TOWN OF DUDLEY

Municipal Vulnerability Preparedness Summary of Findings

May 2020

With assistance from

CMRPC Central Massachusetts Regional Planning Commission

Executive Office of Energy and Environmental Affairs

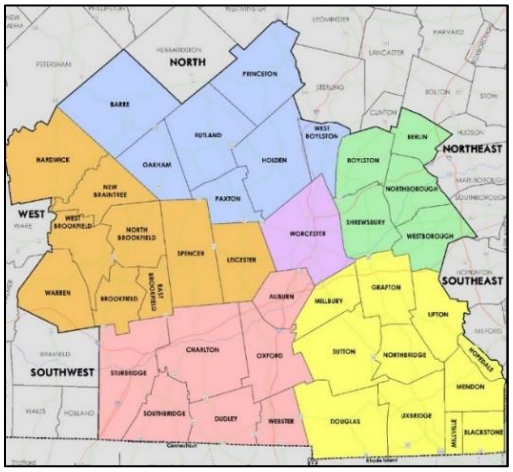
CMRPC Mission

The Central Massachusetts Regional Planning Commission is a regional partnership serving the planning and development interests of 40 member communities in southern Worcester County in Massachusetts. Our primary mission is to improve the quality of life for those who live and work in our region.

We do this by (1) addressing growth and development issues that extend beyond community boundaries; (2) maintaining the region's certification for federal transportation improvement funds; (3) providing technical knowledge an resources to assist local government in addressing specific land use, economic or environmental problems resulting from growth or decline, and (4) building strong working relationships with member communities, state and federal officials, as well as the range of area stakeholders.

Our History and Progress

Founded by the Massachusetts Legislature in 1963, the Central Massachusetts Regional Planning Commission (CMRPC) provides a variety of services to its constituencies and brings a regional perspective to planning and development. One of 13 regional planning agencies in Massachusetts, CMRPC serves the city of Worcester and 39 surrounding communities in the southern two-thirds of Worcester County. CMPRC's programs include Transportation, Regional Services, Geographic Information Systems (GIS), and Community



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Executive Order 569 and the Massachusetts Municipal Vulnerability Preparedness program

In September 2016, Massachusetts Governor Baker signed Executive Order 569, directing multiple state agencies to develop and implement a statewide comprehensive climate adaptation plan with the best climate-change data available. Recognizing that many adaptation solutions are local in nature, a key commitment of Executive Order 569 is to assist local governments in completing their own assessments and resiliency plans. The MVP Grant and Designation Program represents the first step in fulfilling this commitment.

The MVP program provides planning grants to municipalities to complete vulnerability assessments and develop action-oriented resiliency plans. Funding is used by cities and towns to hire an MVP-certified consultant who is trained to provide technical assistance and complete a community's vulnerability assessment and resiliency plan using the Community Resilience Building Framework. Towns and cities are free to choose the consultant of their choice from a list of certified MVP provider. The Town of Dudley invited the Central Massachusetts Regional Planning Commission to lead them in this planning effort.

Communities that complete the MVP planning process become certified "MVP Communities" and are eligible for Action Grant funding and other opportunities through the Commonwealth.

https://www.mass.gov/news/governor-baker-signs-legislation-directing-24-billion-to-climate-change-adaptation

ACKNOWLEDGEMENTS

The Municipal Vulnerability Preparedness (MVP) program and Community Resiliency Workshop was funded by the Executive Office of Energy and Environmental Affairs. This Summary of Findings and CRB Workshop were prepared for the community of Dudley by the Central Massachusetts Regional Planning Commission (CMRPC). Support from the Dudley Board of Selectmen and the town officials was much appreciated, especially for allowing the workshop and listening session to take place in the Selectmen's Meeting Room.

The CMRPC would like to acknowledge the Town of Dudley's Core Team for their time and hard work in participating in this project. These include, but are not limited to:

Jonathan Ruda, Town Administrator, Project lead

Don Johnson, Town Planner, (former)

George Patrinos, Water Superintendent

Vinny Polletta, Highway Superintendent

Michelle Jervis, Administrative Secretory

Dean Kochanowski, Fire Chief

Bill Scanlan, Acting Town Planner

The following individuals were directly and personally involved in planning and conducting the Dudley Community Resilience Building Workshop:

Peter Peloquin, Associate Planner, CMRPC

Ian McElwee, Principal Planner, CMRPC

Mimi Kaplan, Associate Planner, CMRPC

Andrew Loew, Project Manager, CMRPC

Connor Robichaud, Regional Projects Coordinator, CMRPC

Hillary King, Regional Coordinator, EOEEA

DUDLEY: A PROFILE

The Town of Dudley, Massachusetts was incorporated in 1732. Dudley is located along state routes MA-197, MA-131 and MA-31, approximately 20 miles south of the City of Worcester. Dudley is a rural bedroom community with some minor industry. Dudley lies within two watersheds that nearly split the Town in half. The western half lies within the Chicopee River Basin, while the eastern half lies within the French River Basin. Dudley is bordered by Southbridge on the west, Webster on the east, the State of Connecticut on the south, and Charlton and Oxford on the north.

Dudley has a population of 11,682 (American Community Survey Dudley Town Report 2018). With having 20.82 square miles of land area, the population density resides around 547.1 people per square mile. Dudley can be designated as a predominately white community, with 91.2% of the population identifying with that group. The median age range for the population is 37.8 with 21.2% of the population below the age of 18 and 13.6% of the population over the age of 65. The median household income for the community is $67,117, with 6.4% of the population living below the poverty line. Dudley is a demographically stable community, with population growth slowing as buildable land has been on decline following the 1990 surge. According to the Central Massachusetts Regional Planning Commission's (CMRPC) Long Range Transportation Plan, Mobility 2040, the Town of Dudley is expected to experience low population growth of the next 25 years.

The Town of Dudley has an active population in its municipal buildings. Dudley is home to the Dudley Municipal Complex, which is home to the Police Department, Senior Center, Veterans Center and Municipal Offices. The Library -- separate from the municipal building-- and senior center are the social epicenters of the town with daily programs for all ages between the two buildings. The Fire Department built a state-of-the-art fire station that was completed in 2019. The Department of Public Works is home to the Highway, Water and Sewer departments and shares parts of the property with the Animal Shelter and Recycling Center. Dudley belongs to the Dudley-Charlton Regional School District and is also home to the Mason Road School, Dudley Elementary School, Dudley middle School and Shepherd Hill Regional High School.

