Town of Ashland

Community Resilience Building Workshop

Summary of Findings

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FUSS & O'NEILL

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Overview

Extreme weather and natural and climate-related hazards are an increasing concern for the communities of Massachusetts, and there is a clear need to involve municipalities, corporations, organizations, and the State in increasing resilience at all levels. Recent storm events affecting the region have highlighted many of the vulnerabilities that towns and cities face. Hurricane Irene and Superstorm Sandy brought intense flooding to many municipalities and threatened (or destroyed) infrastructure across the state. Extreme temperatures at both ends of the spectrum have pushed the limits of communities' preparedness to protect both infrastructure and people. In coastal communities, the impacts of sea level rise are felt daily and further exacerbate the impacts of other extreme events. Current climate modeling indicates that all of these hazards are expected to increase in frequency and scale over the coming decades. The Municipal Vulnerability Preparedness (MVP) program provides support and a prescribed process for cities and towns in Massachusetts to plan proactively for resiliency and implement key climate change adaptation actions.

In 2019, the Town of Ashland was awarded a $20,000 MVP grant to fund the planning stage of this process. The Town partnered with Fuss & O'Neill, a state certified MVP Provider, to complete a comprehensive, baseline climate change and natural hazard vulnerability assessment and develop a list of priority actions for the Town. This process involved the development of an MVP Core Team, which met on December 12, 2019 to determine initial concerns and worked to identify stakeholders within the municipality and set goals for the process. Those stakeholders were then invited to participate in a Community Resilience Building (CRB) workshop on February 11, 2020, engaging in a day-long, tried and tested process developed by The Nature Conservancy. The CRB methodology is an "anywhere at any scale" format that draws on stakeholders' wealth of information and experience to foster dialogue about the strengths and vulnerabilities within the Town. Workshop participants interacted at both large and small group levels, using an iterative process to gather input, synthesize ideas across groups, and ultimately develop a set of priority resilience and adaptation actions.

The CRB workshop's central objectives were to:

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

Top Hazards and Vulnerable Areas

During the Community Resilience Building workshop, participants were asked to identify the top four natural hazards of concern for the Town of Ashland. Discussion of the top hazards built on earlier conversations that took place at the MVP Core Team Meeting. Flooding was identified as a top hazard. Drought and extreme heat was identified as a second hazard. The collective impacts of ice and snow were seen as a third major hazard. Wind events were identified as a fourth hazard. These four hazards have already had demonstrated impacts on the Town, and as climate change progresses, these hazards are expected to have ever greater consequences for infrastructure and environment, as well as for various societal elements. Specific areas of concern are identified below.

Top Hazards

- Flooding
- Drought and Extreme Heat
- Ice and Snow
- Wind Events

Areas of Concern

While many impacts are expected to be felt Town-wide, certain elements, locations, or community groups present particular concerns.

Neighborhoods/Communities
Cherry Street, Communities in which English is a second language/Non-English speaking communities, senior population, homeless population, low-income population; neighborhoods affected by the Nyanza plume, group homes, Park Road (Ashland Housing Authority property), Ashland House and Ashland Commons (Ashland Housing and Urban Development properties)

Facilities
Department of Public Works facility, Fire Department, Police Department, Emergency Operations Center

Ecosystems
Hopkinton Reservoir, Ashland State Park, Ashland Town Forest, Hopkinton State Park

Dams
Mill Pond Dam, Cedar Street Dam

Infrastructure
Stormwater system, roads (specifically Cedar Street and High Street), electrical infrastructure, water and wastewater infrastructure, MBTA line and station, culverts (specifically Trolley Brook culvert, Olive Street culvert, and High Street culvert), bridges (specifically the Myrtle Street bridge and Ponderosa Road bridge)

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Current Concerns and Challenges Presented by Hazards

Major storm events have been a recurring threat to Ashland throughout its history, from hurricanes bringing wind, intense precipitation, and localized flooding, to winter storms delivering ice and snow. More recently, the Town has been experiencing an increasing regularity of storms, with the so-called 100 year storm occurring every few years. Conversely, the Town has also experienced issues relating to drought. In 2007, after a nine-week drought, the Hopkinton Reservoir was reduced to a "puddle." Ashland was recently under a state of water supply emergency for three years in a row; MassDEP imposed a water ban that almost necessitated an emergency connection to an alternate water supply.

Additionally, more intense storms delivering higher volumes of precipitation in a single event are expected to put significant pressure on dams, culverts, and other drainage infrastructure that were designed to handle smaller storms with more consistent distributions of precipitation. This problem manifests at points across the Town and is acute where the local drainage systems concentrate and discharge. This includes culverts like that at Trolley Brook, which has caused flooding of nearby roads and the MBTA Commuter Rail. Heavy precipitation events have also led to the near-overtopping of the road near the Mill Pond Bridge. This problem of undersized and aging infrastructure has caused flooding issues at numerous locations throughout Town. For example, during 2010, the Town received six inches of rain in 24-hours. This led to flooding of the Chestnut Street pump station as well as inflow and infiltration (I/I) issues that led to sanitary sewer overflows (SSOs) from the Town's manholes. This same storm also flooded the Town's Fire Department, which caused the Department to relocate equipment and dispose of unsalvageable items, including electronics. Shifts in precipitation patterns in recent years have also increased the Town's management responsibilities during the Boston marathon. For example, in 2018, a heavy rainstorm caused runners to dispose of their heavy, wet clothing in the street. The Town was then responsible for cleaning up and discarding more than 15 tons of wet clothing in the road.

Extreme temperatures have also had numerous social impacts in Ashland. The Town has had to make use of cooling and warming shelters; the Ashland Community Center is designated as heating and cooling shelter and was first opened as a cooling shelter two years ago during a heatwave. Shifts in extreme temperatures have also caused the Town to open hydrants to serve as cooling stations during the Boston Marathon in an effort to prevent heatstroke in runners. Additionally, in 2019, there was a harmful algal bloom (HAB) at the Hopkinton Reservoir, which serves as a popular recreational destination for residents of Ashland and nearby communities, especially during hot weather. The HAB impacted the recreational use of the Reservoir and led to unease in the community over its health impacts on humans and animals. Furthermore, like many communities in Massachusetts in 2019, Ashland was impacted by Eastern Equine Encephalitis (EEE). The MA Department of Health placed the Town at a "Critical Risk" level.

Inclement weather events increasingly lead to road closures across Town and place an extra burden on emergency responders, such as the Police and Fire Departments. As storm events become more unpredictable, the burden on these Departments increases as the time between events that require significant management response shortens or disappears. Storm events have also negatively impacted establishments across Town; during a recent windstorm, 24 food establishments along Route 135 and Route 126 lost power.

Specific Categories of Concerns and Challenges

Infrastructural

Culverts and Bridges
Culverts and Bridges are a concern Town-wide. Existing culverts and bridges were designed to accommodate historic patterns of precipitation and runoff, but are rapidly becoming inadequate as a result of climate change. While design standards have changed, the Town's infrastructure largely predates such changes, and thus has not kept up with new standards. As precipitation events become more intense and less predictable, undersized culverts are expected to pose a greater threat of failure and flooding. Although culverts and bridges are a concern Town-wide, workshop participants focused on several in particular, including the Trolley Brook, Charlie Brook, and Olive Street culverts and the Ponderosa Road, High Street, Main Street and Myrtle Street bridges. The Town conducted an assessment of the Trolley Brook culvert and has received recommendations to increase the size of the structure to a 4'x6' box culvert. These structures are undersized and aging, leading to concerns over flooding. The Mill Pond bridge was also identified as a concern— workshop participant Rob St. Germain, Chair of the Stormwater Advisory Committee, noted how the water near the bridge has almost overtopped the road during heavy precipitation events. There are concerns over how this may impact emergency access in the area. Workshop participants noted that addressing the issue is not as simple as raising the bridge, as this would potentially flood homes to the east. Participants identified the need for a Town-wide bridge and culvert assessment to understand their condition and prepare for the impacts of climate change.

Stormwater Infrastructure
Detention basins and other stormwater infrastructure are recognized as a potential concern Town-wide. Similarly to culverts conveying natural streams, much of the stormwater drainage system in Town was designed to accommodate historic patterns of precipitation and runoff, and may be undersized as climate and weather patterns continue to shift. The Town's aging stormwater infrastructure exacerbates flooding potential during heavy rains. There are also catch basins in Town without sumps, which was an area of concern for DPW Engineer Evan White. Many of the catch basins in Town are also constructed of brick and mortar—the Town expressed interest in renovating these catch basins. In 2019, the Town voted to create a Stormwater Utility to fund stormwater management in Ashland; residents are now billed a stormwater fee based on the impervious cover on their property.

Roads
Roads in Ashland are vulnerable to flooding, as well as the impacts of snow and ice. In general, shifting weather patterns due to climate change are increasing the difficulty of maintaining those roadways. Potholes and sinkholes are becoming more problematic due to new patterns of freezing and thawing that occur repeatedly throughout the winter season. Roadway impacts due to hazard events in turn compromise the Town's ability to provide emergency services, especially near Main Street, which is the main crossing between the two sides of Town that are transected by the Commuter Rail. Multiple workshop participants recounted an incident that occurred the week before the workshop, in which a car accident on Main Street blocked traffic for hours, causing lengthy detours to get across Town. A lack of crossover points between the two sides of Town transected by the railroad was also a major area of concern discussed by workshop participants. There are also multiple roads that are vulnerable to flooding across Town, including High Street, Olive Street, Myrtle Road, Tilton Street, Nickerson Road, and Cedar Street.

MBTA Commuter Rail
Workshop participants identified the Ashland MBTA station and commuter rail as both an asset and a vulnerability for the Town. The ability of the train to evacuate large numbers of residents during an emergency

event was identified as a strength. However, participants brought up concerns over the large numbers of commuters passing through Town on a daily basis (a train runs through every half hour). If an accident occurred (e.g., the train derailed) due to a climate-related hazard, it would be an overwhelming burden on emergency responders. The train collided with an empty vehicle stopped on the tracks in February 2020—after the accident, Emergency personnel counted 2,000 individuals who disembarked from the train and had to be safely moved through Town. Providing medical care or other emergency services for such a large amount of people if a hazard event resulted in injury to riders would exceed the Town's available emergency response resources.

A lack of crossover points for the train system was identified as another area of concern for workshop participants. There is one main crossover point and an additional emergency access route across the tracks, but other road/rail intersections occur at ground level, meaning that while the train is stopped, road traffic is also stopped. During a recent accident involving the train, traffic became so ensnarled in Town that Fire responders had to walk to the scene, and police could not get in or out of their station. Workshop participants also discussed concerns over flooding near the tracks on Cherry Street and Tilton Street as a result of the Trolley Brook culvert and the impacts this could have on the rail. Participants also noted that the MBTA is also considering electrifying the line, and brought up concerns over the future implications of this process.

Electrical Infrastructure

Power lines can be knocked out by snow and ice, in addition to wind events, causing extensive impacts to the Town. Extreme heat also stresses the electrical system, as increasing use of air conditioning leads to a risk of brown outs and outages, particularly if heat impacts are region-wide. The last major power outage occurred two years ago, when some residents were without power for up to a week. According to Melissa Hancock, a Community Relations representative from Eversource, Eversource has a robust vegetation management program. The Town also takes initiative to remove hazard trees, although it is difficult to keep up with the problem—the Town receives new calls on a weekly basis about problem trees. Within the next few years, the Town expects to replace a portion of the system on Main Street with underground electrical.

Public Water Supply

Approximately 90-95% of Ashland residents are served by the Town's public water supply. The Town's water is supplied by the five Howe Street wells that deliver water to the Howe Street Water Treatment Plant. The aquifer that supplies the wells is also tied to the Hopkinton Reservoir in Ashland. For this reason, reservoir levels are continuously monitored, and water levels in the Reservoir are a trigger for different stages of water restrictions in Town; these restrictions are codified in the Town's Use Restriction Bylaw. The Town's Water Management Act Permit through DEP also requires that two of the Town's wells (Well #7 and Well #8) be shut down if reservoir levels drop below a certain point (3 feet below the reservoir spillway). Ashland has experienced well shut downs due to low groundwater levels. The wells require periodic fracking and ongoing maintenance. Further, levels in the Hopkinton Reservoir have been severely impacted by drought in recent years. In 2007, there were nine weeks without rainfall—workshop participants described the Reservoir at that time as "a puddle," and there was concern that the Town's wells would run dry. Ashland was under a state of water supply emergency for three years as the aquifer slowly recharged. The Massachusetts Department of Conservation and Recreation also relies on water from the reservoir to maintain downstream flow necessary for other species and habitat. The Town is currently in the process of establishing a supplemental water supply through connection to the Massachusetts Water Resources Authority (MWRA) which draws from the Quabbin Reservoir. The supplemental connection would be able to meet 100% of the Town's demand if the primary water source were to go down, but water supplied through MWRA would be significantly more costly for end users, in addition to the cost of initial connection. Furthermore, workshop participants expressed concern over the Town's SCADA system going offline in the past during power outages at Town Hall, which left the Town without the ability to communicate with and control its water supply systems remotely.

Wastewater Infrastructure

Approximately 80% of the Town is sewered. Wastewater is pumped into Framingham's pipe network before making its way to the MWRA Deer Island Sewage Treatment Plant. The Town has eight pump stations: six lift stations and two sewer main pump stations. The largest of the main pump stations is located on Chestnut Hill and handles three-quarters of the Town's sewage. In April 2010, Ashland received six inches of rain in 24 hours, which led to flooding of the pump station as well as inflow and infiltration (I/I) issues that led to sanitary sewer overflows (SSOs) from the Town's manholes. After that event, the Town took built berms around the pump station as a temporary solution to help guard against future flooding, but a more robust and permanent solution is needed to make the pump station resilient to the types of large, intense precipitation events expected to occur more frequently due to climate change.

Public Facilities

A number of facilities in Town have experienced flooding issues and problems with moisture due to the close proximity of the downtown area to the Sudbury River. The Police and Fire Department are both in the floodplain and have had issues with stormwater-driven flooding. The Fire Department has flooded in the past, which forced the Department to relocate equipment and dispose of unsalvageable items, including electronics. Town Hall has also historically had issues with flooding and moisture, and was raised two-feet during its latest renovation to address damp basement issues. The Post Office has also closed due to mold and mildew issues from dampness in the downtown area.

