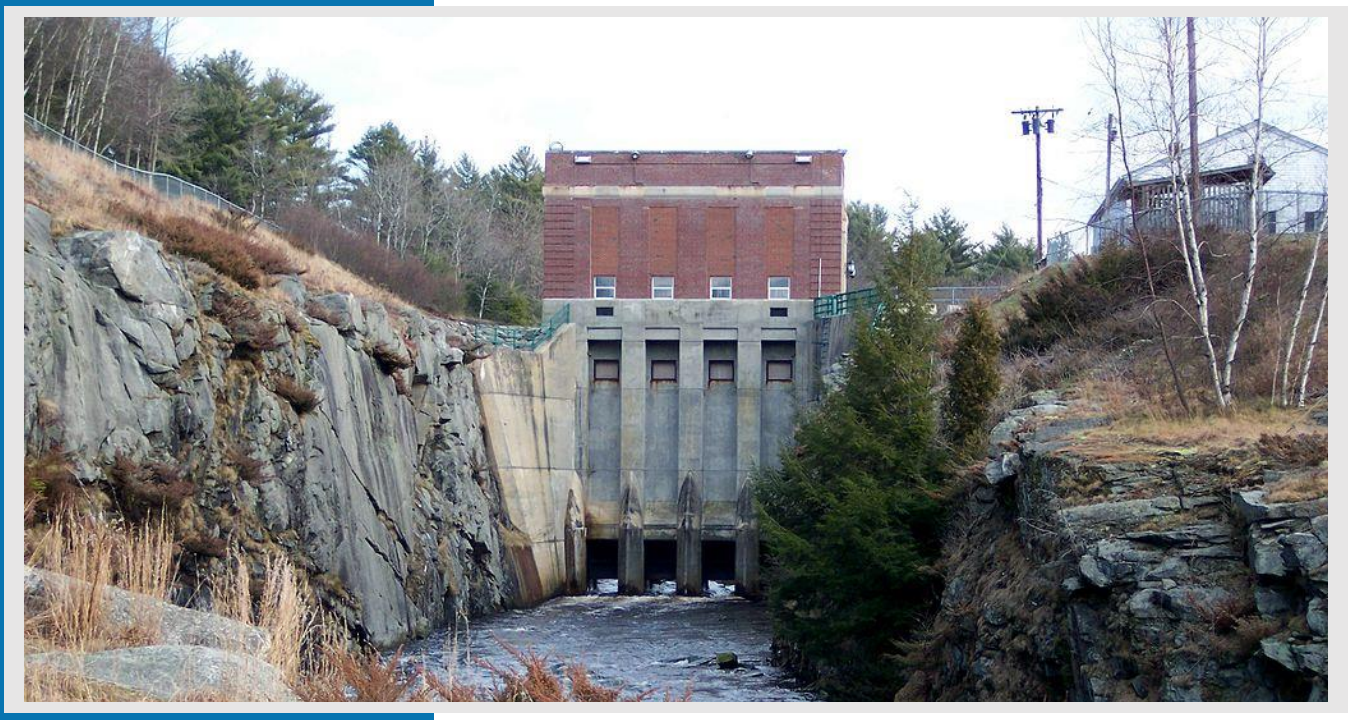
Tighe&Bond
Engineers | Environmental Specialists

COMMUNITY RESILIENCE BUILDING WORKSHOPS- SUMMARY OF FINDINGS

TOWN OF ROYALSTON
MUNICIPAL VULNERABILITY PREPAREDNESS (MVP) PROGRAM



SUBMITTED TO

Town of Royalston
Emergency Management Agency

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Section 1
Community Resilience Building Workshops

1.1 Overview

The Town of Royalston, like other communities in the Commonwealth of Massachusetts, is already feeling the impacts of climate change. In particular, the community has experienced inland flooding and extreme winter events in the recent past, with nine federally declared disasters in the past twenty years. In December 2008, ice storms created serious damage to trees and powerlines with power loss to the region that lasted for over a week. 2011 was a banner year for natural hazard events beginning with the June 2011 tornado damaging homes, businesses and forests, then the October "Halloween Storm" caused power outages and destroyed thousands of trees in the Town, resulting in many residents being without heat for days. In 2017, Royalston experienced a drought that lasted almost an entire year, impacting water supplies and the environment. In February 2018, ice jams on the Millers River extensively damaged the Exchange Street Bridge in the neighboring Town of Athol.

FIGURE 1: Millers River Ice Jam during 2018 Ice Storm (*Greenfield Recorder, 1/14/18*)

In the future, the Town anticipates more severe and commonly occurring weather events due to climate change such as increased flooding from large rain events, more substantial winter storms, and a greater likelihood of drought, including increased extreme heat days and heat waves. These extreme weather events will test Royalston's ability to prepare for and respond to emergencies.

In 2017, the Commonwealth of Massachusetts inaugurated the Municipal Vulnerability Preparedness (MVP) program to assist municipalities in planning for and implementing strategies to adapt to predicted changes in our warming climate. The Executive Office of Energy and Environmental Affairs (EEA) oversees and implements the MVP program. Funds are awarded to municipalities under two categories of work: planning grants and action grants.

To prepare for climate resiliency and begin to consider adaptation strategies, the Town was awarded a planning grant to complete the MVP planning process in addition to a 5-year update to the Town's Hazard Mitigation Plan up (HMP). This summary describes the MVP planning process and findings suggested by the community for building a more resilient Royalston. The MVP planning process and findings will also be added to the Town's HMP under a separate report.

1.1.1 Overview of the Community Resilience Building (CRB) Process

The CRB methodology is an "anywhere at any scale" format that draws on stakeholders' wealth of information and experiences to foster a collaborative dialogue about the strengths and vulnerabilities within a community, identify potential resiliency actions, and advance the education, planning, and ultimately implementation of priority actions. Figure 2 provides an overview of this process from the CRB Workshop Guide, which is available online at: https://www.communityresiliencebuilding.com/

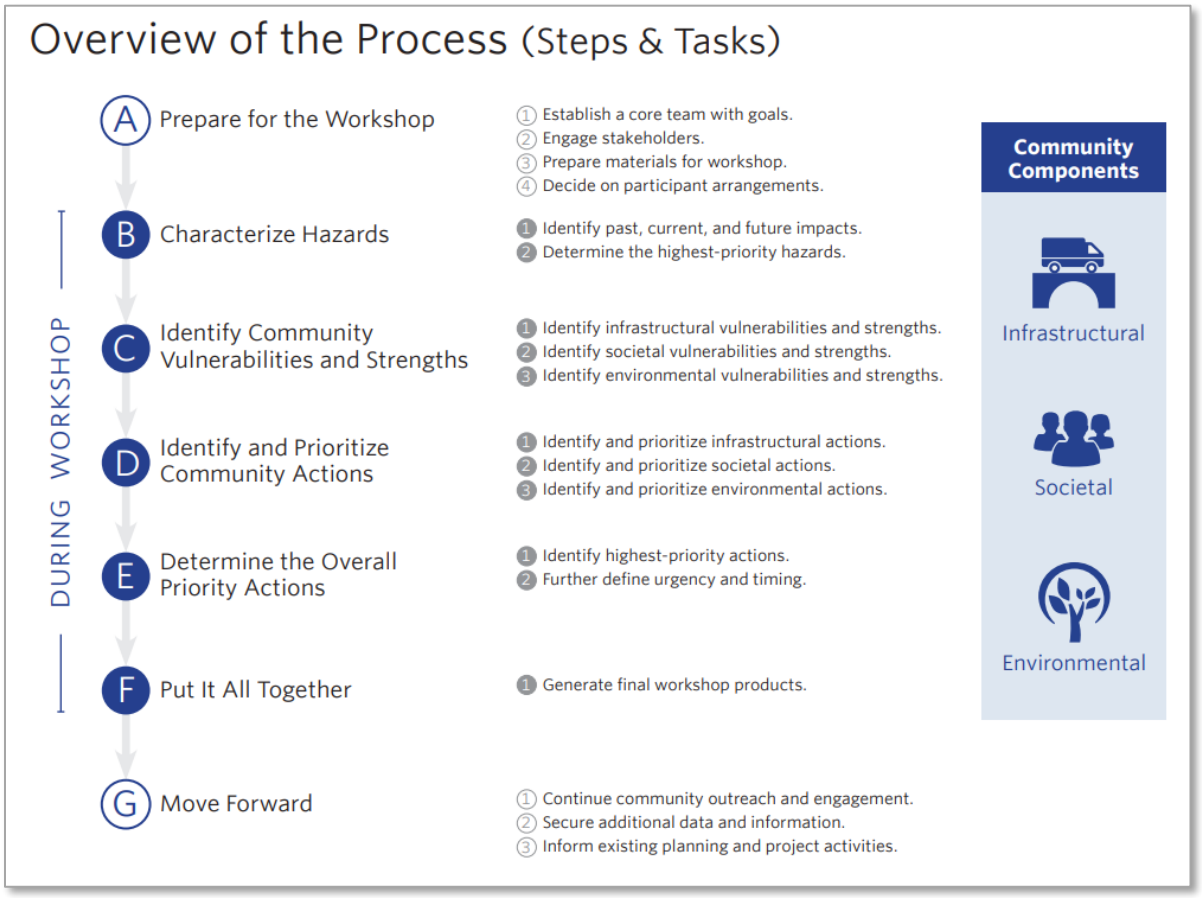


FIGURE 2: Overview of the CRB Process

During the workshops, participants typically interact at both small and large group levels, using an iterative process to gather input, synthesize ideas across groups, and ultimately develop a set of priority resilience and adaptation actions. Each workshop's central objectives are to:

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

1.2 Royalston's CRB Planning Activities

Jim Barclay, Royalston Emergency Management Director, served as the Local Project Manager for undertaking the MVP planning process. The Town partnered with Tighe & Bond, a state-certified MVP Provider, to complete the CRB process, including holding the CRB workshops.

To complete the first step in the CRB Process, Core Team members for the Town of Royalston MVP were identified from multiple departments, boards, and commissions. The Core Team is listed in Table

TABLE 1: Core Team Members

Name	Title/Department/Affiliation
Jim Barclay	Emergency Management Director
Deborah D'Amico	Select Board
Christine Long	Select Board
Kate Collins	Planning Board
Keith Newton	Fire Department and Department of Public Works
Curt Deveneau	Police Department
George Northrop	Conservation Commission
Maureen Blasco	Conservation Commission
Jon Hardie	IT System Administrator
Rebecca Krause-Hardie	Finance Director
Phil Rabinowitz	Capital Planning
Tom Kellner	Millers River Watershed

The role of the Core Team was to:

- Identify and engage community stakeholders to participate in the CRB workshops and the listening session
- Review workshop materials and attend workshop sessions
- Review the summary of findings
- Attend the final listening session

The following provides additional detail on the overcall CRB planning process undertaken by the Town of Royalston to obtain MVP Community Designation.

1.2.1 Core Team Meetings

The MVP kickoff meeting, held on January 23, 2020, was coordinated to involve the Core Team at an early stage in the planning process. At this meeting, Tighe & Bond presented an overview of EEA's MVP Program and Goals, reviewed the scope, schedule, and budget, discussed public involvement and outreach, and reviewed the CRB process.

On February 27th a public meeting with the Core Team was held to introduce both the MVP and the HMP to the public and discuss the natural hazards that have impacted Royalston in the past, future impacts due to climate change, important community assets and the concept of nature-based solutions. Core Team members Jim Barclay and Keith Newton were interviewed on March 12th to get additional input into community concerns and to finalize the list of stakeholders.

Due to COVID-19 and the need to accommodate social distancing and stay-at-home advisories that went into effect on March 13, Core Team reviews after this date were completed via email and virtual meeting format.

The Core Team conducted a final virtual meeting on June 10, 2020, to review the post workshop survey and mitigation strategies, review draft deliverables to date, and finalize the presentation for the listening session.

Materials documenting the Kickoff Core Team meeting is provided in Appendix A.

1.2.2 COVID-19 Alternate Public Engagement Strategy

Royalston worked with their MVP Provider, Tighe & Bond, to develop a virtual engagement process for the CRB workshops and public listening session following the recommendations made by the EEA MVP staff.

1. **Provide an online space for MVP materials**: A municipal-specific MVP website was designed and hosted by Tighe & Bond, to provide all necessary materials for completing the MVP process. Reference materials, including the Massachusetts State Hazard Mitigation and Climate Action Plan, ResilientMA.org, the MVP Workshop Guide, and the municipality's Hazard Mitigation Plan, are available for public access on this website. Recorded CRB Workshop Webinars, survey results, and the draft and final MVP Summary of Findings Report are also posted on the website.

2. **Survey to identify strengths and vulnerabilities**: Tighe & Bond used Survey Monkey to create and distribute a survey to members of the Core Team and identified stakeholders. The survey questionnaire results were used to develop an initial list of strengths and vulnerabilities in the community. The survey was distributed via email and linked to the MVP website.

3. **Distribute recorded presentation on background information**: Tighe & Bond developed a pre-workshop video including information on climate change and the MVP process. The short video was posted on the MVP website for viewing or downloads. Stakeholders were encouraged to view the introductory video prior to attending the Virtual CRB Workshop Webinars.

4. **Distribute virtual CRB Workshop webinar materials**: Materials necessary to participate in the workshop were distributed via email, posted on the MVP website or sent by regular mail if requested. Materials include: (1) a partially pre-populated CRB Matrix according to the Strengths and Vulnerabilities survey, (2) applicable slides to discuss natural hazard risk for the specific community asset sector featured in the workshop, and (3) a map of the municipality and featured community assets and (4) a map showing the location of the 100-year floodplains.

5. **Hold Webinars to meet the CRB Workshop requirement**: Tighe & Bond hosted three virtual CRB Workshop Webinars featuring each one of the Community Asset Categories: societal, infrastructural, and the natural environment. During the workshop, attendees brainstormed mitigation actions for specific community assets to address top priority hazards

6. **Prioritization Polling**: After the completion of the Virtual CRB Workshop Webinars, Tighe & Bond developed and distributed a Survey Monkey poll to the Core Team and stakeholders. This poll includes a list of mitigation actions developed during the webinar. Individuals were asked to rank actions one (low priority) through three (high priority) in each of the four asset categories to develop a draft prioritization.

7. **Core Team Meeting**: Tighe & Bond hosted a final virtual Core Team meeting on June 10, 2020 to review the results of the prioritization polling and discuss the first Draft MVP Summary of Findings Report.

8. **Distribute Listening Session materials**: Tighe & Bond distributed listening session materials to Core Team members and stakeholders electronically or through mailings if requested. Information about the Listening Session and directions to participate were publicly posted. Materials included an agenda and copy of the Draft MVP Summary of Findings Report.

9. **Hold Listening Session:** Tighe & Bond and the Core Team hosted a live, one-hour Listening Session to present the draft MVP Summary of Findings Report and allow time for a session for community Questions and Answers. The Final Draft MVP Summary of Findings Report was available on the MVP website for a 10-day public comment period.

10. **MVP Website:** Tighe & Bond posted the recorded Listening Session, Question & Answer dialog, and Final MVP Summary of Findings Report on the MVP website.

A memo documenting the proposed alternative public engagement strategy is included in Appendix B.

1.2.3 Stakeholder Engagement and Pre-Workshop Survey

Community stakeholders included municipal staff not already a member of the Core Team, elected and appointed officials in Royalston, municipal staff and representatives from abutting communities, Montachusett Regional Planning Commission (MRPC), environmental non-profits, representatives from power utilities, and the citizens involved in local planning. The complete stakeholder list is provided in Appendix C.

Pre-workshop stakeholder engagement materials were developed including maps of community assets and hazard areas and an introductory video about the MVP program and community climate change impacts. A pre-workshop survey was created to get input from stakeholders regarding perception of natural hazard risk, future impacts due to climate change, and important community assets in each of the four sectors.

Royalston MVP lead, Jim Barclay emailed invitations to 37 stakeholders (12 Core Team members and 25 stakeholders from other groups such as adjacent Towns, MEMA, and the Millers River Watershed Association) to participate in the MVP CRB workshop process. The email included a link to the MVP website, instructions on how to take the survey, access pre-workshop materials and links to sign up for the three workshops.

1.2.4 Community Resilience Building Workshops

The three workshops focusing on society, infrastructure, and the environment were held over a five-week period from May 18th-June 8nd.

Each workshop followed a similar format, with an introduction by the Town Emergency Management Director, Jim Barclay, an overview of the MVP planning process, discussion of top natural hazards impacting Royalston including future climate change impacts, followed by a discussion of the featured community assets and survey results. The working sessions with stakeholders included an initial session to dive further into specific strengths and vulnerabilities of the community assets and a second session to develop mitigation strategies that addressed the top identified natural hazards.

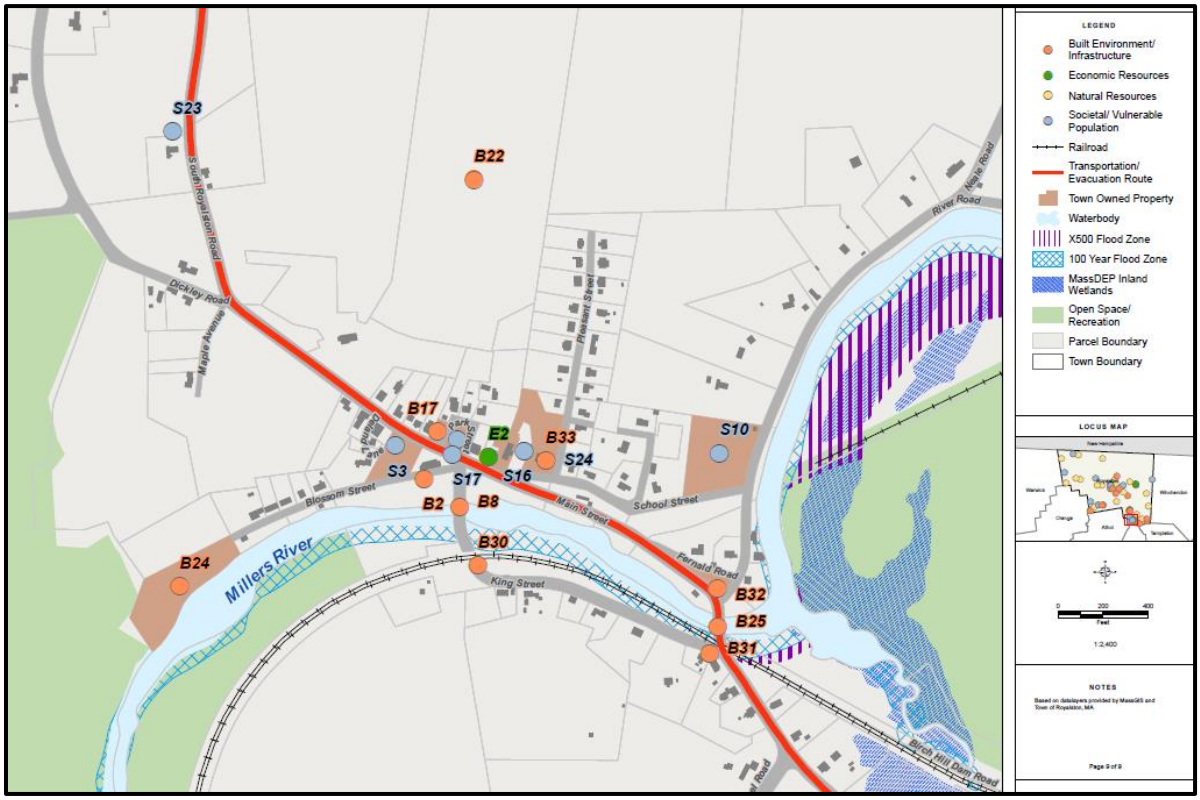


FIGURE 3: Location of Community Assets adjacent to Flood Zones at South Village

The virtual workshops used the Teams Live Event platform, which enabled a production team to provide live video and audio, present slides and complete the CRB worksheets based on input from stakeholders. Participants in the workshop provided comment through the Q&A feature of Teams Live Event and also called in to provide live feedback.

As each workshop was completed, a recording of the workshop, documented Q&A and a draft of the CRB matrix was uploaded to the Town's MVP website. The website address is: http://services.tighebond.com/mvp/Royalston.

Appendix D contains the attendance list for all workshops, the MVP website page and supplemental workshop materials including PowerPoint presentations and published Q&A documentation. Natural Hazard Maps are included in Appendix E. The list of Community Assets is included in Appendix F. The Natural Hazards Risk Index is Appendix G and the EEA Massachusetts Climate Change Data for the Millers River is in Appendix H. The combine CRB matrix from all three workshops is included in Appendix I.

1.2.4 Listening Session

A listening session to present the final report and review the high priority actions identified through the CRB workshops was held on June 15, 2020 via a Zoom meeting. The public notice was posted on the Town website and the Royalston MVP website, and information on how to join the meeting was sent to the Core Team, stakeholders, and Town residents. Town Staff led the session with support from Tighe & Bond. Four Town residents were in attendance.

Town staff facilitated discussion including resident input on the following:

- MVP program background – grant award, CRB process, how process dovetails with HMP update process
- Natural hazards in Royalston – SHMCAP hazards, top hazards in Royalston based on Core Team input and pre-workshop survey results
- Amplified risks from natural hazards due to climate change
- Community asset inventory developed during the CRB workshops
- Workshops – CRB process, objectives, CRB matrix
- Summary of community asset strengths and vulnerabilities from workshops
- Mitigation strategies – types of actions, examples from workshops, results of post-workshop survey on prioritization
- Next steps – public comment period
- MVP Action Grants – types of projects, nature-based solutions
- Q&A

List of attendees and the presentation for the listening session are provided in Appendix J.

Section 2
Top Hazards and Vulnerable Areas

This section discusses Steps B and C of the CRB Process to characterize hazards and identify community vulnerabilities and strengths (a.k.a. community assets).

2.1 Natural Hazard Risks

2.1.1 State Identified Hazards

The 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan (SHMCAP)[1] provides an in-depth overview of natural hazards in Massachusetts. The State Plan identifies 14 natural hazards that have an impact or have a history of impacting communities in the Commonwealth of Massachusetts. These hazards are as follows:

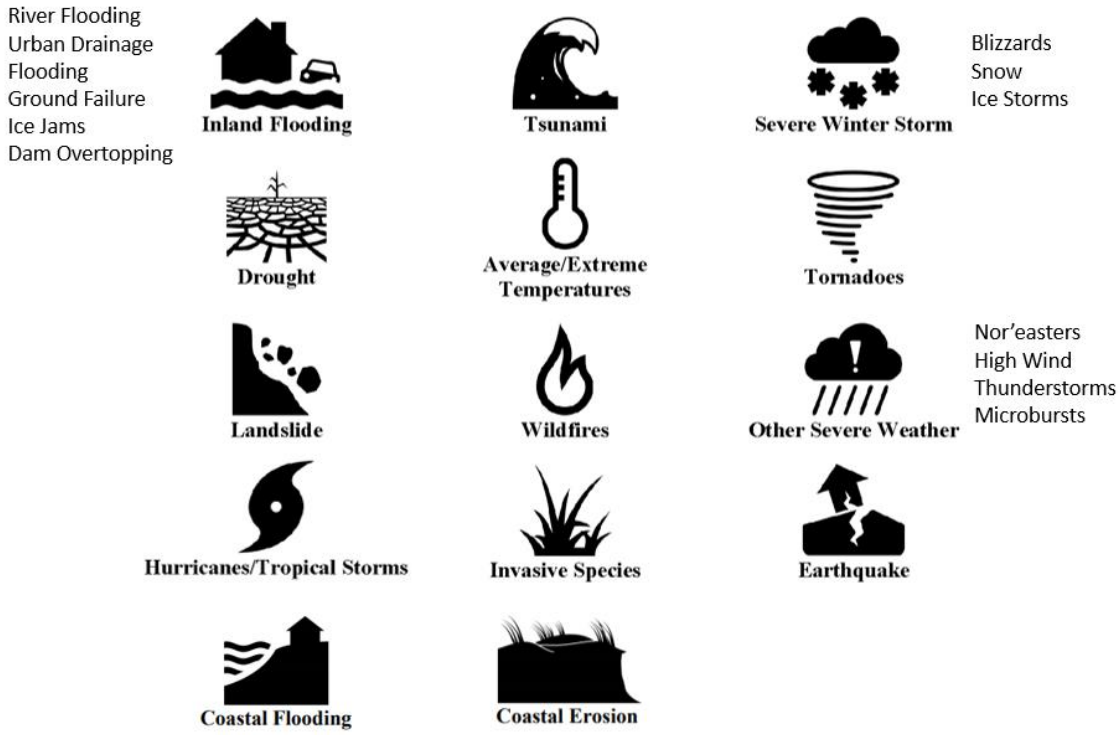


FIGURE 4: Hazards Identified in the SHMCAP

[1] https://www.mass.gov/files/documents/2018/10/26/SHMCAP-September2018-Full-Plan-web.pdf

2.1.2 Hazards that Apply to Royalston

The SHMCAP includes coastal flooding, coastal erosion, and tsunamis that are not applicable to Royalston and are not further discussed or evaluated in this report.

