

MONTACHUSETT REGION NATURAL HAZARD MITIGATION PLAN 2015 UPDATE



Prepared by:

Montachusett Regional Planning Commission (MRPC)
1427R Water Street, Fitchburg, MA 01420



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*Ashburnham
Ashby
Athol
Ayer
Clinton
Devens
Fitchburg
Gardner
Groton
Harvard
Hubbardston
Lancaster
Leominster
Lunenburg
Petersham
Phillipston
Royalston
Shirley
Sterling
Templeton
Townsend
Westminster
Winchendon*

Table of Contents

1. Introduction and Overview	1
Background	1
Geographic Area	2
2. Planning Process	3
The Planning Process and Public Outreach/Participation:	4
Plan Maintenance and Public Participation:	5
3. Regional Profile	6
Population and Employment	6
Regional Land Use	9
Transportation Network	12
Water Resources	14
4. Identification of Natural Hazards	15
Identifying and Profiling Hazards	15
Flood Related Hazards	15
Atmospheric Related and Winter Related Hazards	30
Other Natural Hazards	42
Geologic Hazards	48
5. Regional Mitigation Goals, Objectives and Strategies and Mitigation Action Plan	52
6. Community Profiles	57
Ashburnham Natural Hazard Risk Assessment	57
Critical Facilities	58
Flood Prone Areas	62
Risk Assessment	65
Existing Protections	68
Mitigation Goals, Objectives and Strategies	70
Mitigation Action Plans and Prioritization of Actions (STAPLEE)	72
Ashby Natural Hazard Risk Assessment	78
Critical Facilities	79
Flood Prone Areas	83
Risk Assessment	86
Existing Protections	89
Mitigation Goals, Objectives and Strategies	90
Mitigation Action Plans and Prioritization of Actions (STAPLEE)	91

Athol Natural Hazard Risk Assessment	99
Critical Facilities	100
Flood Prone Areas	106
Risk Assessment	110
Existing Protections.....	114
Mitigation Goals, Objectives and Strategies	116
Mitigation Action Plans and Prioritization of Actions (STAPLEE)	117
Ayer Natural Hazard Risk Assessment	128
Critical Facilities	129
Flood Prone Areas	134
Risk Assessment	138
Existing Protections.....	142
Mitigation Goals, Objectives and Strategies	145
Mitigation Action Plans and Prioritization of Actions (STAPLEE)	147
Clinton Natural Hazard Risk Assessment	152
Critical Facilities	153
Flood Prone Areas	158
Risk Assessment	162
Existing Protections.....	166
Mitigation Goals, Objectives and Strategies	167
Mitigation Action Plans and Prioritization of Actions (STAPLEE)	170
Devens Natural Hazard Risk Assessment	177
Critical Facilities	177
Flood Prone Areas	182
Risk Assessment	184
Existing Protections.....	188
Mitigation Goals, Objectives and Strategies	188
Mitigation Action Plans and Prioritization of Actions (STAPLEE)	190
Fitchburg Natural Hazard Risk Assessment	197
Critical Facilities	198
Flood Prone Areas	207
Risk Assessment	211
Existing Protections.....	216
Mitigation Goals, Objectives and Strategies	218

Mitigation Action Plans and Prioritization of Actions (STAPLEE)	220
Gardner Natural Hazard Risk Assessment	227
Critical Facilities	227
Flood Prone Areas	234
Risk Assessment	237
Existing Protections	241
Mitigation Goals, Objectives and Strategies	243
Mitigation Action Plans and Prioritization of Actions (STAPLEE)	245
Groton Natural Hazard Risk Assessment	251
Critical Facilities	252
Flood Prone Areas	258
Risk Assessment	262
Existing Protections	266
Mitigation Goals, Objectives and Strategies	268
Mitigation Action Plans and Prioritization of Actions (STAPLEE)	269
Harvard Natural Hazard Risk Assessment	276
Critical Facilities	277
Flood Prone Areas	283
Risk Assessment	287
Existing Protections	291
Mitigation Goals, Objectives and Strategies	293
Mitigation Action Plans and Prioritization of Actions (STAPLEE)	295
Hubbardston Natural Hazard Risk Assessment	301
Critical Facilities	302
Flood Prone Areas	306
Risk Assessment	310
Existing Protections	314
Mitigation Goals, Objectives and Strategies	316
Mitigation Action Plans and Prioritization of Actions (STAPLEE)	318
Lancaster Natural Hazard Risk Assessment	325
Critical Facilities	325
Flood Prone Areas	330
Risk Assessment	334
Existing Protections	338

Mitigation Goals, Objectives and Strategies	340
Mitigation Action Plans and Prioritization of Actions (STAPLEE)	342
Leominster Natural Hazard Risk Assessment.....	347
Critical Facilities	348
Flood Prone Areas	356
Risk Assessment	360
Existing Protections.....	364
Mitigation Goals, Objectives and Strategies	366
Mitigation Action Plans and Prioritization of Actions (STAPLEE)	369
Lunenburg Natural Hazard Risk Assessment	376
Critical Facilities	376
Flood Prone Areas	382
Risk Assessment	386
Existing Protections.....	390
Mitigation Goals, Objectives and Strategies	392
Mitigation Action Plans and Prioritization of Actions (STAPLEE)	394
Petersham Natural Hazard Risk Assessment	400
Critical Facilities	401
Flood Prone Areas	405
Risk Assessment	408
Existing Protections.....	412
Mitigation Goals, Objectives and Strategies	414
Mitigation Action Plans and Prioritization of Actions (STAPLEE)	416
Phillipston Natural Hazard Risk Assessment.....	420
Critical Facilities	421
Flood Prone Areas	425
Risk Assessment	428
Existing Protections.....	432
Mitigation Goals, Objectives and Strategies	434
Mitigation Action Plans and Prioritization of Actions (STAPLEE)	435
Royalston Natural Hazard Risk Assessment.....	441
Critical Facilities	442
Flood Prone Areas	446
Risk Assessment	450

Existing Protections.....	454
Mitigation Goals, Objectives and Strategies.....	456
Mitigation Action Plans and Prioritization of Actions (STAPLEE).....	458
Shirley Natural Hazard Risk Assessment.....	462
Critical Facilities	463
Flood Prone Areas.....	468
Risk Assessment.....	472
Existing Protections.....	476
Mitigation Goals, Objectives and Strategies.....	478
Mitigation Action Plans and Prioritization of Actions (STAPLEE).....	479
Sterling Natural Hazard Risk Assessment	485
Critical Facilities	486
Flood Prone Areas.....	491
Risk Assessment.....	495
Existing Protections.....	500
Mitigation Goals, Objectives and Strategies.....	502
Mitigation Action Plans and Prioritization of Actions (STAPLEE).....	504
Templeton Natural Hazard Risk Assessment	511
Critical Facilities	512
Flood Prone Areas.....	518
Risk Assessment.....	522
Existing Protections.....	526
Mitigation Goals, Objectives and Strategies.....	528
Mitigation Action Plans and Prioritization of Actions (STAPLEE).....	529
Townsend Natural Hazard Risk Assessment	536
Critical Facilities	536
Flood Prone Areas.....	542
Risk Assessment.....	545
Existing Protections.....	549
Mitigation Goals, Objectives and Strategies.....	551
Mitigation Action Plans and Prioritization of Actions (STAPLEE).....	552
Westminster Natural Hazard Risk Assessment.....	559
Critical Facilities	560
Flood Prone Areas.....	565

Risk Assessment	569
Existing Protections.....	573
Mitigation Goals, Objectives and Strategies	575
Mitigation Action Plans and Prioritization of Actions (STAPLEE)	576
Winchendon Natural Hazard Risk Assessment	583
Critical Facilities	584
Flood Prone Areas	590
Risk Assessment	593
Existing Protections.....	598
Mitigation Goals, Objectives and Strategies	600
Mitigation Action Plans and Prioritization of Actions (STAPLEE)	602
7. Plan Adoption.....	611

1. Introduction and Overview

Background

A natural hazard is defined as “an event or physical condition that has the potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural loss, damage to the environment, interruption of business, or other types of harm or loss (MEMA & DCR, 2010)”. The Federal Disaster Mitigation of Act of 2000 requires all municipalities that wish to be eligible to receive FEMA hazard mitigation grants (see <http://www.mass.gov/eopss/agencies/mema/hazard-mitigation/>) to adopt a local hazard mitigation plan and to update the plan every five years. A community plan identifies actions to be done now to help alleviate disaster conditions in the future. The Commonwealth of Massachusetts is seeking to ensure that all 351 of its municipalities develop a local mitigation plan. However, not every municipality has the capacity to develop hazard mitigation plans on their own. The State is therefore enlisting the help and technical assistance of the 13 Regional Planning Agencies (RPAs) across the state. The Montachusett Regional Planning Commission (MRPC) was created in 1968 under MGL Chapter 40B, Sections 1-8; per the statute MRPC is a Regional “planning district” and a “public body corporate”, per section 3 of MGL Chapter 40B. RPA’s regularly work on projects on Region-wide importance, and the State is asking them to work with the municipalities in their Region and to prepare one overarching mitigation plan for the Region that includes data for each jurisdiction. The plan update was funded by the Federal Emergency Management Agency (FEMA), the Massachusetts Emergency Management Agency (MEMA) and the MRPC.

This plan is the update of the 2008 Montachusett Region Hazard Mitigation Plan. The 2008 Regional Plan had annexes for each individual community. The updated Plan remains a Multi-Jurisdictional Plan and includes information on all 22 participating communities as well as Devens.¹ Where applicable, text from the 2008 plan was used, although the report has been reorganized and updated to reflect newer data. Each section of this plan was reviewed, reorganized and updated as part of the 2015 update of the 2008 Hazard Mitigation Plan. This included updating the planning process, hazard identification, community assessments, and evaluating and revising action items.

The purpose of this 2015 plan is to identify hazards within the Montachusett Region along with specific locations and vulnerability, and to establish a mitigation strategy to reduce risks. Addressing hazards before they occur is the best way to minimize impacts. This plan was created to achieve the following goal for the Montachusett Region: To reduce the loss of or damage to life, property, infrastructure, and natural and economic resources from natural disasters.

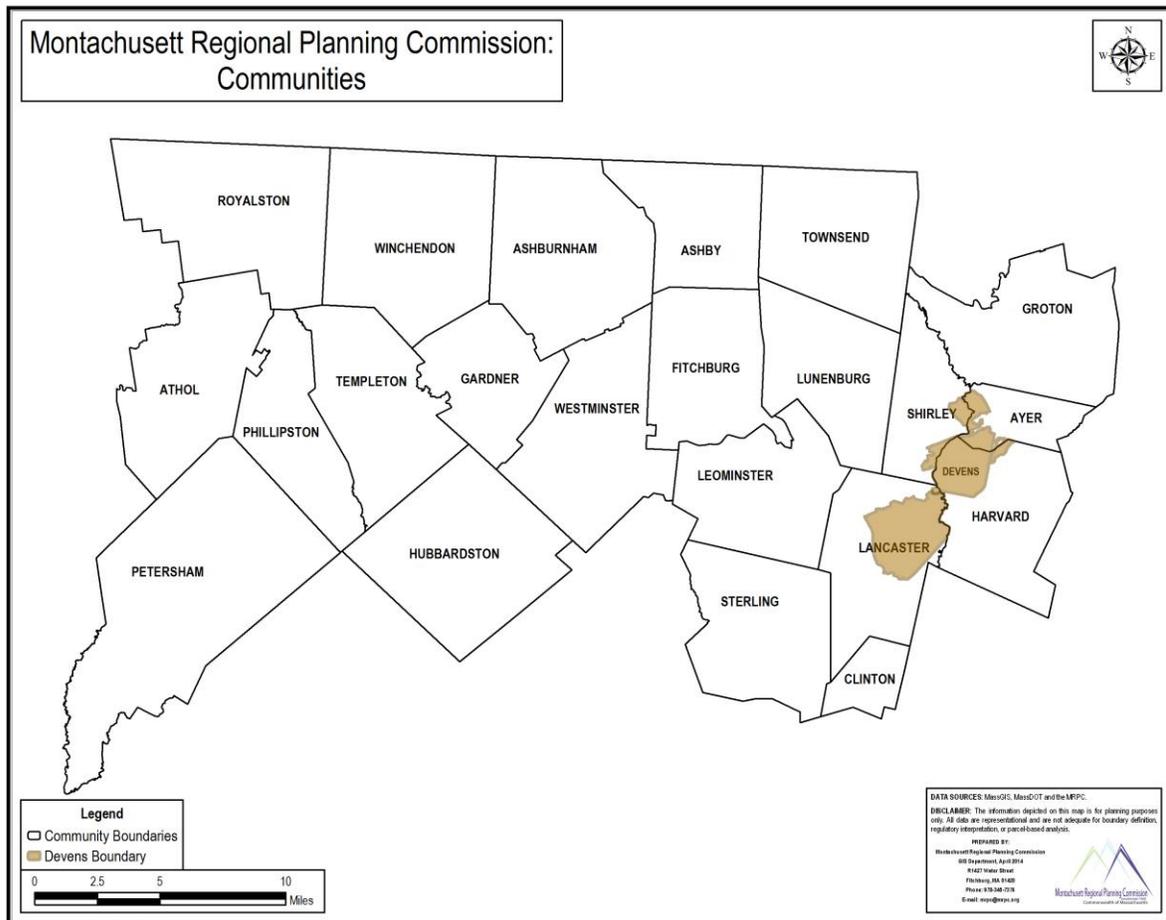
The preparation and implementation of this Montachusett Region Natural Hazard Mitigation Plan 2015 Update will not only make funding sources available to implement the mitigation initiatives when

¹ Devens, Massachusetts is an unincorporated village and census-designated place in the towns of Ayer and Shirley, in Middlesex County and Harvard in Worcester County in the U.S. state of Massachusetts. It is the successor to Fort Devens, a military post that operated from 1917 to 1996. Throughout this Plan, where possible, specific data is reported for Devens. ***However, in some cases, discrete data for Devens is not available and is therefore included as appropriate in data reported for Ayer, Shirley, and Harvard.***

eligible but also mitigation directly related to disaster recovery. This plan emphasizes actions to be taken now to reduce or prevent future disaster damages. This plan assists the community by developing policies and programs before a disaster occurs. If the actions identified in this plan are implemented, the damage that is left in the aftermath of future events can be minimized, thereby easing recovery and reducing the cost of repairs and reconstruction. This plan will also facilitate the receipt of post-disaster state and federal funding because the list of mitigation initiatives is already identified, reducing vulnerability to disasters by focusing limited financial resources to specifically identified needs, and connecting hazard mitigation planning to community and Regional planning where possible.

Geographic Area

Communities Participating in the Plan



The geographic area of this Plan is the Montachusett Region. Montachusett is a Region of 675 square miles located in north central Massachusetts, due west of Boston.

Twenty-two communities and Devens participated in the development of this plan (See Figure 1). Those communities are: Ashby, Ashburnham, Athol, Ayer, Clinton, Gardner, Fitchburg, Groton, Harvard, Hubbardston, Lancaster, Leominster, Lunenburg, Petersham, Phillipston, Royalston, Shirley, Sterling, Templeton, Townsend, Westminster and Winchendon.

The Region is bordered by New Hampshire to the north, metropolitan Worcester to the south, Franklin County to the west and metro Boston to the east. Most of the Region's topography consists of rolling, hilly terrain ranging from 1800 feet above sea level, on Mt. Watatic in Ashby, to 840 feet on Phillips Brook as it flows into the City of Fitchburg. The Region was formed over thousands of years of geologic activity and climate change. Alternating periods of volcanic activity, shifting faults and erosion led to the formation almost 600 million years ago, of the igneous and metamorphic rock that is characteristic of the terrain. One of the most important Region-wide assets is its large quantity of open space. Large constructed lakes and natural bodies of water add to the Region's rural character. Both open pastures and steep, rock slopes characterize a great deal of the land.

2. Planning Process

The planning process was revised as part of the Hazard Mitigation Plan Update. The MRPC worked with the participating communities and coordinated the development of this plan. All twenty-two communities and Devens participated in the development of this plan. **It should be noted that the community of Devens did not participate in the 2008 plan but did participate in the development of this plan.** In its capacity as a Regional Planning Agency, MRPC has conducted numerous detailed land use, transportation, and environmental planning studies. Part of the planning process included an MRPC review and incorporation of relevant local, state and federal existing plans studies, and reports. Plans and studies included but were not limited to, the Montachusett Comprehensive Economic Development Strategy Plan (CEDS), Montachusett Regional Transportation Plan, Montachusett Energy Plans, CEM plans, Homeland Security Plans, Master Plans, and Open Space and Recreation Plans.

At the commencement of the planning process, MRPC consulted with hazard mitigation staff from the Massachusetts Emergency Management Agency and the Massachusetts Department of Conservation and Recreation on the planning process. MRPC reviewed FEMA guidance on developing a Hazard Mitigation Plan and the regulations that guide the development of the plan. While MRPC GIS staff met individually with each community's Emergency Management Director to update a listing of critical facilities, each community was expected to attend one Regional Meeting and three Community Meetings. These **Meetings** are as follows:

Regional Meeting: MRPC began the process by convening a Regional meeting with all participating communities. This event included a welcome and introduction, the Commonwealth's Perspective on Hazard Mitigation and Hazard Mitigation Planning (presented by Sarah White, Acting MEMA Region 1 Manager and State Hazard Mitigation Planner), an Introduction to the Planning Process for the Hazard Mitigation Plan Five-Year Update by MRPC staff, followed by Questions and Answers from Local Emergency Management Directors, other interested officials and the general public. The Regional Meeting was held on January 31, 2012. Community Meeting #1: After the Regional Meeting, a public meeting was held in each of the communities individually to discuss hazard mitigation and to solicit information on what hazards affect each community and to discuss and identify specific problem areas in to the community that need to be addressed within the plan including any newly identified hazards that have been determined to pose a threat – see Appendix A for Meeting Agenda. For example, wildfire risk has increased due to the December 2008 Ice Storm. This resulted in an update of the previously produced Hazard Maps based on updated hazard identification and assessment. Community Meeting #2: Follow-up meetings were then held in each community to discuss and update existing protection and

mitigation measures and goals and objectives— see Appendix A for Meeting Agenda. Community Meeting #3: Following the regional meeting and two meetings in each community, MRPC completed a draft of the report. MRPC then presented the findings and specific items related to the community at a Board of Selectmen or City Council meeting. The context of these meetings can be found in the power-point presented by MRPC contained in Appendix A. After presentation to individual communities, the draft Plans were posted on MRPC’s website www.mrpc.org for public review and comment.

The Planning Process and Public Outreach/Participation:

While meeting participants generally included emergency responders, planners, administrators and public works staff from the community (A list of attendees and meeting dates for all meetings can be located in Appendix A), all meetings were open to the public and anyone with an interest was encouraged through a variety of outreach methods to attend/participate. For every meeting, notices/agendas were posted in each community by City and Town Clerks pursuant to MGL Chapter 30A, Sections 18-25. In Massachusetts, all local public bodies must file meeting notices with the municipal clerk sufficiently in advance of a public meeting to permit posting of the notice at least 48 hours in advance of the public meeting. Notices may be posted on a bulletin board, in a loose-leaf binder or on an electronic display (e.g. television, computer monitor, or an electronic bulletin board), provided that the notice is conspicuously visible to the public at all hours in or on the municipal building in which the clerk’s office is located. For those who could not physically attend, some meetings were televised on the local communities’ public access TV stations.

It should also be noted that status reports on the development of the plan were provided to MRPC Commission Members throughout the duration of this project to inform and update local officials from participating communities within the Montachusett Region. MRPC Commission Meetings take place the last Tuesday of every month with an appointed member and alternate assigned by each community to serve and attend meetings as Planning Commissioners. Media outlets and libraries as well as the Commonwealth’s 13 Massachusetts Regional Planning Agencies also receive copies of MRPC meeting agendas/minutes that contained a monthly status report of this project. This effort enhanced project awareness throughout the Montachusett Region and the Commonwealth of Massachusetts and notified anyone interested in participating including agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests such as businesses, non-profits, etc. to have an opportunity to participate in the planning process.

Upon completion of a draft document, MRPC notified abutting communities outside of the MRPC Region by email to Town Administrators/Town Managers and/or Emergency Management Directors that the draft plan was available for viewing and that MRPC was soliciting comments (the Plan was posted on MRPC’s website mrpc.org. See Appendix A. Abutting communities included the Towns of Barre, MA; Rutland, MA; Princeton, MA; Holden, MA; West Boylston, MA; Boylston, MA; Berlin, MA; Bolton, MA; Stow, MA; Littleton, MA; Westford, MA; Dunstable, MA; Pepperell, MA; Mason, NH; New Ipswich, MA; Fitzwilliam, NH; Richmond, NH; Orange, MA; New Salem, MA; Ware, MA; Hardwick, MA; Brookline, NH; Rindge, NH; Warwick, MA and; Boxborough, MA.

Comments received were fully incorporated into the plan. Comments were made during the public presentation meetings with communities and in some cases emails were sent from the municipal officials and interested residents to the MRPC. Relevant comments were reviewed by MRPC staff and incorporated into the Plan. Narrative in Section 3. Regional Profile and Section 6. Community Annexes were amended as a result of comments received. The final Update of the Hazard Mitigation Plan was

then be forwarded to the Massachusetts Emergency Management Agency (MEMA) and the Federal Emergency Management Agency (FEMA) for their review and approval. Following MEMA and FEMA approval, the approved plan was submitted to communities for formal adoption. A certificate of adoption will be incorporated into the plan. The final plan will then be distributed to all municipalities in the Montachusett Region for implementation. The implementation of the Hazard Mitigation Plan will begin following its approval by MEMA and FEMA and formal adoption by the Mayor in the cities, Board of Selectmen in the towns and Vice President of Operations of Devens. Municipal departments and boards will be responsible for ensuring the development of policies, bylaw revisions, and programs as described in this plan. For Devens, The Devens Enterprise Commission (DEC) will be responsible for ensuring the development of policies and programs described in this plan. The measure of success of the Hazard Mitigation Plan will be the number of identified mitigation strategies implemented. In order for the municipalities and Devens to become more disaster resilient and better equipped to respond to natural disasters, there must be a coordinated effort between local officials, appointed bodies, employees, Regional and state agencies involved in disaster mitigation, and of course the general public.

Plan Maintenance and Public Participation:

Emergency Management Directors of the Emergency Management Departments in all communities plus Devens will be responsible for leading efforts to monitor, evaluate and update the community's plan and communicate with MRPC regarding plan maintenance progress. Assisted by the MRPC, EMD's will continue public participation in the plan maintenance process and the general public will be invited to participate and provide feedback over the next five years. The final plan will be on each participating community's website (and MRPC's website) and it will be noted on the website that comments will always be accepted by the community. Participating communities will also convene a regional hazard mitigation meeting annually to discuss disasters and problems that have occurred during the prior year and to discuss actions that have been completed over the prior year. EMD's in each participating community will **monitor** the status of the identified mitigation actions and report this information at this meeting.

This meeting shall be posted according to the Massachusetts Open Meeting Law and advertised in press releases to local newspapers including the Fitchburg Sentinel and Enterprise, Worcester Telegram, Gardner News, and Athol Daily News encouraging general public participation. Findings from these annual meetings will be incorporated into the 2020 plan update, so this change will allow hazard mitigation to remain an integral part of planning in the region. These annual meetings will assess the effectiveness of the plan by discussing what mitigation actions have occurred and if there have been any issues with the plan not addressing specific problem areas.

Moreover, the Planning Team within each community made up of EMD's, Town Administrators/Managers, Planners, and Department of Public Works and others will work to integrate the goals, requirements, and actions from this plan into their other planning processes and programs, such as CEM plans, Homeland Security Plans, Master Plans, Transportation Plans, Open Space and Recreation Plans, capital improvement plans, zoning bylaws, and wastewater management plans. Each community is different in the types of plans and policies which govern the operation and management of their community. Each community also has varying schedules in the way they develop or update these plans and policies. The responsibility ultimately falls with the individual community to include the appropriate elements from this Hazard Mitigation Plan into their other plans, policies, and programs. Whenever a new planning initiative begins in the community, the Hazard Mitigation Plan will be consulted so that the relevant elements can be incorporated and supported for implementation. At the regional scale, MRPC will continue to incorporate relevant information and strategies into the Regional

Transportation Plan as well as the region's Comprehensive Economic Development Strategy (CEDS). Each community did not incorporate the 2008 Natural Hazard Pre-Disaster Mitigation Plan into other planning mechanisms over the last five years since this is a new requirement.

Finally, MRPC will work with local partners to update this plan five years from its adoption, as resources allow, with the next update being due during the year 2020. Work on the update of the plan will begin in 2018. MRPC will apply to FEMA Pre-disaster mitigation grant program in 2017 for funding to update this plan. The update will focus on evaluating the success and any shortfalls associated with this plan. MRPC will once again work with the communities to determine if any new information relating to new or changing hazard conditions or improved vulnerability assessment will be added. Similar to this plan update, additional hazards data will be researched and it will be determined if it gets incorporated into the plan. The action items will be reviewed for accomplishments, successes will be noted, and new action items will be added as necessary. Outreach to municipalities, private individuals, and interested organizations will remain a priority.

3. Regional Profile

Montachusett Region is comprised of three cities, 19 towns, and the unincorporated village of Devens. Montachusett is a Region of 675 square miles located in north central Massachusetts with a population of 236,475 (2010 U.S. Census). The cities and towns that comprise the Region lie in "North Central Massachusetts" due west of Boston. While the Region is mostly rural, well-defined industrial centers are present in the cities of Fitchburg, Leominster and Gardner and in the towns of Clinton, Ayer and Athol. Fitchburg and Leominster are the Region's most populous communities, and also make the largest contribution to the Regional economy.

The Region's topography is dotted by high peaks such as Mount Wachusett and Mount Watatic and other rolling hills typical of the New England landscape. Three watersheds, namely the Chicopee River, Millers River and Nashua River, other streams, mountain paths, rail-trails, urbanized downtowns and neighborhoods, historic village centers and new housing subdivisions are connected by a local, state and interstate road system and a commuter and freight rail system linking Boston to Albany.

The area has been blessed to be able to experience four distinct seasons each year (summer, fall, winter and spring). Businesses and residents in the Region can take full advantage of mountain biking, camping, canoeing, hiking, angling and picnicking in the summer, promoting tourist-related activities such as the sale of apples and pumpkins at local apple orchards in the fall, skiing, snowmobiling and ice-fishing in the winter and the re-start of outdoor activities in each succeeding spring.

Multiple land uses exists within the Montachusett Region including residential, mixed use (i.e. downtowns, central business districts and village centers), commercial, residential, and protected open space. Municipalities are making concerted efforts to preserve natural resources and open spaces while still fostering residential, commercial and industrial developments.

Population and Employment

Population: The 2010 Census recorded 236,475 residents in the Region, a 3.7% increase in its population from the year 2000. Since 1960, the Region's population as a whole has continued to grow.

This trend can be seen to the right.

Table 1 below indicates that the Region has been growing since 1960. Most communities have seen population increases in recent years. In fact, just three communities in the Region experienced a decrease in population between the years 2000 and 2010: Gardner, Townsend and Leominster. Communities that experienced the largest percentage increase in population since 2000 were Templeton (17.9%), Shirley (13.1%), Hubbardston (12.1%) and Groton (11.5%). Prior to the Devens Restructure in the 1990's, Devens military population was divided among the communities of Ayer, Harvard and Shirley. Devens is no longer an active military installation with any significant military population.

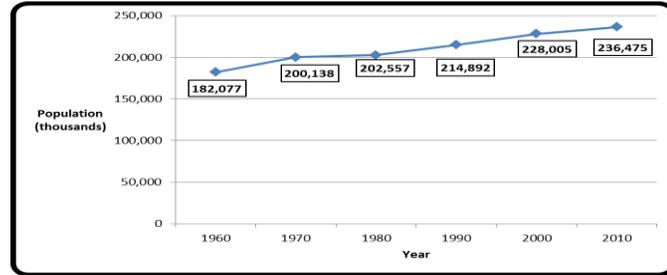


Table 1: Population in the Montachusett Region from 1990-2010

Community	1960	1970	1980	1990	2000	2010	'80-90' % Change	'90-00'% Change	00-10% Change
Ashburnham	2,758	3,484	4,075	5,433	5,546	6,081	33.3%	2.1%	9.6%
Ashby	1,883	2,274	2,311	2,717	2,845	3,074	17.6%	4.7%	8.0%
Athol	11,637	11,185	10,634	11,451	11,299	11,584	7.7%	-1.3%	2.5%
Ayer	14,927	7,393	6,993	6,871	7,287	7,427	-1.7%	6.1%	1.9%
Devens		2,462	710	620	266	383	-12.7%	-57.1%	44.0%
Ayer		5,863	6,283	6,251	7,021	7,044	-0.5%	16.6%	0.3%
Clinton	12,848	13,383	12,771	13,222	13,435	13,606	3.5%	1.6%	1.3%
Fitchburg	43,021	43,343	39,580	41,194	39,102	40,318	4.1%	-5.1%	3.1%
Gardner	19,038	19,748	17,900	20,125	20,770	20,228	12.4%	3.2%	-2.6%
Groton	3,904	5,109	6,154	7,511	9,547	10,646	22.1%	27.1%	11.5%
Harvard	2,563	12,536	12,170	12,329	5,981	6,520	1.3%	-51.5%	9.0%
Devens		9,532	8,118	7,667	751	1,457	-5.6%	-90.2%	94.0%
Harvard		2,962	4,052	4,662	5,230	5,063	15.1%	28.3%	-3.2%
Hubbardston	1,217	1,437	1,797	2,797	3,909	4,382	55.6%	39.8%	12.1%
Lancaster	3,958	6,095	6,334	6,661	7,380	8,055	5.2%	10.8%	9.1%
Leominster	27,929	32,939	34,508	38,145	41,303	40,759	10.5%	8.3%	-1.3%
Lunenburg	6,334	7,419	8,405	9,117	9,401	10,086	8.5%	3.1%	7.3%
Petersham	890	1,015	1,024	1,131	1,180	1,234	10.4%	4.3%	4.6%
Phillipston	695	872	953	1,485	1,621	1,682	55.8%	9.2%	3.8%
Royalston	800	809	955	1,147	1,254	1,258	20.1%	9.3%	0.3%
Shirley	5,202	4,909	5,124	6,118	6,373	7,211	19.4%	4.2%	13.1%
Devens		957	718	686	0	0	-4.5%	-100.0%	No Change
Shirley		3,952	4,406	5,432	6,373	7,211	23.3%	17.3%	13.1%
Sterling	3,193	4,247	5,440	6,481	7,257	7,808	19.1%	12.0%	7.6%
Templeton	5,371	5,863	6,070	6,438	6,799	8,013	6.1%	5.6%	17.9%
Townsend	3,650	4,281	7,201	8,496	9,198	8,926	18.0%	8.3%	-3.0%

Westminster	4,022	4,273	5,139	6,191	6,907	7,277	20.5%	11.6%	5.4%
Winchendon	6,237	6,682	7,019	8,805	9,611	10,300	25.4%	9.2%	7.2%
TOTAL	182,077	199,296	202,557	223,865	228,005	236,475	10.5%	1.8%	3.7%

Source: U.S. Census Bureau & Massachusetts 2010 Population and Housing Unit Counts,
US Department of Commerce, Economics and Statistics Administration

Employment: The Region continues to undergo diversification of its economy. Following national and state trends, for decades, there has been an ongoing trend in the reduction in the number of manufacturing jobs and an increase in jobs in the service sector. In addition, there have been local and Regional efforts to boost tourism in the Region. New types of manufacturing jobs are anticipated to be created in relation to markets yet to emerge and products related to electronics, biotechnology and nanotechnology. The types of service sector jobs that are growing are in the health care and hospitality sectors.

Table 2: Employment by Community and Sector

Community	AGR/ FOR/ FIS/ MIN	CONS	MFG	WS	RT	TRN/ WAR/ UTL	INFO	FIN/ INS/ RE	PRO, SCI, MGN/ WMS	EDU/ HLTH/ SS	ART/ ENT/ REC/ FDS	OTHR	PA	Total By Community
Ashburnham	15	278	461	85	231	79	67	319	347	883	255	92	241	3353
Ashby	37	121	201	94	215	91	17	51	153	479	106	63	86	1714
Athol	13	550	824	99	523	247	151	304	291	1375	315	132	178	5002
Ayer	30	196	420	53	318	146	190	181	548	836	278	172	295	3663
Clinton	27	384	1122	225	843	329	230	378	938	1457	466	364	538	7301
Devens*	0	23	0	0	29	0	0	0	12	80	17	3	53	217
Fitchburg	55	1066	3096	360	2363	711	416	937	1664	4787	1845	684	714	18698
Gardner	28	529	1545	228	1059	148	76	448	611	2397	1110	304	457	8940
Groton	47	163	1030	182	406	38	135	459	1099	1146	298	210	150	5363
Harvard	9	133	426	56	139	44	123	171	527	726	51	121	87	2613
Hubbardston	20	198	430	47	250	33	90	98	203	575	117	86	109	2256
Lancaster	14	147	570	27	691	72	57	171	419	901	234	148	90	3541
Leominster	81	921	3295	584	2419	794	443	1233	1978	4897	1877	1148	1021	20691
Lunenburg	37	597	644	179	614	228	145	380	632	1281	298	326	242	5603
Petersham	34	49	54	3	29	24	14	19	90	187	49	13	34	599
Phillipston	25	95	158	32	124	49	20	21	47	242	50	33	107	1003

Royalston	6	60	98	19	57	9	6	15	52	141	42	13	51	569
Shirley	0	126	433	116	193	133	54	220	359	533	271	143	196	2777
Sterling	69	300	514	33	411	193	54	278	627	1017	212	216	241	4165
Templeton	17	241	518	43	394	298	79	222	314	998	151	200	356	3831
Townsend	61	354	846	145	599	161	72	158	505	1308	212	223	181	4825
Westminster	47	217	736	81	388	176	49	286	454	907	302	194	184	4021
Winchendon	96	206	991	159	553	177	66	279	371	1335	293	290	373	5189
Total	768	6954	18412	2850	12848	4180	2554	6628	12241	28488	8849	5178	5984	115934
Percentage Employed By Sector	0.7%	6%	15.9%	2.5%	11.1%	3.6%	2.2%	5.7%	10.6%	24.6%	7.6%	4.7%	5.2%	

AGR	Agriculture	FIS	Fishing	MIN	Mining	SCI	Scientific
ART	Arts	FOR	Forestry	OTHR	Other	SS	Social Services
CONS	Construction	HLTH	Healthcare	PA	Public Administration	TRN	Transportation
EDU	Education	INFO	Information	PRO	Professional	UTL	Utilities
ENT	Entertainment	INS	Insurance	RE	Real Estate	WAR	Warehouse
FDS	Food Service	MFG	Manufacturing	REC	Recreation	WMS	Waste Management
FIN	Finance	MGN	Management	RT	Retail	WS	Wholesale

Source: American Community Survey

***According to Dunn & Bradstreet, Mass Development and MA Labor Market Information, the total amount of Jobs in Devens (which overlaps the communities of Ayer, Harvard, and Shirley) is 4,030.**

Table 2 above depicts the number of employed by Sector and Community. There are existing clusters of business in the Region. While the area once benefited from furniture and paper manufacturing, these sectors have given way to the emerging polymers, plastics, metals fabrication and food processing facilities supported by a business services cluster (e.g. finance, insurance and real estate). Education, healthcare, and social services account for the most jobs in the Region, at 24.6%. The Region is experiencing dramatic declines in manufacturing, a sector that has been so important to our Region’s history and economy, only accounting for 15.9% of all jobs in the Montachusett Region. In 1990, manufacturing jobs accounted for 29.4% of all jobs, and 24.4% in 2000. (1990 & 2000 U.S. Census)

The Region is experiencing an increase in jobs in Finance, Insurance, and Real Estate (5.7%, up from 5.0% in 2000, and 4.5% in 1990). Agriculture, Forestry, Fishing and Mining accounted for the least amount of jobs in the Region, coming in a just 0.7%, with Information at second-lowest, at 2.2%.

Regional Land Use

The update of this plan does not reflect changes that have taken place in terms of development since the 2008 Natural Hazard Mitigation Plan did not address this. Utilizing the most recent regional land use

information available, data indicates that about 11% of the Montachusett Region is developed, primarily for residential purposes (9%) followed much further behind by Commercial/Industrial development (1%) and the transportation network (1%). Forested land makes up about 67% of the Region's land use and 4% of the land is used for agricultural purposes. Wetlands and water bodies occupy about 13% of the Region. Some of the densest areas of development are often situated along rivers where moving water was once used to power paper and textile mills and other factories. The chart below displays the land use in the Montachusett Region by percent and Table 3 depicts land use by each individual community.

Regional Land Use

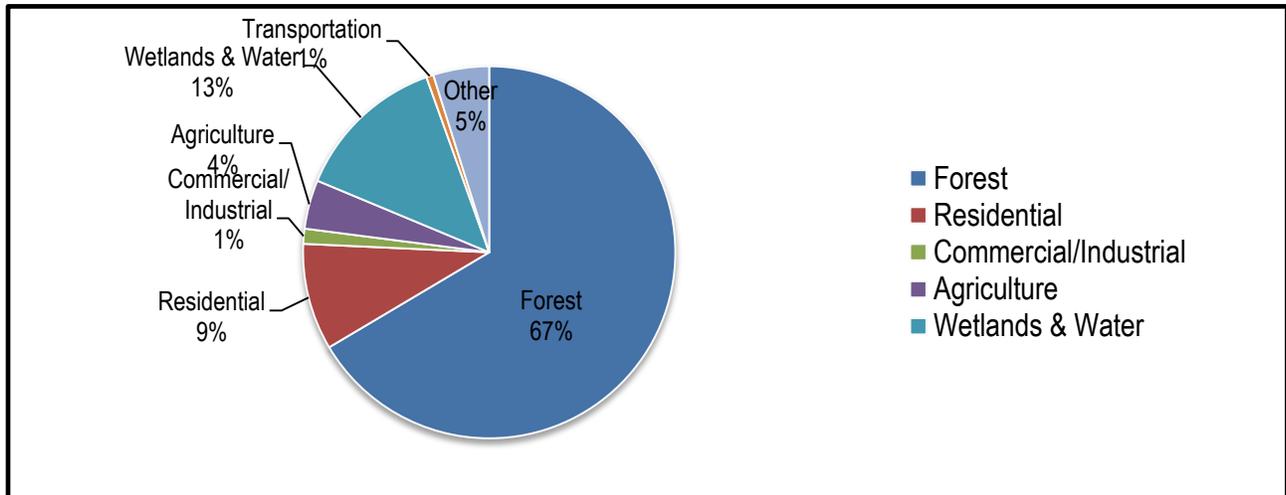


Table 3: Land Use by Community

Community	Forest		Residential		Commercial & Industrial		Agricultural		Wetlands & Water		Transportation		Other		Total Acres
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	
Ashburnham	19428	74.13%	1721	6.57%	53	0.20%	618	2.36%	3940	15.03%	7	0.03%	442	1.69%	26209
Ashby	12055	78.25%	1166	7.57%	35	0.23%	891	5.78%	916	5.94%	1	0.01%	342	2.22%	15406
Athol	16135	75.57%	1885	8.83%	258	1.21%	450	2.11%	1817	8.51%	126	0.59%	682	3.19%	21352
Ayer	2475	40.70%	846	13.92%	519	8.53%	133	2.18%	349	5.74%	951	15.64%	809	13.29%	6082
Clinton	1336	28.75%	246	5.28%	1225	26.36%	75	1.61%	80	1.72%	1106	23.80%	580	12.48%	4647
Devens	1885	42.17%	147	3.28%	241	5.39%	17	0.37%	407	9.11%	221	4.96%	1551	34.70%	4470
Fitchburg	10403	57.81%	3478	19.33%	930	5.17%	920	5.11%	587	3.26%	295	1.64%	1381	7.68%	17995
Gardner	8616	58.50%	2060	13.98%	484	3.29%	307	2.09%	2153	14.62%	166	1.12%	943	6.40%	14728
Groton	12421	57.46%	2975	13.76%	128	0.59%	1756	8.12%	3344	15.47%	9	0.04%	983	4.55%	21617
Harvard	9463	54.45%	1938	11.15%	200	1.15%	1489	8.57%	2443	14.06%	195	1.12%	1650	9.50%	17378
Hubbardston	20052	74.62%	1285	4.78%	107	0.40%	963	3.58%	3557	13.24%	33	0.12%	876	3.26%	26871
Lancaster	9331	52.10%	1541	8.60%	159	0.89%	1495	8.35%	2473	13.81%	223	1.25%	2688	15.01%	17910
Leominster	9835	51.78%	4338	22.84%	1123	5.92%	520	2.74%	1617	8.51%	253	1.33%	1309	6.89%	18994
Lunenburg	9996	56.29%	2794	15.73%	248	1.40%	1374	7.74%	2157	12.15%	42	0.24%	1147	6.46%	17758
Petersham	29984	68.65%	29	0.07%	622	1.42%	1011	2.31%	11473	26.27%	0	0.00%	556	1.27%	43675
Phillipston	12307	78.06%	510	3.24%	23	0.14%	284	1.80%	2368	15.02%	64	0.41%	210	1.33%	15766
Royalston	22386	82.22%	662	2.43%	20	0.07%	653	2.40%	3017	11.08%	15	0.06%	475	1.74%	27228
Shirley	6449	63.38%	1274	12.52%	101	0.99%	382	3.75%	1043	10.25%	43	0.43%	882	8.67%	10175
Sterling	11714	57.81%	2176	10.74%	248	1.23%	2204	10.88%	2410	11.89%	279	1.38%	1233	6.08%	20264
Templeton	13793	66.55%	1800	8.68%	219	1.06%	884	4.27%	2651	12.79%	313	1.51%	1065	5.14%	20724
Townsend	15763	74.69%	2085	9.88%	158	0.75%	828	3.92%	1573	7.45%	6	0.03%	692	3.28%	21104
Westminster	16700	70.04%	1781	7.47%	214	0.90%	752	3.15%	3083	12.93%	188	0.79%	1124	4.72%	23842
Winchendon	20452	72.44%	2399	8.50%	227	0.80%	632	2.24%	3312	11.73%	20	0.07%	1190	4.21%	28231
Source: (MassGIS, 2010)															

Transportation Network

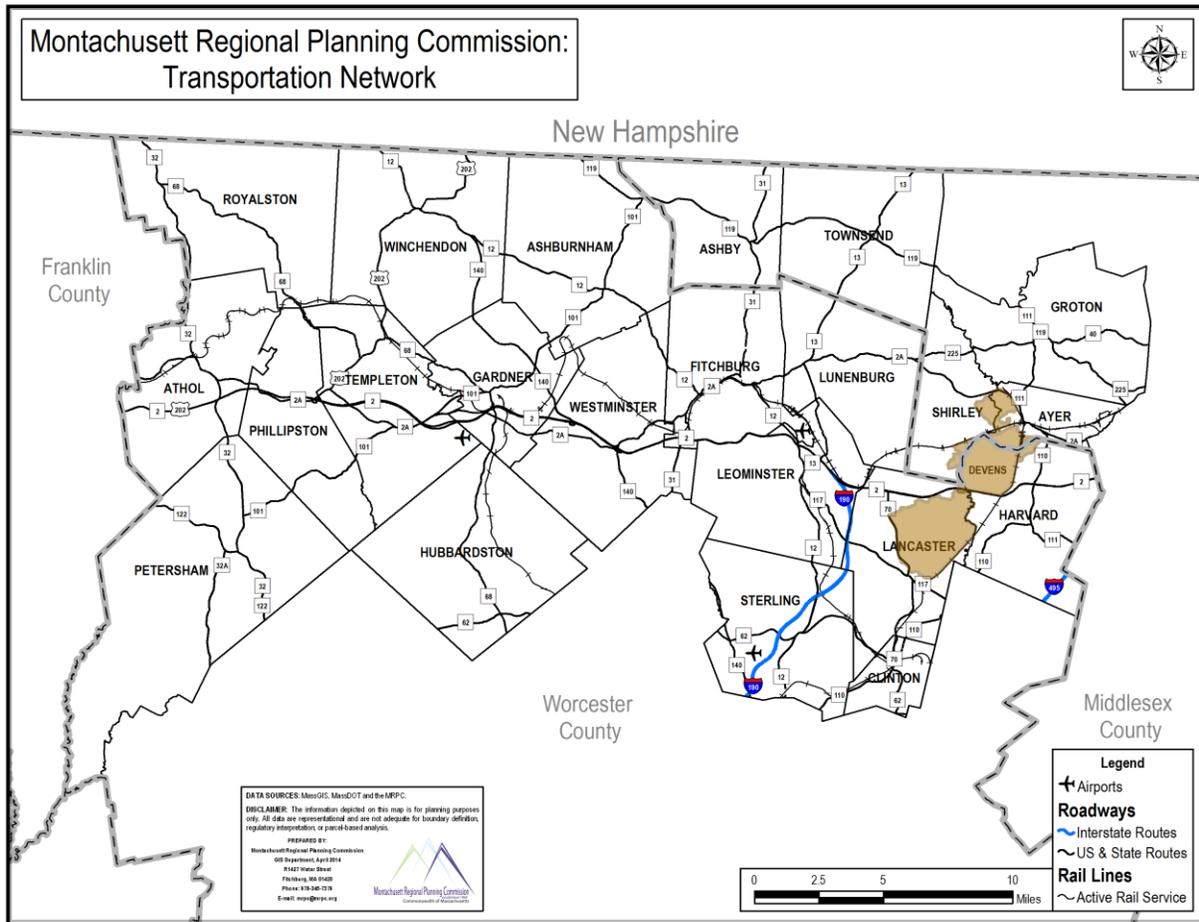
The Montachusett Region is served by several state numbered routes that provide accessible links to all of the Region's communities. Of greatest importance to the area is Route 2, running east-west throughout the entire Region. This is one of two limited access east-west highways in the state and parallels the Massachusetts Turnpike in the center of the Commonwealth. This roadway provides the area with a direct link to I-495 and Boston in the east, and a connection in the west to I-91 and the western half of the state. Consequently, this highway is a major thoroughfare for the state as well as for the Region. Additionally, in the time of an emergency, Route 2 would function as a major evacuation route. The Region's major urban communities, Fitchburg, Leominster and Gardner, all border Route 2. The section of Route 2 from Phillipston to Athol in the MRPC Region was part of an ongoing Safety Improvement Study to improve the highway between Phillipston and Greenfield. Resulting improvements in the two communities included construction of climbing lanes, on and off ramp improvements, a truck weigh station in Athol and the installation of an innovative centerline treatment called "Qwick Kurb" along approximately 13 miles of Route 2 in Phillipston and Athol.

The completion of I-190 in the early 1980's added a second major limited access highway to the Region. This roadway provides direct access to Worcester, I-290 and the Massachusetts Turnpike. This highway has helped to reduce through traffic volumes on Route 12 by providing easier access to the Worcester area.

A second new limited access roadway was added to the Region's highway network with the completion of the Route 140 Bypass in Gardner, Westminster and Winchendon. Also constructed in the early 1980's as an alternative to the existing Route 140 layout, the Route 140 Bypass has enhanced traffic flow and alleviated some of the excess through traffic in Gardner City center. The MRPC and Central MA Regional Planning Commission (CMRPC) have worked with the communities of Sterling, Princeton, and Westminster on a Route 140 South Corridor Profile which has addressed safety concerns and made recommendations for improvements along the roadway from Route 2 south to I-190. A similar effort was undertaken by the MRPC along Route 140 North from Route 2 in Westminster north through Gardner and into Winchendon to Route 12. The Route 140 North Corridor Profile also identified potential improvements to address safety and access concerns in the three communities. Based upon information contained within this Corridor Profile, several safety improvements were implemented in Winchendon to Route 140 from the Gardner city line north to Teel Road.

In Lunenburg, the two major roadways are Route 2A (Massachusetts Avenue) and Route 13 (Chase Road, Massachusetts Avenue and Electric Avenue). Route 2A is functionally classified as a Principal Arterial and is a major east/west road through both the town of Lunenburg and the Region as a whole. This road is under the Massachusetts Department of Transportation (MassDOT) jurisdiction through the town and the pavement condition varies from good to fair condition throughout. Route 13 is a north/south Principal Arterial originating in the City of Leominster towards the south through Lunenburg and the Town of Townsend in the north. Route 13 is almost completely town jurisdiction throughout Lunenburg with the exception of a short 0.1 mile section shared with Massachusetts Avenue (Route 2A) that is under MassDOT jurisdiction. Major improvements to Route 13 in North Leominster are expected to start in 2016 that will greatly improve congestion issues that users from Lunenburg attempting to access Route 2 and other commercial areas currently experience during AM and PM rush hours.

The map below depicts the transportation network throughout the Montachusett Region.



Public Transportation: The Region receives a wide array of public transportation services. At the forefront of the Region’s public transportation is the Montachusett Regional Transit Authority (MART), which administers the local bus systems. MART offers fixed route, demand response and special employment transportation services to the communities of Fitchburg, Leominster and Gardner. Limited intercity bus services are also available in Winchendon, Templeton, Phillipston, Athol and Orange. A majority of communities have transportation service for the elderly and disabled.

The Massachusetts Bay Transportation Authority (MBTA), based in Boston provides commuter rail service to the Region. Four commuter rail stations are located in the Montachusett Region.

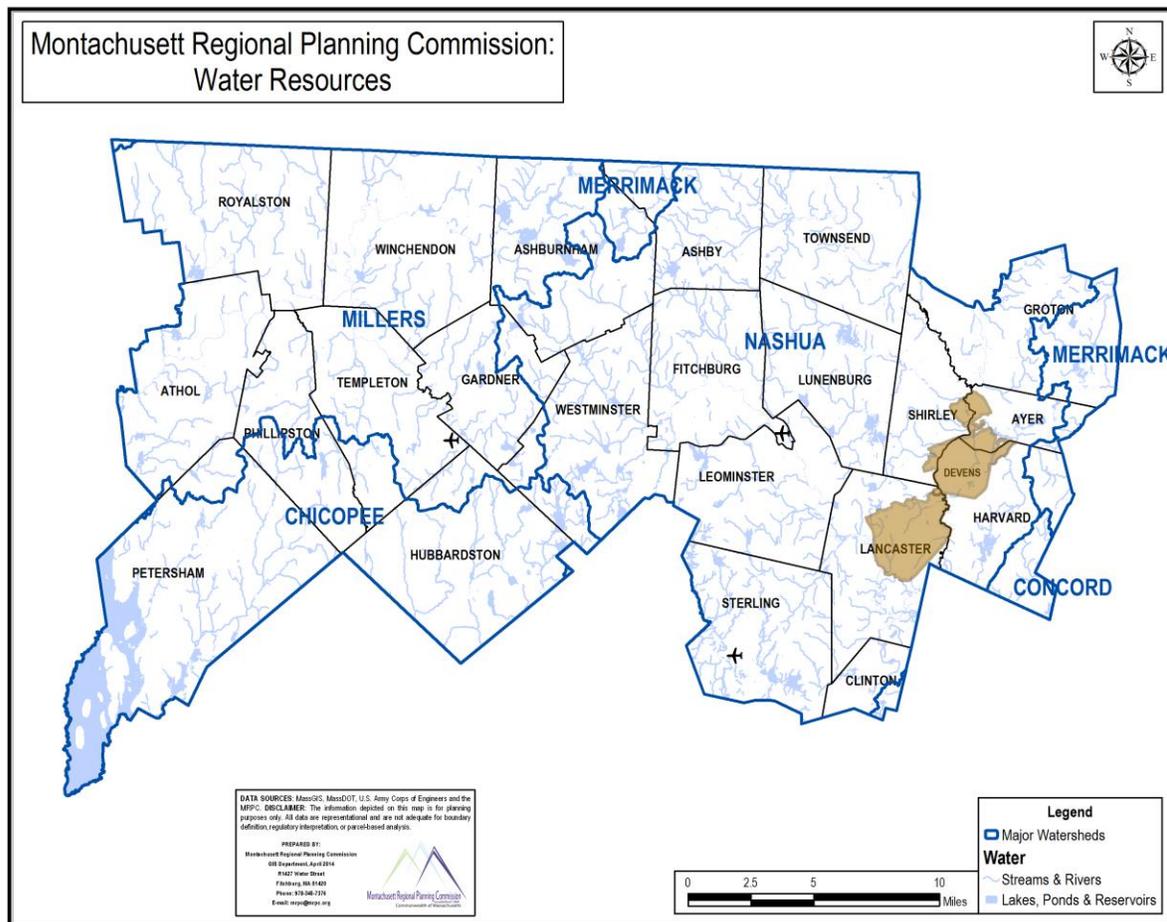
Air Transportation: Within the Montachusett Region, there are three general aviation airports. Fitchburg Municipal Airport is located between the cities of Fitchburg and Leominster and the Gardner Airport in Templeton is located near the Gardner City Line. Both are publicly owned. The third airport is Sterling Airport in Sterling which is owned by a private corporation. All three airports are open to the public. The largest of the airports by far is the Fitchburg Municipal Airport. The airport sits on 335 acres and is classified as a General Aviation, General Utility Stage II airport by the National Plan of Integrated Airport Systems (NPIAS). This indicates that the airport can serve all small airplanes and accommodate some larger aircraft with a wingspan of less than 79 feet. Averages of 170 flights per day are handled on its two-runway system.

Freight: Within the Montachusett Region, three major freight rail carriers operate: CSX Transportation, Pan Am Railways and the Providence & Worcester Railroad. In the Region rail operators own a total of 148.7 track miles.

Water Resources

The Region encompasses parts of four watersheds in the Montachusett Region’s communities: Millers, Nashua, Merrimack, and Chicopee. The majority of the Region’s communities are located in the Nashua River Watershed, followed by six communities in the Millers River Watershed, three in the Chicopee Watershed and a small portion of Ayer and Groton in the Merrimack River Watershed. All of these watersheds contain many smaller rivers and brooks, each with their own unique values, functions, and uses.

The Region contains 1,181 lakes and ponds totaling 22,678 acres. The Region also has 4,277 wetlands, totaling 36,903 acres. The map below depicts water resources throughout the Montachusett Region.



4. Identification of Natural Hazards

As an update of the 2008 Regional Plan, all hazards were reviewed and updated based on the most recent data available.

Identifying and Profiling Hazards

This section outlines the natural hazards that affect the Montachusett Region. For community specific natural hazard locations please refer to Section 6. Community Profiles, Local Hazards Maps. Natural hazards identified are based on the hazards found in the MA State Hazard Mitigation Plan. Throughout this section the natural hazards are discussed, including Location, Extent, Previous occurrences, Probability of Future Events, Impact, and Vulnerability. Definitions associated with probability are as follows:

- Highly likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
- Possible: 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.
- Unlikely: Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.

Flood Related Hazards

Participation in the National Flood Insurance Program

All 22 communities in the Montachusett Region participate in the National Flood Insurance Program (NFIP). The following table shows when each community initiated their participation in the program, when their initial Flood Hazard Boundary Map (FHBM) was created, and the status of their current Flood Insurance Rate Map (FIRM). Of the 22 communities within the Montachusett Region, 21 have established flood plain districts in their zoning bylaws based on their Flood Insurance Rate Map. Only the Town of Petersham does not have a floodplain protection bylaw. The village of Devens does not participate in the NFIP individually, however, Devens consists of the towns of Ayer, Shirley and Harvard and those communities participate in the NFIP.

Floodplain Management and Community Compliance with NFIP can be found in individual community annexes, Section 6. Community Profiles, Flood Prone Areas.

Table 4: Community Participation in the NFIP

Community	Initial FHBM	Initial FIRM date	Current FIRM Date	Date Entered NFIP
Ashburnham	7/19/1974	6/15/1984	6/15/1984	6/15/1984
Ashby	4/29/1977	8/1/1996	6/4/2010	8/1/1996
Athol	3/8/1974	7/19/1982	7/19/1982	7/19/1982
Ayer	3/22/1974	7/19/1982	6/4/2010	7/19/1982
Clinton	8/9/1974	6/15/1982	7/16/2014	6/15/1982
Fitchburg	4/5/1974	5/16/1983	9/18/1991	5/16/1983

Gardner	9/6/1974	7/2/1981	7/2/1981	7/2/1981
Groton	9/6/1974	7/5/1982	6/4/2010	7/5/1982
Harvard	8/2/1974	6/15/1983	7/16/2014	6/15/1983
Hubbardston	9/6/1974	6/1/1984	6/1/1984	11/17/1994
Lancaster	2/22/1974	7/5/1982	7/16/2014	7/5/1982
Leominster	3/22/1974	9/16/1982	4/3/1989	9/16/1982
Lunenburg	9/6/1974	6/15/1982	6/15/1982	6/15/1982
Petersham	9/13/1974	1/23/1979	1/23/1979	1/23/1979
Phillipston	8/9/1974	7/16/1984	7/16/1984	7/16/1984
Royalston	5/17/1974	6/15/1983	6/15/1983	6/15/1983
Shirley	6/28/1974	7/5/1983	6/4/2010	7/5/1983
Sterling	7/19/1974	6/15/1982	6/15/1982	6/15/1982
Templeton	8/2/1974	5/17/1982	5/17/1982	5/17/1982
Townsend	9/20/1974	8/2/1982	6/4/2010	8/2/1982
Westminster	7/26/1974	7/19/1982	7/19/1982	7/19/1982
Winchendon	8/23/1974	6/15/1982	6/15/1982	6/15/1982

Since the initiation of the NFIP, a number of Montachusett communities have experienced losses due to flooding and have made claims under the NFIP. The following table lists the communities who have made claims under the NFIP and the disposition of those claims. In total, based on this inventory, there have been 135 claims in the Montachusett Region resulting in total payments of over \$1.1 million.