Additionally, facilities across Town are inadequately sized and aging. The Emergency Operations Center (EOC) operates out of a rented space in downtown because there is not sufficient space in the Police Station. Some workshop participants noted concerns over the maintenance condition and functional integrity of the building, describing both it and the Fire Department building as "falling apart." The Police and Fire Department currently use separate dispatch systems. To help address these issues, the Town is proposing an approximately $29 million Public Safety Complex, which would house the Police and Fire Departments and the EOC.

Department of Public Works Facility

Workshop participants expressed concern over the possibility of Ponderosa Road flooding (due to close proximity to the Mill Pond dam) and subsequently impairing access to the DPW facility. This impaired access would impact the Department's ability to respond to hazard events. If Ponderosa Road were to flood, a long detour through Town would be required to reach the DPW. The DPW also has the fuel supply for the Fire and Police Departments—workshop participants voiced concern over how limited access to the DPW facility could have impacts on these departments as well.

Backup and Emergency Power Supply

Backup power supply, especially as it relates to supporting communication systems, was a major concern brought up by workshop participants. There are numerous facilities across Town without backup power sources, including the Community Center, Animal Shelter, and Senior Center. Furthermore, while some facilities, such as the High School, have backup power supplies, they are not able to support emergency communication systems. The DPW has two 10,000 gallon diesel generators and the EOC has a residential generator.

Workshop participants also voiced concern over the fact that the Town's phone system runs through the internet fiber-optic and therefore does not function during power outages. As one workshop participant noted, "so many systems that rely on technology don't have backup power." The Town has expressed interest in obtaining adequate backup power supplies for critical facilities as well as mobile backup power sources.

Dams

Dams in Ashland were identified as a source of concern. The town has two Town-owned dams as well as four dams owned by the Department of Conservation and Recreation (DCR) that are regulated under State dam

safety regulations. It is likely that there are other small private dams in Town, which may have unknown condition or risk potential. In Ashland, the Cedar Street dam and the Mill Pond dam are the primary dams of concern. The structural condition of these dams was not discussed during the workshop, although workshop participants expressed concern over the possibility of dam failure leading to flooding of the surrounding roads and infrastructure. Ashland is currently working to develop an Emergency Action Plan for the Cedar Street Dam, per requirements from the Office of Dam Safety for all dams classified as 'significant hazard' dams.

Environmental

Nyanza Chemical Waste Dump Superfund Site (Nyanza Plume)

The Nyanza Chemical Waste Dump superfund site is the result of the 35-acre Nyanza Chemical Facility, which produced textile dyes using various chemicals (including heavy metals, volatile organic compounds, and semi-volatile organic compounds). The chemical waste was disposed of in the Sudbury River or directly on site, leading to a chemical plume that has spread through downtown Ashland. The EPA is managing the site and has plans for additional cleanups—a public meeting was held in January 2020 to update residents on the status of these efforts. Workshop participants were concerned over the impacts that the plume has had and will continue to have on the Town and its residents, and how the plume may be impacted by the effects of climate change.

Environmental Contaminants

While the Nyanza plume was the primary concern with regard to environmental contamination, workshop participants also expressed some concern over the lack of specific knowledge regarding the location of different chemicals being stored in Town and the potential for climate impacts to result in mobilization of contaminants from underground storage tanks or other sites. There was also some concern regarding the unknowns surrounding the potential impacts of PFAS, or per- and polyfluoroalkyl substances. PFAS are industrial surfactants that can be found in a variety of chemical products. PFAS can contaminate water supplies and does not break down, but instead can accumulate in the human body, leading to adverse health effects. The Commonwealth now requires PFAS testing for existing drinking water supplies—the Town expects to know the status of PFAS in the public water supply in six to nine months. The Town has carbon filters and ozone treatment for its water which it hopes will help mitigate any potential PFAS contamination.

Water Quality

Rising average water temperatures resulting from climate change and decreased water levels due to drought both contribute to conditions that are increasingly favorable for the presence of harmful algal blooms (HABs) and bacteria. These negative impacts, as well as nutrient pollution, which is driven in part by changes in land use, can result in fish kills, and impacts to recreation and public health. In 2019, there was a cyanobacteria bloom at the Hopkinton Reservoir. The Hopkinton Reservoir is the primary swimming body in Town, but access had to be restricted in August 2019, as contact with the water is not safe when HABs are occurring. According to workshop participants, the HAB made visitors nervous due to the health impact it has on humans and dogs. Workshop participants brought up concerns over the impact that climate change will have on the intensity and frequency of HABs in Town. There are also numerous impaired waterbodies in Town, including the Sudbury River, Hopkinton Reservoir, and Waushakum Pond. Workshop participants expressed concerns over how these impairments could be exacerbated by climate change, which will increase stormwater runoff from heavy precipitation events. The Town expressed interest in enacting water quality best management practices (BMPs) to address this issue.

Agriculture

Although farming is not as central to the community today as it once was, agriculture still plays a role in Ashland. The Town has a vibrant Farmers Market that draws vendors from around the state, and there are a spattering of farms in and around the Town, including a vegetable farm which offers a CSA, and a Christmas tree farm, both located in Ashland. Climate impacts such as drought, excessive rain, and changing

temperatures may affect agriculture and livestock at all scales. Across New England, for instance, maple sugaring may no longer be economically viable at some point in the future, and some agricultural producers may be forced to consider alternate crops or altogether different sources of income. Workshop participants expressed concern that a farm on the Ashland/ Hopkinton border would soon be moving out of Town, leaving Ashland with no large-scale agricultural practices.

Trees and Forests

Forests provide critical ecosystem services that help buffer the effects of climate change, from storing and sequestering carbon, to increasing groundwater recharge, to modulating local temperature. Street trees are likewise critical for infiltration of rainwater and provision of shade. However, trees and forests are also threatened by climate change. Wind and storms cause blowdowns, drought can contribute to die-off, new invasive pests (e.g., Emerald Ash Borer and Hemlock Wooly Adelgid) are eliminating certain tree species, and others are in decline due to shifting temperature and precipitation regimes that favor more southerly species. In Ashland, there has been a loss of old oaks and maples. The Town's emergency services also recognize that hazard events can convert trees from assets to threats. Although Eversource Energy and the DPW conduct routine maintenance on and removal of trees, hazard trees remain a "major problem" in Ashland. The Town receives weekly calls over resident concerns of hazard trees and trees falling in the streets. The expense of removing trees was noted as a burden for the Town. A citizen committee is currently working to establish a tree conservation bylaw that would help to protect trees and encourage replanting; there is significant concern among workshop participants about the need to balancing sustainability with hazard tree removal.

Invasive Species

Invasive plants and animals are a source of concern in Ashland, as they are throughout the Commonwealth. Forest and upland ecosystems are threatened by a variety of invasive plants, including plants such as oriental bittersweet, multiflora rose, two types of swallowwort, and several non-native honeysuckles. Riparian and aquatic habitats are severely threatened by common reed, Japanese knotweed, invasive water chestnut, hydrilla, purple loosestrife, Eurasian milfoil, and zebra mussels. In addition to their habitat impacts, the latter can potentially cause flooding by clogging drain pipes. Critical invasive insect pests already in the region include the Gypsy Moth and Emerald Ash Borer, both of which have the potential to do serious damage (both environmental and economic) to Massachusetts' forests and trees. Gypsy moths have already impacted the Town. These and other species pose a significant challenge and have serious consequences for ecosystem health and resilience, and these impacts are likely to increase in response to climate change. Warming temperatures will also bring new invasives to the area, and these will have an easier time gaining a foothold if the Town's natural ecosystems are simultaneously weakened due to changes in climatic conditions.

Societal

Commuters and Transportation

Ashland is a "bedroom community" with a high number of commuters living in and traveling through Town via the Commuter Rail. As one workshop participant noted, "Ashland is like a cork in the transportation bottle." There are concerns over how accidents and severe weather events can impact both transportation and emergency access in Town. Weather-related traffic incidents also have a large impact in Town and on commutes. Participants noted that, because of Ashland's central location on the commuter route to and from Boston, transportation impacts are never isolated to Ashland, but instead spread east and west, with significant regional impacts.

Vulnerable Populations

In addition to the mapped environmental justice (EJ) communities in the southern portion of the Town, workshop participants also identified several vulnerable populations in pockets throughout Ashland, including homeless individuals, low-income households, and people who speak English as a second language. Members

of these groups may lack adequate resources to adapt or be especially vulnerable to the effects of climate change in Ashland. Affordable housing in Ashland is located at properties across Town. There are numerous group homes in Town, as well as the Shadows Shelter, a homeless shelter for women. Faith-based organizations were identified as an asset for potential communication channels to these vulnerable populations. The Town is also in the process of an ADA self-evaluation and transition plan.

Senior Population

Workshop participants noted difficulty in communicating with the senior population during hazard events, as this population may only have access to landlines or television and therefore be unable to receive emergency communication through other means during power outages. Seniors are susceptible to extreme temperatures and emergency events and are less likely to leave their homes. The Town is unable to conduct wellness checks during hazard events due to a lack of resources. Although there is a Meals on Wheels program, it does not operate during hazard events, which can be problematic for seniors as the program may provide the only meal or person that some residents see all day. Eversource Energy conducts an opt-in life support program; the company attempts to minimize disruptions for customers on life support, and also notifies the Town when outages occur that affect such customers so that wellness checks or other follow-up can be conducted. Workshop participants also identified several senior living areas as areas of concern, including The Lanterns at Warren Woods and the Mill Pond Rest Home. The Mill Pond Rest Home does not have backup power, is at risk of flooding, and has had pest problems in the past. There is also concern in Town over a lack of backup power supply at the Senior Center.

Vulnerable Neighborhoods

Certain neighborhoods within Ashland are especially prone to flooding and have been experiencing problematic events for some time. Workshop participants identified Cherry Street as prone to flooding. This street currently contains 400 residential units. The Park Road Housing Authority and Ashland Housing and Urban Development (HUD) properties, which house elderly and disabled populations, have also had issues with flooding from overwhelmed culverts. More generally, participants expressed concern about the potential for damage due to flooding of the Sudbury River.

Provisions, Medicine, and Fuel

Maintaining access to essential supplies like groceries, medicines, and fuel (for vehicles, heating, and generators), as well as critical medical care and drug treatment during emergencies is important during hazard events. It was acknowledged that power outages or road closures which affect access to these services could have extensive impacts on residents throughout Town. These issues are exacerbated for vulnerable populations, including individuals depending on oxygen, refrigerated medicine, or energized devices for maintaining their health. There are three pharmacies, two grocery stores, and multiple gas stations in Town. Despite having these resources in Town, certain vulnerable populations may not be able to access these resources during hazard events.

Boston Marathon

Recent history has demonstrated the unpredictable variety of ways in which hazard events, including those linked to climate change, can dramatically increase the already-heavy burden associated with hosting large events. Each year during the Boston Marathon, approximately 30,000 runners, spectators, and support staff pass through Ashland. This event poses major coordination needs for the Town in terms of security and safety/logistical support and emergency planning. Weather events have also increased the burden the Marathon places on the Town's resources; in recent years, the Town has had to set up cooling stations with hydrants to help runners keep cool during the extreme heat. Additionally, after a heavy precipitation event a few years ago, the Town was responsible for picking up 15 tons of wet clothing from the roads after a heavy rain event caused runners to discard heavy, wet clothing during the marathon. Furthermore, emergency situations can exacerbate the burden on Town's resources. For example, during the Boston Marathon bombing in 2013, 80% of the

participants had not made it to the finish line—many of these runners were stranded in Towns on the way to the finish line, such as Ashland.

Emergency Shelters

The Region 4a Medical Reserve Corps of Massachusetts (MRC), a regional volunteer organization that operates in 31 cities and towns from Wilmington to Walpole, is a valuable resource for the Town during emergency events. The MRC helped staff the Community Center during the time it served as a heating shelter. The High School is certified by the American Red Cross as a shelter, and the MRC has a handshake agreement between the Town and the American Red Cross that if a school in Ashland is designated as a shelter, the American Red Cross will be present for aid and to open clinics. The Town's emergency shelter was last opened two years ago—workshop participants noted that users of the shelter were younger individuals who need to charge their phones. The MRC also has an equipment trailer and a generator available for use during emergency situations. Some, but not all, of the emergency shelters in Town have emergency backup power supplies. For example, the Community Center, which serves as a cooling center, does not have a backup power supply. Workshop participants were not certain of the total sheltering capacity of the High School or other shelters in Town.

Pets and Animal Shelters

Workshop participants noted concern over the evacuation of the Town's animal shelter during emergency events, as the shelter only has approximately a dozen pet carriers that could be used to transport animals. There are also three pet care centers that board dogs that may need to be evacuated during hazard events. In addition to the lack of an animal evacuation plan, workshop participants expressed also concern over the lack of sheltering of pets during emergency events.

Parks and Open Space

Open space provides ecosystem services that help buffer the effects of climate change, from sequestering carbon, to increasing groundwater recharge, to modulating local temperature. Open space is also critical in floodplains for providing a buffer and increased flood storage, near public water supplies to maintain high water quality and promote recharge, and to maintain overall habitat connectivity that will be vital to allowing ecosystems and individual species to adapt to a changing climate. From a social perspective, open space and parks also provide opportunities for recreation and stress-relief. The two State Parks and the Town forest are also valuable resources for residents in Ashland and surrounding communities, especially during heat waves. However, there are concerns about the Town's capacity to manage evacuations were a hazard event to occur during a busy day at the parks, which can result in thousands of extra visitors to the Town. The Town is also aware that limited parking at the DCR parks facilities results in crowded road conditions as on-street parking on Town roads increases dramatically. These pressures on Town resources are expected to increase as the number of very hot days increases. Doug Small, DPW Director, also discussed how drought can impact the safety of playing fields in Town. As the number of consecutive dry days increases, the fields need to be irrigated consistently to maintain a safe density of the playing surface; overly hard earth increases the risk of injuries, such as concussions, during play.