WORKSHOP SUMMARY

The Town of Dudley's Municipal Vulnerability Preparedness (MVP) workshop was held on Friday, January 10, 2020 at the Dudley Town Hall. The Town of Dudley contracted with the Central Massachusetts Regional Planning Commission (CMRPC) to serve as the MVP provider, including completing the Community Resiliency Building (CRB) workshop. Through the Community Resilience Building (CRB) process, stakeholders actively engaged in an ongoing discussion to

determine the top hazards related to climate change that currently impact or have the potential to impact Dudley. A small group of Town officials and convened on August 14, 2019 to form the 'Core Team' which, together with CMRPC staff, organized and planned the CRB Workshop over the course of five monthly meetings.

Workshop Invitees and Participants

Name	Affiliation	Attended
Margaret Bussiere	Council on Aging	N
Denis Driscoll	Cultural Council	N
Mark Marzeotti	EDC	N
Dickie Androlewicz	ConCom	N
Daniel Edmiston	Planning Board	N
Jennifer Cournoyer	Board of Health	Y
Steven Lamarche	School Superintendent	Y
Robert LaVigne	Nichols College – Director of Operations	Y
Elizabeth Prince	Tri Valley	Y
Charles Pappas	Park & Shop	N
Catherine Benjamin	Gentex	Y
Kevin Shaughnessy	National Grid	Y
Vinny Polletta	Storm Water Committee/Superintendent Highway Dept.	Y
Victor Kallgren	Agricultural Committee	N
Paul Wieloch	Dudley Conservation Land Trust	Y
Mark Ruggieri	Webco Chemical Inc.	Y
Ryan Simpson	Shields Packaging	N
Douglas Willarston	Webster Representative	N
Jennifer Callahan	Oxford Representative	N
Graham Maxfield	Charlton Representative	N
Ron San Angelo	Southbridge Representative	N
Ken Beausoleil	Thompson CT Representative	N
Jarrod Hutcheson	Providence/Worcester RR	N
Westville Lake	Army Corps. Engineering	N
Kenneth Butkiewicz	Rail Trail	N
Edward Bazinet	French River	N
William Salomaa	Office of Dam Safety (DCR)	N
Jack Clarke	Mass Audubon	N
Barry Lorion	Mass DOT – Division 3	N
Liz Hamilton	Boys and Girls Club	N
Lucille Allard	Housing Authority	N
Stephen Rogerson	Veterans Representative	Y
Steven Sullivan	Board of Selectman	N
Alexandra Burpee	Records and Burpee Animal Farm	Y
Drusilla Carter	Library	Y
Jonathan Androlewicz	Rampco Construction	Y
Pete Durant	State Representative	N
Jon Ruda	Dudley TA	Y

George Patrinos	Dudley Water Department	Y
Stanley Golenski	Dudley Highway Department	Y
Bill Scanlan	Acting Planner	Y
Don Johnson	Town Planner	N
Michelle Jervis	Administrative Secretary	Y
Steven Wojnar	Dudley Police Chief	Y
Dean Kochanowski	Dudley Fire Chief	Y
Udo Plocher	Henke Sass Wolf	N
Hillary King	EEA	N
Ted Zajkowski	Building Department Clerk	Y
Christoper Levesque	Webco Chemical	Y
Peter Fox	Dudley Conservation Land Trust	Y
Tim Galvin	Dudley Water/Sewer Department	Y
Paul Konieczny	Dudley Fire Department	Y
David Harrigan	Dudley Conservation Land Trust	Y
Scott Zajkowski	Dudley Water/Sewer Department	Y

Core Team and Project Team

Name	Affiliation	Role
Jonathan Ruda	Town Administrator	Project Manager, Facilitator
Michelle Jervis	Admin. Secretary	Core Team, Facilitator
George Patrinos	Water Department	Core Team, Facilitator
Bill Scanlan	Acting Town Planner	Core Team, Facilitator
Don Johnson	Town Planner-Former	Core Team, Facilitator
Vinney Polletta	Highway Department	Core Team, Facilitator
Dean Kochanowski	Fire Chief	Core Team, Facilitator
Peter Peloquin	CMRPC	Core Team, Facilitator
Andrew Loew	CMRPC	Core Team, Facilitator

The Workshop's goal was to identify the four top natural hazards that impact Dudley and develop strategies to enhance the town's resiliency related to climate change. Following the CRB work plan process, CMRPC facilitators and planners gave three presentations:

- Overview of the CRB process and the MVP program.
- A summary of climate change projections, impacts and mitigation strategies
- A detailed profile of natural hazards in the Town of Dudley, including the top four hazards perceived by the core team.

Upon completion of the presentations, the group discussed the top four hazards that affect Dudley. There was much discussion by the group deciding the fourth hazard. Earthquakes and extreme temperatures were debated for roughly fifteen minutes. An informal vote was taken of the group with extreme temperatures winning the majority vote. There was final agreement

between the Core Team and all participants that--in no particular order-- ***flooding, wind events, winter storms*** and ***extreme temperatures*** have the greatest effects and potential effects on the Town. Having identified these hazards, workshop attendees were then broken into five groups to work through the CRB program's matrix and mapping exercise. Table facilitators, along with CMRPC staff guided stakeholders in small groups to examine the resources throughout the town and to identify the town's most serious concerns regarding natural and climate-related hazards that threaten their community.

After lunch, Peter Peloquin presented examples of projects from other municipalities in the state that were funded by MVP Action Grants, providing inspiration for participants to:

- Develop and prioritize actions to reduce or mitigate threats.
- Identify opportunities for collaboration aimed at increasing the town's resilience.

The groups then reconvened to build upon the morning work. The goal of the afternoon breakout session was to identify actionable items to reduce or mitigate the projected impacts of climate change. Once each table had completely filled out the matrix, all the groups reconvened and gave a summary of findings by the table reporters. The workshop ended with each attendee voting for what they believed to be the top project in the infrastructure, society and environmental categories.