Statistics regarding the number of flood insurance policies in force by community can be found in Section 6. Community Profiles.

Community	Total Losses	Closed Losses	Open Losses	Closed without Payment (CWOP) Losses	Total Payments
Ashburnham	2	1	0	1	\$ 5,198.83
Ashby	None				
Athol	2	2	0	0	\$ 22,246.80
Ayer	3	2	0	1	\$ 7,783.30
Clinton	29	23	0	6	\$ 385,466.78
Fitchburg	32	27	0	5	\$ 382,131.15
Gardner	None				
Groton	2	1	0	1	\$ 12,395.47
Harvard	None				
Hubbardston	None				
Lancaster	34	31	0	3	\$ 327,168.99

Leominster	25	22	0	3	\$ 98,076.97
Lunenburg	2	1	0	1	\$ 2,537.72
Petersham	None				
Phillipston	None				
Royalston	None				
Shirley	13	8	0	5	\$ 159,633.55
Sterling	1	1	0	0	\$ 6,545.78
Templeton	None				
Townsend	16	12	0	4	\$ 43,801.11
Westminster	6	4	0	2	\$ 7,894.43
Winchendon	2	1	0	1	\$ 419.80
Total	135	105	0	30	\$ 1,134,131.69

**As of October 31, 2014*

The table below depicts repetitive loss properties by community. A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. RL property may or may not be currently insured by the NFIP.

Repetitive Loss Properties by Community			
Community	Repetitive Loss Properties	Type	Total Amount
Ashburnham	0		
Ashby	0		
Athol	0		
Ayer	0		
Clinton	3	2 Residential 1 Commercial	\$59,243.50
Fitchburg	4	1 Residential 3 Commercial	\$192,043.53
Gardner	0		
Groton	0		
Harvard	0		
Hubbardston	0		
Lancaster	5	Residential	\$230,261.59
Leominster	4	3 Residential 1 Commercial	\$38,274.40
Lunenburg	0		
Petersham	0		
Phillipston	0		
Royalston	0		
Shirley	1	Residential	\$67,092

Sterling	0		
Templeton	0		
Townsend	2	Residential	\$19,477.43
Westminster	1	Residential	\$6,526.90
Winchendon	0		

**As of April 2014*

HEAVY RAIN

Flooding can be defined as a rising and overflowing of a body of water onto normally dry land. Floods can be slow or fast rising but generally develop over a period of days. A high percentage of impervious surfaces and high groundwater levels do not allow heavy rain to be absorbed back into the ground. Basement, roadway, and infrastructure flooding can result in significant damages due to poor or insufficient storm water drainage. This not only causes flooding but also prevents groundwater recharge and can threaten water quality, which can affect public drinking water supplies. Floods are among the most frequent and costly natural disasters in terms of human hardship and economic loss.

Previous Occurrences

There have been a number of significant flood events over time that have severely impacted the Montachusett Region including The Great Flood of 1936 when a combination of rainfall and liquid equivalent of melted snow during mid to late March ranged from 7 to 13 inches; The Great New England Hurricane of 1938 which was one of the most destructive and powerful storms ever to strike Southern New England causing a flooding catastrophe in the Region; and tropical storms Connie and Diane which occurred within a little over a week apart of each other in August 1955, producing significant flooding over much of Massachusetts.

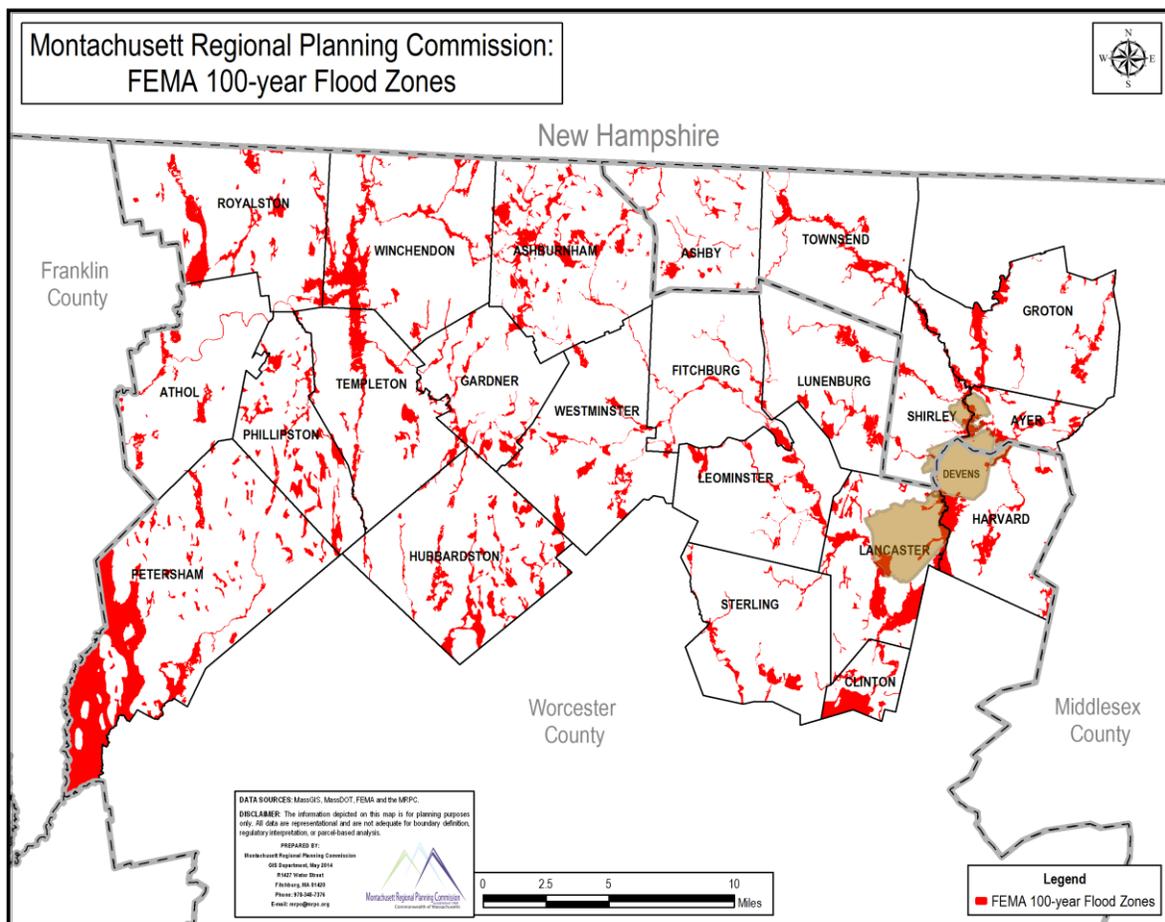
Most recently, there was a major flood event in the Montachusett Region during March 2010 that was caused by a series of moderate to heavy rainfall events over a 5-week period which started in late February. The rainfall saturated soils, swelled rivers and streams, flooded basements, and caused road closures. The first major flood event in March occurred during the 13th to the 15th when 4 to 6 inches fell in parts of the Montachusett Region. The Nashua River experienced its worst flood in 23 years, resulting in substantial flooding in locations such as Lancaster and Clinton. Another significant rain event occurred March 22 to 23. This 1 to 3 inch rainfall event served to cause pockets of minor flooding, keeping soils saturated, and keeping river and streams elevated. The final big rain event occurred on the 29th to 31st of the month with rainfall totals ranging from 3 to 6 inches across central Massachusetts.

Vulnerability

According to flood plain data in the tables below, the Montachusett Region is highly vulnerable to flooding. Moreover, the yearly precipitation total for the Montachusett Region has been experiencing a gradual rise over the last 33 years. The topography of the Montachusett Region is often characterized by rolling hills and valleys, with a significant amount of historic, high density residential/commercial/industrial development along sections of the Nashua and Millers Rivers. This development pattern led to substantial development within the floodplains in the communities of Fitchburg, Leominster, and Winchendon but significantly less development within the floodplains for

higher terrain areas of the Region. The map below illustrates the 100 year flood plain within the Region and Table 6 lists the acreage of each community that is within the 100 year flood plan and how much of the flood plain is developed. Local Hazards Maps for each community located in Section 6, Community Profiles, Risk Assessment indicate vulnerability to hazards.

The 100-year flood, which is the standard used by most Federal and state agencies, is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and to determine the need for flood insurance. It should be noted that the term "100-year flood" is not the flood that will occur once every 100 years. Rather, it is the flood that has a one percent chance of being equaled or exceeded each year. For example, a structure located within the 100 year flood plain has a 26 percent chance of suffering flood damage during the term of a 30-year mortgage. Moreover, the 100-year flood could occur more than once in a relatively short period of time.

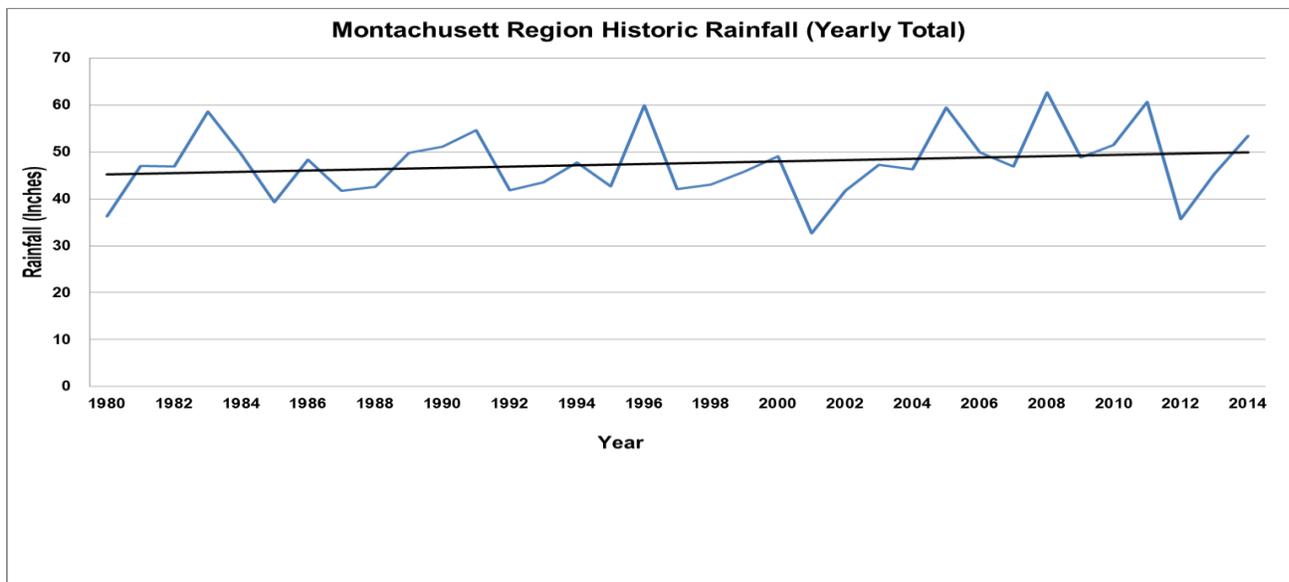


**Table 6: Acreage of Community within the 100 year Flood Plan
And Flood Plain Development**

Community	Acres in Community	Acres in 100-year Floodplain	Percent of Community in 100-year Floodplain	Acres of Floodplain that are developed	Percent of Floodplain Developed
Ashburnham	26,208.81	3434.38	13.10%	65.54	1.91%
Ashby	15,406.70	911.63	5.92%	12.09	1.33%
Athol	21,352.00	1299.58	6.09%	65.77	5.06%
Ayer	6,082.06	1175.61	19.33%	82.32	7.00%
Clinton	4,646.91	1358.09	29.23%	58.93	4.34%
Devens	4,469.63	628.20	14.05%	11.70	1.86%
Fitchburg	17,994.55	876.54	4.87%	344.03	39.25%
Gardner	14,728.23	1421.90	9.65%	37.75	2.66%
Groton	21,616.56	2178.62	10.08%	53.91	2.47%
Harvard	17,378.23	2022.04	11.64%	12.43	0.61%
Hubbardston	26,870.78	3365.78	12.53%	18.51	0.55%
Lancaster	17,909.52	3246.78	18.13%	87.35	2.69%
Leominster	18,993.98	1260.39	6.64%	230.33	18.27%
Lunenburg	17,757.70	1617.79	9.11%	69.13	4.27%
Petersham	43,675.44	11204.06	25.65%	8.64	0.08%
Phillipston	15,766.16	2277.68	14.45%	10.70	0.47%
Royalston	27,229.17	3104.81	11.40%	32.84	1.06%
Shirley	10,175.24	980.09	9.63%	35.08	3.58%
Sterling	20,263.95	1135.56	5.60%	33.08	2.91%
Templeton	20,723.60	2300.54	11.10%	41.92	1.82%
Townsend	21,103.98	1575.41	7.46%	77.87	4.94%
Westminster	23,842.46	1769.54	7.42%	33.75	1.91%
Winchendon	28,230.54	3670.45	13.00%	122.41	3.34%

Source: FEMA/MassGIS 2013

Based on data gathered from the National Climatic Data Center, the yearly precipitation total for the Montachusett Region has been experiencing a gradual rise over the last 33 years. This can be seen in the chart below. In fact, two of the years since 1980 with the highest inches of rainfall have occurred most recently: 2008 (63”) and 2011 (61”).



Source: NOAA (Information only available through 2014)

Probability of Future Events

Using the past as a guide, the Montachusett Region will continue to be impacted by floods in the future. Moreover, with the increase in yearly precipitation the Region is experiencing as well as the amount of development that is within the floodplain, the region is Highly Likely (under the definition of probability) to experience increased amounts of flooding and damage. Efforts to flood proof or relocate existing development within the floodplain, along with efforts to prohibit or limit new development, will decrease the potential for damage and losses in the future.

BRIDGES

According to data from the Massachusetts Department of Transportation (MassDOT), the Montachusett Region has 30 bridges that cross water bodies that are listed as structurally deficient, as shown in Table 7 below. These bridges pose a greater risk for failure during a flooding event.

Typically, bridges with an AASHTO (American Association of State Highway and Transportation Officials) rating below 50 are considered structurally deficient. However some bridges may be considered structurally deficient due to deterioration to one or more of its major components. Eight of the bridges listed in the Table below are in the design status and six are in construction status according to the latest information from MassDOT’s bridge program.

Table 7: Structurally Deficient Bridges in the Montachusett Region

Community	Roadway	Over	Owner	Year Built/Rebuilt	AASHTO Rating	FFY2015-2018 TIP
Athol	Chestnut Hill Avenue	Millers River	Town	1921	6.2	Design
Athol	Crescent Street	Millers River	Town	1937	5.0	
Athol	Exchange Street	Millers River	Town	1988	50.5	
Athol	Morgan Avenue	S Athol Pond Outlet	Town	1979	52.9	
Athol	South Main Street	West Brook	MassDOT	1930	68.6	
Athol	Flat Rock Road	S Athol Pond Outlet	Town	1940	49.4	
Athol	Daniel Shays Highway	Lake Rohnta Outlet	MassDOT	1955	69.7	
Fitchburg	Westminster Street	Phillips Brook	MassDOT	1947	42.1	Design
Fitchburg	River Street	N Nashua River	MassDOT	1952	73.1	Design
Fitchburg	Route 2	Wyman Brook	MassDOT	1947	62.6	
Gardner	West Broadway	Bent Travers Pond	MassDOT	1929	68.9	
Hubbardston	Evergreen Road	Mason Brook	Town	1938	43.4	Design
Hubbardston	Burnshirt Road	Burnshirt River	Town	1940	62.5	Construction
Hubbardston	Old Boston Turnpike	W Br Ware River	Town	1950	34.7	Design
Leominster	Whitney Street	Monoosnoc Brook	City	1913	26.7	Construction
Petersham	Glen Valley Road	E Br Swift River	Town	1976	18.9	
Royalston	Stockwell Road	Lawrence Brook	Town	1985	18.5	Construction
Royalston	North Fitzwilliam Road	Lawrence Brook	Town	1959	69.0	Construction
Shirley	Longley Road	Mulpus Brook	Town	1968	54.9	
Templeton	North Main Street	E Templeton Pond Outlet	Town	1938	45.4	Construction
Townsend	Canal Street	Squannacook River	Town	1976	48.3	
Townsend	West Meadow Road	Locke Brook	Town	1985	68.5	
Townsend	Main Street	Pearl Hill Brook	MassDOT	1931	54.3	
Westminster	Whitmanville Road	Whitman River	Town	1937	39.2	

Westminster	Ashburnham State Road	Phillips Brook	MassDOT	1926	2.0	Design
Winchendon	Front Street	Millers River	Town	1973	47.7	
Winchendon	Royalston Road North	Tarbell Brook	Town	1980	41.8	Design
Winchendon	River Street	Millers River	MassDOT	1932	48.6	
Winchendon	Harris Road	Tarbell Brook	Town	1940	49.1	Design
Winchendon	Maple Street	N Br Millers River	MassDOT	1937	38.3	

Source: MASSDOT Bridge Inventory/Project Info Status

SNOW MELT

Snow melt has the potential to cause significant flooding throughout the Montachusett Region. This can be a serious problem for areas that have received large amounts of snow throughout the winter season. When temperatures rapidly increase, so does the rate at which snow melts; frozen soil also increases the risk of flood as water from melting snow is not able to seep into the ground.

Snowmelt flooding occurs when the major source of water involved in a flood is caused by melting snow. Unlike rainfall that can reach the soil almost immediately, the snowpack can store the water for an extended amount of time until temperatures rise above freezing and the snow melts. This frozen storage delays the arrival of water to the soil for days, weeks, or even months. Once it begins to melt and does reach the soil, water from snowmelt behaves much as it would if it had come from rain instead of snow by either infiltrating into the soil, running off, or both. Flooding can occur when there is more water than the soil can absorb or can be contained in storage capacities in the soil, rivers, lakes and reservoirs.

Previous Occurrences

The Montachusett Region averages about seven severe winter storms per winter (See Table 19: Winter Storms in Montachusett Region by Month), which can cause flooding during times when temperatures can increase quickly/substantially particularly in the spring which has resulted in numerous previous occurrences. The winter of 1935-1936 was one of the worst cases of snow melt/ flooding. As of early March that winter it was estimated that the snowpacks in New England averaged about 7.5 inches of water. In Southern New England, snow water equivalents of 3.5 inches were normal. On March 9, a warm, moisture-laden front moved into, and stalled over New England resulting in increased temperatures as well as heavy rainfall. The combination of heavy rain and melting snow resulted in severe flooding.

Vulnerability

The Montachusett Region is vulnerable to snow melt; heavy snow fall, frigid temperatures followed by a sudden transition to warmer temperatures throughout the Northeast increase the chance of flooding from snowmelt potentially causing flood related damage to homes and businesses, roads and buildings particularly within the floodplain. Local Hazards Maps for each community located in [Section 6, Community Profiles, Risk Assessment](#) indicate vulnerability to hazards.

Probability of Future Events

With the climatic conditions that occur in the Montachusett Region that impact the area each year including an average of seven severe winter storms per year, snow melt will certainly continue into the future which can cause flooding during times when temperatures can increase quickly/substantially particularly in the spring. Probability of future events falls under the definition of probability as Highly Likely.

DAM FAILURE

Dam Failure is an uncontrolled release of water impounded by a dam. The Massachusetts Office of Dam Safety reports that the region's dams, like the other parts of New England infrastructure, are an aging infrastructure that is expensive to repair. Routine maintenance is necessary to control the growth of trees and keep the area clear so defects can be detected. In addition to aging, the region's dams are often doing work beyond their original design. The increase in impervious surfaces leads to increased flows in some streams and rivers and thus greater demands are placed on the dams.

Dam failures may cause loss of life and property downstream, but they may also degrade the environment. Many dams act as a holding area for contaminated sediments. With a dam failure, these sediments are released and can damage wildlife and the ecology of the river system. An associated cost of dam failures is the potential for such destruction to affect fish ladders or culverts for directing water.

Dam failures are potentially the worst of flood events. Typically, a dam failure is the result of neglect, poor design, or structural damage caused by a major event such as an earthquake. When a dam fails, huge volumes of water are often released, causing widespread destruction and potential loss of life. Floods due to dam failures have occurred in New England in the past.

Previous Occurrences

Historically, dam failure has had a low occurrence in the Montachusett Region. However, many of the dams within the Region are more than 100 years old, and some are even older, meaning the possibility of dam failure is not inconceivable.

Vulnerability

Massachusetts Department of Conservation and Recreation Office of Dam Safety maintains an inventory of all dams in the State. The MRPC was unable to obtain an updated database from DCR for this Plan regarding condition, (whether good, fair or poor) of dams in our Region. The hazard potential of dams in the Region is documented in Table 6. A breakdown of the hazard potential of dams by community is located in the community annexes section of this report. Classifications for potential hazards are in accordance with the chart below. In addition, Local Hazards Maps for each community located in Section 6, Community Profiles, Risk Assessment indicate vulnerability to hazards.

Hazard Potential Classification

High Hazard	Refers to dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
Significant Hazard	Refers to dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities
Low Hazard	Refers to dams located where failure may cause minimal property damage to others. Loss of life is not expected.

Source: MA Department of Conservation and Recreation Office of Dam Safety

High hazard dams must be inspected every two year, significant hazard every five years, and low Hazards dams every 10 years. Owners of dams are responsible for having their dam inspected. MGL Chapter 253 and 302 CMR 10.00 requires that dam owners prepare, maintain and update Emergency Action Plans for all High Hazard Potential dams and certain Significant Hazard Potential dams.

Non-jurisdictional dams are not regulated by the Office of Dam Safety or under their jurisdiction. Typically these dams are under 6 feet in height and/or under 15 acre-feet in storage and do not have an assigned 'Hazard Code'. Dams owned and regulated by the Federal Government are also typically non-jurisdictional but DO have an assigned Hazard Code.

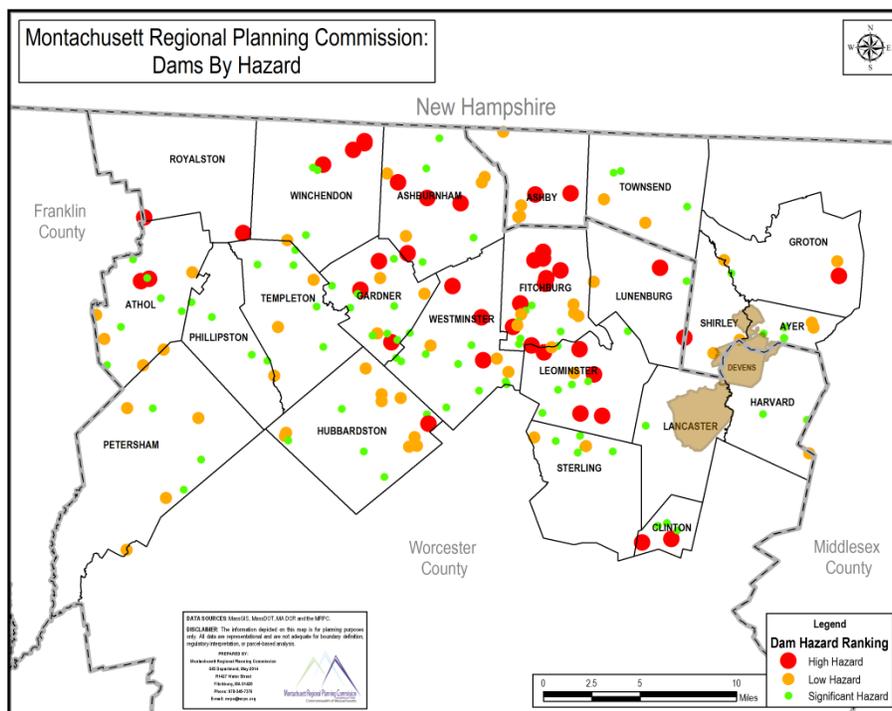
There are 290 Dams in the Montachusett Region. Forty-five (45) are considered high hazard, 76 are of significant hazards and 54 are of low hazard. The remaining dams are non-jurisdictional.

Table 8: Dams in the Montachusett Region and Hazard Potential

Community	High Hazard	Significant Hazard	Low Hazard	Non-Jurisdictional*	Total # of Dams
Ashburnham	4	4	4	12	24
Ashby	2	0	4	1	7
Athol	2	6	4	8	20
Ayer	0	4	3	2	9
Clinton	2	3	0	1	6
Devens*					0
Fitchburg	9	6	5	11	31
Gardner	3	8	3	7	21
Groton	1	1	2	0	4
Harvard	0	2	1	8	11
Hubbardston	1	5	9	6	21
Lancaster	1	0	0	5	6
Leominster	6	6	2	7	21
Lunenburg	2	1	1	5	9
Petersham	0	3	4	4	11
Phillipston	0	4	1	5	10

Royalston	2	0	0	2	4
Shirley	0	0	1	1	2
Sterling	0	5	2	14	21
Templeton	0	5	2	5	12
Townsend	0	3	2	2	7
Westminster	3	10	3	4	20
Winchendon	4	3	1	5	13
Total	45	76	54	115	290

Source: Department of Conservation and Recreation Office of Dam Safety There are no dams in Devens



Probability of Future Events

Future occurrences of dam failure fall under the definition of probability as Possible. Based upon the conditions shown in above map, 45 dams in the Montachusett Region are a high hazard. It should be noted that this that this number could be higher as many dams are non-jurisdictional, thus they are not inspected by the Office of Dam Safety. Non-jurisdictional dams are defined as being less than 6 feet high and store less than 15 acre-feet of water.

ICE JAMS

Ice jams occur in the winter or early spring when normally flowing water begins to freeze. There are two types of ice jams; a freeze up and a breakup jam. A freeze up jam forms in the early winter as ice formation begins. This type of jam can act as a dam and begin to back up the flowing water behind it. The second type, a breakup jam forms as a result of the breakup of ice cover, causing large pieces of ice to move downstream potentially acting as a dam, impacting culverts and bridge abutments.

Previous Occurrences

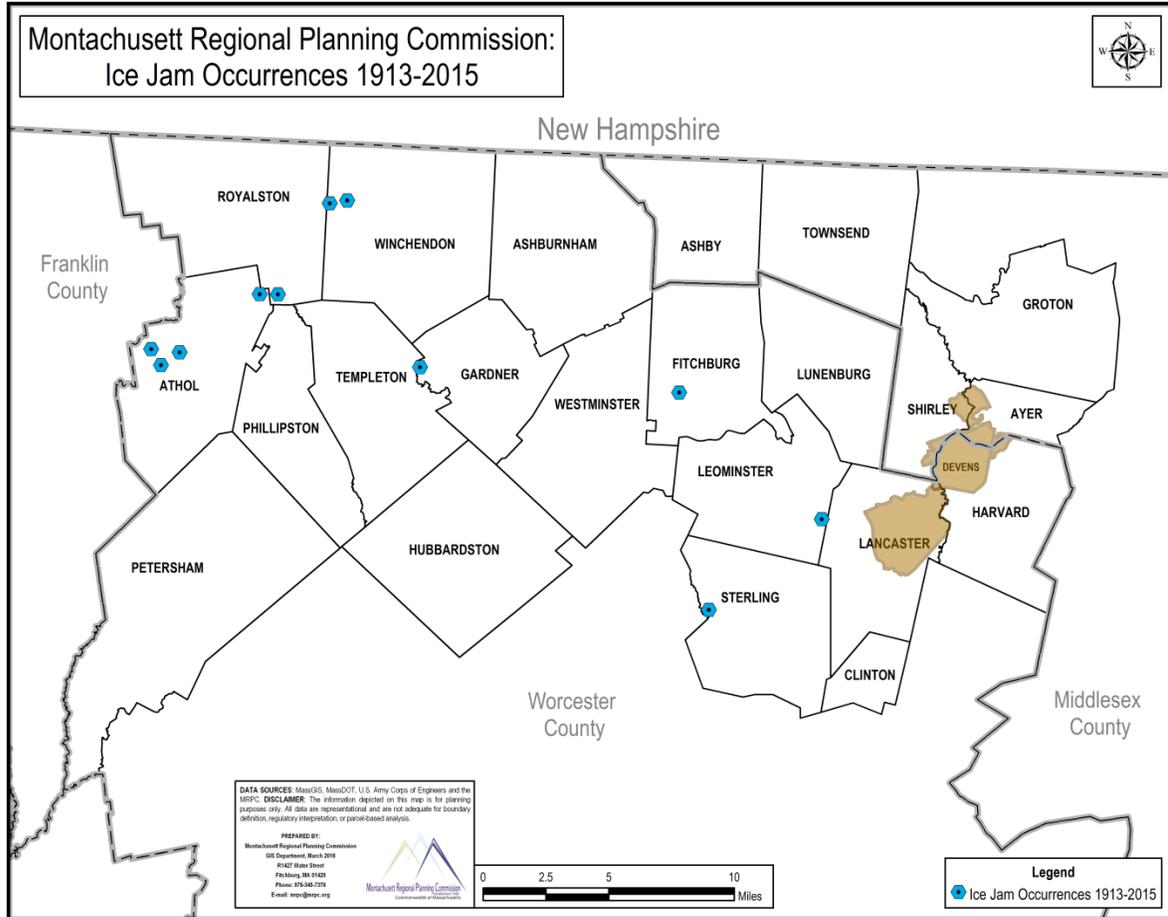
There have been a reported 36 ice jams that have occurred in the Montachusett Region between 1913 and 2015. The Millers River has been problematic and accounts for 21 of these jams within the communities of Athol (6), South Royalston (13), and Winchendon (2). Priest Brook in Winchendon accounts for 5 ice jams; Rocky Brook in Sterling accounted for 5 ice jams. Otter River accounted for 2 ice jams; and the Nashua River accounted for 3 ice jams.

Table 9: Ice Jams in the Montachusett Region

Community	River	Date
Royalston	Millers River	1/6/2015
Athol	Millers River	2/13/2008
Athol	Millers River	12/15/2005
Athol	Millers River	1/24/2005
Athol	Millers River	1/17/2004
Westminster	Nashua River	1/24/1999
Athol	Millers River	1/1/1996
South Royalston	Millers River	1/10/1973
South Royalston	Millers River	1/24/1971
Otter River	Otter River	2/4/1970
Winchendon	Millers River	2/4/1970
South Royalston	Millers River	1/15/1970
South Royalston	Millers River	1/3/1969
Winchendon/Royalston	Priest Brook	3/19/1968
Sterling	Rocky Brook	2/25/1965
Otter River	Otter River	2/11/1965
South Royalston	Millers River	1/23/1964
Sterling	Rocky Brook	1/21/1964
South Royalston	Millers River	2/26/1961
Leominster	North Nashua River	12/12/1960
Sterling	Rocky Brook	3/31/1960
Winchendon	Priest Brook	4/3/1959
South Royalston	Millers River	1/24/1959
South Royalston	Millers River	2/20/1958
South Royalston	Millers River	1/24/1957
Sterling	Rocky Brook	2/2/1953
South Royalston	Millers River	12/21/1951
Winchendon/Royalston	Priest Brook	2/9/1951
Sterling	Rocky Brook	2/7/1951
Leominster	North Nashua River	1/6/1949
South Royalston	Millers River	1/9/1943
South Royalston	Millers River	2/11/1941
Winchendon	Priest Brook	4/2/1940
Winchendon	Millers River	1/25/1938

Winchendon	Priest Brook	12/26/1937
Athol	Millers River	3/12/1936

Source: U.S. Army Corps of Engineers



Vulnerability

The Montachusett Region is somewhat vulnerable to ice jams according to the table above. Heavy snow fall and frigid temperatures throughout the Northeast increase the chance of flooding from snowmelt and ice jams. When river ice piles up at shallow areas, bends and islands it blocks the flow of water and may cause flooding of nearby homes and businesses. Ice jams that become lodged within the abutment of bridges can threaten the integrity of the structures. Heavy equipment, such as cranes with wrecking balls and explosives may have to be used to break up ice jams to reduce potential property and structural damages and losses. Local Hazards Maps for each community located in [Section 6, Community Profiles, Risk Assessment](#) indicate vulnerability to hazards.

Probability of Future Events

Ice jams in the Montachusett Region fall under the definition of probability as Possible. With the climatic conditions that occur in the Montachusett Region, ice jams will continue into the future causing damage to bridges and roads and buildings within the floodplain. To minimize ice jams, special consideration should be made during reconstruction of any bridges or dams which tend to be where ice jams are more likely to occur.

BEAVERS

In all of the communities of the Montachusett Region beavers have been a concern. It takes a great deal of time and expense to control their activities. During most of the Hazard Identification meetings, time was spent on beaver related issues. These hazards of course relate directly to other hazards such as rain storms, hurricanes, floods, and winter related storms.

Previous Occurrences

The beaver is a valuable component of Massachusetts' fauna. Beavers have played an active role in New England's ecology for thousands of years. Beavers are natural "engineers" of the land, they are agents of change, creating wetlands out of uplands and streams, and providing habitat for a variety of plants and animals. However, not long ago the beaver was absent from the Montachusett Region. In fact, it was absent from the late 1700s to the early 1900s. Intensive unregulated hunting and trapping, combined with deforestation to clear land for agriculture, led to the disappearance of beaver habitat and the beaver. In the early 1900's, forested habitat started to recover when many farmers abandoned their farms in order to take jobs in cities or to start new farms in the more fertile Midwestern United States. With the forests able to retake the landscape, the beaver was able to return and an important component of the Montachusett Region's native ecosystems was restored. However, beavers returned to a landscape that had been substantially altered by people.

Vulnerability

When beavers in the Montachusett Region build their dams in areas where there is increased residential development, roads and agricultural use of the land, the flooding that results can cause serious public and private property damage, often threatening homes, septic systems, low-lying roadways, and other public infrastructure. It was stated at all of the Montachusett Region individual Hazard and Vulnerability Sessions that beavers continue to pose a significant problem. The state and local governments have

responded to this crisis with a complex regulatory process. The process places its highest priority on protecting in-ground septic systems and road networks. Most of the regulatory process has been developed to respond to threats to the public health and safety. Local Hazards Maps for each community located in Section 6, Community Profiles, Risk Assessment indicate vulnerability to hazards.

Probability of Future Events

Beaver activity will most certainly continue to persist throughout the Montachusett Region, as the factors that have allowed them to expand their range (increase in suitable habitat, wetland protection, and a decrease in hunting and trapping) are expected to remain constant over the next decade. Probability of future events falls under the definition of probability as Highly Likely.

COASTAL STORMS

Coastal storms have not been addressed in this plan since the Montachusett Region does not have any coast line and is over 30 miles from the nearest coast.

Atmospheric Related and Winter Related Hazards

HURRICANES/TROPICAL STORMS

Both hurricanes and tropical storms can produce substantial damage from storm surge, waves, erosion and intense winds in coastal areas. While this type of coastal storm surge has been the number one cause of hurricane related deaths in the past, more people have died from inland flooding associated with tropical systems in the last 30 years.

Since the 1970s, inland flooding has been responsible for more than half of all deaths associated with tropical cyclones in the United States. Inland flooding from hurricanes can occur hundreds of miles from the seacoast. Communities in the Montachusett Region would not normally be affected by the strongest hurricane winds.

Hurricanes

A hurricane is a type of tropical cyclone; an organized rotating weather system that develops in the tropics.

Tropical cyclones are classified as follows:

- Tropical depression: An organized system of persistent clouds and thunderstorms with a low level circulation and maximum sustained winds of 39 mph or less.
- Tropical storm: An organized system of strong thunderstorms with a well-defined circulation and maximum sustained winds of 39-73 mph.

Tropical depressions and tropical storms, while generally less dangerous than hurricanes, can be deadly. The winds of tropical depressions and tropical storms are usually not the greatest threat. Heavy rains, flooding and severe weather, such as tornadoes, create the greatest problems associated with tropical

storms and depressions.

- Hurricane: An intense tropical weather system with a well-defined circulation and maximum sustained winds of 74 mph or higher. The typical hurricane moves at an average speed of approximately 12 miles per hour. While in the lower latitudes, hurricanes tend to move from east to west. However, when a storm drifts further north, the westerly flow at the mid-latitudes tends to cause the storm to curve toward the north and east. When this occurs, the storm may accelerate its forward speed. This explains why some of the strongest hurricanes have reached New England.

Hurricanes can occur along the East Coast of the United States anytime in the period between June and November. Hurricane intensity and the potential property damage posed by a hurricane are rated from 1 to 5 according to the Saffir-Simpson Hurricane Scale (see Table 10 below).

Table 10: Saffir-Simpson Hurricane Scale

Category	Wind Speed
Tropical Storm	39–73 mph (63–117 km/h)
1	74–95 mph (119–153 km/h)
2	96–110 mph (154–177 km/h)
3	111–130 mph (178–209 km/h)
4	131–155 mph (210–249 km/h)
5	≥156 mph (≥250 km/h)

***Source - National Weather Service, National Hurricane Center**

Previous Occurrences

The National Oceanic and Atmospheric Administration (NOAA) has been keeping records of hurricanes since 1858 – see Table 11. From 1858 to 2015, the Montachusett Region has had one Tropical Depression, seven Tropical Storms, one Category 1 Hurricane, and two Category 2 Hurricanes pass directly through the Region. The map that follows displays the historic tracks of hurricanes across the Region.

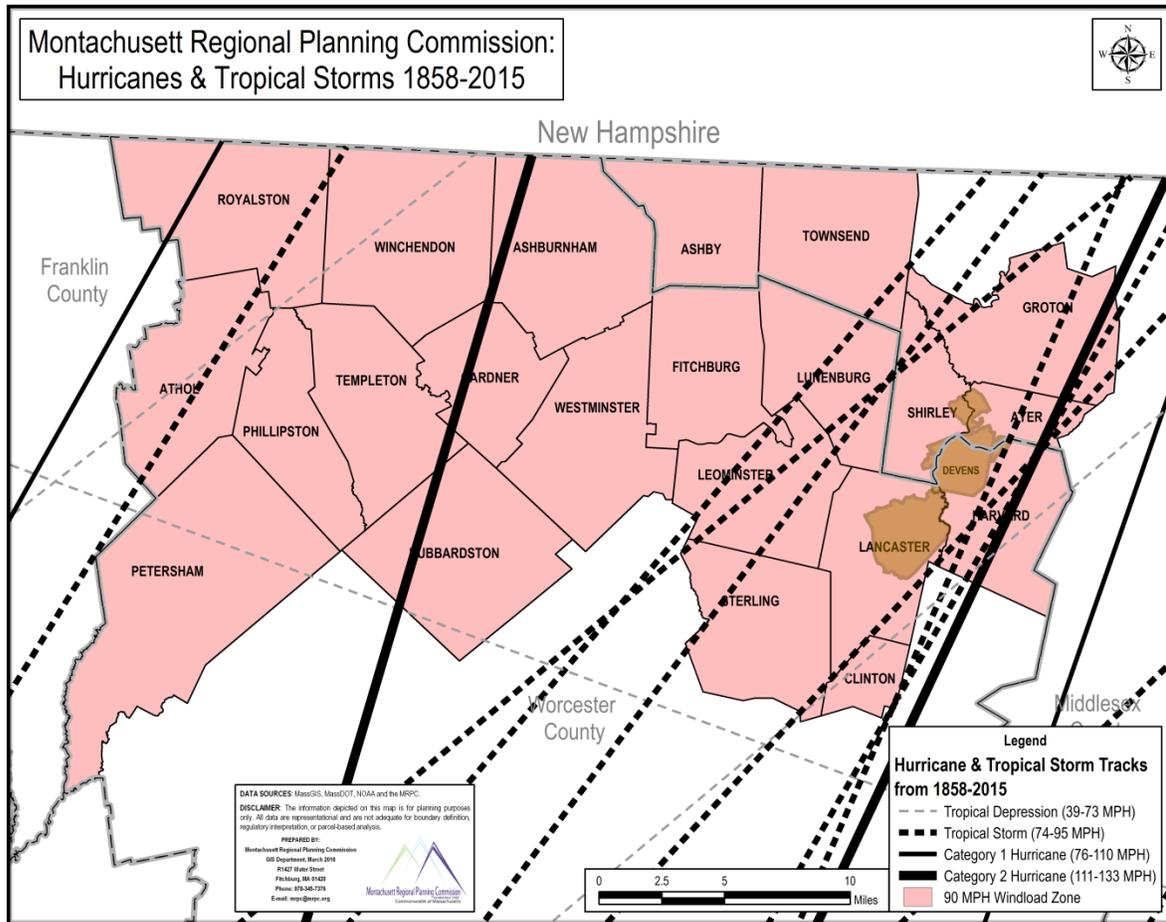


Table 11: Hurricanes and Tropical Storms that passed directly through the Montachusett Region (1858 – 2015)

Date	Type	Name	Wind Speed
9/28/1861	Tropical Storm	Unnamed	50
9/30/1874	Tropical Storm	Unnamed	60
10/10/1894	Tropical Storm	Unnamed	55
9/2/1952	Tropical Depression	Able	30
8/31/1954	Category 2	Carol	85
7/30/1960	Tropical Storm	Brenda	45
9/12/1960	Category 2	Donna	90
9/15/1961	Tropical Storm	Unnamed	35
9/27/1985	Category 1	Gloria	75
9/17/1999	Tropical Storm	Floyd	50
9/17/2004	Tropical Storm	Charley	50

Source: National Oceanic and Atmospheric Administration

The effects of hurricanes and tropical storms are often felt much farther away from the direct path. From 1858 to 2015, an additional 44 hurricanes/tropical storms have passed within 100 miles of the Montachusett Region – see Table below. Table 12 also indicates that hurricanes and tropical storms are generally limited to the months of July, August, and September within one hundred miles of the Montachusett Region although there has been an occurrence in May and November.

Table 12: Hurricanes and Tropical Storms within 100 miles of the Montachusett Region

Month	# of Storms
May	1
June	0
July	3
August	6
September	27
October	6
November	1
Total	44

Source: National Oceanic and Atmospheric Administration

Of all the natural threats that might affect the Montachusett Region, hurricanes such as the one in 1938, have the potential to cause the most property damage and loss of life if adequate planning and preparation is not undertaken. The 1938 Hurricane had winds of over 120 miles per hour that blew across the coastal Regions. While the coastal communities of southeastern Massachusetts generally take the brunt of hurricanes, flooding and winds also affect the inland areas including the Montachusett Region. The sustained rains of the storm contribute to river flooding, and high winds can cause widespread power outages and property damage.

Vulnerability

According to NOAA, the tropical storm season lasts from June 1 to November 30, and an average of 10 tropical storms develop along the eastern seaboard each year. On average, five of these 10 become hurricanes capable of traveling northward towards New England which exposes the Montachusett Region to the risk of high winds and heavy rainfall. Local Hazards Maps for each community located in Section 6, Community Profiles, Risk Assessment indicate vulnerability to hazards.

Probability of Future Events

Based upon past storm events and the geographic location of the Montachusett Region, the area will continue to be impacted by tropical storms and hurricanes. Moreover, it is speculated by many that future occurrences have the potential to be more severe with climate change. Probability of future events fall under the definition of probability as Possible.

TORNADOS

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud with whirling winds of

up to 300 miles per hour. These events are spawned by thunderstorms and occasionally by hurricanes, and may occur singularly or in groups. Tornadoes can occur at any time of the year, although they are rare outside of the warm season. The peak months of "Tornado Season" occurs in the Northeast from May through September. August is the month of greatest tornado frequency. Most tornadoes are likely to occur during the mid-afternoon and evening hours (3-6PM). However, they can occur at any time, often with little or no warning.

Previous Occurrences

The National Climatic Data Center reports data on tornado events, and does so as far back as 1950. Worcester County has been an area of the state where a majority of significant tornadoes in Massachusetts have occurred. Since 1950, there have been 15 tornados in the Montachusett Region, the most recent of which occurred in 2015. Tornados are rated based on the Enhanced Fujita Tornado Scale as shown on Table 13 below.

Table 13: Enhanced Fujita Tornado Damage Scale

F-SCALE NUMBER	INTENSITY PHRASE	WIND SPEED	DAMAGE
F0	Gale tornado	< 73 mph	Light Damage- Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	Moderate tornado	73-112 mph	Moderate Damage- Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	Significant tornado	113-157 mph	Considerable Damage- Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
F3	Severe tornado	158-206 mph	Severe Damage- Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4	Devastating tornado	207-260 mph	Devastating Damage- Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	Incredible tornado	261-318 mph	Incredible Damage- Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yds.); trees debarked; incredible phenomena will occur.

Source: The National Oceanic & Atmospheric Administration

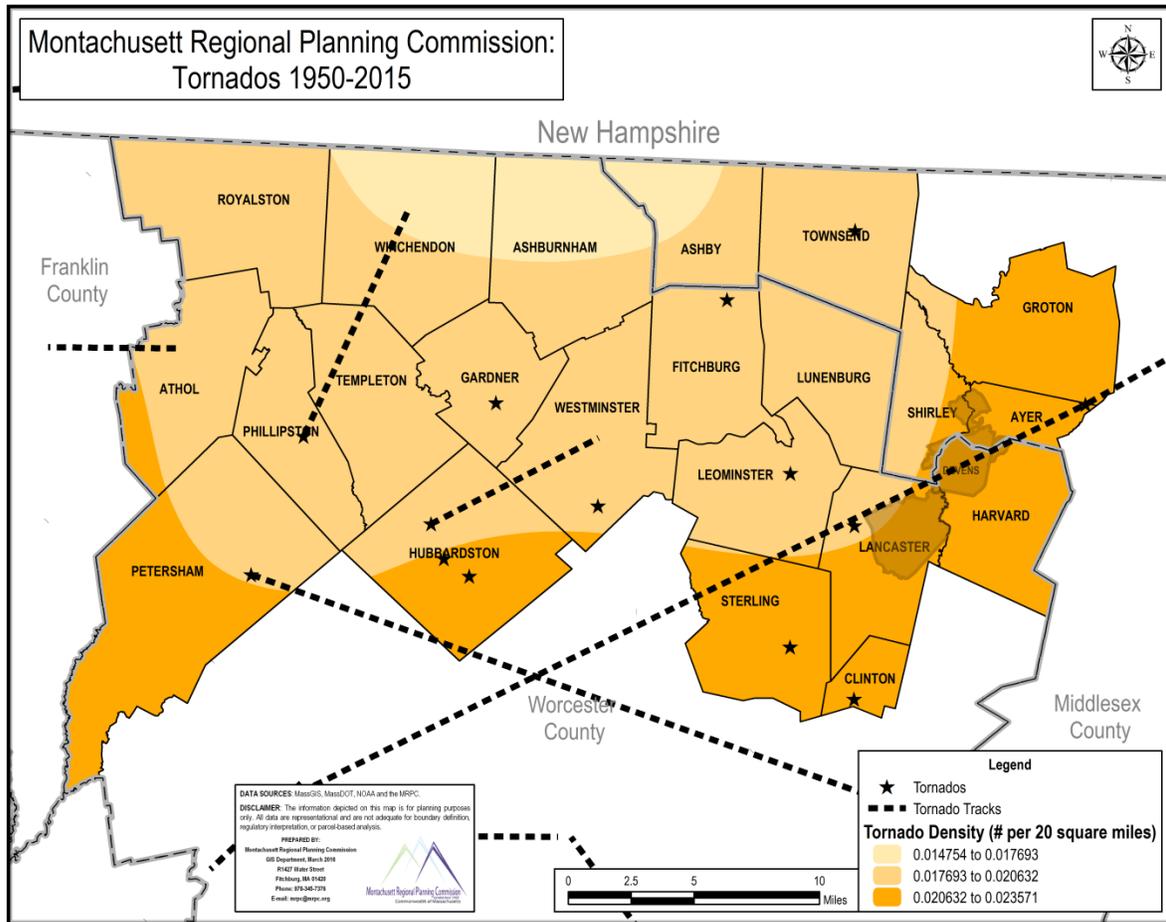
Of the 15 tornados that have occurred in the Region, two (2) were rated as F0 on the Fujita Tornado scale, seven (7) were F1, four (4) were F2, one (1) was F3 and one (1) was F4. The most devastating

tornado ever to occur in New England was an F4 that occurred on July 9, 1953. It first touched down in Petersham, and then traveled on a 46-mile southeast path through Barre, Rutland and Holden, across Worcester into Shrewsbury, Westborough and Southborough. Within a matter of minutes, more than 90 people were dead, and over 1,300 injured and fifteen thousand were left homeless. See Table 14.

Table 14: Tornadoes: 1950 - 2015

Date	Community	Property Damage	Category	Deaths/Injuries
6/9/1953	Petersham	\$50M-\$500M	F4	90/1228
6/1/1956	Fitchburg	\$5K-\$50K	F1	0/14
11/21/1956	Clinton	\$500K-\$5M	F2	0
6/19/1957	Lancaster	\$5K-\$50K	F1	0
7/5/1957	Leominster	\$500-\$5000	F2	0
5/20/1963	Clinton	\$5K-\$50K	F2	0
7/11/1970	Townsend	\$5K-\$50K	F1	0
7/1/1971	Ayer	\$5K-\$50K	F1	0/1
11/7/1971	Hubbardston	\$500-\$5000	F1	0
8/9/1972	Phillipston	\$5K-\$50K	F2	0/1
6/22/1981	Hubbardston	\$5K-\$50K	F3	0/3
7/10/1989	Hubbardston	\$50K-\$500K	F1	0
7/10/1989	Sterling	\$50K-\$500K	F1	0
8/10/1990	Gardner	<\$50K	F0	0
6/23/2015	Westminster	<\$50K	F0	0
Total				90/1247

Source: The National Oceanic & Atmospheric Administration



Tornadoes generally occur during the summer months, however, as can be seen in the table below, tornadoes have occurred as early as May and as late as November.

Table 15
Tornadoes by Month in the Montachusett Region

Month	Count
May	1
June	5
July	5
August	2
November	2

Source: The National Oceanic & Atmospheric Administration

Vulnerability

The Montachusett Region has experienced several Tornado occurrences between 1950 and 2015 indicating that the Region has good potential in terms of spawning tornadoes. In fact, Worcester County has been an area of the state where a majority of significant tornadoes in Massachusetts have occurred.

Local Hazards Maps for each community located in [Section 6, Community Profiles, Risk Assessment](#) indicate vulnerability to hazards.

Probability of Future Events

From 1950 to 2015 there has been, on average, one tornado every 4.3 years. With 9 of the 15 tornados being classified as a relatively weak F0 or F1 tornado, the remaining 6 tornados are classified as major F2 or higher tornados and can be expected approximately every 11 years. Probability of future events fall under the definition of probability as [Possible](#).

HIGH WINDS

High winds could be defined as air moving (sometimes with considerable force) from an area of high pressure to an area of low pressure. High Wind Warning is a warning for sustained surface winds greater than 40 mph/64 kph lasting more than an hour or winds over 58 mph/93 kph over land that are either predicted or occurring for an unspecified period of time. When wind speed increases, pressure against an object increases at a disproportionate rate. For example, a 25- mile per hour wind causes about 1.6 pounds of pressure per square inch. When the wind speed increases to 75 miles per hour, the force on that object increases to 450 pounds per square inch. At a wind speed of 125 miles per hour, the force increases to 1,250 pounds per square inch. Wind-related hazards that can occur in the Montachusett Region include a variety of atmospheric related and winter related hazards described in this plan.

Previous Occurrences

Wind-related hazards that can occur in the Montachusett Region include hurricanes (tropical storms), and tornadoes, severe thunderstorms, Nor'easters, and Blizzards and high wind warnings accompany these events. Previous occurrences of these events have been previously documented in this report.

Vulnerability

Since high winds accompany hurricanes (tropical storms), tornadoes, severe thunderstorms, Nor'easters, and Blizzards as described in this plan, the Montachusett Region and all of its communities are very vulnerable to high winds. Local Hazards Maps for each community located in [Section 6, Community Profiles, Risk Assessment](#) indicate vulnerability to hazards.

Probability of Future Events

High winds accompany hurricanes (tropical storms), tornadoes, severe thunderstorms, Nor'easters, and Blizzards. The probability of future high wind events fall under the definition of probability as [Highly Likely](#).

SEVERE THUNDERSTORMS

Massachusetts is regularly susceptible to flooding from severe rainstorms and thunderstorms throughout the warmer months. A thunderstorm is a rain shower during which you hear thunder. Since thunder comes from lightning, all thunderstorms have lightning. According to National Oceanic and

Atmospheric Administration, a thunderstorm is classified as "severe" when it contains one or more of the following: hail three-quarter inch or greater, winds gusting in excess of 50 knots (57.5 mph), and/or tornadoes.

Previous Occurrences

The table below indicates that from 1996 to 2015 there were 178 severe storms in the Montachusett Region that were comprised of thunderstorms, which averages 9.37 storms per year. Examining the thunderstorms indicates that 96 thunderstorms events occurred in the Montachusett Region over the 19 year period, or 5.05 per year and 82 hail events over the same period, or 4.32 events per year.

Table 16 also indicates that Thunderstorms occurred in January, May, June, July, August, September, and October. However, the majority of storms occurred between May and August with July being the highest month.

Table 16: Severe Storms (1996 – 2015) by Month

Month	Thunderstorms
January	2
February	0
March	0
April	0
May	9
June	28
July	31
August	15
September	9
October	2
November	0
December	0

Source: The National Oceanic & Atmospheric Administration

Vulnerability

Three basic ingredients are required for a thunderstorm to form: moisture, rising unstable air (air that keeps rising when given a nudge), and a lifting mechanism to provide the "nudge." With these ingredients having the ability to originate throughout the Montachusett Region, severe storms can affect every community as shown in Table 17 below. Communities that stand out as having the highest number of thunderstorm events include Athol (9), Leominster (9), and Lunenburg (11). Hail has the potential to be a part of a thunderstorm and communities with the highest number of hail events include Gardner, Lunenburg, and Townsend, each at 11. No relationship could be determined between the community’s location in the Region and the number of severe storm events. Local Hazards Maps for each community located in Section 6, Community Profiles, Risk Assessment indicate vulnerability to hazards.

Table 17: Severe Storms (1996 – 2015) by Municipality

Community	Thunderstorms & High Winds	Hail
Ashburnham	5	6
Ashby	6	0
Athol	9	5
Ayer	2	3
Clinton	1	2
Fitchburg	7	2
Gardner	5	11
Groton	5	2
Harvard	6	1
Hubbardston	1	1
Lancaster	1	1
Leominster	9	2
Lunenburg	11	11
Petersham	1	4
Phillipston	2	2
Royalston	1	1
Shirley	4	1
Sterling	4	5
Templeton	5	3
Townsend	5	11
Westminster	2	3
Winchendon	4	5

Source: The National Oceanic & Atmospheric Administration

Probability of Future Events

Thunderstorms will undoubtedly continue to affect all municipalities of the Montachusett Region and are more likely to occur between May and August. Over the past 19 years, the communities of Lunenburg, Athol, Leominster, and Fitchburg have more occurrences than other MRPC municipalities. Probability of future events fall under the definition of probability as Highly Likely.

WINTER STORMS

Hazards associated with Heavy Snow, Nor'easters, Blizzards, and Ice Storms can be similar in many ways and therefore have been categorized under Winter Storms although each of these hazard events is separately distinguished under Probability of Future of Events. A Winter Storm Warning is a statement made by the National Weather Service of the United States which means a winter storm is occurring or is about to occur in the area, usually within 36 hours. Generally, a Winter Storm Warning is issued if between 4 inches (10 cm) to 7 inches (18 cm) or more of snow or usually 3 inches (7.6 cm) or more of

snow with a large accumulation of ice is forecast. In the Southern United States, where severe winter weather is much less common and any snow is a more significant event, warning criteria are lower, as low as 1 inch (2.5 cm) in the southernmost areas. (Thus, as you go from south to north the necessary accumulations get higher.) A warning can also be issued during high impact events of lesser amounts, usually early or very late in the season when trees have leaves and damage can result. Winter Storm Warnings are issued when winds are less than 35mph; if the storm has winds above this wind speed, it becomes a Blizzard Warning. Usually, a large accumulation of ice alone with little to no snow will result in an Ice Storm Warning, or in the case of light freezing rain, a Winter Weather Advisory, a Freezing Rain Advisory, or Drizzle Advisory.

Winter weather in Massachusetts and southern New England can be described as unpredictable. Days of frigid, arctic air and below freezing temperatures may be followed by days of mild temperatures in the 40s or 50s. Heavy snow, Nor’easters and ice storms are relatively common. MEMA monitors the NWS alerting systems during periods when winter storms are expected, and serves as the primary coordinating arm in the state-wide management of all types of winter storms. The local community is responsible for the basic management of winter storm responses. When local resources for winter storm management are exhausted, assistance can be requested through MEMA’s Area office.

Previous Occurrences

As can be seen in Table 18 below, there have been 11 winter storm related federally declared disasters during the time frame of 1996 through 2015. One of the most significant for the Montachusett Region occurred on December 11, 2008 when the Region’s dependence upon electricity was exposed when a winter storm brought significant sleet and a heavy layer of ice resulting in downed trees and power lines, blocked roads, and large scale power outages causing the Governor to declare a State of Emergency. Within the Region, there were over 43,264 households and businesses without power. The storm raised heavy controversy over the slow return of power; it wasn’t until approximately December 24th when power was essentially restored to all of the Montachusett Region with utility workers from more than several states called in to provide essential repair services. A rare October snowstorm in the year 2011 also had a significant impact on the Montachusett Region with many households and businesses losing power for several days as tree limbs with leaves that were still green downed power lines and blocked roads.