Pests and Disease Control

Ashland is currently a member of a mosquito control district, but there is growing recognition that climate change is affecting pests and disease vectors both through changing precipitation conditions and changing temperature conditions. Warmer, wetter conditions lead to increased mosquito populations, while the absence of sufficient periods of cold means that pest populations that would historically have been killed off or reduced are able to survive the winter and emerge in greater numbers the following season. Further, as the Massachusetts climate begins to look more like the climate of the mid-Atlantic and southern states, we are seeing new types of diseases show up in existing pests (e.g. mosquitoes carrying West Nile Virus, Eastern Equine Encephalitis, or Zika and ticks carrying Rocky Mountain Spotted Fever). These changes present a major public and animal health challenge in terms of education, prevention, and treatment. 2018 marked the

Commonwealth's highest ever incidence of West Nile Virus diagnosis, and 2019 marked the highest number of EEE cases in recent history in Massachusetts. During the EEE outbreak of 2019, the Massachusetts Department of Public Health classified Ashland as high as "critical" risk. Mark Oram, Board of Health Director, discussed how EEE impacted swimming and outdoor activity, especially at the Hopkinton Reservoir/State park area. Doug Small, DPW Director, noted that this not only had a social impact on the Town, but an economic one as well, as field closures prevented the Town from collecting use fees. Personal protective equipment (PPE) for staff during the EEE outbreak also put an unexpected financial burden on the Town.

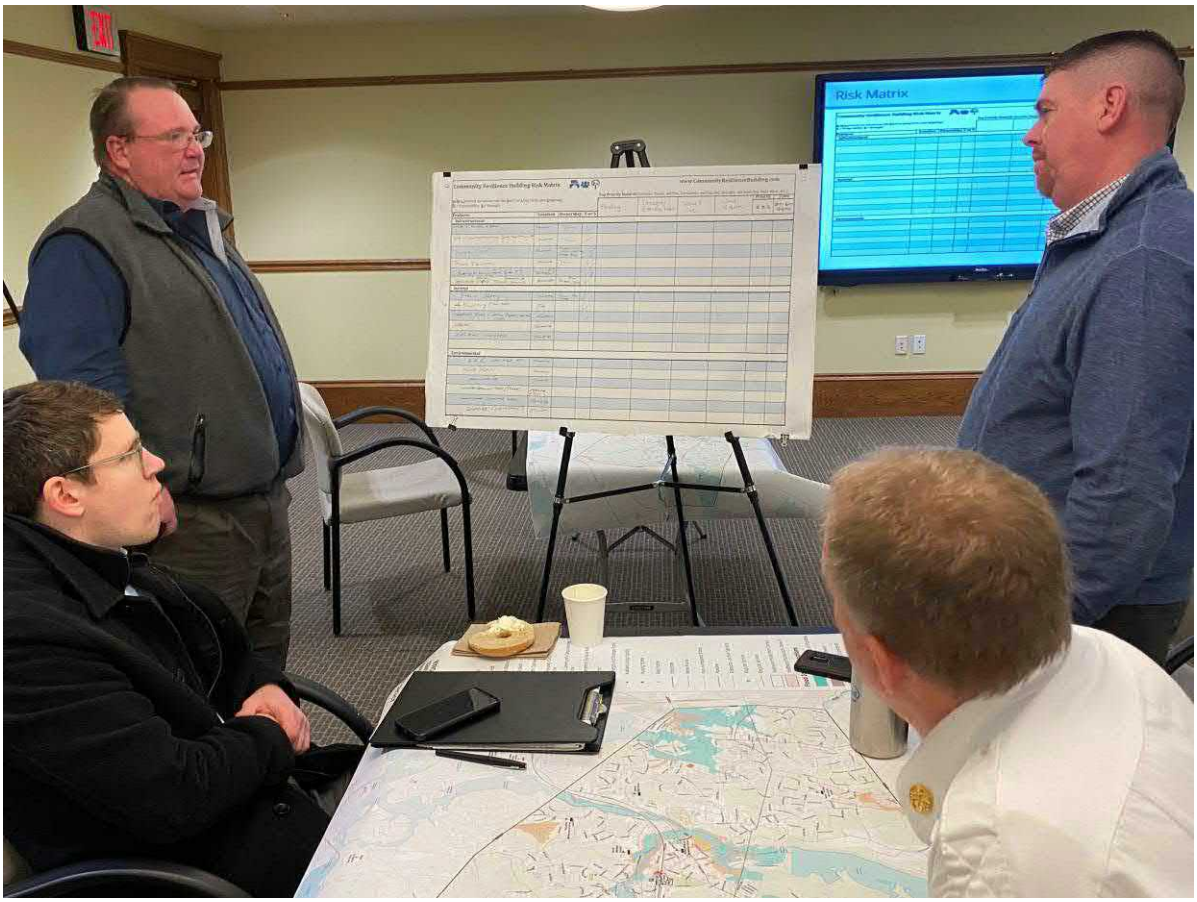
Emergency Communications

The Town operates an emergency notification system, CodeRED, to send mass messages to all registered users during emergency situations, including flooding, road closures, power outages, and other situations relevant to the community. The system is opt-in, and residents can choose to receive alerts by text, email, or phone (landline or cellphone). Registration is available through the Town's website. Workshop participants estimated that 200-300 residents are registered with the CodeRED system.

Additionally, the Town has an Emergency Operations Center (EOC) that operates out of a rented space. There are concerns over the capacity of this space to meet the needs of an EOC. Furthermore, the Town's phone system runs over the internet; if there are power outages, the Town loses the ability to communicate. In the past, the Town has lost 911 capability as well. Power outages have also resulted in the Fire and Police Departments losing function of their radio equipment in the schools, which was described by some as creating a potentially "life threatening" situation. This overall lack of emergency communications during power outages was brought up as a major concern by workshop participants.

Stress on Emergency Services

Ashland's Fire, Police, and Public Works departments bear much of the burden of responding to the increased human threats that result from climate-induced hazards. An ever larger percentage of the departments' time and resources must be devoted to handling things like traffic accidents resulting from ice or other dangerous conditions and activities to maintain traffic flows or protect property during storm events, and Public Works is relied upon to clear roads and maintain access throughout the Town. These departments are also tasked with the provision of shelter services in times of need. Police Chief Vincent Alfano noted the additional burden that severe weather events can place on emergency services, especially during power outages, which can affect communications and emergency access. As Doug Small, DPW Director noted, "it's 24/7 for us, for the Chiefs […] we're always trying to be prepared."


Risk Matrix

Current Strengths and Assets

While the Town recognized a number of vulnerabilities, workshop participants identified key strengths as well. Ashland has a number of systems in place to facilitate emergency communications and information transfer. The Town has also established memorandums of understanding and mutual aid agreements that will support resiliency during hazards.

- The Town operates a **CodeRED Emergency Notification system** that can be used to share information relevant to short-term hazards or expected long-term hazards.
- The Town is in the planning phase of constructing a **new Public Safety Complex**.
- There are two **state parks and a Town forest** in Ashland.
- The Town has short-term **heating and cooling centers**.
- The High School serves as an **emergency shelter** and there are additional sheltering options available at local institutions.
- Ashland has a **handshake agreement with the American Red Cross** to open clinics and provide services at the school shelter during hazard events.
- The regional **Medical Reserve Corps** provides medical support during hazard events.
- The Town is part of a **mosquito control district**.
- The Town has an up-to-date **Open Space and Recreation Plan**.
- The **Town's Net Zero by 2040** program is working towards sustainable energy use in Ashland.
- The Town is pursuing connection to a **supplementary water supply (MWRA).**
- Numerous **faith-based organizations** connect with vulnerable and diverse populations in Town.
- There are **three pharmacies and two grocery stores** in Ashland.
- There is an **MBTA station** in Town.
- The Town has a **Meals on Wheels** program to feed the senior population.
- **Eversource's life-support program** helps protect vulnerable populations during power outages.
- Eversource engages in **proactive tree trimming and removal** to protect power lines.
- There is an **ongoing vulnerability study for homeless populations** in Town.
- The Town is in the process of an **ADA self-evaluation and transition plan.**

Top Recommendations to Improve Resilience in Ashland

Participants at the CRB workshop identified a number of recommendations to address vulnerabilities and increase resiliency in three main topic areas: infrastructure, environment, and society. The impacts of extreme precipitation and flooding were a primary concern that emerged in both the small and large group discussions, encompassing a wide variety of infrastructural concerns. Providing sufficient protections and planning for vulnerable populations in Town (such as seniors and individuals for whom English is a second language/non-English speakers) and improving communications was a second major theme. Unknowns surrounding potential climate impacts at the Nyanza site and the need for robust forest management were also raised repeatedly across the working groups.

Highest Priority

- **Conduct a microgrid feasibility assessment** to assess the viability of providing continuous, green power to a subset of municipal buildings and ensure that key personnel and vulnerable populations have access to Town services, including communications, sheltering, cooling centers, etc. Coordinate the feasibility assessment in conjunction with plans for the new Public Safety Complex.

- **Evaluate opportunities to provide emergency backup power at critical facilities**, including feasibility of green power and battery storage. Town-wide, there are a number of buildings and facilities in need of backup power systems to protect emergency communication during hazard events and to improve series for residents who may lose power during emergencies.

- **Conduct a field inventory of culverts and bridges** to rank and prioritize projects for increased flooding resiliency and storm-hardening, followed by design and implementation of priority re-sizing or replacement projects. Green infrastructure, Low-Impact Design, and other nature-based solutions will be integrated with hard-infrastructure improvements to establish approaches that will be robust in the face of natural hazards and climate-change scenarios. Subsequently implement redesigns and structure resizing at high priority locations.

- **Conduct dam assessments and identify privately-owned dams** to identify where aging, public or privately-owned dams may pose a threat of failure and flooding, or where removal may have significant positive impacts on stream habitat and aquatic organism passage or for increasing flood storage and flood control possibilities. Identify owners of private dams throughout Town. Ensure that Emergency Action Plans are in place for all significant and high hazard dams.

- **Coordinate with the MBTA for an assessment of the Trolley Brook culvert** and its impact on flooding on Cherry Street and Tilton Street. Identify potential funding sources for repair or replacement of the culvert.

- **Upsize the Trolley Brook culvert** to accommodate flows expected under future climatic conditions. Current information suggests that the structure is currently undersized for existing climate conditions; the Town's existing 2016 hydraulic study called for a four foot by six foot box culvert to provide sufficient capacity for current conditions.

- **Develop a comprehensive strategy for sheltering** that evaluates strengths and vulnerabilities of existing shelters and recommends tangible steps for improvements. Include a plan for communication to residents about shelter locations, amenities, and availability, with a focus on including outreach to vulnerable populations. Complete an inventory of all sheltering supplies and determine capacity for shelters across Town.

- **Develop transportation planning for vulnerable populations during hazard events** to ensure that vulnerable groups, notably seniors, will be able to get to shelters, obtain food and medications, or receive emergency services. Focus should be on identifying vulnerable populations and providing aid during all types of climate-induced risks, such as extreme temperatures, increasingly intense storms which may make travel difficult, or flooding and storm events that may leave residents unprepared, stranded, or cut off from supplies.

- **Assess cost-effective green infrastructure opportunities for stormwater management** to develop a list of specific priority projects where reduction of stormwater runoff could mitigate flooding risk and address water quality concerns. Assess feasibility and cost, rank priority projects in terms of climate resilience potential and develop concept designs for key projects, then implement priority retrofits. Review Town regulations and update as necessary to support green infrastructure and low-impact development approaches. Identify potential funding sources for assessing feasibility of and implementing green infrastructure practices. The stormwater drainage connections discharging at the Trolley Brook culvert are an ongoing concern, as is stormwater diversion around the Nyanza site.

- **Incentivize implementation of green infrastructure by private landowners.**

- **Implement ongoing plans to construct a new Public Safety Complex**, incorporating green infrastructure and other nature-based approaches in the site design.

- **Assess opportunities for additional cross-over points for the MBTA Commuter Rail** to increase access across Town, especially during hazard events that could leave the train standing in place on the tracks, blocking existing road/rail intersections. Identify increased access options for emergency response services.

- **Review eligibility for MassDOT Municipal Small Bridge Program** for bridges of concern in Town, specifically the Mill Pond bridge, Myrtle Street bridge, and Ponderosa Road bridge. Apply for small bridge funding and conduct repair and replacement projects as appropriate.

- **Coordinate with the EPA on the Nyanza plume** regarding ongoing EPA-led efforts and or information on how the plume could be impacted by the effects of climate change. Develop GIS mapping to show the extent of the plume and potential future spread. Utilize GIS resources to provide enhanced public education and outreach regarding impacts from the site.

- **Develop a comprehensive tree and forests management program** to identify, remove, and replace problem trees, preserve intact forests and street tree cover, provide guidance and resources for gradually moving toward more climate-resilient trees and forest communities (e.g. species that will tolerate warmer temperatures), and evaluate guidelines to manage conversion of forest land (e.g. solar guidelines).

- **Evaluate options for maintaining access to the DPW facility during flooding events** including feasibility of raising elevations or building dikes to protect the existing site, utilizing nature-based

solutions and green infrastructure to manage stormwater at and around the site, and relocating the DPW facility to a more storm-hardened location. Implement the most effective retrofit options.

- **Identify vulnerable populations and foster a communications network** in advance of a hazard event to facilitate communication efforts and outreach to those most in need of information and assistance. Utilize networks of existing groups to encourage communication efforts led by faith-based organizations, schools, social groups, or town agencies. Focus on populations that may be more vulnerable to climate-induced risks, such as extreme temperatures, may lack appropriate shelter during increasingly intense storms, or that may be unprepared if stranded or cut off from supplies due to flooding or storm events.

- **Increase coordination with abutting communities for improved water quality**. In particular, work with Framingham to address nutrient pollution in Waushakum Pond, and pursue watershed-scale cooperation for maximum impact.

Moderate Priority

- **Increase public awareness programs related to vector-borne diseases,** such as EEE, West Nile, and Lyme disease, to educate residents on the risks and warning signs of these diseases. This should include programs targeted at residents to increase awareness of new diseases and encourage early testing.

- **Perform a risk assessment of the water treatment plant** and establish and implement priority actions for reducing potential flooding impacts, including consideration of nature-based solutions or green infrastructure approaches.

- **Coordinate with DCR to improve resiliency at the two State Parks.** Encourage the State to better accommodate parking needs so that use of the sites for cooling down does not place undue stress on Town resources. Develop emergency action plans in case of a hazard event. Develop stormwater management and water quality solutions that utilize green infrastructure to decrease nutrient inputs that lead to harmful algal blooms.

- **Develop an emergency response plan for the MBTA Commuter Rail** for accidents requiring considerable emergency response. Consider coordinating with the Medical Reserve Corp (MRC), MassDOT, and neighboring towns for police, fire, and medical assistance.