Thirty-four (34) people attended the CRB Workshop, including representatives from the town government, emergency services, the MVP Core team, Municipal Department Heads, Shepard Hill Regional High School, local business owners, Nichols College and concerned citizens of Dudley.

A public listening session to discuss MVP results and recommendations for future actions was held on February 24, 2020 prior to a regularly scheduled Board of Selectmen's Meeting. The listening session and Board of Selectmen's meetings were properly promoted across several avenues, with a combined eighteen (18) residents including all five selectmen in attendance. Between the two meetings, a total of forty-nine (49) people participated in the MVP process.

Top Hazards

Following the presentations at the beginning of the workshop, a full-group discussion was held for approximately fifteen minutes to determine the top four hazards for breakout groups to further assess solutions. Taking climate change projections, critical infrastructure, and other considerations into account, workshop participants chose to focus on the four following hazards. They are presented in no particular order: **flooding**, **extreme temperatures**, **winter storms**, and **wind events**.

In 2016, Dudley experienced extreme droughts along with the majority of the state of Massachusetts. Severe storms, including high winds and intense rainfall, have been increasing in frequency and impact. All of these have caused disruption to the town, including localized

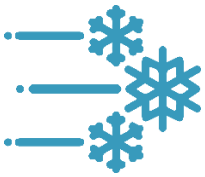
flooding, power outages, and calling upon mutual aid agreements. With climate change, all of these natural events are expected to increase in severity and frequency.

Extreme Temperatures

Projecting an increase of consecutive dry days, with the driest periods in the summer and fall. This leads to increased risk and stress on drinking water systems and wildfire potential.

Flooding

Expected increase in precipitation across all seasons. Heavy rainfall will become more frequent, increasing the risk for flash floods. Also increases non-point source pollution.



Winter Storms

Annual days below freezing will decrease, winter precipitation falling as rain or freezing rain. This increases risk for ice storms and flash flooding when rain falls on frozen ground.

Wind Events

Intensity of storm events is expected to increase due to the warmer atmosphere. This will lead to increased severe thunderstorm and hurricane activity with higher wind

Flooding. Extreme weather in recent years demonstrates how the various hazards impact the town. There have been numerous flooding events over the years. Potash Brook is a town-wide area of concern and has a history of flooding. Areas surrounding Potash Brook, including West Main Street, are at higher risk to these flood events. Specific areas with critical infrastructure have been shown to be prone to flooding, thereby creating a variety of safety concerns. Areas with frequent drainage issues include Route 197, Route 131, and Route 12.

Winter Storms. Winter ice storms, a regional problem, are expected to be more intense and include more mixed precipitation which is highly damaging to trees, power lines and other infrastructure.

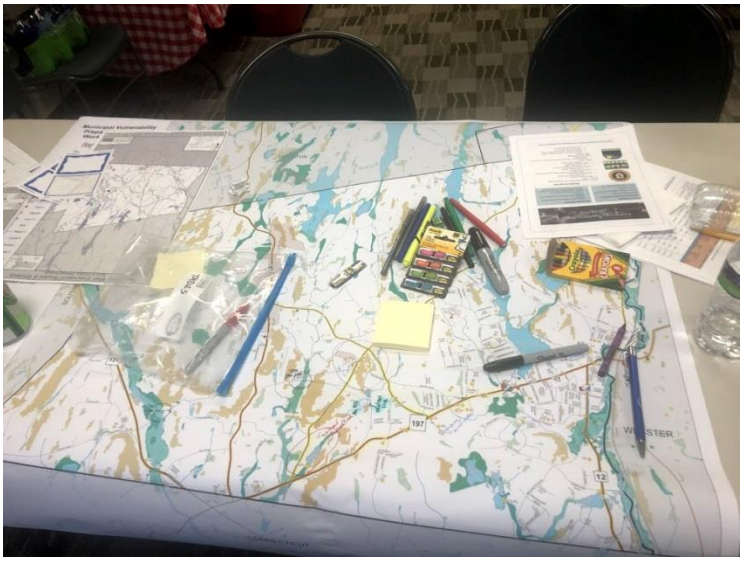
Extreme Temperatures. Wildfires are expected to increase due to the impact of prolonged droughts and extreme heat. Drier forests and wooded areas will be more combustible in drought conditions. Drought will also lead to water shortages that will impact the entire town whether or not residents and businesses are on town water or have wells.

High Wind. Heavy wind events are a serious concern. The town and the surrounding area have experienced a recent uptick in storms with hurricane-level winds including an EF-1 Tornado. While this phenomenon can be linked to extreme temperatures and rising precipitation rates, workshop participants felt it was serious enough to be singled out as a hazard. Thus, the fourth hazard is focused primarily on the winds associated with these storms, leaving heavy rain events to be discussed under flooding.

The workshop participants agreed that different hazards affect the town at different times of the year. Flexibility and comprehensive response by town officials is needed to ensure the safety of the citizens in different hazard situations exacerbated by climate change.

These concerns, which are largely inter-related, are based on data provided by the Massachusetts Climate Clearinghouse as well as watershed-specific data from the Northeast Climate Adaptation Science Center (NE CASC) at the University of Massachusetts at Amherst. For the Quinebaug and French River Basin, where Dudley is located, projections show an expected increase in precipitation overall, with the greatest increase during winter. The number of days with more than 2" of rainfall, potentially leading to inland flooding, is also expected to increase with the average expected to be close to 15 days by the year 2100 compared with approximately 10 days now. Consecutive dry days and days above 90 degrees Fahrenheit are expected to increase, leading to drought. Days at the wintery-mix level of cold are also expected to increase, leading to a greater likelihood of freezing rain in the winter. Higher wind in the summer and storm severity increases with warmer temperatures.

SUMMARY OF FINDINGS



Overall, the workshop was received positively by all in attendance. Following the presentations, participants were asked if they agreed with the core team's identification of, in no particular order, flooding, wind events, winter storms and extreme temperatures as the primary hazards facing Dudley. All the participants agreed that these four hazards were the most relevant for Dudley.