The Core Team reviewed the remaining natural hazards identified in the SHMCAP and identified natural hazards that have impacted Royalston in the past or could impact Royalston in the future. The hazards selection for Royalston was made using local expertise from the Planning Team, information from the 2015 Regional Hazard Mitigation Plan, the SHMCAP and other sources.

The Core Team reviewed each natural hazard and analyzed the history of occurrence in Town, hazard probability, hazard frequency, geographic extent, and severity of impact. Each was ranked based on the Hazard Profile Definitions, displayed in Table 2. Royalston's Natural Hazard Risk Index is summarized in Table 3.

TABLE 2: Hazard Profile Definitions (2018 SHMCAP)

Definitions		
Points		**Description**
Hazard Probability (Possible occurrence in the future)		
1	Unlikely	Less than a 1% probability over the next 100 years
2	Possible	1-10% probability in the next year or at least one chance in the next 100 years
3	Likely	10-100% probability in the next year or at least one chance in the next 10 years
4	Highly Likely	Near 100% probability in the next year
Hazard Frequency		
0	Very Low	Events that occur less frequently than once in 1,000 years (less than 0.1% per year).
1	Low	Events that occur from once in 100 years to once in 1,000 years (0.1% - 1% per year).
2	Medium	Events that occur from once in 10 years to once in 100 years (1% - 10% per year).
3	High	Events that occur more frequently than once in 10 years (greater than 10% per year).
Geographical Extent (Area Impacted by a Given Natural Hazard)		
1	Small	Less than 10% of the Town affected
2	Medium	10-50% of the Town affected
3	Large	More than 50% of the Town affected
Severity of Impact from Hazard		
1	Minor	Limited and scattered property damage; no damage to public infrastructure (roads, bridges, trains, airports, public parks, etc.); contained geographic area (i.e. one or two communities); essential services (utilities, hospitals, schools, etc.) not interrupted; no injuries or fatalities.
2	Serious	Scattered major property damage (more than 10% destroyed); some minor infrastructure damage; wider geographic area (several communities); essential services briefly interrupted up to 1 day; some minor injuries.
3	Extensive	Consistent major property damage (more than 25%); major damage public infrastructure damage (up to several days for repairs); essential services are interrupted from several hours to several days; many injuries and possible fatalities.
4	Catastrophic	Property and public infrastructure destroyed (more than 50%); essential services stopped for 30 days or more, multiple injuries and fatalities.

TABLE 3: Relevant Natural Hazards for the Town of Royalston

Type of Natural Hazard	History of Occurrence in Royalston	Hazard Probability	Hazard Frequency	Geographic Extent	Severity of Impact	Hazard Risk Ranking
Hydrological Hazards						
Flood Related						
• Heavy Rain	Yes	4	3	2	3	1
• Ice Jams	Yes	3	3	1	4	2
• Beavers	Yes	4	3	1	2	2
• Snow Melt	Yes	3	2	2	2	3
• Dam Failure	Yes	1	1	1	4	4
Drought	Yes	2	3	3	2	2
Atmospheric Hazards						
High Winds	Yes	4	3	3	3	1
Hurricanes/Tropical Storms	Yes	3	3	3	3	1
Severe Winter-Storm/Nor'easter	Yes	3	3	3	3	1
Heavy Snow	Yes	4	3	3	2	1
Ice Storms	Yes	4	3	3	3	1
Severe Weather-Thunderstorms	Yes	4	3	2	2	2
Blizzards	Yes	3	2	3	2	2
Extreme Temperature	Yes	4	3	3	1	2
Tornadoes	Yes	3	1	1	3	3
Geological Hazards						
Earthquake	Yes	2	2	2	1	4
Landslide	No	1	0	1	2	5
Other Hazards						
Wildfires	Yes	3	3	1	1	3
Invasive Species	Yes	4	3	1	1	3
Cyanobacteria	Yes	3	3	1	1	3

2.1.3 Top Hazards for Royalston from Risk Matrix

Based on the evaluation of natural hazard risk ranking coupled with the history of occurrence, the geographic extent of impact, economic impact, and consideration for climate change, the Core Team determined the highest ranked natural hazards for Royalston consist of:

- Flooding due to Heavy Rain
- High wind
- Hurricanes/ Tropical Storms
- Severe winter storms: ice, snow, blizzards and nor'easters

2.1.4 Top Hazards for Royalston from Survey

The Pre-workshop survey included polling to identify the top natural hazards currently impacting Royalston, and hazards likely to impact Royalston in the future with climate change. The survey agreed with the findings of the Core Team for natural hazards that are currently impacting Royalston or have impacted the Town in the past; however future natural hazard concerns with climate change included flooding from dam overtopping, invasive species and impacts due to hurricanes and tropical storms.

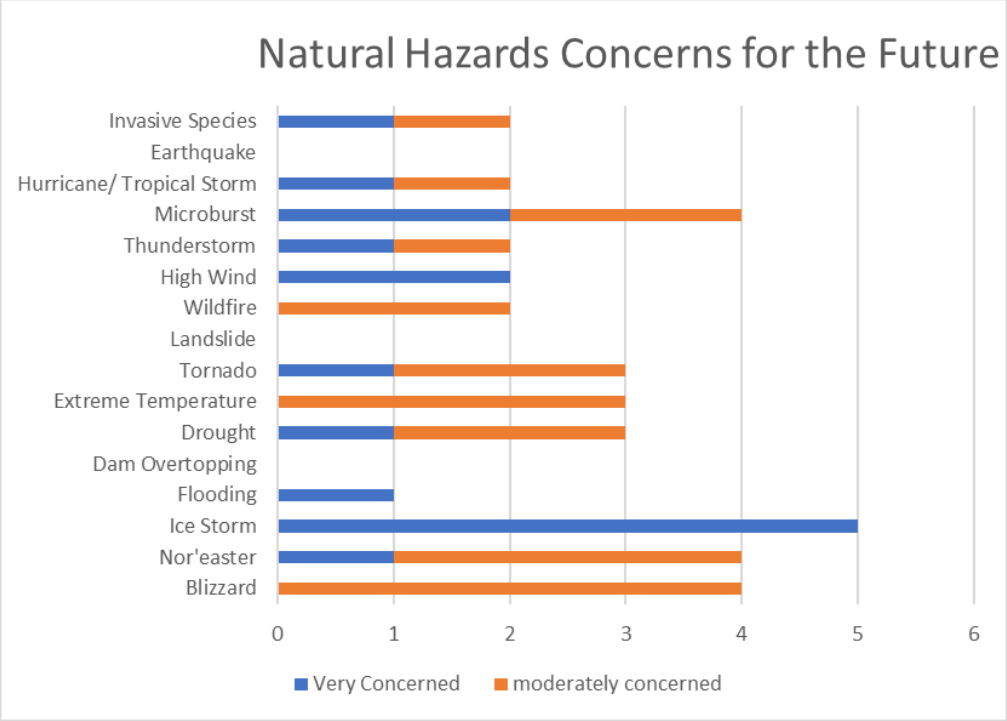


FIGURE 5: Survey Results for Future Natural Hazards

The CRB Workshop top natural hazards combined the Core Team evaluation with the stakeholder survey results for a final list including:

- Flooding due to Heavy Rain
- High wind and Microburst
- Hurricanes/ Tropical Storms
- Severe winter storms: ice, snow, blizzards and nor'easters

2.2 Areas of Concern

During the CRB Workshops, areas of concern were distributed under three categories of community assets, infrastructural, societal and the environmental. A complete list of community assets by category is included in Appendix F. The combined CRB Risk Matrix in Appendix I provides additional information and discussion of vulnerabilities and strengths for specific community assets.

2.2.1 Societal (People / Vulnerable Populations)

Areas of greater population density, or population with unique vulnerabilities or less able to respond and recover during a disaster.

The workshop participants identified the following societal sectors with vulnerabilities or strengths within the community:

1. **Historical and Cultural Resources**
   Historic and Cultural Resources include assets that are unique or irreplaceable and have significance to the community. Mitigation can be preservation of the property and contents. Maintaining the integrity of the historical structure is essential if building improvements are considered.
2. **Buildings That Support Community Needs**
   Buildings that support community service are important gathering spaces, providing resources for impacted individuals during a hazard event and through the recovery phase. Buildings must be self-sufficient and accessible.

FIGURE 6: Phinehas S. Newton Library
photo courtesy of J. Barclay

3. **Vulnerable Populations**
   Vulnerable populations may need additional attention in the event of a natural hazard. These populations may be dependent on caregivers, hard to evacuate, lack means for dealing with prolonged disruption food supply or power loss or be disconnected from the community based on language barrier.

4. **Gathering Places**
   Parks, Town Commons, and other gathering places are important to the character of Royalston. These areas may also be considered under the Environmental Asset category but are included here as important gathering places where the community comes together to connect and celebrate.

5. **Communications and Energy**
   Communication and Energy resilience is a top priority for Royalston. Due to the rural nature of the Town, power outages and poor digital communications are frequent challenges. Mitigation should focus on making the Town and its residents more self-sufficient during a natural hazard event.

2.2.2 Infrastructural (Built Environment)

Critical facilities necessary for a community's response to and recovery from emergencies, infrastructure critical for public health and safety, economic viability, or for critical facilities to operate.

The workshop participants identified the following infrastructural sectors with vulnerabilities or strengths within the community:

1. **Flood Control Infrastructure**
   Flood Control Infrastructure protects utilities, homes, and municipal facilities that are in proximity to the Millers River. These assets include dams that hold control water during high river elevation flood events.

2. **Transportation Corridors**
   Royalston's roads, bridges and access to railway are infrastructure systems critical for life safety and economic viability. Mitigation to protect evacuation routes is especially important in this community that is crisscrossed by rivers and flood hazard areas. If evacuation routes are flooded, areas of the Town may be isolated for days or longer periods.

3. **Critical Facilities**
   Critical facilities are structures and institutions necessary for a community's response to and recovery from emergencies. Critical facilities must continue to operate during and following a disaster to reduce the severity of impacts and accelerate recovery.

Figure 6: Royalston Town Hall
photo courtesy of J. Barclay

4. **Communications and Energy**
   Communication and Energy resilience is a top priority for Royalston. Mitigation should focus on making the Town and its residents, including vulnerable populations more self-sufficient during a natural hazard event.

2.2.4 Environmental (Natural Environment)

Areas that provide protective function to reduce magnitude of hazard impact and increase resiliency. Areas of sensitive habitat that are vulnerable to hazard events, protection of areas that are important to community objectives, such as the protection of sensitive habitat, provide socio-economic benefits, etc.

The workshop participants identified the following environmental sectors with vulnerabilities or strengths within the community:

1. **Hydrologic Resources**
   Wetlands, floodplains and aquifer protection lands are vital environmental resources for Royalston sustaining the water supply, providing habitat, absorbing flood water and passive and active recreation. These assets may overlap with infrastructure, and mitigation crosses almost all categories from protection through structural projects. Nature based solutions are especially appropriate to protect hydrologic resources.

2. **Open Space and Conservation Lands**
   Conservation of open space provides opportunities to meet other community objectives such as protecting sensitive habitat. Mitigation strategies include planning, education and property protection.

3. **Parks and Recreational Areas**
   Environmental assets defined as parks and recreational areas are important to the identity of Royalston and quality of life. Mitigation actions should rely on nature-based solutions to the extent possible to protect functions that reduce hazard impacts and increase resilience in these areas.

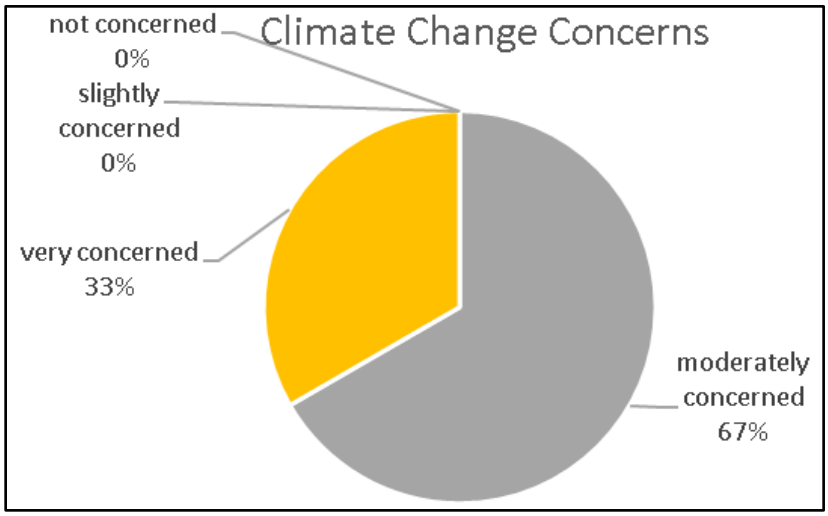
4. **Forestry and Agriculture**
   Forests dominate the landscape of Royalston and include state, municipal and private property. These assets must be preserved to mitigate heat, improve air and water quality and sustain food supplies. Management of the canopy is a priority for maintaining powerlines. As with all of the environmental assets, mitigation actions should rely on nature-based solutions whenever possible.

Figure 7: Tully Lake
Photo credit: Jerry Monkman

Section 3
Current Concerns and Challenges Presented by Hazards and Climate Change

3.1 Climate Change Concerns

The pre-workshop survey results indicate that Royalston is concerned about climate change impacts on natural hazard risk. Two-thirds of the respondents to the survey were moderately concerned about climate change impacts on Royalston and one-third were very concerned. No respondents were not concerned.



Specific events that were discussed by workshop participants include the following:

- Microbursts and high winds have occurred a number of times and had significant impacts to localized areas, especially impacting powerlines from downed tree limbs.
- Flooding is a serious concern in Royalston as most roadway culverts are undersized, and even an average rainstorm causes culverts to overtop and flood roadways.
- Tropical storms and hurricanes impact Royalston, resulting in flooding and power outages.
- Severe storms seem to be more frequent and have a great impact on the Town. Attendees recalled many blizzards including the "Snowtober" event in October 2011, winter storms in February 2013 and January 2015 and ice storm of February 2018.

These hazards are anticipated to be amplified by climate change as discussed in Commonwealth's resilient MA Climate Change Clearinghouse website (http://www.resilientma.org/)

Changes in Precipitation: Changes in the amount, frequency, and timing of precipitation—including both rainfall and snowfall—are occurring across the globe as temperatures rise and other climate patterns shift in response.

Rising Temperatures: Average global temperatures have risen steadily in the last 50 years, and scientists warn that the trend will continue unless greenhouse gas emissions are significantly reduced. The 9 warmest years on record all occurred in the last 20 years (2017, 2016, 2015, 2014, 2013, 2010, 2009, 2005, and 1998), according to the National Oceanographic and Atmospheric Administration (NOAA).

Extreme Weather: Climate change is expected to increase extreme weather events across the globe, as well as right here in Massachusetts. There is strong evidence that storms—from heavy downpours and blizzards to tropical cyclones and hurricanes—are becoming more intense and damaging and can lead to devastating impacts for residents across the state.

The following table reproduced from the SHMCAP shows how climate change interacts with natural hazards.

TABLE 4: Climate Change Interactions

Primary Climate Change Interaction	Natural Hazard	Other Climate Change Interactions	Representative Climate Change Impacts
Changes in Precipitation	Inland Flooding	Extreme Weather	Flash flooding, urban flooding, drainage system impacts (natural and human-made), lack of groundwater recharge, impacts to drinking water supply, public health impacts from mold and worsened indoor air quality, vector-borne diseases from stagnant water, episodic drought, changes in snow-rain ratios, changes in extent and duration of snow cover, degradation of stream channels and wetland
	Drought	Rising Temperatures, Extreme Weather	
	Landslide	Rising Temperatures, Extreme Weather	
Rising Temperatures	Average/Extreme Temperatures	N/A	Shifting in seasons (longer summer, early spring, including earlier timing of spring peak flow), increase in length of growing season, increase of invasive species, ecosystem stress, energy brownouts from higher energy demands, more intense heat waves, public health impacts from high heat exposure and poor outdoor air quality, drying of streams and wetlands, eutrophication of lakes and ponds
	Wildfires	Changes in Precipitation	
	Invasive Species	Changes in Precipitation, Extreme Weather	
Extreme Weather	Hurricanes/Tropical Storms	Rising Temperatures, Changes in Precipitation	Increase in frequency and intensity of extreme weather events, resulting in greater damage to natural resources, property, and infrastructure, as well as increased potential for loss of life
	Severe Winter Storm / Nor'easter	Rising Temperatures, Changes in Precipitation	
	Tornadoes	Rising Temperatures, Changes in Precipitation	
	Other Severe Weather (Including Strong Wind and Extreme Precipitation)	Rising Temperatures, Changes in Precipitation	
Non-Climate-Influenced Hazards	Earthquake	Not Applicable	There is no established correlation between climate change and this hazard

3.2 Massachusetts Climate Change Projections

Researchers from the Northeast Climate Adaptation Science Center (NECASC) at University of Massachusetts Amherst prepared projections for changes in temperature, precipitation, and sea level rise for the entire state, as well as each major watershed in recognition that there are differences regionally. EEA is encouraging municipalities, industry, non-government organizations, state government and others to utilize this information as a standard, peer-reviewed set of climate change projections and is recommending these projections be included in MVP planning efforts. The Town of Royalston is entirely included within the Millers River watershed. The information specific to the Millers River basin excerpted from Massachusetts Climate Change Projections, dated March 2018[2] is included in Appendix H.

3.3 Specific Concerns and Challenges

The CRB Workshops identified a total of 82 community assets that were especially important to recognize in the MVP plan.

The vast majority (50) of the assets were seen as strengths to the community while 37 had specific vulnerabilities noted. Identified community assets that were vulnerable to the impacts of climate change within the Town of Royalston fell within all 3 asset categories with the majority in the infrastructure category. Some examples are included below:

Societal Assets- out of a total of 20 specific social assets, 14 were noted with vulnerabilities, including:

- Many buildings are historical resources and vulnerable to storm damage.
- Many historical buildings need repairs.
- The Royalston Community School and other Town owned facilities do not have generators or other emergency backup power.

Infrastructural Assets- out of a total of 41 specific infrastructural assets, 21 were noted with vulnerabilities, including:

- Evacuation routes are subject to flooding.
- Culverts town-wide are undersized and overtop in minor rain events.
- The railroad transports hazardous material adjacent to waterways.
- Backup power is not widely available, especially for Town-owned facilities.

Environmental Assets- out of a total of 21 specific environmental assets, 3 were noted with vulnerabilities including:

- Bullock Park floods due to high groundwater.
- High numbers of visitors impact resource areas due to erosion and improper use.
- Cell phones don't have service in remote forested lands; lack of communication is a public safety issue.

[2] https://www.mass.gov/files/ma-statewide-and-majorbasins-climate-projections-final.pdf

3.4 Current Strengths and Assets

Royalston officials and emergency response staff are actively engaged in preparing the community to respond to and adapt to current and future natural hazards. Collaboration, communication, and responsiveness of these staff is viewed as a strength in Royalston. In addition, Royalston has an active and engaged resident base that helps facilitate outreach and education and provide input on ongoing planning processes. Royalston's public works staff are viewed as a strength in terms of their operation and management of the water and wastewater systems and assistance with emergency response.

Identified community assets that were strengths to mitigate impacts of climate change fell within all three asset categories with the majority in the infrastructure category. Some examples are included below:

Societal Assets -out of a total of 20 specific societal assets, 14 were noted with strengths, including:

- Library and Post Office are central resources that provide support for the community.
- Royalston Community School is a large place for community gathering.
- Royalston has a strong community social network/ neighbor helping neighbor set-up.

Infrastructural Assets- out of a total of 41 specific infrastructural assets, 22 were noted with strengths, including:

- The wastewater treatment plant is a relatively new facility with backup power.
- National Grid has and implements a Hazard Tree Program to identify and remove trees endangering power lines.
- Fire and Police provide emergency services, food and water distribution, and have generators to use as backup power.
- Tully and Birch Hill Dams provide flood control.
- Numerous roads in Town serve as evacuation routes both for Royalston and for adjacent communities.

Environmental Assets- out of a total of 21 specific environmental assets, 14 were noted with strengths, including:

- Parks and recreation lands provide space for community functions.
- Conservation lands support recreation and tourism and provide environmental education.
- Forested lands provide water and air purification.

3.5 Recommendations and Strategies to Improve Resilience

Following FEMA's Local Multi-Hazard Mitigation Planning Guidance, hazard mitigation measures can generally be sorted into six categories:

1. **Prevention**: Government administrative or regulatory actions or processes that influence the way land and buildings are developed and built, and direct public activities to reduce hazard losses. Examples include planning and zoning, building codes, capital improvement programs, open space preservation, and stormwater management regulations.

   Projects that were recommended for prevention included:

   - Increase penalties and enforcement to prevent dumping in forests and wetland areas
   - Coordinate with other agencies that own/manage trails to develop trail maintenance and public education program
   - Update flood maps to reflect current and future conditions
   - Coordinate with Trustees on Emergency Response Plans for Trustee's properties in Royalston
   - Preserve and protect historical records

2. **Property Protection**: Modification or removal of existing buildings or infrastructure to protect them from a hazard. Examples include acquisition, elevation, relocation, structural retrofits, flood proofing, storm shutters, and shatter resistant glass.

   Projects that were recommended for property protection included:

   - Assess conditions of municipal buildings
   - Conduct drainage study of all Town-owned assets in Town Center and Bullock Park
   - Share results of Town Center drainage study with private landowners
   - Remove dead and/or dangerous trees and tree branches to prevent power loss

3. **Public Education and Awareness**: Actions to inform and educate citizens, elected officials, and property owners about the potential risks from hazards and ways to mitigation them. Such actions include outreach projects, real estate disclosure requirements, hazard information centers, and school-age and adult education programs.

   Projects that were recommended for public education and awareness included:

   - Formalize neighbor helping neighbor program
   - Conduct a communication needs survey for elder population
   - Improve signage about hiking safety and environmental stewardship

- Coordinate with other agencies that own/manage trails to develop trail maintenance program and public education program
- Identify, preserve and increase wildlife corridors
- Improve communication/coordination with Tree Warden
- Conduct a survey to determine who has access to backup or off-grid power, computer and internet during power loss
- Conduct public outreach to increase awareness of dangers of invasive species

4. **Natural Resource Protection and Green Infrastructure**: Actions that, in addition to minimizing hazard losses, preserve or restore the functions of natural systems. These actions include low impact development, sediment and erosion control, stream corridor restoration, watershed management, urban forest and vegetation management, and wetland restoration and preservation.

   Projects that were recommended for natural resource protection and green infrastructure included:

   - Assess the feasibility of green infrastructure to solve existing environmental issues
   - Investigate how to address erosion and flooding while protecting adjacent wetland resource areas
   - Evaluate reduced use of chemicals on roads
   - Evaluate current methods for vegetation management and reduce use of pesticides on Town land
   - Conduct Town-wide Tree Inventory, canopy assessment resulting in a GIS layer
   - Develop Tree Planting Plan that considers climate change impact to species, invasives and resilience planning for forest and street trees, develop meaningful strategies for tree health and planting where canopy is lean.