Table 18: Snow Related Disasters (1996 to 2015)

Disaster Name (Date of Event)	Disaster #(Type of Assistance)
January Blizzard (January 1996)	FEMA-1090-EM (Public)
March Blizzard (March 2001)	FEMA-3165-EM (Public)
February Blizzard (February 17-18, 2003)	FEMA-3175-EM (Public)
December Blizzard (December 6-7 2003)	FEMA-3191-EM (Public)
January Blizzard (January 22-23 2005)	FEMA-3201-EM (Public)
April Nor'easter (April 15-25, 2007)	FEMA-1701-DR-MA (Public)
December Ice Storm (December 11, 2008)	FEMA-1813-DR-MA (Public)
January Snow Storm (January 11-12, 2011)	FEMA-1959-DR (Public)
October Snow Storm (October 29-30, 2011)	FEMA-4051-DR (Public)
February Blizzard (February 8-9, 2013)	FEMA-4110-DR (Public)
January Severe Winter Storm (January 26 – 29, 2015)	FEMA-4214-DR (Public)

Source: FEMA

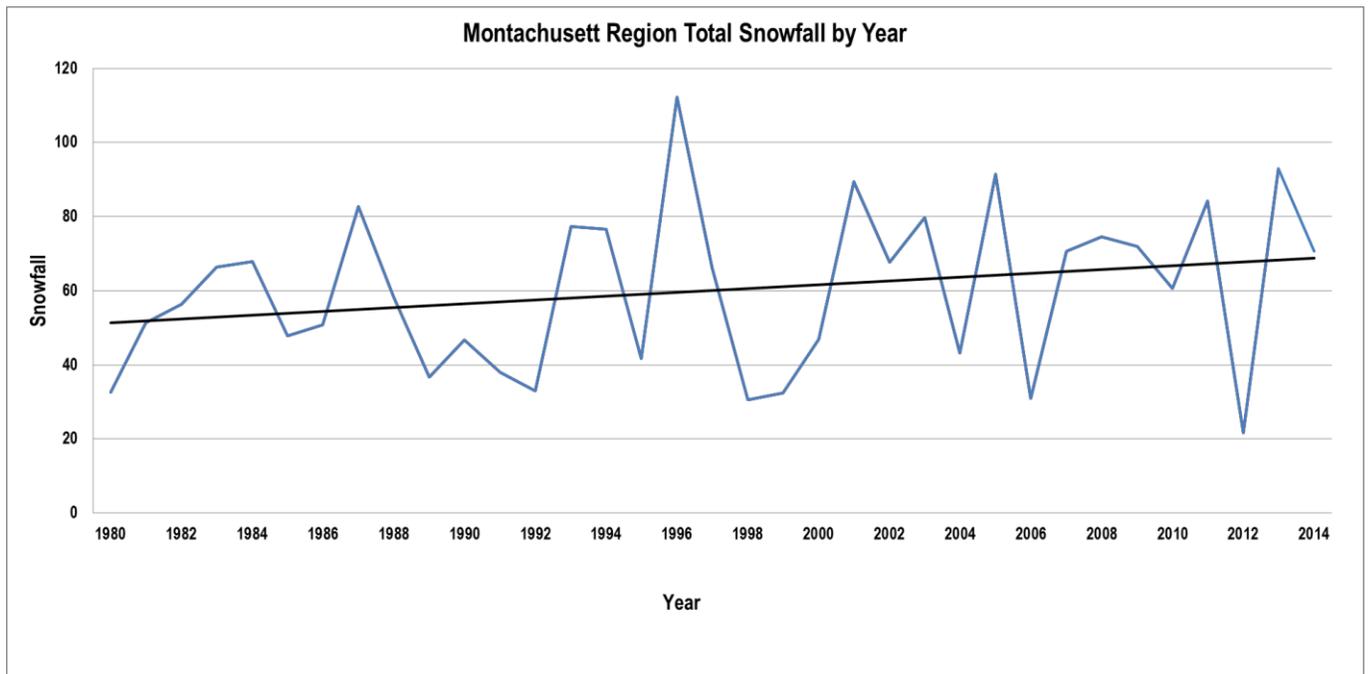
The National Climatic Data Center (NCDC), a division of NOAA, reports statistics on severe winter storms. From 1996 to 2015, the Montachusett Region experienced 153 winter storms, an average of about 8 per winter. The vast majority of severe winter storms that have affected the Montachusett Region have occurred between December and March, as 143 of the 153 (93.46%) occurred in one of these four months. The most likely month for a winter storm was January, when about 28% of all winter storms occurred. See Table 19 below.

Table 19: Winter Storms in Montachusett Region by Month (1996 – 2015)

Month	Number of Storms	% of Total
October	2	1.56%
November	5	3.27%
December	30	23.44%
January	44	28.76%
February	42	27.45%
March	27	21.09%
April	3	2.34%
Total	153	
Average Per Year	8	

Source: The National Oceanic & Atmospheric Administration

It is also interesting to note that, similar to rainfall, there has been a gradual increase in the amount of snowfall since 1980 in the Montachusett Region as depicted in the chart below.



Source: The National Oceanic & Atmospheric Administration (Information only available through 2014)

The Northeast Snowfall Impact Scale (NESIS) developed by Paul Koki of The Weather Channel and Louis Cellini of the National Weather Service (Koki and Cellini, 2004) characterizes and ranks high impact northeast snowstorms. These storms have large areas of 10 inch snowfall accumulations and greater. NESIS has five categories: Extreme, Crippling, Major, Significant, and Notable. NESIS scores are a function of the area affected by the snowstorm, the amount of snow, and the number of people living in the path of the storm. The largest NESIS values result from storms producing heavy snowfall over large areas that include major metropolitan centers. The NESIS categories are as follows:

Category	NESIS	Value Description
1	1 - 2.499	Noteable
2	2.5 - 3.99	Significant
3	4.0 - 5.99	Major
4	6 – 9.99	Crippling
5	10.0 +	Extreme

Source: Massachusetts State Hazard Plan, 2013

Vulnerability

The Montachusett Region is at a high risk for coastal winter storms and heavy snow. It is also quite typical for the Montachusett Region to receive an ice storm when cold air in the valleys is "overridden" by milder, moist air from the Atlantic. Freezing rain causes dangerous traveling conditions. Bridges and overpasses, which typically freeze quicker than other surfaces, are particularly hazardous to drivers. Power outages are also common in an ice storm. The weight of the ice formed by **freezing rain** often causes downed power lines and tree limbs, leaving thousands in the affected area without electricity. Local Hazards Maps for each community located in [Section 6, Community Profiles, Risk Assessment](#) indicate vulnerability to hazards.

Probability of Future Events

According to Table 18, the Montachusett Region experienced six Blizzards between the year 1996 and 2015. Probability of future **Blizzard** events falls under the definition of probability as Possible. The Montachusett Region generally experiences more than one **Nor'easter** on a yearly basis therefore the probability of future Nor'easters is Highly Likely. According to Table 19, the Montachusett Region averages about seven severe winter storms per winter indicating that **Heavy Snow** events are Highly Likely. **Ice storms** are Highly Likely to occur in the Montachusett Region but the severity of ice storms that do occur is unlikely to be as severe as the December 11, 2008 ice storm.

Other Natural Hazards

CLIMATE CHANGE

Climate change was addressed in the 2008 Plan, however, as Climate Change is listed as a secondary hazard in the State Plan, it was not addressed in the update since Climate Change is attributable to hazards already addressed i.e. extreme temperatures, droughts, floods, etc.

MAJOR URBAN FIRES

According to the Massachusetts Hazard Mitigation Plan, “a major urban fire or conflagration is a large destructive, often uncontrollable, fire that spreads substantial destruction. Although fires can start from numerous causes, major fires are often the result of other hazards, such as storms, earthquakes, gas leaks, transportation accidents, hazardous material spills, criminal activity (arson), or terrorism. Small structural fires, which occur more frequently, can result from mundane events such as cooking, smoking, equipment/appliance malfunctions, etc. Nationally, the leading causes of urban fires are arson, open flames, and cooking.”

Previous Occurrences

A notable urban fire that occurred in the Montachusett Region was in the City of Fitchburg. On June 13, 2011 a fire occurred at 52-unit apartment building in the downtown area injuring three firefighters and causing damage estimated at \$2.3 million.

Vulnerability

Urban fires are of minimal concern in the majority of the Montachusett Region due to the lack of an urbanized area. However, the cities of Fitchburg, Gardner, and Leominster and a few towns have a larger amount of developed land than the rest of the Region. Moreover, former mill communities exist in the Region, which have abandoned or vacant mills and warehouses. These structures are very susceptible to vandalism or accidental fires. Local Hazards Maps for each community located in [Section 6, Community Profiles, Risk Assessment](#) indicate vulnerability to hazards.

Probability of Future Occurrences

As discussed above, there has been a previous occurrence in 2011. Also described above, some communities have larger amounts of developed land coupled with abandoned or vacant mills and warehouses. Therefore, the probability of future occurrences is Possible in the urbanized areas.

WILDLAND FIRES

A wildfire can be defined as a naturally occurring, highly destructive, uncontrollable fire. Risk of wildfires has the potential to be significant in the Montachusett Region and area communities because of the many heavily wooded areas. Wildfire risk to developed areas is less, given the existing fire protection service and facilities. However, new construction in heavily wooded areas could pose a threat if vegetation is not managed properly.

Previous Occurrences

Table 20 below shows the number of wildfires that have occurred in the Montachusett Region between 2009 through 2015. The Cities of Fitchburg and Leominster have the highest number of fires (229 and 247 respectively) but Devens has by far the highest acreage at 671.

Table 20: Fire Totals and Acreage

Community	# of Fires	# of Acres Burned	# of Acres Per Fire
Ashburnham	13	16.2	1.2
Ashby	1	0.0	0.0
Athol	37	177.2	4.8
Ayer	37	70.4	1.9
Clinton	73	58.5	0.8
Devens	57	671.3	11.8
Fitchburg	229	48.5	0.2
Gardner	68	26.0	0.4
Groton	23	416.0	18.1
Harvard	47	6.9	0.1
Hubbardston	29	19.0	0.7
Lancaster	25	20.0	0.8
Leominster	247	156.0	0.6
Lunenburg	46	27.5	0.6
Petersham	5	4.8	1.0
Phillipston	0	0.0	0.0
Royalston	1	6.0	6.0
Shirley	0	0.0	0.0
Sterling	61	3.2	0.1
Templeton	11	2.0	0.2
Townsend	13	22.0	1.7
Westminster	47	30.7	0.7
Winchendon	47	27.1	0.6
Total	1,117	1,809.2	

Source: Massachusetts Fire Incident Reporting System (MFIRS)

Vulnerability

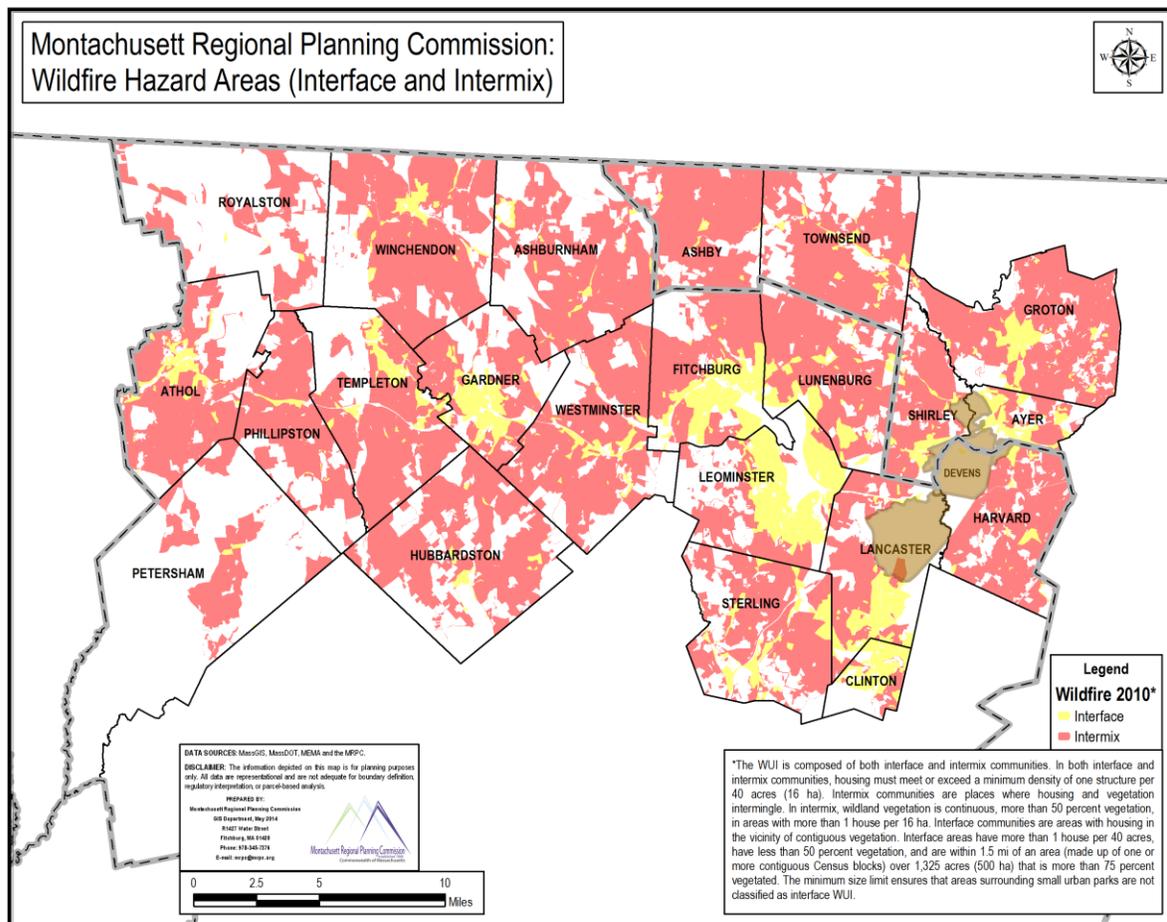
Wildfires are influenced by three major factors: weather, topography, and fuel. These three factors can combine in different ways to produce different levels of wildfire threats. Weather, in particular long periods of drought but also lightning strikes and winds influence the behavior of wildfires. Fire hazard is generally higher in the spring and fall when there are dry and windy conditions. Topography is a factor as steep slopes and gulleys can act as a chimney for fires and the presence or lack of fuel – low shrubs and branches, wood, roofs, wood piles, etc. – can shape the resulting fire. The presence of railroads in a community can also increase susceptibility to wildfires. Trains can emit sparks, heat, and hot materials that can ignite nearby fuels. Possible sources of flame and/or heat include exhaust fumes, hot brake metal, and overheated wheel bearings. Railroad crews cutting, grinding, and welding track are also a source of some railroad fires.

It should be noted that about 67% of the Montachusett Region is made up of forest. Moreover, substantial logging occurs in some of the more rural communities leaving behind lots of brush, stumps

and debris. The December 2008 Ice Storm also brought down a tremendous amount of tree limbs throughout the entire Region substantially adding to the fuel for any potential wildfire. Local Hazards Maps for each community located in Section 6, Community Profiles, Risk Assessment indicate vulnerability to hazards.

Probability of Future Events

Fires within the Montachusett Region are highly dependent on moisture and underbrush. When the Region is in a drought, the chance of fire increases. It was stated at virtually all of the Montachusett Region individual Hazard and Vulnerability Sessions that wildfires are a much more significant problem for the communities than urban fires. Not only does substantial logging occur in some communities leaving behind lots of brush, stumps and debris but the devastating December 2008 Ice Storm brought down a tremendous amount of tree limbs throughout the entire Region which is a major contributor of fuel to any potential wildfire. Most of the Region is “ripe” for large wildfires due to the presence of old growth and tree limbs brought down by the 2008 ice storm. Moreover, many property owners may not understand the need to clear areas around properties to prevent losses. The Towns would have difficulty dealing with wildfires due to the lack of appropriate equipment and personnel. Probability of future events fall under the definition of probability as Highly Likely.



DROUGHTS

Drought is a temporary irregularity and differs from aridity since the latter is restricted to low rainfall Regions and is a permanent feature of climate. Drought occurs in virtually all-climatic zones yet its characteristics vary significantly from one Region to another, since it is relative to the normal precipitation in that Region. The American Meteorology Society defines drought as a period of abnormally dry weather sufficiently long enough to cause a serious hydrological imbalance. The National Climatic Data Center uses the Palmer Drought Severity Index (PDSI) to compute drought conditions. Beyond its role as a factor leading to wildfire, drought also has impacts on public safety for all firefighting activity, agricultural production, and economic vitality of large users such as golf courses or industrial processes.

Previous Occurrences

The Commonwealth of Massachusetts is often considered a “water-rich” state. Under normal conditions, Regions across the state annually receive between 40 and 50 inches of precipitation. However, Massachusetts can experience extended periods of dry weather, from single season events to multi-year events such as experienced in the mid-1960s. Historically, most droughts in Massachusetts have started with dry winters, rather than a dry summer.

Notable times of water stress were experienced in the Region during the 1960’s and more recently in the years 1999, 2000, and 2002. According to the Massachusetts Department of Conservation and Recreation, the Central Drought Region, of which the Montachusett Region is part, experiences 50 months of drought emergency per 100 years.

Vulnerability

Drought is a normal, recurrent feature of climate that occurs in all climatic zones across the northeast. However, as stated above, the Commonwealth of Massachusetts is often considered a “water-rich” state. Palmer Index maps shows how monthly moisture conditions depart from normal (short-term drought and wetness), long-term (cumulative) meteorological drought and wet conditions, and hydrological (long-term cumulative) drought and wet conditions, which more accurately reflect groundwater conditions, reservoir levels, etc. Palmer Index Maps can be located at www.ncdc.noaa.gov/oa/climate/research/prelim/drought/palmer.html. The Palmer Index maps verify that periods of drought are relatively uncommon in the Montachusett Region but they do occur. Local Hazards Maps for each community located in [Section 6, Community Profiles, Risk Assessment](#) indicate vulnerability to hazards.

Probability of Future Events

As indicated above (previous occurrences), the Montachusett Region is part of the Central Drought Region which experiences 50 months of drought emergency per 100 years. The probability of future events falls under the definition of probability as Unlikely. However, it is emphasized that infrequent droughts will continue to occur over time in the region as also evidenced in Palmer Index Maps. It will require vigilance to ensure that sufficient water supplies are available for human consumption and for maintaining base stream flow to support aquatic wildlife. The population of the Montachusett Region is growing along with land under development, although not substantially particularly during the recent

economic downturn. However, this has reduced the amount of land under forest cover.

According to the Massachusetts Drought Management Plan, “Municipal governments are critically important to managing drought situations and assessing the impact of drought situations.” To protect water supplies, local communities must carefully maintain and protect existing reservoirs and groundwater supplies, continue efforts to limit unnecessary water use through conservation measures, and control storm water runoff. Limiting or prohibiting new storm water discharges into municipal drainage systems and encouraging or requiring that storm water be contained on-site for groundwater recharge will help to maintain stream flow in drought conditions. Local water suppliers are also encouraged to develop Drought Plans that include drought indicators and drought triggers. Following the plan may lead to the institution of voluntary or mandatory water use restriction policies.

EXTREME TEMPERATURES

There is no universal definition for extreme temperatures. The term is relative to the usual weather in the region based on climatic averages. Extreme heat is usually defined as a period of 3 or more consecutive days above 90 °F. But more generally a prolonged period of excessively hot weather, which may be accompanied by high humidity. Extreme cold again is relative to the normal climatic lows in a region. Temperatures that drop decidedly below normal and wind speeds that increase can cause harmful wind-chill factors. The wind chill is the apparent temperature felt on exposed skin due to the combination of air temperature and wind speed.

Previous Occurrences

The Montachusett Region has four distinct seasons. The seasons have several defining factors, but temperature is the most important. While no region wide data is available utilizing NOAA, according to Intellicast (see Intellicast.com) the average temperature for the Montachusett Region in January is 32.7 degrees High Fahrenheit (F) and 12.8 degrees F for a low – see chart below. In contrast, the average temperature in the Montachusett Region in July is 81.5 degrees for a High and 59.3 degrees for a low. Monthly averages for individual communities can also be seen in the chart below including record highs and record lows. The record high temperature within the Montachusett Region (Townsend) was 105 degrees in August 1948. The lowest temperature within the Montachusett Region was in January 1957 when three communities (Gardner, Templeton, and Winchendon) recorded a low of -34 degrees.

Table 21: Monthly Averages and Records through 2015

Community*	Average Temperature (Fahrenheit)in January	Average Temperature (Fahrenheit)in July	Record High (Fahrenheit)	Record Low (Fahrenheit)
Ashburnham	30 High 9 Low	79 High 56 Low	95 (July 1963)	-23 (Jan 1957)
Ashby	30 High 9 Low	79 High 56 Low	96 (Aug 1955)	-23 (Jan 1957)
Athol	32 High 9 Low	84 High 56 Low	100(July 1966)	-29 (Jan 1957)
Ayer	33 High 15 Low	81 High 63 Low	98 (Aug 1949)	-26 (Jan 1984)
Clinton	33 High 15 Low	81 High 63 Low	98 (Aug 1949)	-26 (Jan 1984)
Fitchburg	33 High 15 Low	81 High 63 Low	98 (Aug 1949)	-26(Jan 1984)
Gardner	33 High 12 Low	81 High 55 Low	99 (Aug 1948)	-34(Jan 1957)
Groton	38 High 20 Low	83 High 59 Low	105(Aug 1948)	-29 (Jan 1957)
Harvard	33 High 15 Low	81High 63 Low	98 (Aug 1949)	-26 (Jan 1984)

Hubbardston	32 High 11 Low	80 High 55 Low	98 (Aug 1990)	-25 (Jan 1984)
Lancaster	33 High 15 Low	81 High 63 Low	98 (Aug 1949)	-26 (Jan 1984)
Leominster	33 High 15 Low	81 High 63 Low	98 (Aug 1949)	-26 (Jan 1984)
Lunenburg	33 High 15 Low	81 High 63 Low	98 (Aug 1949)	-26 (Jan 1984)
Petersham	32 High 9 Low	84 High 56 Low	100(July 1966)	-29 (Jan 1957)
Phillipston	32 High 9 Low	84 High 56 Low	100(July 1966)	-29 (Jan 1957)
Royalston	32 High 9 Low	84 High 56 Low	100(July 1966)	-29 (Jan 1957)
Shirley	33 High 15 Low	81 High 63 Low	98 (Aug 1949)	-26 (Jan 1984)
Sterling	33 High 15 Low	81 High 63 Low	98 (Aug 1949)	-26 (Jan 1984)
Templeton	32 High 8 Low	81 High 55 Low	99 (Aug 1948)	-34 (Jan 1957)
Townsend	33 High 12 Low	83 High 59 Low	105(Aug 1948)	-29 (Jan 1957)
Westminster	32 High 11 Low	80 High 55 Low	98 (Aug 1990)	-25 (Jan 1984)
Winchendon	32 High 8 Low	81 High 55 Low	99 (Aug 1948)	-34 (Jan 1957)
Montachusett Region	32.6 High 12.3 Low	81.5 High 58.9 Low	---	---

Source: Intellicast (Intellicast.com)

*Historical Data is unavailable for Devens

Vulnerability

The Montachusett Region is highly vulnerable to extreme temperatures ranging from 105 F to -34 F, according to records documented in the chart above. Extreme cold is a dangerous situation that can result in health emergencies for susceptible people, such as those without shelter or who are stranded or who live in homes that are poorly insulated or without heat. Extreme Heat can also be dangerous and people should be aware of who is at the greatest risk and what actions can be taken to prevent a heat-related illness or death. At greater risk are the elderly, children, and people with certain medical conditions, such as heart disease. However, even young and healthy individuals can succumb to heat if they participate in strenuous physical activities during hot weather. Some behaviors also put people at greater risk: drinking alcohol; taking part in strenuous outdoor physical activities in hot weather; and taking medications that impair the body's ability to regulate its temperature or that inhibit perspiration. Local Hazards Maps for each community located in Section 6, Community Profiles, Risk Assessment indicate vulnerability to hazards.

Probability of Future Events

Extreme temperatures in the Montachusett Region fall under the definition of probability as Highly Likely. The vast majority of summers in the Montachusett Region experience 3 or more consecutive days above 90 °F and in the winter, temperatures drop decidedly below normal each year. With the climatic conditions that occur in the Montachusett Region, extreme temperatures will continue into the future.

Geologic Hazards

EARTHQUAKES

An earthquake is the sudden release of strain vibration, sometimes violent, of the earth's surface that follows a release of energy in the earth's crust. The exact earthquake mechanism is still unknown; however, New England's earthquakes appear to be the result of the cracking of the surface due to the

compression and buckling of the North Atlantic Plate.

RICHTER SCALE

<i>Magnitude</i>	<i>Earthquake Effects</i>
2.5 or less	Not felt or felt mildly near the epicenter, but can be recorded in seismographs
2.5 to 5.4	Often felt, but only causes minor damage
5.5 to 6.0	Slight damage to buildings and other structures
6.1 to 6.9	May cause lot of damage in very populated areas
7.0 to 7.9	Major earthquake, serious damage
8.0 or greater	Great earthquake, can totally destroy communities near the epicenter

Previous Occurrences

The Montachusett Region has been affected by relatively small earthquake events between 1978 and 2015. Table 22 shows the locations of earthquake occurrences during this time period. There have been six earthquake events that have had their center in the Montachusett Region between 1978 and 2015. The earthquakes ranged from 0.6 to 2.4 on the Richter Scale.

Table 22: Earthquake Occurrences in the Montachusett Region 1978-2015

Location	Date	Magnitude
South of Athol	11/9/82	2.3
Northeast of Quabbin Reservoir	2/9/83	2.0
Littleton	7/13/93	1.6
West of Barre	10/2/94	2.4
Quabbin Reservoir	9/20/96	2.2
12KM South of Gardner	12/30/12	0.6

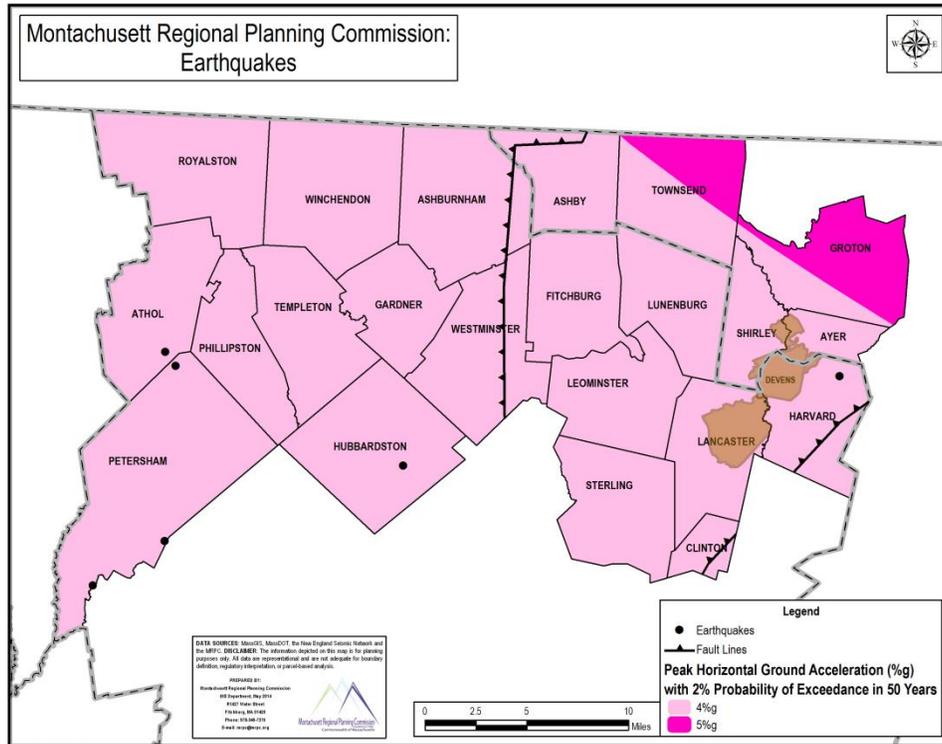
Source: New England Seismic Network

Vulnerability

The map below shows the Peak Ground Acceleration (PGA) zones for the Montachusett Region. PGA represents a model showing the probability that ground motion will reach a certain level. The model shows peak horizontal ground acceleration (the fastest measured change in speed, for a particle at ground level that is moving horizontally due to an earthquake) with a 2% probability of exceeding this percentage in 50 years. Essentially, PGA is a measurement that compares the shaking of the ground with the force of gravity. While the likelihood of a powerful earthquake in the Region is low, the impact of an earthquake is high because of how old the buildings are and because few structures have been built to withstand earthquakes. Local Hazards Maps for each community located in [Section 6, Community Profiles, Risk Assessment](#) indicate vulnerability to hazards.

Probability of Future Events

Based on the historic occurrences, which have been few and of limited severity, the probability of future events for earthquakes falls under the definition of probability as [Possible](#).



LANDSLIDES

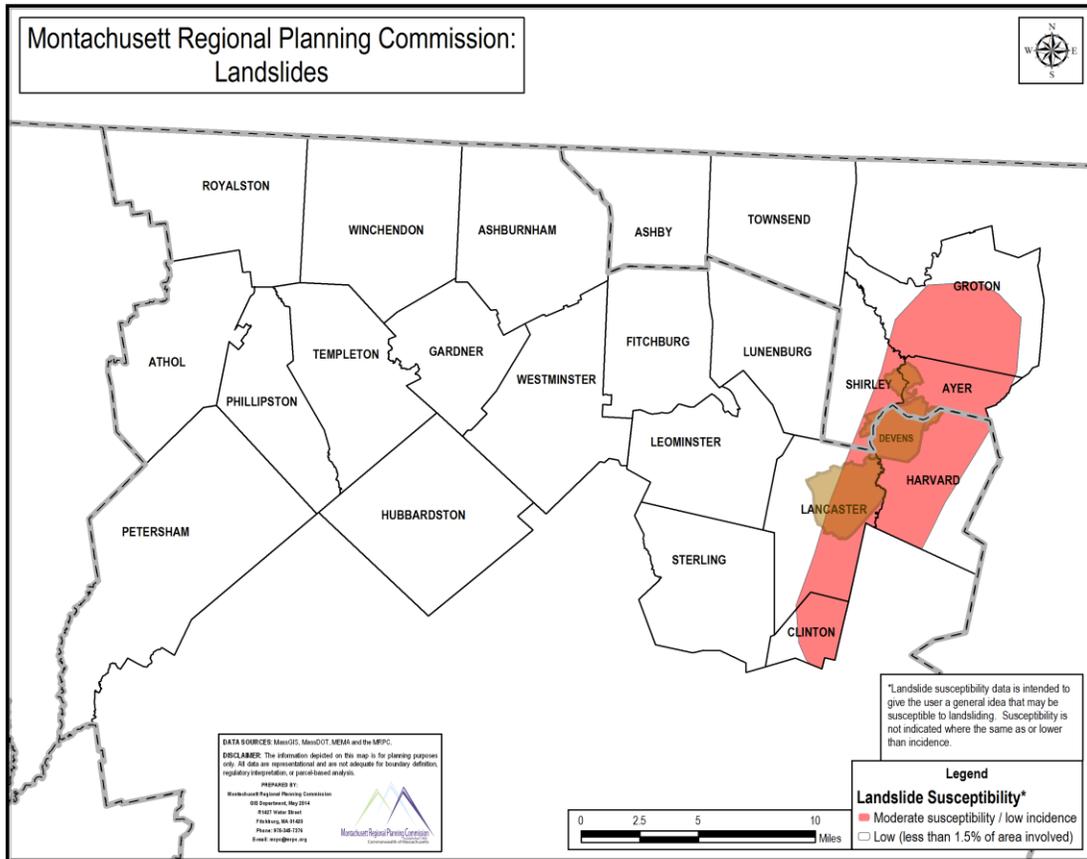
Landslides include a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows.

Previous Occurrences

The data for landslides in the Montachusett Region is very limited and there is nothing that can be presented in this report.

Vulnerability

According to the table below, the eastern portion of the Region, as indicated in the map below, is classified as having a moderate susceptibility/low incidence. The remainder of the region is classified as having a low susceptibility to landslides. Local Hazards Maps for each community located in [Section 6, Community Profiles, Risk Assessment](#) indicate vulnerability to hazards.



Future Occurrences

While the Region is at a low/moderate risk for landslides, the possibility should be recognized.

Probability of Future Events

The data for landslides in the Montachusett Region is very limited and therefore the probability of future cannot be defined.

TSUNAMI

The Montachusett Region is an inland region and there is no Tsunami frequency in the Montachusett Region according to the 2013 Massachusetts Hazard Mitigation Plan. However, tsunami occurrence was discussed during the Local Hazard Mitigation Team Meetings in each community. Three communities listed tsunamis on the Natural Hazard Matrix as “unlikely” while the majority (20 communities) listed this hazard as “not applicable (N/A)” to their community.

5. Regional Mitigation Goals, Objectives and Strategies and Mitigation Action Plan

MRPC previously prepared the 2008 Montachusett Region Hazard Mitigation Plan. As a multi-jurisdictional plan, each community developed their own community goals, objectives and strategies. For the Montachusett Region Natural Hazard Mitigation Plan 2015 Update, a regional approach has also been taken in the development of the Plan. This update includes Regional mitigation goals and measures to be undertaken at the Regional level. The regional mitigation goals and measures below are intended to support and complement the measures which have been identified to be undertaken at the individual community level. Individual communities' mitigation goals, objectives and strategies can be located in Section 6. Community Profiles, Mitigation Goals, Objectives and Strategies under the corresponding community.

Regional Mitigation Goals

MRPC collected and analyzed natural hazard data throughout the development of this plan. In support of that effort, MRPC staff visited and spoke to local officials, first responders, planners, Department of Public Works (DPW) Superintendents from all municipalities within the Region as well as private individuals and organizations. Areas within those municipalities where natural hazards have struck or where flooding is known to be problematic were documented and mapped. MRPC staff also regularly attended Regional Emergency Management Committee (REPC) meetings to understand their needs in addressing natural disasters. The Draft Goals and Objectives within this plan were developed as local vulnerabilities were being identified and concerns were being raised by emergency responders and local officials. The following Regional goal was established early in the process.

Regional Goal: *Reduce the loss of life, property, infrastructure, and environmental and cultural resources from natural disasters.*

In support of the Regional Goal, there are several objectives:

Objective: *Investigate, design and implement structural projects that will reduce and minimize the risk of flooding.*

Objective: *Investigate and implement projects that will reduce and minimize the risk of non-flooding hazards.*

Objective: *Increase the capacity of local Emergency Managers, DPWs, and Fire, Police and Health Departments to plan for and mitigate natural hazards.*

Objective: *Increase public awareness of natural hazard risks and mitigation activities available to them.*

Objective: *Improve the quality of the data for the Region as it pertains to natural hazards.*

Objective: *Improve existing local policies, plans, regulations, and practices to reduce or eliminate the impacts of natural hazards.*

Mitigation Strategies

All mitigation activities considered in the planning process can be categorized as one of the following techniques:

1. Prevention

Preventive actions are actions that will help in keeping problems from getting worse. Prevention actions are intended to address future development and guide development away from hazards. Examples of preventive activities include:

- Planning and zoning
- Open space preservation
- Stormwater management
- Capital improvements planning
- Building codes

2. Property Protection

Property protection actions are actions that address individual buildings and reducing their risk through modification. Examples include:

- Acquisition
- Relocation
- Retrofitting
- Flood-proofing

3. Public Education and Awareness

Public education and awareness actions are those actions that will inform and remind the public about hazards and the actions they can take to avoid potential damage and injury as a result of a hazard.

Example education activities include:

- Community outreach projects
- Hazard area maps
- Regional and community websites
- Displays at public events and public facilities
- Real estate disclosure
- Educational programs in schools

4. Natural Resource Protection

Natural resource protection actions are actions that reduce the intensity of hazard effects and improve the quality of the environment and wildlife habitats. Examples of natural resources protection actions include:

- Erosion and sediment control
- Wetland protection
- Expanding public open space
- Environmental restoration

5. Emergency Services Protection

Emergency services protection actions are actions that will protect emergency services before, during, and immediately after an occurrence. Examples of emergency services protection actions include:

- Protection of warning systems
- Protection of critical facilities
- Protection of infrastructure, such as roads, which are needed for emergency response
- Emergency response training and exercising
- Evacuation planning and management

6. Structural Projects

Structural projects are actions that will control the hazard and directly protect people. Examples of structural projects include:

- Diversion of stormwater
- Channel modification
- Dams
- Diversions / detention and retention basins

Implementation of Mitigation Actions

The actions shown in the following table were identified from analyzing the needs and problems that were expressed by community participants and analysis conducted in the update of the plan. A Regional Action Plan is included in this Montachusett Hazard Mitigation Plan which identifies actions that can be carried out throughout the Region and are not specific to any single jurisdiction. High Priority Actions are defined as actions that should be initiated within one year; Medium Priority Actions are defined as actions that should be initiated within 2 years; and, Low Priority Actions should be initiated within the next 3 to 5 years. Specific actions to be undertaken at the community level are specified in the Local Action Plans presented in section entitled Mitigation Action Plans/STAPLEE.

Regional Mitigation Action Plan					
Type of Natural Hazard	Description of Action	Benefit	Implementation Responsibility	Timeframe/Priority	Resources/Funding*
Flood Related Hazards	Incorporate new FEMA floodplain data and maps into existing and future planning efforts.	New FEMA maps would be more accurate and allow for a more accurate assessment of flooding risks	Montachusett Regional Planning Commission (MRPC), Mass. Emergency Management Agency (MEMA), Municipalities	2017-2020/Medium	Federal Emergency Management Agency (FEMA)

Flood Related Hazards	Work with scientists, engineers and regulators to establish an accepted methodology to resize stormwater infrastructure	Having an accepted methodology in resizing stormwater systems will eliminate the uncertainty of determining properly sized systems	Municipalities	2015-2020/High	MA Department of Environmental Protection (DEP) and Federal Environmental Protection Agency (EPA)
Flood Related Hazards	Provide technical assistance to communities to develop bylaws that require on-site containment of stormwater	On-site bylaws will help reduce the amount of runoff and reduce the load on stormwater systems, thus reducing the risk of flooding	MRPC, Municipalities	2017-2020/Medium	MA Department of Environmental Protection (DEP) and Federal Environmental Protection Agency (EPA)
All Natural Hazards	Periodically update the Montachusett Hazard Mitigation Plan	Periodically updating this plan will enable communities to be more aware of hazards as well allow them to maintain grant eligibility	MRPC, MEMA	2015-2020/High	FEMA
All Natural Hazards	Identify cultural resources within hazard-prone areas	Identifying cultural resources that are in areas prone to hazards will assist in informing communities and other interested parties of potential hazards	MRPC, Regional Emergency Planning Committees (REPCs), MEMA, Central Region Homeland Security Advisory Council (CRHSAC)	2017-2020/Medium	FEMA, Homeland Security

Wildland Fire	Review factors affecting risk to wildfire	By reviewing the factors related to wildfires, a more accurate assessment of where communities are vulnerable can be developed	Municipalities	2017-2020/Medium	Municipal Staff
All Natural Hazards	Review building codes and impact on disaster resistance as well as age of housing	By reviewing building codes, a better understanding of structural vulnerability can be developed	Municipalities	2017-2020/Medium	Municipal Staff
All Natural Hazards	Review vulnerability of Region to hazards	Continuing to review and refine our Region's vulnerability to hazards and how they have changed over time will provide greater guidance on future plan updates	Municipalities/MRPC	2017-2020/Medium	Municipal Staff and MRPC's Comprehensive Economic Development Strategy Update funded by the federal Economic Development Administration.
All Natural Hazards	Review development trends within Region and communities	Review of development trends can help assess the effectiveness of mitigation	Municipalities/MRPC	2017-2020/Medium	Municipal Staff and MRPC's Comprehensive Economic Development Strategy Update funded by the federal Economic Development Administration.

All Natural Hazards	Provide technical assistance to municipalities in GIS/mapping, data collection and analysis, and technical planning resources in support of local hazard mitigation efforts	Technical assistance to municipalities can take many forms. MRPC strives to provide a full range of technical support to its member communities, depending on need.	Municipalities/MRPC	2017-2020/Medium	MRPC's District Local Technical Assistance (DLTA) program funded by the Commonwealth of Massachusetts and other funding sources as available
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*Unless otherwise noted, Municipal Resources/Funding consists of elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

6. Community Profiles

Community profiles for all 23 communities in the Montachusett Region follow.

Ashburnham Natural Hazard Risk Assessment

While this annex focus' pertains to critical facilities, flooding, risk assessment, existing protections and mitigation strategy in the community, more detailed descriptions of each natural hazard's impact on the region and its communities and summary of vulnerability can be located in the regional section entitled " 4. Identification of Natural Hazards, Identifying and Profiling Hazards".

Community Profile

The Town of Ashburnham is located in North Central Massachusetts, bordered by Rindge, and New Ipswich, New Hampshire on the north, Winchendon on the west, Gardner on the southeast, Westminster on the south, and Fitchburg and Ashby on the east. Ashburnham is 9 miles northwest of Fitchburg, 31 miles north of Worcester, 55 miles northwest of Boston, and 200 miles from New York City.

The town of Ashburnham covers an area of 41.00 square miles and has a resident population of 6,081, according to the 2010 US Census. The population density is 148 people per square mile. There are 2,599 housing units in the town with an average household size of 2.75. The median age of residents is 40.

The Town of Ashburnham is a typical New England community. Forests, wetlands, rolling hills and farmland characterize the landscape. It is known as "The Town of Many Lakes." The town has over 20 lakes, eight of significant size. These lakes draw vacationers and part-time residents from all parts of the Northeast. During a summer weekend, the population of the town can double. Incorporated in 1765, the

town grew from a farming settlement into a mill town noted for furniture manufacturing by the mid 1800's. In addition to its natural beauty, Ashburnham is the home of the prestigious preparatory school, Cushing Academy, which draws its 400 students from all over the world. The largest employer in the town is Cushing Academy.

Critical Facilities

In general usage, the term “critical facilities” is used to describe all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired.

Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even access to damaged areas.

The number and nature of critical facilities in a community can differ greatly from one jurisdiction to another, and usually comprise both public and private facilities. In this sense, each community needs to determine the relative importance of the publicly and privately owned facilities that deliver vital services, provide important functions, and protect special populations. *Source: Federal Emergency Management Administration, Risk Management Series, Design Guide for Improving Critical Facility Safety from Flooding and High Winds, FEMA 543, January 2007.*

A list of the critical facilities within the community is shown in Table 23. This data was obtained from the community’s Comprehensive Emergency Management Plan (CEMP). The data was then reviewed by the Emergency Management Director. These facilities were digitized into GIS and used for determining vulnerability to the various hazards. The map that follows entitled FEMA Q3 Flood Zones and Critical Infrastructure depicts Critical Facilities in the community.

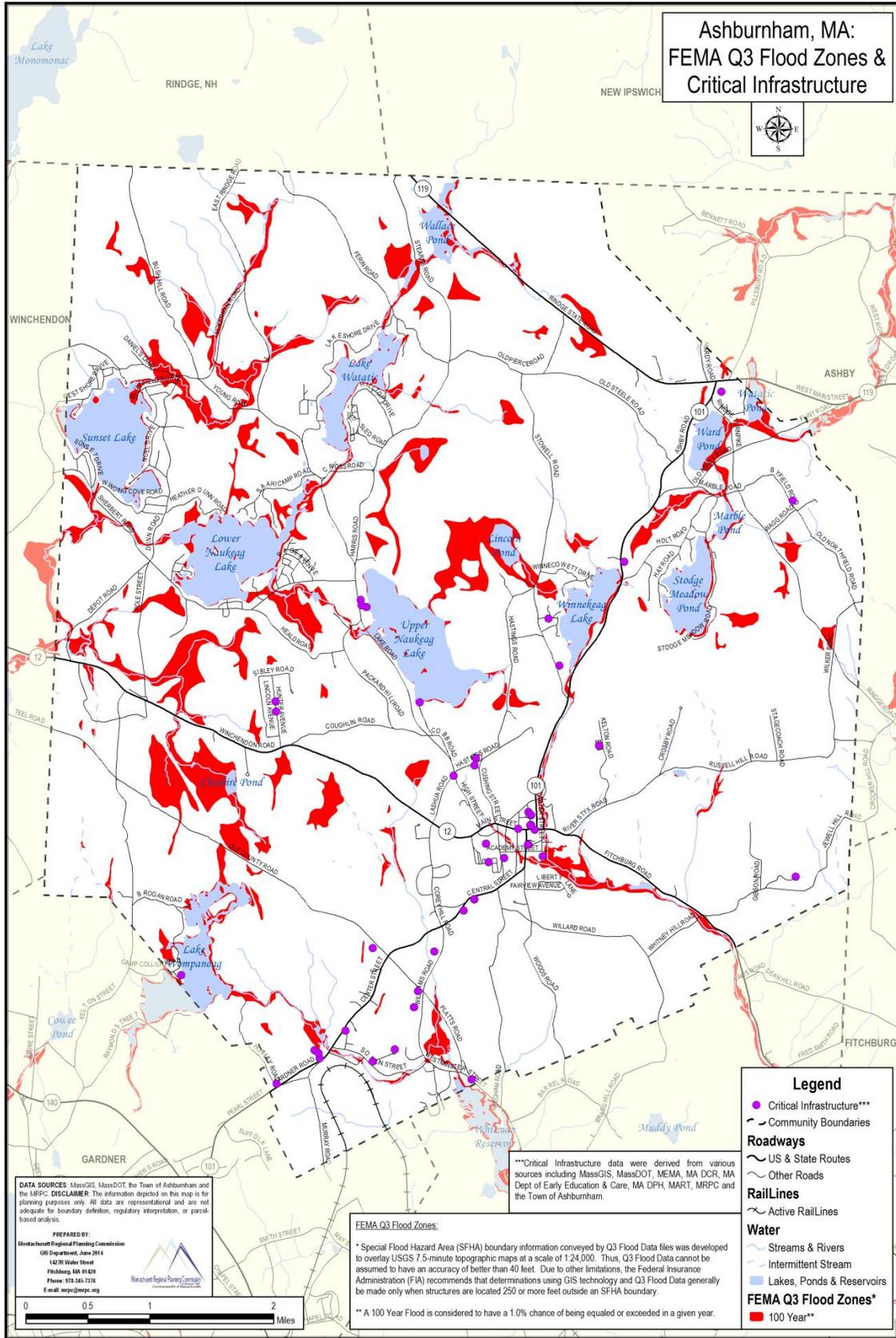
Table 23: Critical Facilities

Feature Type	Name	Address
City/Town Halls	Ashburnham Town Hall	32 Main Street
Public Water Supply*	Camp Wellville Inc.	
	Upper Naukeag Reservoir	
	Ashburnham Country Store, Inc.	
	Camp Split Rock	
	Camp Winnekeag	
	Camp Collier	

DPW Facilities	Ashburnham Highway Department	19 Central Street
Early Education Childcare Facilities	Just Like Home	33 Main Street
	Larsen, Heidi	53 Westminster Street
	Laurie, Janice	87 Hunter Avenue
	Hamilton, Judy M.	3 Cross Street
	Rittberg, Wendy	13 S School Street
	The Birchwood School	120 Hunter Avenue
	Little People Nursery School	64 Main Street
Elderly Housing	Ashley Court Apartments	27 School Street
Electric Substations	Ashburnham Municipal	48 Turnpike Road
Emergency Shelters	Briggs Elementary School	96 Williams Road
	Cushing Academy	39 School Street
End of Life Facilities	Cushing Academy, Iorio Arena	39 School Street
	Saint Dennis Cemetery	
	New Cemetery	Old Nims Road
	Meetinghouse Hill Cemetery	Hastings Road
Emergency Operations Centers	Ashburnham Police Station	99 Central Street
	Veteran's Memorial Bldg.	12 Memorial Drive
Fire	Ashburnham Fire Station	99 Central Street
HazMat Sites	Cushing Academy, Iorio Arena	39 School Street
	Flo Chemical	20 Puffer Street
	Ashburnham/Winchendon Water Filtration Plant	204 Lake Road
Hospitals	McLean Ambulatory Treatment Center at Naukeag	216 Lake Road
Other Critical Facilities	Mr. Mike's Mobil	Gardner Hill Road
	Roy Bros. Propane Tank Farm	Gardner Hill Road
	Flo Chemical	20 Puffer Street
	Roy Bros. Oil	Gardner Hill Road
	Cell Tower #1	Old County Road
	Cell Tower #2	Kallinen Road
	Cell Tower #3	Byfield Road
Other Government Buildings	Ashburnham Highway Department	17 Central Street
	Ashburnham Municipal Light Plant	24 Williams Road
	Stevens Memorial Library	20 Memorial Drive
	Ashburnham Water Tank #1	
	Ashburnham Communication Towers	

	Ashburnham Post Office	123 Central Street
	Veterans Memorial Building	
	Ashburnham Water Tower #2	Gardner Hill Road
Police	Ashburnham Police Station	99 Central Street
School	Briggs Elementary School	96 Williams Road
	Cushing Academy	39 School Street
Potable Water Treatment Plants	Ashburnham/Winchendon Water Filtration Plant	204 Lake Road

*As stated in 310 CMR 22.02, a Public Water System means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year” (Mass GIS, 2014).



Flood Prone Areas

Particular areas within the community where the risk of flood areas are or could occur were determined at the first meeting of the Ashburnham Local Hazard Mitigation Team held on April 2, 2012. This information can be found on Ashburnham's Local Hazard Map which is located under the section entitled Risk Assessment.

Flooding Vulnerability Assessment

An analysis of the Flood Insurance Rate Map (FIRM) flood hazard area maps indicates that there is a total of 3434.38 acres of 100-year floodplain within Ashburnham. This amounts to 13.10% of the total town. Based on additional analysis, 65.54 acres (1.91%) of the floodplain are developed. Currently there are 172 structures in the floodplain which is about 4.28% of the total structures in the community. The buildings are then multiplied by the building value, as determined by the MA Department of Revenue, to come up with a potential loss of \$124,518,800. Excluding dams and bridges there are there are no critical facilities within the 100 year flood zone.

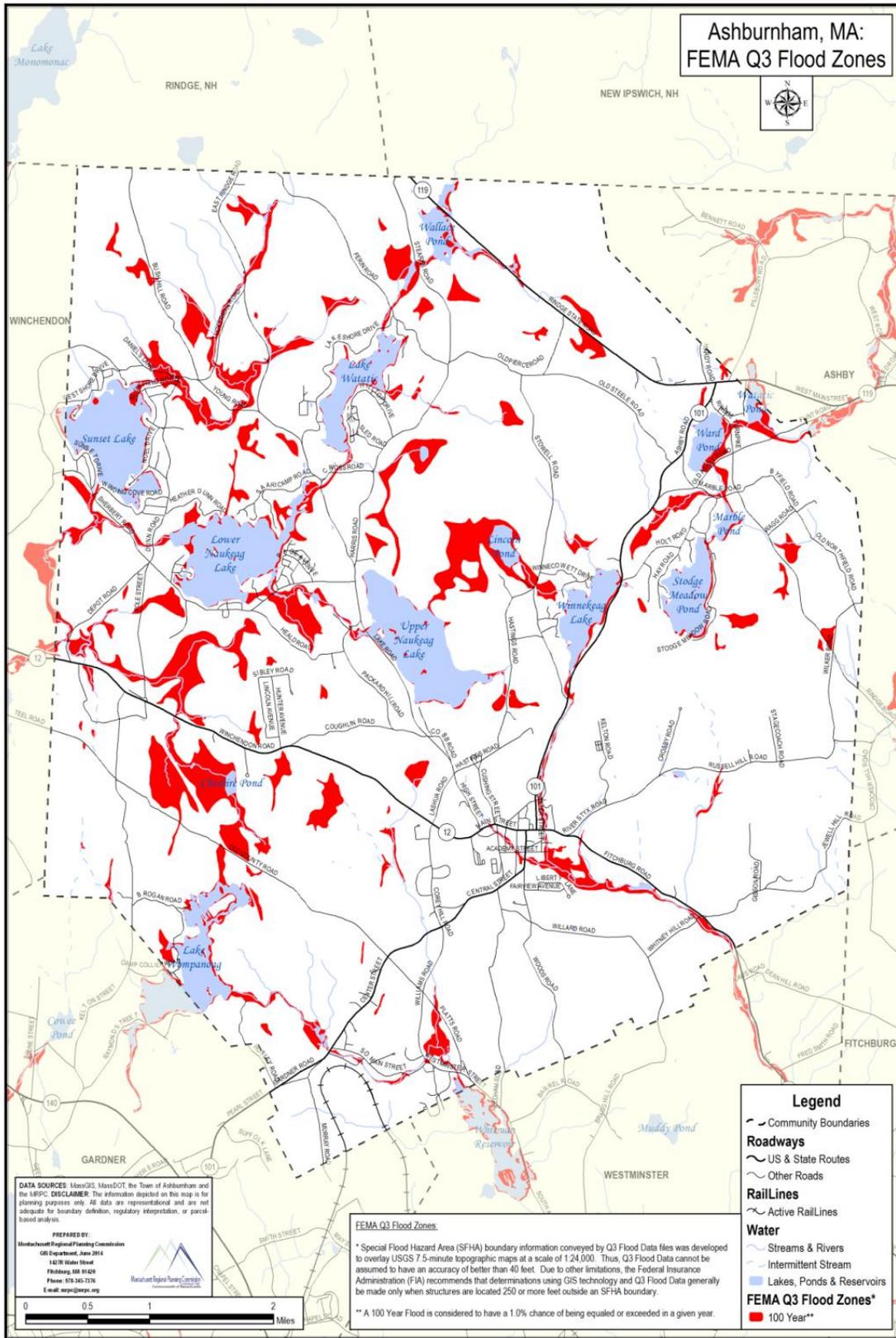
Since the initiation of the National Flood Insurance Program (NFIP), two flood insurance claims in the Town of Ashburnham have been made totaling \$5,198.83 in payments. According to (NFIP) data; there are no repetitive loss properties in Ashburnham. Statistics from the NFIP BureauNet indicate in the town of Ashburnham there are 20 flood insurance policies in force.

Floodplain Management and Compliance with NFIP

The town supports floodplain management activities in an effort to meet compliance of the National Floodplain Insurance Program. These efforts include:

- Implementing the MA Wetlands Protection Act and the town's Wetland's Protection Bylaw regulating development and activity within the wetlands buffer zone and regulating stormwater and other point source discharge.
- Implementing the Town Flood Plain District Bylaw regulating development in the floodplain district.
- Maintain the Town's Low Impact Development Bylaw which establishes minimum requirements and procedures to control the adverse effects of increased post-development stormwater runoff and nonpoint source pollution associated with new development and redevelopment.
- Continued maintenance of municipal stormwater drainage system which includes regular cleaning of catch basins, storm drains and culverts.
- Continued maintenance of public water bodies to reduce flooding caused by erosion and water displacement.
- Enforcement of the Open Space Residential Bylaw which mitigates possible flooding events by designating protected open space within a development which in turn treats stormwater runoff through the means of natural infiltration.

The map that follows entitled FEMA Q3 Flood Zones depicts the 100 year flood zones in the community.



Structurally Deficient Bridges Over Waterways

Ashburnham does not have any bridges over water that are classified by MassDOT as “structurally deficient”.

Hazard Potential of Dams

The DCR Office of Dams Safety lists 24 dams in the Town of Ashburnham as shown in Table 24. Lower Naukeag Lake, Upper Naukeag Lake, Winnekag Lake and Lake Wampanoag Dams are classified as high hazard. Lake Watatic, Factory Village Pond, Whitney Pond and Wallace Pond Dams are of significant Hazard.

Classifications for potential hazards are in accordance with the chart below.

Hazard Potential Classification

High Hazard	Refers to dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
Significant Hazard	Refers to dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities
Low Hazard	Refers to dams located where failure may cause minimal property damage to others. Loss of life is not expected.

Source: MA Department of Conservation and Recreation Office of Dam Safety

High hazard dams must be inspected every two year, significant hazard every five years, and low Hazards dams every 10 years. Owners of dams are responsible for having their dam inspected. MGL Chapter 253 and 302 CMR 10.00 requires that dam owners prepare, maintain and update Emergency Action Plans for all High Hazard Potential dams and certain Significant Hazard Potential dams.

Non-jurisdictional dams are not regulated by the Office of Dam Safety or under their jurisdiction. Typically these dams are under 6 feet in height and/or under 15 acre-feet in storage and do not have an assigned 'Hazard Code'. Dams owned and regulated by the Federal Government are also typically non-jurisdictional but DO have an assigned Hazard Code.

Table 24: Dams – Ashburnham

Town	Dam	Hazard Code	Owner
Ashburnham	Lower Naukeag Lake Dam	High Hazard	Public
Ashburnham	Upper Naukeag Lake Dam	High Hazard	Public
Ashburnham	Winnekeag Lake Dam	High Hazard	Private
Ashburnham	Lake Wampanoag Dam	High Hazard	Private
Ashburnham	Sunset Lake Dam	Low Hazard	Private

Ashburnham	Marble Pond Dam	Low Hazard	Private
Ashburnham	Stodge Meadow Pond Dam	Low Hazard	Private
Ashburnham	Lake Wampanoag North Dike	Low Hazard	Public
Ashburnham	Swimming Pool Dam	N/A	Private
Ashburnham	Farm Pond Dam	N/A	Private
Ashburnham	Old Saw Mill Pond Dam	N/A	Private
Ashburnham	Lathe Mill Pond Dam	N/A	Private
Ashburnham	Ward Pond Dam	N/A	Public
Ashburnham	Jack Wickman Pond Dam	N/A	Private
Ashburnham	Swimming Pool Dam	N/A	Public
Ashburnham	Old Tannery Road Pond Dam	N/A	Public
Ashburnham	**Old Foster Road Mill Dam	N/A	Public
Ashburnham	Lake Wampanoag Little Dike	N/A	Private
Ashburnham	Lake Wampanoag Northeast Dike	N/A	Private
Ashburnham	High Street Dam	N/A	Public
Ashburnham	Lake Watatic Dam	Significant Hazard	Public
Ashburnham	Factory Village Pond Dam	Significant Hazard	Private
Ashburnham	Whitney Pond Dam	Significant Hazard	Public
Ashburnham	Wallace Pond Dam	Significant Hazard	Private

*N/A – Information not available as the dam is non-jurisdictional.

