from severe storms and extreme temperatures. Some areas are not on town water/sewer, may lack water supply in power outage. Close to a limited bus route.	Average and Extreme Temperatures, Severe Storms	42.387976	-72.633875			Vulnerability		Identifying needs of geographically isolated communities and determining extent to which needs can be met, particularly around extreme heat.	Action: see note on extension of water/sewer.		M		Ongoing	
Capawonk Housing for Elderly Is within 500 year flood plain. Does not have a generator. Some residents need power for medical equipment.	Flooding, Average and Extreme Temperatures, Severe Storms	42.373737	-72.596892	2 School Street	Hatfield Housing Authority	Vulnerability		Backup generators			H		S	
Seasonal campers In summer there is a small (~100 individuals) population that set up temporary camps along river, for about 6-7 months, many own property by river and set up camp. This population is vulnerable to extreme temperatures and flooding. A few members of this population are homeless.	Flooding, Average and Extreme Temperatures				Private	Vulnerability		Ensure homeless population has access to shelter and resources. Participate in regional housing efforts.			L		L	
Immigrant and migrant farmer population Many immigrant and migrant farmers who work seasonally and have been for generations. Some may live in town. Anything agriculture related impacts them. This group has less voice than others in Hatfield's political processes.	Flooding, Average and Extreme Temperatures, Severe Storms, Drought					Strength, Vulnerability		Continue to support and enhance agriculture in Hatfield			H		O	
<b>Town Government, Emergency Services, and Emergency Communication, Shelters</b>														
Cooling/warming Shelter Hatfield's elementary school and the senior center serve as shelters for severe storms. They are sized appropriately. Smith Vocational School serves as a backup and overflow shelter. They are located in the 500 year flood plain.	Flooding, Average and Extreme Temperatures, Severe Storms	42.36992	-72.600119			Strength								
Poor cell phone coverage in center of town The center of town, which has Hatfield's densest population and key town facilities, has poor cell phone coverage. This may impact the Town's ability to communicate during natural hazards.	Flooding, Average and Extreme Temperatures, Severe Storms, Drought	42.369801	-72.600253			Vulnerability		Investigate locations for a cell tower. Create plans for alternative methods for broadcasting crucial emergency information in this part of town: for example a public address system or electronic notification sign boards.			M		Short	
<b>Community-- Connectedness/Culture/Identity/Communication/Social Networks</b>														
Historic Downtown Really distinct, unique period of American history represented in downtown Hatfield. Probably Northfield, Hatfield, Deerfield and Whately are the most representative of this period.	Ecosystem Disruption	42.371745	-72.5964			Strength, Vulnerability								
Many long-term residents People live in Hatfield for a long time and across generations. This results in strong community ties that people can call on when the town faces challenges.	Flooding, Average and Extreme Temperatures, Severe Storms, Drought					Strength								
Strong Cohesive Community - Pride of Place can foster Resilience Community cohesiveness offers an opportunity for community generated activities such as preparedness.	Flooding, Average and Extreme Temperatures, Severe Storms, Ecosystem Disruption, Drought	42.372432	-72.5966			Strength	(All hazards) Make resilience and preparedness and annual community wide event with a variety of programs that educate, provide resources and leverage volunteers for work days				L		Ongoing	