5. **Structural Projects**: Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include storm water controls (e.g., culverts), floodwalls, seawalls, retaining walls, and safe rooms.

   Projects that were recommended for structural improvements included:

   - Inspect, identify, and prioritize bridges and culverts that need immediate work in low lying areas prone to flooding
   - Improve culvert capacity at priority locations: Brown Road (DPW), Butterworth Road @ Collar Brook, Neale Road @ Kenny Brook
   - Replace other underperforming culverts so that they meet MA River and Stream Crossing Standards and include road crossing for wildlife
   - Analyze and address erosion and flooding while protecting adjacent wetland areas
   - Conduct Raymond Building shelter assessment and implement recommendations

- Reduce structural stress on first floor of Town Hall
- Strengthen communications and power infrastructure
- Enable access to communications networks for vulnerable populations

6. **Emergency Services Protection**: Actions that will protect emergency services before, during, and immediately after an occurrence. Examples of these actions include protection of warning system capability, protection of critical facilities, and protection of emergency response infrastructure

   Projects that were recommended for emergency service protection included:

   - Designate a space for Emergency Management Department
   - Improve communication network
   - Secure access to gasoline during emergency events
   - Coordinate with US Army Corps of Engineers (USACOE) on Emergency Response Plans for Corps properties in Royalston
   - Work with Fire Department to develop plan to mitigate wildfire risk in times of drought
   - Develop Tree Management Plan to maintain trees to prevent power losses due to wind through removal of dead and/or dangerous trees and tree branches and balance safe removal of hazard trees with Scenic Rds./Public Shade Tree considerations
   - Install generators or other back-up power supply at Library, Town Hall and Raymond Building

3.6 Top Recommendations to Improve Resilience for the Town of Royalston

3.6.1 Prioritization from Post Workshop Survey

All Mitigation Projects identified in the CRB workshops are a priority for the Town. The post workshop survey results are ranked below, organized by descriptive categories. The list prepared below is subject to change based on evolving conditions in the Town.

Projects that include an asterisk (*) were also rated among the top projects following the results of the HMP Cost Benefit Review.

HIGHEST PRIORITY

Culvert Condition Assessment and Capacity Analysis Relative to Climate Change, Prioritization, and Implementation

- Inspect and complete inventory of stream restrictions, including culverts, bridges, and beaver dams
- Prioritize bridges and culverts that have been identified as having historic flooding or failure*

- Improve culvert capacity at priority locations- Brown Road (DPW), Butterworth Road @ Collar Brook, Neale Road @ Kenny Brook,
- Improve roadside drainage on Rt 32, Warwick Road, North Fitzwilliam, Winchendon Road, and Athol Road

Town-wide Watershed Plan

- Complete hydrogeologic model of the watershed to assess vulnerability from 100-yr and 500-yr flood under climate change conditions and update flood maps to reflect current and future conditions
- Assess the feasibility of green infrastructure to solve existing environmental issues
- Analyze and address erosion and flooding while protecting adjacent wetland resource areas

Communication Network, Power and Emergency Back-Up Power Infrastructure Needs

- Conduct a communication needs survey for elderly populations*
- Survey to determine who has access to backup or off-grid power, computer, internet*
- Enable access to communication networks for vulnerable populations*
- Support development of Town-wide broadband*
- Install generators or other back-up power supply at Library, Town Hall, and Raymond Building
- Provide access to gasoline during emergency events
- Preserve and protect historical records

MODERATE PRIORITY

Inventory, Assessment, and Management of Trees

- Conduct Town-wide Tree Inventory, canopy assessment resulting in a GIS layer
- Develop Tree Planting Plan that considers climate change impact to species, invasives and resilience planning for forest and street trees, develop strategies to improve tree health and planting where canopy is lean
- Develop Tree Management Plan to maintain trees to prevent power losses due to wind through removal of dead and/or dangerous trees and tree branches and balance safe removal of hazard trees with Scenic Rds./Public Shade Tree considerations
- Improve coordination with Tree Warden to remove hazardous trees/branches that cause icing on key routes that may also be Scenic Roads*

Building Condition Improvements, Establishment of Emergency Shelter

- Address conditions of municipal buildings
- Reduce structural stress on first floor of Town Hall
- Designate a space for Emergency Management Department*
- Conduct drainage study of Town-owned assets in Town Center and Bullock Park
- Share results of Town Center drainage study with private landowners
- Conduct Raymond Building Shelter Assessment and implement recommendations

LOWER PRIORITY

Coordination, Outreach, and Education

- Formalize neighbor helping neighbor program*
- Develop plan to mitigate wildfire risk in times of drought
- Conduct public outreach to increase awareness of dangers of invasive species*
- Improve signage about hiking safety and environmental stewardship
- Coordinate with USACOE on Emergency Response Plans for Corps properties in Royalston*
- Coordinate with the Trustees on Emergency Response Plans for Trustees' properties in Royalston*
- Identify, preserve, and increase wildlife corridors
- Increase penalties and enforcement to prevent dumping in forests and wetland areas
- Evaluate current methods for vegetation management and reduced use of pesticides on Town land
- Evaluate reduced use of chemicals on roads*

3.6.1 Prioritization from Hazard Mitigation Plan Cost Benefit Analysis

Section 7 of the Draft Royalston Hazard Mitigation Plan includes additional review of mitigation actions utilizing the FEMA STAPLEE cost benefit methodology. This approach is required for the Hazard Mitigation Plan, but it does weigh things differently than the MVP community priority ranking. A total of 36 new and 5 ongoing mitigation actions were reviewed by the Core Team. The mitigation actions were organized by natural hazards and the final ranking was based on the distribution of projects scores within each hazard category.

Based on the Cost Benefit priority ranking, the top projects which address Royalston's current and future natural hazards including flooding, high wind, tropical/ storms, and severe winter weather and invasive species are listed below:

- Prioritize bridges and culverts that have been identified as having historic flooding or failure
- Enable access to communication networks for vulnerable populations, conduct a communication needs survey for elderly population and support development of Town-wide Broadband.
- Designate a space for Emergency Management office
- Survey to determine who has access to backup or off-grid power, computer, internet
- Formalize neighbor-helping-neighbor program
- Conduct public outreach to increase awareness of dangers of invasive species
- Evaluate reduced use of chemicals on roads
- Evaluate current methods for vegetation management and reduced use of pesticides on Town land
- Improve coordination with Tree Warden to remove hazardous trees/branches that cause icing on key routes that may also be Scenic Roads
- Coordinate with USACOE on Emergency Response Plans for Corps properties in Royalston
- Coordinate with the Trustees on Emergency Response Plans for Trustees' properties in Royalston

Section 4
Workshop Details

4.1 Workshop Participants

A list of those invited to participate in the online virtual workshops is included in Appendix D. The following provides a list of participates and affiliation. Members of the workshop project team that had a role are also documented.

4.1.1 Workshop #1 Attendance

Workshop Host: Jim Barclay; Royalston Emergency Management Director; Workshop Facilitator: Gabrielle Belfit, MVP Certified Provider – Tighe & Bond; Workshop Presentation: Emily Tully - Tighe & Bond Q&A Moderator: Kristin Dippold - Tighe & Bond

Table 5: Workshop #1: May 18, 2020
Royalston Societal Assets Webinar – May 18, 2020 - 1:00 PM

Name	Affiliation
Gary Winitzer	Council on Aging
Andrew Smith	EEA MVP
Deborah D'Amico	Select Board
Rachel McMahon	Representative Susannah Whipps Office
Tom Musco	Emergency Management
Phil Rabinowitz	Capital Planning and Finance Committee
Kevin Filchak	MEMA
Jim Barclay	Emergency Management

4.1.2 Workshop #2 Attendance

Workshop Host: Jim Barclay; Royalston Emergency Management Director; Workshop Facilitator: Gabrielle Belfit, MVP Certified Provider – Tighe & Bond; Workshop Presentation: Emily Tully - Tighe & Bond Q&A Moderator: Kristin Dippold - Tighe & Bond

Table 6: Workshop #2: June 1, 2020
Royalston Infrastructural Assets Webinar – June 1, 2020 - 1:00 PM

Name	Affiliation
Phil Rabinowitz	Capital Planning and Finance Committee
Jim Barclay	Emergency Management
Kevin Filchak	MEMA
Deborah D'Amico	Select Board
Gary Winitzer	Council on Aging
Scott Farrar	National Grid

4.1.3 Workshop #3 Attendance

Workshop Host: Jim Barclay; Royalston Emergency Management Director; Workshop Facilitator: Gabrielle Belfit, MVP Certified Provider – Tighe & Bond; Workshop Presentation: Emily Tully - Tighe & Bond Q&A Moderator: Kristin Dippold - Tighe & Bond

Table 7: Workshop #3: June 8, 2020
Royalston Natural Environment Assets Webinar – June 8, 2020 – 1:00 PM

Name	Affiliation
Jim Barclay	Emergency Management
Phil Rabinowitz	Capital Planning and Finance Committee
Christine Long	Select Board
Gary Winitzer	Council on Aging
Kevin Filchak	MEMA
Deborah D'Amico	Select Board
Rachel McMahon	Representative Susannah Whipps Office

4.2 Acknowledgements

Funding for the CRB workshop was provided through a Massachusetts Executive Office of Energy and Environmental Affairs (EEA) Municipal Vulnerability and Preparedness Planning Grant during Fiscal Year 20.

Many thanks to Jim Barclay; Royalston Emergency Management Director for serving as the lead for the MVP Planning Process. A special thanks to all MVP Core Team members and everyone who participated in the CRB workshops as presenters, facilitators and stakeholders. A special thanks for everyone's patience to complete the MVP in a virtual workshop setting.

4.3 Report Citation

Tighe & Bond (2020). *Community Resilience Building Workshop Summary of Findings*, Town of Royalston, Massachusetts.

Tighe&Bond

APPENDIX A

Royalston MVP / HMP Core Team Kickoff Meeting Agenda

TO: MVP/HMP Core Team
LOCATION: Royalston Town Hall (Dining Hall)
DATE: January 23, 2020
TIME: 1:00-3:00 PM

1:00 PM **Welcome & Introductions**

1:05 PM **Presentation**

Background
MVP / HMP Grant and Workshop Goals and CRB Process
Guidelines/Guidance
More about the workshops
Deliverables
What does Royalston get from this process?
Roles & Responsibilities
Schedule

1:30 PM **Discussion Item: Natural Hazard Risks**

Matrix to be presented

2:00 PM **Discussion Item: Community Asset Update**

Mapping and questions

2:30 PM **Discussion Item: HMP Goals**

2:50 PM **Next Steps**

3:00 PM **Conclude**

HMP/MVP Core Team

Name and Title	Mailing Address	Email	Phone	Sign-In
Jim Barclay, Director MVP/HMP Project Lead	Emergency Management Agency PO Box 92 Royalston, MA 01368-0092	ema@royalston-ma.gov	978-249-2904 Office 978-273-4951 Cell	
Deborah D'Amico, Select Board		deb.damico@royalston-ma.gov	9782499633	
Chris Long, Select Board	69 Butterworth Rd Orange, MA 01364	chris.long@royalston-ma.gov	978-249-0240	
Kate Collins, Planning Unavailable		katecollins64@gmail.com		
Keith Newton, FD and DPW	ROYALSTON DPW PO BOX 86 ROYALSTON, MA. 01368	dpw@royalston-ma.gov	978-249-4923	
George Northrop, Conservation Commission Maureen Blasco		george01368@yahoo.com maureenblasco@gmail.com	978-249-5138	
Jon Hardie, IT				

Name and Title	Mailing Address	Email	Phone	Sign-In
Rebecca Krause-Hardie, Finance Director	PO Box 16	financedir@royalston-ma.gov	978 407 6002	
Phil Rabinowitz, Capital Planning	52 Athol Rd.	prabinow45@gmail.com	978-249-4422	
Tom Kellner, Millers River Watershed		tomkellner12@gmail.com		
Curt Deveneau, PD		cadeveneau@doc.state.ma.us		
Emily R. Tully Project Planner	Tighe & Bond 53 Southampton Rd Westfield, MA 01085	ETully@tighebond.com		Emily Tully
Gabrielle Belfit, CFM Senior Environmental Scientist (Project Manager)	Tighe & Bond 4 Barlows Landing Rd Pocasset, MA 02559	GCBelfit@tighebond.com		gcBelfit

ROYALSTON HAZARD MITITGATION AND MUNICIPAL VULNERABILITY PREPAREDNESS

Core Team Kickoff Meeting

January 23, 2020

Tighe&Bond

1

INTRODUCTIONS

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2

BACKGROUND

- Executive Order 569: An Integrated Climate Change Strategy for the Commonwealth
- Environmental Bond Bill: $2.4 billion - focus on climate change resiliency. Over $200 million for climate change. Bill codified EO569, including the MVP program
- Royalston awarded $35K for **Municipal Vulnerability Preparedness (MVP)** Community Resilience Building (CRB) Workshop Process and to prepare a **draft Hazard Mitigation Plan (HMP) Update**

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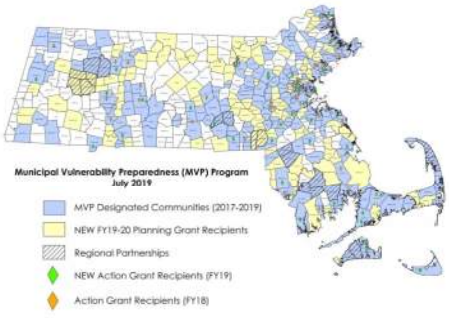
3

BACKGROUND



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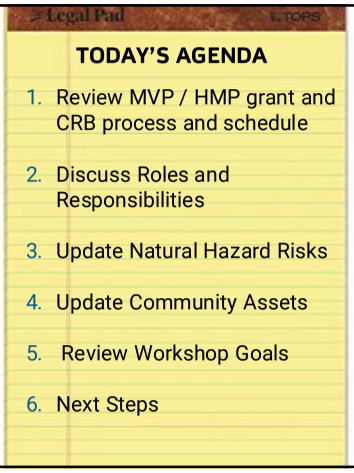

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MVP/HMP GRANT AND WORKSHOP PROCESS GOALS

Build Resilience and Preparedness:

- Understand community assets and vulnerabilities
- Plan for more frequent and intense weather events
- Improve pre-event planning, response & recovery, and identify long-term mitigation actions

A prepared and resilient Royalston will be able to maintain functions, protect its residents, and be ready for future storm events and a changing climate.

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MVP/HMP GRANT AND CRB PROCESS

1. Establish Core Team
2. Complete MVP/HMP Evaluation/Assessment
   - Natural Hazard Risks
   - Community Assets
   - Multi-Hazard Vulnerability Assessment
   - Capabilities Assessment
   - Mitigation Strategies
   - Adaptation Projects for priority sites
3. Hold one workshop
4. Draft MVP Report
5. Hold Listening Session
6. Final MVP Report & Draft HMP Report

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THERE IS AN OVERLAP WITH LOCAL PLANNING

- Comprehensive Emergency Management Plan
- Capital Planning
- Open Space and Recreation Plan

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Copies available

Community Resilience Building
WORKSHOP GUIDE

www.CommunityResilienceBuilding.org

ResilientMA.org

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MULTI-HAZARD MITIGATION PLAN GUIDANCE

- Disaster Mitigation Act of 2000, 44 CRF Part 201.6
- Commonwealth of Massachusetts State Hazard Mitigation & Climate Adaptation Plan 2018
- *FEMA Local Mitigation Plan Review Guidance, October 2011*
- *FEMA Local Mitigation Planning Handbook, March 2013*
  1. Document the Planning Process
  2. Document Methodologies Used
  3. Involve Larger Community
  4. Address FEMA concerns from 2015

FEMA

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WHAT ARE THESE WORKSHOPS…?

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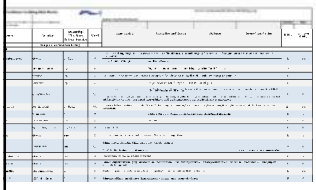
DELIVERABLES

- MVP Report
- Hazard Mitigation Plan



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WHAT DOES ROYALSTON GET FROM THIS PROCESS?

MVP Community Designation =
Eligibility for MVP Action Grants

Once approved, HMP =
Eligibility for FEMA Hazard Mitigation Grants

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WHY ARE YOU HERE?

See roles & responsibilities handout

- Kickoff Meeting
- Two interim meetings to review / provide input on work products
- Attend the MVP Workshop
- Review draft reports & provide comments
- Attend the final listening session

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SCHEDULE

Task	Date
1. Kickoff Meeting	January 2020 (Core Team)
2. Characterize and Prioritize Hazards	January 2020
3. Community Asset Inventory	January/February 2020 (Interviews)
4. Multi-Hazard Vulnerability Assessment	February 2020 (Public Mtg 2/28)
5. Capabilities Assessment	February 2020
6. Development of Adaptation Strategies	March 2020 (Core Team Con Call)
7. MVP workshop	April 2020 (Workshop 4/16/20)
8. Draft and Final MVP Report	May2020
9. Draft HMP Update Report	May 2020
10. Public Community Listening Session	June 2020 (@BOS meeting)

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DISCUSSION ITEM: NATURAL HAZARD RISKS

See Handout

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DISCUSSION ITEM: COMMUNITY ASSETS

See Handout

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DISCUSSION ITEM: WORKSHOP GOALS

See Handout

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YOUR CHANCE FOR INPUT TODAY ON LOGISTICS…

- **Plan for communication & workshops**
  - Identify stakeholders
  - Public notification- Town Website, Press Releases, direct email
  - Approach to staffing workshops (size, facilitators: 1 per table)

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NEXT STEPS

- **Core Team to review update to Asset Inventory**
- **Town staff to assist with Capabilities Assessment**
- **Core Team to review Draft Deliverables**
- **Brainstorm stakeholders for Workshop**

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OPEN DISCUSSION & QUESTIONS

Contact Information:

- **Gabrielle Belfit, CFM, Senior Environmental Scientist**
  - GCBelfit@tighebond.com
  - 508.304.6362
- **Emily Tully, Environmental Planner**
  - ERTully@tighebond.com
  - 413.875.1622

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APPENDIX B

Town of Royalston MVP Grant – Virtual Public Engagement During COVID-19

TO: Andrew Smith, MVP Greater Connecticut River Valley Regional Coordinator, Executive Office of Energy and Environmental Affairs (EEA)

FROM: Gabrielle Belfit, CFM, Senior Environmental Scientist, Tighe & Bond

COPY: Jim Barclay, Royalston Emergency Management Director

DATE: May 4, 2020

On April 7, 2020, EEA provided an email that contained recommendations for adjusting the public engagement strategies to accommodate social distancing and stay-at-home advisories due to the ongoing COVID-19 crisis, while still accomplishing the Fiscal Year Municipal Vulnerability Preparedness (MVP) grant program requirements.

We understand that a key component of the MVP program is public engagement; however, during this time, meeting the various requirements for public engagement within the MVP program will require a multi-modal approach. To meet the requirements of the program, it is necessary that Royalston's community is informed and engaged. The virtual public engagement plan proposed below recognizes equitable engagement within the MVP process as a top priority. The engagement methods proposed below allow participation from key stakeholders as well as vulnerable populations.

The MVP Planning Grant process typically includes a minimum of three in-person, group meetings: Core Team Meeting, the Community Resilience Building (CRB) Workshop, and Public Listening Session. In addition, Royalston was awarded funds to complete a Hazard Mitigation Plan (HMP) Update which requires a Public Meeting. Royalston has completed one in-person Core Team meeting and the HMP public meeting, made significant progress in completing the draft HMP, and prepared for the workshops. Royalston still needs to complete the CRB workshop, Listening Session and presentation of the HMP to the Select Board.

The sections below outline Royalston's proposed strategy to virtually meet the goals of the MVP engagement process. **Royalston is seeking confirmation from EEA as soon as possible that the proposed virtual engagement strategy meets the requirements of the MVP contract so we may proceed.**

Overview of Proposed Virtual MVP Engagement Process

To meet the requirements of the in-person meetings outlined above, Royalston will work with their MVP Provider, Tighe & Bond, to complete the following virtual engagement process:

1. **Provide an online space for MVP materials**: A municipal-specific MVP website will be designed and hosted by Tighe & Bond that may be also linked from the Town's official website, to provide all necessary materials for completing the MVP process. Reference material such as the Massachusetts State Hazard Mitigation and Climate Action Plan, ResilientMA.org, the MVP Workshop Guide, and the Regional Hazard Mitigation Plan that covers Royalston will be available for public access on this website. Municipal-specific information such as maps and the workshop matrix will also be provided via the online website or through email. Recorded meetings and Virtual CRB Workshop Webinars and the draft and final MVP Summary of Findings Report will be posted to the website.

2. **Survey to identify strengths and vulnerabilities**: Tighe & Bond will use Survey Monkey to create and distribute a survey to members of the Core Team and identified stakeholders. The survey questionnaire results will be used to develop a master list of strengths and vulnerabilities in the community. The survey will be distributed via email, the MVP website, and/or regular mail if requested.

3. **Distribute recorded presentation on background information**: Tighe & Bond will develop a pre-workshop video including information on climate change and the MVP process. The short video will be recorded and posted on the MVP website for viewing or downloads. This presentation will be made available to workshop participants for independent viewing prior to attending the Virtual CRB Workshop Webinars.

4. **Distribute Virtual CRB Workshop Webinar materials**: Tighe & Bond will develop all materials necessary to participate in the workshop. Materials will be distributed via email, posted on the MVP website, and/or sent by regular mail if requested. Materials will include: (1) a partially, pre-populated CRB Matrix according to the Strengths and Vulnerabilities survey, (2) applicable slides to discuss natural hazard risk for the specific community asset sector featured in the workshop, and (3) a map of the municipality and featured community assets.

5. **Hold Webinars to meet the CRB Workshop requirement**: Tighe & Bond will develop and host three separate Virtual CRB Workshop Webinars using Microsoft Teams Live Event. Each meeting will feature one of the Community Asset Categories: infrastructural, societal, and natural environment. During the workshop, attendees will brainstorm mitigation actions for specific community assets, addressing top priority hazards. Attendees who cannot access the live event via the internet can call into the event on the phone, and follow along with the mailed materials.

6. **Prioritization Polling**: After the completion of all three Virtual CRB Workshop Webinars, Tighe & Bond will develop and distribute a Survey Monkey poll to the Core Team and stakeholders. This poll will include a list of mitigation actions developed during the webinar. Individuals will be asked to rank actions one through five in each of the four categories. This will develop a draft prioritization.

7. **Core Team Meeting**: Tighe & Bond will host a final Core Team meeting via Teams. The goal of the meeting will be to review the results of the prioritization polling and discuss the first Draft MVP Summary of Findings Report.

8. **Distribute Listening Session materials**: Tighe & Bond will distribute listening session materials to Core Team members and stakeholders electronically or through mailings if requested. Information about the Listening Session and directions to participate will also be publicly posted. Materials will include an agenda and copy of the Draft MVP Summary of Findings Report.

9. **Hold Listening Session:** If in-person meetings remain not practical, Tighe & Bond and the Core Team will host a live, one-hour Listening Session on Teams Live Event to present the draft MVP Summary of Findings Report and allow time for a Question & Answer session for community input. Those in the community that cannot access the internet can call into the meeting on the phone and follow along with mailed materials. The Final Draft MVP Summary of Findings Report will be available on the MVP website for a 14-day public comment period.

10. **MVP Website:** Tighe & Bond will post the recorded Listening Session, Question & Answer dialog, and Final MVP Summary of Findings Report on the MVP website.

11. **Public Meeting:** If in-person meetings remain not practical, Tighe & Bond and the Core Team will participate in a virtual Select Board meeting, or other method to seek approval for sending the draft HMP to MEMA for comment.

The following tables describe the typical format for each meeting and a summary of the proposed format for comparison.