**This dam is owned by Ashburnham but located in Winchendon.

Risk Assessment

As previously stated, located in Section 4. Identification of Natural Hazards, Identifying and Profiling Hazards”, there is a description of each identified hazards’ impact on the region and its communities as well as an overall summary of vulnerability. Based on the region-wide hazards identified in this plan and the assessment of risks by the Town of Ashburnham, the town considers itself to be at a high risk for Heavy Rain, Beavers, Heavy Snow, Ice Storms, and Blizzard; moderate risk for snow melt, dam failure, ice jams, high winds, hurricanes, tornados, nor’easters, severe thunderstorms, major urban fires, wild land fire, drought, extreme temperature, and earthquakes; low risk for landslides and of course unlikely for tsunami. This information is documented in Ashburnham’s Natural Hazard Matrix below which was obtained from participants at the Ashburnham Local Hazard Mitigation Team Meeting held on April 2, 2012.

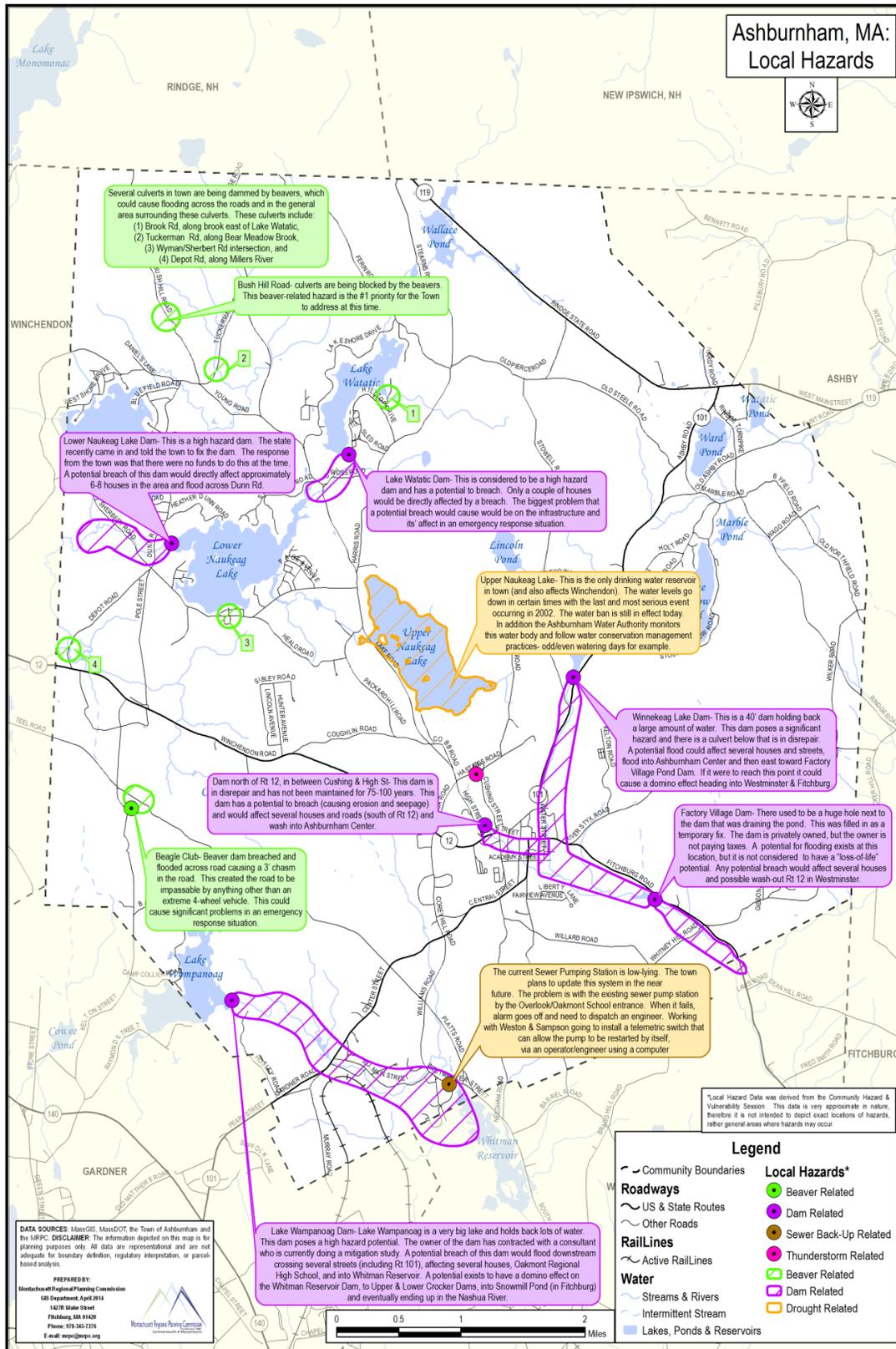
Also discussed at this meeting were the hazards that affect each community and the identification of specific problem areas in the community that need to be addressed. This included the identification of new hazards that were determined to pose a threat or community vulnerability which are detailed in Ashburnham’s Local Hazards Map on the following page. The entire community is equally at risk to the following hazards: Heavy rain, snow melt, ice jams, high winds, hurricanes, tornados, nor’easters, heavy snow, ice storms, blizzards, major urban fires, wildland fires, extreme temperatures, earthquakes and landslides.

Ashburnham Natural Hazard Matrix

Natural Hazard	Likelihood of Occurrence	Location	Impacts	Hazard Index
Natural Hazard Separated by Flood, Atmospheric Related and Winter Related, Other Natural Hazards, and Geologic Hazards	3 = Highly Likely 2 = Possible 1 = Unlikely	3 = Regional/State 2 = Multi Community/Regional 1 = Local/Town	4 = Catastrophic 3 = Critical 2 = Limited 1 = Negligible	Ranking Determined by Combining the Likelihood, Location and Impacts of a Natural Hazard
Flood-Related Hazards				
• Heavy Rain	3	2	2	7
• Snow Melt	2	2	2	6
• Dam Failure	2	2	4	8
• Ice Jams	2	1	3	6
• Beavers	3	1	2	6
Atmospheric Related and Winter Related Hazards				
• High Winds	2	1	2	5
• Hurricanes	2	1	4	7
• Tornados	2	1	4	7
• Nor'easters	2	1	3	6
• Severe Thunderstorms	2	1	2	5
• Heavy Snow	3	2	3	8
• Ice Storms	3	1	3	7
• Blizzard	3	2	3	8
Other Natural Hazards				
• Major Urban Fires	2	2	4	8
• Wildland Fire	2	2	4	8
• Drought	2	2	3	7
• Extreme Temperatures	2	2	3	7
Geologic Hazards				
• Earthquakes	2	3	4	9
• Landslides	1	1	4	6
• Tsunami	1	2	4	7

Key

Highly likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
 Possible: 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.
 Unlikely: Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.
 Catastrophic: Immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.
 Critical: Fast speed of onset or long duration of event resulting in devastating damage and loss of services for weeks or months.
 Limited: Moderate speed of onset or moderate duration of event, resulting in some damage.
 Negligible: Slow speed of onset or short duration of event resulting in little to no damage.



Existing Protections

The original inventory of hazard mitigation actions which the Montachusett communities undertook for the 2008 Montachusett Region Hazard Mitigation Plan was reviewed and updated by each community at a meeting held in each community with the MRPC and the community's Local Hazard Mitigation Planning Team and, in some communities, the Emergency Management Committee. The attendees of the meetings can be found in Appendix A. The following matrices depict the updated inventory of what is currently being done to mitigate hazards by listing the programs and activities already in place. It includes a description of the protection measure, who is responsible, and improvements and changes that may be needed. This inventory was used by the Planning Team/Emergency Management Committee to identify gaps in existing protections that were then addressed through the development of this plan update.

Existing Protection Matrix – Ashburnham

Type of Existing Protection	Description	Area Covered	Implementation Resources and Funding*	Improvements or Changes Needed
Flood Related Hazards				
Storm water management standards	State Regulation under the Wetlands Protection Act to regulate storm water and other point source discharge	Town-Wide	Enforced by both the Ashburnham Conservation Commission (Wetlands Protection Act) staffed by the Town's Conservation Agent and Ashburnham Planning Board (Subdivision Control Law and site plan review).	No improvement or changes needed. Stormwater management standards are and continue to be enforced.
Wetlands Protection Act (state)	State law regulating development and activity within wetland buffer zone	100-foot state buffer around wetland area; 200 foot buffer around river front areas	Enforced by the Ashburnham Conservation Commission staffed by the Town's Conservation Agent.	No improvement or changes needed.
Wetlands Protection Bylaw (local)	Local bylaw supplementing the Wetlands Protection Act	100-foot state buffer around wetland area; 200 foot buffer around river front areas	Enforced by the Ashburnham Conservation Commission staffed by the Town's Conservation Agent.	No improvement or changes needed.

100 Year Flood Zone	Federal law requiring elevation above 100-year flood level of new and substantially improved residential structures in floodplain	100-year floodplain as shown on Flood Insurance Rate Map dated June 15, 1984.	Enforced by the Building Commissioner (municipal staff) and Conservation Commission staffed by the Town's Conservation Agent.	Flood Rate Maps need to be updated.
Town Bylaw Flood Plain District	Local bylaw enhancing federal/state laws and regulating any development in the flood plain district	100-year floodplain as shown on Flood Insurance Rate Map dated June 15, 1984.	Enforced by the Building Commissioner (municipal staff) and Conservation Commission staffed by the Town's Conservation Agent.	Flood Rate Maps need to be updated.
Low Impact Development	General Bylaw	Town – Wide	Enforced by Planning Board.	General Bylaw and enforcement remain in effect. No improvements or changes needed.
Maintenance of municipal storm water drainage system	Regular cleaning of catch basins, storm drains, and culverts	Town-Wide	Directed by the Department of Public Works municipal staff.	Maintenance continues but additional Personnel and Equipment is Needed to undertake this task.
Maintenance of public water bodies (ponds, streams, brooks, wetlands)	Periodic cleaning of waterways is undertaken, i.e., remove trash, debris	Town-Wide	Directed by the Department of Public Works municipal staff with guidance from Conservation Commission staffed by the Town's Conservation Agent.	Maintenance continues. No changes or improvement needed.

<u>Wind Related Hazards</u>				
State Building Code	State Law related to design loads to include wind effects	Town-Wide	Enforced by Building Commissioner (municipal staff).	Continued enforcement remains in place. No improvements or changes needed.
Tree Maintenance	Regular inspection and tree maintenance to cut branches threatening power lines and overhead utilities	Town-Wide	Municipal Light plant staff and Department of Public Works municipal staff.	Tree maintenance continues but additional Staff needed to complete this task.
<u>Winter Storms Related</u>				

Clearing Snow from Major Arterial Routes	Ensure Access to Emergency Services	Town-Wide	Department of Public Works municipal staff.	Snow clearing continues but additional personnel and equipment needed.
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*Ashburnham's enforcement/implementation is generally carried out by elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

Mitigation Goals, Objectives and Strategies

As discussed earlier in this Plan, MRPC previously prepared the 2008 Montachusett Region Hazard Mitigation Plan which consisted of individual annexes for each MRPC community. Similarly, as part of the multi-jurisdictional plan update, each community also developed their own individual goals, objectives and strategies which are listed in this section.

Ashburnham Goals, Objectives and Strategies

Overall Goal Statement: To reduce the loss of life, property, infrastructure and cultural resources throughout the town of Ashburnham from natural disasters through a multiple hazard mitigation program that involves increased coordination, planning, education, and capital improvements.

1. **Objective:** To provide adequate shelter, water, food, and basic first aid to displaced residents in the event of a natural disaster, and to provide adequate notification and information regarding evacuation procedures, etc., to residents in the event of a natural disaster.
2. **Objective:** to increase coordination between inter-departments in pre-disaster planning, post-disaster recovery and continuous hazard mitigation implementation.
3. **Objective:** Increase awareness of hazard mitigation among town officials, private organizations, businesses, and the general public.
4. **Objective:** To ensure that critical infrastructure sites are protected from natural hazards, and to maintain existing mitigation infrastructure in good condition.
5. **Objective:** To educate the public about the threat of natural hazards and the possible mitigation measures that can be taken to protect public health and safety, as well as infrastructure and property; and to educate the public as well about zoning and building regulations, particularly regulations that relate to new construction.
6. **Objective:** To encourage future development in areas that are not prone to natural disasters.
7. **Objective:** To identify existing shelters that are earthquake resistant as well as outside of floodplain and inundation areas. Disseminate this information to appropriate Town departments. Also, educate townsfolk.
8. **Objective:** To inventory supplies at existing shelters and develop a needs list and storage requirements; and to establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster.
9. **Objective:** To examine current notification system and consider implementation of a Code Red system.
10. **Objective:** To collect, periodically update, and disseminate information on which local radio stations provide emergency information, what to include in a 'home survival kit,' how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to follow during a natural disaster.

Specific Natural Hazard Goals

Goal Statement for Flooding: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to flooding. And to pursue prevention activities which include planning, zoning, open space preservation, floodplain and wetland development regulations, storm water management, waterway dumping regulations, watershed protection measures, and best management practices, as well as, soil erosion, building ordinances, and subdivision regulations.

- Objective:** To implement standards in the Subdivision Rules and Regulations to require temporary and permanent erosion control measures for streams and surface water bodies.
- Objective:** To add more specific requirements to address flood related issues in the Special Permit and Site Plan Approval provisions in the Ashburnham Zoning Bylaw including topographic change, removal of cover vegetation, risk of erosion or siltation and increased stormwater runoff.
- Objective:** *To identify all structures throughout Town that needs to be elevated above the base-flood elevation.*
- Objective:** *To Develop a priority list and seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town.*

Goal Statement for Protection from Beavers: To minimize the threat to health, the damage to roads and property, and the disruption of governmental services and general business activities due to flooding caused by beavers.

- Objective:** To develop and implement a coordinated beaver protection plan.

Goal Statement for Hurricanes and Tornadoes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to high winds associated with hurricanes and tornadoes. (The objectives listed above, under flooding, address the flooding that can result from a hurricane.)

Goal Statement for Winter Related Hazards: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to severe snow and ice storms.

- Objective:** To develop a plan for providing access to water, information, shelter, and food stores to people in remote locations in Ashburnham in the event of a severe winter storm.

Goal Statement for Dam Failure: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to dam failures.

- Objective:** To identify sources of funding for dam safety inspections.

Goal Statement for Earthquakes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to earthquakes.

- Objective:** To evaluate all Shelters to determine if they are earthquake resistant.
- Objective:** To insure that all identified shelters have sufficient back-up utility service in the event of primary power failure.

Goal Statement for Drought: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to drought.

- Objective:** Prepare a Water Conservation Plan for Ashburnham.

Goal Statement for Wildfires/Brushfires: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to wildfires/brushfires.

1. **Objective:** Develop and distribute an educational pamphlet on fire safety and prevention.
2. **Objective:** Consider amending the Subdivision Rules and Regulations and Required Improvements section to include fire suppression provisions for new residential developments.

Goal Statement for Weather Extremes: To minimize the loss of life and the threats to public health and safety.

1. **Objective:** To develop and distribute educational information regarding the threats from extreme heat and cold.

Mitigation Action Plans and Prioritization of Actions (STAPLEE)

Initial Mitigation Action Plans for the Montachusett Communities were presented in the communities Hazard Mitigation Plans that were approved by FEMA in 2009 and 2010. The original Mitigation Action Plans were developed through an inventory of potential hazards which could impact the community and an evaluation of a range of alternatives to address these hazards. As part of the plan update process, the original Mitigation Action Plan was reviewed by the community's Local Hazard Mitigation Planning Team/Emergency Management Committee to delete actions which have already been completed, add additional actions which are either underway or planned to be undertaken, and to update the current status of all actions. The goals were reviewed and updated at the second meeting with each community.

An additional step in this process was to conduct a "STAPLEE" analysis for each action to prioritize all actions within each community and a subjective evaluation of each action's perceived cost/benefit. In the 2008 plan, actions were not prioritized so there were no changes in priorities in this update. The revised Community Mitigation Action Plans matrices that follow identify each mitigation action, the responsible department or board responsible for implementation, potential funding sources, the timetable of the action, results of the prioritization of actions through the STAPLEE analysis, and the perceived cost/benefit for each mitigation action.

The goal of each identified strategy, or mitigation action, is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each action to establish priorities for implementation, using the "STAPLEE" method. The STAPLEE methodology was developed by the Federal Emergency Management Agency as a tool to help communities prioritize their hazard mitigation strategies and determine the most appropriate actions for implementation. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of an action and is designed to be used by public officials and planners for making planning decisions.

To conduct the STAPLEE exercise, the community's Hazard Mitigation Team was asked to rate each action in their Mitigation Action Plan on each of the following criteria, using a score of 1 to 3 (Good = 3, Average = 2, Poor = 1):

- **Social:** Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?

- Technical: Will the proposed strategy work? Will it create more problems than it solves?
- Administrative: Can the community implement the action? Is there someone to coordinate and lead the effort?
- Political: Is the action politically acceptable? Is there public support both to implement and to maintain the action?
- Legal: Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- Economic: What are the costs of this action? Does the cost seem reasonable for the size of the problem and the likely benefits?
- Environmental: How will the action impact the environment? Will the action need environmental regulatory approvals?

These scores were then totaled, resulting in a final score of 7 (least priority) to 21 (highest priority) for each action. The higher the final score, the higher the relative priority of that action for implementation. This information can then be utilized in each community as they conduct and administer relevant municipal functions and activities. The final STAPLEE score for each action is shown in the following mitigation action plan.

The Hazard Mitigation team was also asked to do a relative cost/benefit of each action. This assessment was intended to informally indicate if an action will either have more benefits accrued to the Town than the Cost of implementing the action, or if the costs would exceed any benefits. Responses include: “Benefits Exceed Costs”, “Benefits Equal Costs, or “Costs Exceed Benefits”.

ASHBURNHAM IMPLEMENTATION STRATEGY FOR PRIORITY MITIGATION ACTIONS

Type of Natural Hazard	Description of Action	Implementation Responsibility	Resources/Funding*	Timeframe	Priority (STAPLEE Score)	Cost/Benefit Evaluation	Status Update from 2008 Plan**
Wildland Fire	Increase awareness by educating property owners regarding actions that they can take to reduce risk to property by hosting an Open House at the Fire Department, developing and distributing an Educational Pamphlet on Fire Safety and Prevention (SAFE PROGRAM) (SENIOR SAFE) and wildfire prevention.	Fire Department	Municipal Staff	2015 - 2020	21	Benefit exceeds cost	Completed. Carried forward Ongoing. Open House held annually. Materials distributed annually.
All Natural Hazards	Increase hazard education and risk awareness to public by updating and disseminating information on Local Radio/TV Stations to educate the public and alert them of emergency information including shelter locations and other instructions related to all natural hazards.	Emergency Management Director	Municipal Staff	2015 - 2020	21	Benefit equals cost	Completed. Carried forward Ongoing This is done an annual basis.

Atmospheric and Winter Related Hazards	Develop a Mitigation Plan to provide access to water, information, shelter and Food Stores to People in Remote Locations of the town in the Event of a natural hazard and integrate this information into community comprehensive plans.	Emergency Management Director	Municipal Staff/Volunteers	2015 - 2020	21	Benefit exceeds cost	Carried forward due to time constraints.
Flood Related Hazards	Identify all structures throughout the town that need to be Elevated above the Base-Flood Elevation to reduce flood damage. Once identified, educate property owners about their options for mitigation.	Building Inspector, Fire Department	Municipal Staff. Also, 75% FEMA FUNDING AVAILABLE. remaining 25% (non-federal)	2015 - 2020	16	Benefit equals cost	Carried forward due to time constraints.
Flood Related Hazards	Develop a priority list and possibly seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town to reduce or eliminate flooding risk.	Board of Selectmen, Highway Department	Municipal Staff/ FEMA HMGP grant	2015 – 2018	16	Benefit equals cost	Carried forward due time constraints.

Flood Related Hazards	Educate property owners regarding options for mitigating their properties from flooding through outreach programs that address measures that residents can take(i.e installing backflow valves, securing debris, etc.)	Emergency Management Director, Fire Department	Town of Ashburnham	2015 - 2020	14	Benefit equals cost	New Action.
Flood Related Hazards	Continue participation in the National Flood Insurance Program to enable property owners to purchase insurance protection against flood losses.	Board of Selectmen, Conservation commission	FEMA/MEMA	2015 - 2020	14	Benefit exceeds cost	Completed. Carried over. Town continues to participate in the NFIP.
Other Natural Hazards (Wildland fire)	Identify areas with potential for brush fires to track community vulnerability by developing and maintaining a data base.	Department of Public Works	Municipal Staff	2015 - 2020	19	Benefit exceeds cost	New Action.
Winter Related Hazards	Expand residential parking bans to enable snow removal from all streets.	Department of Public Works, Board of Selectmen	Ashburnham Board of Selectmen	2015 - 2018	19	Benefit exceeds cost	Carried over. Additional time needed to implement a new bylaw.

All Natural Hazards	Identify shelters and publicize locations to mitigate the effects of all hazards on the general population.	Emergency Management Director	Emergency Management Director/Ashburnham Fire Department (municipal Staff).	Completed / Update periodically as needed between 2015 to 2020	21	Benefit exceeds cost	This action has been completed but has been carried over because this is a continuous effort.
All Natural Hazards	Utilize interactive mapping application prepared by MRPC/CMRPC to update critical infrastructure and simulate real time evacuation scenarios to mitigate hazards to the public.	Emergency Management Director	Emergency Management Director	2015-2020	21	Benefit exceeds cost	New action.
Flood Related Hazards	Install "beaver diverters" and water control devices to mitigate flooding caused by beaver dams.	Department of Public Works	Department of Public Works Municipal Staff	2015 – 2020 as needed	21	Benefit exceeds cost	This action has been completed but has been carried over because this is a continuous effort.
Flood Related Hazards	Hire trapper for removal of beavers to mitigate flooding caused by beaver dams.	Department of Public Works	Department of Public Works Municipal Staff. Funds through local taxes to be utilized for hiring of a trapper.	2015 – 2020 as needed	14	Benefit equals cost	This action has been completed but is carried over because this is a continuous effort.

All Natural Hazards	Implement recommendations regarding natural hazard mitigation in existing planning documents including the implementation element of the master plan, five year action plan of the open space and recreation plan and the emergency evacuation plan	Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	2015 - 2020	20	Benefit equals cost	Completed but Carried forward. This is an ongoing effort. For example, Town recently adopted an OSRD bylaw which preserves open space and mitigates possible flooding from excess development. This was a recommendation of the town's community development plan.
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*Unless otherwise noted, Ashburnham's Resources/Funding consists of elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

**Actions identified as carried forward were not completed in the previous planning cycle unless otherwise stated.

Mitigation actions from the 2008 Montachusett Region Hazard Mitigation Plan that have been completed include the following:

- Identify Existing Shelters that are Earthquake Resistant as well as Outside of Floodplain (and Dam Inundation) Areas.
- Develop a Preliminary Project Proposal and Cost Estimate for Updating Current 911 System including Feasibility of Reverse 911.
- Work with Neighboring Communities to Establish a Community Emergency Response Team (CERT).

Ashby Natural Hazard Risk Assessment

While this annex focus' pertains to critical facilities, flooding, risk assessment, existing protections and mitigation strategy in the community, more detailed descriptions of each natural hazard's impact on the region and its communities and summary of vulnerability can be located in the regional section entitled " 4. Identification of Natural Hazards, Identifying and Profiling Hazards".

Community Profile

Ashby is located in the northwestern part of Middlesex County, north of Worcester on the New Hampshire border. To the east it is bordered by the towns of Townsend and Lunenburg, to the south is the City of Fitchburg, and to the west is Ashburnham. On the north it is bordered by the New Hampshire towns of Ipswich and Mason. Ashby is 8 miles north of the center of Fitchburg, 32 miles north of Worcester, 49 miles northwest of Boston, 87.1 miles from Springfield, 97.5 from Hartford, and 212 miles from New York City. Looking north Ashby is only 24.4 miles south of Nashua, New Hampshire.

The town of Ashby covers an area of 24.17 square miles with a resident population of 3,074, according to the 2010 US Census. The population density is 127 people per square mile. There are 1,191 housing units in the town, and the average household size is 2.78 people. The median age of residents is 42.

Ashby was once an outpost of Lunenburg, and was incorporated in 1767. Ashby was originally agrarian; however, by the mid-eighteenth century the town began to harness its fast flowing streams for water powered manufacturing. The first grist mill was built in 1750. Other manufacturing included sawmills, a wood turning mill, wool carding, and several food-processing mills. In 1831 the Lawrence Brothers and Martin Allen made the first wooden tubs and pails in Massachusetts. Three noted clockmakers, Abraham Edwards, the Willard Brothers, (Alexander and Philander) worked in Ashby. Jonas Prescott Whitney fashioned church organs. A unique cottage industry was the braided palm leaf hats made by women Ashby.

Ashby is primarily a residential community with a small commercial base of 156 home based businesses. Much of the town-of-the century look remains today in the Ashby Historic District, center around Ashby's Town Common. The town is characterized by rugged, hilly terrain interspersed with gently rolling open fields, woodland, streams and wetlands. Ashby's strengths are its rural character and natural resources. Recreational opportunities are abundant as Ashby. Mount Watatic, Willard Brook State Park, Pearl Hill State Park and Blood Hill State Park attracting tourists to the area. Ashby Elementary School and Bain Pest Control Services are the two major employers in Ashby.

Critical Facilities

In general usage, the term "critical facilities" is used to describe all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired.

Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even access to damaged areas.

The number and nature of critical facilities in a community can differ greatly from one jurisdiction to another, and usually comprise both public and private facilities. In this sense, each community needs to determine the relative importance of the publicly and privately owned facilities that deliver vital services, provide important functions, and protect special populations. *Source: Federal Emergency Management Administration, Risk Management Series, Design Guide for Improving Critical Facility Safety from Flooding and High Winds, FEMA 543, January 2007.*

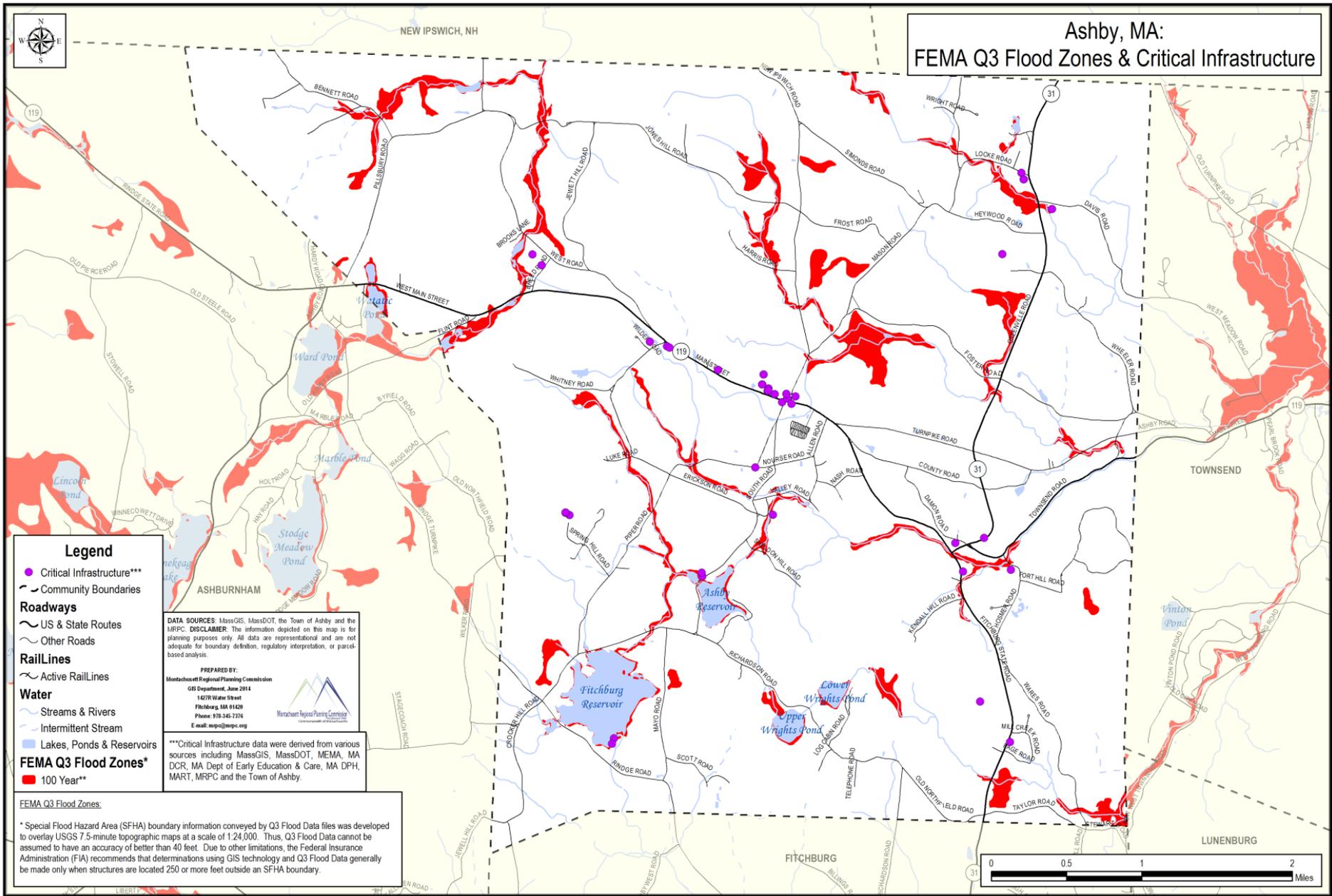
A list of the critical facilities within the community is shown in Table 25. This data was obtained from the community's Comprehensive Emergency Management Plan (CEMP). The data was then reviewed by the Emergency Management Director. These facilities were digitized into GIS and used for determining vulnerability to the various hazards. The map that follows entitled FEMA Q3 Flood Zones and Critical Infrastructure depicts Critical Facilities in the community.

Table 25: Ashby Critical Facilities

<i>Feature Type</i>	<i>Name</i>	<i>Address</i>
City/Town Halls	Ashby Town Hall	895 Main Street
DPW Facilities	Ashby DPW	93 Breed Road
Early Education Childcare Facilities	Doody, Christine	176 Piper Rd
	The Children's Garden Nursery School	247 Locke Rd
Emergency Dispensing Sites	Ashby Elementary	911 Main Street
Emergency Operations Centers	Ashby Police Station	895 Main Street
	Ashby Fire Station	1093 Main Street
Emergency Shelters	Ashby Fire Station	1093 Main Street
	Ashby Elementary School	911 Main Street
	Ashby Town Hall	895 Main Street
End of Life Facilities	Ashby Elementary School	911 Main Street
Fire	Ashby Fire Station	1093 Main Street
Other Critical Facilities	Mr. Mike's	1274 Main Street
	31 Store	704-1 Fitchburg State Road
	4-H Camp Middlesex	1031 Erickson Road
	Ashby Market	840 Main Street
	Allen Field	530 West Road
	Ashby Cell Tower #1	1140 Greenville Road
	Ashby Common & Gazebo	Main Street
	Ashby Cell Tower #2	603 Fitchburg State Road
	Ashby Cell Tower #3	20 Common Road
	Spring Hill Wellness	250 Spring Hill Road
	Ashby Market	873 Main Street
Other Government Buildings	Ashby Highway Department	92 Breed Road

	Ashby Public Library	812 Main Street
	Maja Hall	47 Ericson Rd.
Police	Ashby Police Station	895 Main Street
Public Health Office	Ashby Board of Health	895 Main Street
Public Water Supply*	Ashby Elementary School	
	Well #2	
	Well #1	
	Crossroads For Kids/Camp Lapham	
	DCR Willard Brook State Forest	
	Pines Campground	
	Evergreen Family Restaurant	
	The Gardeners Cottage	
	Fitchburg Reservoir	
	Country Creamery	
	The Children's Garden Nursery School	
	Ashby Diner	
	Ashby Market	873 Main Street
	Ashby Elementary School	911 Main Street
	Fitchburg Reservoir	
	Ashby Academy Well #1	250 Spring Hill Road
	Ashby Academy Well #2	250 Spring Hill Road
	Crossroads For Kids/camp Lapham	731 South Road
	Pines Campground	39 Davis Road
	The Children's Garden Nursery School	247 Locke Road
School	Ashby Elementary School	911 Main Street
	Children's Garden Nursery School	247 Locke Road
Sports and Cultural Areas	Congregational Church	21 New Ipswich Road
	First Parish Unitarian	20 Common Road

*As stated in 310 CMR 22.02, a Public Water System means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year" (Mass GIS, 2014).



Flood Prone Areas

Particular areas within the community where the risk of flood areas are or could occur were determined at the first meeting of the Ashby Local Hazard Mitigation Team held on April 25, 2012. This information can be found on Ashby's Local Hazard Map which is located under the section entitled Risk Assessment.

Flooding Vulnerability Assessment

An analysis of the FIRM flood hazard area maps indicates that there is a total of 911.63 acres of 100-year floodplain within Ashby. This amounts to 5.92% of the total town. Based on additional analysis, 12.09 acres (1.33%) of the floodplain are developed. Currently there are 34 structures in the floodplain which is about 1.52% of the total structures in the community. The buildings are then multiplied by the building value, as determined by the MA Department of Revenue, to come up with a potential loss of \$31,145,900. Excluding dams and bridges there are no critical facilities within the 100 year flood zone.

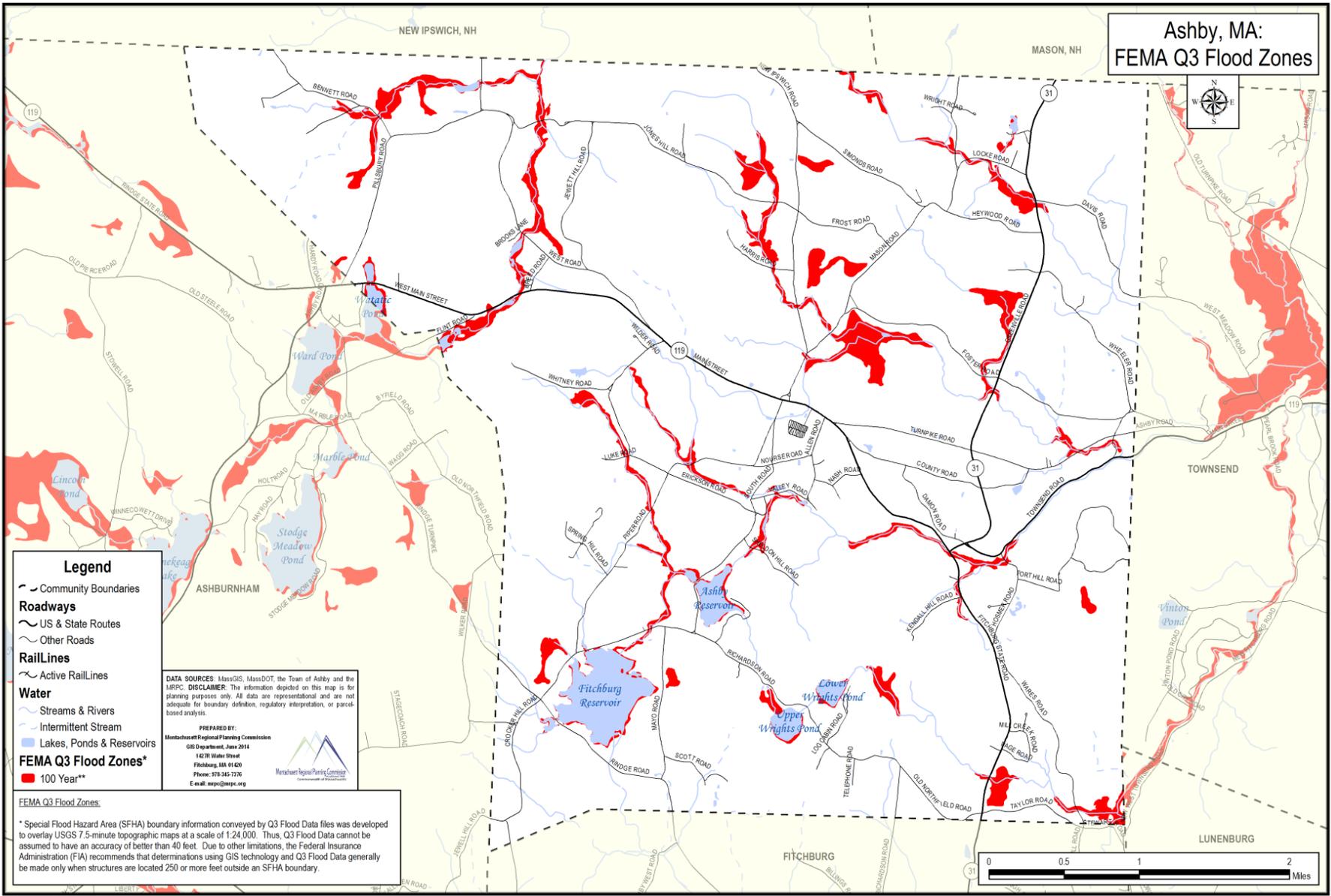
Since the initiation of the National Flood Insurance Program (NFIP) data, there have been no flood insurance claims in the town of Ashby. There are no repetitive loss properties in Ashby. Statistics from the NFIP BureauNet indicate in the town of Ashby there are five flood insurance policies in force.

Floodplain Management and Compliance with NFIP

The town supports numerous floodplain management activities in an effort to meet compliance of the National Floodplain Insurance Program. These efforts include:

- Implementing the MA Wetlands Protection Act regulating development and activity within the wetlands buffer zone and regulating stormwater and other point source discharge.
- Implementing the Town Flood Plain District Bylaw regulating development in the floodplain district.
- Continued maintenance of municipal stormwater drainage system which includes regular cleaning of catch basins, storm drains and culverts.
- Continued maintenance of public water bodies to reduce flooding caused by erosion and water displacement.
- Enforcement of the Open Space Residential Bylaw which mitigates possible flooding events by designating protected open space within a development which in turn treats stormwater runoff through the means of natural infiltration.

The map that follows entitled FEMA Q3 Flood Zones depicts the 100 year flood zones in the community.



Structurally Deficient Bridges Over Waterways

There are no bridges over water in the town that is classified by MassDOT as “structurally deficient.

Hazard Potential of Dams

The DCR Office of Dams Safety lists seven dams in the Town of Ashby as shown in Table 26. Two dams, Ashby Reservoir Dam and Damon Pond Dam are classified as high hazard.

Classifications for potential hazards are in accordance with the chart below.

Hazard Potential Classification

High Hazard	Refers to dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
Significant Hazard	Refers to dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities
Low Hazard	Refers to dams located where failure may cause minimal property damage to others. Loss of life is not expected.

Source: MA Department of Conservation and Recreation Office of Dam Safety

High hazard dams must be inspected every two year, significant hazard every five years, and low Hazards dams every 10 years. Owners of dams are responsible for having their dam inspected. MGL Chapter 253 and 302 CMR 10.00 requires that dam owners prepare, maintain and update Emergency Action Plans for all High Hazard Potential dams and certain Significant Hazard Potential dams.

Non-jurisdictional dams are not regulated by the Office of Dam Safety or under their jurisdiction. Typically these dams are under 6 feet in height and/or under 15 acre-feet in storage and do not have an assigned 'Hazard Code'. Dams owned and regulated by the Federal Government are also typically non-jurisdictional but DO have an assigned Hazard Code.

Table 26: Dams

Town	Dam	Hazard Code	Owner
Ashby	Ashby Reservoir Dam	High Hazard	Public
Ashby	Damon Pond Dam	High Hazard	Public
Ashby	Fitchburg Reservoir North Dam	Low Hazard	Public
Ashby	Fitchburg Reservoir S.E. Dam	Low Hazard	Public
Ashby	Fitchburg Reservoir South Dike	Low Hazard	Public
Ashby	Pond at West Road	Low Hazard	Private
Ashby	Mount Watatic Dam	N/A	Private

*N/A – Information not available as the dam is non-jurisdictional.

Risk Assessment

As previously stated, located in Section 4. Identification of Natural Hazards, Identifying and Profiling Hazards”, there is a description of each identified hazards’ impact on the region and its communities as well as an overall summary of vulnerability. Based on the hazards identified in this plan and the assessment of risks by the Town of Ashby, the town considers itself to be at a high risk for Heavy Rain, Snow Melt, Beavers, Ice Storms, Heavy Snow, Blizzard; moderate risk for Dam Failure, Hurricanes, Tornados, High Winds, Nor’easters, Severe Thunderstorms, Major Urban Fires, Wild land Fire, Drought, Extreme Temperatures; low risk Ice Jams, Earthquakes, and Landslides and unlikely risk for tsunami. This information is documented in the Ashby Natural Hazard Matrix below which was obtained from participants at Ashby Local Hazard Mitigation Tea Meeting held on April 25, 2012.

Also discussed at this meeting were the hazards that affect each community and the identification of specific problem areas in the community that need to be addressed. This included the identification of new hazards that were determined to pose a threat or community vulnerability which are detailed in Ashby’s Local Hazards Map on the following page. The entire community is equally at risk to the following hazards: snow melt, ice jams, high winds, hurricanes, tornados, nor’easters, heavy snow, ice storms, blizzards, major urban fires, wildland fires, drought extreme temperatures, earthquakes and landslides.

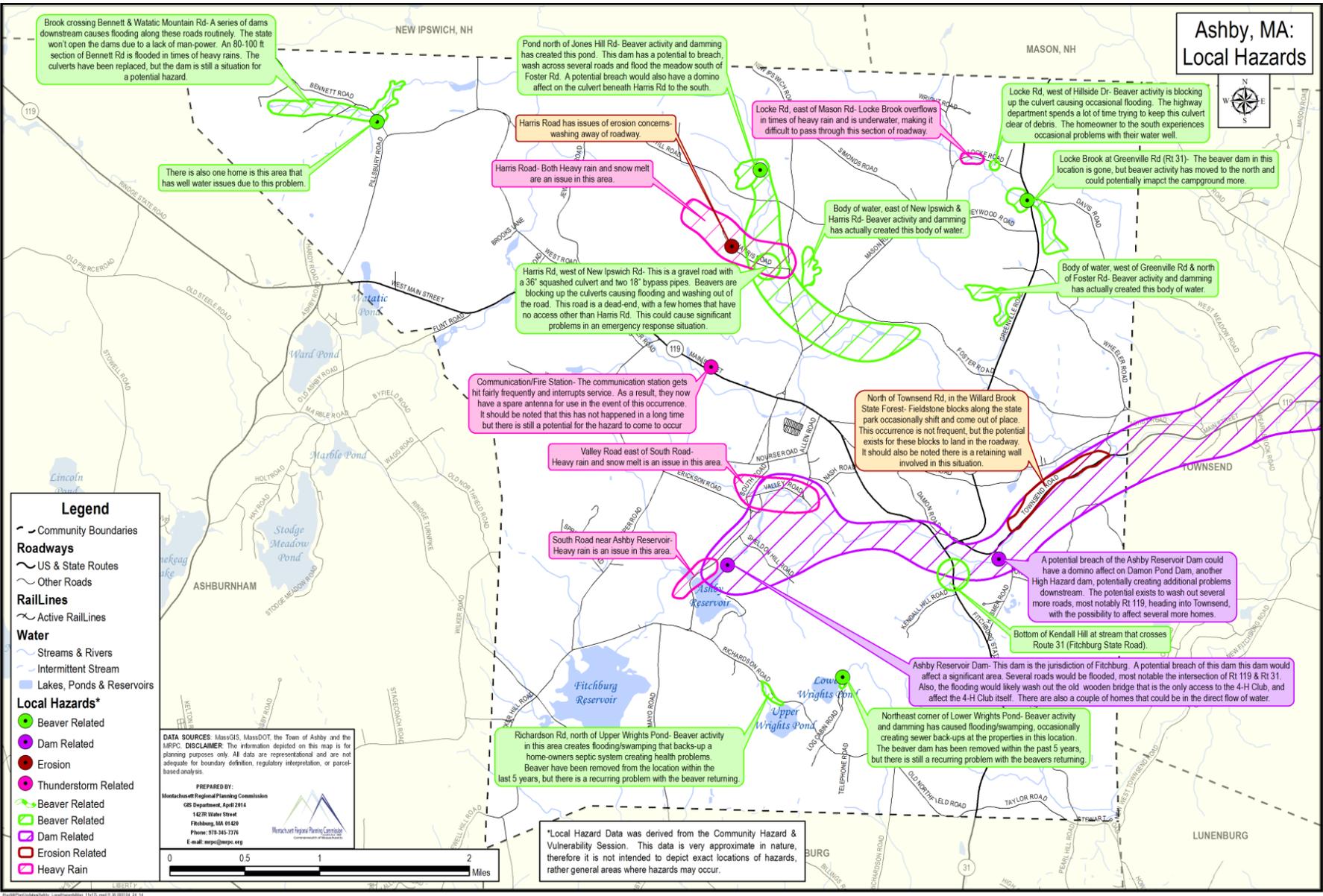
Ashby Natural Hazard Matrix

Natural Hazard	Likelihood of Occurrence	Location	Impacts	Hazard Index
Natural Hazard Separated by Flood, Atmospheric Related and Winter Related, Other Natural Hazards, and Geologic Hazards	3 = Highly Likely 2 = Possible 1 = Unlikely	3 = Regional/State 2 = Multi Community/Regional 1 = Local/Town	4 = Catastrophic 3 = Critical 2 = Limited 1 = Negligible	Ranking Determined by Combining the Likelihood, Location and Impacts of a Natural Hazard
Flood-Related Hazards				
• Heavy Rain	3	3	4	10
• Snow Melt	3	2	3	8
• Beavers	3	2	3	8
• Dam Failure	2	1	3	6
• Ice Jams	1	1	2	4
Atmospheric Related and Winter Related Hazards				
• Ice Storms	3	2	4	9
• Hurricanes	2	2	4	8
• TORNADOS	2	2	4	8
• Heavy Snow	3	2	3	8
• Blizzard	3	2	3	8
• High Winds	2	2	3	7
• Nor'easters	2	2	3	7
• Severe Thunderstorms	2	2	3	7
Other Natural Hazards				
• Major Urban Fires	2	2	4	8
• Wildland Fire	2	2	4	8
• Drought	2	3	3	8
• Extreme Temperatures	2	3	3	8
Geologic Hazards				
• Earthquakes	1	3	4	8
• Landslides	1	3	4	8
• Tsunami	1	3	4	8

Key

Highly likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
 Possible: 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.
 Unlikely: Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.
 Catastrophic: Immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.
 Critical: Fast speed of onset or long duration of event resulting in devastating damage and loss of services for weeks or months.
 Limited: Moderate speed of onset or moderate duration of event, resulting in some damage.
 Negligible: Slow speed of onset or short duration of event resulting in little to no damage.

Ashby, MA: Local Hazards



Brook crossing Bennett & Watic Mountain Rd- A series of dams downstream causes flooding along these roads routinely. The state won't open the dams due to a lack of man-power. An 80-100 ft section of Bennett Rd is flooded in times of heavy rains. The culverts have been replaced, but the dam is still a situation for a potential hazard

There is also one home in this area that has well water issues due to this problem.

Pond north of Jones Hill Rd- Beaver activity and damming has created this pond. This dam has a potential to breach, wash across several roads and flood the meadow south of Foster Rd. A potential breach would also have a domino affect on the culvert beneath Harris Rd to the south.

Harris Road has issues of erosion concerns- washing away of roadway

Harris Road- Both Heavy rain and snow melt are an issue in this area.

Harris Rd, west of New Ipswich Rd- This is a gravel road with a 36" squashed culvert and two 18" bypass pipes. Beavers are blocking up the culverts causing flooding and washing out of the road. This road is a dead-end, with a few homes that have no access other than Harris Rd. This could cause significant problems in an emergency response situation.

Communication/Fire Station- The communication station gets hit fairly frequently and interrupts service. As a result, they now have a spare antenna for use in the event of this occurrence. It should be noted that this has not happened in a long time but there is still a potential for the hazard to come to occur

Valley Road east of South Road- Heavy rain and snow melt is an issue in this area.

South Road near Ashby Reservoir- Heavy rain is an issue in this area.

Richardson Rd, north of Upper Wrights Pond- Beaver activity in this area creates flooding/swamping that backs-up a home-owners septic system creating health problems. Beaver have been removed from the location within the last 5 years, but there is a recurring problem with the beaver returning.

Locke Rd, east of Mason Rd- Locke Brook overflows in times of heavy rain and is underwater, making it difficult to pass through this section of roadway.

Body of water, east of New Ipswich & Harris Rd- Beaver activity and damming has actually created this body of water.

Locke Rd, west of Hillside Dr- Beaver activity is blocking up the culvert causing occasional flooding. The highway department spends a lot of time trying to keep this culvert clear of debris. The homeowner to the south experiences occasional problems with their water well.

Locke Brook at Greenville Rd (Rt 31). The beaver dam in this location is gone, but beaver activity has moved to the north and could potentially impact the campground more.

Body of water, west of Greenville Rd & north of Foster Rd- Beaver activity and damming has actually created this body of water.

North of Townsend Rd, in the Willard Brook State Forest- Fieldstone blocks along the state park occasionally shift and come out of place. This occurrence is not frequent, but the potential exists for these blocks to land in the roadway. It should also be noted there is a retaining wall involved in this situation.

A potential breach of the Ashby Reservoir Dam could have a domino affect on Damon Pond Dam, another High Hazard dam, potentially creating additional problems downstream. The potential exists to wash out several more roads, most notably Rt 119, heading into Townsend, with the possibility to affect several more homes.

Bottom of Kendall Hill at stream that crosses Route 31 (Fitchburg State Road).

Ashby Reservoir Dam- This dam is the jurisdiction of Fitchburg. A potential breach of this dam this dam would affect a significant area. Several roads would be flooded, most notable the intersection of Rt 119 & Rt 31. Also, the flooding would likely wash out the old wooden bridge that is the only access to the 4-H Club, and affect the 4-H Club itself. There are also a couple of homes that could be in the direct flow of water.

Northeast corner of Lower Wrights Pond- Beaver activity and damming has caused flooding/swamping, occasionally creating sewer back-ups at the properties in this location. The beaver dam has been removed within the past 5 years, but there is still a recurring problem with the beavers returning.

Existing Protections

The original inventory of hazard mitigation actions which the Montachusett communities undertook for the 2008 Montachusett Region Hazard Mitigation Plan was reviewed and updated by each community at a meeting held in each community with the MRPC and the community's Local Hazard Mitigation Planning Team and, in some communities, the Emergency Management Committee. The attendees of the meetings can be found in Appendix A. The following matrices depict the updated inventory of what is currently being done to mitigate hazards by listing the programs and activities already in place. It includes a description of the protection measure, who is responsible, and improvements and changes that may be needed. This inventory was used by the Planning Team/Emergency Management Committee to identify gaps in existing protections that were then addressed through the development of this plan update.

Ashby

Type of Existing Protection	Description	Area Covered	Implementation Resources and Funding*	Improvements or Changes Needed
Flood Related Hazards				
Storm water management standards	State Regulation under the Wetlands Protection Act to regulate storm water and other point source discharge	Town-Wide	Enforced by both the Ashby Conservation Commission (Wetlands Protection Act) and Ashby Planning Board (Subdivision Control Law and site plan review) both staffed by the municipal Land Use Agent.	Storm water management standards remain in place. No improvements or changes needed.
Wetlands Protection Act (state)	State law regulating development and activity within wetland buffer zone	100-foot state buffer around wetland area; 200 foot buffer around river front areas	Enforced by the Ashby Conservation Commission staffed by the municipal Land Use Agent.	Continued enforcement remains in place. No improvements or changes needed.
100 Year Flood Zone	Federal law requiring elevation above 100-year flood level of new and substantially improved residential structures in floodplain	100-year floodplain as shown on Flood Insurance Rate Map dated June 4, 2010.	Enforced by the Building Inspector (municipal staff) and Ashby Conservation Commission staffed by the municipal Land Use Agent.	Insurance Flood Rate Maps need to be updated.
Town Bylaw Flood Plain District	Local bylaw enhancing federal/state laws and regulating any development in the flood plain district	100-year floodplain as shown on Flood Insurance Rate Map dated June 4, 2010.	Enforced by the Building Inspector (municipal staff) and Ashby Conservation Commission staffed by the municipal Land Use Agent.	Insurance Flood Rate Maps need to be updated.

Maintenance of municipal storm water drainage system	Regular cleaning of catch basins, storm drains, and culverts	Town-Wide	Directed by the Department of Public Works municipal staff.	Additional Personnel and Equipment Needed for this task.
Maintenance of public water bodies (ponds, streams, brooks, wetlands)	Periodic cleaning of waterways undertaken, i.e., removal of trash, debris	Town-Wide	Directed by the Department of Public Works municipal staff with guidance from Conservation Commission staffed by the municipal Land Use Agent.	Continued maintenance remains in place. No improvements or changes needed.

* Ashby's enforcement/implementation is generally carried out by elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

Mitigation Goals, Objectives and Strategies

As discussed earlier in this Plan, MRPC previously prepared the 2008 Montachusett Region Hazard Mitigation Plan which consisted of individual annexes for each MRPC community. Similarly, as part of the multi-jurisdictional plan update, each community also developed their own individual goals, objectives and strategies which are listed in this section.

Ashby Goals, Objectives and Strategies

Overall Goal Statement: To prepare to reduce the loss of life, property, infrastructure and cultural resources throughout the community from natural disasters through a multiple hazard mitigation program that involves increased coordination, planning, education, and capital improvements.

1. **Objective:** To organize and prepare to provide adequate shelter, water, food, and basic first aid to displaced residents in the event of a natural disaster, and to provide adequate notification and information regarding evacuation procedures, etc., to residents in the event of a natural disaster.
2. **Objective:** To inventory supplies at existing shelters and develop a needs list and storage requirements; and to establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster.
3. **Objective:** To have the MED lead an effort to increase coordination between departments in pre-disaster planning, and implementation of hazard mitigation projects.
4. **Objective:** Increase awareness of hazard mitigation among town officials, private organizations, businesses, and the general public.
5. **Objective:** To examine and update the current notification system including the progress made by the Central Mass Homeland Security Committee's development of a county-wide Reverse 911.
6. **Objective:** To collect, periodically update, and disseminate information on which local radio stations provide emergency information, what to include in a 'home survival kit,' how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to follow during a natural disaster.
7. **Objective:** To have the Highway Department obtain an emergency back-up power supply to enable gas to be pumped when power to commercial gas stations may be interrupted.

Specific Natural Hazard Goals for Ashby

Goal Statement for Flooding: To prepare emergency staff and volunteers in order to minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to flooding.

1. **Objective:** To continue to participate in the National Flood Insurance Program and to have the flood maps periodically updated.
2. **Objective:** To Develop a priority list and seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout the town.

Goal Statement for Protection from Beavers: To minimize the threat to health, the damage to roads and property, and the disruption of governmental services and general business activities due to flooding caused by beavers.

1. **Objective:** Support local town departments to continue present methods to prevent beaver caused flooding.
2. **Objective:** Seek assistance from beaver management professionals, including trappers.
3. **Objective:** Install beaver management devices.

Goal Statement for Hurricanes and Tornadoes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to high winds associated with hurricanes and tornadoes. (The objectives listed above, under flooding, address the flooding that can result from a hurricane.)

1. **Objective:** To educate residents and volunteers regarding the safe methods and actions necessary to deal with Hurricanes and Tornadoes.

Goal Statement for Winter Related Hazards: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to severe snow and ice storms.

1. **Objective:** To develop a plan for providing access to water, information, shelter, and food stores to people in remote locations in the event of a severe winter storm.

Goal Statement for Earthquakes: To educate staff, residents and volunteers about the potential for earthquakes and strategies to minimize the loss of life, damage to property, the disruption of governmental services and general business activities due to earthquakes.

1. **Objective:** To educate and encourage homeowners and developers to rehab and build using methods to minimize the effects of earthquakes and other disasters.

Mitigation Action Plans and Prioritization of Actions (STAPLEE)

Initial Mitigation Action Plans for the Montachusett Communities were presented in the communities Hazard Mitigation Plans that were approved by FEMA in 2009 and 2010. The original Mitigation Action Plans were developed through an inventory of potential hazards which could impact the community and an evaluation of a range of alternatives to address these hazards. As part of the plan update process, the original Mitigation Action Plan was reviewed by the community's Local Hazard Mitigation Planning Team/Emergency Management Committee to delete actions which have already been completed, add additional actions which are either underway or planned to be undertaken, and to update the current status of all actions. The goals were reviewed and updated at the second meeting with each community.

An additional step in this process was to conduct a “STAPLEE” analysis for each action to prioritize all actions within each community and a subjective evaluation of each action’s perceived cost/benefit. In the 2008 plan, actions were not prioritized so there were no changes in priorities in this update. The revised Community Mitigation Action Plans matrices that follow identify each mitigation action, the responsible department or board responsible for implementation, potential funding sources, the timetable of the action, results of the prioritization of actions through the STAPLEE analysis, and the perceived cost/benefit for each mitigation action.