# Community Resilience Building Risk Matrix

Hatfield, Massachusetts



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

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

Features	Hazards	Lat	Lon	Location	Ownership	V or S	Flooding	Severe Storms	Average & Extreme Temperatures / Drought	Ecosystem Disruption	Priority		Time	
											H - M - L	H - M - L	Short	Long
Demographic changes-loss of school children School is struggling with numbers. There are not enough school children because there is a lack of housing turnover. Residents in Hatfield have lived in town longer than any other community in Commonwealth. School system is incredibly small. The town recently passed an ADU bylaw to encourage development of more places to live. Ultimately if the schools were not able to stay open it would have big impacts on community cohesion.		42.369832	-72.599974			Strength,Vulnerability	(All hazards) Planning for more diverse types of housing in appropriate locations to protect town farmland and open space while attracting families to Hatfield					M		L
Older homes and barn museum along Main Street/Town Center Potential flooding from the CT River and Mill River would impact the historical district.	Flooding	42.371795	-72.599471			Vulnerability	Improve flood control structures along river and streams					H		Long
<b>Food Supply/Agriculture</b>														
Agriculture Agriculture has both a natural resource, social/economic component; it splits categories. The farm land in Hatfield is valley bottom land that is unique, with some of best soil in world. Agricultural soil is definitely a natural resource. Most of the farmland is in small parcels and does not qualify for state APR. Many large farmers lease land for farming. Past major floods (1936) resulted in significant erosion of Hatfield's farm land. Bob Wagner (Agricultural Advisory Commission/Community Preservation Commission) has identified areas that are more at risk because they are not in flood plain. Wagner had prime farmland soils mapped/identified because that would make that land eligible for APR.	Flooding,Average and Extreme Temperatures,Severe Storms,Ecosystem Disruption	42.401372	-72.594429		Private	Strength,Vulnerability	(All hazards) Identify areas of prime agricultural soil and protect them, especially areas that are buildable. Farmers need grants to transition to no till agriculture and other climate resilient practices. Federal resources could be option. NRCS has reached out trying to fund a no-till planter (Mark Wamsley)					H		Ongoing
Community support for farmers and farms Town government and town residents strongly support farmers. For example, the town has reduced water supply rates for farmers. The town helped facilitate placing APRs on several parcels. There is a lot of land in Chapter 61 programs. There are water fill pipes in farming areas. Conservation development projects example N Hatfield and Straights Rd (confirm). The Town Ag Advisory Committee produces annual brochure of local farms. <u>Town residents purchase products from local farms.</u>	Flooding,Average and Extreme Temperatures,Severe Storms,Drought	42.368089	-72.599991			Strength	(All hazards) Continue and enhance community support for farmers and farms					H		O
Community Farm (Riquezas del Campo) New community farm contributes to food distribution network for vulnerable communities.		42.371254	-72.638578			Strength	(All hazards) Support this an similar efforts throughout Hatfield, as they ensure local produce feeds local communities.					M		Ongoing
Food Bank of Western Massachusetts Strength - supports local food security		42.39772	-72.61472			Strength	(All hazards: continue to support Food Bank)					H		O
Zoning-Open Space Design bylaw Hatfield's Open Space Development bylaw is clunky and rarely used. The open space requirements of the by-law could help with securing carbon-sinks, protecting farmland for future use, storing floodwaters, providing passive recreational opportunities. With density bonuses, a well-crafted by-law could theoretically take pressure off of other lands to be converted for housing thus allowing those lands to continue to provide natural resource values and benefits.	Flooding,Average and Extreme Temperatures,Severe Storms,Ecosystem Disruption	42.372789	-72.59683			Vulnerability	(all hazards) incentivize use of blylaw, expand study, etc					M		S
Farms vulnerable to changes in temperatures, changes in water availability (including drought), increased pest pressure	Flooding, Average and Extreme Temperatures,Severe Storms,Drought	42.378424	-72.615586			Vulnerability	(All hazards) Support farmers in adopting climate resilient farmng practices.					H		O
Farms Vulnerable to Flooding Farms in this area (near wastewater treatment plant) are vulnerable to flooding.	Flooding	42.4002	-72.591754			Vulnerability	Study/needs assessment and maintenance plan for existing ditches.					H		S
<b>Development Patterns/Laws, Regulations</b>														
Conservation Development Initiative Successful conservation development projects example include one in N Hatfield and one on Straights Rd (confirm). However the Open Space Development has not been widely used.	Flooding,Average and Extreme Temperatures,Ecosystem Disruption	42.403654	-72.615359			Strength,Vulnerability								