- **Assess the future flood vulnerability at Myrtle Street and feasibility of raising the Myrtle Street bridge** to address flooding concerns.

- **Continue to support coordinated efforts with MRC to provide emergency shelters** that effectively serve Ashland's population during hazard events, including cooling and warming centers.

- **Seek to establish resilient natural infrastructure** to mitigate the effects of climate change, particularly through the ongoing preservation, maintenance and planting of trees, and through forest stewardship. Focus on implementing these systems near impaired waterbodies in Town.

- **Assess pump stations for properly connected emergency alert systems** to ensure that all necessary alarms are activated and information about failures is communicated in timely fashion.

- **Utilize existing resources in the community to facilitate engaged climate resiliency.** Ashland's Earth Day celebration and Green-Up Ashland event provide key opportunities, as do partnerships with large faith-based organizations like the Connect Church and Sri Lakshmi Temple which reach significant portions of the population.

- **Assess and improve stormwater infrastructure systems** by replacing outdated brick and mortar catch basins with concrete catch basins, adding sumps to catch basins (some of which currently discharge directly to culverts), and increasing storm system capacity at high risk areas that cannot be managed with green infrastructure BMPs.

Lower Priority

- **Assess additional mosquito/pest control options,** including nature-based solutions such as establishment of buffers between developed and undeveloped areas, determination of future risks due to increase in type and quantity of pests/disease vectors due to climate change, and development of an education and outreach program.

- **Pursue opportunities for open space acquisition** that will mitigate the effects of increased storm events.

- **Develop plans for pet evacuation** to ensure that individuals' pets are safe and secure during a hazard, and that concern about pets does not prevent people from evacuating during an emergency.

- **Develop a neighbor-to-neighbor program** to facilitate identification of and support for vulnerable populations and promote assistance between neighbors.

- **Analyze hazardous materials risk** to develop an understanding of how climate-change induced hazards could potentially increase the risk of accidents or spills involving the freight railroad line that runs through Town.

- **Educate residents on wildfire risks and prevention.**

- **Conduct a chemical storage inventory** for all public and private facilities in Town to understand the risk of chemical contamination during flooding events. Develop GIS mapping to help visualize how potential chemical risks overlap with other resources in Town.

- **Develop comprehensive invasive species management** from inventory stage through management planning and implementation to address existing invasive populations that threaten features such as open space or forests, both of which contribute to resiliency, as well as anticipate new invasives that are likely to move into the area as climates shift.

- **Encourage greater enrollment in the CODE RED/Reverse 911 system.**

- **Assess cost-effectiveness of environmentally-friendly road treatment alternatives,** including salt brine, byproducts from the brewing industry, and other new products. Assess options for both efficacy and potential environmental impacts, such as nutrient content.

- **Develop an understanding of how climate change may impact particular impaired waterbodies.** Utilize this information to better prepare for adaptation, and to educate the public about the linkage between climate, water quality, and best management practices.

- **Coordinate with Eversource** to better manage hazard trees, understand risks, and prepare for climate impacts by, for example, assessing the likelihood of increased air conditioning usage and potential impacts on system capacity. Work together with the company to plan for climate resiliency measures.

- **Identify and address communication barriers** such as language barriers that prevent adequate communication of climate hazards and adaptation strategies to the Town's Spanish, Portugese, Hindu, and Russian-speaking populations. Develop improved outreach to these residents.

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CRB Workshop Participants

All workshop invitees are listed below; attendees are indicated with an asterisk.

Name	Position/Organization
Evan White*	Engineer, Ashland Department of Public Works
Vincent Alfano*	Chief, Ashland Police Department
Maeghan Dos Anjos	Conservation Agent, Ashland Conservation Commission
Emma Shellings*	Assistant Town Planner, Ashland Planning Department
Peter Matchak*	Town Planner, Ashland Planning Department
Mark Oram*	Director/Health Agent, Ashland Board of Health
Keith Robie*	Chief, Ashland Fire Department
Doug Small*	Director, Ashland Department of Public Works
Dan Mauren	Foreman, Ashland Department of Public Works
Rob St. Germain*	Chair, Ashland Stormwater Advisory Committee
Michael Gurnick*	Chair, Medical Reserve Corps
Steven Mitchell*	Chair, Ashland Select Board
Frank Nakashian*	Sustainability Coordinator, Ashland Planning Department
Melissa Hancock*	Community Relations, Eversource Energy
Joanne Duffy*	Director, Ashland Community Center—Senior Center
Paul Carpenter*	Director, Information Technology
Matt Marshquist*	Chair, Ashland Sustainability Committee
Jennifer Wuelfing*	Director of Human Services, Ashland Community Center
Lyn Moraghan*	Captain, Ashland Fire Department
Michael Herbert*	Town Manager, Town of Ashland
Hillary King*	MVP Central Regional Coordinator, Massachusetts EOEEA

CRB Workshop Project Team

Name	Organization	Role
Evan White	Engineer, Ashland Department of Public Works	Project Coordinator/ Core Team Member
Vincent Alfano	Chief, Ashland Police Department	Core Team Member
Maeghan Dos Anjos	Conservation Agent, Ashland Conservation Commission	Core Team Member
Emma Shellings	Assistant Town Planner, Ashland Planning Department	Core Team Member
Peter Matchak	Town Planner, Ashland Planning Department	Core Team Member
Mark Oram	Director/Health Agent, Ashland Board of Health	Core Team Member
Keith Robie	Chief, Ashland Fire Department	Core Team Member
Doug Small	Director, Ashland Department of Public Works	Core Team Member
Dan Mauren	Foreman, Ashland Department of Public Works	Core Team Member
Julianne Busa	Fuss & O'Neill	MVP Lead Facilitator
Sarah Hayden	Fuss & O'Neill	MVP Facilitator/Scribe
Stefan Bengston	Fuss & O'Neill	MVP Facilitator/Scribe

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Funding for the CRB Workshop was provided through a Massachusetts MVP grant.

Cover image credit: John Phelan.

Appendix A

Final Risk Matrix

Community Resilience Building Risk Matrix

www.CommunityResilienceBuilding.org

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

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

Features	Location	Ownership	V or S	Flooding	Drought and Extreme Heat	Ice and Snow	Wind Events	Priority H - M - L	Time Short Long Ongoing
Infrastructural									
Culverts and Bridges	Town-wide, Mill Pond Bridge, Myrtle Street Bridge, Ponderosa Bridge, Trolley Brook	Town, State, Private	V	Conduct a field inventory of culverts and bridges to rank and prioritize projects for increased flooding resiliency and storm-hardening, followed by design and implementation of priority re-sizing or replacement projects. Green infrastructure, Low-Impact Design, and other nature-based solutions will be integrated with hard-infrastructure improvements.				H	S
			V	Coordinate with the MBTA to assess Trolley Brook culvert and its impact on flooding on Cherry Street and Tilton Street. Identify potential funding sources for repair or replacement.				H	S
			V	Review eligibility for MassDOT Municipal Small Bridge Program for bridges of concern in Town, specifically the Mill Pond bridge, Myrtle Street bridge, and Ponderosa Road bridge. Apply for small bridge funding and conduct repair and replacement projects as appropriate.				H	S
			V	Assess future flood vulnerability at Myrtle Street and feasibility of raising the bridge.				M	S
Stormwater Infrastructure	Town-wide, Trolley Brook, Nyanza Site	Town	V	Assess cost-effective green infrastructure opportunities for stormwater management to develop a list of specific priorities, assess feasibility and cost, rank priority projects in terms of climate resilience and water quality improvement potential, and develop concept designs. Special focus on Trolley Brook culvert and stormwater diversion around the Nyanza site. Review Town regulations and update as necessary to support green infrastructure and low-impact development approaches.				H	S
			V	Incentivize implementation of green infrastructure by private landowners.				H	L
			V	Assess and improve stormwater infrastructure systems by replacing outdated brick and mortar catch basins with concrete catch basins, adding sumps to catch basins, and increasing storm system capacity at high risk areas that cannot be managed with green infrastructure BMPs.				M	L
Roads	Town-wide	Town	V	Assess cost-effectiveness of environmentally-friendly road treatment alternatives. Assess options for both efficacy and potential environmental impacts, such as nutrient content.				L	S
MBTA Commuter Rail	Town-wide	State	S	There is an MBTA station in Town.				N/A	O
			V	Coordinate with the MBTA for an assessment of the Trolley Brook culvert and its impact on flooding on Cherry Street and Tilton Street. Identify potential funding sources.				H	S
			V	Assess opportunities for additional cross-over points for the MBTA Commuter Rail to increase access across Town, especially during hazard events that could leave the train standing in place on the tracks. Identify increased access options for emergency response services.				H	S
Electrical Infrastructure	Town-wide	Eversource	S	The Town's Net Zero by 2040 program is working towards sustainable energy use in Ashland.				N/A	O
			S	Eversource engages in proactive tree trimming to protect power lines and their life-support program helps protect vulnerable populations during power outages.				N/A	O
			V	Coordinate with Eversource to better manage hazard trees, understand risks, and prepare for climate impacts by, for example, assessing the likelihood of increased air conditioning usage and potential impacts on system capacity. Work with the company to plan for climate resiliency measures.				L	L
Public Water Supply	Town-wide	Town	S	The Town is pursuing connection to a supplementary water supply (MWRA).				N/A	O
			V	Assess pump stations for properly connected emergency alert systems to ensure that all necessary alarms are activated and information about failures is communicated in timely fashion.				M	S
Wastewater Infrastructure	Town-wide	Town	V	Perform a risk assessment of the water treatment plant and establish and implement priority actions for reducing potential flooding impacts, including consideration of nature-based solutions or green infrastructure approaches.				M	S
Public Facilities	Town-wide	Town	S	The Town is in the planning phase of constructing a new Public Safety Complex.				N/A	O
			V	Conduct a microgrid feasibility assessment to evaluate the viability of providing green, continuous power to a subset of municipal buildings. Coordinate in conjunction with plans for the new Public Safety Complex.				H	S
			V	Implement ongoing plans to construct a new Public Safety Building, incorporating green infrastructure and other nature-based approaches in the site design.				H	O
Department of Public Works Facility	DPW Facility	Town	V	Evaluate and implement options for maintaining access to the DPW facility during flooding events including feasibility of raising elevations or building dikes to protect the existing site, utilizing nature-based solutions and green infrastructure to manage stormwater at and around the site, and relocating the DPW facility to a more storm-hardened location.				H	L
Backup and Emergency Power Supply	Town-wide	Town	V	Evaluate opportunities to provide sustainable green energy and emergency backup power at critical facilities, including feasibility of green power and battery storage.				H	L
			V	Conduct a microgrid feasibility assessment to evaluate the viability of providing green, continuous power to a subset of municipal buildings. Coordinate in conjunction with plans for the new Public Safety Complex.				H	S
Dams	Town-wide	Town, Private	V	Conduct dam assessments and identify privately-owned dams to identify where aging dams may pose a threat of failure and flooding, or where removal may have significant positive impacts. Ensure Emergency Action Plans are in place for all significant and high hazard dams.				H	L
Societal									
Commuters and Transportation			S/V	The MBTA station is a strenth, but also a vulnerability. Develop an emergency response plan for the MBTA Commuter Rail for accidents requiring considerable emergency response. Consider coordinating with the Medical Reserve Corp (MRC), MassDOT, and neighboring towns for police, fire, and medical assistance.				M	L
Vulnerable Neighborhoods	Town-wide	N/A	V	Develop a neighbor-to-neighbor program to facilitate identification of and support for vulnerable populations and promote assistance between neighbors.				N/A	N/A
Senior Population	Town-wide	N/A	S	The Town has a Meals on Wheels program to feed the senior population.				N/A	O
			V	Develop transportation planning for vulnerable populations during hazard events to ensure that vulnerable groups, notably seniors, will be able to get to shelters, obtain food and medications, or receive emergency services during all types of climate-induced hazards.				H	S