The goal of each identified strategy, or mitigation action, is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each action to establish priorities for implementation, using the “STAPLEE” method. The STAPLEE methodology was developed by the Federal Emergency Management Agency as a tool to help communities prioritize their hazard mitigation strategies and determine the most appropriate actions for implementation. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of an action and is designed to be used by public officials and planners for making planning decisions.

To conduct the STAPLEE exercise, the community’s Hazard Mitigation Team was asked to rate each action in their Mitigation Action Plan on each of the following criteria, using a score of 1 to 3 (Good = 3, Average = 2, Poor = 1):

- **Social:** Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- **Technical:** Will the proposed strategy work? Will it create more problems than it solves?
- **Administrative:** Can the community implement the action? Is there someone to coordinate and lead the effort?
- **Political:** Is the action politically acceptable? Is there public support both to implement and to maintain the action?
- **Legal:** Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- **Economic:** What are the costs of this action? Does the cost seem reasonable for the size of the problem and the likely benefits?
- **Environmental:** How will the action impact the environment? Will the action need environmental regulatory approvals?

These scores were then totaled, resulting in a final score of 7 (least priority) to 21 (highest priority) for each action. The higher the final score, the higher the relative priority of that action for implementation. This information can then be utilized in each community as they conduct and administer relevant municipal functions and activities. The final STAPLEE score for each action is shown in the following mitigation action plan.

The Hazard Mitigation team was also asked to do a relative cost/benefit of each action. This assessment was intended to informally indicate if an action will either have more benefits accrued to the Town than the Cost of implementing the action, or if the costs would exceed any benefits. Responses include: “Benefits Exceed Costs”, “Benefits Equal Costs, or “Costs Exceed Benefits”.

ASHBY IMPLEMENTATION STRATEGY FOR PRIORITY MITIGATION ACTIONS

Type of Natural Hazard	Description of Action	Implementation Responsibility	Resources/Funding*	Timeframe	Priority (STAPLEE Score)	Cost/Benefit Evaluation	Status Update from 2008 Plan**
All Natural Hazards	Work with Neighboring Communities to Establish a Community Emergency Response Team (CERT) to more effectively respond to all natural hazards thus mitigating any damage.	Board of Selectmen, Police & Fire Departments, Emergency Management Director	Municipal Staff/Volunteers	2015 - 2020	19	Benefit exceeds cost	Carried Forward due to time constraints.
Wildland Fire	Increase awareness by educating property owners on actions that they can take to reduce risk to property by developing and distribute an Educational Pamphlet on Fire Safety and Prevention (SAFE PROGRAM) (SENIOR SAFE) and wildfire prevention.	Fire Department	Municipal Staff	2015 to 2020	20	Benefit exceeds cost	Completed but carried forward. This action undertaken annually.

All Natural Hazards	Increase hazard education and risk awareness to public by collecting, updating and disseminating Information on Local Radio/TV Stations to educate the public and alert them of emergency information including shelter locations and other instructions related to all natural hazards.	Emergency Management Director	Municipal Staff	2015 to 2020	17	Cost exceeds benefit	Completed but carried forward. Ongoing. This is done on an annual basis.
All Natural Hazards	Inventory Supplies at Existing Shelters and Develop a Needs List and Storage Requirements to ensure the availability of adequate supplies during a natural hazard. Supplies must be adequate to eliminate or reduce risk to human life.	Emergency Management Director, Planning Committee, School Facilities Manager	Municipal Staff/Utilize Red Cross	2015-2020	21	Cost exceeds benefit	Completed but carried forward. Ongoing. This action is undertaken on an as needed basis.

Atmospheric and Winter Related Hazards	Develop a Mitigation Plan to provide access to Water, Information, Shelter and Food Stores to People in Remote Locations of the town in the Event of a Severe Winter Storm and integrate this information into community comprehensive plans.	Emergency Management Director	Municipal Staff/Volunteers	2015 – 2020	21	Cost exceeds benefit	Carried forward due to time constraints and lack of funding.
All Natural Hazards	Develop a Preliminary Project Proposal and Cost Estimate for Updating Current 911 System including Feasibility of Reverse 911 to reduce or eliminate the long-term risk to human life and property from hazards.	Board of Selectmen, Emergency Management Director	Municipal Staff/Volunteers	2015-2020	17	Cost exceeds benefit	Carried forward. Town is continuing its research on current options.

Flood Related Hazards	Develop a priority list and possibly seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town to reduce or eliminate flooding risk.	Board of Selectmen, Highway Department	Municipal Staff/ FEMA HMGP grant	2015 – 2018	17	Benefit exceeds cost	Development of priority list carried forward due to time constraints.
Flood Related Hazards	Educate property owners regarding options for mitigating their properties from flooding through outreach programs that address measures that residents can take (i.e installing backflow valves, securing debris, etc.)	Emergency Management Director, Fire Department	Property Owners	2015 – 2020	14	Cost exceeds benefit	New Action.

Flood Related Hazards	Continue participation in the National Flood Insurance Program to enable property owners to purchase insurance protection against flood losses.	Conservation Commission, Board of Selectmen	FEMA/MEMA	2015 – 2020	21	Cost exceeds benefit	Completed but carried forward. Town continues to participate in the NFIP.
Flood Related Hazards	Evaluate and relocate furnaces, water heaters, and electrical equipment in municipal owned buildings that are located in areas prone to flooding to reduce flood damage.	Emergency Management Director, Fire Department	Municipal Staff	2015 – 2020	21	Benefit exceeds cost	Carried forward. Ongoing. Additional time needed due to time constraints and lack of municipal funding.
Atmospheric Related Hazards	Enforce state building codes related to design loads to include wind effects generated from atmospheric related hazards.	Building Inspector	Contractor and Property Owners	2015 – 2020	21	Cost exceeds benefit	Completed but Carried over. Ongoing. Town continually enforces building codes.
Other Natural Hazards (Wildland fire)/Atmospheric Related and Winter Related Hazards	Identify areas with potential for brush fires to track community vulnerability by developing and maintaining a data base.	Highway Department	Municipal Staff	2015 – 2020	21	Benefit exceeds cost	New action.

Other Natural Hazards (Wildland fire)/Atmospheric Related and Winter Related Hazards	To protect buildings and infrastructure from the impacts of winter storms and wind damage regularly inspect and cut branches threatening power lines and overhead utilities.	Highway Department	Municipal Staff	2015 – 2020	21	Benefit exceeds cost	Completed but carried forward. Action is undertaken as needed.
All Natural Hazards	Identify shelters and publicize locations to mitigate the effects of all hazards on the general population.	Emergency Management Director	Emergency Management Director /Fire Department	2015 - 2020	21	Cost exceeds benefit	Completed but carried forward. This action is updated periodically as needed.
Flood Related Hazards	Install "beaver diverters" and water control devices to mitigate flooding caused by beaver dams.	Department of Public Works	Department of Public Works	2015 – 2020	14	Cost exceeds benefit	Completed but carried forward. This action is undertaken periodically as needed.
Flood Related Hazards	Hire trapper for removal of beavers to mitigate flooding caused by beaver dams.	Department of Public Works	Department of Public Works	2015 - 2020	14	Cost exceeds benefit	Completed but carried forward. This action is implemented periodically as needed.
All Natural Hazards	Purchase and distribute educational materials at public facilities and events regarding protection from natural hazards	Emergency Management Director	Board of Selectmen	Implement annually from 2015 - 2020	17	Cost exceeds benefit	Completed but carried forward. This action is implemented on an annual basis.

All Natural Hazards	Implement recommendations regarding natural hazard mitigation in existing planning documents including the Community Development plan, five year action plan of the open space and recreation plan and the emergency evacuation plan	Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	2015 – 2020	21	Benefit exceeds cost	Completed but carried forward. This is an ongoing effort. For example, Town recently completed a feasibility study for a public water supply and sewer which would help to mitigate contamination from a natural hazard. This was a recommendation of the town's community development plan.
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*Unless otherwise noted, Ashby's Resources/Funding consists of elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

**Actions identified as carried forward were not completed in the previous planning cycle unless otherwise stated.

Mitigation actions from the 2008 Montachusett Region Hazard Mitigation Plan that are complete include:

- Insurance Flood Rate Maps updated.
- Hold open house at Fire Department
- Expand residential parking bans to enable snow removal from all streets.
- Identification of Existing Shelters that are Earthquake Resistant as well as Outside of Floodplain (and Dam Inundation) Areas to ensure that shelters are available to the public during these type of hazards.
- Utilize interactive mapping application prepared by MRPC/CMRPC to update critical infrastructure and simulate real time evacuation scenarios to mitigate hazards to the public.

Athol Natural Hazard Risk Assessment

While this annex focus' pertains to critical facilities, flooding, risk assessment, existing protections and mitigation strategy in the community, more detailed descriptions of each natural hazard's impact on the region and its communities and summary of vulnerability can be located in the regional section entitled " 4. Identification of Natural Hazards, Identifying and Profiling Hazards".

Community Profile

The Town of Athol is located within the picturesque Millers River Valley, in the North Quabbin Region of north central Massachusetts, approximately 25 miles west of Fitchburg, 38 miles northwest of Worcester and 71 miles west of Boston. It is bordered by Orange to the west, New Salem to the south

west, Royalston to the north, Phillipston to the east and Petersham to the southeast.

The town of Athol covers an area of 33.4 square miles and has a resident population of 11,584 according to the 2010 US Census. Athol's population density is 347 people per square mile. There are 5,231 housing units in the town, and the average household size is 2.46 people. The median age of residents is 40.

Settled on the banks of the Millers River in the 1790's as a typical New England mill town, Athol has been a strong metalwork manufacturing hub since the beginning of the 19th century. Hence the town's nickname, "Tool Town, U.S.A." The Town of Athol offers a unique blend of urban and rural characteristics. The traditional downtown district boasts a variety of shops, restaurants and manufacturers, while the largely undeveloped outer rim offers spectacular views and outstanding recreation opportunities for outdoor enthusiasts. The town's physical characteristics include several ponds, scattered wetlands, the Millers River, several tributary streams and brooks, rolling hills, steep ridges, forests, and remnant farmlands and meadows lie within the town's boundaries. Athol also has a densely populated urban center dominated by historic mills, shops, restaurants, municipal buildings, parks, and residential subdivisions. The town's large land area and sprawling open spaces have enabled preservationists to conserve a significant amount of undeveloped land. L. S. Starrett Company is the largest employer in town, followed by the Athol Memorial Hospital.

Critical Facilities

In general usage, the term "critical facilities" is used to describe all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired.

Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even access to damaged areas.

The number and nature of critical facilities in a community can differ greatly from one jurisdiction to another, and usually comprise both public and private facilities. In this sense, each community needs to determine the relative importance of the publicly and privately owned facilities that deliver vital services, provide important functions, and protect special populations. *Source: Federal Emergency Management Administration, Risk Management Series, Design Guide for Improving Critical Facility Safety from Flooding and High Winds, FEMA 543, January 2007.*

A list of the critical facilities within the community is shown in Table 27. This data was obtained from the community's Comprehensive Emergency Management Plan (CEMP). The data was then reviewed by

the Emergency Management Director. These facilities were digitized into GIS and used for determining vulnerability to the various hazards. The map that follows entitled FEMA Q3 Flood Zones and Critical Infrastructure depicts Critical Facilities in the community.

Table 27: Critical Facilities

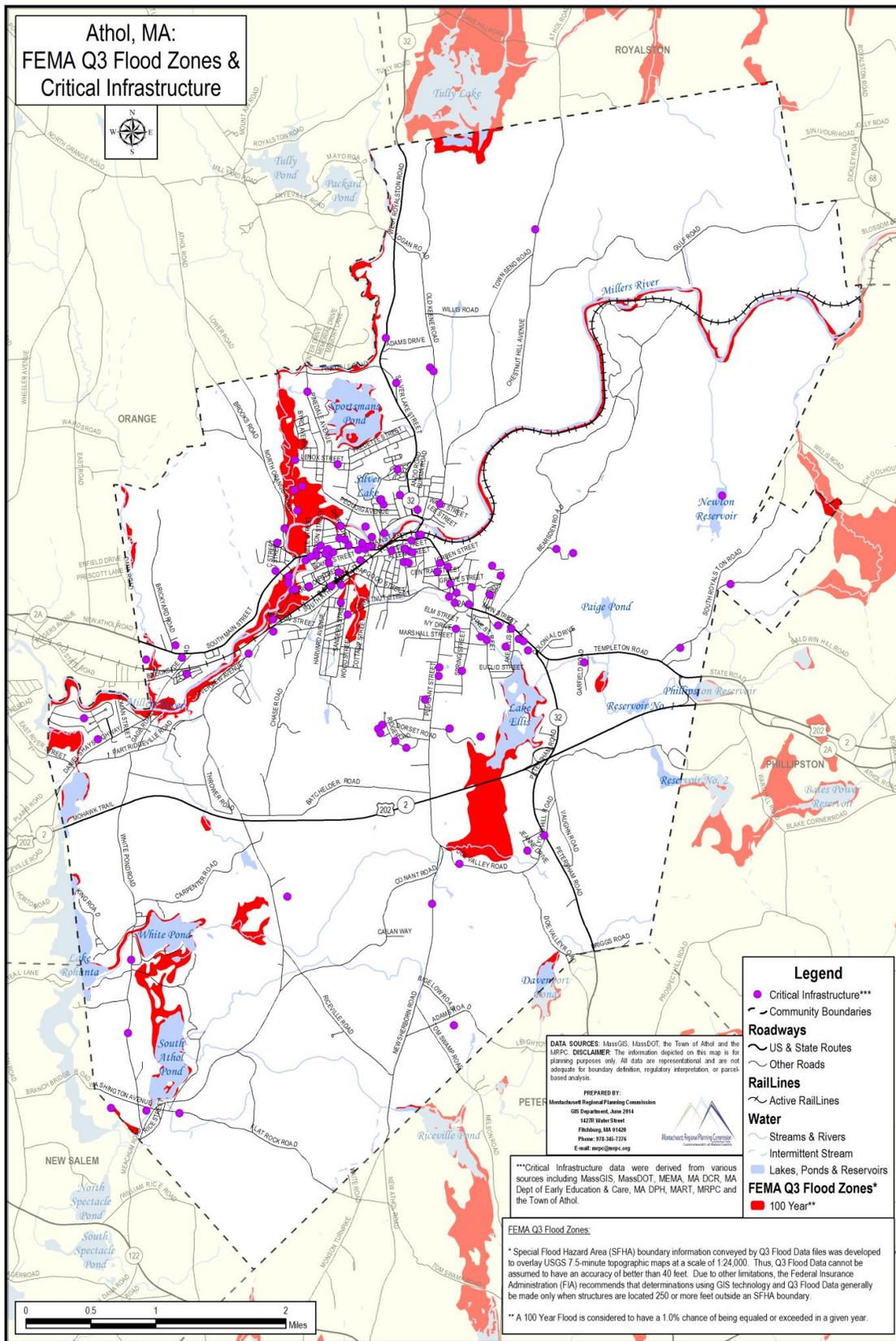
Feature Type	Name	Address
City/Town Halls	Athol Town Hall	584 Main Street
Clinics	Clinical & Support Options Inc.	491 Main Street
	North Quabbin Family Physicians	201 South Main Street
Communication Towers	National Grid Communication Tower	Pleasant Street
Public Water Supply*	Morgan Memorial Fresh Air Camp	
	South Street Gravel Packed Well #1	Off Jones Street
	Well 1 Tully Wellfield	Off Pequoig Avenue
	Well 2 Tully Wellfield	Off Pequoig Avenue
	Newton Reservoir	
	North Quabbin Commons Water Tank	Templeton Road
	Well 3 Tully Wellfield	Off Pequoig Avenue
DPW Facilities	Athol DPW	Unity Avenue
Early Education Childcare Facilities	LaFountain, Melissa L.	383 Chestnut Hill Avenue
	Lanoué, Rebecca	387 School Street
	Little Blessings Christian Preschool	47 Pine Street
	Little Tot Day Care	107 Park Street
	Gates, Cynthia	17 Craigin Street
	Mcintosh, Tina	200 Orange Street
	MOC Child Care & Head Start Services	12 Riverbend Street
	Muzzy, Jill	491 Spring Street
	Girgenti, Kathleen Ann	237 Ridge Road
	Robideau, Rebecca M.	44 South Athol Road
	Sayarath, Kerri	83 Jeanne Drive
	Winship, Kelly	117 Kelton Street
	Sinclair, Cheryl L.	1581 Petersham Road
	Wilder, Crystal	67 Laurel Street
	Small Wonders Preschool	780 Od Keene Road
	Warrington, Kimberly A.	20 Everett Avenue
	Guerin, Kim	528 W Royalston Road
	Smith, Laurie s.	177 Riverbend St # 1
	Tourigny, Lianne	178 Summer Street
	Evans, Ellen	18 Sunset Avenue
Curtis, Wendy	2064 White Pond Road	

	Cummings, Carol I.	372 Unity Avenue
	Thompson, Tracy	533 New Sherborn Road
	Clyatt, Barbara	167 Cobb Road
	Carey, Lisa Marie	127 Flat Rock Road
	Burnett,	152 Ridge Road
	Athol Area YMCA Nursery School	545 Main Street
	Horrigan, Amanda	419 High Knob Road
	King, Anna	1711 White Pond Road
Elderly Housing	Pequoig Apartments	416 Main Street
	Riverbend Woods/ Miller's Woods Complex	739 Daniel Shays Highway
	Lakeside Apartments	21 Gibson Drive
	Morton Meadows	1-30 Bickford Drive
Electric Substations	National Grid Substation	Chestnut Hill Avenue
Emergency Dispensing Sites	Liberty Hall/Town Hall	584 Main Street
	Athol Royalston Middle School	1062 Pleasant Street
	Athol Senior Center	62 Freedom Street
Emergency Shelters	Athol Town Hall	584 Main Street
	Athol Middle School	1062 Pleasant Street
End of Life Facilities	Higgins O'Connor Funeral Home	146 Main Street
	Fiske Funeral Home	1356 Main Street
	Witty's Funeral Home	137 Main Street
	Mount Pleasant Cemetery	Mount Pleasant Street
	Highland Cemetery	Hillside Terrace
	New Sherborn Cemetery	New Sherborn Road
	Ellinwood Cemetery	Doe Valley Road
	Calvary Cemetery	Vine Street
	Silver Lake Cemetery	Silver Lake Street
	Chestnut Hill Cemetery	Chestnut Hill Avenue
	Gethseme Cemetery	Brookside Road
	Red Apple Farm	
Emergency Operations Centers	Athol Fire Station	2251 Main Street
	Athol Police Station	280 Exchange Street
	Athol Town Hall	584 Main Street
Fire	Athol Fire Station	206 Exchange Street
	Athol Fire Station	2251 Main Street
Freight	Pan Am Southern Railways	
HazMat Sites	Pexco	764 South Athol Road
	Verizon Switching Station	Riverbend Street
	LS Starrett	Fish Street

	Ron's Fuel	575 South Street	
	National Grid Service Center	Harrison Avenue	
	Athol Highway Department	338 Unity Avenue	
	Athol Post Office	242 Main Street	
	Athol High School	2363 Main Street	
	Athol-Royalston Middle School	1062 Pleasant Street	
	Pleasant Street School	1060 Pleasant Street	
	Athol Water & Wastewater Treat Facility	Off Jones Street	
	Athol Water Treatment Plant - South St	Off Jones Street	
	National Grid-Substation	Off P1 Chestnut Hill Ave.	
	Uptown Citgo (Dennis' Citgo)	1728 Main Street	
	Conway Petro	1590 Main Street	
	Cumberland Farms #1	297 Main Street	
	BP Gas Station (Main St. Auto)	223 Main Street	
	Athol Memorial Hospital	2033 Main Street	
	Cumberland Farms #2	109 Brookside Road	
Hospitals	Athol Memorial Hospital	2033 Main Street	
Long Term Care Facility	Applewood Home for Elders	171 S. Royalston Road	
	Providence Cliff Senior Residence	648 Pleasant Street	
	Quabbin Valley Healthcare	821 Daniel Shays Highway	
Other Critical Facilities	Hannaford Plaza	South Main Street	
	Pexco	764 South Athol Road	
	Cingular Cell Tower	Bearsden Road	
	Verizon Cell Tower	Bearsden Road	
	Verizon Switching Station	Riverbend Street	
	Ocean State Job Lot	62 Freedom Street	
	LS Starrett	Fish Street	
	LS Starrett	121 Crescent Street	
	Mr. Mikes	2143 Main Street	
	CVS	1665 Main Street	
	Ron's Fuel	575 South Street	
	National Grid Service Center	Harrison Avenue	
	National Grid Communication Tower	Pleasant Street	
	Athol Uptown Common	Main Street	
	Informally Known as the Athol House	41 Brickyard Road	
	Pleasant Street Water Tank	High Knob Road	
	Other Government Buildings	Athol Highway Department	338 Unity Avenue
		Athol Public Library	568 Main Street
		North Orange Road Sewage Lift Station	165 North Orange Road

	Athol Post Office	242 Main Street
	Athol Historical Society	1307 Main Street
	Athol Water Storage Tank- High Knob	High Knob Road
	Bickford Drive Sewage Lift Station	Bickford Drive
	Garfield Water Tank	Garfield Road
	Lenox St Sewage Lift Station	Lenox Street
	Linden Park Sewage Lift Station	Linden Park
	Main Water Storage Tank	Hillside Terrace
	Old Silver Lake Sewage Lift Station	Silver Lake Street
	Pinedale Ave Sewage Lift Station	Pinedale Avenue
	South Athol Sewage Lift Station	South Athol Road
	Water Booster Station	Hillside Terrace
	Athol Fire Training Facility	Hillside Terrace
Police	Athol Police Station	280 Exchange Street
	State Police Barracks- Athol (Station C-1)	2289 Main Street
School	Athol High School	2363 Main Street
	Riverbend School	174 Riverbend Street
	Sanders Street School	314 Sanders Street
	Athol-Royalston Middle School	1062 Pleasant Street
	Pleasant Street School	1060 Pleasant Street
Sports And Cultural Areas	Temple Israel	107 Walnut Street
	Seventh Day Adventist Church	3200 South Athol Rd
	Starrett Memorial Church	40 Island Street
	Athol Congregational Church	1225 Chestnut Street
	Athol-Orange Baptist Church	131 Ridge Avenue
	St. John's Episcopal Church	15 Park Avenue
	St. Francis of Assisi	105 Main Street
	Our Lady Immaculate Church	192 School Street
Potable Water Treatment Plants	Athol Water & Wastewater Treat Facility	Off Jones Street
	Athol Water Treatment Plant - South St	Off Jones Street
Wastewater Treatment Plant	Athol Water & Wastewater Treatment Facility	Off Jones Street

*As stated in 310 CMR 22.02, a Public Water System means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year” (Mass GIS, 2014).



Flood Prone Areas

Particular areas within the community where the risk of flood areas are or could occur were determined at the first meeting of Athol’s Local Hazard Mitigation Team held on March 14, 2012. This information can be found on Athol’s Local Hazard Map which is located under the section entitled Risk Assessment.

Flooding Vulnerability Assessment

An analysis of the FIRM flood hazard area maps indicates that there is a total of 1299.58 acres of 100-year floodplain within Athol. This amounts to 6.09% of the total town. Based on additional analysis, 65.77 acres (5.06%) of the floodplain are developed. Currently there are 159 structures in the floodplain which is about 2.41% of the total structures in the community. The buildings are then multiplied by the building value, as determined by the MA Department of Revenue, to come up with a potential loss of \$58,034,400.

In addition to dams and bridges the table below lists the critical facilities within the 100 year flood zone.

Table 28: Athol Critical Facilities within 100-Year Flood Zone

Feature Type	Name	Address
Elderly Housing	Morton Meadows	1-30 Bickford Drive
Other Government Buildings	Bickford Drive Sewage Lift Station	Bickford Drive
	Lenox St Sewage Lift Station	Lenox Street
Public Water Supply	South Street Gravel Packed Well #1	Off Jones Street
	Well 1 Tully Well field	Off Pequoig Avenue
	Well 2 Tully Well field	Off Pequoig Avenue

Since the initiation of the National Flood Insurance Program (NFIP), two flood insurance claims in the Town of Athol have been made totaling \$22,246.80 in payments. According to (NFIP) data, there are no repetitive loss properties in Athol. Statistics from the NFIP BureauNet indicate in the town of Athol there are 14 flood insurance policies in force.

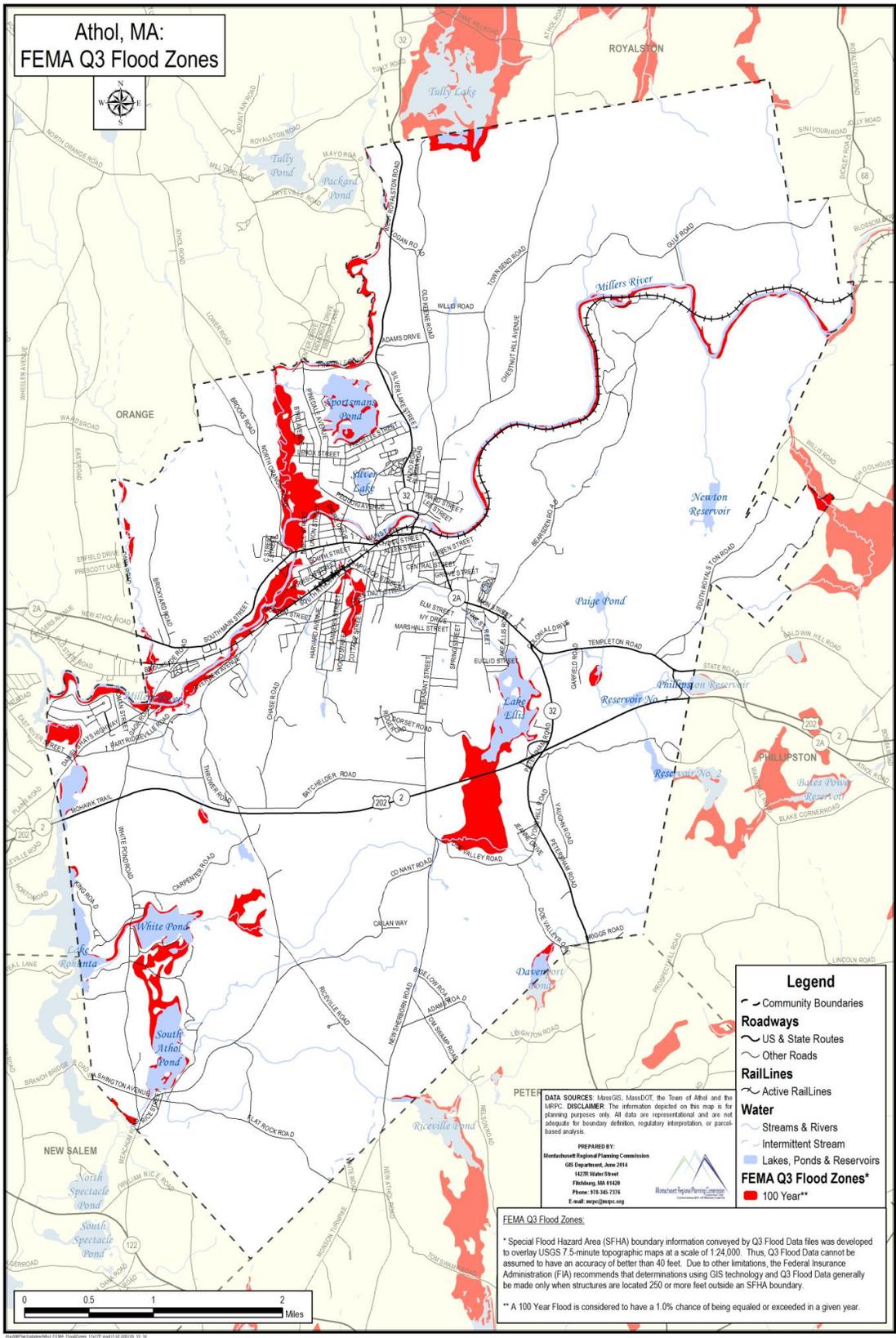
The town supports numerous floodplain management activities in an effort to meet compliance of the National Floodplain Insurance Program. These efforts include:

- Implementing the MA Wetlands Protection Act regulating development and activity within the wetlands buffer zone and regulating stormwater and other point source discharge.
- Implementing the Town Flood Plain District Bylaw (September 18, 2000) regulating development in the floodplain district.
- Continued maintenance of municipal stormwater drainage system which includes regular cleaning of catch basins, storm drains and culverts.
- Continued maintenance of public water bodies to reduce flooding caused by erosion and water displacement.
- Maintain Low Impact Development Design Standards in their Subdivision Rules and Regulations

which mitigates stormwater and help recharge water table to alleviate flooding.

- Enforcement of the Open Space Residential Design which mitigates possible flooding events by designating protected open space within a development which in turn treats stormwater runoff through the means of natural infiltration.

The map that follows entitled FEMA Q3 Flood Zones depicts the 100 year flood zones in the community.



Structurally Deficient Bridges Over Waterways

Athol has seven bridges over water that are classified by MassDOT as “structurally deficient. The bridges locations and water bodies are as follows: Chestnut Hill Avenue over Millers River; Crescent Street over Millers River; Exchange Street over Millers River; Morgan Avenue over South Athol Pond Outlet; South Main Street over West Brook; Flat Rock Road over South Athol Pond Outlet; and Daniel Shays Highway over Lake Rohnta Outlet.

Hazard Potential of Dams

The DCR Office of Dams Safety lists 20 dams in the Town of Athol as shown in Table 29. Seven of these dams are either high or significant hazard dams. Cresticon Upper Dam and Crescent Street Dam are classified as high hazard. Six dams are classified as significant hazard.

Classifications for potential hazards are in accordance with the chart below.

Hazard Potential Classification

High Hazard	Refers to dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
Significant Hazard	Refers to dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities
Low Hazard	Refers to dams located where failure may cause minimal property damage to others. Loss of life is not expected.

Source: MA Department of Conservation and Recreation Office of Dam Safety

High hazard dams must be inspected every two year, significant hazard every five years, and low Hazards dams every 10 years. Owners of dams are responsible for having their dam inspected. MGL Chapter 253 and 302 CMR 10.00 requires that dam owners prepare, maintain and update Emergency Action Plans for all High Hazard Potential dams and certain Significant Hazard Potential dams.

Non-jurisdictional dams are not regulated by the Office of Dam Safety or under their jurisdiction. Typically these dams are under 6 feet in height and/or under 15 acre-feet in storage and do not have an assigned 'Hazard Code'. Dams owned and regulated by the Federal Government are also typically non-jurisdictional but DO have an assigned Hazard Code.

Table 29: Dams

Town	Dam	Hazard Code	Owner
Athol	Cresticon Upper Dam	High Hazard	Private
Athol	Crescent Street Dam	High Hazard	Private
Athol	Newton Reservoir Dam	Low Hazard	Public
Athol	Lake Rohunta Dam	Low Hazard	Private
Athol	Riceville Pond Dam	Low Hazard	Public
Athol	White Pond Dam	Low Hazard	Private
Athol	Cass Pond Dam	N/A	Private
Athol	New Quinlan Pond Dam	N/A	Private
Athol	Chase Pond Dam	N/A	Private
Athol	Farm Pond Dam	N/A	Private
Athol	Bemis Pond Dam	N/A	Private
Athol	Canal Dam	N/A	Private
Athol	Filter Plant Dam	N/A	Private
Athol	1000 Acre Pond Dam	N/A	Public
Athol	Lake Ellis Dam	Significant Hazard	Public
Athol	Sportsmans Pond Dam	Significant Hazard	Private
Athol	South Athol Pond Dam	Significant Hazard	Private
Athol	Reservoir #2 Dam	Significant Hazard	Private
Athol	Cresticon Lower Dam	Significant Hazard	Private
Athol	Ward Pond Dam	Significant Hazard	Private

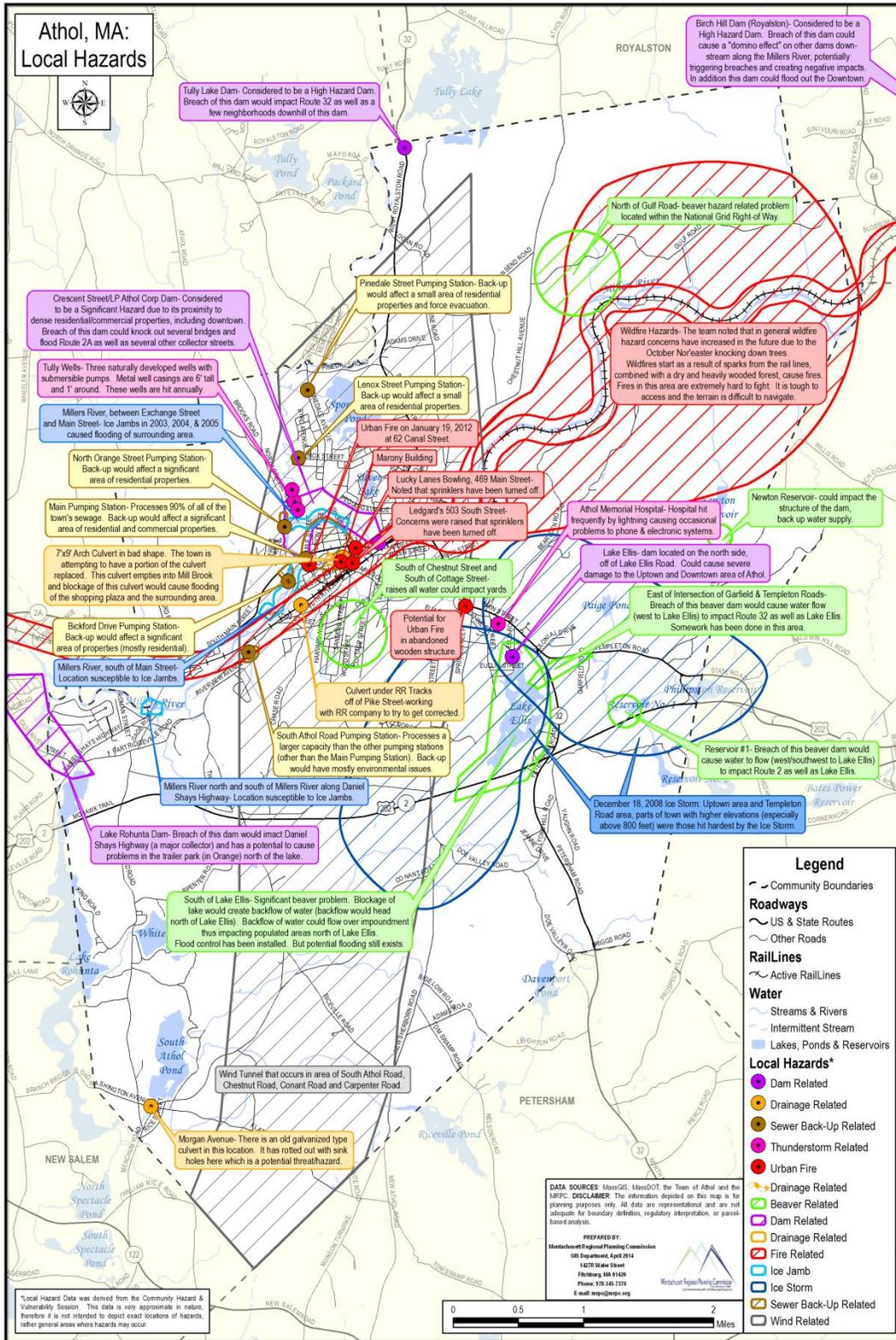
*N/A – Information not available as the dam is non-jurisdictional.

Risk Assessment

As previously stated, located in Section 4. Identification of Natural Hazards, Identifying and Profiling Hazards”, there is a description of each identified hazards’ impact on the region and its communities as well as an overall summary of vulnerability. Based on the hazards identified in this plan and the assessment of risks by the Town of Athol, the town considers itself to be at a high risk for Heavy Rain, Beavers, Nor’easters, Severe Thunderstorms, Heavy Snow, and Wild land Fire; moderate risk for Dam Failure, Ice Jams, High Winds, Hurricanes, Tornados, Ice Storms, Blizzard, Major Urban Fires, Extreme Temperatures; low risk for Snow Melt, Drought, landslides; and tsunamis as not applicable. This information is documented in Athol’s Natural Hazard Matrix below which was obtained from participants at the Athol Local Hazard Mitigation Team Meeting held on March 14, 2012.

Athol Natural Hazard Matrix				
Natural Hazard	Likelihood of Occurrence	Location	Impacts	Hazard Index
Natural Hazard Separated by Flood, Atmospheric Related and Winter Related, Other Natural Hazards, and Geologic Hazards	3 = Highly Likely 2 = Possible 1 = Unlikely	3 = Regional/State 2 = Multi Community/Regional 1 = Local/Town	4 = Catastrophic 3 = Critical 2 = Limited 1 = Negligible	Ranking Determined by Combining the Likelihood, Location and Impacts of a Natural Hazard
Flood-Related Hazards				
• Heavy Rain	3	3	2	8
• Snow Melt	1	1	2	4
• Dam Failure	2	2	4	8
• Ice Jams	2	1	2	5
• Beavers	3	1	2	6
Atmospheric Related and Winter Related Hazards				
• High Winds	2.5	2	2	6.5
• Hurricanes	2	3	3	8
• Tornadoes	2	2	4	8
• Nor'easters	3	3	2	8
• Severe Thunderstorms	3	3	2	8
• Heavy Snow	3	3	2	8
• Ice Storms	2	2	3	7
• Blizzard	2	3	2	7
Other Natural Hazards				
• Major Urban Fires	2	1	4	7
• Wildland Fire	3	1	2	6
• Drought	1	3	3	7
• Extreme Temperatures	2	3	2.5	7.5
Geologic Hazards				
• Earthquakes	1.5	3	4	8.5
• Landslides	1	1	1	3
• Tsunami	N/A	N/A	N/A	N/A
Key				
Highly likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.				
Possible: 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.				
Unlikely: Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.				
Catastrophic: Immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.				
Critical: Fast speed of onset or long duration of event resulting in devastating damage and loss of services for weeks or months.				
Limited: Moderate speed of onset or moderate duration of event, resulting in some damage.				
Negligible: Slow speed of onset or short duration of event resulting in little to no damage.				

Also discussed at this meeting were the hazards that affect each community and the identification of specific problem areas in the community that need to be addressed. This included the identification of new hazards that were determined to pose a threat or community vulnerability which are detailed in Athol's Local Hazards Map on the following page. The entire community is equally at risk to the following hazards: Heavy rain, snow melt, hurricanes, tornados, nor'easters, heavy snow, blizzards, drought, extreme temperatures, earthquakes and landslides.



Existing Protections

The original inventory of hazard mitigation actions which the Montachusett communities undertook for the 2008 Montachusett Region Hazard Mitigation Plan was reviewed and updated by each community at a meeting held in each community with the MRPC and the community's Local Hazard Mitigation Planning Team and, in some communities, the Emergency Management Committee. The attendees of the meetings can be found in Appendix A. The following matrices depict the updated inventory of what is currently being done to mitigate hazards by listing the programs and activities already in place. It includes a description of the protection measure, who is responsible, and improvements and changes that may be needed. This inventory was used by the Planning Team/Emergency Management Committee to identify gaps in existing protections that were then addressed through the development of this plan update.

Athol

Type of Existing Protection	Description	Area Covered	Implementation Resources and Funding*	Improvements or Changes Needed
Flood Related Hazards				
Storm water management standards	State Regulation under the Wetlands Protection Act to regulate storm water and other point source discharge	Town-Wide	Enforced by the Athol Conservation Commission (Wetlands Protection Act) and Athol Planning Board (Subdivision Control Law and site plan review) staffed by the municipal Town Planner.	Storm water management standards are and continue to be enforced. No improvements or changes needed.
Wetlands Protection Act (state)	State law regulating development and activity within wetland buffer zone	100-foot state buffer around wetland area; 200 foot buffer around river front areas	Enforced by the Athol Conservation Commission.	No improvements or changes needed.
100 Year Flood Zone	Federal law requiring elevation above 100-year flood level of new and substantially improved residential structures in floodplain	100-year floodplain as shown on Flood Insurance Rate Map dated July 9, 1982.	Enforced by the Building Inspector (municipal staff) and Athol Conservation Commission	Insurance Flood Rate Maps need updating.
Town Bylaw Flood Plain District	Local bylaw enhancing federal/state laws and regulating any development in the flood plain district	100-year floodplain as shown on Flood Insurance Rate Map dated July 9, 1982.	Enforced by the Building Inspector (municipal staff) and Board of Appeals.	Insurance Flood Rate Maps need to be updated.

Maintenance of municipal storm water drainage system	Regular cleaning of catch basins, storm drains, and culverts	Town-Wide	Undertaken by the Department of Public Works municipal staff.	Maintenance continues but additional Personnel and Equipment Needed to undertake this task.
Maintenance of public water bodies (ponds, streams, brooks, wetlands)	Periodic cleaning of waterways needed, e.g., remove trash, debris	Town-Wide	Undertaken by the Department of Public Works municipal staff with guidance from Athol Conservation Commission	Maintenance continues no improvements or changes needed.
Inspection of major dams	Periodic inspections of the structural integrity of the dam	Town-Wide	Undertaken by the Massachusetts Department of Conservation and Recreation, Office of Dam Safety	Update Dam failure studies for the dams rated as high hazard
Wind Related Hazards				
State Building Code	State Law related to design loads to include wind effects	Town-Wide	Enforced by Building Department (municipal staff).	Continued enforcement remains in place. No improvements or changes needed.
Tree Maintenance	Regular inspection and tree maintenance to cut branches threatening power lines and overhead utilities	Town-Wide	National Grid staff (Electric Company).	No improvement or changes needed.
Fire Related Hazards				
Limited Brush Clearing	Provide brush clearing for access of Emergency Services vehicles.	Town-Wide	Undertaken by the Department of Public Works municipal staff.	Continue to identify additional areas with Potential for Brushfires
Winter Storms Related				
Residential Parking Bans	Parking Bans to Enable Snow Removal Effectively from Residential Streets	Town-Wide	Department of Public Works municipal staff.	Additional personnel and equipment needed to enforce parking bans.
Clearing Snow from Major Arterial Routes	Ensure Access to Emergency Services	Town-Wide	Department of Public Works municipal staff.	Snow clearing continues but additional personnel and equipment needed

*Athol's enforcement/implementation is generally carried out by elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

Mitigation Goals, Objectives and Strategies

As discussed earlier in this Plan, MRPC previously prepared the 2008 Montachusett Region Hazard Mitigation Plan which consisted of individual annexes for each MRPC community. Similarly, as part of the multi-jurisdictional plan update, each community also developed their own individual goals, objectives and strategies which are listed in this section.

Overall Goal Statement: To be prepared to reduce the loss of life, property, infrastructure and cultural resources throughout the town of Athol from natural disasters through a multiple hazard mitigation program that involves increased coordination, planning, education, and capital improvements.

- 1. Objective:** To organize and prepare to provide adequate shelter, water, food, and basic first aid to displaced residents in the event of a natural disaster, and to provide adequate notification and information regarding evacuation procedures, *etc.*, to residents in the event of a natural disaster.
- 2. Objective:** To inventory supplies at existing shelters and develop a needs list and storage requirements; and to establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster.
- 3. Objective:** To have the Emergency Management Director (EMD) lead an effort to increase coordination between inter-departments in pre-disaster planning and implementation of hazard mitigation projects.
- 4. Objective:** Increase awareness of hazard mitigation among town officials, private organizations, businesses, and the general public.
- 5. Objective:** To examine and update the current notification system including the progress made by the Central Mass Homeland Security Committee's development of a countywide Reverse 911.
- 6. Objective:** To collect, periodically update, and disseminate information on which local radio stations provide emergency information, what to include in a "home survival kit, how to prepare homes and other structures to withstand flooding and high winds, how to manage back-up power equipment, and the proper evacuation procedures to follow during a natural disaster.

Specific Natural Hazard Goals for Athol

Goal Statement for Flooding: To prepare emergency staff and volunteers in order to minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to flooding.

- 1. Objective:** To continue to participate in the National Flood Insurance Program, and to have the flood maps periodically updated.
- 2. Objective:** To Develop a priority list and seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town.

Goal Statement for Protection from Beavers: To minimize the threat to health, the damage to roads and property, and the disruption of governmental services and general business activities due to flooding caused by beavers.

- 1. Objective:** Support local town departments to continue present methods to prevent beaver caused flooding.
- 2. Objective:** Seek assistance from beaver management professionals, including trappers.
- 3. Objective:** Install beaver management devices.

Goal Statement for Hurricanes and Tornadoes: To minimize the loss of life, damage to property, and

the disruption of governmental services and general business activities due to high winds associated with hurricanes and tornadoes. (The objectives listed above, under flooding, address the flooding that can result from a hurricane.)

1. Objective: To educate residents and volunteers regarding the safe methods and actions necessary to deal with Hurricanes and Tornadoes.

Goal Statement for Winter Related Hazards: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to severe snow and ice storms.

1. Objective: To develop a plan for providing access to water, information, shelter, and food stores to people in remote locations in Athol in the event of a severe winter storm.

Goal Statement for Earthquakes: To educate staff, residents and volunteers about the potential for earthquakes and strategies to minimize the loss of life, damage to property, the disruption of governmental services and general business activities due to earthquakes.

1. Objective: To educate and encourage homeowners and developers to rehab and build using methods to minimize the effects of earthquakes and other disasters.

2. Objective: To insure that all identified shelters have sufficient back-up utility service in the event of primary power failure or long-term power outages.

Mitigation Action Plans and Prioritization of Actions (STAPLEE)

Initial Mitigation Action Plans for the Montachusett Communities were presented in the communities Hazard Mitigation Plans that were approved by FEMA in 2009 and 2010. The original Mitigation Action Plans were developed through an inventory of potential hazards which could impact the community and an evaluation of a range of alternatives to address these hazards. As part of the plan update process, the original Mitigation Action Plan was reviewed by the community's Local Hazard Mitigation Planning Team/Emergency Management Committee to delete actions which have already been completed, add additional actions which are either underway or planned to be undertaken, and to update the current status of all actions. The goals were reviewed and updated at the second meeting with each community.

An additional step in this process was to conduct a "STAPLEE" analysis for each action to prioritize all actions within each community and a subjective evaluation of each action's perceived cost/benefit. In the 2008 plan, actions were not prioritized so there were no changes in priorities in this update. The revised Community Mitigation Action Plans matrices that follow identify each mitigation action, the responsible department or board responsible for implementation, potential funding sources, the timetable of the action, results of the prioritization of actions through the STAPLEE analysis, and the perceived cost/benefit for each mitigation action.

The goal of each identified strategy, or mitigation action, is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each action to establish priorities for implementation, using the "STAPLEE" method. The STAPLEE methodology was developed by the Federal Emergency Management Agency as a tool to help communities prioritize their hazard mitigation strategies and determine the most appropriate actions for implementation. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of an action and is designed to be used by public officials and planners for making planning decisions.

To conduct the STAPLEE exercise, the community's Hazard Mitigation Team was asked to rate each action in their Mitigation Action Plan on each of the following criteria, using a score of 1 to 3 (Good = 3, Average = 2, Poor = 1):

- Social: Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- Technical: Will the proposed strategy work? Will it create more problems than it solves?
- Administrative: Can the community implement the action? Is there someone to coordinate and lead the effort?
- Political: Is the action politically acceptable? Is there public support both to implement and to maintain the action?
- Legal: Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- Economic: What are the costs of this action? Does the cost seem reasonable for the size of the problem and the likely benefits?
- Environmental: How will the action impact the environment? Will the action need environmental regulatory approvals?

These scores were then totaled, resulting in a final score of 7 (least priority) to 21 (highest priority) for each action. The higher the final score, the higher the relative priority of that action for implementation. This information can then be utilized in each community as they conduct and administer relevant municipal functions and activities. The final STAPLEE score for each action is shown in the following mitigation action plan.

The Hazard Mitigation team was also asked to do a relative cost/benefit of each action. This assessment was intended to informally indicate if an action will either have more benefits accrued to the Town than the Cost of implementing the action, or if the costs would exceed any benefits. Responses include: "Benefits Exceed Costs", "Benefits Equal Costs, or "Costs Exceed Benefits".

ATHOL IMPLEMENTATION STRATEGY FOR PRIORITY MITIGATION ACTIONS

Type of Natural Hazard	Description of Action	Implementation on Responsibility	Resources/Funding*	Timeframe	Priority (STAPL EE Score)	Cost/Benefit Evaluation	Status Update from 2008 Plan**
Wildland Fire	Increase awareness by educating property owners regarding actions that they can take to reduce risks to property by developing and distributing Educational Pamphlet on Fire Safety and Prevention (SAFE PROGRAM) (SENIOR SAFE) and wildfire prevention.	Fire Department	Municipal Staff/ SAFE Grant	2015 - 2020	21	Benefit exceeds cost	Completed but carried forward. Ongoing. Materials distributed annually.

All Natural Hazards	Increase hazard education and risk awareness to public by Updating and Disseminating Information on Local Radio/TV Stations to educate the public and alert them of emergency information including shelter locations and other instructions related to all natural hazards.	Emergency Management Director	Municipal Staff	2015 - 2020	21	Benefit exceeds cost	Completed but carried forward. Ongoing. This action is undertaken periodically.
Atmospheric and Winter Related Hazards	Develop a Mitigation Plan to provide access to Water, Information, Shelter and Food Stores to People in Remote Locations of the town in the Event of a natural hazard and integrate this information into community comprehensive plans.	Emergency Management Director	Municipal Staff/ Volunteers	2015-2020	15	Not Evaluated	Carried forward due to lack of funding.

All Natural Hazards	Develop a Preliminary Project Proposal and Cost Estimate for Updating Current 911 System including Feasibility of Reverse 911 to reduce or eliminate the long-term risk to human life and property from hazards.	Board of Selectmen, Emergency Management Director	Municipal Staff/ Volunteers	2015-2020	17	Benefit exceeds cost	Carried forward. Police 911 Equipment upgrade required, still no R-911 at this time
Flood Related Hazards	Identify all structures throughout the town that need to be Elevated above the Base-Flood Elevation. Once identified educate those property owners about their options for mitigation.	Building Inspector, Fire Department	Municipal Staff 75% FEMA FUNDING AVAILABLE	2015 - 2020	16	Benefit exceeds cost	Carried forward. Building Footprint GIS Layer just became available.

Flood Related Hazards	To Develop a priority list and Possibly seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town to reduce or eliminate flooding risk.	Board of Selectmen, Highway Department	Municipal Staff/ FEMA HMGP grant	2016 (12 months)	18	Benefit exceeds cost	Carried forward. Priority List developed. (See listing of culverts in the three rows that follow)
	Replace undersized Culvert #1: 7'x9' Arch Culvert by Ocean State Job Lot to reduce or eliminate flooding risk.	Highway Department	FEMA HMGP grant	2015 - 2020	20	Benefit exceeds cost	New action.
Flood Related Hazards.	Problem Replace undersized Culvert #2: Culvert under RR Tracks off of Pike Street to reduce or eliminate flooding risk.	Highway Department	FEMA HMGP grant	2015 - 2020	16	Benefit exceeds cost	New action.
Flood Related Hazards	Problem Replace undersized Culvert #3: Morgan Avenue to reduce or eliminate flooding risk.	Highway Department	FEMA HMGP grant	2015 - 2020	20	Benefit exceeds cost	New action.

Flood Related Hazards	Educate property owners regarding options for mitigating their properties from flooding through outreach programs that address measures that residents can take (i.e installing backflow valves, securing debris, etc.)	Emergency Management Director, Fire Department, Building Department	Property Owners	2015 - 2020	14	Benefit exceeds cost	New Action.
Flood Related Hazards	Continue participation in the National Flood Insurance Program to enable property owners to purchase insurance protection against flood losses.	Board of Selectmen, Conservation Commission, Building Department	FEMA/MEM A	2015 - 2020	21	Benefit exceeds cost	Completed but carried forward. Town continues its participation in the NFIP.

Flood Related Hazards	Evaluate and relocate valuable and historical items and furnaces, water heaters, and electrical equipment in municipal owned buildings that are located in areas prone to flooding to reduce flood damage.	Emergency Management Director, Fire Department	Municipal Staff and Property Owners	2015 - 2020	15	Benefit exceeds cost	Carried forward. Additional time needed due to time constraints and lack of municipal funding.
Other Natural Hazards (Wildland fire)	Identify areas with potential for brush fires to track community vulnerability by developing and maintaining a data base.	Department of Public Works/ National Grid	Municipal Staff/National Grid	2015 - 2020	16	Very favorable cost benefit	New Action.
Other Natural Hazards (Wildland fire)	Educate property owners on actions that they can take to reduce risks to property by hosting open house at Fire Department Prevention Week Fire training; Bring Program around at Fall Festival. Allow public to visit and see equipment and educate the public on wildfire mitigation.	Fire Department	Fire Department	2015 - 2016	21	Benefit exceeds cost	Completed but carried forward. Open House is held annually. Expanding education to Fall Festival will take place in the upcoming year.

Flood Related Hazards	Install "beaver diverters" and water control devices to mitigate flooding caused by beaver dams.	Department of Public Works and Board of Health	Municipal Staff	2015 – 2020 as needed	21	Benefit exceeds cost	Completed but Carried Forward. This action is undertaken periodically as needed.
All Natural Hazards	Distribute educational materials at public facilities and events regarding protection from natural hazards	Emergency Management Director, Building Department, and Board of Health	Board of Selectmen	2015 - 2020	21	Benefit exceeds cost	Completed but carried forward. This action takes place annually.
Flood Related Hazards	Participate in NFIP training offered by the State and/or FEMA that addresses flood hazard planning and management	Emergency Management Director, Building Department, and Board of Health	Municipal Staff	2015 - 2020	16	Benefit exceeds cost	New action.
Flood Related Hazards	Revise/Adopt subdivision regulations, erosion control regulations, board of health regulations, etc. to improve floodplain management.	Planning Board	Municipal Staff	2018 (12 months)	21	Very favorable cost benefit	New action.

Flood Related Hazards	Apply to FEMA's Community Rating System (CRS) to augment the Town's NFIP as an incentive for citizens in the floodplain to purchase flood insurance at reduced rate	Emergency Management Director, Building Department, and Board of Health	Municipal Staff	2016 (12 months)	15	Benefit exceeds cost	New action.
Flood Related Hazards	Identify any non-compliance structures located in Athol in flood prone areas and develop a mitigation strategy	Building Department	Municipal Staff	2015 - 2020	20	Benefit exceeds cost	New action.
Flood Related Hazards	Identify and become knowledgeable of any submit-to-rate structures located in Athol to determine mitigation actions.	Emergency Management Director, Building Department, and Board of Health	Municipal Staff	2015 - 2020	Not Scored	Not Evaluated	New action.
Flood Related Hazards	Inspect foundations at time of completion before framing to determine if lowest floor is at or above Base Flood Elevation.	Building Department	Municipal Staff	2015 – 2020 as necessary	Not Scored	Not Evaluated	New action.

Other Natural Hazards (Wildland Fire)	Prepare a Community Wildfire Protection Plan to reduce Wildland fire risks.	Fire Department	Municipal Staff	2017 (12 months)	19	Benefit exceeds cost	New action.
Flood Related Hazards	Enhance local officials, builders, developers, local citizens and other stakeholder's knowledge of how to read and interpret the FIRM to ensure awareness of areas located in flood zone.	Emergency Management Director, Building Department, and Board of Health	Municipal Staff	2015 - 2020	21	Benefit exceeds cost	New action.
Flood Related Hazards	Require use of elevation certificates-to ensure compliance with the floodplain management bylaw to reduce flood related hazards.	Emergency Management Director, Building Department, and Board of Health	Municipal Staff	2015 - 2020	7	Not Evaluated	New action.

All Natural Hazards	Implement recommendations regarding natural hazard mitigation in existing planning documents including the master plan, five year action plan of the open space and recreation plan and the emergency evacuation plan	Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	2015 - 2020	16	Very favorable cost benefit	Recommendations in existing planning documents have been implemented. For example, the town implemented Low Impact Development Design Standards in their Subdivision Rules and Regulations which would mitigate stormwater and help recharge water table to alleviate flooding. This was a recommendation of the strategic framework plan
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*Unless otherwise noted, Athol's Resources/Funding consists of elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

**Actions identified as carried forward were not completed in the previous planning cycle unless otherwise stated.

Mitigation actions from the 2008 Montachusett Region Hazard Mitigation Plan that have been completed include:

- Identification of existing shelters that are earthquake resistant as well as outside of floodplain (and dam inundation) areas.
- Inventory supplies at existing shelters and develop a needs list and storage requirements. Completed a Comprehensive Shelter Plan with supplies.

Ayer Natural Hazard Risk Assessment

While this annex focus' pertains to critical facilities, flooding, risk assessment, existing protections and mitigation strategy in the community, more detailed descriptions of each natural hazard's impact on the region and its communities and summary of vulnerability can be located in the regional section entitled " 4. Identification of Natural Hazards, Identifying and Profiling Hazards".

Community Profile

The Town of Ayer is located in the far eastern part of North Central Massachusetts, on the western edge of Middlesex County. It is bordered by the Town of Shirley on the west, Groton on the north, Littleton on the east, and Harvard on the South. Ayer is located 27 miles northeast of Worcester, 35 miles northwest of Boston, 38.8 miles directly east of Athol, 88.3 miles from Springfield, and 207 miles from New York City.

The town of Ayer covers an area of 9.57 square miles and has a resident population of 7,427, according to the 2010 U.S. Census. The population density is 776 people per square mile. There are 3,462 housing units in the town, and the average household size is 2.30. Median age of Ayer’s residents is 38.