Core Team Meeting

Typical Format	Proposed Format
In-person meeting at Town Hall with representatives from municipal departments and any other core stakeholders.	Use Microsoft Teams virtual meeting software to conduct meetings with representatives from the Core Team. Pre-meeting materials will be distributed electronically via email.

CRB Workshop

Typical Format	Proposed Format
One 8-hour, or two 4-hour, in person workshops with representatives from municipal departments, local organizations, State agencies, surrounding communities, and other stakeholders	Royalston's MVP provider, Tighe & Bond, will host three 1 to 1.5 hour Virtual CRB Workshop Webinars using Microsoft Teams Live Event with identified stakeholders and the Core Team. These virtual workshops will address infrastructural, societal and environmental community assets. The Live Event webinars will include question and answer periods, and be recorded for later viewing. Workshop preparation materials will be distributed to participants prior to the webinar including instructions as to how to access the webinar. Material distribution is via email, regular mail if requested and posted for downloading on a dedicated Community MVP website. Individuals without internet access can call in directly to the live event and follow along with pre-mailed material. After the webinar, the recorded meetings will be posted on the website. A post-workshop survey will be distributed to participants via email and regular mail if requested. The survey may be completed online, via email, or completed surveys may be mailed in. The total time required for participants will be approximately 6-8 hours between the pre-meeting work, attending the 3 workshops, and completing the follow up surveys and rankings.

Public Meetings

Typical Format	Proposed Format
Daytime or evening meeting open to all members of the public	The first public meeting was completed in person on February 27th as part of the HMP planning process. The second public meeting will take place as part of a regularly scheduled Select Board meeting via in person or remote meeting format to seek approval for forwarding the HMP draft to MEMA for review.

Public Listening Session

Typical Format	Proposed Format
Daytime or evening meeting open to all members of the public	Provide listening session meeting materials to stakeholders and the Core Team via email and post on the MVP community website including agenda, draft MVP report and instructions to access the Listening Session. Hold one, hour long meeting using Teams Live Event. Individuals without internet access can call in directly to the live event and follow along with pre-mailed material. The final draft MVP Summary of Findings Report will be available post-meeting for a 14-day review period to allow for additional comment from members of the community. The Town will organize comments received, respond, and post to the MVP community website.

j:\r\r0177 royalston sewer\007 - mvp planning grant\correspondence\covid-19_virtual public engagement_memo royalston 5.4.docx

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APPENDIX C

Royalston MVP/HMP Stakeholder List

Contact Name	Affilation	Email Address
Susannah Whipps	State Representative	susannah.whipps@mahouse.gov
Jo Comerford	State Senator	jo.comerford@masenate.gov
James McGovern	US Representative	congressman.mcgovern@mail.house.gov
Roland Hamel	Select Board, Vice Chair Building Committee Cemetery Commission Town Constable	roland.hamel@royalston-ma.gov
Jennifer Janowicz	Agricultural Commission, Co-chair	AgCom@royalston-ma.gov
Philip Leger	Board of Health, Chair	boh@royalston-ma.gov
Geoffrey Newton	Building Inspector	geoff.newton@royalston-ma.gov
Marsha Charest	Community Preservation	cpa@royalston-ma.gov
Todd Neale	South Village Revitalization Committee	
Larry Siegel	Financial Advisory Committee, Chair Tree Warden	fincom@royalston-ma.gov
Peter Kraniak	Historic District Commission, Chair	pjkpolska@yahoo.com
Katherine Morris	Phineas S. Newton Library, Director	kathy.morris@royalston-ma.gov
	Open Space Committee, Chair New England Scenic Trail Council Rep	openspace@royalston-ma.gov
Nancy Melbourne	School District or Committee Member?	melbournes@verizon.net
Gary Winitzer	Sewer Commission, Chair	glw110@gmail.com
Barbara Richardson	Town Clerk	townclerk@royalston-ma.gov
Rise Richardson	Village School, Director	rise@villageschoolma.org
Bonnie Roy	MEMA	bonnie.roy@state.ma.us
Ivan Ussach	Millers River Watershed Council	ivanussach@gmail.com
John Hume	MRPC	jhume@mrpc.org
Jeffrey Mangum	Army Corps of Engineers	jeffrey.c.mangum@usace.army.mil
Scott Farrar	National Grid	scott.farrar@nationalgrid.com
Eric Smith	Town of Athol	planning@townofathol.org
	Town of Orange	
	Town of Warwick	
Tracy Murphy	Town of Winchendon	tmurphy@townofwinchendon.com
Al Gallant	Town of Winchendon	agallant@townofwinchendon.com
	Town of Templeton	
Andrew Smith	Regional MVP Coordinator	andrew.b.smith@state.ma.us

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APPENDIX D

Municipal Vulnerability and Preparedness Planning for the Town of Royalston

Public Engagement Information

Municipal Vulnerability Preparedness Planning Background The Town of Royalston was recently awarded a $36,000 grant by the Executive Office of Energy and Environmental Affairs (EEA) Municipal Vulnerability and Preparedness (MVP) Planning Grant to complete a public engagement and climate resilience planning process before June 30, 2020. Royalston's Emergency Management Department is taking the lead on the MVP program, with participation of a Core Team of Town Staff to plan for ways to better prepare and protect the Town from natural and climate-related hazards. Once the plan is completed and approved by EEA, the Town of Royalston will be designated as an MVP Community, joining 287 communities across Massachusetts that have been designated since the MVP program began in 2017.

Why plan for climate resilience? Climate resilience is the ability of a community to address the needs of its built, social and natural environment to anticipate, cope with, and rebound stronger from events and trends related to climate change hazards. Planning for climate resilience allows Westfield to build capacity to reduce the impacts from future climate events rather than just react to events as they occur.

How will the public engage in MVP? MVP is a Community Driven Process to understand climate vulnerabilities and identify priority actions. MVP provides structured opportunities for public engagement through review of community specific mapping and climate data, participation in unique Community Resilience Building Workshops, and developing priority action plans to improve their community's resilience with an emphasis on nature-based solutions.

Due to COVID-19, previously planned public meetings and workshops will be held online.

The Town is utilizing a number of public engagement methods including:

- Posting online resources that will be used in the workshops
- Conducting pre- and post- workshop surveys
- Hosting virtual workshops focusing on climate resilience within the context of Royalston's societal, built infrastructure, natural resources and economic community assets.
- Hosting a community listening session

Read More About EEA Municipal Vulnerability Preparedness (MVP)

Royalston's MVP Summary of Findings Draft Report is Available for Review
Click here to download the draft report

Please forward comments to Jim Barclay at ema@royalston-ma.gov
By June 25, 2020.

Good Job! The Community Resilience Building Workshops Have Been Completed

#1 Royalston's Societal Assets- Vulnerable Populations and Cultural Facilities: Held May 18

- **Click here to view recording**
- **Click here for Workshop #1 Q&A**
- **Click here for Workshop #1 Draft Community Resilience Building Matrix**

#2 Royalston's Infrastructural Assets -Critical Facilities and Built Environment: Held June 1

- **Click here to view recording**
- **Click here for Workshop #2 Q&A**
- **Click here for Workshop #2 Draft Community Resilience Building Matrix**

#3 Environmental Assets – Natural Resources and Open Space: Held June 8

- **Click here to view recording**
- **Click here for Workshop #3 Q&A**
- **Click here for Workshop #3 Draft Community Resilience Building Matrix**

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3. Select "Join anonymously."

Workshop Planning Resources

- Introductory Video- Municipal Vulnerability Preparedness and climate change impact on local assets
- Community Asset Maps- Distribution of Local Community Assets
- Flood Risk Maps- FEMA 100-Year Flood Zones
- Natural Hazard Risk Index- Ranking of Natural Hazards that impact the local community
- Basin specific climate data- developed by Massachusetts Climate Adaptation Science Center

Royalston MVP CRB Workshop Sign In

Royalston Societal Assets Webinar – May 18, 2020 - 1:00 PM

Person	Affiliation
Gary Winitzer	Council on Aging
Andrew Smith	EEA
Deborah D'Amico	Select Board
Rachel McMahon	Representative Susannah Whipps Office
Tom Musco	Emergency Management
Phil Rabinowitz	Capital Planning and Finance Committee
Kevin Filchak	MEMA
Jim Barclay	Emergency Management

Royalston Infrastructural Assets Webinar – June 1, 2020 - 1:00 PM

Person	Affiliation
Phil Rabinowitz	Capital Planning and Finance Committee
Jim Barclay	Emergency Management
Kevin Filchak	MEMA
Deborah D'Amico	Select Board
Gary Winitzer	Council on Aging
Scott Farrar	National Grid

Royalston Natural Environment Assets Webinar – June 8, 2020 – 1:00 PM

Person	Affiliation
Jim Barclay	Emergency Management
Phil Rabinowitz	Capital Planning and Finance Committee
Christine Long	Select Board
Gary Winitzer	Council on Aging
Kevin Filchak	MEMA
Deborah D'Amico	Select Board
Rachel McMahon	Representative Susannah Whipps Office

TOWN OF ROYALSTON MUNICIPAL VULNERABILITY PREPAREDNESS

Community Resilience Building Workshop – Societal Vulnerabilities & Strengths

May 18, 2020

Tighe&Bond

1

TODAY'S AGENDA

1:00 *Introduction & Workshop Goals*

1:10-1:20 *Natural Hazard Risks and Identified Community Assets -Survey Summary*

1:20-1:30 *Confirm Societal Assets List and Strengths and Vulnerabilities (submit comments via Q&A)*

1:30-1:45 *Mitigation Action Definitions and Examples*

1:45-2:15 *Discussion on Mitigation Actions (submit comments via Q&A)*

2:15-2:30 *Wrap up and Participant Homework (post workshop survey)*

Tighe&Bond

2

WHY DO THIS PLANNING?

Help Royalston Build Resilience and Preparedness:

- Build on the Town's existing emergency management capabilities
- Plan for more frequent and intense weather events that are linked to climate change
- Engage multiple stakeholders in the planning process
- Improve access to funding for mitigation and adaptation

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HAZARD MITIGATION PLANNING PROCESS VS MVP

1) Define potential risk due to natural hazards including impacts of climate change
2) Identify key community assets and vulnerability to risk
3) Define mitigation projects to improve resiliency
4) Prioritize projects for areas most at risk

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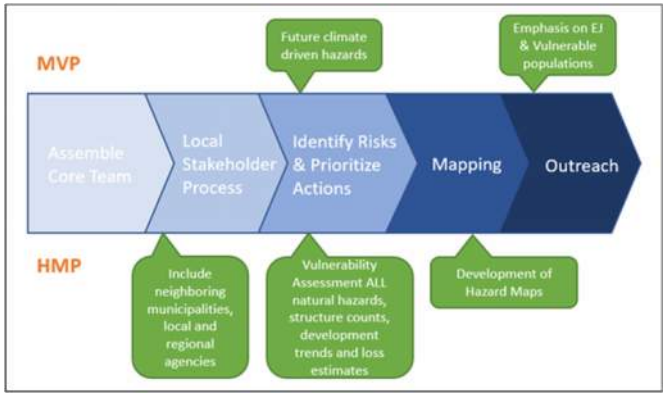
4

HOW DOES MVP PROCESS AUGMENT HMP?



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THANK YOU TO ROYALSTON'S MVP CORE TEAM

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Christine Long – Select Board
Kate Collins – Planning
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Maureen Blasco – Conservation Commission
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Phil Rabinowitz – Capital Planning
Tom Kellner – Millers River Watershed Council
Curt Deveneau – Police Dept
Tom Musco – Emergency Mgmt

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ROYALSTON'S MVP WEBSITE

http://services.tighebond.com/mvp/royalston/

Read More About EEA Municipal Vulnerability Preparedness (MVP) here

How do I participate in the Community Resilience Building Workshops ?

1. Reserve your spot to participate one or more of the 90-minute workshops by clicking on the dates below .

Community Resilience Building Workshop Dates/Time

#1 Royalston's Societal Assets - Vulnerable Populations and Cultural Facilities: May 18 – 1:00-2:30PM
#2 Royalston's Infrastructural Assets - Critical Facilities and Built Environment: June 1 – 1:00-2:30PM
#3 Environmental Assets - Natural Resources and Open Space: June 8 – 1:00-2:30PM
Public Listening Session: - June 15th 7:00-8:00 PM

2. View the planning resources linked below, especially the video. You may wish to download the maps and data for easy reference during the workshops and save these to your desktop.

Workshop Planning Resources (click on link to view or download)

- Introductory Video - Municipal Vulnerability Preparedness and climate change impact on local assets
- Community Asset Maps - Distribution of Local Community Assets
- Flood Risk Maps- FEMA 100-Year Flood Zones
- Natural Hazard Risk Index - Ranking of Natural Hazards that impact the local community
- Basin specific climate data - developed by Massachusetts Climate Adaptation Science Center

3. Please take the pre-workshop survey, by clicking here . The results of the survey will be used in the workshops.

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7

Session #1 Presentation

Identify Natural Hazards, Risk Areas and Community Strengths

1:10 PM

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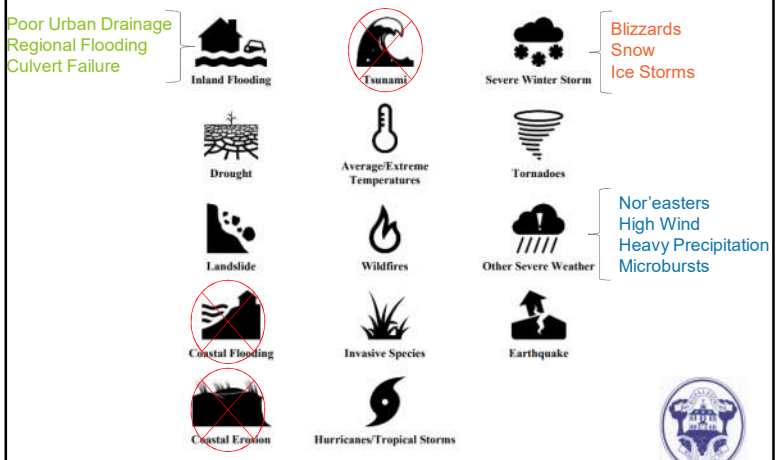
8

WHAT ARE NATURAL HAZARDS?



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9

TOP NATURAL HAZARDS – PAST & PRESENT

- Heavy rain
- High wind
- Hurricanes / tropical storms
- Severe winter weather / ice storms / Nor'easters

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10

TOP NATURAL HAZARDS – FUTURE

- Heavy rain
- High wind
- Hurricanes / tropical storms
- Severe winter weather / ice storms / Nor'easters

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11

WESTFIELD'S TOP NATURAL HAZARDS THE SURVEY SAYS….

HEAVY RAIN

HIGH WIND EVENTS

HURRICANES

SEVERE WINTER WEATHER

+ **CLIMATE CHANGE** =

AMPLIFIED RISKS

- Community and regional infrastructure
- Local and regional economies
- Public Health
- Natural resources and our environment

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12

WHAT ARE COMMUNITY ASSETS?

Societal

Infrastructure

Economy

Natural Resources

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13

PEOPLE – SOCIETAL ASSETS

- Cemeteries
- Churches
- Historic District
- Whitney Hall
- Phineas S. Newton Library
- Town Common
- South Village Common
- Tully Lake Campground
- Winchendon Rod & Gun Club
- South Village
- Royalston Post Office
- The Village School
- Royalston Community School

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14

Session #1 Discussion

Societal Assets: Strengths and Vulnerabilities

1:20 PM

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15

Switch to Community Resilience Building Workshop Risk Matrix to review societal assets and their strengths and vulnerabilities

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16

Session #2 Presentation

Identify Actions to Address Vulnerabilities and Protect Strengths

1:30 PM

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17

TYPES OF MITIGATION ACTIONS

1. Prevention
2. Property Protection
3. Public Education and Awareness
4. Natural Resource Protection and Green Infrastructure (nature-based solutions)
5. Structural Projects
6. Emergency Services Protection

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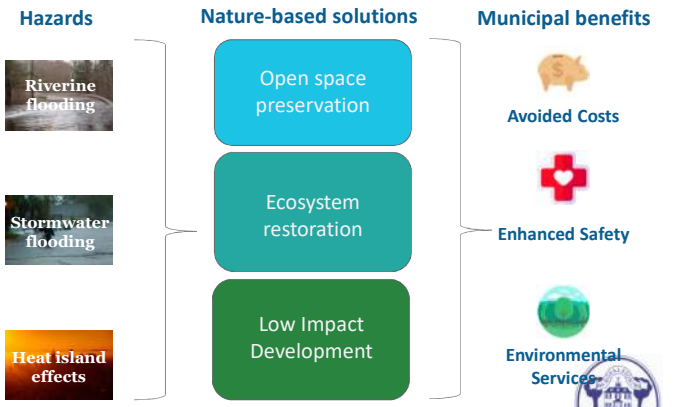
18

DISCUSSION ITEM: Mitigation Strategies



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19

Switch to Community Resilience Building Workshop Risk Matrix to populate mitigation strategies

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20

Session #3

Wrap up and Assignments

2:15 PM

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21

PARTICIPANT ASSIGNMENTS

- **Take the Post Workshop Survey!**
  - http://services.tighebond.com/mvp/royalston/
- **Sign up for Additional Workshops**
  - Infrastructural assets: June 1st, 1:00-2:30 PM
  - Environmental assets: June 8th, 1:00-2:30 PM
- **Review the Draft Findings CRB Report**
  - Available on the website in mid-June
- **Attend the Listening Session**

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STILL HAVE QUESTIONS OR COMMENTS?

Contact Information:

- **Gabrielle Belfit, CFM, Senior Environmental Scientist**
  - GCBelfit@tighebond.com
  - 508.304.6362
- **Emily Tully, Environmental Planner**
  - ETully@tighebond.com
  - 413.875.1622

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TOWN OF ROYALSTON MUNICIPAL VULNERABILITY PREPAREDNESS

Community Resilience Building Workshop
Infrastructural Vulnerabilities & Strengths

June 1, 2020

Tighe&Bond

1

TODAY'S AGENDA

1:00 *Introduction & Workshop Goals*

1:10-1:20 *Natural Hazard Risks and Identified Community Assets -Survey Summary*

1:20-1:30 *Confirm Infrastructural Assets List and Strengths and Vulnerabilities (submit comments via Q&A)*

1:30-1:45 *Mitigation Action Definitions and Examples*

1:45-2:15 *Discussion on Mitigation Actions (submit comments via Q&A)*

2:15-2:30 *Wrap up and Participant Homework (post workshop survey)*

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WHY DO THIS PLANNING?

Help Royalston Build Resilience and Preparedness:

- Build on the Town's existing emergency management capabilities
- Plan for more frequent and intense weather events that are linked to climate change
- Engage multiple stakeholders in the planning process
- Improve access to funding for mitigation and adaptation

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3

HAZARD MITIGATION PLANNING PROCESS VS MVP

1) Define potential risk due to natural hazards including impacts of climate change
2) Identify key community assets and vulnerability to risk
3) Define mitigation projects to improve resiliency
4) Prioritize projects for areas most at risk

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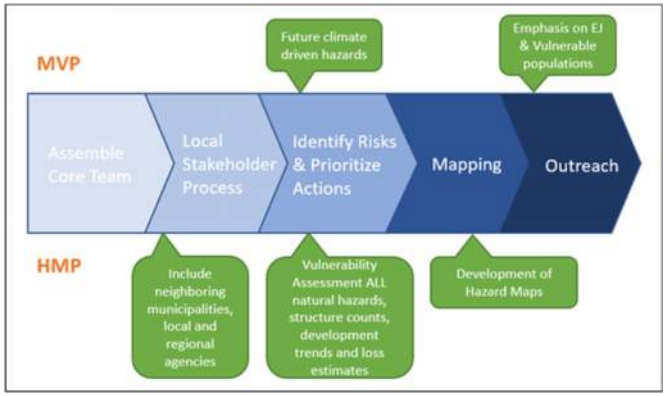
HOW DOES MVP PROCESS AUGMENT HMP?



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THANK YOU TO ROYALSTON'S MVP CORE TEAM

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Christine Long – Select Board
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Maureen Blasco – Conservation Commission
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Tom Kellner – Millers River Watershed Council
Curt Deveneau – Police Dept
Tom Musco – Emergency Mgmt

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ROYALSTON'S MVP WEBSITE

http://services.tighebond.com/mvp/royalston/

Community Resilience Building Workshop Dates/Time

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- Click here for Workshop #1 Q&A
- Click here for Workshop #1 Draft Community Resilience Building Matrix

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#3 Environmental Assets – Natural Resources and Open Space: June 8 – 1:00-2:30PM

Public Listening Session: June 15th 7:00-8:00 PM

Tighe&Bond

7

Session #1 Presentation

Identify Natural Hazards, Risk Areas and Community Strengths

1:10 PM

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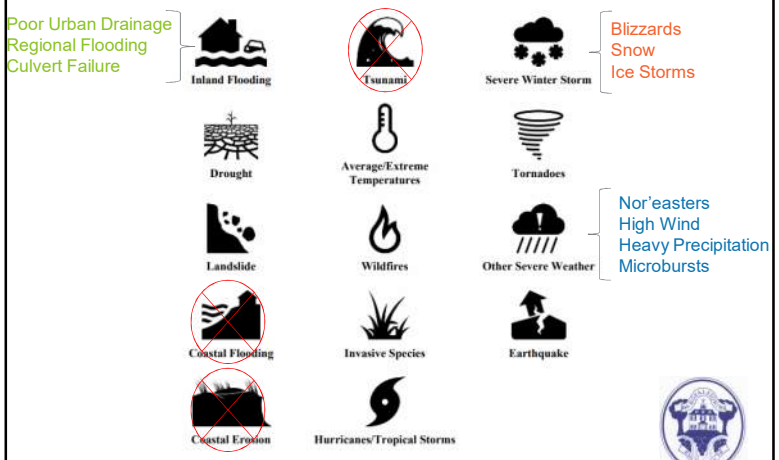
8

WHAT ARE NATURAL HAZARDS?



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9

TOP NATURAL HAZARDS IN ROYALSTON

- Heavy rain
- High wind
- Hurricanes / tropical storms
- Severe winter weather / ice storms / Nor'easters

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10

ROYALSTON'S TOP NATURAL HAZARDS THE SURVEY SAYS….

- HEAVY RAIN
- HIGH WIND EVENTS
- HURRICANES
- SEVERE WINTER WEATHER

AMPLIFIED RISKS

- Community and regional infrastructure
- Local and regional economies
- Public Health
- Natural resources and our environment

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11

WHAT ARE COMMUNITY ASSETS?