Available schools and emergency trainings were described as strengths, along with the available senior programs and the Dudley Conservation Land Trust. The local bylaws and public resources were considered to be an overall strength for the town. Flooding and stormwater management were considered to be a vulnerability, along with the large number of dams in town.

Areas in and around the Jericho neighborhood are considered vulnerable. The Merino Pond Dam, Lower Merino Pond Dam, Carpenter Road Pond Dam, and the Packard Pond Dam are safety and public health hazards. Studying removal or replacement options for these dams was discussed and supported by a majority of participants.

Another area that was widely seen as prospect for action was the Joshua Place apartments. The Joshua Place apartments, which serve as housing for low-income elderly and persons with disabilities, requires housing upgrades, backup energy sources, and an additional egress. Other vulnerable areas mentioned were issues of overall tree health and tree maintenance systems, a lack of stormwater management and the need for back-up power in public buildings. There was concern about the need for a higher level of emergency communication equipment and for expanding communication resources to vulnerable populations in town. Recommendations included upgrading emergency communications systems and increasing cellular service throughout the Town.

Similarly, to that of the Joshua Place apartments, a vulnerability was identified at both Sheppard Hill High School and the Mason Road Elementary School. Due to a lack of an additional egress, access to and from the school, particularly during emergencies is a hazard for the community.

There was agreement that the Town's water and sewer pumping stations needed to be upgraded and outfitted with alternate power sources to provide for the expansion of both water and sewer throughout the town. Many asked for greater public education regarding water conservation, flooding and drainage issues at homes with private wells or septic tanks, and insect-borne diseases.

All five tables identified specific vulnerable locations that are already in need of attention and will likely face worsening impacts due to climate change. These include the town-wide dams, senior housing, public water system, and state-owned roads.

Current Concerns and Challenges Presented by Hazards and Climate Change

CMRPC, the MVP planning provider, had the unique advantage of preparing Dudley's Hazard Mitigation Plan (HMP), which was adopted by the Town's Board of Selectmen and approved by FEMA in April 2019. Meetings with the MVP Core Team prior to the workshop as well as the HMP helped to identify past climate-related events that significantly impacted the Town. Disaster events of concern included frequent major winter storms (as in 2015 and 2018), ice storms (2008), severe rain events (2005, 2010, 2016), tropical storms (Irene, Sandy), infestations of invasive and otherwise undesirable species (Asian Longhorn Beetle, gypsy moths, aquatic invasive species, ticks), and extended periods of drought (2015 to 2016). Dudley has fair public water coverage and maintains three well sources. Advisedly, it will be important for the town to maintain a backup and response plan in the event that one or more wells is damaged by drought or storm and cannot be replenished at the prescribed rate of use.

At the workshop, CMRPC staff presented downscaled climate change data provided by Massachusetts's Executive Office of Energy and Environment Affairs (EOEEA) and the Northeast

Climate Science Center at the University of Massachusetts, Amherst. Dudley lies mostly in the Quinebaug River Basin and the French River Basin, and should projections for the watershed hold true, by mid-century, annual average temperatures will increase in the range of 3 to 6.4 degrees from the historical baseline. Hot days over 90 degrees will increase 9 to 30 days annually; days below freezing will fall 19 to 38 days annually; annual precipitation will increase 1.2 to 6.3 inches. Seasonal drought conditions will become more frequent as precipitation becomes more concentrated in extreme intensity events and winter snowpack is reduced. Some of the challenges of these projected changes – many of which are already being observed – were discussed in a presentation at the workshop focused on specific hazards in the Dudley area.

Challenges highlighted in the presentations and/or discussed as a group or in the breakout groups included:

- In general, attendees cited concerns that climate change will exacerbate problems that are already apparent and the town lacks the resources to address comprehensively – flooding and storm water management, vulnerable roads, ecological damage, and vulnerable populations, all within the context of a small community.
- An increase in hot and warm days and decrease in cold days will mean increased need for cooling and less need for heating, especially among vulnerable groups such as children and seniors.
- Increased temperatures can also be expected to cause changes in the water cycle, leading to more intense rain events. Increased precipitation rates will lead to more frequent and severe flooding in areas outside of designated flood zones defined using historical data – particularly around the Quinebaug and French Rivers, and along West Main Street (Route 197).
- Increased storm intensity will likely cause more tree damage leading to power outages and road closures, higher peak river flows requiring new approaches to storm water management, and increased erosion of river and brook banks and nearby infrastructure. Severe storms will still likely damage and impact the power lines throughout the town and especially the overhead transmission lines. Tree damage will occur from intense wind storms such as recent tornadoes or from heavy snow and ice storms.
- More frequent and severe droughts will challenge water supplies and increase risks from wildfire. Increased risk of wildfire can lead to a wide-range of ecological outcomes including increased damage to human property and life, removal of suitable habitat space, and changes in ecosystem services made available by forest cover.
- Invasive plant and animal species can impact public health through increasing numbers of disease carrying pests (e.g., ticks and mosquitoes) and by damaging key ecosystems such as forests and wetlands, thereby increasing wildfire and flood risks.

As the climate continues to change and natural disasters increase in frequency and strength the need to communicate with residents, businesses, and other institutions. Changing climate will dictate the need for enhanced communications systems and related infrastructure and flexible emergency response and evacuation plans. These flexible response and evacuation plans will be particularly important for the senior citizens who live alone and do not have access to a vehicle.

VULNERABLE AREAS

The locations in Dudley identified by workshop participants during discussion as vulnerable to the hazards discussed include areas near high-risk dams, forested areas, roadways that frequently flood, and neighborhoods with vulnerable populations that might need assistance in times of emergency.

VULNERABLE AREAS

- Dams
- Senior Housing
- Localized Flooding
- Water System
- Forested Areas

Town-wide Dams were of concern to many in attendance, and were discussed at all five workshop tables. The Merino Pond Dam, the Lower Merino Pond Dam, and the Carpenter Road Pond Dam were of particular concern. The Gore Pond Dam, also known as the Baker Pond Dam, recently received a Certificate of Non-Compliance and Dam Safety Order. All of these dams were thought of to be studied for removal or replacement.