Vulnerable Populations	Town-wide, Cherry Street, Park Road	N/A	S	The Town has short-term heating and cooling centers, numerous faith-based organizations that connect with vulnerable populations in Town, and there is an ongoing vulnerability study examining homelessness in Town. The Town is also undergoing an ADA self-evaluation and transition plan.	N/A	O
			V	Develop transportation planning for vulnerable populations during hazard events to ensure access to shelters, food and medications, and emergency services.	H	S
			V	Utilize existing resources in the community to facilitate engaged climate resiliency: Ashland's Earth Day celebration, Green-Up Ashland event, partnerships with large faith-based organizations like the Connect Church and Sri Lakshmi Temple.	M	L
			V	Develop a neighbor-to-neighbor program to facilitate identification of and support for vulnerable populations and promote assistance between neighbors.	L	S
			V	Identify and address communication barriers; develop improved outreach to the Town's Spanish, Portuguese, Hindu, and Russian-speaking populations.	L	S
Provisions, Medicine, and Fuel	Town-wide	Private	S	There are three pharmacies and two grocery stores in Ashland.	N/A	O
Boston Marathon	Town-wide	Private	V	No priority actions were discussed for this topic.	N/A	N/A
Emergency Shelters	Town-wide	Town	S	There are several emergency shelters in Town, including the High School. The regional Medical Reserve Corps provides medical support during hazard events. The Town has a handshake agreement with the American Red Cross to open clinics and provide services at the school shelter during hazard events.	N/A	O
			V	Develop a comprehensive strategy for sheltering that evaluates strengths and vulnerabilities of existing shelters and recommends tangible steps for improvements. Include a plan for communication to residents about shelter locations, amenities, and availability, focusing on outreach to vulnerable populations. Complete an inventory of all sheltering supplies and determine capacity for shelters across Town.	H	S
			V	Continue to support coordinated efforts with MRC to provide emergency shelters that effectively serve Ashland's population during hazard events, including cooling and warming centers.	M	L
			V	Conduct a microgrid feasibility assessment to evaluate the viability of providing green, continuous power to a subset of municipal buildings. Coordinate in conjunction with plans for the new Public Safety Complex.	H	S
Pets and Animal Shelters	Town-wide	Town, Private	V	Develop plans for animal shelter and pet evacuation to ensure that individuals' pets are safe and secure during a hazard, and that concern about pets does not prevent people from evacuating during an emergency.	L	S
Parks and Open Space	Town-wide	Town, State, Private	S	There are two state parks and a Town forest in Ashland. The Town also has an up-to-date Open Space and Recreation Plan.	N/A	O
			V	Coordinate with DCR to improve resiliency at the two State Parks. Encourage the State to better accommodate parking needs so that use of the sites for cooling down does not place undue stress on Town resources. Develop emergency action plans in case of a hazard event. Develop stormwater management and water quality solutions that utilize green infrastructure to decrease nutrient inputs that lead to harmful algal blooms.	M	L
			V	Pursue opportunities for open space acquisition that will mitigate the effects of increased storm events.	L	L
Pests and Disease Control	Town-wide	N/A	S	The Town is part of a mosquito control district.	N/A	O
			V	Assess additional mosquito/pest control options, including nature-based solutions such as establishment of buffers between developed and undeveloped areas, determination of future risks due to increase in type and quantity of pests/disease vectors due to climate change, and development of an education and outreach program.	L	L
			V	Increase public awareness programs related to vector-borne diseases, such as EEE, West Nile, and Lyme disease, to educate residents on the risks and warning signs of these diseases. This should include programs targeted at residents to increase awareness of new diseases and encourage early testing.	M	S
Emergency Communications	Town-wide	Town	V	Identify vulnerable populations and foster a communications network in advance of a hazard event to facilitate communication efforts and outreach to those most in need of information and assistance. Utilize networks of existing groups to encourage communication efforts led by faith-based organizations, schools, social groups, or town agencies. Focus on populations that may be more vulnerable to climate-induced risks or that may be unprepared if stranded or cut off from supplies due to flooding or storm events.	H	S
			V	Encourage greater enrollment in the CODE RED/Reverse 911 system.	L	S
Stress on Emergency Services	Town-wide	Town	S	The Town operates a CodeRED Emergency Notification system that can be used to share information relevant to short-term hazards or expected long-term hazards.	N/A	O
			V	Implement ongoing plans to construct a new Public Safety Building, incorporating green infrastructure and other nature-based approaches in the site design.	H	L
			V	Educate residents on wildfire risks and prevention.	L	S
Environmental						
Nyanza Chemical Waste Dump Superfund Site (Nyanza Plume)	Downtown, Town-wide	Town, Private	V	Coordinate with the EPA on the Nyanza plume regarding ongoing EPA-led efforts and or information on how the plume could be impacted by the effects of climate change. Develop GIS mapping to show the extent of the plume and potential future spread. Utilize GIS resources to provide enhanced public education and outreach regarding impacts from the site.	H	S
Environmental Contaminants	Town-wide	Town, State, Private	V	Analyze hazardous materials risk to develop an understanding of how climate-change induced hazards could potentially increase the risk of accidents or spills involving the freight railroad line that runs through Town.	L	S
			V	Conduct a chemical storage inventory for all public and private facilities in Town to understand the risk of chemical contamination during flooding events. Develop GIS mapping to help visualize how potential chemical risks overlap with other resources in Town.	L	S
Water Quality	Town-wide	Town, Private	V	Increase coordination with abutting communities for improved water quality. In particular, work with Framingham to address nutrient pollution in Waushakum Pond, and pursue watershed-scale cooperation for maximum impact.	H	L
			V	Develop an understanding of how climate change may impact particular impaired waterbodies. Utilize this information to better prepare for adaptation, and to educate the public about the linkage between climate, water quality, and best management practices.	L	L
Agriculture	Town-wide	Private	S/V	No priority actions were discussed for this topic.	N/A	N/A
Trees and Forests	Town-wide	Public, private	S	Eversource engages in proactive tree trimming and removal to protect power lines.	N/A	O
			V	Develop a comprehensive tree and forests management program to identify, remove, and replace problem trees, preserve intact forests and street tree cover, provide guidance and resources for gradually moving toward more climate-resilient trees and forest communities, and evaluate guidelines to manage conversion of forest land (e.g. solar guidelines).	H	S
			V	Seek to establish resilient natural infrastructure to mitigate the effects of climate change, particularly through the ongoing preservation, maintenance and planting of trees, and through forest stewardship. Focus on implementing these systems near impaired waterbodies in Town.	M	L
Invasive Species	Town-wide	Public, private	V	Develop comprehensive invasive species management from inventory stage through management planning and implementation to address existing invasive populations that threaten features such as open space or forests, both of which contribute to resiliency, as well as anticipate new invasives that are likely to move into the area as climates shift.	L	L

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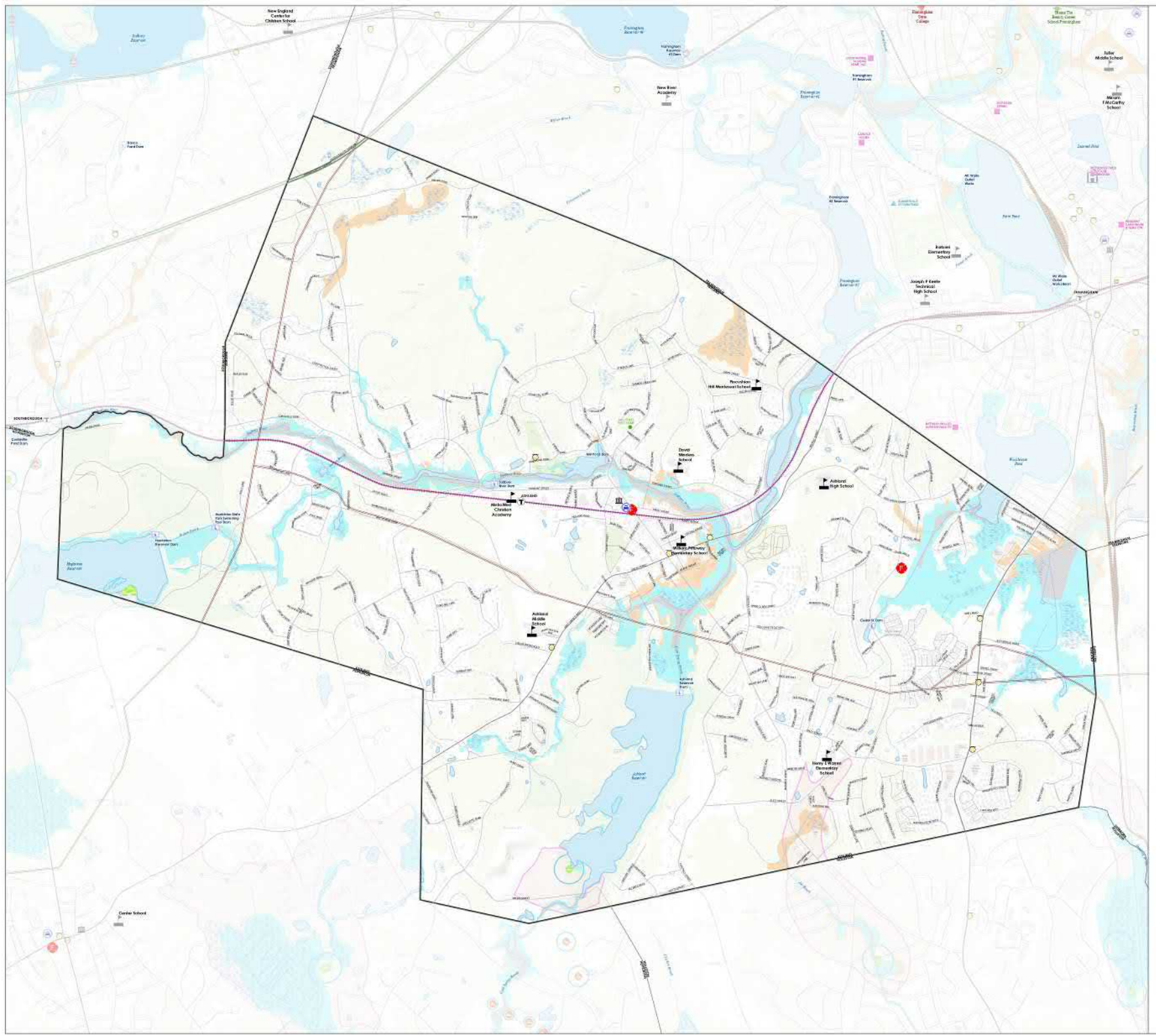
Appendix B

CRB Workshop Base Map



ASHLAND, MA

MUNICIPAL VULNERABILITY PREPAREDNESS PROGRAM

- School
- Town Hall
- Police Station
- Fire Station
- Health Center
- Community Groundwater Source
- Non-Community Groundwater Source
- Emergency Surface Water
- Dams
- Underground Storage Tanks
- Assisted Living Facility
- Nursing Home
- Rest Home
- Interstate
- State Route
- Non-numbered Road
- Pipeline
- Railroads - Active Service
- Regular Service
- Regular Service
- Wellhead Protection Zone I
- Wellhead Protection Zone II

Flood Zone Designations

- 1% Annual Chance of Flooding
- Regulatory Floodway
- 0.2% Annual Chance of Flooding

0 0.23 0.45 0.9 Miles

Data sources:
MassGIS - Infrastructure, Hydrology, and Administrative Data
ESRI - World Topographic Map - Base Map

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Appendix C

CRB Workshop Outputs:
Participatory Mapping Exercise & Risk Matrices

Community Resilience Building Risk Matrix

A

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

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

Features	Location	Ownership	V or S	FLOODING	DROUGHT/ EXTREME HEAT	SNOW & ICE	WIND EVENTS	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
DPW LOCATION		TOWN - DPW	V	Raise elevations to protect (DIKE) Green infrastructure to improve Move location				M	L
BRIDGES	Myrtle St, High St, Main St (Bridge)	TOWN	V	Small Bridge Assessment Small Bridge Program		Alternative Road Treatments		H	O
ROADS	High St. (Over Tracks) Cedar St.	TOWN MBTA/STATE	V	Improved + More Access over RR Assessment of Cedar St. Dam		Alternative Road Treatments	Road Tree/Maintenance Program - More Robust	H	O
CULVERTS Town-Wide Assessment Needed	Numerous Aging	TOWN	V	Town-Wide Assessment State Programs Work with DOT/MBTA				M	O
WATER SUPPLY	TOWN WIDE	TOWN MWRA	V/S	Treatment Plant Assessment	MWRA Connection - Strength			H	O
TRAIN SYSTEM	TOWN WIDE	DOT/MBTA	V	Communication between State + Town → Add'l Crossover Points →				L	O
Societal									
High Senior Density Locations	TOWN WIDE	MIXED TOWN + PRIVATE	V	Assess + Identify vulnerable senior populations and locations → Develop communication + evacuation plans → Transportation Plan →	Coordination Plan with Private Entities →		[illegible] Sheltering Plan →	H	S
Schools + Day Care Facilities	TOWN WIDE	MIXED TOWN + PRIVATE	V	"	"	"	"	H	S
Communication Barriers	TOWN WIDE	MIXED TOWN + PRIVATE	V	Identify Language Barriers → Identify Technological Barriers → Assessment of Emergency Communication System + Backup →		Clear Liaison with Utilities →		H	S
FAITH-BASED ORGANIZATIONS	TOWN WIDE	PRIVATE	S ↑	Assist + Support with Barriers reaching vulnerable populations Assess for Shelter Capacity				H	S
EMERGENCY SHELTERS + EVACUATION PLAN	TOWN WIDE	MIXED TOWN PRIVATE MEMA RED CROSS ARC	V	Assessment of Potential Shelter Program → Assessment of Evacuation Plans → Assessment of Emergency Supplies + Equipment →		Develop emergency generator program → Explore regional responses →		H	S/L
Access to Emergency Services - New Public Safety Building	TOWN WIDE	MIXED TOWN + PRIVATE	V/S	" Use Green infrastructure in PSB design	"	"	"	H	S/L
Environmental									
POTENTIAL IMPACTS FROM NYANZA SITE	TOWN PRIVATE	TOWN DEP EPA	V	Assessment by DEP if Nyanza site is at Risk				L	O
FORESTED OPEN SPACE	TOWN - STATE	TOWN DCR	V/S	Tree Replacement Program Forest Health Assessment	Work w/DCR (State Park)			L	O
STREET TREES	TOWN WIDE	TOWN EVERSOURCE	V/S	"	Work w/ Eversource			M	O
STORMWATER INFRASTRUCTURE	TOWN PRIVATE	TOWN + PRIVATE	V/S	Bridge + Culvert Assessment Investigate Zoning Bylaw Relative to green infrastructure requirements Program to incentivize green infrastructure for existing properties			Work w/DCR to improve green systems	M	O
Potable Water Quality	TOWN PRIVATE MWRA	TOWN/MWRA	V	Increased Water Testing → Coordination w/ Abutting Town →				H	O
INVASIVE SPECIES - PLANT + INSECT	TOWN	MIXED	V	Assessment of Invasives Throughout Town → Develop Mitigation plans →	Resident Education →			H/M	O

Community Resilience Building Risk Matrix

www.CommunityResilienceBuilding.com

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

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

Features	Location	Ownership	V or S	Flooding	Drought/ Extreme Heat	Snow & Ice	Wind Events	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
CULVERTS, BRIDGES, + DAMS	TOWNWIDE	TOWN	✓	Assessment					
W + S INFRASTRUCTURE (PLANTS, PUMP STATIONS, ETC)	TOWNWIDE	TOWN	✓	Assessment - condition - flood protection options					
POWER (I.T.)	TOWNWIDE	EVERSOURCE, KINDER MORGAN? COMCAST, TOWN	✓/S	Assessment BACKUP POWER ACROSS systems ←	←		→		
PUBLIC FACILITIES	TOWNWIDE	TOWN	✓/S	- SUSTAINABILITY LOCATION BACKUP POWER ←	←		)		
TRANSPORTATION (MBTA, ROADS, ?)	TRANSPORTATION (T)	PRIVATE TOWN STATE	✓/S	ASSESSMENT, RAISE ROADS Improve culverts					
ASSISTED LIVING, SENIOR HOUSING (SHELTERS, COMMUNITY CTR.)	TOWNWIDE	TOWN PRIVATE/STATE	✓	BACKUP Power	BACKUP Power	BACKUP Power	BACKUP Power		
Societal									
PUBLIC SAFETY	TOWNWIDE	TOWN STATE FED	S	New PS Building ← Education & Prepare			→		
ELDERLY (ROB + STEVE) TOWN FATHERS	T.W.		✓	EDUCATION / civic Engage work w/ Volunteer Groups	Cooling STA	Warming STA			
SUDBURY RIVER (HOUSING IMPACTS FROM FLOOD CONTA. - Concord St.)	FLOOD PLAIN	PRIVATE	✓	Education of offerings					
HEALTH (LYME DISEASE) (WATER QUALITY)	TOWNWIDE	T, S.	✓						
ANIMAL SHELTER	TOWNWIDE	T	✓	ASSESSMENT					
Environmental									
EEE, WEST NILE, ETC.	TOWNWIDE		V/S	Education mosquito control district					
FLOOD PLAIN	TOWNWIDE			- ASSESSMENT - EDUCATION · INSURANCE?	→		→		
AGRICULTURE	TOWNWIDE			ASSESSMENT	→		→		
UNDERGROUND TANKS, (PLUME)	NYANZA & T.W.			"					
CHILD CARE. SCHOOLING, WORK	TOWNWIDE								
WILDLIFE (DISPLACEMENT)	TOWNWIDE								