Societal

Infrastructure

Economy

Natural Resources

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12

PEOPLE – INFRASTRUCTURAL ASSETS

- Routes 32 and 68
- Athol Road, North Fitzwilliam Road, Winchendon Road
- Fire Stations
- Police Station
- Whitney Hall
- Town Hall
- Transfer Station
- Electrical Substation
- Water Tank and Wells
- Helicopter Landing Zones
- Bridges
- Birch Hill Dam and Tully Dam
- Wastewater Treatment Plant
- Communication towers
- Raymond School
- Royalston Post Office
- Royalston Community School

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13

Session #1 Discussion

Infrastructural Assets: Strengths and Vulnerabilities

1:20 PM

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Switch to Community Resilience Building Workshop Risk Matrix to review infrastructural assets and their strengths and vulnerabilities

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15

Session #2 Presentation

Identify Actions to Address Vulnerabilities and Protect Strengths

1:30 PM

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TYPES OF MITIGATION ACTIONS

1. Prevention
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5. Structural Projects
6. Emergency Services Protection

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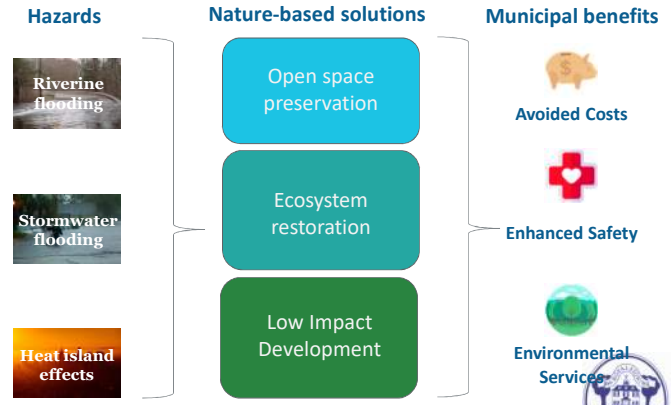

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18

Switch to Table 1: Mitigation Actions from 2015 Hazard Mitigation Plan to discuss status of mitigation actions from 2015 Montachusett Regional Hazard Mitigation Plan

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Switch to Community Resilience Building Workshop Risk Matrix to populate mitigation strategies

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20

Session #3

Wrap up and Assignments

2:15 PM

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21

PARTICIPANT ASSIGNMENTS

- **Sign up for the last workshop**
  - Environmental assets: June 8th, 1:00-2:30 PM
- **Take the Post Workshop Survey**
  - http://services.tighebond.com/mvp/royalston/
  - Will be posted after all workshops are completed
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TOWN OF ROYALSTON MUNICIPAL VULNERABILITY PREPAREDNESS

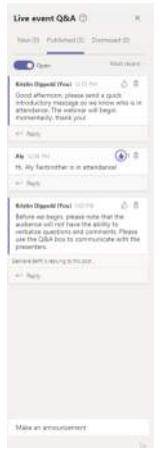
Community Resilience Building Workshop
Environmental Vulnerabilities & Strengths

June 8, 2020

Tighe&Bond

1

TODAY'S AGENDA



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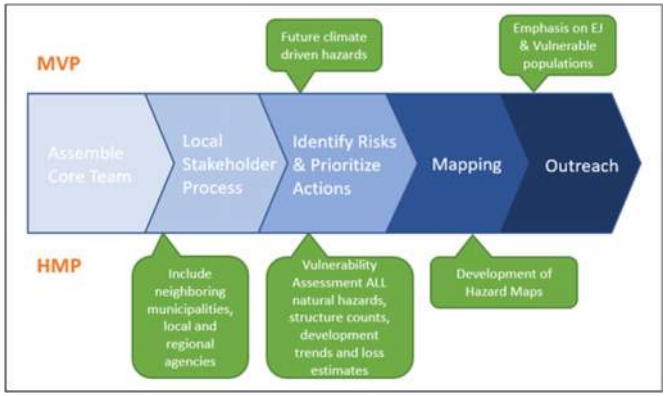

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Note: the webinars may have a period of silence for a few minutes at the beginning of the recording.

2. If you have not already done so, please take the pre-workshop survey, by clicking here . The results of the survey will be used in the workshops.

- Draft Survey Results can be seen here

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7

Session #1 Presentation

Identify Natural Hazards, Risk Areas and Community Strengths

1:10 PM

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WHAT ARE NATURAL HAZARDS?

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TOP NATURAL HAZARDS IN ROYALSTON

- Heavy rain
- High wind
- Hurricanes / tropical storms
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ROYALSTON'S TOP NATURAL HAZARDS THE SURVEY SAYS….

- HEAVY RAIN
- HIGH WIND EVENTS
- HURRICANES
- SEVERE WINTER WEATHER

+ CLIMATE CHANGE =

AMPLIFIED RISKS

- Community and regional infrastructure
- Local and regional economies
- Public Health
- Natural resources and our environment

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11

WHAT ARE COMMUNITY ASSETS?

Societal

Infrastructure

Economy

Natural Resources

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12

PEOPLE – ENVIRONMENTAL ASSETS

- Bullock Park
- Doane's Falls / Coddings Meadow
- Jacob's Hill / The Ledges / Spirit Falls
- Royalston Falls
- Millers River
- Collar Brook
- Kinney Brook
- East Branch Tully River
- Royalston Eagle Reserve
- Birch Hill WMA
- Lawrence Brook WMA
- Fish Brook WMA
- Millers River WMA
- Chase Memorial Forest
- Ehrich Memorial Forest
- Royalston, Warwick, Otter River State Forests
- Royalston Academy Conservation Area

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13

Session #1 Discussion

Environmental Assets: Strengths and Vulnerabilities

1:20 PM

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14

Switch to Community Resilience Building Workshop Risk Matrix to review environmental assets and their strengths and vulnerabilities

Tighe&Bond

15

Session #2 Presentation

Identify Actions to Address Vulnerabilities and Protect Strengths

1:30 PM

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16

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2. Property Protection
3. Public Education and Awareness
4. Natural Resource Protection and Green Infrastructure (nature-based solutions)
5. Structural Projects
6. Emergency Services Protection

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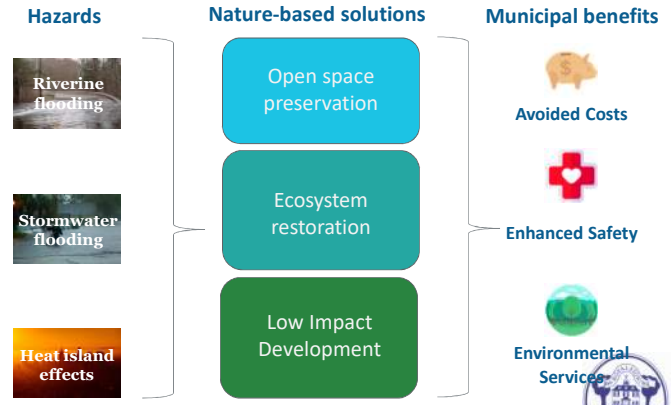
17

DISCUSSION ITEM: Mitigation Strategies



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18

Switch to Community Resilience Building Workshop Risk Matrix to populate mitigation strategies

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19

Session #3

Wrap up and Assignments

2:15 PM

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20

PARTICIPANT ASSIGNMENTS

- **Take the Post Workshop Survey**
  - http://services.tighebond.com/mvp/royalston/
- **Review the Draft Findings CRB Report**
  - Available on the website in mid-June
- **Attend the Listening Session**
  - June 15th, 7:00-8:00 PM

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STILL HAVE QUESTIONS OR COMMENTS?

Contact Information:

- **Gabrielle Belfit, CFM, Senior Environmental Scientist**
  - GCBelfit@tighebond.com
  - 508.304.6362
- **Emily Tully, Environmental Planner**
  - ETully@tighebond.com
  - 413.875.1622

Tighe&Bond

Royalston MVP Webinar #1: Societal Assets – Q&A

Kristin Dippold (You)
12:57 PM
Good afternoon, please send a quick introductory message so we know who is in attendance. Feel free to share your affiliation (business owner, resident, municipal staff, etc.). The webinar will begin momentarily, thank you!

Gary
12:58 PM
Council on Aging

Andrew Smith EEA
1:01 PM
Andrew Smith EEA

Deb D'Amico
1:02 PM
I'm here for Select Board.

Deb D'Amico
1:02 PM
Some folks having trouble accessing this webinar. Can you wait a bit longer?

Anonymous
1:03 PM
Hello. This is Rachel from Rep. Whipps office. Excited to be here!

Deb D'Amico
1:03 PM
Microsoft Teams not easy to get into. That could be why so few are on.

Deb D'Amico
1:04 PM
Microsoft Teams not at all easy to access. Could be why so few are here.

Tom Muso
1:04 PM
I had to log on anonymously.

Phil Rabinowitz
1:05 PM
I'm here. Had God's own time getting in. Not user-friendly at all.

Gabrielle Belfit (Moderator)
1:05 PM
sorry you had issues

Deb D'Amico
1:05 PM
...and then you have to join anonymously.

Gabrielle Belfit (Moderator)
1:06 PM

OK if we start

Deb D'Amico
1:08 PM
Yes, and Phil R also said difficult to get on.

Phil Rabinowitz
1:09 PM
Is anything happening? If so, I'm not getting it.

Deb D'Amico
1:09 PM
Go ahead.

Phil Rabinowitz
1:10 PM
OK now -- figured it out.

Kristin Dippold (You)
1:11 PM
We appreciate your cooperation with us as we navigate this online format. Please note that the audience will not have the ability to verbalize questions and comments. Use this Q&A box to communicate with the presenters. You may need to continually scroll down to see the moderator's questions and other participants comments.

Kristin Dippold (You)
1:11 PM
If you have an issue with Microsoft Teams please send a text message to our IT Support, Marc at 508-499-8193

Andrew Smith EEA
1:11 PM
We are muted and our cameras are off, correct?

Kristin Dippold (You)
1:12 PM
Correct. Please use the Q&A to communicate with the presenters. Thanks!

Kristin Dippold (You)
1:24 PM
Based on the survey, here are the societal assets for the Town of Royalston. Are there any other types of vulnerable populations that should be listed? Is this list missing anything? Should any items be deleted?

Anonymous
1:28 PM
Raymond School?

Tom Muso
1:28 PM
How about a list of residences that have backup generators?

Tom Muso
1:29 PM
Raymond School is closed at present

Tom Muso
1:30 PM

Ideally Raymond School would have a backup generator when it is open

Phil Rabinowitz
1:30 PM
Again -- how do we characterize groups of residents with specific supportive goals? There is a group focused on improving the South Village that could be used for other purposes. There's also a neighbor-to-neighbor help group.

Tom Muso
1:31 PM
Right now, I would say Raymond School is vulnerable - it has a leaky roof

Deb D'Amico
1:31 PM
Not sure if this is what are asking, but the Royalston community School is an asset as it can accommodate large groups of people, but there is no emergency power there, so it won't work as a shelter

Phil Rabinowitz
1:33 PM
By the same token -- residences with independent solar electric power

Deb D'Amico
1:33 PM
Is Raymond in a flood plain?

Gabrielle Belfit (Moderator)
1:34 PM
the community asset floodplain maps will have that information

Tom Muso
1:33 PM
The town now has a Facebook page as well as the Library town newsletter

Gabrielle Belfit (Moderator)
1:34 PM
That is great to add for communications

Deb D'Amico
1:34 PM
Should note that when you type a question here the program takes you away from the whole list of other people's conversations. So, you lose that unless you switch yourself back.

Deb D'Amico
1:41 PM
Is the Village School or the Royalston Community School the largest employer?

Kristin Dippold (You)
1:45 PM
The types of mitigation actions are prevention, property protection, public education and awareness, natural resource protection, structural projects, and emergency services protection. Does anyone have any ideas on mitigation actions for these specific assets?

Phil Rabinowitz
1:45 PM
Tully Lake campground is occasionally under water even now

Tom Muso
1:47 PM
cemeteries - trim or remove dead and/or dangerous trees

Deb D'Amico
1:50 PM
Town Common: trees vulnerable to high wind damage which could bring down power lines. Not sure what to do to mitigate

Deb D'Amico
1:53 PM
There is also quite a delay between when we type and when you see it.

Kristin Dippold (You)
1:53 PM
Great point! Thanks, Deb.

Deb D'Amico
1:53 PM
So we are here!

K. Filchak (MEMA)
1:54 PM
With respect to trees, are there any issues related to gypsy moths that may have harmed trees making them more susceptible to severe weather.

Phil Rabinowitz
1:55 PM
Vulnerable cemeteries and other low-lying areas could perhaps be fitted with drainage systems, where appropriate. Tully Lake campground, for example, couldn't be drained because the reservoir which floods it is meant to flood to prevent flooding up and down stream.

Deb D'Amico
1:59 PM
Re: trees on common - I believe insect damage has caused unhealthy trees which has caused loss. Perhaps replanting with trees that are known to be resilient/resistant to disease.

Gabrielle Belfit (Moderator)
2:00 PM
Great comment!

Deb D'Amico
2:01 PM
Would Bullock Park be considered a societal asset? If so, it also floods

Deb D'Amico
2:03 PM
And re: communications that would go out in an emergency - whatever internet we have currently would also be vulnerable which would lose Facebook/Web access

Anonymous
2:06 PM
Many seniors do not have computers

Tom Muso
2:09 PM
If we inventory homes with generators, we should know by survey which residents do not have a computer.

Deb D'Amico
2:11 PM
Seniors are connected locally though the Council on Aging. They have the ability to do outreach.

Deb D'Amico
2:13 PM
Senior network appears to be strong among seniors themselves. Key is to access that network for emergency announcements or door-to-door outreach.

Tom Muso
2:14 PM
Does the south village sewer treatment plant have backup power?

Gabrielle Belfit (Moderator)
2:15 PM
We will discuss the sewer treatment plant next week

Deb D'Amico
2:14 PM
South Village Common needs some thinking.

Deb D'Amico
2:17 PM
It's also an asset because its condition affects the spirit of the town and the folks who live in the Village.

Deb D'Amico
2:19 PM
Jim...I know who you should call for Council on Aging! We can talk...

Phil Rabinowitz
2:22 PM
There's a separate neighbor-to-neighbor help group that has been formed as a result of the present situation. It could be established as a semi-permanent group that could be activated whenever there's a town emergency situation.

Q&A – Royalston – Infrastructure

Kristin Dippold (You)
12:55 PM
Good afternoon - Please send a quick introductory message so we know who is in attendance. Feel free to share your affiliation. The webinar will begin momentarily, thank you!

Kristin Dippold (You)
12:56 PM
If you would like to call into the meeting, please dial 978-703-6483 and use conference ID 177914577#

Phil
12:56 PM
Hi -- Phil Rabinowitz, Capital Planning and Finance Committee

Anonymous
12:57 PM
Jim Barclay

Kristin Dippold (You)
12:58 PM
Jim, please dial in when you are ready. Thank you!

Jim
12:59 PM
I have to dial in by phone?

Kevin Filchak
1:02 PM
Kevin Filchak - MA Emergency Management Agency, Local Coordinator.

Jim
1:02 PM
I'm on the phone, but muted.

Jim
1:02 PM
The Internet in Royalston is painfully slow today! We may have issues.

Deb D'Amico
1:02 PM
Checking in. Select Board Chair.

Deb D'Amico
1:03 PM
There is a pretty significant delay between when I post a question and when it shows up here. could be internet issues...

Kristin Dippold (You)
1:05 PM
Hi Deb - Unfortunately a delay is normal for the Microsoft Teams program. If you'd rather call into the meting you can do so.

Deb D'Amico
1:09 PM
Ok. Good to know. I'll stay online for now.

Deb D'Amico
1:12 PM
Is everyone still there?

Kristin Dippold (You)
1:13 PM
Yes - we are here. If the audio does not catch up soon, please let me know.

Phil
1:15 PM
Deb, try calling in using the phone no. and the meeting id on this list of questions

Deb D'Amico
1:15 PM
You have started? I hear nothing!

Kristin Dippold (You)
1:15 PM
To call in dial 978-703-6483 and use conference ID 177914577#

Kristin Dippold (You)
1:18 PM
If you have joined us by phone, please mute your microphone when not speaking to avoid background noise.

Jim
1:18 PM
Need to allow for the delay between the phone and the slides on the screen.

Anonymous
1:25 PM
Is there any way to make the spreadsheet larger? Hard to view?

Deb D'Amico
1:27 PM
Thank you. That's better!

Deb D'Amico
1:28 PM
Vulnerability on Northeast Fitzwilliam road: prone to flooding.

Gary
1:29 PM
Athol Road not completed

Deb D'Amico
1:32 PM
I believe some culvert clean out from recent construction is still needed from contractor.

Gary

1:33 PM
water Phil talked about due to Keating not completed work schedule for spring. outstanding issue with project manager

Deb D'Amico
1:36 PM
What about the flooding on Norcross Rd near the wetlands?

Deb D'Amico
1:39 PM
Yes

Deb D'Amico
1:41 PM
Is the South Village Bridge at the RR crossing?

Gary
1:42 PM
Lawrence brook Bridge new drainage corrects problem

Deb D'Amico
1:43 PM
Is a vulnerability at Town Hall the fact that there is no backup power there?

Gary
1:43 PM
Corps of Engineers

Deb D'Amico
1:44 PM
Drainage issues around/near Raymond building. I think there is a plan to provide mitigation around the perimeter of the building, but that whole area is in a high water table area.
Gary
1:45 PM
Birch Hill Dam controls that water

Deb D'Amico
1:45 PM
Stockwell Rd Bridge fixed.

Gary
1:47 PM
Station only one with generator

Gary
1:47 PM
Station 1 only one with generator

Scott Farrar, National Grid
1:54 PM
No known vulnerabilities with Royalston Sub. Keep in mind that the Town is fed from Royalston, Athol (Chestnut Hill Sub) and a bit from Winchendon.

Gary
1:55 PM
manganese no longer a problem

Gary
1:58 PM
I spelled it wrong.

Gary
2:04 PM
where on web site is it posted?

Emily Tully (Moderator)
2:07 PM
Hi, Gary, the CRB matrix from today will be posted on the website in a few days once we clean it up and make sure all of today's comments are incorporated

Scott Farrar, National Grid
2:26 PM
We have a hazard tree program that is used to identify hazard trees near our lines and remove if possible.

Scott Farrar, National Grid
2:26 PM
This is in addition to our normal tree trimming practices.

Scott Farrar, National Grid
2:28 PM
The success of the tree program depends on large part to a good relationship with the tree warden.

Gary
2:30 PM
Senator Brewer

Gary
2:37 PM
DSL is fine

Gary
2:45 PM
not in flood plain

Gary
2:46 PM
where on website?

Gary
2:47 PM
I just loaded it

Scott Farrar, National Grid
2:47 PM
We do have an electric hardening program where we identify poles, wires, grounding etc for replacement to make the system more resilient.

Gary
2:48 PM
Thank you

Gary
2:49 PM
Where do I send my bill?

Royalston – Webinar #3 – Environment

Attendees:

1. Jim Barclay
2. Phil Rabinowitz
3. Chris
4. Gary
5. Kevin Filchak
6. Deborah D'Amico
7. Rachel (from Rep. Whipps office)

Gary
1:01 PM
I am listening

Kristin Dippold (You)
1:02 PM
Welcome! If you are just joining, please introduce yourself so we know who is in attendance. We will begin the webinar soon.

Gary
1:03 PM
I am fast

K. Filchak
1:03 PM
MEMA is on.

Anonymous
1:05 PM
This is Rachel from Rep. Whipps office, excited to be here!

Jim Barclay
1:06 PM
Still not seeing slides on Teams.

Deb D'Amico
1:14 PM
What slide should we be seeing?

Jim Barclay
1:14 PM
I dropped out and rejoined and the slides are now showing.

Deb D'Amico
1:14 PM

OK. I'll be patient!

Deb D'Amico
1:17 PM
I have to keep refreshing and logging back in for the slides to change. I'll do my best to hang in here, but this is a challenge today.

Deb D'Amico
1:21 PM
I'm going to sign off. Too hard to follow without the slides. Sorry! Still on "What are natural Hazards?" slide.

Jim Barclay
1:21 PM
Need to be sure everyone has the spreadsheet, especially Deb.

Jim Barclay
1:22 PM
Not yet.

Gary
1:27 PM
Bullock Park has drainage, repaired last year

Gary
1:34 PM
Royalston Falls attracts people that get lost

Gary
1:51 PM
Refresh - ctl - F5

Kristin Dippold (You)
1:51 PM
Thanks for the tip!

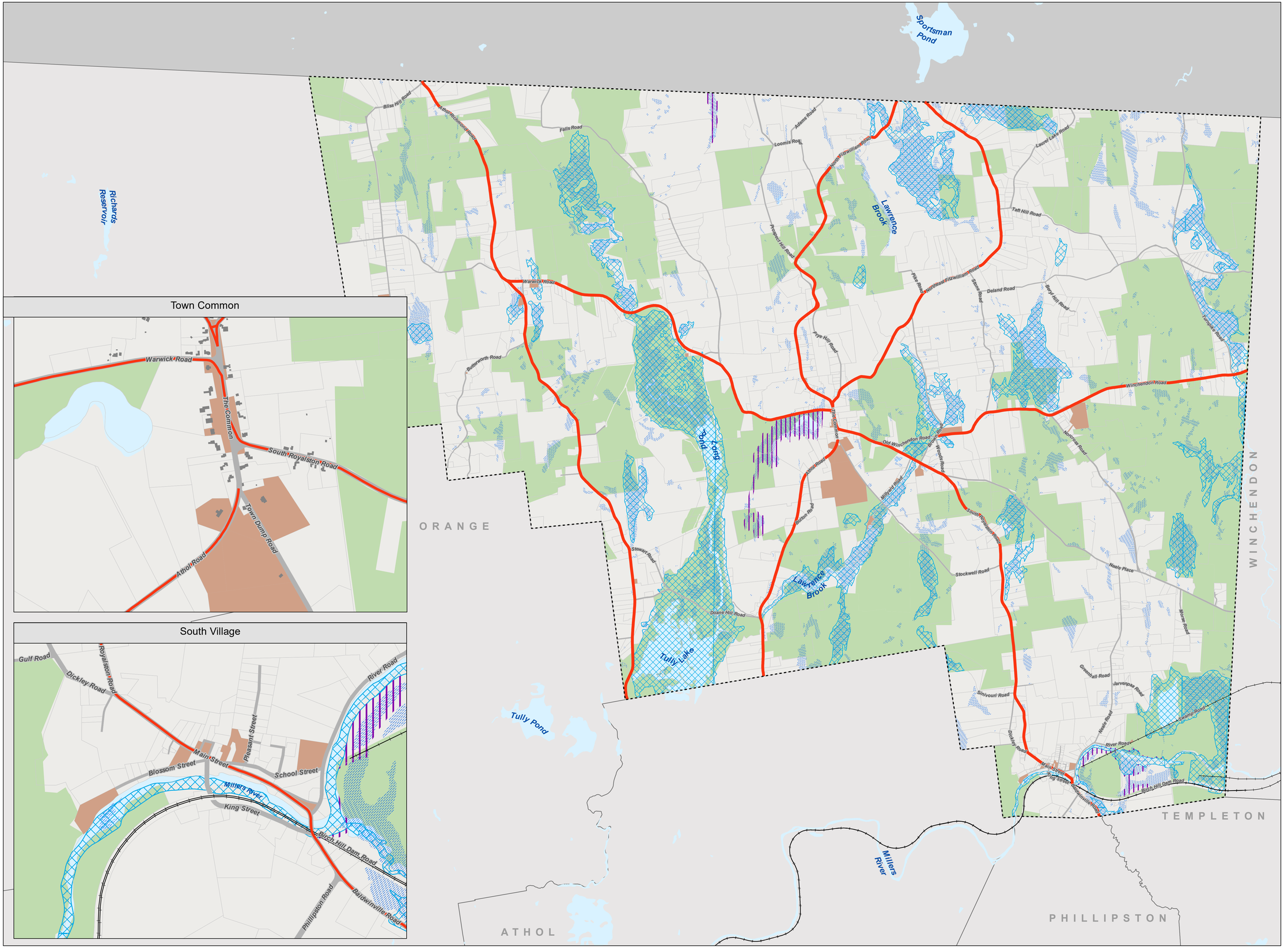
Jim Barclay, Again
1:55 PM
Not showing, yet.

Deb D'Amico
2:01 PM
Signing off here. I can't follow this without being able to see as well as hear. I have great faith in the folks who are on. Thanks for everyone's input.