Ayer's history dates back to 1667 when the first mill, used to grind corn in the agricultural community, was built. Originally part of the town of Groton, Ayer was incorporated in 1871 and named in honor of Dr. James Cook Ayer, a prominent resident of Lowell who provided the funding for the construction of Town Hall (1873-76). The Town's growth was influenced by a period of rapid development of railroad transportation during the mid-19th century. Though only 9.5 square miles in area the Town became a major junction for both east-west and north-south rail lines, and developed into an important commercial center. During the Civil War an army training camp, Camp Stevens, was located near the Nashua River. Camp Devens, which eventually became Fort Devens, was established in 1917, during World War I. The presence of thousands of military and civilian personnel on the base shifted Ayer's commercial development towards meeting their needs until Fort Devens was closed in 1994. The Town today is a reflection of its history. Within its relatively small area the Town boasts numerous industries, a thriving, historical downtown, unique to the Region and modern commuter rail service to Boston.

Ayer is also home to the Nashua River Rail Trail, an 11-mile long, beautifully maintained, pastoral corridor connecting five New England towns, a popular attraction. The town has a significant number of employers, the three largest being, Nashoba Valley Medical Center, American Superconductor Corp and Apple Valley Nursing and Rehab.

Critical Facilities

In general usage, the term “critical facilities” is used to describe all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired.

Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even access to damaged areas.

The number and nature of critical facilities in a community can differ greatly from one jurisdiction to another, and usually comprise both public and private facilities. In this sense, each community needs to determine the relative importance of the publicly and privately owned facilities that deliver vital services, provide important functions, and protect special populations. *Source: Federal Emergency Management Administration, Risk Management Series, Design Guide for Improving Critical Facility Safety from Flooding and High Winds, FEMA 543, January 2007.*

A list of the critical facilities within the community is shown in Table 30. This data was obtained from the community's Comprehensive Emergency Management Plan (CEMP). The data was then reviewed by the Emergency Management Director. These facilities were digitized into GIS and used for determining vulnerability to the various hazards. The map that follows entitled FEMA Q3 Flood Zones and Critical Infrastructure depicts Critical Facilities in the community.

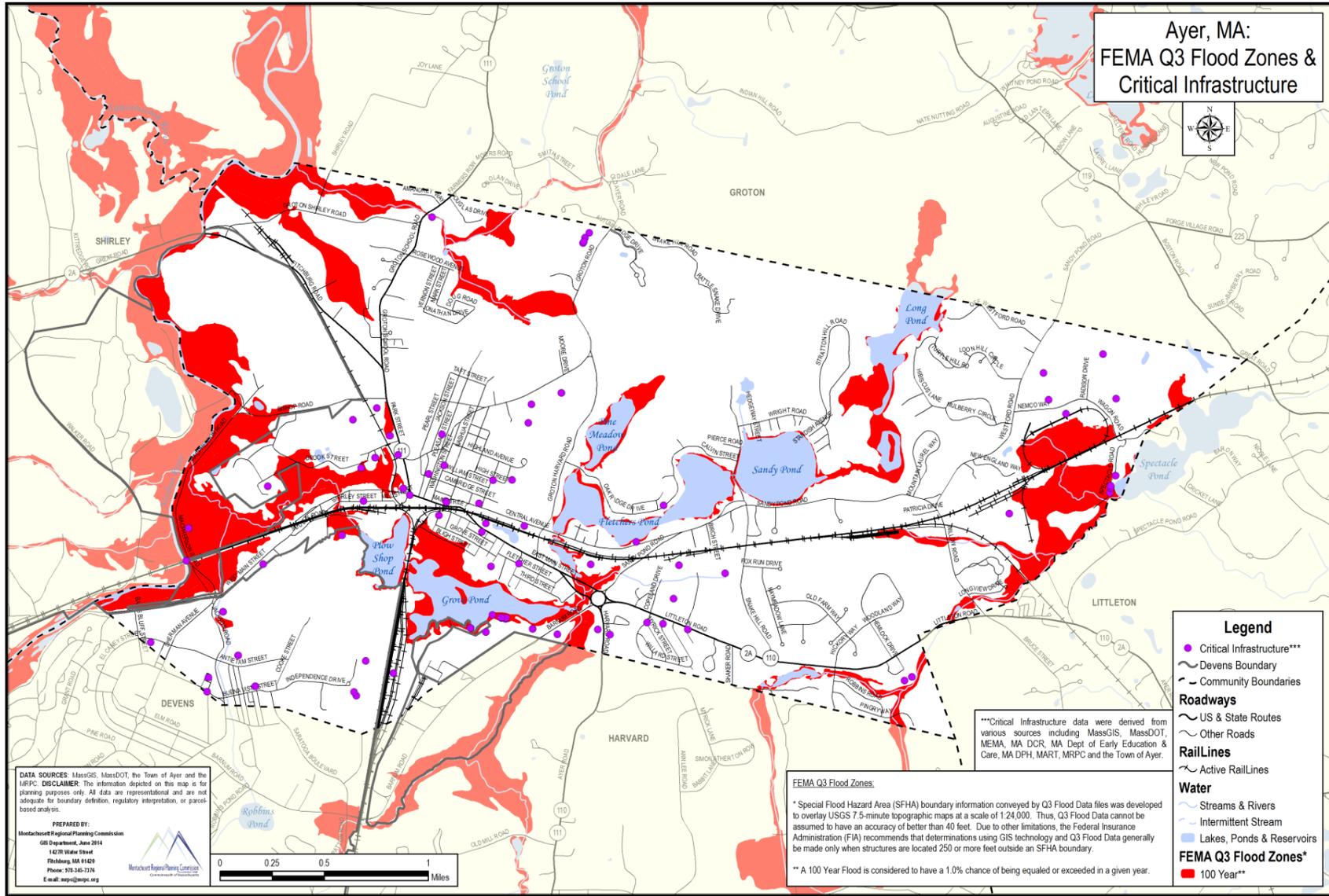
Table 30: Ayer Critical Facilities

<i>Feature Type</i>	<i>Name</i>	<i>Address</i>
Animal Shelters	Ayer Animal Medical Center	196 West Main Street
City/Town Halls	Ayer Town Hall	1 Main Street
Clinics	Advocates Community Counseling	11 Depot Square
District Court	Ayer District Courthouse	25 East Main Street
DPW Facilities	Ayer DPW	25 Brooks Street
Early Education Childcare Facilities	Mullan, Janet	6 Forest St
	Ayer Kiddie Depot	33 Shirley St
	Stevens, Patricia	23 High St
	Boisseau, Brenda M.	22 Fletcher St
	Duncanson, Tiffany	10 Atherton St.
	Aguiar Muniz, Claudia	2 Myrick St
	Bourne, Karen	142 Oak Ridge Dr
	Duncanson, Linda	9 Hatch St.
Elderly Housing	Ayer Housing Authority	18 Pond Street
	Pleasant Street School Apartments	62 Pleasant Street
Emergency Operations Centers	Ayer Police Station	54 Park Street
	Ayer Fire Station	1 West Main Street
Emergency Shelters	Nashoba Valley Medical Center	200 Groton Road
	Ayer Town Hall	1 Main Street
	Ayer High School	141 Washington Street
End Of Life Facilities	Woodlawn Cemetery	
	Woodlawn Cemetery	
	Anderson Family Funeral Homes	46 Washington St
	Saint Marys Cemetery	
Fire	Ayer Fire Station	1 West Main Street
Freight	Panam Southern Rr Auto Yard	
	Devens Intermodal Rail Terminal	
Hazmat Sites	Cains Foods, L.P. (Warehouse)	3 Nemco Way
	Cains Foods, L.P. (Manufacturing Facility)	114 East Main Street
	Cargill Inc- Horizon Milling	35 Nemco Way
	Cpf Inc/Northeast Hotfill	25 Copeland Drive

	Epic Enterprises Inc.	11 Copeland Drive
	Jiffy Lube	38 Park Street
	Jp Sullivan & Co.	50 Barnum Road
	L3 Communications Essco	90 Nemco Way
	National Grid- Ayer 201	Bishop Road
	National Grid- Sandy Pond 237	Westford Road
	Steward Health Care Systems D/B/A Nashoba	200 Groton Road
	Verizon	26 Pleasant Street
	Nashoba Valley Express Co., Inc.	81 Central Avenue
	National Grid- Sandy Pond Hvdc	Radisson Road
Hospitals	Nashoba Valley Medical Center	200 Groton Street
Long Term Care Facility	Nashoba Park	15 Winthrop Avenue
	Apple Valley Center	400 Groton Road
Other Critical Facilities	Ayer Water Storage Tank	Off Washington Street
Other Government Buildings	Ayer Dpw	25 Brooks Street
	Ayer Public Library	26 East Main Street
Police	Ayer Police Station	54 Park Street
Potable Water Treatment Plants	Ayer Water Treatment Plant	Off Nemco Way
	Ayer Water Treatment Plant	Off Barnum Road
Public Health Office	Ayer Board Of Health	1 Main Street
	Nashoba Associated Board Of Health	30 Central Avenue
Public Water Supply*	Proposed Grove Pond Well #3	
	Spectacle Pond Well # 1a	
	Spectacle Pond 2 Well	
	Well #1	
	Grove Pond Well #1	
	Grove Pond Well #2	
	Pepsi Cpf	25 Copeland Drive
	Spectacle Pond # 2 Well	
	Spectacle Pond # 1 Well	
	Grove Pond Gravel Packed (12 8") Wells	
	Well #1	
	Macpherson Naturally Developed Well	
	Grove Pond Well # 1	
	Grove Pond Well # 2	
Pumping Stations	Ayer Water Treatment Plant	Off Barnum Road
	Ayer Water Pumping Station	Central Avenue
	Ayer Water Pumping Station	25 Brooks Street
	Groton School Road Pumping Station	Groton School Road

School	Page-Hilltop School	115 Washington Street
	Ayer High School	141 Washington Street
Wastewater Treatment Plant	Ayer Wastewater Treatment Facility	25 Brooks Street

*As stated in 310 CMR 22.02, a Public Water System means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year” (Mass GIS, 2014).



Flood Prone Areas

Particular areas within the community where the risk of flood areas are or could occur are shown on the Ayer Local Hazards Assessment Map (Appendix 2) as determined at the first meeting of the Ayer Local Hazard Mitigation Team held on December 10, 2012.

Flooding Vulnerability Assessment

An analysis of the FIRM flood hazard area maps indicates that there is a total of 1175.61 acres of 100-year floodplain within Ayer. This amounts to 19.33% of the total town. Based on additional analysis, 82.32 acres (7%) of the floodplain are developed. Currently there are 101 structures in the floodplain which is about 3.21% of the total structures in the community. The buildings are then multiplied by the building value, as determined by the MA Department of Revenue, to come up with a potential loss of \$221,082,000.

Listed below are critical facilities within the 100 year flood zone. Bridges and Dams are also within the 100 year flood zone.

Table 31: Ayer Critical Facilities within 100-Year Flood Zone

Feature Type	Name	Address
Emergency Operations Centers	Ayer Fire Station	1 West Main Street
Fire	Ayer Fire Station	1 West Main Street
Hazmat Sites	Shelpley Hill Treatment Facility	(Access Off Of) Scully Road
Other Critical Facilities	Guilford Rail Bridge	Rail Line & Nashua River
Potable Water Treatment Plants	Ayer Water Treatment Plant	Off Nemco Way
Public Water Supply	Grove Pond Gravel Packed (12 8") Wells	
	Macpherson Naturally Developed Well	
	Grove Pond Gravel Packed (12 8") Wells	
	Proposed Grove Pond Well #3	
	Macpherson Naturally Developed Well	
	Grove Pond Well #1	
	Grove Pond Well #2	
	Grove Pond Gravel Packed (12 8") Wells	
	Macpherson Naturally Developed Well	
	Grove Pond Well # 1	
	Grove Pond Well # 2	
Pumping Stations	Ayer Water Pumping Station	25 Brooks Street

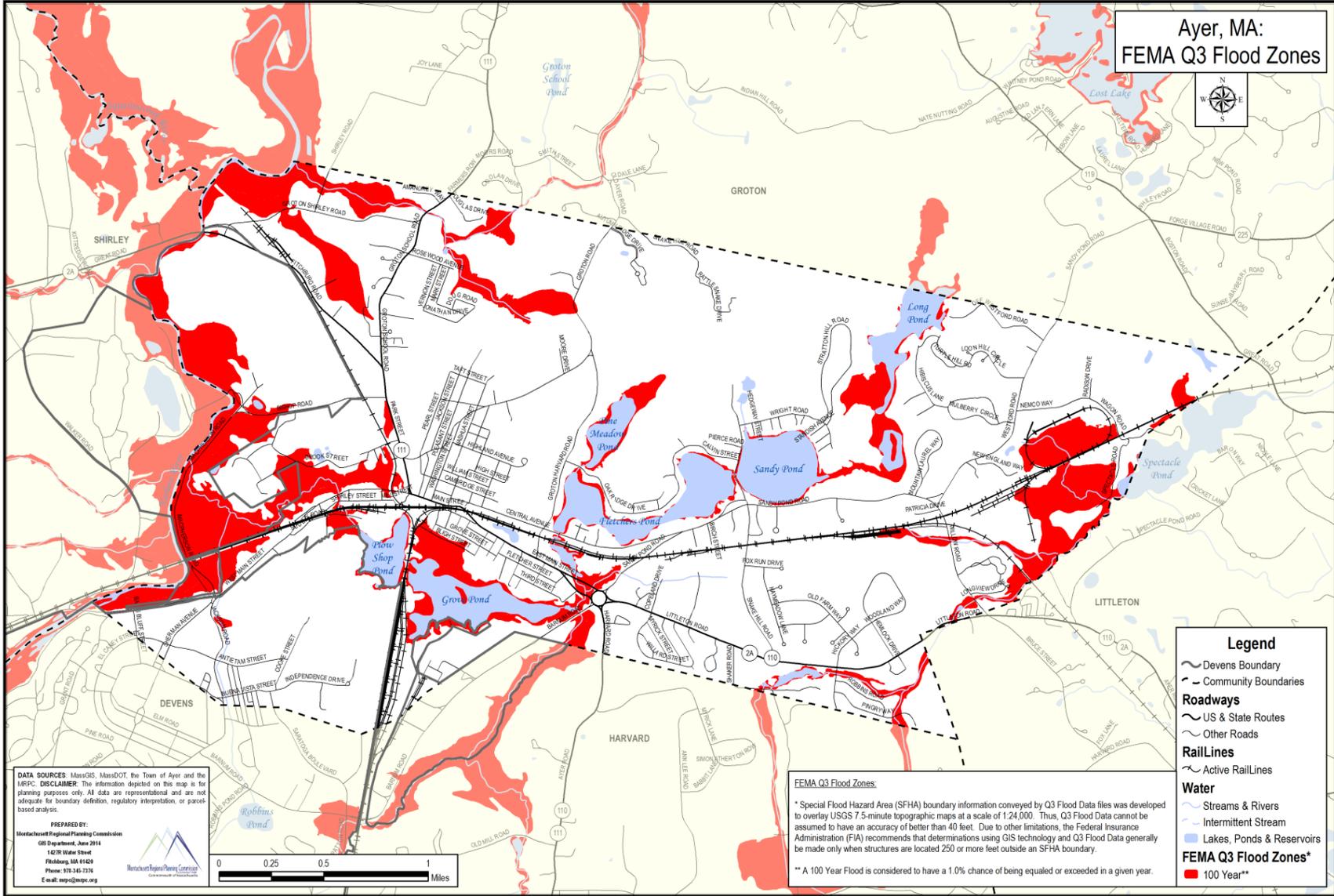
Since the initiation of the National Flood Insurance Program (NFIP), three flood insurance claims in the Town of Ayer have been made totaling \$7,783.30 in payments. There are no repetitive loss properties in Ayer. Statistics from the NFIP BureauNet indicate in the town of Ayer there are 34 flood insurance policies in force.

Floodplain Management and Compliance with NFIP

The town supports numerous floodplain management activities in an effort to meet compliance of the National Floodplain Insurance Program. These efforts include:

- Implementing the MA Wetlands Protection Act and the town's Wetland's Protection Bylaw regulating development and activity within the wetlands buffer zone and regulating stormwater and other point source discharge.
- Implementing the Town Flood Plain District Bylaw (December 10, 1999) regulating development in the floodplain district.
- Continued maintenance of municipal stormwater drainage system which includes regular cleaning of catch basins, storm drains and culverts.
- Continued maintenance of public water bodies to reduce flooding caused by erosion and water displacement.
- Enforcement of the Cluster Development Bylaw which mitigates possible flooding events by designating protected open space within a development which in turn treats stormwater runoff through the means of natural infiltration.

The map on the following page entitled FEMA Q3 Flood Zones depicts the 100 year flood zones in the community.



Structurally Deficient Bridges Over Waterways

Ayer does not have any bridges over water that are classified by MassDOT as “structurally deficient”.

Hazard Potential of Dams

The DCR Office of Dams Safety lists nine dams in the Town of Ayer as shown in Table 32. Of these nine dams, four dams, namely, Balch Pond, Upper Flanagan Pond, Plow Shop Pond, and Balch Pond Dike Dams are classified as significant hazards.

Classifications for potential hazards are in accordance with the chart below.

Hazard Potential Classification

High Hazard	Refers to dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
Significant Hazard	Refers to dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities
Low Hazard	Refers to dams located where failure may cause minimal property damage to others. Loss of life is not expected.

Source: MA Department of Conservation and Recreation Office of Dam Safety

High hazard dams must be inspected every two year, significant hazard every five years, and low Hazards dams every 10 years. Owners of dams are responsible for having their dam inspected. MGL Chapter 253 and 302 CMR 10.00 requires that dam owners prepare, maintain and update Emergency Action Plans for all High Hazard Potential dams and certain Significant Hazard Potential dams.

Non-jurisdictional dams are not regulated by the Office of Dam Safety or under their jurisdiction. Typically these dams are under 6 feet in height and/or under 15 acre-feet in storage and do not have an assigned 'Hazard Code'. Dams owned and regulated by the Federal Government are also typically non-jurisdictional but DO have an assigned Hazard Code.

Table 32: Dams

Town	Dam	Hazard Code	Owner
Ayer	Ice House Dam	Low Hazard	Private
Ayer	Lower Long Pond Dam	Low Hazard	Private
Ayer	Long Pond Dam	Low Hazard	Public
Ayer	Plow Shop Pond Dike	N/A	Private
Ayer	Ayer Fish & Game Club Pond Dam	N/A	Private
Ayer	Balch Pond Dam	Significant Hazard	Public

Ayer	Upper Flanagan Pond Dam	Significant Hazard	Private
Ayer	Plow Shop Pond Dam	Significant Hazard	Private
Ayer	Balch Pond Dike	Significant Hazard	Public

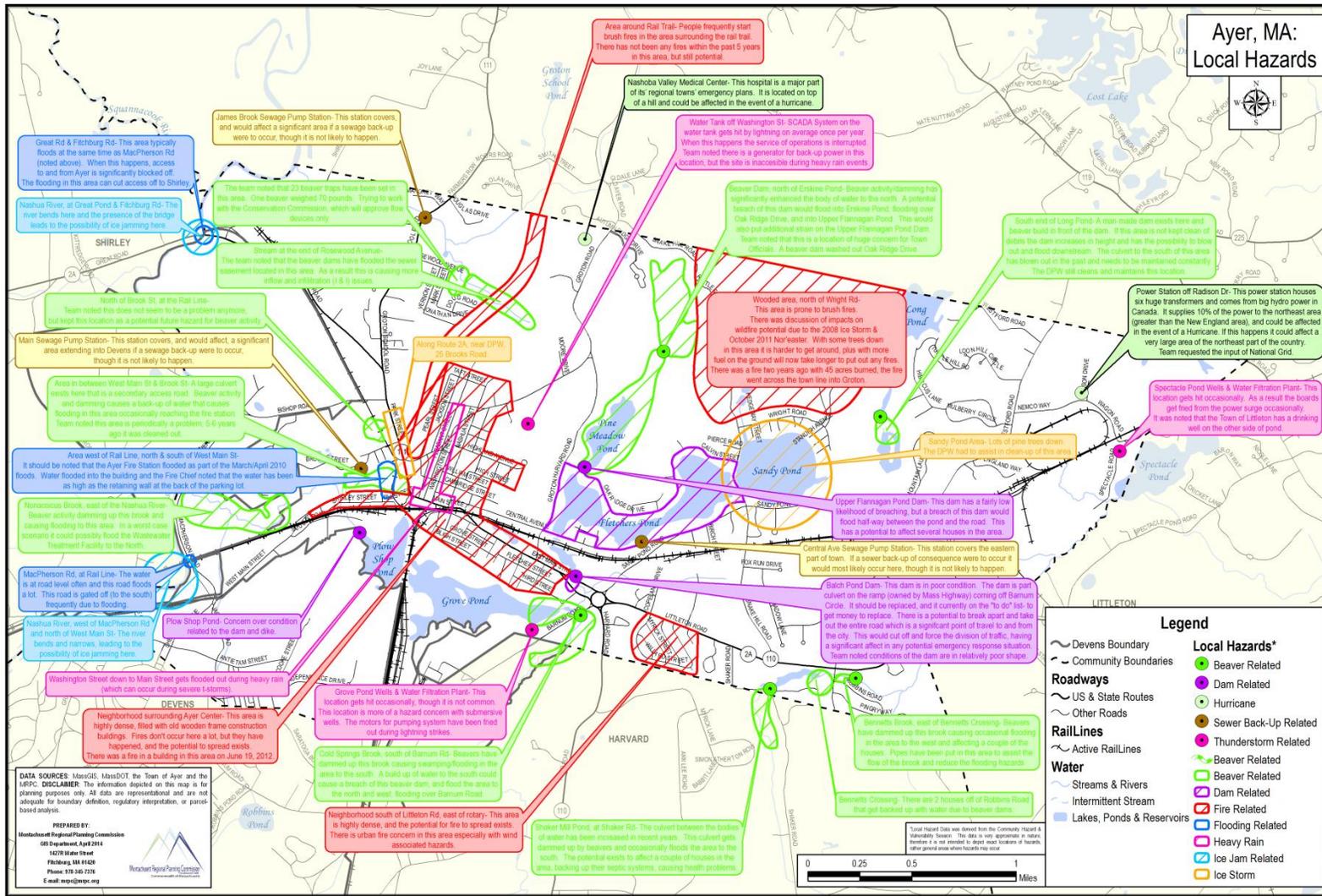
*N/A – Information not available as the dam is non-jurisdictional.

Risk Assessment

As previously stated, located in Section 4. Identification of Natural Hazards, Identifying and Profiling Hazards”, there is a description of each identified hazards’ impact on the region and its communities as well as an overall summary of vulnerability. Based on the hazards identified in this plan and the assessment of risks by the Town of Ayer, the town considers itself to be at a high risk for Beavers, Heavy Snow, and Wild land Fire; moderate risk for Heavy Rain, Dam Failure, High Winds, Nor’easters, Severe Thunderstorms, and Ice Storms; low risk for Snow Melt, Ice Jams, Hurricanes, Blizzard, Major Urban Fires, Drought, Extreme Temperatures, Earthquakes and Landslides; and tsunamis as not applicable. This information is documented in the Ayer Natural Hazard Matrix below which was obtained from participants at the Ayer Local Hazard Mitigation Team Meeting held on December 10, 2012.

Ayer Natural Hazard Matrix				
Natural Hazard	Likelihood of Occurrence	Location	Impacts	Hazard Index
Natural Hazard Separated by Flood, Atmospheric Related and Winter Related, Other Natural Hazards, and Geologic Hazards	3 = Highly Likely 2 = Possible 1 = Unlikely	3 = Regional/State 2 = Multi Community/Regional 1 = Local/Town	4 = Catastrophic 3 = Critical 2 = Limited 1 = Negligible	Ranking Determined by Combining the Likelihood, Location and Impacts of a Natural Hazard
<u>Flood-Related Hazards</u>				
• Heavy Rain	2	1	2	5
• Snow Melt	1	1	1	3
• Dam Failure	2	2	3	7
• Ice Jams	1	2	3	6
• Beavers	3	1	2	6
<u>Atmospheric Related and Winter Related Hazards</u>				
• High Winds	2	2	3	7
• Hurricanes	1	3	3	7
• Tornadoes	1	2	3	6
• Nor'easters	2	3	2	7
• Severe Thunderstorms	2	1	2	5
• Heavy Snow	3	2	3	8
• Ice Storms	2	2	3	7
• Blizzard	1	2	3	6
<u>Other Natural Hazards</u>				
• Major Urban Fires	1	1	3	5
• Wildland Fire	3	1	2	6
• Drought	1	3	2	6
• Extreme Temperatures	1	3	2	6
<u>Geologic Hazards</u>				
• Earthquakes	1	2	2	5
• Landslides	1	1	1	3
• Tsunami	NA	NA	NA	NA
<p>Key</p> <p>Highly likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.</p> <p>Possible : 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.</p> <p>Unlikely: Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.</p> <p>Catastrophic: Immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.</p> <p>Critical: Fast speed of onset or long duration of event resulting in devastating damage and loss of services for weeks or months.</p> <p>Limited: Moderate speed of onset or moderate duration of event, resulting in some damage.</p> <p>Negligible: Slow speed of onset or short duration of event resulting in little to no damage.</p>				

Also discussed at this meeting were the hazards that affect each community and the identification of specific problem areas in the community that need to be addressed. This included the identification of new hazards that were determined to pose a threat or community vulnerability which are detailed in the Ayer Local Hazards Map on the following page. The entire community is equally at risk to the following hazards: snow melt, tornados, nor'easters, heavy snow, blizzards, drought, extreme temperatures, earthquakes and landslides.



Existing Protections

The original inventory of hazard mitigation actions which the Montachusett communities undertook for the 2008 Montachusett Region Hazard Mitigation Plan was reviewed and updated by each community at a meeting held in each community with the MRPC and the community's Local Hazard Mitigation Planning Team and, in some communities, the Emergency Management Committee. The attendees of the meetings can be found in Appendix A. The following matrices depict the updated inventory of what is currently being done to mitigate hazards by listing the programs and activities already in place. It includes a description of the protection measure, who is responsible, and improvements and changes that may be needed. This inventory was used by the Planning Team/Emergency Management Committee to identify gaps in existing protections that were then addressed through the development of this plan update.

Ayer

Type of Existing Protection	Description	Area Covered	Implementation Resources and Funding*	Improvements or Changes Needed
Flood Related Hazards				
Storm water management standards	State Regulation under the Wetlands Protection Act to regulate storm water and other point source discharge	Town-Wide	Enforced by the Ayer Conservation Commission (Wetlands Protection Act) and Ayer Planning Board (Subdivision Control Law and site plan review).	Storm water management standards are and continue to be enforced. No improvements or changes needed.
Wetlands Protection Act (state)	State law regulating development and activity within wetland buffer zone	100-foot state buffer around wetland area; 200 foot buffer around river front areas	Enforced by the Ayer Conservation Commission.	No improvements or changes needed.
Wetland Protection Bylaw (local)	Local bylaw supplementing the Wetlands Protection Act	100-foot state buffer around wetland area; 200 foot buffer around river front areas	Enforced by the Ayer Conservation Commission.	No improvements or changes needed.
100 Year Flood Zone	Federal law requiring elevation above 100-year flood level of new and substantially improved residential structures in floodplain	100-year floodplain as shown on Flood Insurance Rate Map dated June 4, 2010.	Enforced by the Building Inspector (municipal staff) and Board of Appeals	No improvements or changes needed.

Town Bylaw Flood Plain District	Local bylaw enhancing federal/state laws and regulating any development in the flood plain district	100-year floodplain as shown on Flood Insurance Rate Map dated June 4, 2010.	Enforced by the Building Inspector (municipal staff) and Board of Appeals.	Insurance Flood Rate Maps need to be updated.
Maintenance of municipal storm water drainage system	Regular cleaning of catch basins, storm drains, and culverts	Town-Wide	Directed by the Department of Public Works municipal staff.	Maintenance continues but additional Personnel and Equipment Needed to undertake this task.
Maintenance of public water bodies (ponds, streams, brooks, wetlands)	Periodic cleaning of waterways is undertaken, i.e., remove trash, debris	Town-Wide	Undertaken by the Department of Public municipal staff. Works with guidance from Conservation Commission	Maintenance continues. No improvements or changes needed.
Inspection of major dams	Periodic inspections of the structural integrity of the dam	Town - Wide	Undertaken by the Massachusetts Department of Conservation and Recreation, Office of Dam Safety	Update Dam failure studies for the dams rated as high hazard
Wind Related Hazards				
State Building Code	State Law related to design loads to include wind effects	Town-Wide	Enforced by Building Inspector (municipal staff).	Continued enforcement remains in place. No improvements or changes needed.
Tree Maintenance	Regular inspection and tree maintenance to cut branches threatening power lines and overhead utilities	Town-Wide	National Grid staff (electric company).	This task continues. No improvements or changes needed.
Fire Related Hazards				
Limited Brush Clearing	Brush clearing to provide access to Emergency Service vehicles.	Town-Wide	Directed by the Department of Public municipal staff.	Continue to Identify additional Areas with Potential for Brushfires
Winter Storms Related				
Residential Parking Bans	Parking Bans to Enable Snow Removal Effectively from Residential Streets	Town-Wide	Department of Public Works municipal staff.	Additional personnel and equipment needed to enforce parking bans.

Clearing Snow from Major Arterial Routes	Ensure Access to Emergency Service vehicles.	Town-Wide	Department of Public Works municipal staff.	Snow clearing continues but additional personnel and equipment needed
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*Ayer's enforcement/implementation is generally carried out by elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

Mitigation Goals, Objectives and Strategies

As discussed earlier in this Plan, MRPC previously prepared the 2008 Montachusett Region Hazard Mitigation Plan which consisted of individual annexes for each MRPC community. Similarly, as part of the multi-jurisdictional plan update, each community also developed their own individual goals, objectives and strategies which are listed in this section.

Overall Goal Statement: To prepare to reduce the loss of life, property, infrastructure and cultural resources throughout the Town of Ayer from natural disasters through a multiple hazard mitigation program that involves increased coordination, planning, education, and capital improvements.

1. **Objective:** To provide adequate shelter, water, food, and basic first aid to displaced residents in the event of a natural disaster, and to provide adequate notification and information regarding evacuation procedures, etc., to residents in the event of a natural disaster.
2. **Objective:** to increase coordination between inter-departments in pre-disaster planning, post-disaster recovery and continuous hazard mitigation implementation.
3. **Objective:** Increase awareness of hazard mitigation among town officials, private organizations, businesses, and the general public.
4. **Objective:** To ensure that critical infrastructure sites are protected from natural hazards, and to maintain existing mitigation infrastructure in good condition.
5. **Objective:** To educate the public about the threat of natural hazards and the possible mitigation measures that can be taken to protect public health and safety, as well as infrastructure and property; and to educate the public as well about zoning and building regulations, particularly regulations that relate to new construction.
6. **Objective:** To encourage future development in areas that are not prone to natural disasters.
7. **Objective:** To identify existing shelters that are earthquake resistant as well as outside of floodplain and inundation areas. Disseminate this information to appropriate Town departments.
8. **Objective:** To inventory supplies at existing shelters and develop a needs list and storage requirements; and to establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster.
9. **Objective:** To implement the Town's Reverse 911 notification system.
10. **Objective:** To collect, periodically update, and disseminate information on which local radio stations provide emergency information, what to include in a 'home survival kit,' how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to follow during a natural disaster.

Specific Natural Hazard Goals for Ayer

Goal Statement for Flooding: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to flooding. And to pursue prevention activities which include planning, zoning, open space preservation, floodplain and wetland development regulations, storm water management, waterway dumping regulations, watershed protection measures, and best management practices, as well as, soil erosion, building ordinances, and subdivision regulations.

1. **Objective:** To implement standards in the Subdivision Rules and Regulations to require temporary and permanent erosion control measures for streams and surface water bodies.
2. **Objective:** To add more specific requirements to address flood related issues in the Special

Permit and Site Plan Approval provisions in the Ayer Zoning Bylaw including topographic change, removal of cover vegetation, risk of erosion or siltation and increased stormwater runoff.

3. Objective: To identify all structures throughout Town that need to be elevated above the base-flood elevation.

4. Objective: To Develop a priority list and seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town.

Goal Statement for Protection from Beavers: To minimize the threat to health, the damage to roads and property, and the disruption of governmental services and general business activities due to flooding caused by beavers.

1. Objective: Support local town departments to continue present methods to prevent beaver caused flooding.

2. Objective: See assistance from beaver management professionals, including trappers.

3. Objective: Install beaver management devices.

Goal Statement for Hurricanes and Tornadoes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to high winds associated with hurricanes and tornadoes. (The objectives listed above, under flooding, address the flooding that can result from a hurricane.)

1. Objective: To educate residents and volunteers regarding the safe methods and actions necessary to deal with hurricanes and tornados.

Goal Statement for Winter Related Hazards: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to severe snow and ice storms.

1. Objective: To develop a plan for providing access to water, information, shelter, and food stores to people in remote locations in Ayer in the event of a severe winter storm.

Goal Statement for Dam Failure: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to dam failures.

1. Objective: To identify sources of funding for dam safety inspections and improvements.

Goal Statement for Earthquakes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to earthquakes.

1. Objective: To evaluate all Shelters and Reception Centers to determine if they are earthquake resistant.

2. Objective: To insure that all identified shelters have sufficient back-up utility service in the event of primary power failure.

Goal Statement for Drought: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to drought.

1. Objective: Review and update, as needed, the Town of Ayer Water Conservation Plan.

Goal Statement for Wildfires/Brushfires: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to wildfires/brushfires.

1. Objective: Develop and distribute an educational pamphlet on fire safety and prevention.

2. Objective: Consider amending the Subdivision Rules and Regulations and Required

Improvements section to include fire suppression provisions for new residential developments.

Goal Statement for Weather Extremes: To minimize the loss of life and the threats to public health and safety.

- 1. Objective:** To develop and distribute educational information regarding the threats from extreme heat and cold.
- 2. Objective:** To educate the residents as to the causes and effects of global warming; and how it affects the residents of Ayer, and what they could be doing to help improve the situation.

Mitigation Action Plans and Prioritization of Actions (STAPLEE)

Initial Mitigation Action Plans for the Montachusett Communities were presented in the communities Hazard Mitigation Plans that were approved by FEMA in 2009 and 2010. The original Mitigation Action Plans were developed through an inventory of potential hazards which could impact the community and an evaluation of a range of alternatives to address these hazards. As part of the plan update process, the original Mitigation Action Plan was reviewed by the community's Local Hazard Mitigation Planning Team/Emergency Management Committee to delete actions which have already been completed, add additional actions which are either underway or planned to be undertaken, and to update the current status of all actions. The goals were reviewed and updated at the second meeting with each community.

An additional step in this process was to conduct a "STAPLEE" analysis for each action to prioritize all actions within each community and a subjective evaluation of each action's perceived cost/benefit. In the 2008 plan, actions were not prioritized so there were no changes in priorities in this update. The revised Community Mitigation Action Plans matrices that follow identify each mitigation action, the responsible department or board responsible for implementation, potential funding sources, the timetable of the action, results of the prioritization of actions through the STAPLEE analysis, and the perceived cost/benefit for each mitigation action.

The goal of each identified strategy, or mitigation action, is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each action to establish priorities for implementation, using the "STAPLEE" method. The STAPLEE methodology was developed by the Federal Emergency Management Agency as a tool to help communities prioritize their hazard mitigation strategies and determine the most appropriate actions for implementation. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of an action and is designed to be used by public officials and planners for making planning decisions.

To conduct the STAPLEE exercise, the community's Hazard Mitigation Team was asked to rate each action in their Mitigation Action Plan on each of the following criteria, using a score of 1 to 3 (Good = 3, Average = 2, Poor = 1):

- **Social:** Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- **Technical:** Will the proposed strategy work? Will it create more problems than it solves?
- **Administrative:** Can the community implement the action? Is there someone to coordinate and lead the effort?

- Political: Is the action politically acceptable? Is there public support both to implement and to maintain the action?
- Legal: Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- Economic: What are the costs of this action? Does the cost seem reasonable for the size of the problem and the likely benefits?
- Environmental: How will the action impact the environment? Will the action need environmental regulatory approvals?

These scores were then totaled, resulting in a final score of 7 (least priority) to 21 (highest priority) for each action. The higher the final score, the higher the relative priority of that action for implementation. This information can then be utilized in each community as they conduct and administer relevant municipal functions and activities. The final STAPLEE score for each action is shown in the following mitigation action plan.

The Hazard Mitigation team was also asked to do a relative cost/benefit of each action. This assessment was intended to informally indicate if an action will either have more benefits accrued to the Town than the Cost of implementing the action, or if the costs would exceed any benefits. Responses include: “Benefits Exceed Costs”, “Benefits Equal Costs, or “Costs Exceed Benefits”.

AYER IMPLEMENTATION STRATEGY FOR PRIORITY MITIGATION ACTIONS

Type of Natural Hazard	Description of Action	Implementation Responsibility	Resources/Funding	Timeframe	Priority (STAPLEE SCORE)	Cost/Benefit Evaluation	Status Update from the 2008 Plan**
Wildland Fire	Increase awareness by educating property owners on actions that they can take to reduce risk to property by developing and distributing an Educational Pamphlet on Fire Safety and Prevention (SAFE PROGRAM) (SENIOR SAFE) and wildfire prevention.	Fire Department	Municipal Staff	2015 - 2020	21	Benefits Exceed Costs	Completed but carried forward. Materials updated and distributed annually.

All Natural Hazards	Increase hazard education and risk awareness to public by Updating and Disseminating Information on Local Radio/TV Stations to educate the public and alert them of emergency information including shelter locations and other instructions related to all natural hazards. Share MEMA alerts on Town's website as well as making use of Social Media feeds on Facebook and Twitter	Emergency Management Director	Municipal Staff	2015 - 2020	21	Benefits Exceed Costs	New Action. Sharing MEMA Alerts. Update and Dissemination of information completed but carried forward as action is undertaken on an annual basis.
All Natural Hazards	Inventory supplies at existing shelters and develop a needs list and storage requirements for food and first aid supplies in the event of a natural disaster. Supplies must be adequate to eliminate or reduce risk to human life.	Emergency Management Planning Committee, School Facilities Manager	Municipal Staff	2015-2020	21	Benefits Exceed Costs	Completed but carried forward. Inventory of Supplies done periodically Note: Bought a shelter trailer for supplies/equipment however, a permanent storage area is needed.

Flood Related Hazards	Identify all structures throughout the town that need to be Elevated above the Base-Flood Elevation. Once identified educate those property owners regarding their options for mitigation.	Building Inspector, Fire Department, DPW with MRPC assistance	Municipal Staff. FEMA HMGP grant 75%	2015-2020	10	Benefits Exceed Costs	Carried forward. Building Footprint GIS Layer recently completed.
Flood Related Hazards	Develop a priority list and possibly seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town to reduce or eliminate flooding risk.	Department of Public Works	Municipal Staff, MRPC Assistance in mapping FEMA HMPG grant 75%	2015-2020	21	Benefits Exceed Costs	Carried forward: Mapping of culverts was recently completed. Priority list needs to be developed.
Flood Related Hazards	Educate property owners regarding options for mitigating their properties from flooding through outreach programs that address measures that residents can take (i.e installing backflow valves, securing debris, etc.)	Emergency Management Director, Fire Department	Property Owners	2015 - 2020	21	Benefits Exceed Costs	New Action.

All Hazards	Evaluate and relocate valuable and historical items, and furnaces, Water heaters, and electrical equipment to reduce flood damage.	Emergency Management Director, Fire Department	Municipal Staff	2017;	12	Benefits Exceed Costs	Carried forward. Additional time needed due to lack of municipal funding. Note: Town Hall does have a storage issue with historical records; still needs to be addressed.
Other Natural Hazards (Wildland fire)	Identify areas with potential for brush fires to track community vulnerability by developing and maintaining a data base.	Department of Public Works/Tree Warden and National Grid	Municipal Staff; National Grid through ratepayers	2015 - 2020	21	Benefits Exceed Costs	New Action.
Flood Related Hazards	Install "beaver diverters" and water control devices to mitigate flooding caused by beaver dams.	Department of Public Works	Municipal Staff	2015 – 2020 as needed	20	Benefits Exceed Costs	Carried Over. Ongoing. This action is undertaken on an as needed basis.
Flood Related Hazards	Hire trapper for removal of beavers to mitigate flooding caused by beaver dams.	Department of Public Works	Municipal Staff	2015 – 2020 as needed		Benefits Exceed Costs	Carried Over. Ongoing. This action is undertaken on an as needed basis.

All Natural Hazards	Implement recommendations regarding natural hazard mitigation in existing planning documents such as the master plan, five year action plan of the open space and recreation plan and the emergency evacuation plan	Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	2015 - 2020	21	Benefits Exceed Costs	Carried forward due to time constraints.
Flood Related Hazards	Continue participation in the National Flood Insurance Program to enable property owners to purchase insurance protection against flood losses.	Board of Selectmen, Conservation Commission	FEMA/MEMA	2015 - 2020	21	Benefit exceeds cost	Completed but carried forward. Town continues its participation in the NFIP.

*Unless otherwise noted, Ayer's Resources/Funding consists of elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

**Actions identified as carried forward were not completed in the previous planning cycle unless otherwise stated.

Mitigation Actions from the 2008 Montachusett Region Hazard Mitigation Plan that are complete include:

- Identify existing shelters that are earthquake resistant as well as outside of floodplain (and dam inundation) areas.
- Identify shelters and publicize locations; Obtain flashing sign to direct residents to shelter.
- Implementation of Reverse 911.
- Update Insurance Flood Rate Maps.
- Hold open house at Fire Department.
- Expansion of residential parking bans to enable snow removal from all streets.
- Evacuation routes have been identified.

Clinton Natural Hazard Risk Assessment

While this annex focus' pertains to critical facilities, flooding, risk assessment, existing protections and mitigation strategy in the community, more detailed descriptions of each natural hazard's impact on the region and its communities and summary of vulnerability can be located in the regional section entitled

“ 4. Identification of Natural Hazards, Identifying and Profiling Hazards”.

Community Profile

The Town of Clinton is located in North Central Massachusetts, bordered by Bolton and Berlin on the east, Boylston on the south, Sterling on the west, and Lancaster on the northwest and north. Clinton is 13 miles north of Worcester, 16 miles south of Fitchburg, 35 miles west of Boston, and 200 miles from New York City.

Clinton covers an area of 7.29 square miles and has a resident population of 13,606, according to the 2010 U.S. Census. The population density is 1866 people per square mile. There are 6,397 housing units in the town, and the average household size is 2.32. The median age of Clinton’s residents is 39.

In 1828 the Bigelow brothers, Erastus and Horatio started an industrial revolution that left a lasting mark on the many aspects of Clinton. Erastus, a mechanical genius, invented the power loom for manufacturing coach lace, counterpane cloths and gingham plaids. With Horatio, a marketing entrepreneur, the brothers captured a firm hold on the textile industry. The Bigelow’s and the Town of Clinton’s success continued with the development of the carpet loom. Bigelow’s carpets were of superior quality and were found in finest establishments including; the White House, the Waldorf-Astoria, and the SS TITANIC. Clinton’s industrial foothold began to slip during the Great Depression of the 1930’s. As with many New England mill towns, businesses closed or moved away. Fortunately, the numerous mill buildings were discovered again during the 1970’s and 1980’s by modern day entrepreneurs and many successful businesses now thrive where the Bigelow’s left off.

Clinton’s development pattern is fairly urban and the town functions as an economic center. There are over 350 employer establishments in the town. Clinton is home to a number of major employers including Nypro, Weetabix, Book Trauma, Injlectronics, UMass Memorial-Clinton Hospital and Scholastic Book Fairs. The Museum of Russian Icons attracts many visitors to the community. A noteworthy feature of Clinton is the Wachusett Reservoir, which supplies drinking water to 2.5 million people in Eastern Massachusetts through MA Water Resources Authority.

Critical Facilities

In general usage, the term “critical facilities” is used to describe all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired.

Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even

access to damaged areas.

The number and nature of critical facilities in a community can differ greatly from one jurisdiction to another, and usually comprise both public and private facilities. In this sense, each community needs to determine the relative importance of the publicly and privately owned facilities that deliver vital services, provide important functions, and protect special populations. *Source: Federal Emergency Management Administration, Risk Management Series, Design Guide for Improving Critical Facility Safety from Flooding and High Winds, FEMA 543, January 2007.*

A list of the critical facilities within the community is shown in Table 33. This data was obtained from the community’s Comprehensive Emergency Management Plan (CEMP). The data was then reviewed by the Emergency Management Director. These facilities were digitized into GIS and used for determining vulnerability to the various hazards. The map that follows entitled FEMA Q3 Flood Zones and Critical Infrastructure depicts Critical Facilities in the community.

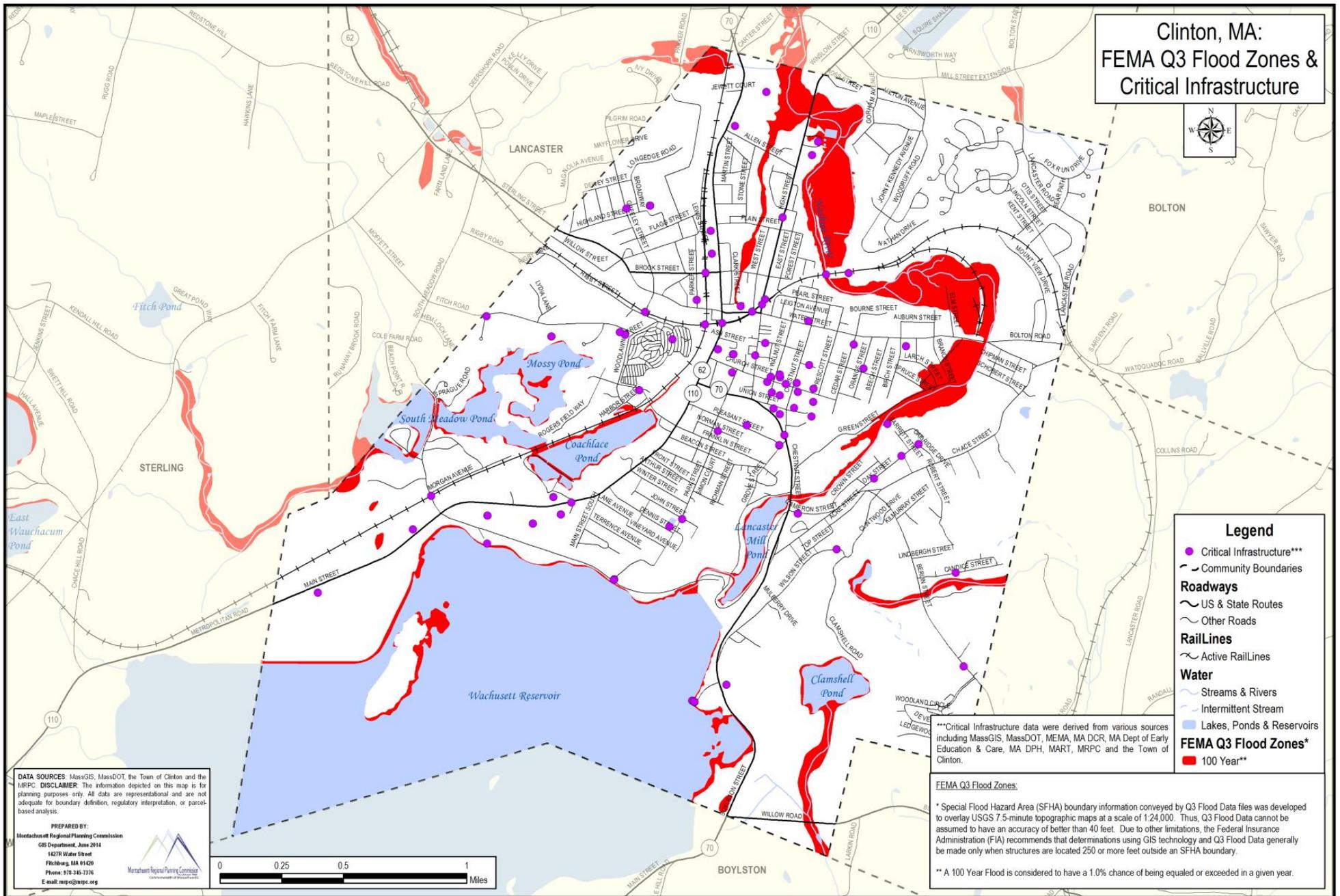
Table 33: Clinton Critical Facilities

Feature Type	Name	Address
City/Town Halls	Clinton Town Hall	242 Church Street
Clinics	Community Health Link Lipton	221 Greeley street
	Edward M Kennedy Community Health	200 high street
Communication Towers	First Congregational Church	16 Walnut Street
	Parker Street Communication Tower	19 Parker Street
District Court	Clinton District Courthouse	300 Boylston Street
Public Water Supply*	Wachusett reservoir	
DPW Facilities	Clinton DPW	99 Woodlawn Street
Early Education Childcare Facilities	Duchnowski, Cara	268 Oak Street
	Rippon, Ruth D.	17 Prospect Street
	Croak, Margaret	27 Norman Street
	Newell, Debra	22 Candice Street
	Early Adventures Child Care Center Inc.	120 Park Street
	Guerra, Vilma A.	526 High Street
	McNamara, Josephine	2 Oak Ridge Drive
	Wee Kare Early Education Center, LLC	449 Berlin Street
	Marko, Barbara	91 Orange Street
	Maloney, Jennifer	5 Stonebridge Circle
	MOC Child Care & Head Start Service	20 West Boylston Street
	Flanders, Robyn	344 Oak Street
	Burzenski, Christine	195 Wilson Street
	Gemma, Kerriane	141 Cedar Street
Patel, Berky	3 Harbor Street	
Elderly Housing	Prescott Mill Apartments	24 Water Street

	Presentation Apartments	309 Church Street
	Shaughnessy Apartments	271 Chestnut Street
	Water Street Elderly Housing	367 Water Street
Electric Substations	National Grid Substation	
Emergency Shelters	Clinton Senior High School	200 West Boylston Street
	Clinton Middle School	100 West Boylston Street
	Clinton Elementary School	100 Church Street
End of Life Facilities	Philbin Comeau Funeral Home	176 Water St
	Robert J M Nally Funeral Home	304 Church St
	Woodlawn Cemetery	
	Reservoir Pines Cemetery	
Emergency Operations Centers	Clinton Fire Station	555 Main Street
	Clinton Emergency Management Agency	359 High Street
	Clinton Police Department	176 Chestnut Street
Fire	Clinton Fire Station	555 Main Street
Freight	Rail Line CSX	
HazMat Sites	National Grid Substation	
	Clinton State Pool - Seasonal	
	Weetabix Co.	
	Polymer Concentrates	
	Clinton Wastewater Treatment Plant	677 High Street Extension
	Verizon Substation	
	Clinton Hospital	201 Highland Street
Hospitals	Clinton Hospital	201 Highland Street
Long Term Care Facility	Corcoran House	40 Walnut Street
	Pleasant Terrace (comm. Of Mass.)	137-139 Pleasant Street
Other Critical Facilities	Clinton State Pool - Seasonal	
	MWRA - Wachusett Pump Station	
	Weetabix Co.	
	Keyspan Gas Distribution	
	Shaw's	1157 Main Street
	CVS Pharmacy	792 Main Street
	R&R Bridge #1	High Street
	Rite Aid	1031 Main Street
	Polymer Concentrates	
	R&R Bridge #2	Water Street
	R&R Bridge #3	Main Street

	R&R Bridge #4	Railroad Crossing
	R&R Bridge #5	Greeley Street
	R&R Bridge #6	Nashua River
	Central Park	
	Verizon Substation	
	Pleasant Terrace	
	Clinton Historic Society Holden Memorial	210 Church Street
	St. John's Gym	149 Chestnut Street
	Hannaford Supermarket	333 Brook Street
	CATV Public Television	242 Church Street
	R&R Bridge #7	Brook Street
	R&R Bridge #8	South Meadow Road
	Alternatives Unlimited, Inc.	216 Union Street
Other Government Buildings	Bigelow Public Library	54 Walnut Street
	Clinton DPW	99 Woodlawn Street
	Park Street Communication Tower	Park Street
	Clinton School Administration Building	
	Clinton Senior Center	271 Church Street
Police	Clinton Police Station	176 Chestnut Street
Pumping Stations	Clinton Water Pumping Station	
	MWRA - Wachusett Pump Station	70 Boylston Street
	Leominster Backup Pumping Station	South Meadow Road
	Town of Clinton Pumping Station	South Meadow Road
School	Clinton Senior High School	200 West Boylston Street
	Clinton Middle School	100 West Boylston Street
	Clinton Elementary School	100 Church Street
Sports And Cultural Areas	Davis Farmland	145 Redstone Hill Road
Potable Water Treatment Plants	Clinton Water Treatment Plant	55 West Boylston Street
Wastewater Treatment Plant	Clinton Wastewater Treatment Plant	677 High Street Extension

*As stated in 310 CMR 22.02, a Public Water System means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year” (Mass GIS, 2014).



Clinton, MA: FEMA Q3 Flood Zones & Critical Infrastructure



- Legend**
- Critical Infrastructure***
 - - - Community Boundaries

Roadways

 - ~ US & State Routes
 - ~ Other Roads

RailLines

 - ~ Active RailLines

Water

 - ~ Streams & Rivers
 - ~ Intermittent Stream
 - Lakes, Ponds & Reservoirs

FEMA Q3 Flood Zones*

 - 100 Year**

***Critical Infrastructure data were derived from various sources including MassGIS, MassDOT, MEMA, MA DCR, MA Dept of Early Education & Care, MA DPH, MART, MRPC and the Town of Clinton.

FEMA Q3 Flood Zones:
* Special Flood Hazard Area (SFHA) boundary information conveyed by Q3 Flood Data files was developed to overlay USGS 7.5-minute topographic maps at a scale of 1:24,000. Thus, Q3 Flood Data cannot be assumed to have an accuracy of better than 40 feet. Due to other limitations, the Federal Insurance Administration (FIA) recommends that determinations using GIS technology and Q3 Flood Data generally be made only when structures are located 250 or more feet outside an SFHA boundary.

** A 100 Year Flood is considered to have a 1.0% chance of being equaled or exceeded in a given year.

DATA SOURCES: MassGIS, MassDOT, the Town of Clinton and the MRPC. **DISCLAIMER:** The information depicted on this map is for planning purposes only. All data are representational and are not adequate for boundary definition, regulatory interpretation, or parcel-based analysis.

PREPARED BY:
Montachusett Regional Planning Commission
GIS Department, June 2014
142TR Water Street
Fitchburg, MA 01525
Phone: 978-246-7376
E-mail: mrpc@mrpc.org



Flood Prone Areas

Particular areas within the community where the risks of flood areas are or could occur were determined at the first meeting of the Clinton Local Hazard Mitigation Team held on September 20, 2013. This information can be found on Clinton’s Local Hazard Map which is located under the section entitled Risk Assessment.

Flooding Vulnerability Assessment

An analysis of the FIRM flood hazard area maps indicates that there is a total of 1358.09 acres of 100-year floodplain within Clinton. This amounts to 29.23% of the total town. Based on additional analysis, 58.93 acres (4.34%) of the floodplain are developed. Currently there are 126 structures in the floodplain which is about 2.46% of the total structures in the community. The buildings are then multiplied by the building value, as determined by the MA Department of Revenue, to come up with a potential loss of \$200,118,700.

Excluding dams and bridges the table below depicts critical facilities within the 100 year flood zone.

Table 34
Clinton Critical Facilities within 100-Year Flood Zone

<i>Feature Type</i>	<i>Name</i>	<i>Address</i>
Other Critical Facilities	R&R Bridge #6	Nashua River
Public Water Supply	Wachusett Reservoir	

Since the initiation of the National Flood Insurance Program (NFIP), 29 flood insurance claims in the Town of Clinton have been made totaling \$385,466.78 in payments. According to (NFIP) data, there are three repetitive loss properties in Clinton totaling \$59,243.50 in claims. Statistics from the NFIP BureauNet indicate in the town of Clinton there are 114 flood insurance policies in force.