B

Community Resilience Building Risk Matrix

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

Features	Location	Ownership	V or S	Flooding	Drought / Extreme Heat	Snow & Ice	Wind Events	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
Communications (911, SCADA, School Ls, Public Notif.)	Townwide	PUBLIC	V	ASSESSMENT OF VULN	ERABILITIES DURING	POWER LOSS →			
WATER SUPPLY	Townwide				MWRA TIE IN COORDINATE w/ EVERSOURCE + HOPKINTON REGIONAL COORDINATION TO PROTECT WATER SUPPLY				
Societal									
PARKS & FIELDS	Townwide	PUBLIC T/S	V/S		-FIRE RISK CONTINUE w/ MWRA TIE IN				
Environmental									
ALGAL BLOOMS (ASN. RES) RECREATION	STATE PARK	STATE	V	N/A	WORK W/ STATE ON POLLUTANT REDUCTION	N/A	N/A		

Community Resilience Building Risk Matrix

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

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

Features	Location	Ownership	V or S	Flooding	Drought/ Extreme Heat	Snow & Ice	Wind Events	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
Culverts	Town-wide	Town	V	Undersized culverts and bridges → Assessment on culvert condition/Hydraulic assessment	→ Upgrading Trolley Brook		- Tree Fell → proactive tree removal	M	O
Water Treatment Plant	Howe Street	Town/Hopkinton	V	Pollution introduction Bacteria/algae Water Quality Protection Assessment	lack of available water - Assessment on available water sources/use backup		- Backup water sources	H	L
Vulnerable Roads	Town-Wide	Town/State	V/S	Assessment of flooding vulnerabilities especially around culverts				H	S/O
Electrical Grid	Town-Wide	Eversource	V	Ground conduits/infrastructure Discussion/Review with Eversource →	A/C more power demand →	Power outages →	Power outages → Backup power at emergency [illegible] (Solar, battery)	H	S/L
Stormwater Infrastructure	Town-Wide	Town	V	→ Increase capacity in high risk areas → BMPs - green infrastructure to retain on site	← Before updates	Replace brick + mortar catch basins		M	O
Sewer Infrastructure			V	- Chestnut St pump station has had SSO problem					
Societal									
Community Center	162 W. Union St.	Town	S/V		Used as a cooling center	- No backup power - freezing pipes	No backup power	H	S
Mill Pond Rest Home	Myrtle Street	Private	S/V	- Has flooded before and used as a shelter - Used for the elderly	- Has air conditioning - Bed purge/pests	- Accessible backup shelter		H	S
Chestnut Place / JoAnne Drive Apartments	JoAnne Drive	Private	S/V		- Historical Fires - Pest control		← EMERGENCY SHELTER	H	O
Park Road Housing Authority	Park Road	State	S/V	- Enlarge culverts downtown to allow more flow	- Elderly population would need air conditioning	- Power outages/Backup generator - Elderly population solar - Transportation to Comm Center		H	O
Ashland HUD Housing Ctr (Ashland House, Ashland Commons)	Main St / W. Union St / [illegible]	Private	S/V	- Ashland Commons could flood	- House disabled, elderly and families → power outages could cause problems			H	O
Shadow Shelter / Homeless Population ?	Alder/Summer	Private	V	←	- Assessment of homeless population in Town ← Develop outreach program	→ Assessment →		H	S
Environmental									
Impaired Waterbodies	Town-Wide	Town/DEP	V	Keep shore water quality best management practices - Education of residents	- Assessment of waterbodies Impaired for extreme heat/climate change cyanotoxin			H	O
Mosquito Control (Tick Control)	Town-Wide	Town/DEP	V	- Mitigation plan for mosquito/tick borne illness - Vulnerability assessment - Research natural methods for control - Education efforts	- [illegible] - more → water control devices to manage standing water	[illegible] education/signage		H	O
Town Forests			V/S		- Assess tree species at risk drought/hardy - management plan for adapting → Wildfires - education about fire risks		~ Wind resistant trees?	M	O
Nyanza (Superfund Site)	Downtown / RTD	Town/EPA	V	- Assessment of vulnerability and potential for contamination spreading - Action items to mitigate pollution/promote contaminant				H	O
Chemical Storage Inventory in Town	Town-Wide		V	- Develop an inventory of chemical storage (private/public) chemical storage in town				H	O

C

D

Community Resilience Building Risk Matrix

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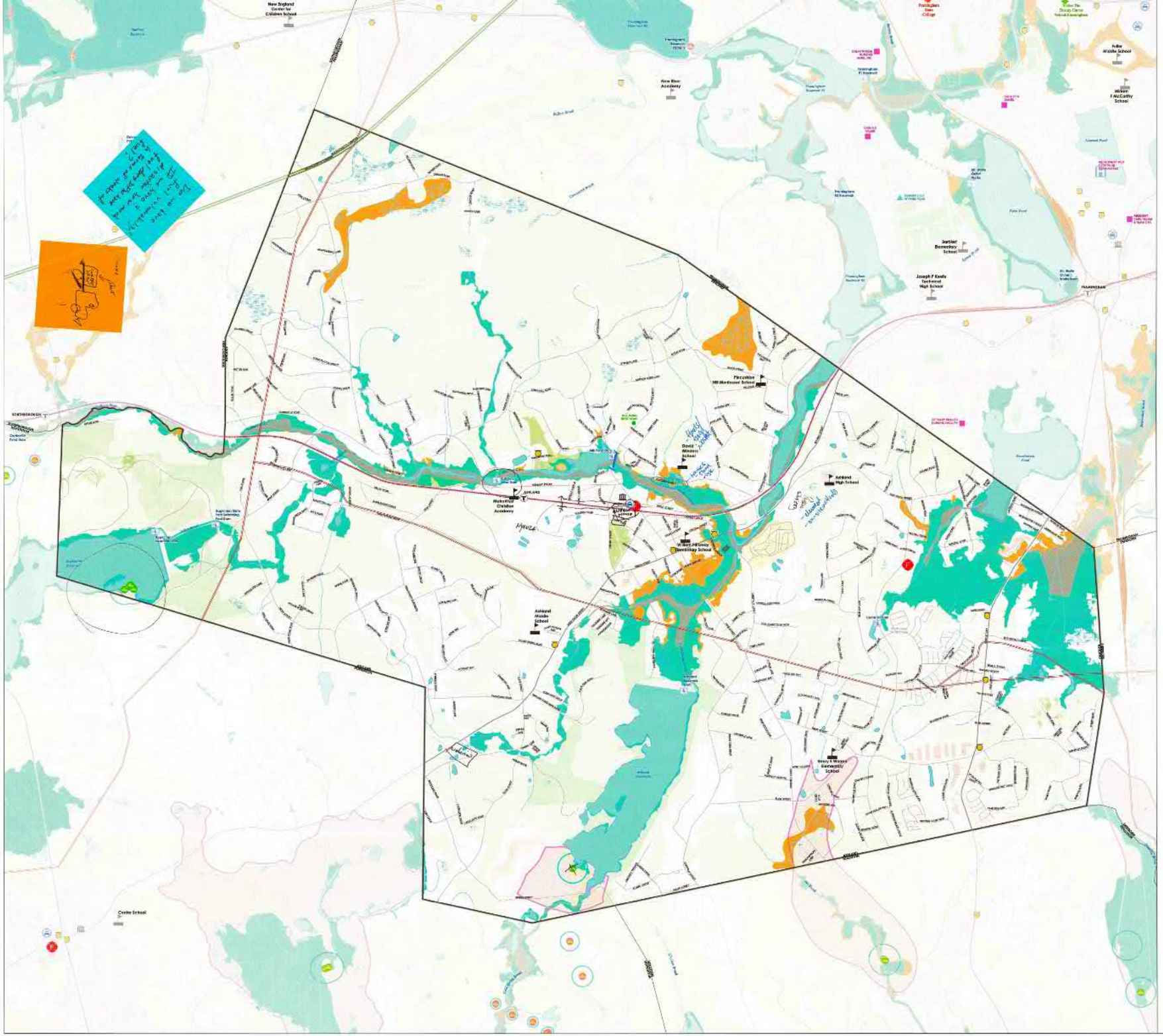
H-M-L priority for action over the Short or Long term (and Ongoing)
V = Vulnerability S = Strength

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

Features	Location	Ownership	V or S	Flooding	Drought / Extreme Heat	Snow & Ice	Wind events	Priority H-M-L	Time S Long O ngoing
Infrastructural									
Community Center Infrastructure	Old Union Street	Town	V	X	Extreme Heat (Power)	Power / Travel	Power	H	O
Public Safty Building	TBA	Town	V	EOC in Fire Station	-No Power (emergency) -Serves as main "cooling" Station	Commuter Corridor	Power / Accessibility	H	O
- Police / Fire / EOC / Ambulance	DOWNTOWN	TOWN	V	" /	" "	" "	" "	H	O
- Emergency Power in town Building (Phone Service)	TOWN WIDE	TOWN	V	~~Generator~~	"Communication for town Safty Dept	town Safty Dept - EOC - Police - Fire - Schools		H	O
→ MBTA / Tracks / COMMUTERS	TRANSPORT CORRIDORS	MBTA / TOWN / DOT	V	X	Extreme Heat/Fire	Commuters stuck from Train!!		H	O
→ Bridges (Mill Pond) (Pinebrook)	~~Hwy~~ / SUDBURY ~~Stm~~ R.	TOWN / DOT	V/S	X	N/A	X Travel	N/A	H	O
Societal									
Community Center / Emergency Shelter	RT 135	TOWN	V/S	N/A	Ex Heat	Travel / Accessibility	Power	H	O
School Building Security (Communications) (Dept Focus)	TOWN WIDE	TOWN	V	N/A (~~Designated~~ Shelter)	~~Designated~~ Shelter 24/7 Power	N/A	Power - Safety Communications	H	O
DAY CARE FACILITIES	SE of TOWN	PRIVATE	V	N/A	Heat / Power	Travel / Accessibility	Power Communication Generator	M	O
GROUP HOMES (24 H FACILITY)	MULTIPLE LOCATIONS	PRIVATE / STATE	V/S		" "	" "	Heat Power Communication Generator	M	O
INTERDEPARTMENTAL COOPERATION	TOWN WIDE	TOWN	S		" "	Travel / Accessibility		M	O
55+ HOUSING	DOWNTOWN TOWN-WIDE	TOWN / PRIVATE	V		" "	" "	Land Lines	M	O
Environmental									
- Dam (Infrastructure) Flooding	SUDBURY R.	PUBLIC / PRIVATE	V	Evidence X Accessibility	NA	N/A	N/A	H	O
Flood of Bridges	SUDBURY R.		V	X Meadow Street / Mill Road				H	O
Large trees (overgrown) (Dead) (Charging Climate)	TOWN - WIDE		V/S				PROACTIVE MGMT TREE TRIMMING PRIORITIZE COMMUTER ROUTES	H	O
ANIMAL SHELTER / DOG CARE / (3) BOARDING	MULTIPLE	TOWN / PRIVATE	V/S					M	O
NYANZA (Cap)				Plume & Groundwater	NA	N/A	N/A	~~H~~ N/A	O
Ma. State Parks (Summer time use)					X Extreme Heat	NA		H	O

Repeaters
Make part of plan for Wells
Radio Repeaters *
Critical Infra
Train Signaling (Dundas)
Water Treatment Plant
Wood Union St
MBTA Access Plans Intersection
Separation / Evaluation needed

# of Visitors → Additional Parking Lots needed (Beach Parks)



ASHLAND, MA

MUNICIPAL VULNERABILITY PREPAREDNESS PROGRAM

- School
- Town Hall
- Police Station
- Fire Station
- Health Center
- Community Groundwater Source
- Non-Community Groundwater Source
- Emergency Surface Water
- Dams
- Underground Storage Tanks
- Assisted Living Facility
- Nursing Home
- Rest Home
- Interstate
- State Route
- Non-numbered Road
- Pipeline
- Railroads - Active Service
- Regular Service
- Regular Service
- Wellhead Protection Zone I
- Wellhead Protection Zone II