Tighe&Bond

APPENDIX E

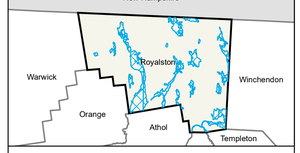
Figure 2
FEMA Flood Hazard Zones



LEGEND

- Railroad
- Transportation/ Evacuation Route
- Town Owned Property
- X500 Flood Zone
- 100 Year Flood Zone
- MassDEP Inland Wetlands
- Open Space/ Recreation
- Waterbody
- Parcel Boundary
- Town Boundary

LOCUS MAP



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Feet

1:24,000

NOTES

Based on datalayers provided by MassGIS and Town of Royalston, MA

Community Assets
Municipal Vulnerability Preparedness
Planning Grant
Royalston, Massachusetts

March 2020

Tighe&Bond

Path: G:\GIS\MA\RoyalstonMA\avproj\MVP_FloodZones_24x36.mxd

R-0177

Tighe&Bond

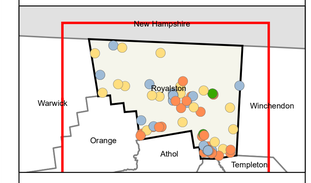
APPENDIX F

Figure 1
Community Assets

LEGEND

- Built Environment/ Infrastructure
- Economic Resources
- Natural Resources
- Societal/ Vulnerable Population
- Railroad
- Transportation/ Evacuation Route
- Town Owned Property
- Open Space/ Recreation
- Waterbody
- Parcel Boundary
- Town Boundary

LOCUS MAP



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1:24,000

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Royalston, Massachusetts

March 2020

Tighe&Bond

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R-0177

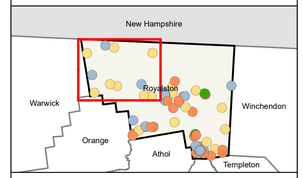
Figure 1
Community Assets

Category	ID	Name
Natural Resources	N4	Collar Brook
	N7	East Branch Tully River and Long Pond
	N8	Ehrich Memorial Forest
	N9	Fish Brook Wildlife Management Area
	N10	Jacob's Hill/The Ledges/Spirit Falls
	N17	Royalston Falls
	N18	Royalston State Forest
	N20	Warwick State Forest
Societal/ Vulnerable Population	S2	Gale and Gates Cemetery
	S7	Newtown Cemetery
	S22	Under the Hill Cemetery

LEGEND

- Built Environment/ Infrastructure
- Economic Resources
- Natural Resources
- Societal/ Vulnerable Population
- Railroad
- Transportation/ Evacuation Route
- Town Owned Property
- Open Space/ Recreation
- Waterbody
- Parcel Boundary
- Town Boundary

LOCUS MAP



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Feet

1:9,600

NOTES

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Royalston, Massachusetts

March 2020

Tighe&Bond

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Figure 1
Community Assets

LEGEND

- Built Environment/ Infrastructure
- Economic Resources
- Natural Resources
- Societal/ Vulnerable Population
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- Transportation/ Evacuation Route
- Town Owned Property
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- Waterbody
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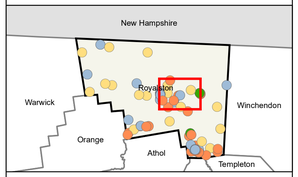
LOCUS MAP



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NOTES

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Community Assets
Municipal Vulnerability Preparedness
Planning Grant
Royalston, Massachusetts

March 2020

Tighe&Bond

Category	ID	Name
Built Environment/ Infrastructure	B9	Lawrence Brook Bridge
	B10	Northeast Fitzwilliam Road Bridge
	B15	Royalston DPW Building
	B26	Stockwell Road Bridge
Natural Resources	N3	Chase Memorial Forest
	N16	Royalston Academy Conservation Area
Societal/ Vulnerable Population	S4	Jonas Alliene Cemetery
	S5	Lawrence Brook Cemetery

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R-0177

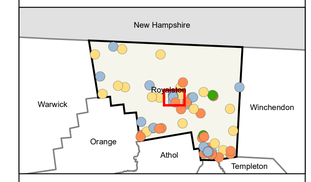
Figure 1
Community Assets

Category	ID	Name
Built Environment/ Infrastructure	B12	Raymond Building
	B13	Raymond School Well
	B16	Royalston Fire Station
	B18	Royalston Police Station
	B20	Royalston Town Hall
	B21	Royalston Transfer Station
Natural Resources	N2	Bullock Park
	N12	Lawrence Brook Wildlife Conservation Area
Societal/ Vulnerable Population	S1	First Congregational Church
	S8	Olde Center Cemetery
	S9	Phinehas S Newton Library
	S12	Royalston Historic District
	S13	Royalston Historical Society
	S14	Royalston Post Office
	S15	Royalston Town Hall
	S20	Town Common

LEGEND

- Built Environment/ Infrastructure
- Economic Resources
- Natural Resources
- Societal/ Vulnerable Population
- Railroad
- Transportation/ Evacuation Route
- Town Owned Property
- Open Space/ Recreation
- Waterbody
- Parcel Boundary
- Town Boundary

LOCUS MAP



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Feet

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NOTES

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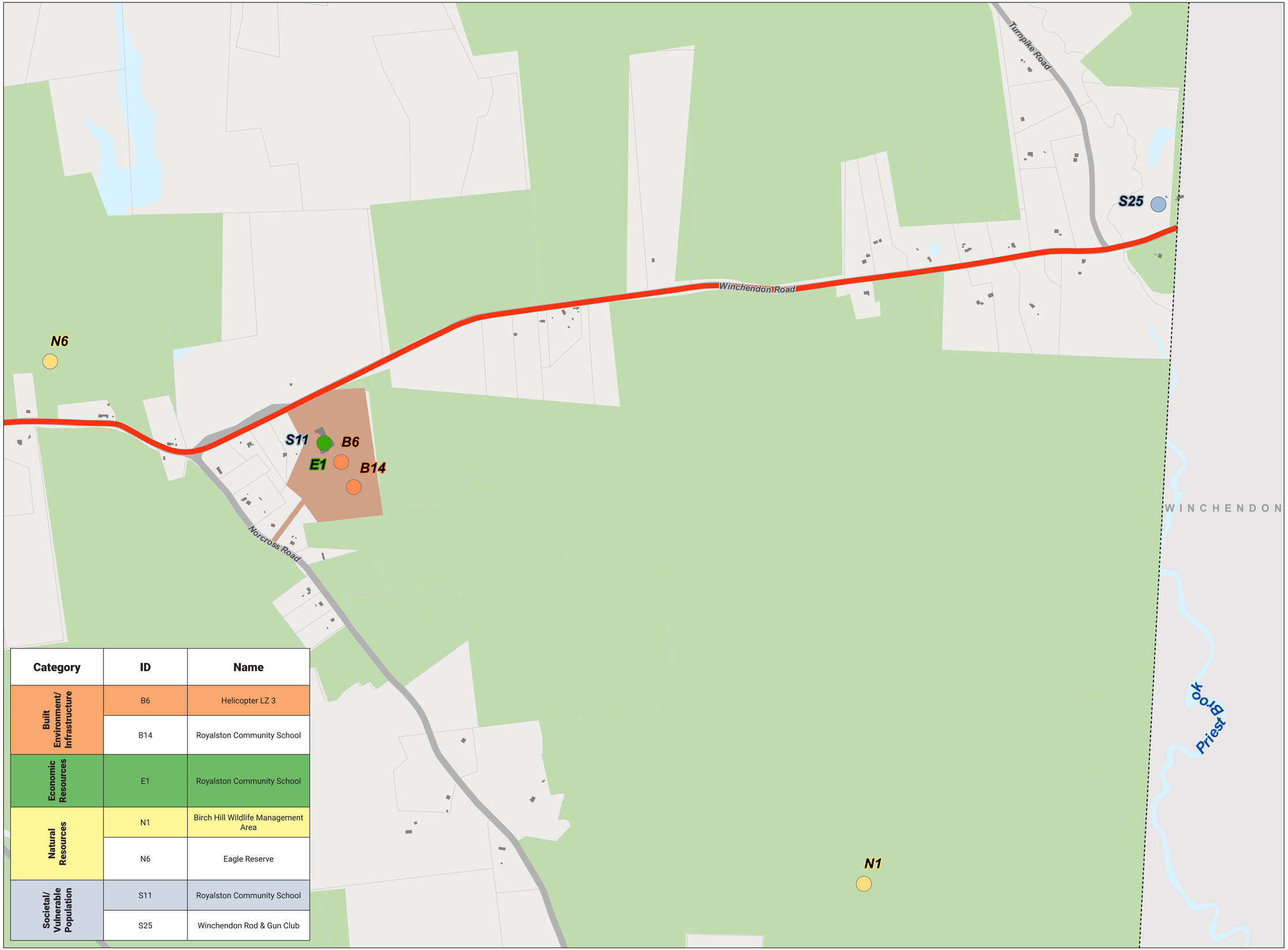
Royalston, Massachusetts

March 2020

Tighe&Bond



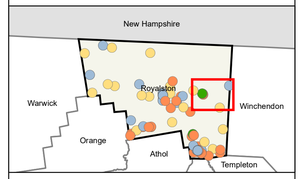
Category	ID	Name
Built Environment/ Infrastructure	B6	Helicopter LZ 3
	B14	Royalston Community School
Economic Resources	E1	Royalston Community School
Natural Resources	N1	Birch Hill Wildlife Management Area
	N6	Eagle Reserve
Societal/ Vulnerable Population	S11	Royalston Community School
	S25	Winchendon Rod & Gun Club

Figure 1
Community Assets

LEGEND

- Built Environment/ Infrastructure
- Economic Resources
- Natural Resources
- Societal/ Vulnerable Population
- Railroad
- Transportation/ Evacuation Route
- Town Owned Property
- Open Space/ Recreation
- Waterbody
- Parcel Boundary
- Town Boundary

LOCUS MAP



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Royalston, Massachusetts

March 2020

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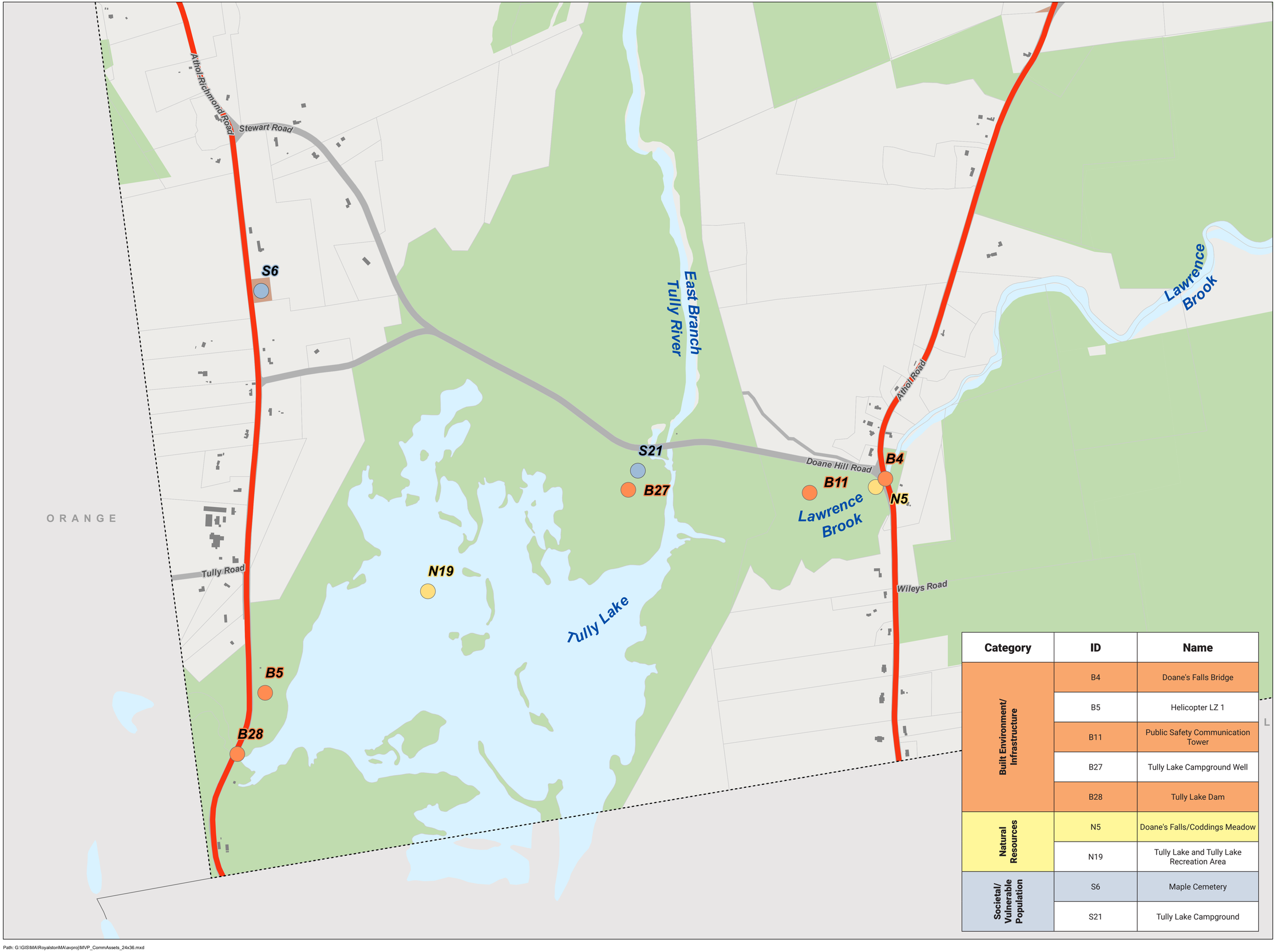
R-0177

Figure 1
Community Assets



Category	ID	Name
Built Environment/ Infrastructure	B4	Doane's Falls Bridge
	B5	Helicopter LZ 1
	B11	Public Safety Communication Tower
	B27	Tully Lake Campground Well
	B28	Tully Lake Dam
Natural Resources	N5	Doane's Falls/Coddings Meadow
	N19	Tully Lake and Tully Lake Recreation Area
Societal/ Vulnerable Population	S6	Maple Cemetery
	S21	Tully Lake Campground

LEGEND

- Built Environment/ Infrastructure
- Economic Resources
- Natural Resources
- Societal/ Vulnerable Population
- Railroad
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- Open Space/ Recreation
- Waterbody
- Parcel Boundary
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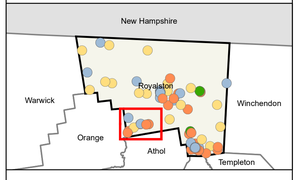
LOCUS MAP



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Community Assets
Municipal Vulnerability Preparedness Planning Grant
Royalston, Massachusetts

March 2020

Tighe&Bond

Path: G:\GIS\MA\RoyalstonMA\avproj\MVP_CommAssets_24x36.mxd

R-0177

Figure 1
Community Assets

South Royalston Road
Stockwell Road
Lawrence Brook
Greenhall Road
Jolly Road
Sinivouri Road
ATHOL

B19
N14
E3
S19
B29
B3

Category	ID	Name
Built Environment/ Infrastructure	B3	Camp Caravan
	B19	Royalston Substation #701
	B29	Village School Well
Economic Resources	E3	The Village School
Natural Resources	N14	Millers River Wildlife Management Area
Societal/ Vulnerable Population	S19	The Village School

LEGEND

- Built Environment/ Infrastructure
- Economic Resources
- Natural Resources
- Societal/ Vulnerable Population
- Railroad
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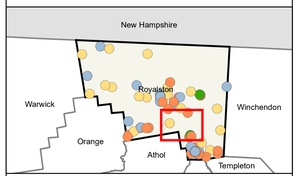
- Town Boundary

LOCUS MAP



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NOTES

Based on datalayers provided by MassGIS and Town of Royalston, MA

Community Assets
Municipal Vulnerability Preparedness Planning Grant
Royalston, Massachusetts

March 2020

Tighe&Bond

Path: G:\GIS\MA\RoyalstonMA\avproj\MVP_CommAssets_24x36.mxd

R-0177

Category	ID	Name
Built Environment/ Infrastructure	B1	Birch Hill Dam
	B7	Helicopter LZ 3
	B23	South Royalston Railroad
Natural Resources	N11	Kenny Brook
	N13	Millers River
	N15	Otter River State Forest

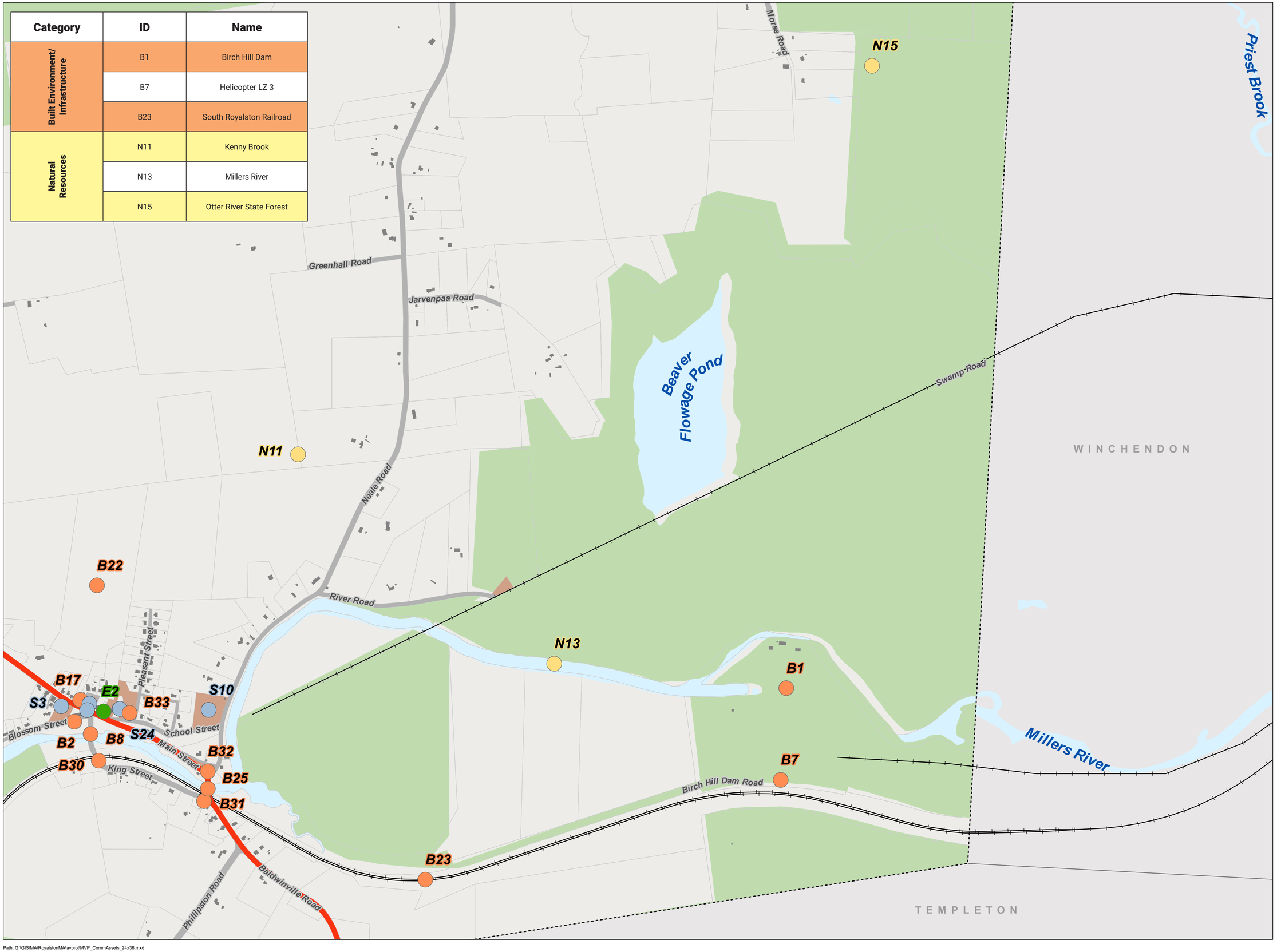
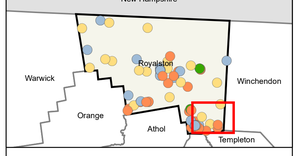


Figure 1
Community Assets

LEGEND

- Built Environment/ Infrastructure
- Economic Resources
- Natural Resources
- Societal/ Vulnerable Population
- Railroad
- Transportation/ Evacuation Route
- Town Owned Property
- Open Space/ Recreation
- Waterbody
- Parcel Boundary
- Town Boundary

LOCUS MAP



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NOTES

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Community Assets
Municipal Vulnerability Preparedness
Planning Grant
Royalston, Massachusetts

March 2020

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Path: G:\GIS\MA\RoyalstonMA\avproj\MVP_CommAssets_24x36.mxd

R-0177

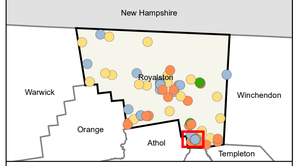
Figure 1
Community Assets

Category	ID	Name
Built Environment/ Infrastructure	B2	Blossom Street Rock Well
	B8	King Road Bridge
	B17	Royalston Fire Station #2
	B22	Royalston Water Tank
	B24	South Royaslton Wastewater Treatment Plant
	B25	South Village Bridge
	B30	Wastewater Pumping Staion 96-4555-AM
	B31	Wastewater Pumping Station 96-4556-AM
	B32	Wastewater Pumping Station 96-4557-AM
	B33	Whitney Hall
Economic Resources	E2	Royalston General Store
Societal/ Vulnerable Population	S3	Hillside Cemetery
	S10	Riverside Cemetery
	S16	Second Congregational Church
	S17	South
	S18	South Village Common
	S23	Vale do Amanhecer
	S24	Whitney Hall

LEGEND

- Built Environment/ Infrastructure
- Economic Resources
- Natural Resources
- Societal/ Vulnerable Population
- Railroad
- Transportation/ Evacuation Route
- Town Owned Property
- Open Space/ Recreation
- Waterbody
- Parcel Boundary
- Town Boundary

LOCUS MAP



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APPENDIX G

The table below indicates the history and possibility for future occurrence of each hazard, current frequency and geographical extent, severity of hazard impact, and results of a hazard index ranking based on a scale of 1 (highest risk) through 5 (lowest risk).

Natural Hazard Risk Index- Royalston, MA

Type of Natural Hazard	History of Occurrence in Royalston	Hazard Probability	Hazard Frequency	Geographic Extent	Severity of Impact	Hazard Risk Ranking
Hydrological Hazards						
Flood Related						
• Heavy Rain	Yes	4	3	2	3	1
• Ice Jams	Yes	3	3	1	4	2
• Beavers	Yes	4	3	1	2	2
• Snow Melt	Yes	3	2	2	2	3
• Dam Failure	Yes	1	1	1	4	4
Coastal Flooding	No	0	0	0	0	NA
Drought	Yes	2	3	3	2	2
Atmospheric Hazards						
High Winds	Yes	4	3	3	3	1
Hurricanes/Tropical Storms	Yes	3	3	3	3	1
Severe Winter-Storm/Nor'easter	Yes	3	3	3	3	1
Heavy Snow	Yes	4	3	3	2	1
Ice Storms	Yes	4	3	3	3	1
Severe Weather-Thunderstorms	Yes	4	3	2	2	2
Blizzards	Yes	3	2	3	2	2
Extreme Temperature	Yes	4	3	3	1	2
Tornadoes	Yes	3	1	1	3	3
Geological Hazards						
Coastal Erosion	No	0	0	0	0	NA
Earthquake	Yes	2	2	2	1	4
Landslide	No	1	0	1	2	5
Tsunami	No	NA	NA	NA	NA	NA
Other Hazards						
Wildfires	Yes	3	3	1	1	3
Invasive Species	Yes	4	3	1	1	3
Cyanobacteria	Yes	3	3	1	1	3

Definitions

Points		Description
Hazard Probability (Possible occurrence in the future)		
1	Unlikely	Less than a 1% probability over the next 100 years
2	Possible	1-10% probability in the next year or at least one chance in the next 100 years
3	Likely	10-100% probability in the next year or at least one chance in the next 10 years
4	Highly Likely	Near 100% probability in the next year
Hazard Frequency		
0	Very Low	Events that occur less frequently than once in 1,000 years (less than 0.1% per year).
1	Low	Events that occur from once in 100 years to once in 1,000 years (0.1% - 1% per year).
2	Medium	Events that occur from once in 10 years to once in 100 years (1% - 10% per year).
3	High	Events that occur more frequently than once in 10 years (greater than 10% per year).
Geographical Extent (Area Impacted by a Given Natural Hazard)		
1	Small	Less than 10% of the Town affected
2	Medium	10-50% of the Town affected
3	Large	More than 50% of the Town affected
Severity of Impact from Hazard		
1	Minor	Limited and scattered property damage; no damage to public infrastructure (roads, bridges, trains, airports, public parks, etc.); contained geographic area (i.e. one or two communities); essential services (utilities, hospitals, schools, etc.) not interrupted; no injuries or fatalities.
2	Serious	Scattered major property damage (more than 10% destroyed); some minor infrastructure damage; wider geographic area (several communities); essential services briefly interrupted up to 1 day; some minor injuries.
3	Extensive	Consistent major property damage (more than 25%); major damage public infrastructure damage (up to several days for repairs); essential services are interrupted from several hours to several days; many injuries and possible fatalities.
4	Catastrophic	Property and public infrastructure destroyed (more than 50%); essential services stopped for 30 days or more, multiple injuries and fatalities.