# Community Resilience Building Risk Matrix

Hatfield, Massachusetts



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

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

Features	Hazards	Lat	Lon	Location	Ownership	V or S	Flooding	Severe Storms	Average & Extreme Temperatures / Drought	Ecosystem Disruption	Priority		Time	
											H - M - L	L	Short	Long Ongoing
Zoning-large lot requirements Larger minimum lot acreage results in large houses/higher end development. Two very successful 55 and over housing developments. Nicely done and fast selling, but don't contribute more families to fill schools. Limit supply of new housing for young people, downsizing older adults, and others who want smaller/cheaper housing.		42.360332	-72.623583			Vulnerability	(All hazards) Consider zoning that facilitates development of more diverse housing so that new families are able to move into Hatfield. Long-term lack of housing turnover may compromise the schools which would result in loss of community cohesion.					M		S
Franklin Regional Transit Authority (FRTA) transit FRTA Doesn't run on weekends. This is an issue for general mobility and may make it difficult for residents who rely on public transit to prepare for climate driven storms.	Flooding,Severe Storms,Drought	42.363744	-72.637653			Vulnerability	(All hazards) Increase FRTA transit frequency through Hatfield					L		L
<b>Environmental</b>														
<b>Water Resources: Lakes and Ponds, Wetlands, Streams, (includes conserved land, invasive species, harmful algae blooms, water quality, runoff, infiltration, etc).</b>														
Connecticut River Hatfield has experienced Connecticut River flooding in the past. Levees currently protect part of Hatfield, but they may not have been designed for the scale of flooding that could result from climate-change driven storms. On the other hand, the river is an amazing natural and recreational resource for Hatfield.	Flooding,Ecosystem Disruption,Drought	42.36514	-72.590104			Strength,Vulnerability	Study to assess future flood magnitudes on the Connecticut River and evaluate dikes' capacity and condition.					H		Short
Great Pond The area is home to lots of wildlife. The Hatfield transfer station and materials storage facility are adjacent to the pond.	Flooding,Average and Extreme Temperatures,Severe Storms,Ecosystem Disruption,Drought	42.392147	-72.606356			Strength,Vulnerability						L		
Wetlands and riparian areas in northeast of Hatfield are conservation priorities	Flooding,Ecosystem Disruption	42.389202	-72.591425			Strength,Vulnerability	(All hazards) Conserve additional wetland and riparian areas					M		L
Forested land in northwest of Hatfield is a conservation priority. Near water supply areas.	Ecosystem Disruption,Drought	42.398837	-72.667859			Strength,Vulnerability	(All hazards) Conserve forested land near water supply areas					M		L
<b>Forests (includes invasive species and pests, wildfire, conserved land)</b>														
Forest Management Lack of forest management on town-owned land	Ecosystem Disruption	42.402418	-72.650659			Vulnerability	(All hazards) Implementing management plans for town-owned forest lands will reduce the impact of invasive species and enhance the resiliency of the forests.					H		Long
Riparian forests Riparian areas along the Connecticut River and Miller River are important. In the Mill River there are various unique mussels species. There are endangered and/or endemic riparian species along the river. Riparian forests and rivers are sometime negatively impacted by agriculture, which can contribute excess nutrients from fertilizer runoff, and sedimentation from erosion. Climate change driven storms may result in increased impacts.	Flooding,Average and Extreme Temperatures,Ecosystem Disruption,Drought	42.399851	-72.589562			Strength,Vulnerability	Protect riparian corridors eg. Silvio O. Conte National Fish and Wildlife Refuge in Hatfield (19 acres) CONFIRM					M		L
<b>Hazardous Materials</b>														
Transportation corridors Transportation access is one of Hatfield's strengths. It attracts residents and new businesses. However hazardous materials travel on both on I-91 and the railroad tracks. There is potential for spills, including within the aquifer and water supply areas.	Flooding,Average and Extreme Temperatures,Severe Storms	42.394178	-72.628817			Strength,Vulnerability								
<b>Wildlife and Aquatic Species (includes Beavers)</b>														