Flood Zone Designations

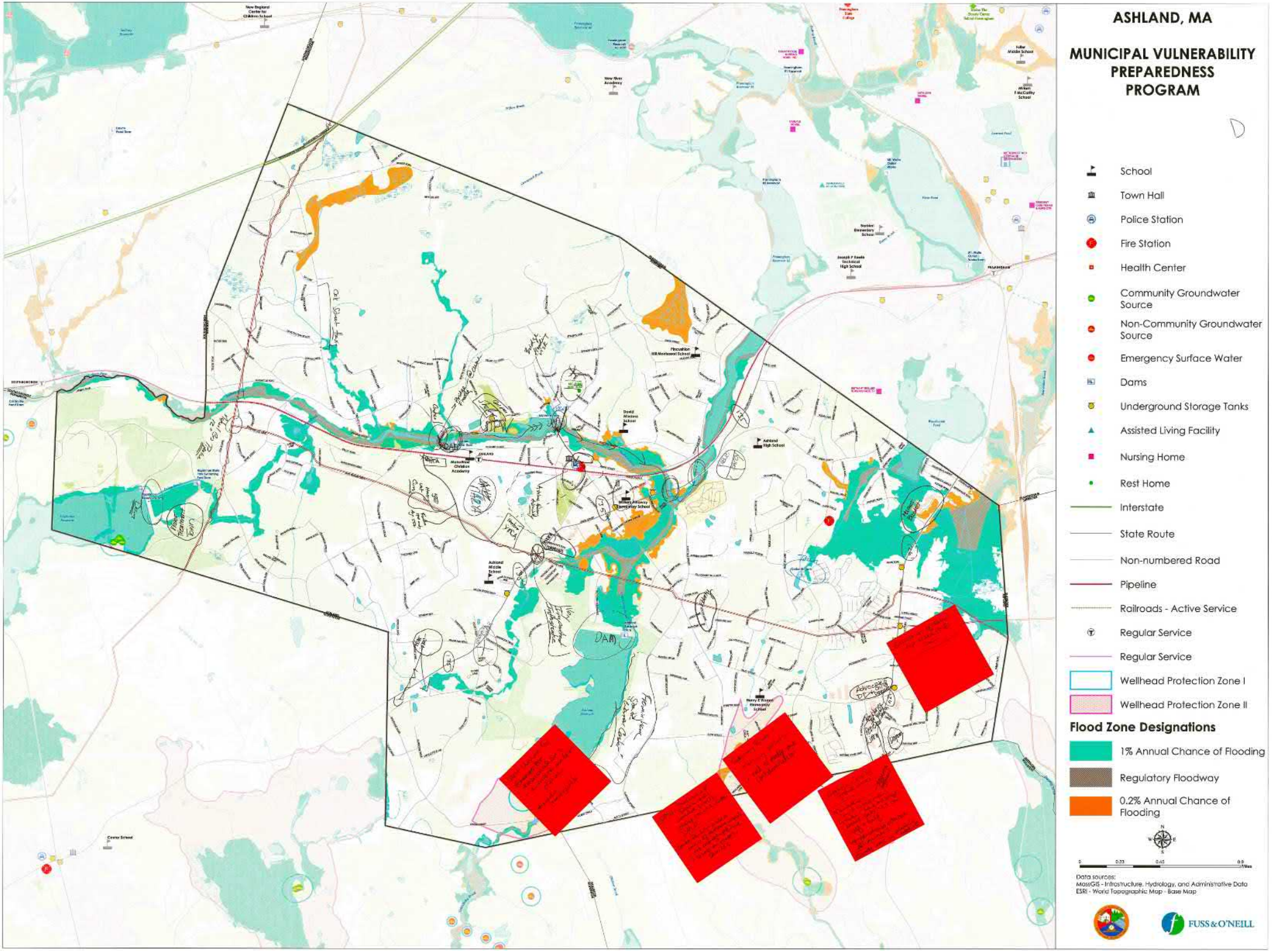
- 1% Annual Chance of Flooding
- Regulatory Floodway
- 0.2% Annual Chance of Flooding

N W E S

0 0.23 0.45 0.9 Miles

Data sources:
MassGIS - Infrastructure, Hydrology, and Administrative Data
ESRI - World Topographic Map - Base Map

FUSS & O'NEILL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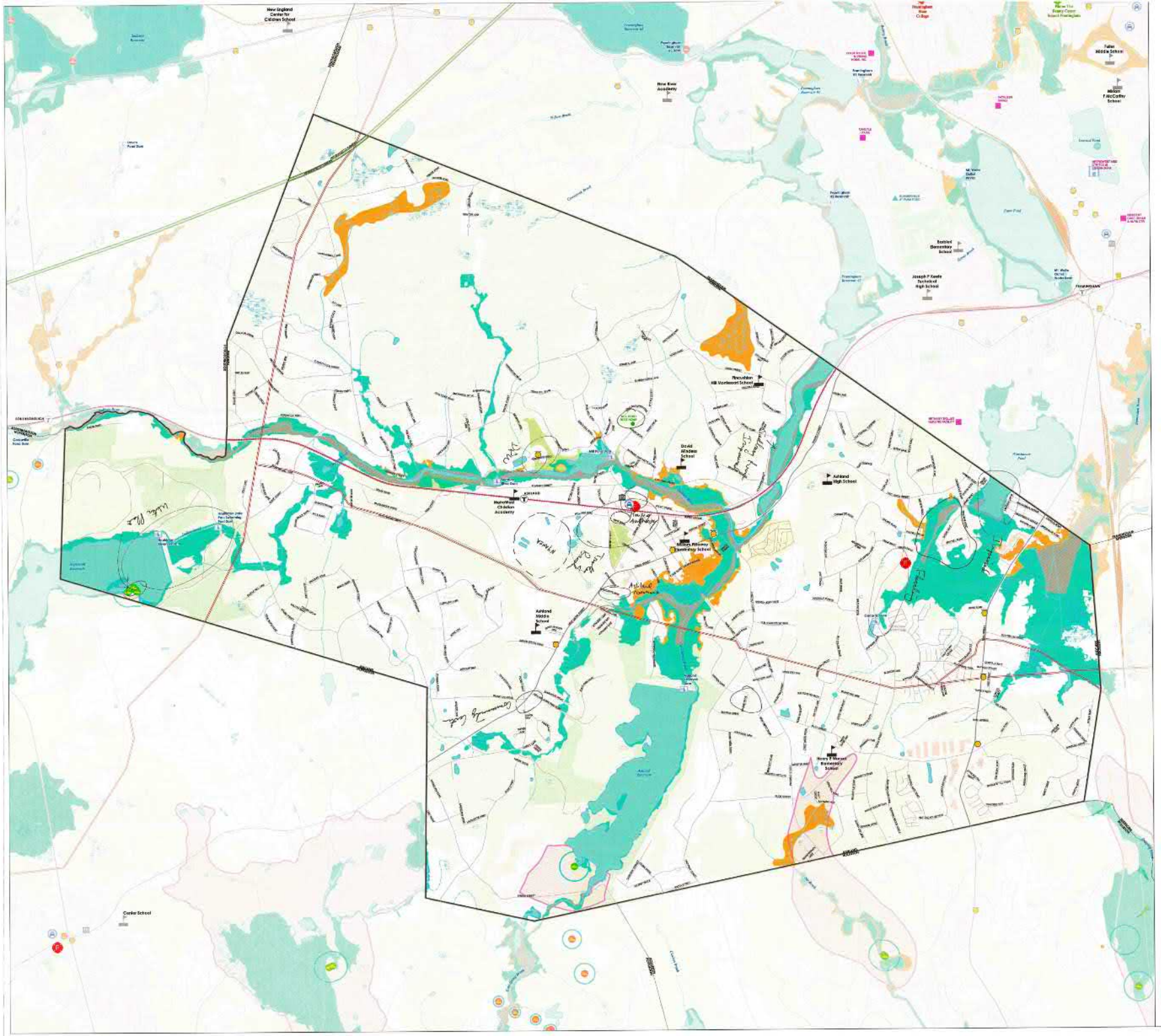
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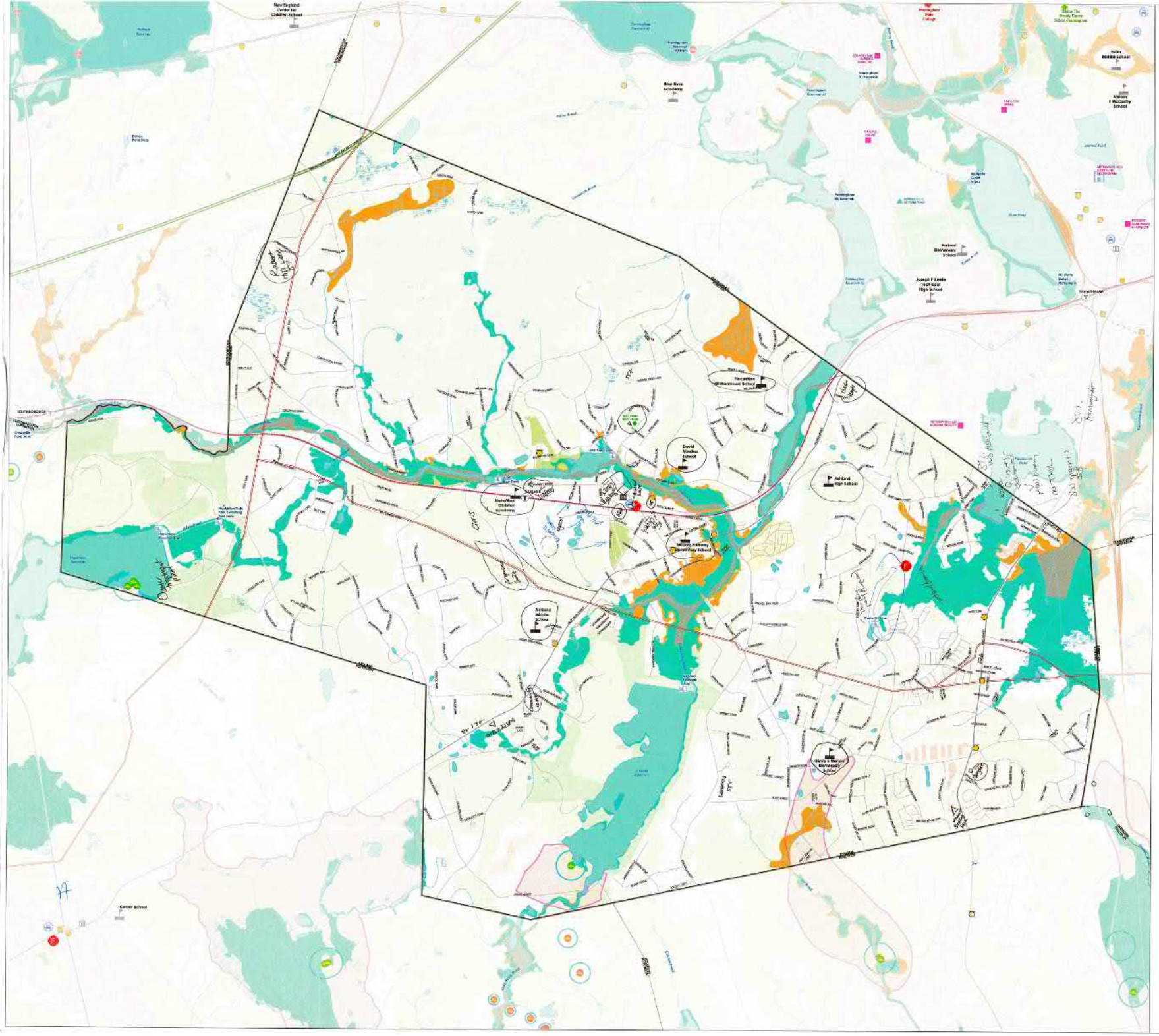

ASHLAND, MA

MUNICIPAL VULNERABILITY PREPAREDNESS PROGRAM

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FUSS & O'NEILL

Appendix D

CRB Workshop Presentation Materials

FUSS & O'NEILL

Boston Firefighters, January 4, 2018 (Reuters)

Spillway, Ashland State Park

Municipal Vulnerability Preparedness Program
Community Resilience Building Workshop
Town of Ashland

February 11, 2020

Community Resilience Building Workshop

Agenda

- CRB Team and participant introductions
- Introduction to Massachusetts Municipal Vulnerability Preparedness Program (MVP)
- Introduction to Climate Change and the Town of Ashland
- Discussion by Ashland participants on status of current planning and risks
- Introduction to CRB Workshop process

- Large group
  - Determine top four hazards

- Small work groups (Using Risk Matrix)
  - Identify Ashland's vulnerabilities and strengths
  - Prioritize response actions

- Lunch

- Large group
  - Report out from small groups
  - Determine overall priority actions for the Town

- Discussion on next steps
- Conclusion

FUSS & O'NEILL

Fuss & O'Neill Overview

Fuss & O'Neill is a leading MVP consultant in assisting Massachusetts communities secure grant assistance, achieve designation as a Massachusetts Municipal Vulnerability Preparedness (MVP) community, and execute their MVP priority projects.

The MVP team is experienced in local government, environmental services, civil site engineering, stormwater management, and emergency management.

Fuss & O'Neill assisted new MVP communities secure more than $3.15 million in MVP Action Grants in the program's first and second funding rounds.

Ashland's MVP Program – $20,000

- Grant Supports Climate Change Vulnerability Assessments and Resiliency Planning
- MVP Comprehensive Approach
  - Infrastructure
  - Society
  - Environment

MVP designation leads to enhanced standing in future funding opportunities

MVP Project Team

Julie Busa, PhD

Julie is a senior environmental scientist in the Water Environment and Natural Resources group of Fuss & O'Neill. She is a Certified Senior Ecologist with over 10 years of experience in the areas of global biodiversity and forest conservation, sustainability, and ecological modelling. Julie works extensively with municipalities on MS4 compliance and the MVP program.

Sarah Hayden

Sarah is an environmental scientist in the Water Environment and Natural Resources group of Fuss & O'Neill. She has a background in environmental science as well as a strong foundation in business administration and environmental economics. Sarah works with municipalities on MS4 compliance and the MVP program.

Stefan Bengston

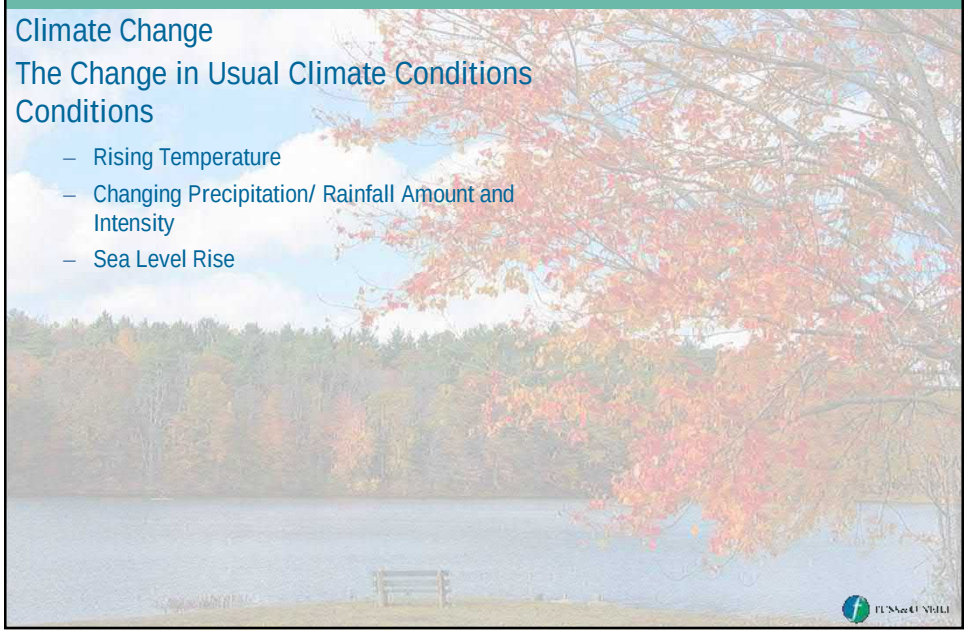
Stefan is an environmental scientist in the Water Environment and Natural Resources group of Fuss & O'Neill. He has a background in wetland, watershed and ecosystem sciences and geographic information systems (GIS). Stefan works with municipalities on MS4 compliance and the MVP program.