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APPENDIX H

Massachusetts Statewide and Major Basins Climate Projections

Millers River Basin Summaries

Prepared by: New England Climate Adaptation Science Center, March 2018

Prepared for: Massachusetts State Hazard MItigation and Climate Adaptation Plan, 2019

MILLERS BASIN

MUNICIPALITIES WITHIN MILLERS BASIN:

Ashburnham, Athol, Erving, Gardner, Hubbardston, Montague, New Salem, Northfield, Orange, Petersham, Phillipston, Royalston, Templeton, Warwick, Wendell, Westminster, and Winchendon

Many municipalities fall within more than one basin, so it is advised to use the climate projections for the basin that contains the majority of the land area of the municipality.

MILLERS BASIN

Millers Basin		Observed Baseline 1971-2000 (°F)	Projected Change in 2030s (°F)	Mid-Century Projected Change in 2050s (°F)	Projected Change in 2070s (°F)	End of Century Projected Change in 2090s (°F)
Average Temperature	Annual	44.7	+2.2 to +4.5	+3.0 to +6.3	+3.5 to +8.9	+3.9 to +10.8
	Winter	22.4	+2.4 to +5.2	+2.9 to +7.6	+3.8 to +9.1	+4.2 to +10.5
	Spring	43.2	+1.5 to +3.4	+2.3 to +5.2	+2.6 to +7.3	+3.0 to +8.9
	Summer	66.0	+2.2 to +4.5	+3.1 to +7.1	+3.4 to +10.5	+3.8 to +12.9
	Fall	47.0	+2.1 to +5.2	+3.6 to +6.5	+3.5 to +9.4	+4.0 to +11.7
Maximum Temperature	Annual	56.6	+2.0 to +4.2	+2.6 to +6.4	+3.1 to +9.1	+3.5 to +11.0
	Winter	33.1	+1.9 to +4.5	+2.5 to +6.7	+3.0 to +8.0	+3.4 to +9.0
	Spring	55.2	+1.3 to +3.2	+2.1 to +5.3	+2.6 to +7.6	+3.1 to +9.2
	Summer	78.7	+1.9 to +4.7	+2.8 to +7.4	+3.2 to +11.0	+3.6 to +13.6
	Fall	58.8	+2.3 to +5.0	+3.5 to +7.0	+3.3 to +9.9	+3.9 to +12.2
Minimum Temperature	Annual	32.9	+2.3 to +4.9	+3.3 to +6.4	+3.8 to +8.8	+4.2 to +10.9
	Winter	11.6	+2.7 to +6.1	+3.5 to +8.4	+4.4 to +10.2	+4.8 to +11.7
	Spring	31.1	+1.6 to +3.8	+2.4 to +5.6	+2.7 to +7.1	+3.1 to +8.8
	Summer	53.3	+2.4 to +4.6	+3.2 to +7.3	+3.6 to +9.9	+4.0 to +12.3
	Fall	35.2	+1.8 to +5.3	+3.4 to +6.6	+3.6 to +9.0	+4.0 to +11.4

- The Millers basin is expected to experience increased average temperatures throughout the 21st century. Maximum and minimum temperatures are also expected to increase throughout the end of the century. These increased temperature trends are expected for annual and seasonal projections.
- Seasonally, maximum summer and fall temperatures are expected to see the highest projected increase throughout the 21st century.
    - Summer mid-century increase of 2.8 °F to 7.4 °F (3-9% increase); end of century increase of 3.6 °F to 13.6 °F (5-17% increase).
    - Fall mid-century increase of 3.5 °F to 7.0°F (6-12% increase); end of century increase by and 3.9 °F to 12.2 °F (7-21% increase).
- Seasonally, minimum winter and fall temperatures are expected to see increases throughout the 21st century.
    - Winter mid-century increase of 3.5 °F to 8.4 °F (30-72% increase); end of century increase by 4.8 °F to 11.7 °F (41-100% increase).
    - Fall mid-century of 3.4 °F to 6.6 °F (10-19% increase); end of century increase of 4°F to 11.4 °F (11-32% increase).

MILLERS BASIN

Millers Basin		Observed Baseline 1971-2000 (Days)	Projected Change in 2030s (Days)	Mid-Century Projected Change in 2050s (Days)	Projected Change in 2070s (Days)	End of Century Projected Change in 2090s (Days)
Days with Maximum Temperature Over 90°F	Annual	4	+5 to +16	+8 to +30	+10 to +51	+12 to +70
	Winter	0	+0 to +0	+0 to +0	+0 to +0	+0 to +0
	Spring	<1[66]	+<1[66] to +1	+<1[66] to +2	+<1[66] to +3	+<1[66] to +5
	Summer	4	+5 to +15	+7 to +26	+9 to +43	+10 to +57
	Fall	<1[66]	+<1[66] to +1	+<1[66] to +3	+<1[66] to +7	+1 to +9
Days with Maximum Temperature Over 95°F	Annual	<1[66]	+1 to +6	+2 to +13	+2 to +28	+3 to +44
	Winter	0	+0 to +0	+0 to +0	+0 to +0	+0 to +0
	Spring	0	+0 to +<1[66]	+<1[66] to +<1[66]	+<1[66] to +1	+0 to +2
	Summer	<1[66]	+1 to +5	+2 to +12	+2 to +25	+3 to +40
	Fall	0	+0 to +<1[66]	+<1[66] to +1	+<1[66] to +2	+<1[66] to +3
Days with Maximum Temperature Over 100°F	Annual	0	+<1[66] to +1	+<1[66] to +3	+<1[66] to +9	+<1[66] to +20
	Winter	0	+0 to +0	+0 to +0	+0 to +0	+0 to +0
	Spring	0	+0 to +<1[66]	+0 to +<1[66]	+0 to +<1[66]	+0 to +<1[66]
	Summer	0	+<1[66] to +1	+<1[66] to +3	+<1[66] to +9	+<1[66] to +19
	Fall	0	+0 to +<1[66]	+0 to +<1[66]	+0 to +<1[66]	+0 to +1

- Due to projected increases in average and maximum temperatures throughout the end of the century, the Millers basin is also expected to experience an increase in days with daily maximum temperatures over 90 °F, 95 °F, and 100 °F.
    - Annually, the Millers basin is expected to see days with daily maximum temperatures over 90 °F increase by 8 to 30 more days by mid-century, and 12 to 70 more days by the end of the century.
    - Seasonally, summer is expected to see an increase of 7 to 26 more days with daily maximums over 90 °F by mid-century.
    - By end of century, the Millers basin is expected to have 10 to 57 more days.

[66] Over the observed period, there were some years with at least 1 day with seasonal Tmax over a certain threshold while in all the other years that threshold wasn't crossed seasonally at all.

MILLERS BASIN

Millers Basin		Observed Baseline 1971-2000 (Days)	Projected Change in 2030s (Days)	Mid-Century Projected Change in 2050s (Days)	Projected Change in 2070s (Days)	End of Century Projected Change in 2090s (Days)
Days with Minimum Temperature Below 0°F	Annual	19	-6 to -11	-8 to -13	-9 to -14	-9 to -15
	Winter	18	-5 to -10	-7 to -12	-8 to -13	-8 to -14
	Spring	1	-0 to -1	-0 to -1	-0 to -1	-0 to -1
	Summer	0	-0 to -0	-0 to -0	-0 to -0	-0 to -0
	Fall	<1[67]	-0 to -0	-0 to -0	-0 to -0	-0 to -0
Days with Minimum Temperature Below 32°F	Annual	177	-11 to -28	-19 to -35	-22 to -49	-22 to -58
	Winter	88	-1 to -4	-1 to -5	-2 to -10	-2 to -13
	Spring	49	-4 to -10	-6 to -15	-7 to -19	-9 to -21
	Summer	<1[67]	-0 to -0	-0 to -1	-0 to -1	-0 to -1
	Fall	40	-5 to -14	-10 to -17	-9 to -22	-10 to -26

- Due to projected increases in average and minimum temperatures throughout the end of the century, the Millers basin is expected to experience a decrease in days with daily minimum temperatures below 32 °F and 0 °F.
- Seasonally, winter, spring and fall are expected to see the largest decreases in days with daily minimum temperatures below 32 °F.
    - Winter is expected to have 1 to 5 fewer days by mid-century, and 2 to 13 fewer by end of century.
    - Spring is expected to have 6 to 15 fewer days by mid-century, and 9 to 21 fewer days by end of century.
    - Fall is expected to have 10 to 17 by mid-century, and 10 to 26 fewer days by end of century.

[67] Over the observed period, there were some years with at least 1 day with seasonal Tmin under a certain threshold while in all the other years that threshold wasn't crossed seasonally at all.

MILLERS BASIN

Millers Basin		Observed Baseline 1971-2000 (Degree-Days)	Projected Change in 2030s (Degree-Days)	Mid-Century Projected Change in 2050s (Degree-Days)	Projected Change in 2070s (Degree-Days)	End of Century Projected Change in 2090s (Degree-Days)
Heating Degree-Days (Base 65°F)	Annual	7741	-610 to -1278	-824 to -1742	-970 to -2303	-1076 to -2685
	Winter	3857	-200 to -486	-259 to -702	-341 to -826	-387 to -963
	Spring	2019	-126 to -293	-196 to -446	-216 to -595	-268 to -700
	Summer	201	-65 to -113	-88 to -145	-96 to -166	-103 to -176
	Fall	1666	-170 to -423	-304 to -510	-284 to -716	-304 to -839
Cooling Degree-Days (Base 65°F)	Annual	327	+171 to +367	+233 to +647	+266 to +1016	+308 to +1349
	Winter	0	+0 to +0	+0 to +0	+0 to +0	+0 to +0
	Spring	13	+8 to +22	+12 to +43	+17 to +73	+14 to +102
	Summer	289	+142 to +302	+177 to +511	+205 to +796	+232 to +1014
	Fall	23	+17 to +60	+26 to +100	+32 to +172	+44 to +236
Growing Degree-Days (Base 50°F)	Annual	2002	+362 to +746	+487 to +1189	+589 to +1777	+667 to +2253
	Winter	2	-3 to +6	-2 to +7	-1 to +9	+1 to +10
	Spring	215	+55 to +114	+78 to +202	+98 to +307	+97 to +401
	Summer	1471	+202 to +415	+277 to +654	+308 to +961	+345 to +1184
	Fall	305	+93 to +249	+142 to +350	+139 to +541	+184 to +677

- Due to projected increases in average, maximum, and minimum temperatures throughout the end of the century, the Millers basin is expected to experience a decrease in heating degree-days, and increases in both cooling degree-days and growing degree-days.
- Seasonally, winter historically exhibits the highest number of heating degree-days and is expected to see the largest decrease of any season, but spring and fall are also expected to see significant change.
    - The winter season is expected to see a decrease of 7-18% (259 -702 degree-days) by mid-century, and a decrease of 10-25% (387 -963 degree-days) by the end of century.
    - The spring season is expected to decrease in heating degree-days by 10-22% (196-446 degree-days) by mid-century, and by 13-35% (268 -700 degree-days) by the end of century.
    - The fall season is expected to decreases in heating degree-days by 18-31% (304 -510 degree-days) by mid-century, and by 18-50% (304 -839 degree-days) by the end of century.
- Conversely, due to projected increasing temperatures, summer cooling degree-days are expected to increase by 61-177% (177 -511 degree-days) by mid-century, and by 80-351% (232 -1014 degree-days) by end of century.

- Seasonally, summer historically exhibits the highest number of growing degree-days and is expected to see the largest decrease of any season, but the shoulder seasons of spring and fall are also expected to see an increase in growing degree-days.
    - The summer season is projected to increase by 19-44% (277 -654 degree-days) by mid-century, and by 23-81% (345 -1184 degree-days) by end of century.
    - Spring is expected to see an increase by 36-94% (78 -202 degree-days) by mid-century and 45-186% (97 -401 degree-days) by end of century.
    - Fall is expected to see an increase by 47-115% (142 -350 degree-days) by mid-century and 60-222% (184 -677 degree-days) by end of century.

MILLERS BASIN

Millers Basin		Observed Baseline 1971-2000 (Days)	Projected Change in 2030s (Days)	Mid-Century Projected Change in 2050s (Days)	Projected Change in 2070s (Days)	End of Century Projected Change in 2090s (Days)
Days with Precipitation Over 1"	Annual	6	+0 to +2	+<1[68] to +2	+1 to +3	+1 to +3
	Winter	1	+0 to +1	+<1[68] to +1	+<1[68] to +1	+<1[68] to +1
	Spring	1	+0 to +1	+0 to +1	+<1[68] to +1	+<1[68] to +1
	Summer	2	+0 to +1	+0 to +1	+0 to +1	+0 to +1
	Fall	2	+0 to +1	+0 to +1	+0 to +1	+0 to +1
Days with Precipitation Over 2"	Annual	<1[68]	+0 to +<1[68]	+0 to +<1[68]	+0 to +<1[68]	+<1[68] to +<1[68]
	Winter	<1[68]	+0 to +<1[68]	+0 to +<1[68]	+0 to +<1[68]	+0 to +<1[68]
	Spring	<1[68]	+0 to +<1[68]	+0 to +<1[68]	+0 to +<1[68]	+0 to +<1[68]
	Summer	<1[68]	+0 to +<1[68]	+0 to +<1[68]	+0 to +<1[68]	+0 to +<1[68]
	Fall	<1[68]	+0 to +<1[68]	+0 to +<1[68]	+0 to +<1[68]	+0 to +<1[68]
Days with Precipitation Over 4"	Annual	0	+0 to +<1[68]	+0 to +<1[68]	+0 to +<1[68]	+0 to +<1[68]
	Winter	0	+0 to +0	+0 to +0	+0 to +0	+0 to +0
	Spring	0	+0 to +0	+0 to +0	+0 to +0	+0 to +0
	Summer	0	+0 to +<1[68]	+0 to +<1[68]	+0 to +<1[68]	+0 to +<1[68]
	Fall	0	+0 to +<1[68]	+0 to +<1[68]	+0 to +<1[68]	+0 to +<1[68]

- The projections for expected number of days receiving precipitation over one inch are variable for the Millers basin, fluctuating between loss and gain of days.
    - Seasonally, the winter season is generally expected to see the highest projected increase.
    - The winter season is expected to see an increase in days with precipitation over one inch of 0-1 days by mid-century, and of 0-1 days by the end of century.
    - The spring season is expected to see an increase in days with precipitation over one inch of 0-1 days by mid-century, and of an increase of 0-1 days by the end of century.

[68] Over the observed period, there were some years with at least 1 day with seasonal precipitation over a certain threshold while in all the other years that threshold wasn't crossed seasonally at all.

MILLERS BASIN

Millers Basin		Observed Baseline 1971-2000 (Inches)	Projected Change in 2030s (Inches)	Mid-Century Projected Change in 2050s (Inches)	Projected Change in 2070s (Inches)	End of Century Projected Change in 2090s (Inches)
Total Precipitation	Annual	45.6	-0.2 to +4.6	+1.0 to +5.9	+1.4 to +7.0	+1.3 to +7.4
	Winter	10.4	-0.4 to +1.8	+0.1 to +2.2	+0.4 to +2.7	+0.7 to +3.7
	Spring	11.5	-0.2 to +2.1	+0.0 to +1.8	+0.3 to +2.5	+0.0 to +2.7
	Summer	12.0	-0.3 to +1.5	-0.2 to +2.1	-0.3 to +1.7	-0.8 to +1.9
	Fall	11.7	-1.2 to +1.4	-1.2 to +1.5	-1.5 to +1.6	-1.7 to +1.4

- Similar to projections for number of days receiving precipitation over a specified threshold, seasonal projections for total precipitation are also variable for the Millers basin.
    - The winter season is expected to experience the greatest change with an increase of 1-21% by mid-century, and of 6-36% by end of century.
    - Projections for the summer and fall seasons are more variable, and could see either a drop or increase in total precipitation throughout the 21st century.
        - The summer season projections for the Millers or basin could see a decrease of 0.2 to an increase of 2.1 inches by mid-century (decrease of 1% to increase of 17%) and a decrease of 0.8 to an increase of 1.9 inches by the end of the century (decrease of 7% to increase of 16%).
        - The fall season projections for the Millers basin could see a decrease of 1.2 to an increase of 1.5 inches by mid-century (decrease of 10% to increase of 13% and a decrease of 1.7 to an increase of 1.4 inches by the end of the century (decrease of 14% to increase of 12%).

Millers Basin		Observed Baseline 1971-2000 (Days)	Projected Change in 2030s (Days)	Mid-Century Projected Change in 2050s (Days)	Projected Change in 2070s (Days)	End of Century Projected Change in 2090s (Days)
Consecutive Dry Days	Annual	16.	-0 to +2	-1 to +2	-1 to +2	-0 to +2
	Winter	11	-1 to +1	-1 to +2	-1 to +1	-1 to +1
	Spring	11	-1 to +1	-1 to +1	-1 to +1	-1 to +1
	Summer	12	-1 to +1	-1 to +1	-1 to +2	-1 to +2
	Fall	12	-0 to +2	-0 to +2	-0 to +3	-0 to +3

- Annual and seasonal projections for consecutive dry days, or for a given period, the largest number of consecutive days with precipitation less than 1 mm (~0.04 inches), are variable throughout the 21st century.
    - For all the temporal parameters, the Millers basin is expected to see a slight decrease to an increase in consecutive dry days throughout this century.
    - Seasonally, the fall and summer seasons are expected to continue to experience the highest number of consecutive dry days.
        - The fall season is expected to experience an increase of 0-3 days in consecutive dry days by the end of the century.

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APPENDIX I

Community Resilience Building Risk Matrix

www.CommunityResilienceBuilding.org

Royalston's Priority Assets				Mitigation Actions	Priority	Time
Name	**Location**	**Ownership (Town, State, Federal, Private)**	**Vulnerability (V) or Strength (S)**	Heavy rain High wind Hurricanes / tropical storms Severe winter weather / ice storms / nor'easters	**H - M - L**	**S**hort **L**ong **O**ngoing
Societal						
Historic and Cultural Resources						
Cemeteries		Town/ Private	V - historic places vulnerable to damage from storms	Trim or remove dead and/or dangerous trees Replanting with disease resistant/resilient tree species Stormwater drainage improvements where appropriate	**M**	**O**
Royalston Historical District		Town/ Private	V - historic places vulnerable to damage from storms	Trim or remove dead and/or dangerous trees Replanting with disease resistant/resilient tree species Stormwater drainage improvements where appropriate	**H**	**O**
Churches		Private	S - support for community			
Buildings that Support Community Needs						
Royalston Town Hall	13 On the Common	Town	S, V - town staff and services, vulnerable historic building	Stormwater drainage improvements where appropriate	**H**	**L**
Whitney Hall	5 School St	Town	S, V - town staff and services, vulnerable historic building	Survey of condition of Town facilities, maintenance needs	**H**	**S**
Phineas S. Newton Library	19 On the Common	Town	S - knowledgeable staff, internet access	Survey of condition of Town facilities, maintenance needs Preserve and Protect Historical Records	**H/M**	**S**
Royalston Post Office	1 Athol Rd	Federal	S - centralized location with information and outreach	Stormwater drainage improvements where appropriate	**H**	**L**
The Village School	253 So Royalston Rd	Private	S- large indoor space , community shelter, back up emergency power	Survey of condition of Town facilities, maintenance needs	**M**	**S**
Raymond School (closed)		Town	S - potential shelter when reopened with back-up generator V - leaky roof	Stormwater drainage improvements where appropriate Repairs to bring building up to code for use as Town offices and shelter	**M**	**L**
Vulnerable Populations						
Royalston Community School	96 Winchendon Rd	Town	S - can accommodate large groups of people V - no emergency power	Survey of condition of Town facilities, maintenance needs	**H**	**S**
Seniors		Private	V - no access to computers S - strong network	Door to door neighbor checks Alternative methods of outreach and public education using Council on Aging and/or senior network Improved coordination between Council on Aging and REMA	**M**	**S**

Community Resilience Building Risk Matrix

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Royalston's Priority Assets				Mitigation Actions	Priority	Time
Name	**Location**	**Ownership (Town, State, Federal, Private)**	**Vulnerability (V) or Strength (S)**	Heavy rain High wind Hurricanes / tropical storms Severe winter weather / ice storms / nor'easters	**H - M - L**	**Short Long Ongoing**
South Village		Private	S - neighbor to neighbor help group V- within floodplain	South Village Revitalization Committee	**L**	**O**
Neighbor to neighbor help group			S - community support, outreach	Establish as semi-permanent group that could be activated during Town emergency situations	**L**	**O**
Gathering Places						
Town Common	On the Common	Town	V - trees, power lines vulnerable to high wind damage	Trim or remove dead and/or dangerous trees Replanting with disease resistant/resilient tree species	**M**	**L**
South Village Common	Main & Feeders	Town	V - near river, railroad S - condition affects community	Assess vulnerability from 100-yr and 500-yr flood	**H**	**L**
Tully Lake Campground	Doan Hill Rd	State	V - occasionally underwater	Assess vulnerability from 100-yr and 500-yr flood	**H**	**L**
Bullock Park	1 Athol Rd	Town	V - floodplain	Assess vulnerability from 100-yr and 500-yr flood	**H**	**L**
Communication and Energy						
Residences with backup or off grid power		Private	S - able to maintain power during an outage	Survey to determine who has access to backup or off grid power, computer, internet	**H**	**S**
Town Facebook Page and Newsletter		Town	S - communication and outreach V - no internet during emergency event	Strengthening communications and power infrastructure	**H**	**O**
Other (overarching protection of society)				Access to gasoline during emergency events Strengthening communications infrastructure Survey of condition of Town facilities, maintenance needs	**H/M**	**L**
Infrastructural						
Transportation Corridors						
Route 32		Town	S- Evacuation Route V - town wide, culverts undersized relative to current and future storms, prone to failure V - icing during winter storms, trees overhanging road	Upsize culverts relative to existing and future storms Improve roadside drainage near Bartlett Farm	**H**	**L**
Warwick Road	becomes Warwick Rd north of Town	Town	S- Evacuation Route V - town wide, culverts undersized relative to current and future storms, prone to failure	Upsize culverts out of the Common relative to existing and future storms Improve roadside drainage to reduce localized flooding	**H**	**L**