Localized Flooding was identified along West Main Street, Southbridge Road, and Schofield Avenue. Higher density rainfall events coupled with undersized culverts are a major contributing factor.

Senior Housing was considered vulnerable by all groups during the breakout sessions. A lack of back of backup power was concerning for many due to the projected longer period of higher temperatures. In addition to better emergency planning, the availability of transportation for, and communications with, the senior population during these times is considered to be a key aspect of resiliency that needs upgrading and rethinking.

Water Systems in town were identified as at risk for pressures with flooding and drought. The limited extent of the water system could leave populations in Dudley without water during times of drought or extreme heat. This will put residents at risk of limited drinking supply and limited firefighting water sources.

Forested Areas throughout town are vulnerable to increasing pressures from heat, drought, and invasive insect species. The aging tree population is of concern for the overall health of the forested area covering most of the Town. Roadside trees are also a vulnerability due to a lack of a funding for tree trimming programs.

Specific Categories of Concerns and Challenges

The following topics were identified by workshop attendees as concerns or challenges related to Dudley's changing climate and natural hazards.

Infrastructure Concerns

INFRASTRUCTURE

- Dams
- Flooding/Stormwater
- Water Service
- Municipal Facilities

Dams

Dudley has 31 regulated dams in total throughout the town. Of these 31 dams, 2 are designated as High Hazard, and 13 are designated as Significant Hazard. Dams assigned as High Hazard are those where failure or improper operation will likely cause loss of life and serious damage to homes, industrial or commercial facilities, important public utilities, main highways, or railroads. And dams that are designated Significant Hazard are those where failure or improper operation may cause loss of life and damage to homes, industrial or commercial facilities, secondary highways or railroads, or cause interruption to use or service of relatively important facilities. Three dams that were noted of concern by attendees were the Merino Pond Dam, the Lower Merino Pond Dam, and the Carpenter Road Pond Dam. The Merino Pond Dam is designated as a High Hazard dams and is located between Merino Pond and Low Pond in the eastern part of town. The Lower Merino Pond Dam is also designated as a High Hazard dam and is located in very close proximity to the Merino Pond Dam. The Carpenter Road Pond Dam is designated as a Significant Hazard dam in unsafe condition, and is on the state list of 100 critical dams. It is located in the southern part of town. All three of these dams are town-owned, and there are another seven town-owned dams in Dudley. In addition to these, the Gore Pond Dam, also known as the Baker Pond Dam, recently received a Certificate of Non-Compliance and Dam Safety Order, and was deemed a potential threat to public safety. Along with the publicly owned dams, there are 21 privately-owned dams, five of which are Significant Hazards, which will pose additional obstacles due to ownership.

Gore Pond Dam, Photo curtesy of Michelle Jervis

Flooding and Stormwater Management

Stormwater management was another major concern noted by participants as several roads in town experience localized flooding issues. With heavier and more frequent rains, flooding and road conditions in these areas are expected to worsen. This was of particular concern along all state-owned roads in town. Lack of action or upkeep has resulted in major flooding issues at the intersection of Route 197 (West Main Street) and Center Road and at the intersection of Route 197 and Prospect Avenue. Route 131 (Southbridge Road) and Route 12 (Schofield Avenue) were other areas of concern as they were identified as having poor drainage. Culverts along these three roads are in poor condition and need upgrades, especially on West Main Street in front of Yummy's Restaurant and on West Main Street in front of the post office. Flooding along these major routes can be a public safety risk as it could impede travel in times of emergency, cause roadway destruction, or cause flooding and contamination of the water and sewer systems in town. Relations with the Massachusetts Department of Transportation should be improved so that these issues can be collaborated on at the state and local level.

Water Service

Water services were also seen to be at-risk by participants. A lack of coverage and limited water sources was widely discussed. The town is served by underground aquifers in three wells, and while it is a strength that the town provides some water, large portions of the town lie outside of the water service district. Climate change projections indicate that there will be an increase in consecutive dry days and hotter temperatures. Residents in these rural areas outside of the water district will be at greater risk from drought impacts. As drought worsens, fuel load in forests and fire risks will also worsen, leaving these residents vulnerable to wildfire. If fires are not an issue, access to drinking water will be. With more dry days, well pump outage could increase and will lead to emergency water needs.

The current water system infrastructure was also discussed as an area of concern. Existing water wells, storage tanks, and water mains were noted to be old and in poor condition. And both the public and private water wells are at risk from flooding and drainage issues. Flooding could cause runoff pollution to contaminate these wells, making the water unusable. Similarly, the sewer system was also noted to be a concern. The sewer station lacks back up power generators, and could pose a health risk if it stops functioning properly.

Municipal Facilities

Dudley is fortunate to have a number of Municipal facilities throughout town, however, many of these facilities have limited access. The Recycling Center, Highway Department and Animal Shelter are all located off of West Main Street along Indian Road. This road has only one access point, leaving these facilities vulnerable and also could prevent residents from receiving those services in times of emergency. Especially in times of flooding on West Main Street, these facilities will be cut off without a second egress. The Shepherd Hill Regional High School and the Dudley Middle School are located on Dodge Way. The only access point to these schools is via

Dudley Oxford Road. These facilities act as the town's shelter and could be difficult to access in times of emergency without a second egress.

In addition, it was noted that the electrical grids and power supplies in town are vulnerable. With increasing temperatures, households and buildings throughout town will likely need to increase air conditioning usage. These increased a/c loads could pose threats to the existing electrical grid. The overhead powerlines are also at risk from damage by fallen trees and limbs. Relations with the utility companies should be improved to expand mitigation efforts of these threats.

Societal Concerns

SOCIETAL

- Senior Residents
- Vulnerable Populations
- Communication

Senior Residents

The Dudley Housing Authority, more commonly referred to as Joshua Place, is a state-aided Public Housing Agency that provides housing for low-income elderly and persons with disabilities. It is located at 22 Joshua Place just off of Route 197. While attendees viewed this facility as a strength, it was acknowledged that housing upgrades and additional housing units are needed. In addition, every table noted concerns for the residents living there. These residents will need greater assistance in times of emergency. Senior citizens will feel the effects of climate change more than other residents in town. Due to their age, they will be more vulnerable to extreme temperatures and the limited drinking water supply that will accompany drought and hot days. In addition, older residents are more susceptible to disease, particularly EEE and other insect-borne diseases, which will only increase with the changing climate. And, older residents will be more defenseless in times of emergency when evacuation is necessary due to their reduced ability to mobilize quickly. The only access to Joshua Place is via West Main Street; a route that frequently floods. With their already limited access to transportation, a flooding event could limit their evacuation ability even further. Physical health status, psychological well-being, and social characteristics will make it more challenging for senior residents to move, recover, or evacuate quickly in the time of crisis.