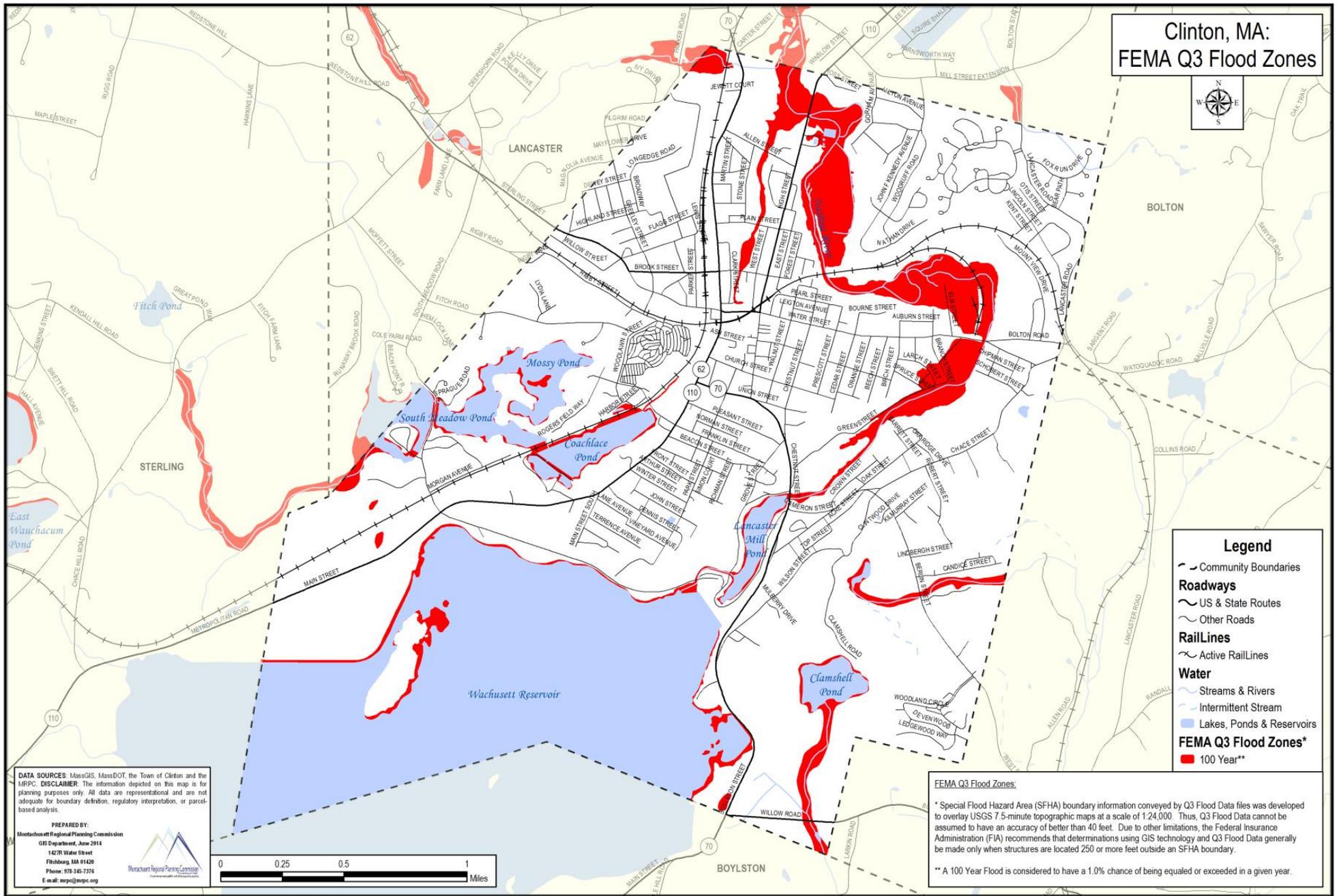
Floodplain Management and Compliance with NFIP

The town supports floodplain management activities in an effort to meet compliance of the National Floodplain Insurance Program. These efforts include:

- Implementing the MA Wetlands Protection Act regulating development and activity within the wetlands buffer zone and regulating stormwater and other point source discharge.
- Implementing the Town Flood Plain District Bylaw regulating development in the floodplain district.
- Continued maintenance of municipal stormwater drainage system which includes regular cleaning of catch basins, storm drains and culverts.
- Continued maintenance of public water bodies to reduce flooding caused by erosion and water displacement.
- Enforcement of the Flexible Development Bylaw which mitigates possible flooding events by designating protected open space within a development which in turn treats stormwater runoff through the means of natural infiltration.

- Enforcement of Stormwater Management and Land Disturbance Bylaw which regulates land alterations, disturbances and construction activities that may impact stormwater flow that could unduly cause flooding events.

The map that follows entitled FEMA Q3 Flood Zones depicts the 100 year flood zones in the community.



Structurally Deficient Bridges Over Waterways

Clinton does not have any bridges over water that are classified by MassDOT as “structurally deficient”.

Hazard Potential of Dams

The DCR Office of Dams Safety lists six dams in the Town of Clinton as shown in Table 35. Wachusett Reservoir Dam and Wachusett Reservoir North Dike are classified as high hazard.

Classifications for potential hazards are in accordance with the chart below.

Hazard Potential Classification

High Hazard	Refers to dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
Significant Hazard	Refers to dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities
Low Hazard	Refers to dams located where failure may cause minimal property damage to others. Loss of life is not expected.

Source: MA Department of Conservation and Recreation Office of Dam Safety

High hazard dams must be inspected every two year, significant hazard every five years, and low Hazards dams every 10 years. Owners of dams are responsible for having their dam inspected. MGL Chapter 253 and 302 CMR 10.00 requires that dam owners prepare, maintain and update Emergency Action Plans for all High Hazard Potential dams and certain Significant Hazard Potential dams.

Non-jurisdictional dams are not regulated by the Office of Dam Safety or under their jurisdiction. Typically these dams are under 6 feet in height and/or under 15 acre-feet in storage and do not have an assigned 'Hazard Code'. Dams owned and regulated by the Federal Government are also typically non-jurisdictional but DO have an assigned Hazard Code.

Table 35: Dams

Town	Dam	Hazard Code	Owner
Clinton	Wachusett Reservoir Dam	High Hazard	Public
Clinton	Wachusett Reservoir North Dike	High Hazard	Public
Clinton	Colonial Press Dam	N/A	Private
Clinton	Coach lace Pond Dam	Significant Hazard	Private
Clinton	Lancaster Millpond Dam	Significant Hazard	Private
Clinton	Mossy Pond Dam	Significant Hazard	Private

*N/A – Information not available as the dam is non-jurisdictional.

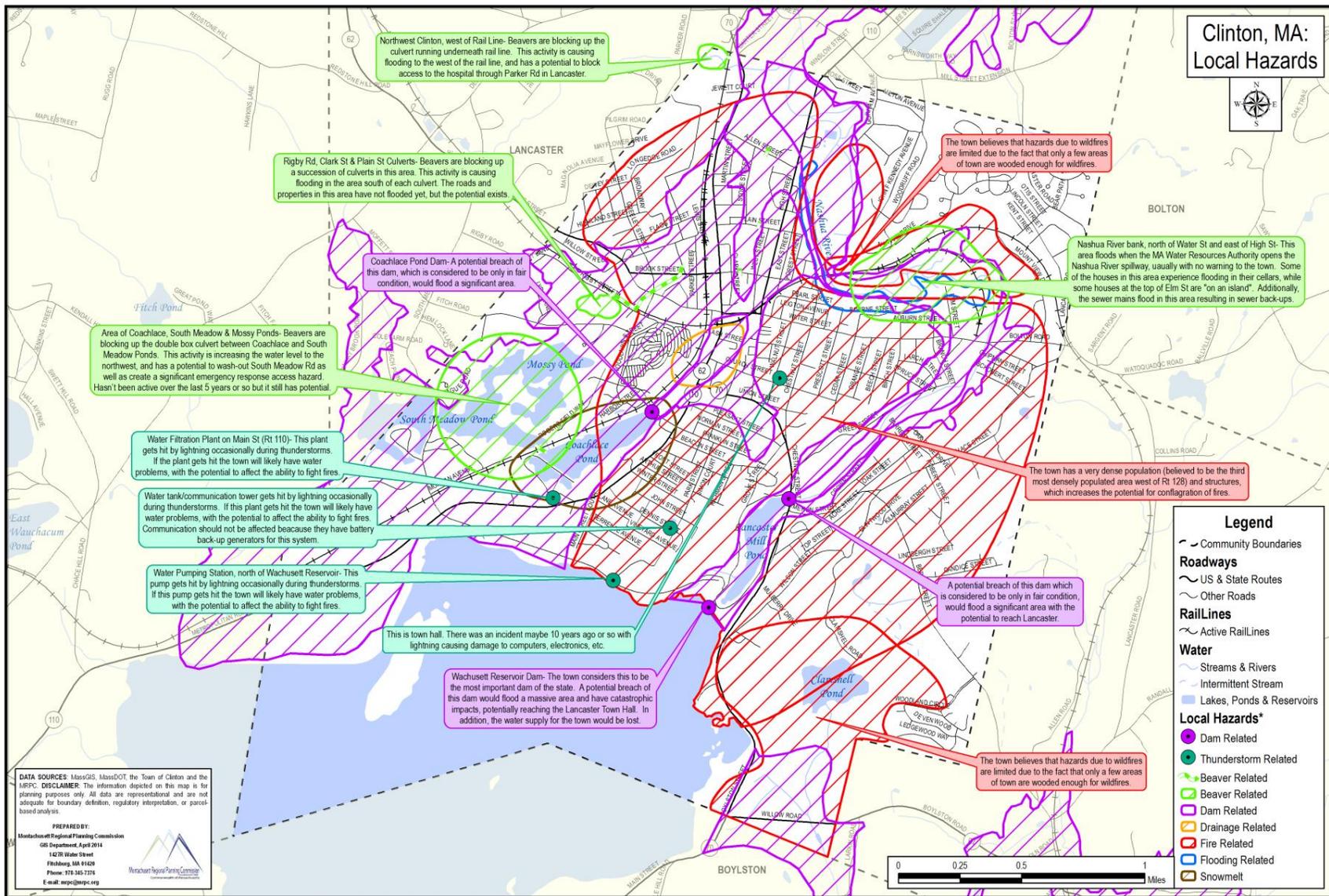
Risk Assessment

As previously stated, located in Section 4. Identification of Natural Hazards, Identifying and Profiling Hazards”, there is a description of each identified hazards’ impact on the region and its communities as well as an overall summary of vulnerability. Based on the hazards identified in this plan and the assessment of risks by the Town of Clinton, the town considers itself to be at a high risk for Heavy Rain, Snow Melt, Hurricanes, Nor’easters, Severe Thunderstorms, Heavy Snow, Ice Storms, Blizzard; moderate risk Beavers, High Winds, Major Urban Fires, Wildland Fire; low risk for Dam Failure, Ice Jams, Tornados, Drought, Extreme Temperatures, landslides; and tsunamis as not applicable. This information is documented in the Clinton Natural Hazard Matrix below which was obtained from participants at the Clinton Local Hazard Mitigation Team Meeting held on September 20, 2013.

Clinton Natural Hazard Matrix

Natural Hazard	Likelihood of Occurrence	Location	Impacts	Hazard Index
Natural Hazard Separated by Flood, Atmospheric Related and Winter Related, Other Natural Hazards, and Geologic Hazards	3 = Highly Likely 2 = Possible 1 = Unlikely	3 = Regional/State 2 = Multi Community/Regional 1 = Local/Town	4 = Catastrophic 3 = Critical 2 = Limited 1 = Negligible	Ranking Determined by Combining the Likelihood, Location and Impacts of a Natural Hazard
Flood-Related Hazards				
• Heavy Rain	3	2	3	8
• Snow Melt	3	2	3	8
• Dam Failure	1	3	4	8
• Ice Jams	1	1	1	3
• Beavers	2	1	1	4
Atmospheric Related and Winter Related Hazards				
• High Winds	2	1	2	5
• Hurricanes	3	2	3	8
• Tornadoes	1	1	4	6
• Nor'easters	3	1	3	7
• Severe Thunderstorms	3	1	2	6
• Heavy Snow	3	1	2	6
• Ice Storms	3	1	3	7
• Blizzard	3	1	2	6
Other Natural Hazards				
• Major Urban Fires	2	1	4	7
• Wildland Fire	2	1	3	6
• Drought	1	1	1	3
• Extreme Temperatures	1	1	2	4
Geologic Hazards				
• Earthquakes	1	3	4	8
• Landslides	1	1	2	4
• Tsunami	NA	NA	NA	NA
Key				
Highly likely:	90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.			
Possible :	10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.			
Unlikely:	Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.			
Catastrophic:	Immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.			
Critical:	Fast speed of onset or long duration of event resulting in devastating damage and loss of services for weeks or months.			
Limited:	Moderate speed of onset or moderate duration of event, resulting in some damage.			
Negligible:	Slow speed of onset or short duration of event resulting in little to no damage.			

Also discussed at this meeting were the hazards that affect each community and the identification of specific problem areas in the community that need to be addressed. This included the identification of new hazards that were determined to pose a threat or community vulnerability which are detailed in Clinton's Local Hazards Map on the following page. The entire community is equally at risk to the following hazards: Heavy rain, ice jams, high wind, hurricanes, tornados, nor'easters, heavy snow, ice storms, blizzards, drought, extreme temperatures, earthquakes and landslides.



Existing Protections

The original inventory of hazard mitigation actions which the Montachusett communities undertook for the 2008 Montachusett Region Hazard Mitigation Plan was reviewed and updated by each community at a meeting held in each community with the MRPC and the community's Local Hazard Mitigation Planning Team and, in some communities, the Emergency Management Committee. The attendees of the meetings can be found in Appendix A. The following matrices depict the updated inventory of what is currently being done to mitigate hazards by listing the programs and activities already in place. It includes a description of the protection measure, who is responsible, and improvements and changes that may be needed. This inventory was used by the Planning Team/Emergency Management Committee to identify gaps in existing protections that were then addressed through the development of this plan update.

Clinton

Type of Existing Protection	Description	Area Covered	Implementation Resources and Funding*	Improvements or Changes Needed
Flood Related Hazards				
Storm water management standards	State Regulation under the Wetlands Protection Act to regulate storm water and other point source discharge	Town-Wide	Enforced by the Clinton Conservation Commission (Wetlands Protection Act) and Clinton Planning Board (Subdivision Control Law and site plan review) both staffed by the municipal permitting clerk.	Storm water management standards are and continue to be enforced. No improvements or changes needed.
Wetlands Protection Act (state)	State law regulating development and activity within wetland buffer zone	100-foot state buffer around wetland area; 200 foot buffer around river front areas	Enforced by the Clinton Conservation Commission staffed by the municipal permitting clerk.	No improvements or changes needed.
100 Year Flood Zone	Federal Law requiring elevation above 100-year flood level of new and substantially improved residential structures in floodplain	100-year floodplain as shown on Flood Insurance Rate Map dated July 16, 2014.	Enforced by the Building Inspector (municipal staff) and Clinton Conservation Commission staffed by the municipal permitting clerk.	No improvements or changes needed.
Town Bylaw Flood Plain Districts	Local bylaw enhancing federal/state laws and regulating any development in the flood plain district	100-year floodplain as shown on Flood Insurance Rate Map dated July 16, 2014.	Enforced by the Building Inspector (municipal staff) and regulated by the Board of Appeals.	No improvements or changes needed.
Maintenance of municipal storm	Regular cleaning of catch basins, storm	Town-Wide	Undertaken by the Department of Public	Maintenance continues but

water drainage system	drains, and culverts		Works municipal staff.	additional Personnel and Equipment Needed to undertake this task.
Maintenance of public water bodies (ponds, streams, brooks, wetlands)	Periodic cleaning of waterways undertaken, i.e., remove trash, debris	Town-Wide	Undertaken by the Department of Public Works municipal staff with guidance from Conservation Commission	Maintenance continues. No improvements or changes needed.
Inspection of major dams	Periodic inspections of the structural integrity of the dam	Major Dams	Undertaken by the Massachusetts Department of Conservation and Recreation, Office of Dam Safety	Update Dam failure studies for the dams rated as high hazard
<u>Wind Related Hazards</u>				
State Building Code	State Law related to design loads to include wind effects	Town-Wide	Enforced by Building Department (municipal staff).	Continued enforcement remains in place. No improvements or changes needed.
Tree Maintenance	Regular inspection and tree maintenance to cut branches threatening power lines and overhead utilities	Town-Wide	National Grid staff (Electric Company).	Tree maintenance continues. No improvements or changes needed.
<u>Fire Related Hazards</u>				
Limited Brush Clearing	Brush clearing undertaken to provide access to Emergency Service vehicles.	Town-Wide	Directed by the Department of Public Works municipal staff.	Continue to Identify additional Areas with Potential for Brushfires
<u>Winter Storms Related</u>				
Residential Parking Bans	Parking Bans to Enable Snow Removal Effectively from Residential Streets	Town-Wide	Department of Public Works municipal staff.	Additional Personnel and equipment needed to enforce parking bans.
Clearing Snow from Major Arterial Routes	Ensure Access to Emergency Service vehicles.	Town-Wide	Department of Public Works municipal staff.	Additional personnel and equipment needed for snow removal.

*Clinton's enforcement/implementation is generally carried out by elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

Mitigation Goals, Objectives and Strategies

As discussed earlier in this Plan, MRPC previously prepared the 2008 Montachusett Region Hazard

Mitigation Plan which consisted of individual annexes for each MRPC community. Similarly, as part of the multi-jurisdictional plan update, each community also developed their own individual goals, objectives and strategies which are listed in this section.

Overall Goal Statement: To reduce the loss of life, property, infrastructure and cultural resources throughout the town of Clinton from natural disasters through a multiple hazard mitigation program that involves increased coordination, planning, education, and capital improvements.

1. **Objective:** To provide adequate shelter, water, food, and basic first aid to displaced residents in the event of a natural disaster, and to provide adequate notification and information regarding evacuation procedures, etc., to residents in the event of a natural disaster.
2. **Objective:** to increase coordination between inter-departments in pre-disaster planning, post-disaster recovery and continuous hazard mitigation implementation.
3. **Objective:** Increase awareness of hazard mitigation among town officials, private organizations, businesses, and the general public.
4. **Objective:** To ensure that critical infrastructure sites are protected from natural hazards, and to maintain existing mitigation infrastructure in good condition.
5. **Objective:** To educate the public about the threat of natural hazards and the possible mitigation measures that can be taken to protect public health and safety, as well as infrastructure and property; and to educate the public as well about zoning and building regulations, particularly regulations that relate to new construction.
6. **Objective:** To encourage future development in areas that are not prone to natural disasters.
7. **Objective:** To identify existing shelters that are earthquake resistant as well as outside of floodplain and inundation areas. Disseminate this information to appropriate Town departments.
8. **Objective:** To inventory supplies at existing shelters and develop a needs list and storage requirements; and to establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster.
9. **Objective:** To examine current notification system including a Reverse 911 system.
10. **Objective:** To collect, periodically update, and disseminate information on which local radio stations provide emergency information, what to include in a 'home survival kit,' how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to follow during a natural disaster.

Specific Natural Hazard Goals for Clinton

Goal Statement for Flooding: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to flooding. And to pursue prevention activities which include planning, zoning, open space preservation, floodplain and wetland development regulations, storm water management, waterway dumping regulations, watershed protection measures, and best management practices, as well as, soil erosion, building ordinances, and subdivision regulations.

1. **Objective:** To implement standards in the Subdivision Rules and Regulations to require temporary and permanent erosion control measures for streams and surface water bodies.
2. **Objective:** To add more specific requirements to address flood related issues in the Special Permit and Site Plan Approval provisions in the Clinton Zoning Bylaw including topographic change, removal of cover vegetation, risk of erosion or siltation and increased stormwater runoff.

3. **Objective:** To identify all structures throughout Town that needs to be elevated above the base-flood elevation.
4. **Objective:** To Develop a priority list and seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town.

Goal Statement for Protection from Beavers: To minimize the threat to health, the damage to roads and property, and the disruption of governmental services and general business activities due to flooding caused by beavers.

1. **Objective:** Support local town departments to continue present method to prevent beaver caused flooding.
2. **Objective:** Seek assistance from beaver management professionals, including trappers.
3. **Objective:** Install beaver management devices.

Goal Statement for Hurricanes and Tornadoes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to high winds associated with hurricanes and tornadoes. (The objectives listed above, under flooding, address the flooding that can result from a hurricane.)

1. **Objective:** To educate residents and volunteers regarding the safe method and actions necessary to deal with Hurricanes and Tornadoes.

Goal Statement for Winter Related Hazards: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to severe snow and ice storms.

1. **Objective:** To develop a plan for providing access to water, information, shelter, and food stores to people in remote locations in Clinton in the event of a severe winter storm.

Goal Statement for Dam Failure: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to dam failures.

1. **Objective:** To identify sources of funding for dam safety inspections.

Goal Statement for Earthquakes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to earthquakes.

1. **Objective:** To evaluate all Shelters and Reception Centers to determine if they are earthquake resistant.
2. **Objective:** To insure that all identified shelters have sufficient back-up utility service in the event of primary power failure.

Goal Statement for Drought: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to drought.

1. **Objective:** Prepare a Water Conservation Plan for Clinton.

Goal Statement for Wildfires/Brushfires: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to wildfires/brushfires.

1. **Objective:** Develop and distribute an educational pamphlet on fire safety and prevention.
2. **Objective:** Consider amending the Subdivision Rules and Regulations and Required Improvements section to include fire suppression provisions for new residential developments.

Goal Statement for Weather Extremes: To minimize the loss of life and the threats to public health and safety.

- 1. Objective:** To develop and distribute educational information regarding the threats from extreme heat and cold.
- 2. Objective:** To educate the residents as to the causes and effects of global warming; and how it affects the residents of Clinton, and what they could be doing to help improve the situation

Mitigation Action Plans and Prioritization of Actions (STAPLEE)

Initial Mitigation Action Plans for the Montachusett Communities were presented in the communities Hazard Mitigation Plans that were approved by FEMA in 2009 and 2010. The original Mitigation Action Plans were developed through an inventory of potential hazards which could impact the community and an evaluation of a range of alternatives to address these hazards. As part of the plan update process, the original Mitigation Action Plan was reviewed by the community's Local Hazard Mitigation Planning Team/Emergency Management Committee to delete actions which have already been completed, add additional actions which are either underway or planned to be undertaken, and to update the current status of all actions. The goals were reviewed and updated at the second meeting with each community.

An additional step in this process was to conduct a "STAPLEE" analysis for each action to prioritize all actions within each community and a subjective evaluation of each action's perceived cost/benefit. In the 2008 plan, actions were not prioritized so there were no changes in priorities in this update. The revised Community Mitigation Action Plans matrices that follow identify each mitigation action, the responsible department or board responsible for implementation, potential funding sources, the timetable of the action, results of the prioritization of actions through the STAPLEE analysis, and the perceived cost/benefit for each mitigation action.

The goal of each identified strategy, or mitigation action, is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each action to establish priorities for implementation, using the "STAPLEE" method. The STAPLEE methodology was developed by the Federal Emergency Management Agency as a tool to help communities prioritize their hazard mitigation strategies and determine the most appropriate actions for implementation. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of an action and is designed to be used by public officials and planners for making planning decisions.

To conduct the STAPLEE exercise, the community's Hazard Mitigation Team was asked to rate each action in their Mitigation Action Plan on each of the following criteria, using a score of 1 to 3 (Good = 3, Average = 2, Poor = 1):

- **Social:** Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- **Technical:** Will the proposed strategy work? Will it create more problems than it solves?
- **Administrative:** Can the community implement the action? Is there someone to coordinate and lead the effort?
- **Political:** Is the action politically acceptable? Is there public support both to implement and to

maintain the action?

- Legal: Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- Economic: What are the costs of this action? Does the cost seem reasonable for the size of the problem and the likely benefits?
- Environmental: How will the action impact the environment? Will the action need environmental regulatory approvals?

These scores were then totaled, resulting in a final score of 7 (least priority) to 21 (highest priority) for each action. The higher the final score, the higher the relative priority of that action for implementation. This information can then be utilized in each community as they conduct and administer relevant municipal functions and activities. The final STAPLEE score for each action is shown in the following mitigation action plan.

The Hazard Mitigation team was also asked to do a relative cost/benefit of each action. This assessment was intended to informally indicate if an action will either have more benefits accrued to the Town than the Cost of implementing the action, or if the costs would exceed any benefits. Responses include: "Benefits Exceed Costs", "Benefits Equal Costs, or "Costs Exceed Benefits".

CLINTON IMPLEMENTATION STRATEGY FOR PRIORITY MITIGATION ACTIONS

Type of Natural Hazard	Description Of Action	Implementation Responsibility	Resources/ Funding*	Timeframe	Priority (Staple Score)	Cost/Benefit Evaluation	Status Update from the 2008 Plan**
All Natural Hazards	Work with Neighboring Communities to Establish a Community Emergency Response Team (CERT) to more effectively respond to all natural hazards thus mitigating any damage.	Board of Selectmen, Police & Fire Departments, Emergency Management Director	Municipal Staff/ Volunteers	2015 - 2020	20.5	Benefit exceeds cost	Carried Forward due to time constraints.
Flood Related Hazards and Geologic Hazards	Identify Existing Shelters that are Earthquake Resistant as well as Outside of Floodplain (and Dam Inundation) Areas to ensure that shelters are available to the public during these type of hazards. Shelters must be identified and adequate to eliminate or reduce risk to human life.	Building Inspector, Emergency Management Director	Municipal Staff	2017 (12 months)	21	Benefit exceeds cost	Carried forward due to time constraints.

Wildland Fire	Increase awareness by educating property owners regarding actions that they can take to reduce risk to property by hosting an Open House at the Fire Department, developing and distributing an Educational Pamphlet on Fire Safety and Prevention (SAFE PROGRAM) (SENIOR SAFE) and wildfire prevention.	Fire Department	Municipal Staff	2015 - 2020	21	Benefit exceeds cost	Completed but carried forward as this action is undertaken on an annual basis.
Natural All Hazards	Increase hazard education and risk awareness to public by updating and Disseminating Information on Local Radio/TV Stations to educate the public and alert them of emergency information including shelter locations and other instructions related to all natural hazards.	Emergency Management Director	Municipal Staff	2015 - 2020	19.5	Benefit equals cost	Completed but carried forward as this action is undertaken on an annual basis.

All Natural Hazards	Inventory Supplies at Existing Shelters and Develop a Needs List and Storage Requirements to ensure the available of adequate supplies during a natural hazard. Supplies must be adequate to eliminate or reduce risk to human life.	Emergency Management Planning Committee, School Facilities Manager	Municipal Staff	2015 - 2020	20.5	Benefit exceeds cost	Completed but carried forward as this action is undertaken on an annual basis.
Atmospheric and Winter Related Hazards	Develop a Mitigation Plan to provide access to Water, Information, Shelter and Food Stores to People in Remote Locations of the town in the Event of a natural hazard and integrate this information into community comprehensive plans.	Emergency Management Director /CEMA	Municipal Staff /Volunteers	2015-2020	20	Benefit equals cost	Carried forward due to lack of funding and time constraints.
All Natural Hazards	Develop a Preliminary Project Proposal and Cost Estimate for Updating Current 911 System including Feasibility of Reverse 911 to reduce or eliminate the long-term risk to human life and property from hazards.	Board of Selectmen, Emergency Management Director	Municipal Staff/ Volunteers	2017 (12 months)	21	Benefit exceeds cost	Carried forward due to time constraints.

Flood Related Hazards	Identify all structures throughout the town that need to be Elevated above the Base-Flood Elevation. Once identified educate those property owners regarding their options for mitigation.	Building Inspector, Emergency Management Director	Municipal Staff. Also FEMA HMGP grant 75%	2020 (12 months)	17.5	Cost exceeds benefit	Carried forward due to time constraints.
Flood Related Hazards	To Develop a priority list and possibly seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town to reduce or eliminate flooding risk.	Board of Selectmen, Highway Department	Municipal Staff/ FEMA HMGP grant 75%	2017 (12 months)	18.5	Benefit equals cost	Carried forward due to time constraints.
Flood Related Hazards	Educate property owners regarding options for mitigating their properties from flooding through outreach programs that address measures that residents can take (i.e installing backflow valves, securing debris, etc.)	Emergency Management Director, Fire Department	Property Owners	2015 - 2020	13.5	Benefit exceeds cost	New Action.

Flood Related Hazards	Continue participation in the National Flood Insurance Program to enable property owners to purchase insurance protection against flood losses.	Board of Selectmen, Conservation Commission	FEMA/MEMA	2015 - 2020	21	Benefit exceeds cost	Completed but carried forward. Ongoing. The town continues its participation in the NFIP.
Flood Related Hazards	Evaluate and relocate furnaces, water heaters, and electrical equipment in municipal owned buildings that are located in areas prone to flooding to reduce flood damage.	Emergency Management Director, Fire Department	Municipal Staff	2015 - 2020	12	Cost exceeds benefit	Carried forward due to staff constraints and lack of municipal funding.
Flood Related Hazards	Hire trapper for removal of beavers to mitigate flooding caused by beaver dams.	Department of Public Works	Department of Public Works	2015 – 2020	14.5	Cost equals benefit	Carried forward. Ongoing. This action is undertaken needed.
All Natural Hazards	Implement recommendations regarding natural hazard mitigation in existing planning documents including the master plan, five year action plan of the open space and recreation plan and the emergency evacuation plan	Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	Conservation Commission, Planning Board, Emergency Management Director	2015 - 2020	19.5	Benefit exceeds cost	Completed but Carried forward. This is an ongoing effort. For example, Town recently adopted a flexible development bylaw which preserves open space and mitigates possible flooding and erosion from excess development. This was a recommendation of the town's open space and recreation plan.

*Unless otherwise noted, Clinton's Resources/Funding consists of elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

**Actions identified as carried forward were not completed in the previous planning cycle unless otherwise stated.

Mitigation Actions from the 2008 Montachusett Region Hazard Mitigation Plan that are complete include:

- Evacuation Routes Study.
- Expand residential parking bans to enable snow removal from all streets
- Update Insurance Flood Rate Maps.

Devens Natural Hazard Risk Assessment

While this annex focus' pertains to critical facilities, flooding, risk assessment, existing protections and mitigation strategy in the community, more detailed descriptions of each natural hazard's impact on the region and its communities and summary of vulnerability can be located in the regional section entitled "4. Identification of Natural Hazards, Identifying and Profiling Hazards".

Community Profile

Devens is a self-contained community in north central Massachusetts, previously Fort Devens. Devens covers an area of 6.76 square miles and has a resident population of 1,840, according to the 2010 U.S. Census. It is bordered by Ayer on the east, Shirley on the north, Lancaster on the west, Harvard on the south. The population density is 269 people per square mile. There are 152 housing units at Devens, and the average household size is 2.62 people. The median age of Devens' residents is 29.

After serving as the U.S. Army's New England Headquarters for 79 years, Fort Devens was closed in 1996. With the endorsement of the voters in the host towns of Ayer, Harvard, and Shirley, and the approval of the state, the property was conveyed to Mass Development, a quasi-public economic development and real estate agency tasked with stimulating economic investment across Massachusetts.

With nearly 2,100 acres of open space and recreation lands, Devens offers unique opportunities for active and passive recreation to area residents. Mass Development currently provides municipal services, education, environmental protection, and the infrastructure improvements to convert the former military installation into a planned community. Devens has become a national model for military base reuse. Devens is also host to world-class high-technology companies.

Critical Facilities

In general usage, the term "critical facilities" is used to describe all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired.

Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals,

and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even access to damaged areas.

The number and nature of critical facilities in a community can differ greatly from one jurisdiction to another, and usually comprise both public and private facilities. In this sense, each community needs to determine the relative importance of the publicly and privately owned facilities that deliver vital services, provide important functions, and protect special populations. *Source: Federal Emergency Management Administration, Risk Management Series, Design Guide for Improving Critical Facility Safety from Flooding and High Winds, FEMA 543, January 2007.*

A list of the critical facilities within the community is shown in Table 36. This data was obtained from the community’s Comprehensive Emergency Management Plan (CEMP). The data was then reviewed by the Emergency Management Director. These facilities were digitized into GIS and used for determining vulnerability to the various hazards. The map that follows entitled FEMA Q3 Flood Zones and Critical Infrastructure depicts Critical Facilities in the community.

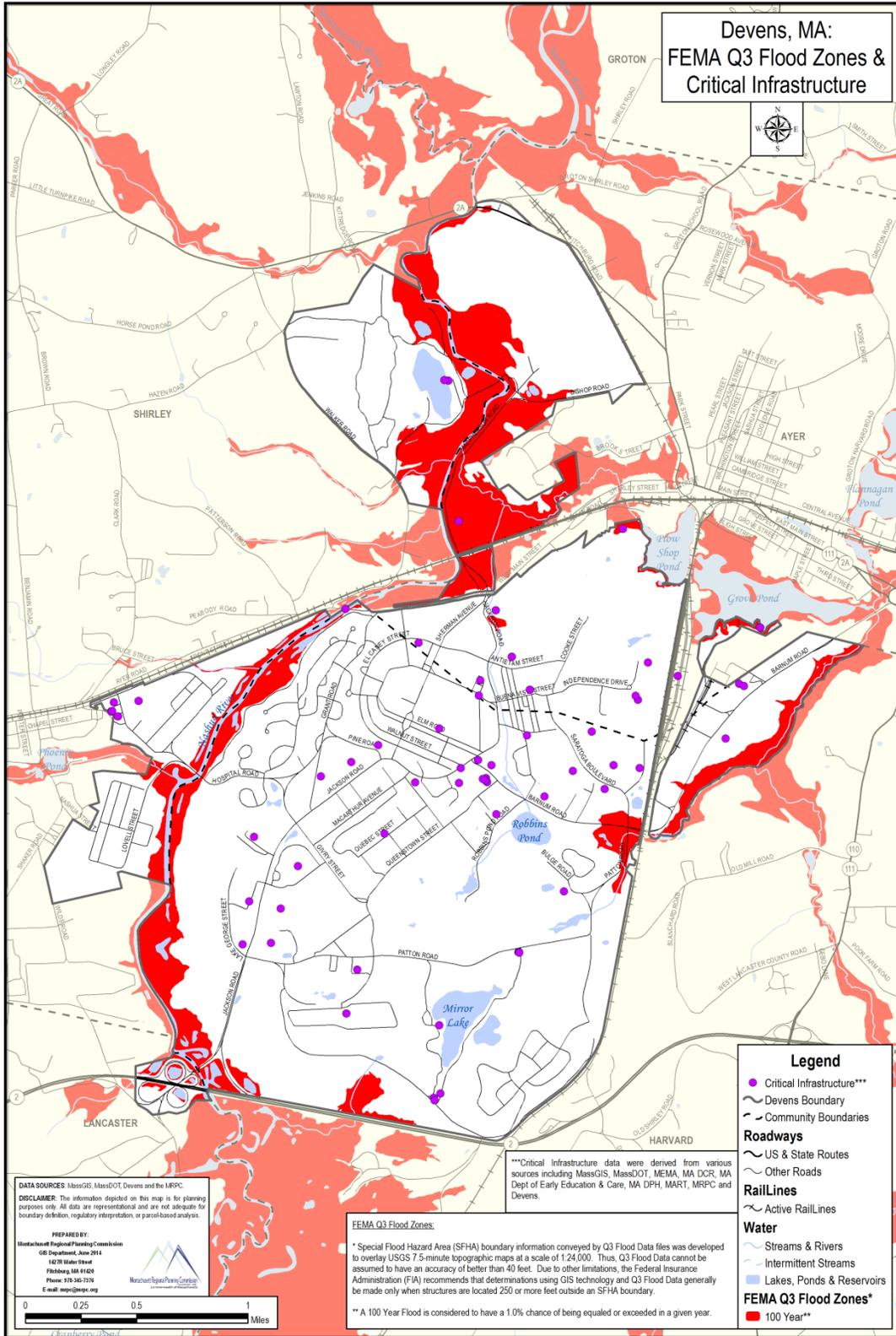
Table 36: Devens Critical Facilities

Feature Type	Name	Address
City/Town Halls	*Shirley Town Hall	7 Keady Way
College	Mt.Wachusett Comm. College, Adult Learning Center	27 Jackson Road
Communication Towers	Communication Tower in back of fire department	Barnum Road
DPW Facilities	Devens DPW	99 Buena Vista Street
Early Education Childcare Facilities	Guild of St. Agnes - EEC - Devens	172 JACKSON RD
	Applewild preschool	27 Jackson Road
	Evergreen Garden Preschool	270 BARNUM RD
Emergency Operations Centers	*Shirley Police Station	11 Keady Way
	Devens Fire Station	182 Jackson Road
	Devens DPW	99 Buena Vista Street
Emergency Shelters	Devens Community Center	100 Sherman Ave
	Hilton Garden Inn	59 Andrews Pkwy.
	SpringHill Suites by Marriott	27 Andrews Parkway
	Francis W. Parker Charter Essential	49 Antietam Street
	*Shirley Town Hall	7 Keady Way
	*Shirley Police Station	11 Keady Way
	*Hazen Memorial Library	3 Keady Way
	*Shirley Middle School	1 Hospital Road
End of Life Facilities	None	
Fire	Devens Fire Station	182 Jackson Rd

Freight	Devens Intermodal Rail Terminal	
HazMat Sites	American Superconductor	64 Jackson Rd.
	Army Natl Guard Complex	87 Barnum Road
	Bionostics	7 Jackson Rd.
	Bristol Meyers Squibb	38 Jackson Road
	Comrex	19 Pine St.
	Eglomise Designs	4 Antietam St.
	Integra	29 Saratoga Blvd.
	Johnson-Matthey	25 Patton Rd.
	Kenco	
	MEMA M&C	87 Barnum Rd. Bldg 3768
	Netstal Machinery	57 Jackson Rd.
	New England Sheets	
	Parker Hannifin Aerospace FSD	14 Robbins Pond Rd.
	RFTA Fort Devens	30 & 31 Quebec St.
	Rapid Refill	4 Andrews Parkway
	Red Tail Golf Course	15 Buldge Rd.
	Regency Warehouse	50 Independence Dr.
	Rock Tenn - Southern Container LLC	51 Independence Drive
	Ryerson Corp.	45 Saratoga Blvd.
	Shelpley Hill Treatment facility	(access off of) Scully Road
	United Water Waste Water Treatment Plant	31 Macpherson Rd.
	Waiteco Machine	18 Saratoga Blvd
	Xinetics, Inc.	115 Jackson Rd.
Devens DPW	99 Buena Vista Street	
Devens Regional WWTF	85 Walker Road	
FMC Devens - Federal Medical Center	42 Patton Road	
Other Critical Facilities	Shriver Job Corps Center	280 Jackson Road
	Mirror Lake Recreational Area (Seasonal)	Patton Rd
	Shriver Job Corps Center	280 Jackson Road
	Our Fathers House	18 Cavite Street
	Barnum Bridge	West Main Street
	Nashoba Valley Regional Emergency Comm. Center	270 Barnum Road
	Seven Hills Academy Adult day care facility	22 Grant Road
	Quiet Logistics II	235 Barnum road
	Quiet Logistics	66 Saratoga Blvd.
Police	*Shirley Police Station	11 Keady Way
	State Police Barracks- Devens (Station C-9)	59 Buena Vista Street
	MSP Headquarters C-9	59 Buena Vista Street

Potable Water Treatment Plants	Patton Well	168 Patton Road
Prisons	FMC Devens - Federal Medical Center	42 Patton Road
	FMC Devens - Satellite Camp	42 Patton Road
Public Health Office	*Shirley Town Offices	7 Keady Way
	Grove Pond Gravel Packed (12 8") Wells	
	Macpherson Naturally Developed Well	
	Proposed Sheridan Rd Well (Tw9b-08)	
	Shabokin Replacement Well	
	Patton Replacement Well	
	Shabokin Gravel Packed Well	
	Patton Gravel Packed Well	
	Grove Pond Gravel Packed (12 8") Wells	
	Macpherson Naturally Developed Well	
	Grove Pond Gravel Packed (12 8") Wells	
	Macpherson Naturally Developed Well	
	Patton Gravel Packed Well	
	Shabokin Gravel Packed Well	
School	*Ayer/ Shirley Middle School (ASRD)	1 Hospital Road
	Shriver job Corps	270 Jackson Rd.
	Oxbow Schoolhouse	270 Barnum Rd
	Francis W. Parker Charter Essential	49 Antietam Street
Wastewater Treatment Plant	Devens Regional WWTF	85 Walker Road

*Facility is located within the boundaries of Devens but is under the jurisdiction of the specified municipality.



Flood Prone Areas

Particular areas within the community where the risk of flood areas are or could occur were determined at the first meeting of the Devens Local Hazard Mitigation Team held on October 16, 2012. This information can be found on Devens’s Local Hazard Map which is located under the section entitled Risk Assessment.

Flooding Vulnerability Assessment

An analysis of the FIRM flood hazard area maps indicates that there is a total of 628.2 acres of 100-year floodplain within Devens. This amounts to 14.05% of the total community. Based on additional analysis, 11.7 acres (1.86%) of the floodplain are developed. Currently there are 7 structures in the floodplain which is about 1.53% of the total structures in the community. The buildings are then multiplied by the building value, as determined by the MA Department of Revenue, to come up with a potential loss of \$1,312,100.

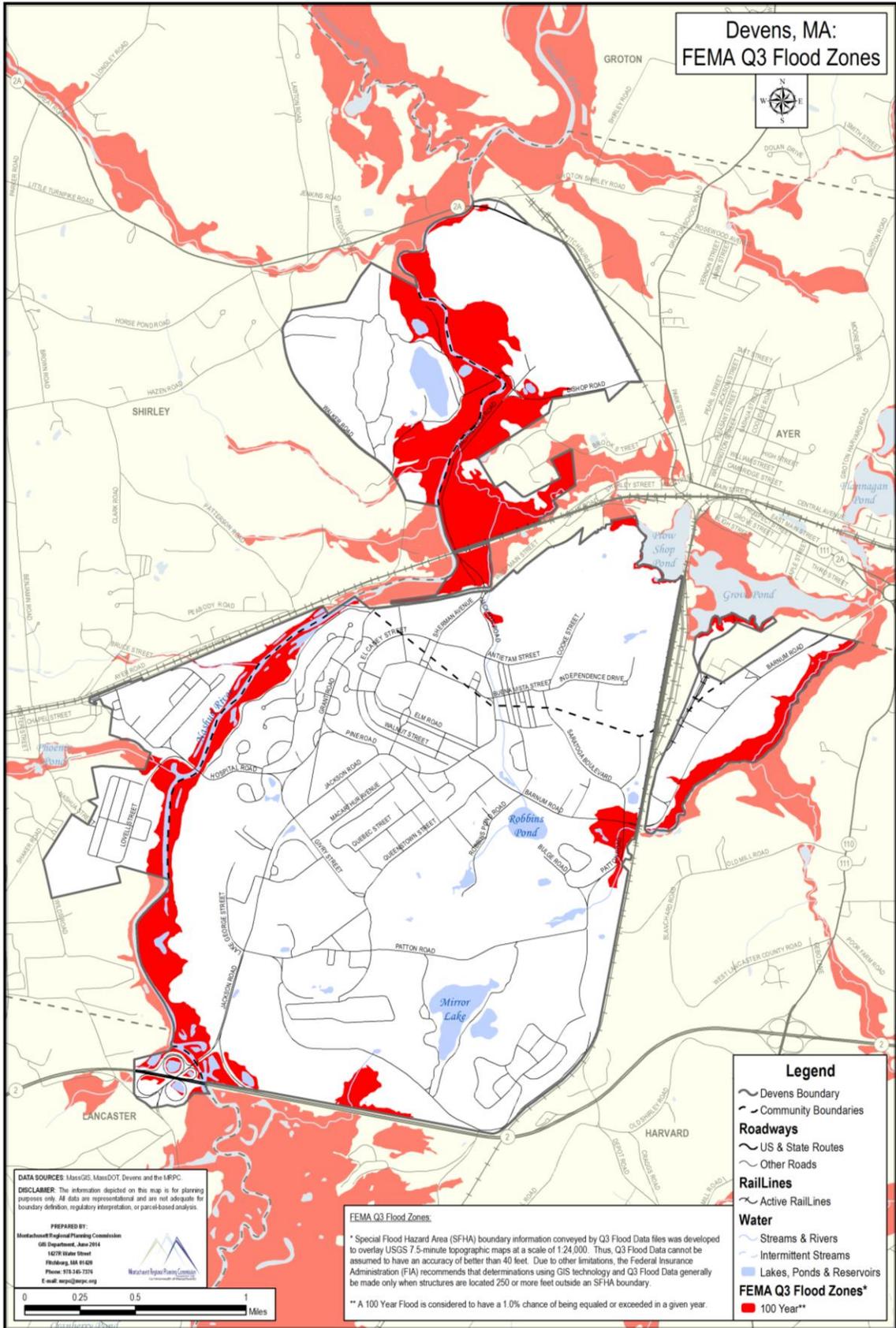
The village of Devens does not participate in the NFIP individually. However Devens geographically consists of towns of Ayer, Shirley and Harvard and those communities participate in the NFIP.

Critical facilities in Devens that are within the 100 year floodplain are listed in the table that follows.

Table 37: Devens Critical Facilities within 100-Year Flood Zone

Feature Type	Name	Address
HazMat Sites	Shelpley Hill Treatment facility	(access off of) Scully Road
Other Critical Facilities	Barnum Bridge	West Main Street
Public Water Supply	Grove Pond Gravel Packed (12 8") Wells	
	Macpherson Naturally Developed Well	
	Grove Pond Gravel Packed (12 8") Wells	
	Macpherson Naturally Developed Well	
	Grove Pond Gravel Packed (12 8") Wells	
	Macpherson Naturally Developed Well	

The map that follows entitled FEMA Q3 Flood Zones depicts the 100 year flood zones in the community.



Structurally Deficient Bridges Over Waterways

Devens does not have any bridges over water that are classified by MassDOT as “structurally deficient”.

Hazard Potential of Dams

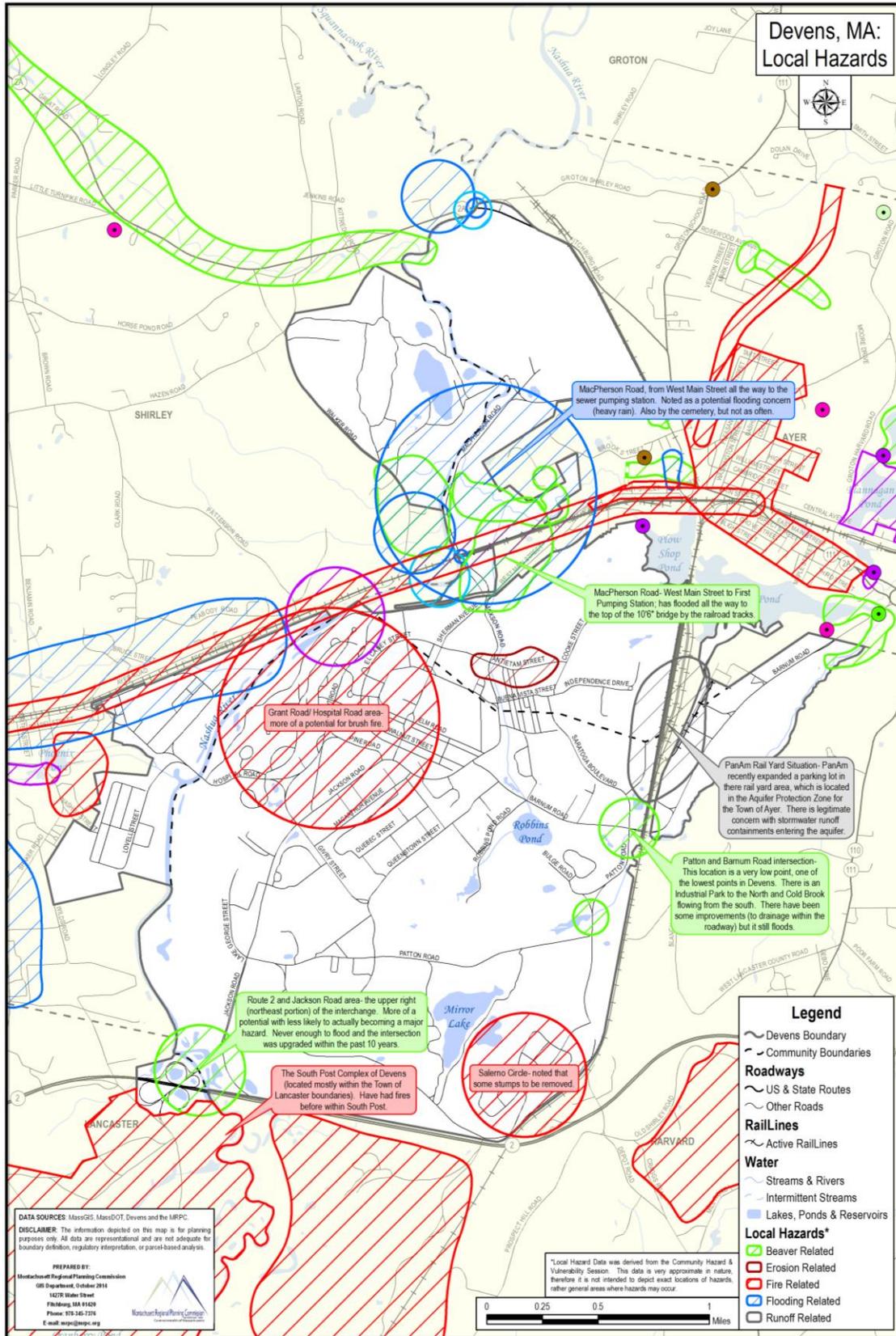
There are no existing dams in Devens.

Risk Assessment

As previously stated, located in Section 4. Identification of Natural Hazards, Identifying and Profiling Hazards”, there is a description of each identified hazards’ impact on the region and its communities as well as an overall summary of vulnerability. Based on the hazards identified in this plan and the assessment of risks by Devens, the community considers itself to be at a high risk for Heavy Rain, Snow Melt, Beavers, Severe Thunderstorms; moderate risk Ice Jams, High Winds, Hurricanes, Nor’easters, Heavy Snow, Ice Storms, Blizzard, Wild land Fire, Drought, Extreme Temperatures, Earthquakes; low risk for Dam Failure, Tornados, Major Urban Fires, and Landslides: and tsunamis as not applicable. This information is documented in the Devens Natural Hazard Matrix below which was obtained from participant at the Devens Local Hazard Mitigation Team Meeting held on October 16, 2012.

Devens Natural Hazard Matrix				
Natural Hazard	Likelihood of Occurrence	Location	Impacts	Hazard Index
Natural Hazard Separated by Flood, Atmospheric Related and Winter Related, Other Natural Hazards, and Geologic Hazards	3 = Highly Likely 2 = Possible 1 = Unlikely	3 = Regional/State 2 = Multi Community/Regional 1 = Local/Town	4 = Catastrophic 3 = Critical 2 = Limited 1 = Negligible	Ranking Determined by Combining the Likelihood, Location and Impacts of a Natural Hazard
Flood-Related Hazards				
• Heavy Rain	3	2	2	7
• Snow Melt	3	2	2	7
• Dam Failure	1	1	1	3
• Ice Jams	2	1	1	4
• Beavers	3	2	2	7
Atmospheric Related and Winter Related Hazards				
• High Winds	2	2	2.5	6.5
• Hurricanes	2	2	2	6
• Tornadoes	1	1	1	3
• Nor'easters	2	2	2.5	6.5
• Severe Thunderstorms	3	2	2	7
• Heavy Snow	2	1	2	5
• Ice Storms	2	1	2	5
• Blizzard	2	1	2	5
Other Natural Hazards				
• Major Urban Fires	1	1	1	3
• Wildland Fire	2	2	2.5	6.5
• Drought	2	1	1	4
• Extreme Temperatures	2	1	1	4
Geologic Hazards				
• Earthquakes	2	2	2	6
• Landslides	1	1	1	3
• Tsunami	NA	NA	NA	NA
<p>Key</p> <p>Highly likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.</p> <p>Possible: 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.</p> <p>Unlikely: Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.</p> <p>Catastrophic: Immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.</p> <p>Critical: Fast speed of onset or long duration of event resulting in devastating damage and loss of services for weeks or months.</p> <p>Limited: Moderate speed of onset or moderate duration of event, resulting in some damage.</p> <p>Negligible: Slow speed of onset or short duration of event resulting in little to no damage.</p>				

Also discussed at this meeting were the hazards that affect each community and the identification of specific problem areas in the community that need to be addressed. This included the identification of new hazards that were determined to pose a threat or community vulnerability which are detailed in Deven's Local Hazards Map on the following page. The entire area is equally at risk to the following hazards: Heavy rain, snow melt, ice jams, high winds, hurricanes, tornados, nor'easters, heavy snow, ice storms, blizzards, drought, extreme temperatures, earthquakes and landslides.



Existing Protections

Existing Protection Matrix – Devens

The Community of Devens, Massachusetts is different from the other jurisdictions in the Montachusett Region in that it is an unincorporated village and census-designated place within the towns of Ayer, Shirley and Harvard. Therefore, the Hazard Mitigation Plans for each of these three communities are applicable to Devens, including their existing protections matrices. In addition, separate from the Hazard Mitigation Plans developed for the 22 Montachusett Region municipalities, Devens has prepared its own Comprehensive Emergency Management Plan (CEMP), which was updated as of February, 2014. The CEMP provides a framework wherein the community can plan and perform their respective emergency functions during a disaster or emergency situation on the local, state or national level. The CEMP addresses Mitigation, Preparedness, Response, and Recovery aspects of emergency management organizations, programs, protective actions, and specific hazards:

1. Mitigation: Those activities which eliminate or reduce the probability of disaster;
2. Preparedness: Those activities which governments, organizations, and individuals develop to save lives and minimize damage;
3. Response: Those activities which prevent loss of lives and property and provide emergency assistance; and
4. Recovery: Short and long term activities which return all systems to normal or improved standards.

The plan is written in accordance with existing federal, state and local statues and understanding of the various departments involved and is incorporated by reference into the Montachusett Hazard Mitigation Plan. The Devens Comprehensive Emergency Management Plan outlines an emergency management program for planning and response to potential emergency or disaster situations. It assigns responsibilities and functions, which will provide for the safety and welfare of citizens against the threat of natural, technological, and national security emergencies and disasters.

Mitigation Goals, Objectives and Strategies

Devens Overall Goal Statement: To prepared to reduce the loss of life, property, infrastructure and cultural resources throughout the Devens Community from natural disasters through a multiple hazard mitigation program that involves increased coordination, planning, education, and capital improvements.

1. **Objective:** To organize and prepare to provide adequate shelter, water, food, and basic first aid to displaced residents in the event of a natural disaster, and to provide adequate notification and information regarding evacuation procedures, etc., to residents in the event of a natural disaster.
2. **Objective:** To inventory supplies at existing shelters and develop a needs list and storage requirements; and to establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster.
3. **Objective:** To have the Emergency Management Director (EMD) led an effort to increase coordination between inter-departments in pre-disaster planning and implementation of hazard mitigation projects.
4. **Objective:** Participate in Regional emergency dispatching system (includes Lancaster, Lunenburg, Devens, and Harvard).

5. **Objective:** To maintain Code Red notification system (coordinated with Regional dispatching system).
6. **Objective:** To collect, periodically update, and disseminate information through local radio stations, weekly email newsletter, internet mailings, and utility bill enclosures to provide emergency information on what to include in a “home survival kit, how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to follow during a natural disaster.

Specific Natural Hazard Goals for the Devens Community

Goal Statement for Flooding: To prepare emergency staff and volunteers in order to minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to flooding.

1. **Objective:** To continue to participate in the National Flood Insurance Program and to have the flood maps periodically updated.
2. **Objective:** To conduct culvert cleaning through the Massachusetts Mosquito Program.

Goal Statement for Protection from Beavers: To minimize the threat to health, the damage to roads and property, and the disruption of governmental services and general business activities due to flooding caused by beavers.

1. **Objective:** Support local town departments to continue present methods to prevent beaver caused flooding.
2. **Objective:** Utilize Devens DPW staff for beaver control.
3. **Objective:** Install beaver management devices.

Goal Statement for Hurricanes and Tornadoes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to high winds associated with hurricanes and tornadoes. (The objectives listed above, under flooding, address the flooding that can result from a hurricane.)

1. **Objective:** To educate residents and volunteers regarding the safe methods and actions necessary to deal with Hurricanes and Tornadoes.
2. **Objective:** Pursue protective measures to eliminate potential hazards.

Goal Statement for Winter Related Hazards: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to severe snow and ice storms.

1. **Objective:** To develop a plan for providing access to water, information, shelter, and food stores to people in remote locations in the Devens Community in the event of a severe winter storm.
2. **Objective:** Coordinate with local businesses to provide shelter/short-term refuge in the event of serious emergency or power outage.

Goal Statement for Earthquakes: To educate staff, residents and volunteers about the potential for earthquakes and strategies to minimize the loss of life, damage to property, the disruption of governmental services and general business activities due to earthquakes.

1. **Objective:** To insure that all identified shelters have sufficient facilities and back-up utility service in the event of primary power failure.

Mitigation Action Plans and Prioritization of Actions (STAPLEE)

Initial Mitigation Action Plans for the Montachusett Communities were presented in the communities Hazard Mitigation Plans that were approved by FEMA in 2009 and 2010. The original Mitigation Action Plans were developed through an inventory of potential hazards which could impact the community and an evaluation of a range of alternatives to address these hazards. As part of the plan update process, the original Mitigation Action Plan was reviewed by the community's Local Hazard Mitigation Planning Team/Emergency Management Committee to delete actions which have already been completed, add additional actions which are either underway or planned to be undertaken, and to update the current status of all actions. The goals were reviewed and updated at the second meeting with each community.

An additional step in this process was to conduct a "STAPLEE" analysis for each action to prioritize all actions within each community and a subjective evaluation of each action's perceived cost/benefit. In the 2008 plan, actions were not prioritized so there were no changes in priorities in this update. The revised Community Mitigation Action Plans matrices that follow identify each mitigation action, the responsible department or board responsible for implementation, potential funding sources, the timetable of the action, results of the prioritization of actions through the STAPLEE analysis, and the perceived cost/benefit for each mitigation action.

The goal of each identified strategy, or mitigation action, is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each action to establish priorities for implementation, using the "STAPLEE" method. The STAPLEE methodology was developed by the Federal Emergency Management Agency as a tool to help communities prioritize their hazard mitigation strategies and determine the most appropriate actions for implementation. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of an action and is designed to be used by public officials and planners for making planning decisions.

To conduct the STAPLEE exercise, the community's Hazard Mitigation Team was asked to rate each action in their Mitigation Action Plan on each of the following criteria, using a score of 1 to 3 (Good = 3, Average = 2, Poor = 1):

- **Social:** Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- **Technical:** Will the proposed strategy work? Will it create more problems than it solves?
- **Administrative:** Can the community implement the action? Is there someone to coordinate and lead the effort?
- **Political:** Is the action politically acceptable? Is there public support both to implement and to maintain the action?
- **Legal:** Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- **Economic:** What are the costs of this action? Does the cost seem reasonable for the size of the problem and the likely benefits?
- **Environmental:** How will the action impact the environment? Will the action need environmental regulatory approvals?