Community Resilience Building Risk Matrix

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Royalston's Priority Assets				Mitigation Actions	Priority	Time
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South Royalston Road		Town	S - Evacuation Route	Evaluation of bridge on Lawrence Brook	**H**	**S**
Athol Road		Town	S- Evacuation Route V - culvert clean-out from recent construction not completed	Upsize culverts relative to existing and future storms Improve roadside drainage to reduce localized flooding	**H**	**L**
Winchendon Road		Town	S- Evacuation Route V - town wide, culverts undersized relative to current and future storms, prone to failure	Evaluation of bridge at Priest Brook	**H**	**S**
North Fitzwilliam Road		Town	V - roadways prone to flooding and washouts, could prevent evacuation of neighboring communities	Upsize culverts relative to existing and future storms Improve roadside drainage to reduce localized flooding address drainage near low point in vicinity of 107 N Fitzwilliam Rd	**H**	**L**
Northeast Fitzwilliam Road		Town	V - town wide, culverts undersized relative to current and future storms, prone to failure V - prone to flooding	Improve water-handling and drainage at bridge across Lawrence Brook	**H**	**L**
Railroad	South Village		V- hazardous materials are transported by rail			
Bridges and Culverts						
Northeast Fitzwilliam Road Bridge	42.687516/-72.177140	Town	V - insufficient drainage, nearby hillside erosion problems, bridge washes out during large storm events	Evaluation of condition and improvements needed	**H**	**S**
Doane's Falls Bridge	42.649700/-72.200561	Town	V - road goes under water when water backed up by dam, west side of Town cut off	Coordinate with Corps on Emergency Response Plan	**L**	**O**
South Village Bridge	42.628459/-72.144228	Town	V - low elevation relative to water	Coordinate with Corps on Emergency Response Plan	**L**	**O**
Stockwell Road Bridge	0 Stockwell Road	Town	S - recently rebuilt, flooding resiliency			
Lawrence Brook Bridge on South Royalston Road	42.671131/-72.173055	Town	S - new drainage design provides flooding resiliency	Evaluation of condition and improvements needed	**H**	**L**
Culverts	Brown Rd, Butterworth Rd, Neal Rd and River Rd intersection, Norcross Rd	Town	V - prone to flooding (undersized culverts)	Brown Rd - replace undersized culverts near DPW and NE Fitzwilliam Rd Butterworth Rd at Collar Brook - replace undersized culvert, coordinate with MassDEP and ConsComm regarding adjacent wetlands Neale Rd at Kenny Brook - replace undersized culvert	**H**	**L**
Flood control infrastructure						

Community Resilience Building Risk Matrix

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Royalston's Priority Assets				Mitigation Actions	Priority	Time
Name	**Location**	**Ownership (Town, State, Federal, Private)**	**Vulnerability (V) or Strength (S)**	Heavy rain High wind Hurricanes / tropical storms Severe winter weather / ice storms / nor'easters	**H - M - L**	**S**hort **L**ong **O**ngoing
Birch Hill Dam	42.632530/-72.123123	Federal	S - flood protection	Coordinate with Corps on Emergency Response Plan	**L**	**O**
Tully Dam	42.638174/-72.223986	Federal	S - flood protection	Coordinate with Corps on Emergency Response Plan	**L**	**O**
Critical Facilities						
Royalston Fire Station	4 Athol Road	Town	S - emergency services, food and water distribution point, electronics charging, generator			
Royalston Fire Station #2	17 Main Street	Town	S - emergency services, food and water distribution point, electronics charging, generator			
Royalston Police Station	2 Athol Road	Town	S - emergency services, food and water distribution point, electronics charging, generator			
Whitney Hall	5 School Street	Town	S - Town services V - no backup power	Preserve and Protect Historical Records	**H**	**L**
Royalston Town Hall	13 On The Common	Town	S - central Town services V - no backup power			
Raymond Building	1 Raymond Place	Town	S - candidate for community shelter V - drainage issues, high water table area	General drainage study of entire area Shelter assessment and recommendations	**M**	**S**
Royalston Community School	96 Winchendon Road	Town	S - candidate for community shelter V - no backup power			
Royalston Post Office	1 Athol Road	Town	S - community communication			
Blossom Street Rock Well	0 Blossom Street	Town	V - potential water quality concerns			
The Village School	253 South Royalston Road	Private				

Community Resilience Building Risk Matrix

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Royalston's Priority Assets				Mitigation Actions	Priority	Time
Name	**Location**	**Ownership (Town, State, Federal, Private)**	**Vulnerability (V) or Strength (S)**	Heavy rain High wind Hurricanes / tropical storms Severe winter weather / ice storms / nor'easters	**H - M - L**	**Short Long Ongoing**
Public Safety Communication Tower	42.649403/-72.203325	Town	S - communication V - power loss during storms			
South Royalston Wastewater Treatment Plant	15 Blossom Street	Town	S - new facility, generator backup V - very close to river (but not in floodplain)			
Communications and Energy						
Electrical grid	Town is fed from Royalston, Athol, and Winchendon	Private	S - hazard tree program used to identify and remove trees as possible S - Nat Grid electric hardening program to id poles, wires for replacement to make system more resilient V - above ground, vulnerable to wind, tree branches	Improve coordination with Tree Warden	**M**	**S**
Royalston Substation #701	95 South Royalston Rd	Private	S - power supply			
Environmental/Natural Resources						
Hydrologic Resources						
Wetlands			S - flood storage, habitat			
Millers River			V - vulnerable species (turtles?)			
Doane's Falls/Coddings Meadow	42.649575/-72.200928	Private	S - Trustees properties - maintained, tourism, environmental education at campground V - lots of visitors, beaver dams			
Collar Brook	Butterworth Road		V - erosion, flooding, adjacent wetlands	Investigate how to address erosion and flooding while protecting adjacent wetland resource areas	**H**	**L**
Lawrence Brook			V - erosion, flooding, adjacent wetlands	Investigate how to address erosion and flooding while protecting adjacent wetland resource areas	**H**	**L**
Priest Brook	Along Royalston-Winchendon border		V - flooding risk, could cut Town off from Winchendon			

Community Resilience Building Risk Matrix

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Royalston's Priority Assets				Mitigation Actions	Priority	Time
Name	**Location**	**Ownership (Town, State, Federal, Private)**	**Vulnerability (V) or Strength (S)**	Heavy rain High wind Hurricanes / tropical storms Severe winter weather / ice storms / nor'easters	**H - M - L**	**Short Long Ongoing**
Royalston Falls	42.714666/-72.245401	Private	S - TTOR properties - maintained, tourism V - lots of visitors, easy to get lost			
Parks and Recreational Areas						
Bullock Park	1 Athol Road	Town	S - community functions V - flooding (high groundwater, in vicinity of Town center)	Larger-scale drainage study (Town center)	**M**	**S**
Jacob's Hill/The Ledges/Spirit Falls	42.674828/-72.203079	Private	S - TTOR properties - maintained, tourism V - lots of visitors			
Chase Memorial Forest	42.666010/-72.164908	Private	S - recreation (snowmobile, hiking)			
Tully Lake and Tully Lake Recreation Area	42.646679/-72.217152°	Federal	S - nature trail			
Hiking trails		Town/private	S - recreation, tourism V - erosion due to improper usage, lack of communication coverage (cell service, broadband)	Coordinate with other agencies that own/manage trails to develop trail maintenance program and public education program to reduce inappropriate use	**L**	**L**
Open Space and Conservation Lands						
Ehrich Memorial Forest	42.710670/-72.202350	Private	S - water and air purification			
Royalston State Forest	42.683093/-72.241989	State	S - water and air purification			
Warwick State Forest	42.709895/-72.275895	State	S - water and air purification			
Otter River State Forest	42.647978/-72.120316	State	S - water and air purification			
Eagle Reserve	42.679668/-72.153699	Private	S - educational signage on wildlife			

Community Resilience Building Risk Matrix

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Royalston's Priority Assets				Mitigation Actions	Priority	Time
Name	**Location**	**Ownership (Town, State, Federal, Private)**	**Vulnerability (V) or Strength (S)**	Heavy rain High wind Hurricanes / tropical storms Severe winter weather / ice storms / nor'easters	**H - M - L**	**S**hort **L**ong **O**ngoing
Birch Hill Wildlife Management Area	42.665946/-72.124260	State	S - educational signage			
Forest & Agriculture						
General				Feasibility assessment for green infrastructure to solve existing environmental issues	**H**	**L**
Town-wide tree canopy				Tree inventory and tree management plan to balance safe removal of hazard trees with Scenic Rds/Public Shade Tree considerations, invasive species and climate change risks to species	**H**	**l**

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APPENDIX J

TOWN OF ROYALSTON'S HAZARD MITIGATION AND MUNICIPAL VULNERABILITY PREPAREDNESS PLANNING

Listening Session
June 15, 2020

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1

WELCOME

Royalston awarded $35 K grant for
- Municipal Vulnerability Preparedness (MVP) Community Resilience Building (CRB) Workshop Process
- Draft Hazard Mitigation Plan (HMP) Update

First step in unlocking additional funding opportunities for Royalston from FEMA/MEMA and Commonwealth of Massachusetts

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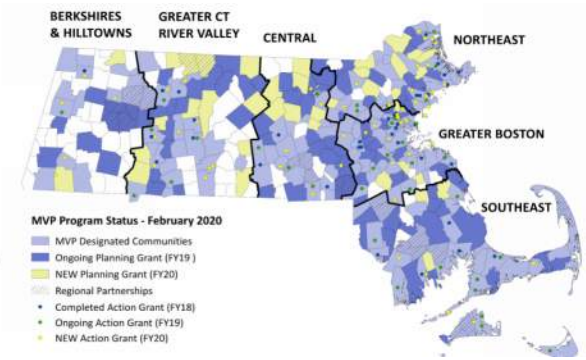
2

BACKGROUND ON MVP PROGRAM

MVP Designations
82% of the Commonwealth
287 communities

Action Grant Projects
FY 18: 37
FY 19: 36
FY 20: 54

Total Awards
$33M+ in planning and action grants to date



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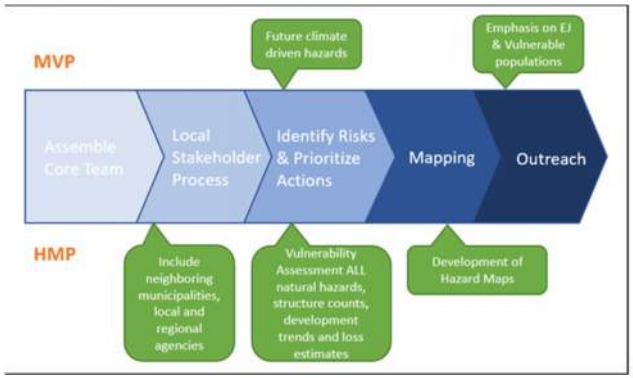
HOW DO THE MVP AND HMP PROCESSES OVERLAP?



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MVP/HMP GRANT AND CRB PROCESS

1. Establish Core Team
2. Complete Evaluation/Assessment
3. Hold Workshops
4. Draft MVP Report
5. Hold Public Meeting
6. Draft HMP Update
7. Hold Listening Session
8. Final MVP Report

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THANK YOU TO ROYALSTON'S MVP CORE TEAM

Deborah D'Amico – Select Board
Christine Long – Select Board
Kate Collins – Planning
Keith Newton – Fire Dept and DPW
George Northrup – Conservation Commission
Maureen Blasco – Conservation Commission
Rebecca Krause-Hardie – Finance Director
Jon Hardie – IT Systems Administrator
Phil Rabinowitz – Capital Planning
Tom Kellner – Millers River Watershed Council
Curt Deveneau – Police Dept
Tom Musco – Emergency Mgmt

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NATURAL HAZARDS AND CLIMATE CHANGE

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WHAT ARE NATURAL HAZARDS?

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TOP NATURAL HAZARDS IN ROYALSTON

- Heavy rain
- High wind
- Hurricanes / tropical storms
- Severe winter weather / ice storms / Nor'easters

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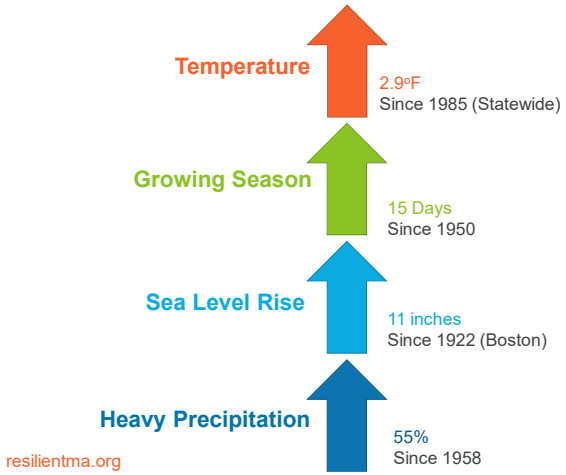
MASSACHUSETTS OBSERVED CLIMATE CHANGES



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CHANGES IN PRECIPITATION

Millers Basin		Observed Baseline 1971-2000 (Inches)	Projected Change in 2030s (Inches)	Mid-Century Projected Change in 2050s (Inches)	Projected Change in 2070s (Inches)	End of Century Projected Change in 2090s (Inches)
Total Precipitation	Annual	45.6	-0.2 to +4.6	+1.0 to +5.9	+1.4 to +7.0	+1.3 to +7.4
	Winter	10.4	-0.4 to +1.8	+0.1 to +2.2	+0.4 to +2.7	+0.7 to +3.7
	Spring	11.5	-0.2 to +2.1	+0.0 to +1.8	+0.3 to +2.5	+0.0 to +2.7
	Summer	12.0	-0.3 to +1.5	-0.2 to +2.1	-0.3 to +1.7	-0.8 to +1.9
	Fall	11.7	-1.2 to +1.4	-1.2 to +1.5	-1.5 to +1.6	-1.7 to +1.4

IMPACTS:

- Episodic droughts
- Concerns over food production and drinking water supply
- Stress on ecosystems
- Flooding

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RISING TEMPERATURE

IMPACTS:

- Heat-related illnesses
- Vector borne-diseases
- Health of plants, animals, ecosystems
- Reduced crop production
- Larger energy demand
- Droughts and wildfires

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EXTREME STORMS

Blizzards
- More than 5 in MA since 2011

Nor'easters and Hurricanes
- Upward trend since the 1970s

IMPACTS:
- **Public safety concerns, including increased injuries and mortality**
- **Economic damages and business disruption**
- **Property and infrastructure damage**
- **Impacts on natural resources**

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CLIMATE CHANGE + NATURAL HAZARDS = AMPLIFIED RISK

CLIMATE CHANGES	RELATED NATURAL HAZARDS	PROJECTIONS BY THE END OF THIS CENTURY
Changes in precipitation	– Inland flooding – Drought – Landslide	– Annual precipitation: Increase up to 16% (+7.3 inches) – Days with rainfall accumulation 1+ inch: Increase up to 57% (+4 days) – Consecutive dry days: Increase 18% (+3 days) – Summer precipitation: Decrease
Sea level rise	– Coastal flooding – Coastal erosion – Tsunami	– Sea level: Increase 4.0 to 10.5 feet along the Massachusetts coast
Rising temperatures	– Average/extreme temperatures – Wildfires – Invasive species	– Average annual temperature: Increase up to 23% (+10.8 degrees Fahrenheit) – Days/year with daily minimum temperatures below freezing: Decrease up to 42% (-62 days) – Winter temperatures: Increase at a greater rate than spring, summer, or fall – Long-term average minimum winter temperature: Increase up to 66% (+11.4 degrees Fahrenheit) – Days/year with daily maximum temperatures over 90 degrees Fahrenheit: Increase by up to 1,280% (+64 days) – Growing degree days: Increase by 23% to 52%
Extreme weather	– Hurricanes/tropical storms – Severe winter storms/nor'easters – Tornadoes – Other severe weather	– Frequency and magnitude: Increase

Note: This plan also assesses earthquakes, but there is no established correlation between climate change and earthquakes.
Source of Climate Change Projections: Northeast Climate Adaptation Science Center at the University of Massachusetts, Amherst.

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COMMUNITY ASSET INVENTORY

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COMMUNITY ASSETS

Societal

Infrastructure

Economy

Natural Resources

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PEOPLE – SOCIETAL ASSETS

- Historical and Cultural Resources
- Vulnerable Populations
- Gathering Places
- Buildings that Support Community Needs
- Communications and Energy

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INFRASTRUCTURAL ASSETS

- Flood Control Infrastructure
- Transportation Corridors
- Critical Facilities
- Communications and Energy

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ENVIRONMENTAL ASSETS

- Hydrologic Resources
- Open Space and Conservation Lands
- Parks and Recreational Areas
- Forestry and Agriculture

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MVP WORKSHOPS

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Overview of the Process (Steps & Tasks)

DURING WORKSHOP

- A Prepare for the Workshop
  - 1 Establish a core team with goals.
  - 2 Engage stakeholders.
  - 3 Prepare materials for workshop.
  - 4 Decide on participant arrangements.
- B Characterize Hazards
  - 1 Identify past, current, and future impacts.
  - 2 Determine the highest-priority hazards.
- C Identify Community Vulnerabilities and Strengths
  - 1 Identify infrastructural vulnerabilities and strengths.
  - 2 Identify societal vulnerabilities and strengths.
  - 3 Identify environmental vulnerabilities and strengths.
- D Identify and Prioritize Community Actions
  - 1 Identify and prioritize infrastructural actions.
  - 2 Identify and prioritize societal actions.
  - 3 Identify and prioritize environmental actions.
- E Determine the Overall Priority Actions
  - 1 Identify highest-priority actions.
  - 2 Further define urgency and timing.
- F Put It All Together
  - 1 Generate final workshop products.
- G Move Forward
  - 1 Continue community outreach and engagement.
  - 2 Secure additional data and information.
  - 3 Inform existing planning and project activities.

Community Components

- Infrastructural
- Societal
- Environmental

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WORKSHOP OBJECTIVES

- Engage
- Connect
- Prioritize
- Implement

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CRB MATRIX

Community Resilience Building Risk Matrix

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Royalston's Priority Assets

Name	Location	Ownership (Town, State, Federal, Private)	Vulnerability (V) or Strength (S)	Hazard rain high wind Hurricane / tropical storms Severe winter weather / ice storms / nor'easters
Societal				
Historic and Cultural Resources				
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Buildings that Support Community Needs				
Royalston Town Hall	13 On the Common	Town	S, V - town staff and services, vulnerable historic building	Stormwater drainage improvements where appropriate
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Phineas S. Newton Library	19 On the Common	Town	S - knowledgeable staff, internet access	Survey of condition of Town facilities, maintenance needs
Royalston Post Office	1 Athol Rd	Federal	S - centralized location with information and outreach	Stormwater drainage improvements where appropriate
The Village School	253 So Royalston Rd	Town	S- large indoor space , community shelter, back up emergency power	Survey of condition of Town facilities, maintenance needs
Raymond School (closed)		Town	S - potential shelter when reopened with back-up generator V - leaky roof	Stormwater drainage improvements where appropriate Repairs to bring building up to code for use as Town offices and shelter
Vulnerable Populations				
Royalston Community School	96 Winchendon Rd	Town	S - can accommodate large groups of people V - no emergency power	Survey of condition of Town facilities, maintenance needs
Seniors		Private	V - no access to computers S - strong network	Door to door neighbor checks Alternative methods of outreach and public education using Council on Aging and/or senior network Improved coordination between Council on Aging and REMA
South Village		Private	S - neighbor to neighbor help group V - within floodplain	South Village Revitalization Committee

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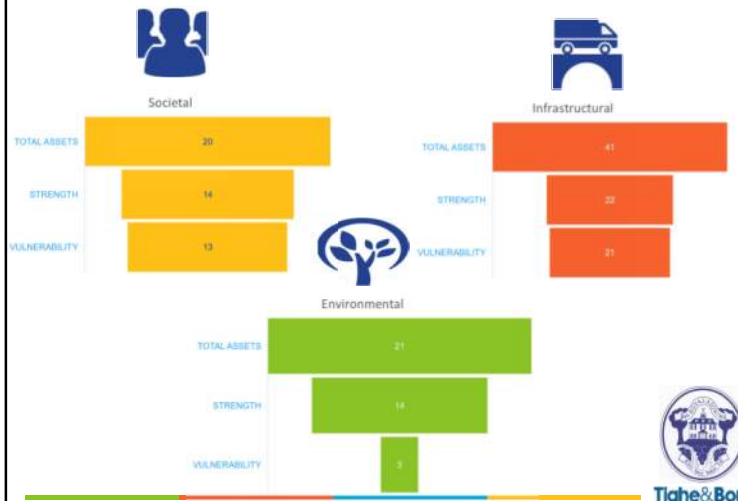
IDENTIFIED STRENGTHS AND VULNERABILITIES



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MITIGATION STRATEGIES

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TYPES OF MITIGATION ACTIONS

- Prevention
- Property Protection
- Public Education and Awareness
- Natural Resource Protection and Green Infrastructure
- Structural Projects
- Emergency Services Protection

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EXAMPLE MITIGATION ACTIONS IN ROYALSTON

- **Prevention**
  - Update flood maps to reflect current and future condition
- **Natural Resource Protection**
  - Investigate how to address erosion and flooding while protecting adjacent wetland resource areas
- **Structural Projects**
  - Conduct a capacity planning study and prioritize culverts for design, permit, and construction
- **Emergency Services Protection**
  - Designate a space for Emergency Management Director
  - Install emergency generators or other back up power source at Library, Town Hall and Raymond Building
  - Secure access to gasoline/oil during emergency events

Full list available in draft MVP Report on website

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TOP SURVEY RESULTS FOR MITIGATION ACTIONS

Societal

- Conduct communication needs survey for elder populations
- Strengthen communication and power infrastructure
- Conduct building needs survey
- Preserve and protect historic records

Infrastructural

- Identify, inspect and prioritize bridge and culverts for improvements
- Complete hardening of critical infrastructure against flooding
- Tree maintenance- remove dead and or dangerous trees and branches
- Stormwater drainage improvements

Environmental

- Update flood maps to reflect current and future conditions
- Assess feasibility of green infrastructure to solve existing issues
- Develop tree planting plan tat considers climate change impact to species, invasives and resilience
- Work with fire dept to mitigate wild fire risk in times of drought

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WHAT'S NEXT?

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NEXT STEPS BEFORE JUNE 30, 2020

- DRAFT MVP Summary of Findings Report Online for public review
- Submit Comments to Jim Barclay, EMA by June 25th
- MVP Final Summary of Findings Report
- Submit documents to EEA

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MVP ACTION GRANT OPPORTUNITIES

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MVP ACTION GRANTS

- Detailed Vulnerability and Risk Assessment*
- Community Outreach and Education
- Local Bylaws, Ordinances, Plans, and Other Management Measures**
- Redesigns and Retrofits***
- Nature-Based Flood Protection, Drought Mitigation, Water Quality, and Water Infiltration Techniques
- Nature-Based, Infrastructure and Technology Solutions to Reduce Vulnerability to Extreme Heat and Poor Air Quality

* Most common project type
** Second-most common project type
***Third-most common project type

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MVP ACTION GRANTS (CONT)

- Nature-Based Solutions to Reduce Vulnerability to other Climate Change Impacts
- Ecological Restoration and Habitat Management to Increase Resiliency

NEW IN 2019

- Energy Resilience
- Chemical Safety
- Land Acquisition for Resilience
- Subsidized Low-Income Housing Resilience Strategies
- \+ Expanded eligibility of project location

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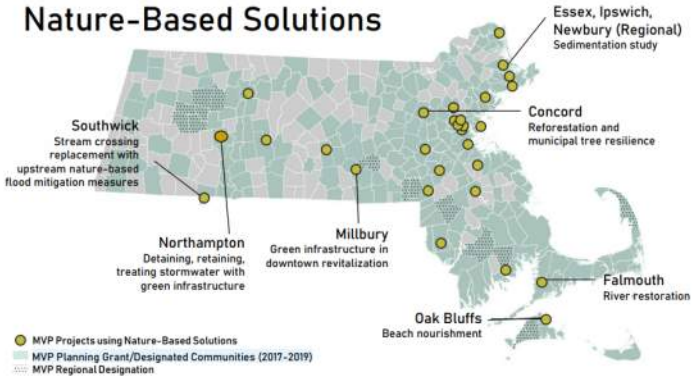
Nature-Based Solutions



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THINKING ABOUT ADAPTATION STRATEGIES

- **For the three Town-owned community assets most at risk, the Core Team has begun to explore specific adaptation strategies tailored to site.**
- **Considering specific actions to adapt to natural hazards and climate change.**
  - Town Center Drainage Study
  - Raymond Building Assessment
  - Culvert Capacity Brown Rd/Butterworth Rd/ Neil & River Rd @ Kenny Brook
  - Tree Inventory and Management Plan

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FOR MORE INFORMATION

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AND NOW FOR QUESTIONS AND ANSWERS

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