Vulnerable Populations

Dudley has several groups of people that are at higher risk from the effects of climate change. Similar to the senior residents in town, these people will need additional assistance and planning considerations. Low-income, renters, and the homeless community, as well as the homeschooled and transient school populations were all noted to be of concern.

The Jericho neighborhood is located in the eastern portion of Dudley. It is bordered by the French River on the east, and Low Pond and Merino Pond on the south and southwest sides. Its close proximity to the French River puts this neighborhood at risk for flooding events. And because it immediately abuts the Lower Merino Pond Dam, should that dam fail, the

neighborhood could face severe damage to homes and businesses, and potential loss of life. The neighborhood is comprised of a larger renter and low-income population with limited means of transportation. During times of flooding, dam failure, or other weather-related disasters, these low-income residents would need to walk to shelters or might not be able to access them at all. Aside from the flooding risks, this demographic is also vulnerable during times of extreme heat or drought. With limited income, it is possible that these residents do not have access to air conditioning and will need to walk long distances to find cooling relief.

A homeless camp is located nearby the Jericho neighborhood, just off of Oxford Avenue between Dudley Elementary School and the French River. These residents are extremely vulnerable to the effects of climate change. They lack adequate shelter from storms, drought, and extreme heat. In addition, they lack regular access to drinking water. And, they may not have access to information resources and could be cut off from emergency communications throughout town. This area in particular is vulnerable because it is within the 100- and 500-year flood area of the French River, increasing the risk of flooding to this population.

In addition, the homeschooled and transient school populations face additional challenges. The homeschooled residents lack access to a communication network in town. And the Southern Worcester County Educational Collaborative and Nichols College house students for only part of the year. These residents may lack knowledge of Dudley as well as a means of accessing emergency notifications.

Communication

The current communication system in Dudley uses copper wiring and is in need of upgrading. Communication systems used by the public safety departments and Town Hall are also in need of upgrading. There were also concerns regarding town-wide emergency communication. On July 1, 2019, Dudley changed over from Code Red to the RAVE Emergency Alert System. Since residents must opt into the emergency alert system, efforts should be made to increase the number of people subscribed.

In addition to the system concerns, there was also discussion about inclusion and addressing the communication needs of non-English speakers. Immigrants and non-English speakers are prevalent throughout town. There are a number of language barriers with these communities, and as a result, these populations do not have sufficient access to emergency notifications or understanding of the evacuation protocols.

Environmental Concerns

Insect-Borne Disease

Risk of insect-borne diseases, especially EEE and Lyme disease, will worsen as the climate warms and periods of flood and drought increase. Mosquitos carry EEE and West Nile Virus (WNV).

ENVIRONMENTAL

- Insect-Borne Disease
- Forest Management
- Water Resources

They tend to lay their eggs in and around standing water, so populations of mosquitos will likely increase in times of flooding. Mosquitos are also more aggressive on hot, dry days, and will feed more frequently during those periods, causing greater instances of contracting those diseases. In Massachusetts, deer ticks (*Ixodes scapularis*) can carry Lyme disease. Typically, deer ticks will die out during the cold winter months, controlling the deer tick population and managing the spread of Lyme disease. However, climate change will result in milder and warmer winters, causing fewer disease-carrying ticks to die out during those winter months. With fewer ticks dying, the overall tick population will increase, creating a greater chance of contracting Lyme-disease. Children and senior citizens are more susceptible to the effects of insect-borne diseases, and those living near open water or flood-prone areas could be more exposed to insect-borne diseases. Education and prevention measures of insect-borne disease should be taught town-wide.

Forest Management

About 55% of Dudley is forested, and another 15% is vegetated. Each of these areas are at risk from drought and invasive species. Both drought and invasive species can lead to increased fire load and risk of wildfires. The Town of Dudley has already experienced 107 wildfire incidents in the last ten years, totaling 71 acres burned. With an increase in temperatures and numbers of consecutive hot days, drought, and consequently more wildfires, will be an ongoing hazard. Along with drought, climate change will bring a shift in flora and fauna of the region. Plants and animals that have adapted to warmer and drier climates will increase in Massachusetts, and native species that are better adapted to cooler weather will decrease. When a non-native species invades an area, it can often outcompete the native species. And without a predator to manage population numbers, invasive species can dominate an ecosystem very quickly. This is especially detrimental to forest ecosystems. Attendees noted the gypsy moth and emerald ash borer as invasive insect concerns. While these insects typically do not have direct harmful effects to humans, they do have disastrous effects on native tree species in Massachusetts. The gypsy moth prefers to feed on oak and birch trees, amongst other species, while the emerald ash borer feeds on ash trees. Trees that are impacted by invasive insects are much more vulnerable to damage during intense storm events as well as drought. Street trees impacted by these hazards pose risks to overhead powerlines, especially since Dudley lacks a sufficient tree trimming fund.

Water Resources

There is a need to better protect the existing water resources in town. The brooks in town, especially Potash Brook, were identified as having flooding concerns. Potash Brook is located in the southern portion of Dudley near West Main Street. With its close proximity to West Main Street, run off pollution from West Main Street could flow to the brook. There was also consensus between the workshop tables that the town should enact better enforcement of wetland area protections, particularly for flood mitigation. Lakes, ponds, and rivers were thought of as generally lacking preservation, funding, and upkeep. And it was noted that there was a lack of recreational opportunities along the water resources in town.

Current Strengths and Assets

Dudley has taken some steps to address natural hazards and climate change over recent years. Public opinion holds that the policies in town and the resources it provides are an "infrastructural strength" that will protect and strengthen the Dudley community. Programing available to senior citizens and the Dudley Conservation Land Trust are other perceived strengths that help fortify the town.