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Features	Hazards	Lat	Lon	Location	Ownership	V or S	Flooding	Severe Storms	Average & Extreme Temperatures / Drought	Ecosystem Disruption	Priority		Time	
											H - M - L		Short	Long Ongoing
Wildlife Corridor A significant corridor for both wildlife and recreation can be established/protected, extending from Broad Brook-Fitzgerald Lake Conservation Area in Northampton, north through the White Rock area and beyond.	Ecosystem Disruption	42.378181	-72.655698			Strength,Vulnerability				Landowner outreach and conservation.	M		Ongoing	
Beavers Significant issue of repeat blockage of culverts by Beavers on a small stream on Depot Road and Cronin Road.	Flooding	42.405682	-72.604887			Vulnerability					L		Ongoing	
Great Pond The area is home to lots of wildlife. The Hatfield transfer station and materials storage facility are adjacent to the pond.	Flooding,Average and Extreme Temperatures,Severe Storms,Ecosystem Disruption,Drought	42.392147	-72.606356			Strength,Vulnerability					L		L	
Create conservation connection to Fitzgerald Lake Conservation Area/Broadbrook Conservation Area The Broadbrook Coalition/Fitzgerald Lake Conservation (850 acres) areas are the largest conservation areas in the local area that extends upward towards Hatfield. This tract of conservation land contains transitional geography from river to uplands, and is very diverse ecologically. This area could be part of a potential wildlife corridor from large core of protected land. This conservation area could be connected to land in Hatfield to encourage migration of individual and populations of animals	Ecosystem Disruption	42.375381	-72.655212			Strength				Conserve key parcels along the corridor. Land owner outreach	M		Ongoing	
<b>Disease Vectors (ticks, mosquitos, fleas, flies)</b>														
More tick-borne disease Hatfield may see increased tick populations due to due to shorter winters and larger populations due to changes in habitat and host species (e.g. increased Japanese barberry cover is linked to increased tick populations). More ticks leads to increased incidence of tick-borne diseases like Lyme disease, babesiosis, ehrlichiosis.	Average and Extreme Temperatures,Ecosystem Disruption	42.390233	-72.62536			Vulnerability				Conduct a study of land and wildlife management practices to reduce tick populations. Conduct an awareness campaign to increase knowledge of tick-borne diseases and measures to reduce risk.	M		Short	
<b>Soil Cycle (erosion, soil carbon sequestration)</b>														
Ag Soils Well managed agricultural soils can help mitigate climate change and reduce flooding. Tilled soils have roughly the same runoff coefficient as paved surfaces; increasing no-till farming can decrease downstream impacts and increase organic content of soils, providing a reservoir for GHG and reducing need for irrigation through greater moisture retention in soils.	Flooding,Ecosystem Disruption,Drought	42.413107	-72.585567		Private	Strength				Help farmers adopt no-till agriculture, cover cropping, etc	M		Ongoing	

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

Features	Hazards	Lat	Lon	Location	Ownership	V or S	Flooding	Severe Storms	Average & Extreme Temperatures / Drought	Ecosystem Disruption	Priority		Time	
											H - M - L	H - M - L	Short	Long Ongoing
<p>Farm Fields</p> <p>Hatfield values its farming heritage and culture. Any extreme weather event could affect the fields and a farmer's living, thus hurting farming in Hatfield. With increased extreme weather events and low-profit margins, there are pressures on farmers. Also, with increased pressures to build on prime agricultural soils, climate change could drastically reduce farming in Hatfield.    Alternative perspective: Lots of ag land is also in areas that are not prime for development and so don't have a lot of pressure. Do a fairly good job balancing agriculture and development.</p>	<p>Flooding,Average and Extreme Temperatures,Severe Storms,Ecosystem Disruption,Drought</p>	42.407562	-72.585725		Private	Strength,Vulnerability	<p>We could encourage farmers to change farming practices to make them more resilient: low/no till, cover cropping, diversifying their crops; all to sequester carbon and fight climate change. Building up the soil health will also help it retain moisture and make it more resilient during droughts or intense rainstorms. It would also help fight against invasive species or ecosystem change. Encouraging landowners to consider protecting their land through the state APR program or working with local land trusts will help maintain the land base for farming -- protecting it from non-farm development and enabling the application of climate-resilient actions.</p>					H		S, L, O
<p>Farmland preservation--APR program deficiencies</p> <p>The state's Ag Preservation Restriction Program (APR) as currently configured and managed bases the cash value of the conservation restriction solely on the residential/development potential of the land. This is understandable given that development conversion is the biggest threat to farmland. However, by doing so, this process severely discounts the value of protecting farmland in flood plains, because the traditional development value is so low. But, from a climate change perspective this is some of the most important land to keep in a permanent open state. As we know, keeping building out of floodplains is not a foregone conclusion. So, creating financial incentives to encourage landowners to place such conservation restrictions on such lands should be a priority. (from Bob Wagner)</p>	<p>Flooding,Severe Storms</p>	42.404066	-72.579768			Vulnerability						M		Long
<p>Climate Change Mitigation (includes carbon sequestration and alternative Energy—Wind Power Installations, Large-scale Solar Installations)</p>														