MVP Action Grant

- Grant supports priority actions identified at Community Resilience Building Workshop
- $25,000 - $2,000,000 available (up to $5,000,000 for regional projects)
- Local match of 25% - can be in-kind
- Next funding round anticipated April 2020

Only those communities which have completed the CRB workshop are eligible to apply

Terminology



Climate Change

The Change in Usual Climate Conditions Conditions

- Rising Temperature
- Changing Precipitation/ Rainfall Amount and Intensity
- Sea Level Rise

Town of Ashland–Charles and Sudbury-Assabet-Concord Basins

Rising Temperature

Charles Basin Sudbury-Assabet-Concord Basin	Observed Baseline 1971-2000	Projected Change in 2030s			Projected Change in 2050s			Projected Change in 2070s			Projected Change in 2090s		
Average Annual Temperature (°F)	49.38 48.73	2.05 2.18	to	4.02 4.37	2.67 2.88	to	6.07 6.32	3.23 3.47	to	8.79 9.03	3.49 3.76	to	10.72 10.94
Annual Days with Maximum Temperature over 90°F (Days)	8.95 8.07	7.08 7.24	to	19.58 20.03	10.01 10.13	to	35.04 35.14	12.74 12.20	to	56.79 56.37	15.71 14.48	to	75.87 76.25
Annual Days with Minimum Temperature below 32°F (Days)	136.36 143.36	-10.38 -11.90	to	-25.73 -27.94	-16.89 -19.26	to	-38.60 -39.80	-20.22 -22.36	to	-52.35 -55.02	-22.22 -24.35	to	-63.10 -64.94

Town of Ashland–Charles and Sudbury-Assabet-Concord Basins

Changing Precipitation

Charles Basin Sudbury-Assabet-Concord Basin	Observed Baseline 1971-2000	Projected Change in 2030s			Projected Change in 2050s			Projected Change in 2070s			Projected Change in 2090s		
Total Annual Precipitation (Inches)	46.55 45.44	-0.04 0.16	to	4.77 4.84	0.23 0.56	to	6.13 6.06	1.24 1.53	to	7.47 7.79	0.74 1.23	to	8.18 8.01
Annual Consecutive Dry Days (Days)	16.92 16.83	-0.4 -0.55	to	1.46 1.41	-0.65 -0.40	to	2.35 1.98	-1.00 -0.88	to	2.97 2.26	-0.77 -0.72	to	2.71 2.50

Climate Change Impacts – Temperature

- Economic
  - Winter Recreation
  - Snow and Ice
- Agricultural
  - Longer Growing Season
- Health
  - Increased Pests
  - Heat Stroke
- Infrastructure
  - Road Buckling
  - More Potholes
  - Power Outages
- Environment
  - Change in Habitat

Climate Change Impacts – Precipitation

- Economic
  - Dangerous Floods
  - Lost Work Time
- Agricultural
  - Excessively Wet Spring
  - Drought
- Health
  - Flood/High Water-related Deaths
  - Emergency Response Delays
- Infrastructure
  - Road Washout
  - Environment
  - Sewer System Overflows
  - Compromised Bridges
- Environment
  - Changes in Habitat

Stakeholder Updates

MVP Program

- Identify Top Four Hazards
  - Review MVP Sectors
  - Maps as tool
  - List infrastructure, societal, environmental feature
  - Determine whether a vulnerability or strength
  - Identify actions to reduce vulnerability or reinforce strength
  - Prioritize actions
  - Report Out
- Finalize Prioritization Plan

Climate Change Hazards

- Flooding
- Extreme Precipitation Events
- Heat Waves
- Drought
- Snow/Ice
- Wildfire
- Tornadoes
- Hurricanes
- Nor'easters
- Other

Risk Matrix

Community Resilience Building Risk Matrix www.CommunityResilienceBuilding.com

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

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

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

MVP Sectors

- Infrastructure
  - Evacuation routes
  - Schools
  - Roads, bridges, dams
  - Water and wastewater
  - Septic systems
  - Hospitals
  - Commercial Buildings, churches
  - Utilities: electric, gas
  - Factories
  - Emergency management facilities

MVP Sectors

- Societal
  - Emergency shelters
  - Senior housing
  - Schools and campuses
  - Economically challenged populations
  - Evacuation plans
  - Animal shelters
  - Hospitals, pharmacies
  - Grocery stores
  - Utilities: electric, gas
  - Homeless
  - Other

MVP Sectors

- Environmental
  - Drinking water supply
  - Rivers and streams
  - Parklands
  - Agriculture
  - Title V systems
  - Stormwater management
  - Open spaces
  - Flood plains
  - Forest
  - Other

Community Resilience Building Workshop

Next Steps:

- Public Review of Priorities
- Monitor and Update
- Annual Review

Community Resilience Building Workshop

Questions?

Municipal Vulnerability Preparedness Program
Community Resilience Building in Ashland

Hillary B. King
MVP Central Regional Coordinator
MA Executive Office of Energy and Environmental Affairs

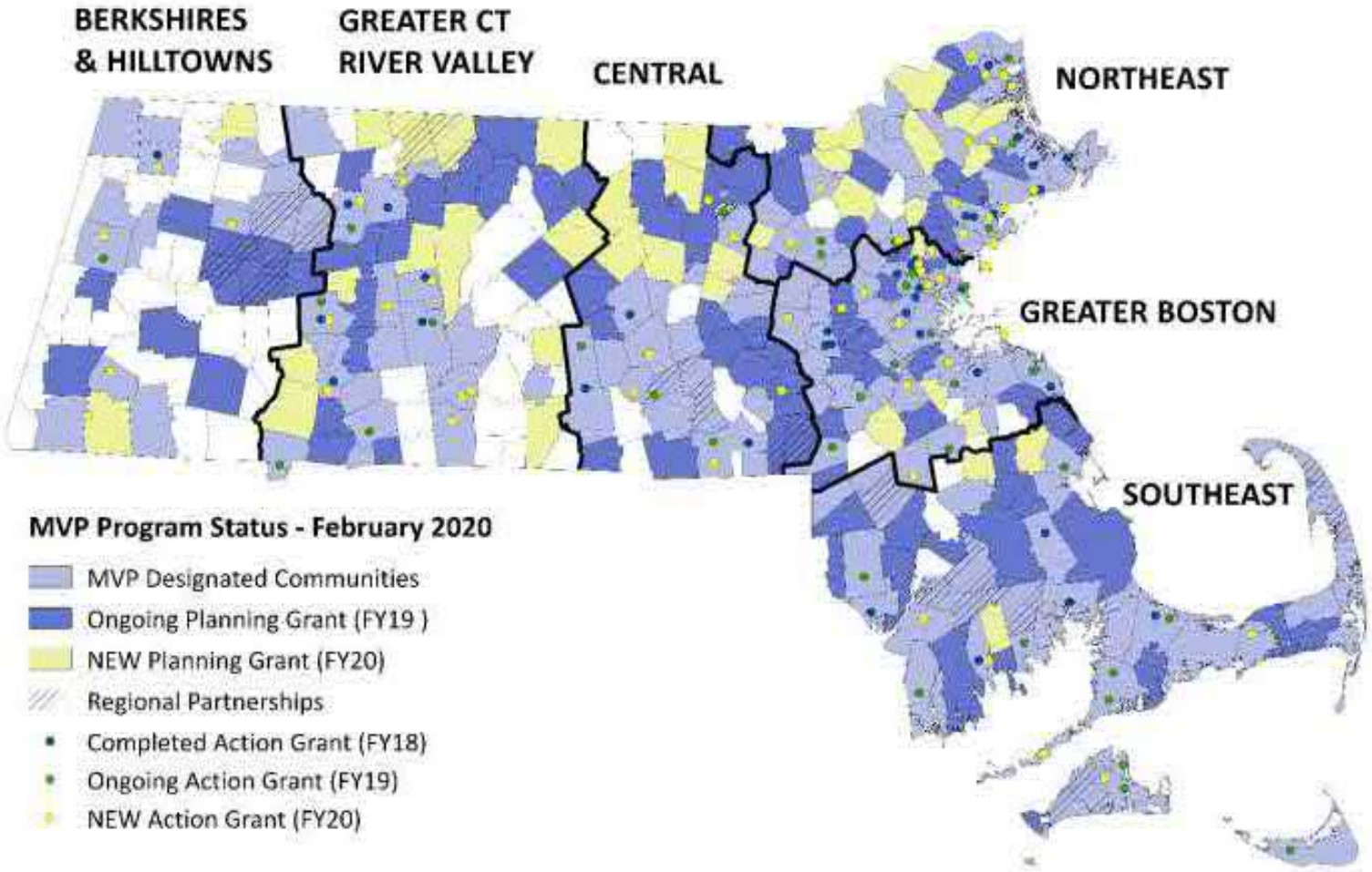
Photo Sources:
Right: thecornerspotashland.com
Left: Henry Danico, backroadsights.com

MVP Program

Community Resilience
<u>Building Process</u>
82% Participation
287 communities

<u>Action Grant Projects</u>
FY 18: 37
FY 19: 36
FY20: 52

<u>Total Awards</u>
$28M+ to date



MVP Central Region

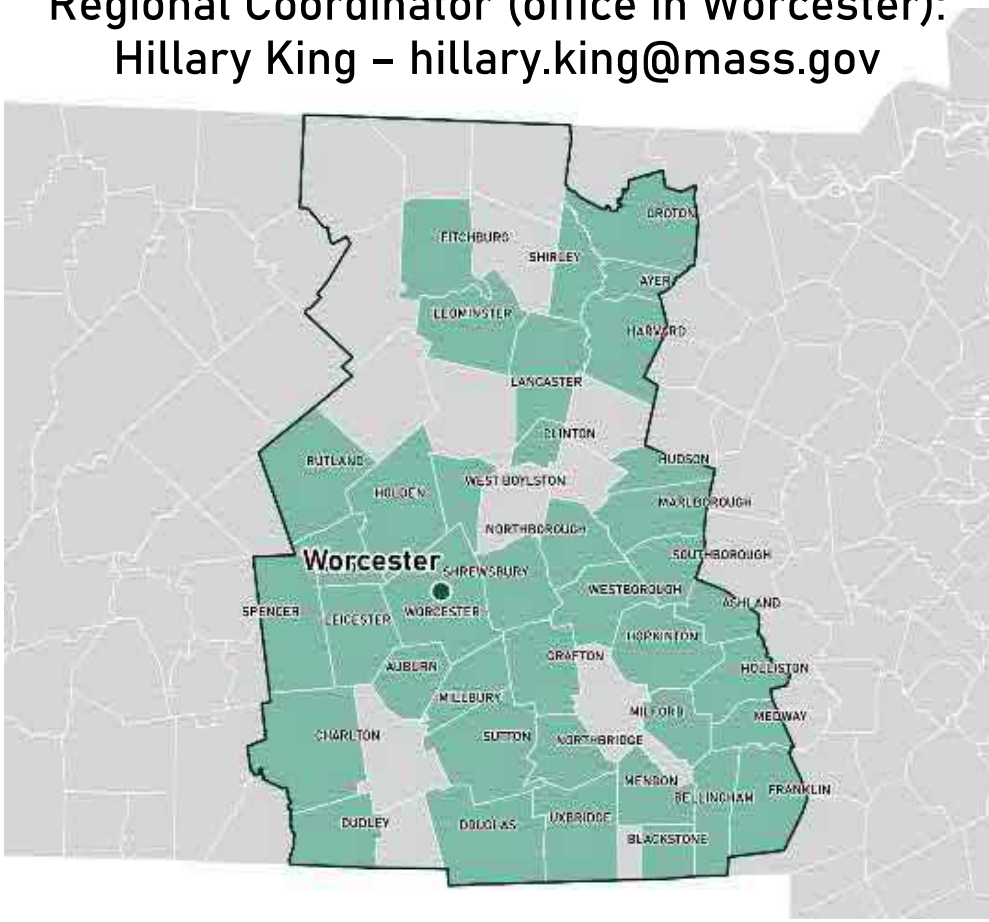
FY19 Planning Grants:
- Ashland
- Ayer
- Bellingham
- Douglas
- Dudley
- Fitchburg
- Franklin
- Groton
- Holliston
- Hopkinton
- Lancaster
- Leominster
- Medway
- Northborough
- Paxton
- Rutland
- Shirley
- Southborough
- Westborough

FY20 Planning Grants:
- Berlin
- Bolton
- Lunenburg
- Princeton
- Sterling
- Townsend
- Westminster

FY19 Action Grants:
- Devens
- Millbury
- Spencer
- Uxbridge

FY20 Action Grants:
- Auburn
- Harvard
- Holliston
- Shirley
- Uxbridge
- Worcester

Regional Coordinator (office in Worcester):
Hillary King – hillary.king@mass.gov



MVP Resources

- www.resilientma.org
- www.mass.gov/municipal-vulnerability-preparedness-program

Example MVP Project Types

- Vulnerability and Risk Assessments, Adaptation Plans
- Updates to Local Bylaws/Ordinances, Plans, and Other Management Measures
- Redesigns and Retrofits for Critical Facilities and Infrastructure
- Nature-based Solutions for Ecological and Public Health

Why nature-based?

- Cost-effective
- Protects water quality and quantity
- Provides food and recreation opportunities
- Reduces erosion
- Minimizes temperature increases associated with developed areas and climate change

ASHLAND FARMERS MARKET
keeping it fresh

PROUD TO BE 100% VOLUNTEER POWERED

POWER
Prevention Outreach While Encouraging Resilience

MetroWest College & Career FAIR
Saturday
March 21, 2020
9:00am - 12:00pm
Ashland High School
65 E. Union St, Ashland, MA 01721

WICKED LOCAL ASHLAND

Ashland tackles climate change

By Cesareo Contreras / Daily News Staff
Posted Apr 25, 2019 at 6:06 PM
Updated Apr 25, 2019 at 6:08 PM

Selectmen have voted to put a net-zero resolution on the November Town Meeting warrant that states that by 2040, the town will have completely offset its use of greenhouse emissions.