Infrastructure Strengths

INFRASTRUCTURE

- Policies
- Municipal Resources

Policies

While more needs to be done to address flooding issues and to protect natural resources in town, there are a number of policies in place that can be used to enforce these efforts. The town upholds the Wetlands Protection Act (WPA) to help protect their wetland resources. And in 2008, Dudley approved their most updated Conservation Commission Bylaw. This bylaw further protects wetland areas and is more stringent than the WPA alone. Additionally, the Town of Dudley was granted the NPDES General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts (MS4 General Permit). This permit makes Dudley an MS4 community and mandates that the town perform some stormwater management.

Municipal Resources

While some facilities in town are in need of upgrades or additional access, Dudley has a number of resources that are critical to the community. Dudley provides sewer and water services through the Water and Sewer Commission. The town sources water from underground aquifers in three wells. Water is then distributed through 35 miles of mains in two storage tanks. And they have implemented standard water use restriction policies to preserve water supplies as a preventative measure.

The Town Hall, located on West Main Street, holds various departments and provides a number of services to residents. There are four schools in Dudley. The Mason Road School is located at 20 Mason Road and provides education for preschool, Kindergarten, and grade 1. Dudley Elementary School is on 16 School Street and serves students in grades 2-4. Shepherd Hill Regional High School and Dudley Middle School are both located on Dudley-Oxford Road and they serve grades 9-12 and grades 5-8 respectively. The middle school also acts as the town's shelter in times of emergency. And the Recycling and Transfer Station is located at the Dudley Highway Department on Indian Road.

Society Strengths

Senior Programing

The Dudley Senior Center is located at the Council on Aging on 71 West Main Street. From active programs like chair yoga, scrabble, and cribbage, to resources for drug and alcohol treatment or Medicare assistance, the senior center provides a variety of services that engage and inform the senior community.

SOCIETAL

- Senior Programing
- Education and Training

In addition, the Dudley Housing Authority provides housing at the Joshua Place apartments for low-income seniors and people with disabilities. While there is a need to add additional housing units, having an existing facility that can be built upon or improved is a great starting point. Tri Valley Inc. is a non-profit organization that provides services to seniors and people with disabilities to help them live independently and with dignity. Services they provide range from caregiver support, nutrition services, in-home services, and more.

Education and Training

As noted above, there are four public schools within Dudley. Collectively, the Mason Road School, Dudley Elementary School, Dudley Middle School, and the Shepherd Hill Regional High School serve students in preschool all the way through grade 12. These schools provide education, after school programs, and a means for emergency notification to the students and their families. In addition to these public schools, there is also Nichols College and the Southern Worcester County Educational Collaborative. The town could benefit from sharing resources and facilities with these two schools. And, there is a homeschooled population that could and should be integrated better.

The Tri-EPIC Regional Emergency Planning Committee is a group that works to improve emergency response and preparedness in the Worcester County region of Massachusetts. The Town of Dudley is a part of this organization, along with Charlton, Oxford, Sturbridge, Southbridge, Webster, and Brimfield. Tri-EPIC has hosted a number of CERT (Citizen Emergency Response Team) trainings to help educate volunteers about disaster preparedness and basic disaster response skills.

Environmental Strengths

Water Resources

Dudley has a number of lakes, ponds, streams, and wetlands in town. Wetlands were noted to be valuable for both flood storage and runoff filtration, and should continue to be protected. The Merino Pond was noted as another strength because the attached town beach

ENVIRONMENTAL

- Water Resources
- Dudley Conservation Land Trust

provides summertime recreation. The French River was also discussed as an important water resource, though there is a desire to grow recreational opportunities there.

Dudley Conservation Land Trust

The Dudley Conservation Land Trust (DCLT) is a non-profit conservation organization that serves as an educational agency and encourages environmental stewardship throughout town. Participants highlighted the DCLT as a strength for its many accomplishments promoting the conservation, acquisition, and protection of land in Dudley. The DCLT owns and stewards eight wildlife and conservation sanctuaries in Dudley. In 2017, the DCLT received a grant to develop a Forest Management Plan for one of their properties, Wieloch Woods. And later in that same year, the DCLT approved a five-year strategic plan to focus its land acquisition, stewardship, education, and outreach efforts.

RECOMMENDATIONS TO IMPROVE RESILIENCE

Workshop attendees at each table took the next step in completing the CRB Matrix by suggesting actions that would address vulnerabilities, or further bolster strengths they identified. The following actions are compiled from the matrices from all three tables at the Dudley MVP Workshop. The completed Matrix for each table can be found in Appendix B of this document.

Infrastructure Actions

INFRASTRUCTURE

- Dam Assessment
- Roadway Maintenance
- Accessibility
- Improve Public Utilities

With 31 regulated dams in town, performing a **town-wide dam assessment** to prioritize the most deficient dams is a high priority. The Merino Pond Dam, Lower Merino Pond Dam, and Carpenter Road Pond Dam should all be studied for either removal, repair, or complete replacement. A design study was recommended for a replacement of the Packard Pond Dam. And the town should address the Certificate of Non-Compliance and Dam Safety Order that it received for the Gore Pond Dam (Baker Pond Dam).

Improved **roadway maintenance** will be crucial to building resilience, especially as the number of storms and flooding events increase. Flooding and drainage issues should be addressed town-wide, particularly along West Main Street (Route 197), Southbridge Road (Route 131), and Schofield Avenue (Route 12). As these three main routes are state-owned, collaboration between the state and town will be essential. Along with flooding issues, storms could increase debris and blocked roadways from fallen trees. Increased funding should be explored to establish a consistent tree trimming and maintenance program as well as a gypsy moth monitoring program.

It was recommended that designs for a second egress at the Highway Department, Recycling Center, and Animal Shelter complex be engineered to **increase accessibility** to necessary equipment in times of disaster. Designing an additional egress at the Shepherd Hill Regional High School and Dudley Middle School complex is also recommended as the middle school serves as the town's shelter. Evacuation plans throughout town should be revisited in order to account for the town's most vulnerable populations. Transportation contracts should be checked and increased to ensure that seniors and low-income residents who may not drive or have a car will still have a means to evacuate.

With the number of concerns regarding all of the public utilities, efforts should be made to **improve the existing public utilities** in town and expand access where feasible. Dudley should look to increase the capacity of and extend the gas lines. Both the sewer system and the water system will benefit from generators or alternative energy sources to keep the systems operational in power outages. In addition, it was recommended that the old water mains be replaced. The projected increase in the occurrence of drought and hot days led to concerns for drinking water access. The town should promote stronger water conservation efforts and explore options for either installing new water sources or interconnecting the current system with surrounding towns.

Societal Actions

SOCIETAL

- Senior Citizen Support
- Vulnerability Assessment
- Emergency Resources

Participants felt that the town would benefit from **increasing support of senior citizens** on a wide range of issues. Better communication with and outreach to the senior citizen community should occur before, during, and after emergencies. An evacuation and transportation plan specific to the senior citizens in town should be developed. This plan should account for limited mobility and disabled individuals who may have difficulties traveling long distances or using stairs. The shelter should upgrade services to address the needs of the elderly community. Sustainable food with low sodium options should be secured, as well as safe drinking water, medical devices, and medicines that are used to treat chronic illnesses.

Existing senior housing should be upgraded and constructing additional housing units should be explored. The Council on Aging should research options to increase funding of senior programs and hours at the Senior Center. The town should also collaborate with Tri Valley, Inc. and advertise their services to the elderly and disabled community. Creation of a database of all seniors and veterans in town was mentioned as a means to track these individuals during a disaster event.

Discussions at the workshop highlighted a number of communities that will be at increased risk during times of crisis. A **vulnerability assessment** should be performed to address the needs of

these groups of people. The Jericho neighborhood could benefit from a comprehensive vulnerability study due to the vast majority of susceptible populations there including children, elderly, impoverished, and non-English speaking individuals. The town should establish a community liaison for the immigrant and non-English speaking populations. Resources for non-English speaking individuals should be shared between the schools, the public library, and with surrounding towns. And additional language options should be offered in times when emergency communication alerts are sent out. Communications with the homeschooled population should also be increased. The town should encourage these families to sign up for the RAVE system in order to develop a communication network with the town. And the town should research ways to connect the homeless population with emergency information, especially in times when evacuation is necessary.

Improving access to **emergency notification resources** was also suggested. Nichols College hosts their own radio station, FM 97.5 WNRC, and this station should be advertised to the town as a means of emergency notification. Maximizing the number of people subscribed to the RAVE Emergency Alert system will also be significant. And expanding the cell service in town should be considered.

Environmental Actions

ENVIRONMENTAL

- Mosquito Management
- Natural Resource Improvements
- Open Space Stewardship

Risks of increased flooding and higher temperatures led participants to discuss improved **mosquito management** in town. Attendees recommended joining a regional mosquito control group to establish a larger collaboration on this issue. Encouraging a bat house program to help control the mosquito population was offered as a nature-based solution. And increasing funding for spraying was also proposed. Mosquitos are carriers of a number of insect-borne illnesses, specifically EEE. Efforts to increase public awareness and knowledge of these diseases should be made. And hosting more vaccination clinics to help prevent these diseases was suggested.

A vulnerability assessment of the lakes, ponds, rivers, and forests in town should be performed to determine the preservation, upkeep, funding needs, and **improvements of these natural resources**. The town should also continue protecting wetlands and should reinforce existing regulations as this resource provides flood storage and wildlife habitat benefits. Potash Brook was noted as an area with increased flooding risk, so natural retention areas should be designed and constructed to improve flood storage in this location. Diligent management of the forests and clearing of debris should be considered as a means for reducing the fire load. And establishing pest monitoring programs could also help in these efforts.

Engaging in town-wide **open space stewardship** was recommended to help fortify the town as the climate continues to change. The town should investigate funding options to purchase land for either protection or development for community good. Coordination with the Dudley Conservation Land Trust was suggested to help reinforce their efforts. Availability of recreational opportunities appeared to be lacking in town, so the town should look to increase these offerings, especially at the French River.

Top Recommendations

Prioritization of recommendations was achieved through four steps: 1) informal discussion at each breakout table during the workshop; 2) voting using stickers placed on the participant's table's CRB matrix (each attendee was given five stickers to select his/her top priority actions, with at least one sticker required to be used for each general topic area); 3) summary's from each table to the full audience to discuss and discern consensus priorities; and 4) final review and reconciliation of duplicate priorities. Several tables mentioned similar concerns and suggested similar ways to address them, but each table had a unique perspective on the challenges Dudley faces. These recommendations were organized on a large sheet to enable participants to see the overlap between tables and to learn about suggestions not discussed at their table.

TOP RECOMMENDATIONS

- Merino and Carpenter Dams Removal Assessment
- Investigate Water Sources
- Upgrade Senior Housing
- Insect-Borne Diseases Awareness
- Drainage Study

The overall top recommendation is to complete a dam removal v. replacement assessment of the **Merino Pond, Lower Merino Pond, and Carpenter Road Pond Dams**. All five workshop tables recommended investigating **new water sources** or interconnecting with surrounding towns. The top societal action is to provide **shelter and housing upgrades for the elderly**, specifically at **Joshua's Place**. Other recommended actions agreed upon by the majority include increasing education and action on **insect-borne diseases**, as well as implementing a town-wide **drainage study** to assess the roadway flooding throughout town.

At the end of the workshop, Peter Peloquin thanked attendees for giving their time and attention, and announced several of the actions with the most votes. The following top recommendations were compiled based on those actions reported out by each table and those actions that participants voted for. Actions are organized by priority and project type.

APPENDIX A

I. Agendas and Sign-in Sheets
II. Workshop Agenda and Sign-in Sheet
III. Listening Session Agenda and Sign-in Sheet
IV. MVP Program Information
V. Workshop Base Maps
VI. Table 1 Materials
VII. Table 2 Materials
VIII. Table 3 Materials
IX. Table 4 Materials
X. Table 5 Materials
XI. Summary of Recommended Actions
XII. Hazard Mitigation Plan – Mitigation Strategies
XIII. Workshop Presentation
XIV. Listening Session Presentation