These scores were then totaled, resulting in a final score of 7 (least priority) to 21 (highest priority) for each action. The higher the final score, the higher the relative priority of that action for implementation. This information can then be utilized in each community as they conduct and administer relevant municipal functions and activities. The final STAPLEE score for each action is shown in the following mitigation action plan.

The Hazard Mitigation team was also asked to do a relative cost/benefit of each action. This assessment was intended to informally indicate if an action will either have more benefits accrued to the Town than the Cost of implementing the action, or if the costs would exceed any benefits. Responses include: "Benefits Exceed Costs", "Benefits Equal Costs, or "Costs Exceed Benefits".

DEVENS IMPLEMENTATION STRATEGY FOR PRIORITY MITIGATION ACTIONS

Type of Hazard	Description of Action	Implementation Responsibility	Resources/Funding*	Timeframe	Priority (STAPLEE Score)	Cost/Benefit Evaluation	**Status Update
All Natural Hazards	Work with Neighboring Communities to Establish a Community Emergency Response Team (CERT) to more effectively respond to all natural hazards thus mitigating any damage.	Fire Departments, Emergency Management Director	Devens Staff/ Volunteers	2015 to 2020;	13.25	Benefit exceeds cost	New Action.
Flood Related Hazards and Geologic Hazards	Identify Existing Shelters that are Earthquake Resistant as well as Outside of Floodplain (and Dam Inundation) Areas to ensure that shelters are available to the public during these type of hazards. Shelters must be identified and adequate to eliminate or reduce risk to human life.	Devens Enterprise Commission (DEC), EMD	Devens Staff	2015 to 2020	19.25	Cost equal benefit	New Action.

Wildland Fire	Increase awareness by educating property owners regarding actions that they can take to reduce risk to property by hosting an Open House at the Fire Department, developing and distributing an Educational Pamphlet on Fire Safety and Prevention (SAFE PROGRAM) (SENIOR SAFE) and wildfire prevention.	Fire Department	Devens Staff	2015 to 2020	21	Benefit exceeds cost	New Action.
All Natural Hazards	Increase hazard education and risk awareness to public by Collecting, Updating, and Disseminating Information through Local Radio/TV Stations, newsletters and the use of the Internet regarding Emergency Information related to all natural hazards.	Emergency Management Director, Mass Development	Devens Staff	2015 to 2020	21	Benefit exceeds cost	New Action.

All Natural Hazards	Inventory Supplies at Existing Shelters and Develop a Needs List and Storage Requirements to ensure the available of adequate supplies during a natural hazard. Supplies must be adequate to eliminate or reduce risk to human life.	Emergency Management Planning Committee, School Facilities Manager	Devens Staff	2015 to 2020	17	Benefit exceeds cost	New Action.
Atmospheric and Winter Related Hazards	Develop a Mitigation Plan to provide access to Water, Information, Shelter and Food Stores to People in Remote Locations of the town in the Event of a Severe natural hazard. Integrate this information into community comprehensive plans.	Devens Enterprise Commission (DEC)	Devens Staff/Volunteers	2015 to 2020	17.25	Benefit exceeds cost	New Action.
Flood Related Hazards	Update flood mapping to identify structures in flood plain	Building Inspector, Fire Department	Devens Staff. Also, 75% FEMA FUNDING AVAILABLE. remaining 25% (non-federal)	2015; Some wells may be subject to flooding	21	Benefit exceeds cost	New Action.

Flood Related Hazards	Prepare a Priority List and possibly seek funding through the Hazard Mitigation Program for the Replacement of Undersized Culverts throughout the town to reduce or eliminate flooding risk.	Devens Engineering, Department of Public Works	Devens Staff	2015 (12 months)	14.5	Cost equal benefit	New Action.
Flood Related Hazards	Continue participation in the National Flood Insurance Program***	Devens Enterprise Commission (DEC), Conservation Commission	FEMA/MEMA	2015 to 2020	Not Evaluated	Benefit exceeds cost	New Action.
Flood Related Hazards	Evaluate and relocate furnaces, water heaters, and electrical equipment in municipal owned buildings that are located in areas prone to flooding to reduce flood damage.	Emergency Management Director, Fire Department, Department of Public Works	Devens Staff and Property Owners	2015 to 2020; All historic properties are outside of flood plain	20	Benefit exceeds cost	New Action.
Atmospheric Related Hazards	Enforce state building codes related to design loads to include wind effects generated from atmospheric related hazards.	Building Inspector, Fire Department	Devens Staff, Contractor and Property Owners	2015 to 2020	21	Benefit exceeds cost	New Action.

Other Natural Hazards (Wildland fire)/ Atmospheric Related and Winter Related Hazards	Identify areas with potential for brush fires to track community vulnerability by developing and maintaining a data base. Clear brush to provide access for emergency services. Regularly inspect and cut branches threatening power lines and overhead utilities.	Department of Public Works, Utilities	Devens Department	2015 to 2020	18.5	Cost equal benefit	New Action.
Winter Related Hazards	Residential parking bans to enable snow removal from all streets	Mass Development, Massachusetts State Police	Devens Enterprise Commission (DEC)	2015 - 2020	20	Benefit exceeds cost	New Action.
All Natural Hazards	Identify shelters and publicize locations to the public to reduce or eliminate long term risk to human life.	Emergency Management Director	Emergency Management Director /Fire Department	2015 - 2020	18.25	Benefit exceeds cost	New Action.
All Natural Hazards	Utilize interactive mapping application prepared by MRPC/CMRPC to update critical infrastructure and simulate real time evacuation scenarios to mitigate hazards to the public.	Emergency Management Director, Department of Public Works, Massachusetts State Police	Emergency Management Director	2015 – 2020	21	Benefit exceeds cost	New Action.

Flood Related Hazards	Install "beaver diverters" and water control devices to mitigate flooding caused by beaver dams.	Department of Public Works	Department of Public Works	2015 – 2020 as needed	17	Benefit exceeds cost	New Action.
Flood Related Hazards	Hire trapper for removal of beavers to mitigate flooding caused by beaver dams.	Department of Public Works	Department of Public Works	2015 – 2020 as needed	20.5	equals/exceeds	New Action.
All Natural Hazards	Increase hazard education and risk awareness to public by purchasing and distributing educational materials at public facilities.	Emergency Management Director Fire Safety and Prevention (through their SAFE office, funded by the Commonwealth of Massachusetts)	Devens Enterprise Commission (DEC)	2015 - 2020	20.75	Cost equal benefit	New Action.
All Natural Hazards	Implement recommendations regarding natural hazard mitigation in existing planning documents including the emergency evacuation plan	Emergency Management Director, Mass Development	Devens Enterprise Commission (DEC)	2015 - 2020	20.75	Benefit exceeds cost	New Action.

*Unless otherwise noted, Devens’ Resources/Funding consists of Devens staff whose positions are funded through Commonwealth of Massachusetts State taxes.

****Devens was not part of 2008 Plan; therefore every mitigation action is new.**

***Devens does not participate in the NFIP individually, however, Devens consists of the towns of Ayer, Shirley and Harvard and those communities participate in the NFIP.

Fitchburg Natural Hazard Risk Assessment

While this annex focus’ pertains to critical facilities, flooding, risk assessment, existing protections and mitigation strategy in the community, more detailed descriptions of each natural hazard’s impact on the region and its communities and summary of vulnerability can be located in the regional section entitled “ 4. Identification of Natural Hazards, Identifying and Profiling Hazards”.

Community Profile

Fitchburg is located in North-Central Worcester County in Massachusetts just 10 miles from New Hampshire and 46 miles from Boston, 25 miles from Worcester, and 211 miles from New York City. It is bordered by Westminster on the west, Ashby on the north, Lunenburg on the east and Leominster on the south.

The City of Fitchburg covers an area of 28.06 square miles and has a resident population of 40,318, according to the 2010 US Census. The population density is 1,435 people per square mile. There are 17,117 housing units in the City, and the average household size is 2.49 people. The median age of Fitchburg's residents is 37.

The original Fitchburg Railroad ran through to the Hoosac Tunnel, Linking Boston and Albany, New York. The tunnel was built using the Burleigh Rock Drill, designed and built in Fitchburg. By the 19th century Fitchburg was a thriving industrial center. Originally operated by water power, large mills produced machines, tools, clothing, paper and firearms. The city is noted for its architecture, particularly in the Victorian style, built at the height of its mill city prosperity. The former reliance on the paper industry has given way to a greater economic diversification today.

Although being one of the largest cities in the county, Fitchburg retains its small town flavor. Fitchburg is noted for its old mills that line the Nashua River, its hilly topography and Regional parks and its tightly knit neighborhood enclaves that, in many cases, still retain their ethnic identity. Among the city's cultural assets are the Fitchburg Art Museum, Fitchburg State University and the world famous annual Longsjo Classic bicycle race. The former reliance on the paper industry in the community has given way to a healthier economic diversification which now includes pharmaceuticals, tool and die makers, machine manufacturers, plastic molders and textile producers. Health Alliance Hospital is the largest employer in Fitchburg, followed by Fitchburg State University.

Critical Facilities

In general usage, the term "critical facilities" is used to describe all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired.

Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even access to damaged areas.

The number and nature of critical facilities in a community can differ greatly from one jurisdiction to another, and usually comprise both public and private facilities. In this sense, each community needs to

determine the relative importance of the publicly and privately owned facilities that deliver vital services, provide important functions, and protect special populations. *Source: Federal Emergency Management Administration, Risk Management Series, Design Guide for Improving Critical Facility Safety from Flooding and High Winds, FEMA 543, January 2007.*

A list of the critical facilities within the community is shown in Table 38. This data was obtained from the community’s Comprehensive Emergency Management Plan (CEMP). The data was then reviewed by the Emergency Management Director. These facilities were digitized into GIS and used for determining vulnerability to the various hazards. The map that follows entitled FEMA Q3 Flood Zones and Critical Infrastructure which depicts Critical Facilities in the community.

Table 38: Fitchburg Critical Facilities

Feature Type	Name	Address
Airports	Fitchburg Municipal	567 Crawford Street
Animal Shelters	Fitchburg Animal Control	301 Broad Street
City/Town Halls	Fitchburg City Hall	166 Boulder Drive
Clinics	Care Net Pregnancy Resource Center	326 Nichols Road
	Community Health Connections	275 Nichols Road
	I u k Behavioral Health Clinic	545 Westminster Street
	Action Health Services-mobile	275 Nichols Road
	Community Health Link Lipton Counsel	275 Nichols Road
	Community Health Connection fhc	140 Arnhow Farm Road
	Counseling & Assessment Clinic	76 Summer Street
	Multicultural Wellness Center	76 summer Street
	Planned Parenthood	391 Main Street
	Reliant Medical Group	370 Lunenburg Street
	Riverfront Counseling Center	76 Summer Street
	Spectrum Health Systems Inc.	76 Summer Street
	Umass Memorial MRI & Imaging Center	275 Nichols road
College	Fitchburg State University- Main Campus	160 Pearl Street
Communication Towers	Communication Tower	Flat Rock Road
District Court	Fitchburg District Courthouse	100 Elm Street
Public Water Supply*	Overlook Reservoir	
	Lovell Reservoir	
	Scott Reservoir	
	Falulah Reservoir	
DPW Facilities	Fitchburg Highway Department	301 Broad Street
	Fitchburg DPW Headquarters	166 Boulder Drive
Early Education Childcare Facilities	Irfan, Rebecca	32 3RD Street
	Deitzel, Sharon	372 Franklin Road
	MOC Child Care & Head Start Services Center / Hosp	110 South Street

Del Orbe, Fatima	179 Summer Street
Northwest Child Development Center of Fitchburg	1400 John Fitch Hwy
Cintron, Adela F.	177 Harrison Avenue
Ngah, Jennifer	541 Arnhow Farm Rd
Barbagallo, Sandra	37 Anita Drive
Stewart, Cheryl	81 Legros Street
Acevedo, Cornelia	9 Ross Street
MOC Child Care and Head Start Services	133 Prichard Street
Fernandez, Rachael	213 Bishop Road
Sosa, GABRIELA	194 Summer Street
Burgos, Aida	355 Pearl Street
Montachusett Regional YMCA Preschool / Kindergarten	55 Wallace Avenue
Slattery, Erin C.	132 Canton Street
Montoya, Giovany	937 Main St Floor 2
Gomez, Patricia	43 Maple Street
Leone, Cheryl	226 Ashby State Road
Silvera, Silvia	107 Daniels Street
Burbank Child Development Center	265 Nichols Road
Children's Aid Child Care Center	1480 John Fitch Hwy
Diaz, Amber	174 Sanborn Street
Cintron, Ana	80 Lawrence Street
Fisher, Julie	46 Farmer Avenue
Aubuchon, Kathleen	491 5th Massachusetts Tpk
Bourque, Kimberly	145 East Street
Spare, Nano T.	12 William Street
Sicard, Diane	149 Highview Street
Selin, Kelly	510 Rollstone Road
Benoit-St. Onge, Pamela	470 Blossom Street
Sinkus, Diana	48 Kaysha Drive
Lizardo, Yisel	22 Columbia Ave
Fuentes, Julie	18 Davis St. #1
Torres, Maragaria	112 Cedar Street
Sanderson, Carol	60 Phillips Passway
Emma, Amy Beth	21 Gloria Avenue
Maclean, Marites	44 Townsend Street
Rojas, Brenda	9 Crown St. Apt. 2
Sadowski, Rebecca L.	74 Whittemore Street
Sacred Heart Preschool and Child Care Center	22 Cottage Street
Becerril, Isabel	111 Canton Street
Manning, Erica	391 Mount Elam Road
Alvarado, Jacqueline	9 Sheridan Street

	Tamaro, Melissa	104 Loisselle Avenue
	Tabales, Nicole	4 Harrison Ave
	Tabales, Nicole	42 Skyview Drive
	Maverick Street Family Center	98 Maverick Street
	Reyes, Mayra	33 Pearl Street
	Ramos, Olga	185 Hazel Street Apt 2
	Lacourse, Angelica	21 Hazel Street
	Howe, Patricia	31 Charles Street
	Guild of St. Agnes - Fitchburg Preschool/School	62 Dover Street
	Mendoza, Maria	494 Rollstone Street
	Messiah Lutheran Preschool	780 Rindge Rd
	Meyer, Heidy	52 Winter St
	Amezcuca, Eva	22 Hale St
	Kinsman, Xan	12 Pleasantview Ave
	Christian, Diane	100 Abbott Ave
	Rodriguez, Elisa I.	15 Wildwood Drive
	Cote, Debra T.	124 Depot Street
	Hernandez, Maria E.	35 Nutting Street
	Caban, Robin	418 Pratt Road
	Daigle, Denise	48 Exeter Street
	Bylund, Pamela L.	85 Highview Street
	Rodriguez, Gretchen	7 Orchard Street
	Busy Bees Preschool Center, Inc.	3 Harugari Street
	Kids Stop	184 Clarendon Street
	Kozy Kids Day Care	372 Franklin Road
Elderly Housing	Durkin Apartments	50 Day Street
	Pleasant Street Residence	132 Pleasant Street
	Canton Valley Terrace	1 Valley Street
	Daniel Heights	16 Daniel Street
	Wallace Tower	54 Wallace Avenue
	Groop/Town View Tower	16 Prichard Street
	Fitchburg Green Apartments	350 Water Street
	Joseph's House	279 Daniels Street
	The Sundial	29 Merriam Parkway
	Hotel Raymond	35 Day Street
	Blossom Court Apartments	37-43 Blossom Street
Electric Substations	Substation #1	Sawyer Passway
	Substation #2	Ellis Street
	Substation #3	Wallace Street
	Substation #4	Westminster Street
	Substation #5	Princeton Road

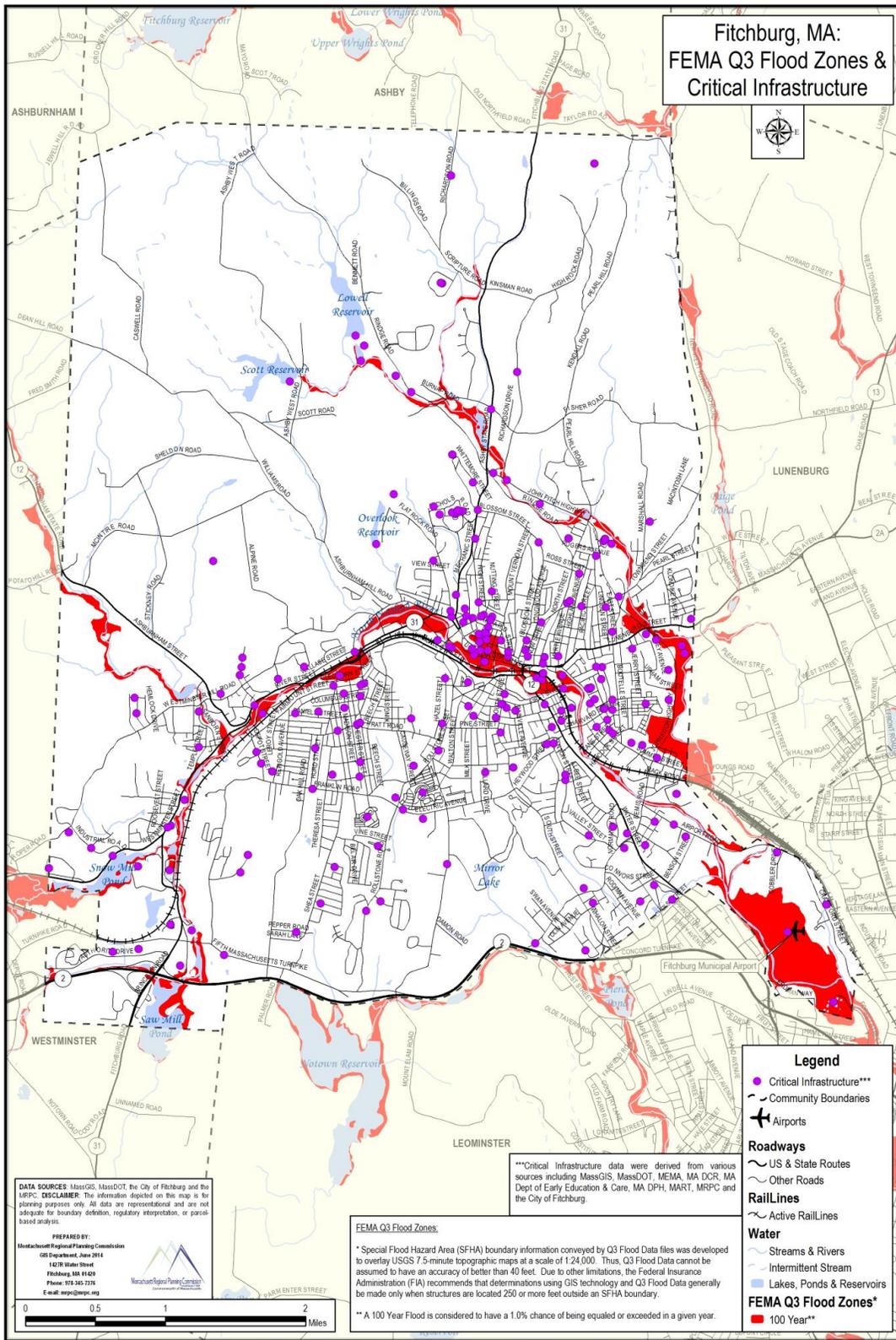
Emergency Dispensing Sites	Crocker Elementary School	200 Bigelow Road
	Fitchburg High School	140 Arnhow Farm Road
	Fitchburg Senior Citizen's Center	14 Wallace Avenue
	FSC- McKay Public School	67 Rindge Road
	Memorial Intermediate School	615 Rollstone Street
	Reingold Elementary School	70 Reingold Avenue
	Saint Bernard's Central Catholic High School	45 Harvard Street
	South Street Elementary School	376 South Street
	Wallace Civic Center	1000 John Fitch Hwy.
Emergency Shelters	FSC- McKay Public School	67 Rindge Road
	Fitchburg High School	140 Arnhow Farm Road
	Memorial Intermediate School	615 Rollstone Street
	Reingold Elementary School	70 Reingold Avenue
	BF Brown Arts Vision School	62 Academy Street
	Crocker Elementary School	200 Bigelow Road
	Saint Bernard's Central Catholic High School	45 Harvard Street
	South Street Elementary School	376 South Street
	Wallace Civic Center	1000 John Fitch Highway
	Fitchburg Senior Citizen's Center	14 Wallace Avenue
End of Life Facilities	Aubuchon-Moorcroft Funeral Home	132 Woodland Street
	Bosk Funeral Home	85 Blossom Street
	Brandon Simard Funeral Home	305 Wanoosnoc Road
	Lavery, Chartrand & Alario Funeral Home	99 Summer Street
	Louis M Isabelle Funeral Home	316 Clarendon Street
	Smith-Mallahy-Masciarelli Funeral Home	243 Water Street
	Saint Joseph Cemetery	
	Laurel Hill Cemetery	
	Saint Bernard's Cemetery	
	Forest Hill Cemetery	
	Jewish Cemetery	Rollstone Road
	Wallace Civic Center	1000 John Fitch Highway
Emergency Operations Centers	Fitchburg- Central Fire Station	33 North Street
	Fitchburg Senior Citizen's Center	14 Wallace Avenue
Fire	Fitchburg- Central Fire Station	33 North Street
	Fitchburg- Summer Street Fire Station	42 John Fitch Highway
	Fitchburg- Oak Hill Fire Station	231 Fairmont Street
HazMat Sites	Omnova Solutions Inc.	119 Authority Drive
	Cleghorn Oil Incorporated	
	Newark America	100 Newark Way
	Moduform, Inc.	172 Industrial Road

	Crocker Technical Papers, Inc.	431 Westminster Street
	Airgas East Inc.	510 Crawford Street
	Ryder Fuel Services #0152A	215 Crawford Street
	First Student Bus	203 Airport Road
	Simonds International Corp	135 Intervale Road
	Jiffy Lube	541 John Fitch Highway
	Munksjo Paper, Inc.	642 River Street
	Micron Products Inc.	41 Sawyer Passway
	Verizon Switching Facility MA873207	676 Main Street
	Fitchburg Communication Tower	795 High Rock Road
	Falulah Filtration Plant	1200 Rindge Road
	Fitchburg- East Wastewater Treatment Facility	24 Lanides Lane
	Fitchburg- West Wastewater Treatment Facility	401 Princeton Road
	Verizon Tower	Franklin Road (Oak Hill)
	Penske	210 Airport Road
	Avery Dennison Corp	224 Industrial Road
	Fitchburg State University	160 Pearl Street
	DRS Technologies	166 Boulder Drive
Hospice	Veterans Hospice	69 High Street
	Health Alliance Hospital-BURBANK CA	275 Nichols Road
Hospitals	Radiology Program @Health Alliance CAN	275 Nichols Road
Long Term Care Facility	The Gables of Fitchburg	935 John Fitch Hwy.
	Golden Living Center	1199 John Fitch Highway
	Caldwell Home- Extended Care	10 Prospect Street
	The Highlands, A Life Care Center	335 Nichols Street
	Hillcrest Nursing Center	94 Summer Street
	James Manor Rest Home	222 South Street
	Bethel House Rest Home	82 Mechanic Street
Other Critical Facilities	Omnova Solutions Inc.	
	Cleghorn Oil Incorporated	
	Can-Am Machinery	44 Princeton Road
	Mar Lee Mold Company, Inc.	207 Authority Drive
	Newark America	
	Verizon Tower	Franklin Road
	Moduform, Inc.	
	Crocker Technical Papers, Inc.	431 Westminster Street
	Airgas East Inc.	510 Crawford St
	Ryder Fuel Services #0152A	215 Crawford St
	MART Garage	R1427 Water Street
	South Fitchburg Early Learning Center	1011 Water Street
	Green Acres Village	13 Normandy Road

	First Student Bus	203 Airport Road
	Simonds International Corp	135 Intervale Road
	CVS Pharmacy	57 Rollstone Road
	Institute of Professional Practice	270 Airport Road 360 Electric Avenue
	Walgreens	571 John Fitch Highway
	Jiffy Lube	541 John Fitch Highway
	Market Basket	399 John Fitch Highway
	Munksjo Paper, Inc.	
	Market Basket	130 Water Street
	CVS Pharmacy	96 Water Street
	Micron Products Inc.	41 Sawyer Passway
	Unitil Gas Distribution Line	
	Montouri Oil Corp.	125 Main Street
	CVS Pharmacy	436 John Fitch Highway
	Fitchburg Historical Society	50 Grove Street
	Verizon Switching Facility MA873207	676 Main Street
	The Arc of Opportunity	564 Main Street
	Cleghorn YMCA After School Program	40 Fairmont Street
	Fitchburg Adult Day Health Center	481 Electric Avenue
	Hosmer Head Start	110 South Street
	Maverick Street Family Center	98 Maverick Street
	Noah's Ark	149 Highview Street
	Verizon Tower	259 High Rock Road
	Verizon Tower	609 Wanoosnoc Road
	Radio Towers	Alpine Road
	Train Station MBTA Red Line	100 Main Street
	Unitil-F G & E	285 John Fitch Highway
	Van Pool Transportation Services	47 Summit Street
	Fitchburg Senior Citizen's Center	14 Wallace Avenue
Other Government Buildings	Fitchburg Highway Department	301 Broad Street
	Fitchburg Public Library	610 Main Street
	Wallace Civic Center	1000 John Fitch Highway
	Fitchburg Radio Towers	1080 Franklin Road
	Fitchburg Communication Tower	795 High Rock Road
	Fitchburg Post Office & Federal Building	881 Main Street
	Worcester County Registry of Deeds	166 Boulder Drive
	Falulah Water Storage Tanks	990 Rindge Road
Police	Fitchburg Police Station	20 Elm Street

Residential Program Facilities	Seven Hills - Pepper Rd. Program	149 Pepper
	LUK-Horizon House Male STARR Program	27 Myrtle Avenue
	LUK-Bridge-STARR	101 South Street
	LUK Crisis Center -Therapeutic Foster Care	545 Westminster Street
	Seven Hills- Cathy Street	33 Cathy Street
	LUK - Horizon House Female Program	846 Westminster Street
	Seven Hills -Kimball Road Program	83 Kimball Road
School	FSC- McKay Public School	67 Rindge Road
	Fitchburg High School	140 ArnHow Farm Road
	Memorial Intermediate School	615 Rollstone Street
	Reingold Elementary School	70 Reingold Avenue
	Arthur Longsjo Middle School	98 Academy Street
	Crocker Elementary School	200 Bigelow Road
	Applewild School	120 Prospect Street
	Saint Bernard's Central Catholic High School	45 Harvard Street
	Saint Anthony Elementary School	123 Salem Street
	Notre Dame Preparatory High School	171 South Street
	South Street Elementary School	376 South Street
	Saint Bernard Elementary School	254 Summer Street
	Caldwell Alternative School	44 Wanoosnoc Road
	North Central Charter Essential School	171 South Street
	Museum Partnership School - McKay	82 Academy Street
	Montachusett Reg Vocational Technical School	1050 Westminster Street
Fitchburg Alternative School	111 Goodrich Street	
Sports And Cultural Areas	St. Bernard's Activity Center	286 Summer Street
	St. Camillus Church/St. Bernard's Church	333 Mechanic Street
	St. Joseph's Church	46 Woodland Street
	St. Anthony De Padua Church	123 Salem Street
	Carmelita Landry Arena	1000 John Fitch Hwy.
	George Wallace, Jr. Civic Center	1000 John Fitch Hwy.
	Fitchburg Art Museum	185 Elm Street
	Madonna of Holy Rosary	118 Theresa Street
Potable Water Treatment Plants	Falulah Filtration Plant	1200 Rindge Road
	Falulah Water Storage Tanks	990 Rindge Road
Wastewater Treatment Plant	Fitchburg- East Wastewater Treatment Facility	Lanides Lane
	Fitchburg- West Wastewater Treatment Facility	230 Princeton Road

*As stated in 310 CMR 22.02, a Public Water System means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year” (Mass GIS, 2014).



Flood Prone Areas

Particular areas within the community where the risk of flood areas are or could occur were determined at the first meeting of the Fitchburg Local Hazard Mitigation Team held on September 17, 2012. This information can be found on Fitchburg’s Local Hazard Map which is located under the section entitled Risk Assessment.

Flooding Vulnerability Assessment

An analysis of the FIRM flood hazard area maps indicates that there is a total of 876.54 acres of 100-year floodplain within Fitchburg. This amounts to 4.87% of the total city. Based on additional analysis, 344.03 acres (39.25%) of the floodplain are developed. Currently there are 303 structures in the floodplain which is about 2.3% of the total structures in the community. The buildings are then multiplied by the building value, as determined by the MA Department of Revenue, to come up with a potential loss of \$298,511,400.

Excluding dams and bridges listed below are the critical facilities within the 100 year flood zone.

Table 39: Fitchburg Critical Facilities within 100-Year Flood Zone

Feature Type	Name	Address
Airports	Fitchburg Municipal	567 Crawford Street
Animal Shelters	Fitchburg Animal Control	301 Broad Street
City/Town Halls	Fitchburg City Hall	166 Boulder Drive
District Court	Fitchburg District Courthouse	100 Elm Street
DPW Facilities	Fitchburg DPW Headquarters	166 Boulder Drive
Electric Substations	Substation #4	Westminster Street
Emergency Dispensing Sites	Fitchburg Senior Citizen's Center	14 Wallace Avenue
Emergency Operations Centers	Fitchburg Senior Citizen's Center	14 Wallace Avenue
Emergency Shelters	Fitchburg Senior Citizen's Center	14 Wallace Ave.
HazMat Sites	Jiffy Lube	541 John Fitch Highway
	Munksjo Paper, Inc.	642 River Street
	Micron Products Inc.	41 Sawyer Passway
	Fitchburg- East Wastewater Treatment Facility	24 Lanides Lane
	DRS Technologies	166 Boulder Drive
Other Critical Facilities	Jiffy Lube	541 John Fitch Highway
	Cinema World	476 John Fitch Highway
	Munksjo Paper, Inc.	
	Market Basket	130 Water Street
	CVS Pharmacy	96 Water Street

	Micron Products Inc.	41 Sawyer Passway
	Unitil Gas Distribution Line	
	CVS Pharmacy	436 John Fitch Highway
	The Arc of Opportunity	564 Main Street
	Fitchburg Senior Citizen's Center	14 Wallace Avenue
Other Government Buildings	Fitchburg Highway Department	301 Broad Street
	Fitchburg Public Library	610 Main Street
	Worcester County Registry of Deeds	166 Boulder Drive
Public Water Supply	Falulah Reservoir	
School	North Central Charter Essential School	171 South Street
Wastewater Treatment Plant	Fitchburg- East Wastewater Treatment Facility	Lanides Lane

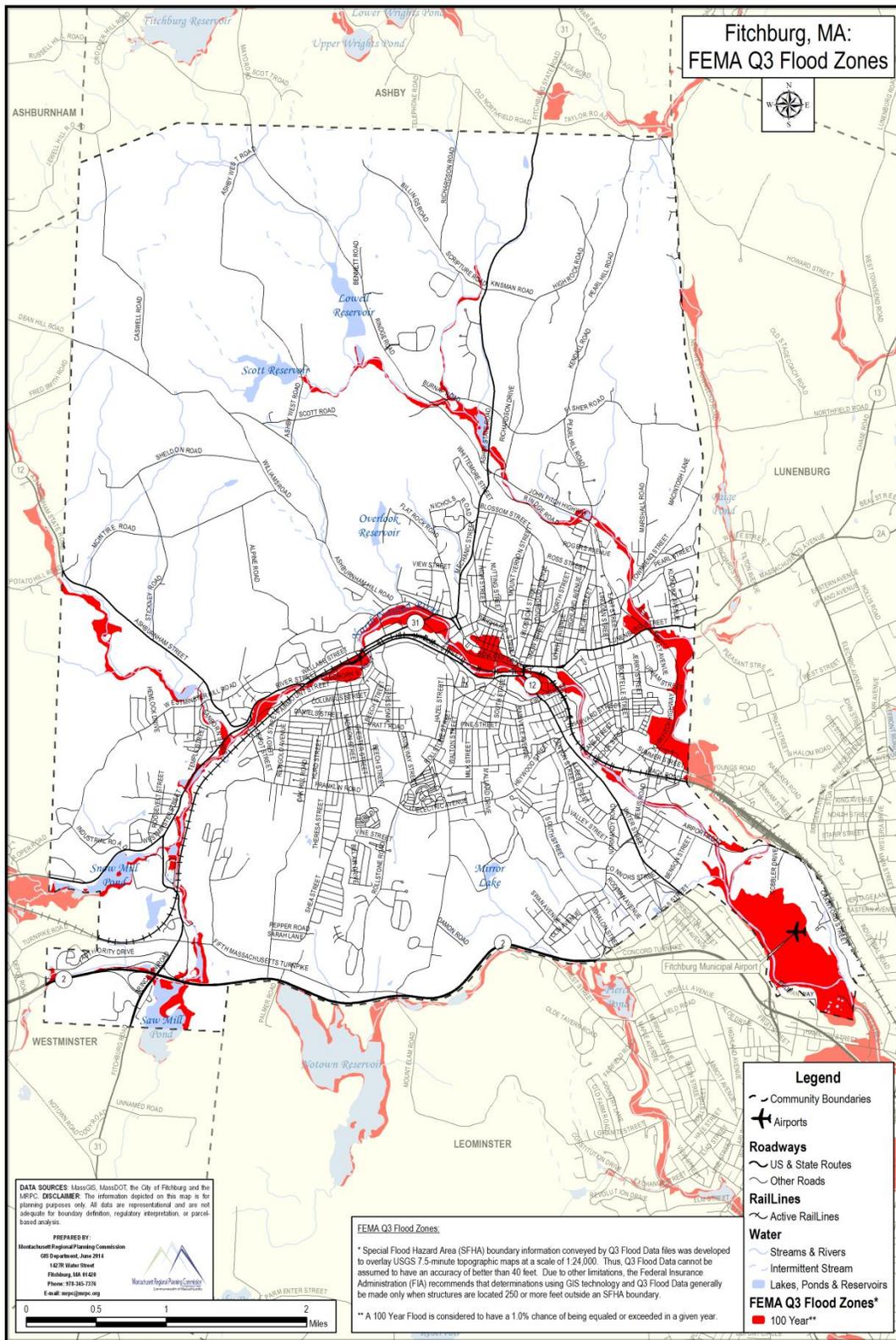
Since the initiation of the National Flood Insurance Program (NFIP), 32 flood insurance claims in the City of Fitchburg have been made totaling \$382,131.15 in payments. According to NFIP data, there are four repetitive loss structures in Fitchburg totaling \$192,043.53 in claims. Statistics from the NFIP BureauNet indicate in the City of Fitchburg there are 66 flood insurance policies in force.

Floodplain Management and Compliance with NFIP

The City supports floodplain management activities in an effort to meet compliance of the National Floodplain Insurance Program. These efforts include:

- Implementing the MA Wetlands Protection Act regulating development and activity within the wetlands buffer zone and regulating stormwater and other point source discharge.
- Implementing the City Flood Plain District Bylaw regulating development in the floodplain district.
- Continued maintenance of municipal stormwater drainage system which includes regular cleaning of catch basins, storm drains and culverts.
- Continued maintenance of public water bodies to reduce flooding caused by erosion and water displacement.
- Enforcement of flexible development bylaw which preserves open space and mitigates possible flooding and erosion from excess development.
- Enforcement of Stormwater Management and Erosion Control Ordinance which regulates land alterations, disturbances and construction activities that may impact stormwater flow that could unduly cause flooding events.
- Enforcement of the Flexible Development which mitigates possible flooding events by designating protected open space within a development which in turn treats stormwater runoff through the means of natural infiltration.

The map that follows entitled FEMA Q3 Flood Zones depicts the 100 year flood zones in the community.



Structurally Deficient Bridges Over Waterways

Fitchburg has three bridges over water that are classified by MassDOT as “structurally deficient”. The bridges locations and water bodies are as follows: Route 2 over Wyman Brook; Westminster Road over Phillips Brook; and River Street over North Nashua River.

Hazard Potential of Dams

The DCR Office of Dams Safety lists 31 dams in the City of Fitchburg as shown in Table 40. Nine dams in Fitchburg are classified as high hazard.

Classifications for potential hazards are in accordance with the chart below.

Hazard Potential Classification

High Hazard	Refers to dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
Significant Hazard	Refers to dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities
Low Hazard	Refers to dams located where failure may cause minimal property damage to others. Loss of life is not expected.

Source: MA Department of Conservation and Recreation Office of Dam Safety

High hazard dams must be inspected every two year, significant hazard every five years, and low Hazards dams every 10 years. Owners of dams are responsible for having their dam inspected. MGL Chapter 253 and 302 CMR 10.00 requires that dam owners prepare, maintain and update Emergency Action Plans for all High Hazard Potential dams and certain Significant Hazard Potential dams.

Non-jurisdictional dams are not regulated by the Office of Dam Safety or under their jurisdiction. Typically these dams are under 6 feet in height and/or under 15 acre-feet in storage and do not have an assigned 'Hazard Code'. Dams owned and regulated by the Federal Government are also typically non-jurisdictional but DO have an assigned Hazard Code.

Table 40: Dams – Fitchburg

City	Dam	Hazard Code	Owner
Fitchburg	Scott Reservoir Dam	High Hazard	Public
Fitchburg	Lovell Reservoir Dam	High Hazard	Public
Fitchburg	Greene’s Pond Dam	High Hazard	Public
Fitchburg	Overlook Reservoir Dam	High Hazard	Public
Fitchburg	Snows Mill Pond Dam	High Hazard	Private

Fitchburg	McTaggarts Pond Dam	High Hazard	Public
Fitchburg	Lovell Reservoir Dike	High Hazard	Public
Fitchburg	Overlook Reservoir Dike	High Hazard	Public
Fitchburg	Falulah Reservoir Dam	High Hazard	Public
Fitchburg	Arden Mill Dam	Low Hazard	Private
Fitchburg	North Nashua River Mill #9 Dam	Low Hazard	Private
Fitchburg	Fitchburg Gas & Electric Dam	Low Hazard	Private
Fitchburg	Waste Water Treatment Plant Dam	Low Hazard	Public
Fitchburg	Electric Station Dam	Low Hazard	Private
Fitchburg	Swimming Pool Dam	N/A	Private
Fitchburg	Weyerhauser Dam	N/A	Private
Fitchburg	Lower Spring Pond Dam	N/A	Private
Fitchburg	Upper Spring Pond Dam	N/A	Private
Fitchburg	Putnams Pond Dam	N/A	Public
Fitchburg	Parkhill Park Swimming Pool Dam	N/A	Public
Fitchburg	Trotting Park Or Coolidge Park Dam	N/A	Public
Fitchburg	Kimball Rd. Dam	N/A	Private
Fitchburg	Marshal Reservoir Dam	N/A	Public
Fitchburg	Nichols Pond Dam	N/A	Private
Fitchburg	Nichols St. Dam	N/A	Private
Fitchburg	Sawmill Pond Dam	Significant Hazard	Private
Fitchburg	Mill Pond #1 Dam	Significant Hazard	Private
Fitchburg	James Pond Dam	Significant Hazard	Private
Fitchburg	North Nashua River Mill #4 Dam	Significant Hazard	Private
Fitchburg	North Nashua River Mill #6 Dam	Significant Hazard	Private
Fitchburg	Mirror Lake Dam	Significant Hazard	Public

*N/A – Information not available as the dam is non-jurisdictional.

Risk Assessment

As previously stated, located in Section 4. Identification of Natural Hazards, Identifying and Profiling Hazards”, there is a description of each identified hazards’ impact on the region and its communities as well as an overall summary of vulnerability. Based on the hazards identified in this plan and the assessment of risks by Fitchburg, the community considers itself to be at a high risk for Heavy Rain, Beavers, High Winds, Nor’easters, Severe Thunderstorms, Heavy Snow, and Major Urban Fires; moderate risk for Snow Melt, Dam Failure, Ice Jams, Hurricanes, Tornados, Ice Storms, Blizzard, Wild land Fire, Drought Extreme Temperatures, Earthquakes, and Landslides; and tsunamis as not applicable. This information is documented in the Fitchburg Natural Hazard Matrix below which was obtained from participants at the Fitchburg Local Hazard Mitigation Team Meeting held on September 17, 2012.

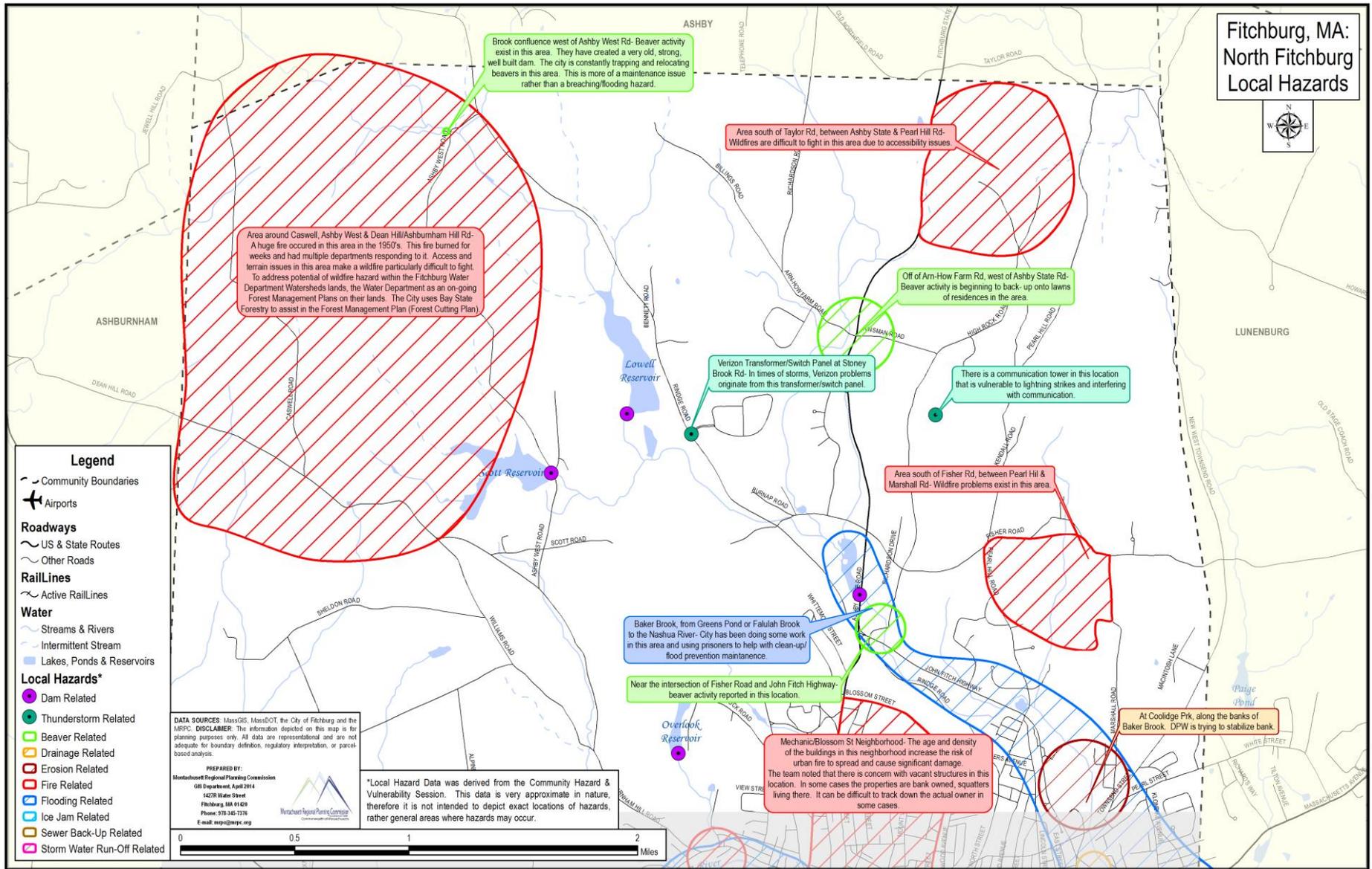
Fitchburg Natural Hazard Matrix

Natural Hazard	Likelihood of Occurrence	Location	Impacts	Hazard Index
Natural Hazard Separated by Flood, Atmospheric Related and Winter Related, Other Natural Hazards, and Geologic Hazards	3 = Highly Likely 2 = Possible 1 = Unlikely	3 = Regional/State 2 = Multi Community/Regional 1 = Local/Town	4 = Catastrophic 3 = Critical 2 = Limited 1 = Negligible	Ranking Determined by Combining the Likelihood, Location and Impacts of a Natural Hazard
Flood-Related Hazards				
• Heavy Rain	3	2	3	8
• Snow Melt	2	1	3	6
• Dam Failure	2	1	3	6
• Ice Jams	2	1	2	5
• Beavers	3	1	2	6
Atmospheric Related and Winter Related Hazards				
• High Winds	3	2	2	7
• Hurricanes	2	2	2	6
• Tornadoes	2	2	3	7
• Nor'easters	3	3	3	9
• Severe Thunderstorms	3	3	2	8
• Heavy Snow	3	2	2	7
• Ice Storms	2	2	3	7
• Blizzard	2	3	2	7
Other Natural Hazards				
• Major Urban Fires	3	1	3	7
• Wildland Fire	2	1	1	4
• Drought	2	2	2	6
• Extreme Temperatures	2	3	2	7
Geologic Hazards				
• Earthquakes	2	3	4	9
• Landslides	2	1	2	5
• Tsunami	NA	NA	NA	NA

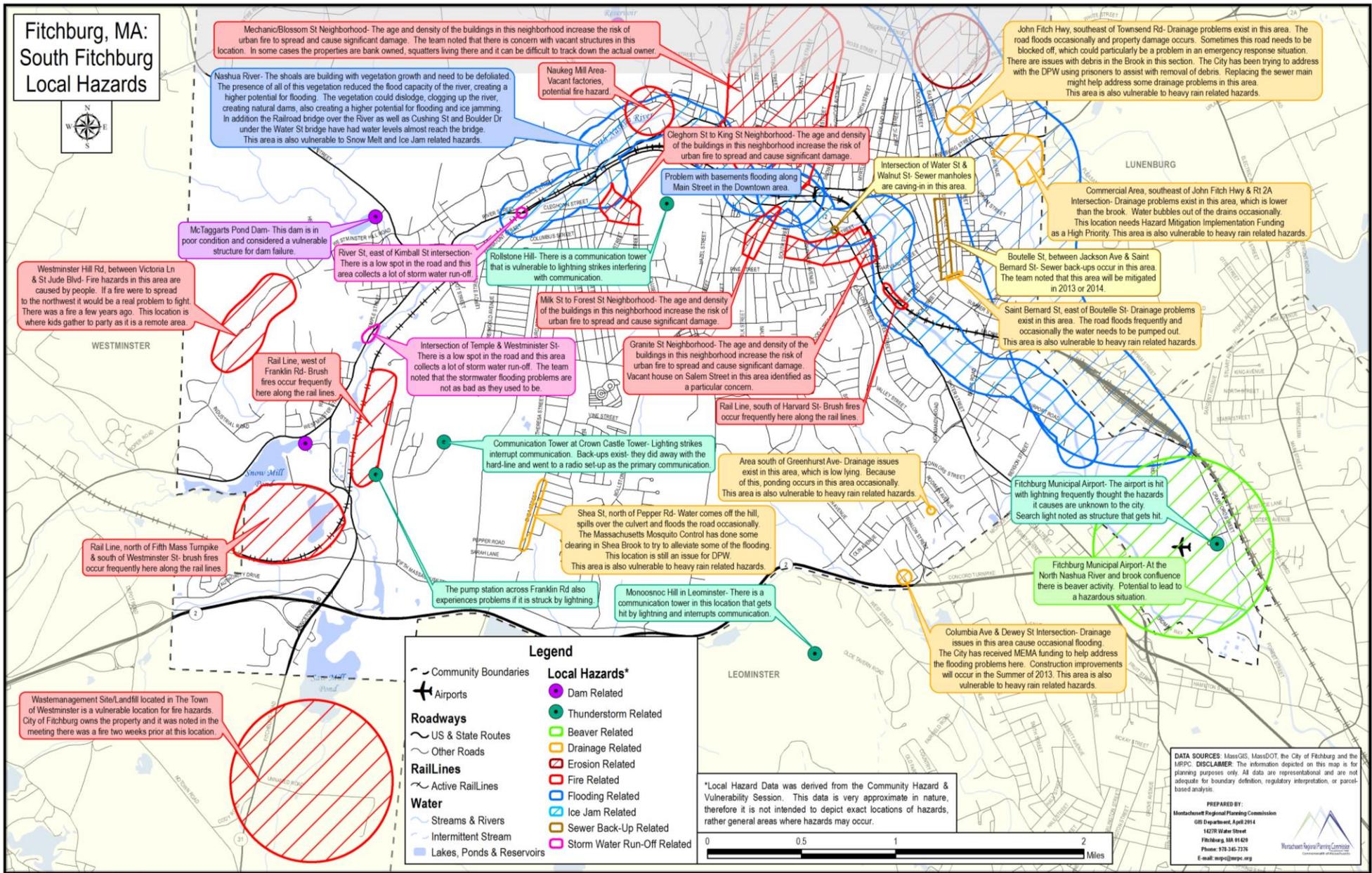
Key

Highly likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
 Possible: 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.
 Unlikely: Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.
 Catastrophic: Immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.
 Critical: Fast speed of onset or long duration of event resulting in devastating damage and loss of services for weeks or months.
 Limited: Moderate speed of onset or moderate duration of event, resulting in some damage.
 Negligible: Slow speed of onset or short duration of event resulting in little to no damage.

Also discussed at this meeting were the hazards that affect each community and the identification of specific problem areas in the community that need to be addressed. This included the identification of new hazards that were determined to pose a threat or community vulnerability which are detailed in Fitchburg's Local Hazards Map on the following page. The entire community is equally at risk to the following hazards: heavy rain, snow melt, high winds, hurricanes, tornados, nor'easters, heavy snow, ice storms, blizzards, drought, extreme temperatures, earthquakes and landslides.



Fitchburg, MA: South Fitchburg Local Hazards



Legend

- Community Boundaries
- Airports
- Roadways**
 - US & State Routes
 - Other Roads
- RailLines**
 - Active RailLines
- Water**
 - Streams & Rivers
 - Intermittent Stream
 - Lakes, Ponds & Reservoirs
- Local Hazards***
 - Dam Related
 - Thunderstorm Related
 - Beaver Related
 - Drainage Related
 - Erosion Related
 - Fire Related
 - Flooding Related
 - Ice Jam Related
 - Sewer Back-Up Related
 - Storm Water Run-Off Related

*Local Hazard Data was derived from the Community Hazard & Vulnerability Session. This data is very approximate in nature, therefore it is not intended to depict exact locations of hazards, rather general areas where hazards may occur.



DATA SOURCES: MassGIS, MassDOT, the City of Fitchburg and the MRPC. **DISCLAIMER:** The information depicted on this map is for planning purposes only. All data are representational and are not adequate for boundary definition, regulatory interpretation, or parcel-based analysis.

PREPARED BY:
Montachusett Regional Planning Commission
GIS Department, April 2014
1427W Water Street
Fitchburg, MA 01420
Phone: 978-346-7735
E-mail: mrpc@mrpc.org

Existing Protections

The original inventory of hazard mitigation actions which the Montachusett communities undertook for the 2008 Montachusett Region Hazard Mitigation Plan was reviewed and updated by each community at a meeting held in each community with the MRPC and the community's Local Hazard Mitigation Planning Team and, in some communities, the Emergency Management Committee. The attendees of the meetings can be found in Appendix A. The following matrices depict the updated inventory of what is currently being done to mitigate hazards by listing the programs and activities already in place. It includes a description of the protection measure, who is responsible, and improvements and changes that may be needed. This inventory was used by the Planning Team/Emergency Management Committee to identify gaps in existing protections that were then addressed through the development of this plan update.

Fitchburg

Type of Existing Protection	Description	Area Covered	Implementation Resources and Funding*	Improvements or Changes Needed
Flood Related Hazards				
Storm water management standards	State Regulation under the Wetlands Protection Act to regulate storm water and other point source discharge	city-Wide	Enforced by the Fitchburg Conservation Commission (Wetlands Protection Act) and Fitchburg Planning Board (Subdivision Control Law and site plan review) both staffed by the Fitchburg Department of Community Development.	Storm water management standards are and continue to be enforced. No improvements or changes needed.
Wetlands Protection Act (state)	State law regulating development and activity within wetland buffer zone	100-foot state buffer around wetland area; 200 foot buffer around river front areas	Enforced by the Fitchburg Conservation Commission staffed by the Fitchburg Department of Community Development.	No improvements or changes needed.
100 Year Flood Zone	Federal law requiring elevation above 100-year flood level of new and substantially improved residential structures in floodplain	100-year floodplain as shown on Flood Insurance Rate Map dated September 18, 1991	Enforced by the Building Inspector (municipal staff) and Fitchburg Conservation Commission staffed by the Fitchburg Department of Community Development.	Insurance Flood Rate Maps need to be updated.

City Bylaw Flood Plain Protection Overlay Districts	Local bylaw enhancing federal/state laws and regulating any development in the flood plain district	100-year floodplain as shown on Flood Insurance Rate Map dated September 18, 1991	Enforced by the Building Inspector (municipal staff) and regulated by Board of appeals.	Insurance Flood Rate Maps need to be updated.
Maintenance of municipal storm water drainage system	Regular cleaning of catch basins, storm drains, and culverts	city-wide	Undertaken by the Department of Public Works municipal staff.	Maintenance continues but Additional Personnel and Equipment Needed to undertake this task.
Maintenance of public water bodies (ponds, streams, brooks, wetlands)	Periodic cleaning of waterways undertaken, i.e., remove trash, debris	city-wide	Directed by the Department of Public Works municipal staff with guidance from Conservation Commission staffed by the Fitchburg Department of Community Development.	Maintenance continues. No improvements or changes needed.
Inspection of major dams	Periodic inspections of the structural integrity of the dam	Major Dams.	Undertaken by the Massachusetts Department of Conservation and Recreation, Office of Dam Safety	Update Dam failure studies for the dams rated as high hazard
Wind Related Hazards				
State Building Code	State Law related to design loads to include wind effects	city-wide	Enforced by Building Department (municipal staff).	Enforcement continues. No improvements or changes needed.
Tree Maintenance	Regular inspection and tree maintenance to cut branches threatening power lines and overhead utilities	city-wide	Unitil staff (Electric Company).	Tree maintenance continues. No improvements or changes needed.
Fire Related Hazards				
Limited Brush Clearing	Brush clearing to provide access to Emergency Service vehicles	city-wide	Undertaken by the Department of Public Works municipal staff.	Continue to Identify additional Areas with Potential for Brushfires
Winter Storms Related				

Residential Parking Bans	Parking Bans to Enable Snow Removal Effectively from Residential Streets	city-wide	Department of Public Works municipal staff.	Additional personnel and equipment needed to enforce parking bans.
Clearing Snow from Major Arterial Routes	Ensure Access to Emergency Service vehicles.	city-wide	Department of Public Works municipal staff.	Snow clearing continues but Additional personnel and equipment needed.

*Fitchburg’s enforcement/implementation is generally carried out by elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

Mitigation Goals, Objectives and Strategies

As discussed earlier in this Plan, MRPC previously prepared the 2008 Montachusett Region Hazard Mitigation Plan which consisted of individual annexes for each MRPC community. Similarly, as part of the multi-jurisdictional plan update, each community also developed their own individual goals, objectives and strategies which are listed in this section.

Fitchburg Overall Goal Statement: To prepared to reduce the loss of life, property, infrastructure and cultural resources throughout the city of Fitchburg from natural disasters through a multiple hazard mitigation program that involves increased coordination, planning, education, and capital improvements.

1. **Objective:** To organize and prepare to provide adequate shelter, water, food, and basic first aid to displaced residents in the event of a natural disaster, and to provide adequate notification and information regarding evacuation procedures, etc., to residents in the event of a natural disaster.
2. **Objective:** To inventory supplies at existing shelters and develop a needs list and storage requirements; and to establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster.
3. **Objective:** To have the Emergency Management Director (EMD) lead an effort to increase coordination between inter-departments in pre-disaster planning and implementation of hazard mitigation projects.
4. **Objective:** Increase awareness of hazard mitigation among city officials, private organizations, businesses, and the general public.
5. **Objective:** To implement the Code Red notification system. Also provide emergency information through the use of message boards at key locations.
6. **Objective:** To collect, periodically update, and disseminate information on which local radio stations provide emergency information on what to include in a “home survival kit, how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to follow during a natural disaster.

Specific Natural Hazard Goals for Fitchburg

Goal Statement for Flooding: To prepare emergency staff and volunteers in order to minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to flooding.

1. **Objective:** To continue to participate in the National Flood Insurance Program and to have the

flood maps periodically updated.

- Objective:** To seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout City.

Goal Statement for Protection from Beavers: To minimize the threat to health, the damage to roads and property, and the disruption of governmental services and general business activities due to flooding caused by beavers.

- Objective:** Support local city departments to continue present methods to prevent beaver caused flooding.
- Objective:** Utilize DPW staff in conjunction with the Board of Health to manage beaver issues.
- Objective:** Install beaver management devices.

Goal Statement for Hurricanes and Tornadoes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to high winds associated with hurricanes and tornadoes. (The objectives listed above, under flooding, address the flooding that can result from a hurricane.)

- Objective:** To educate residents and volunteers regarding the safe methods and actions necessary to deal with Hurricanes and Tornadoes.

Goal Statement for Winter Related Hazards: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to severe snow and ice storms.

- Objective:** To develop a plan for providing access to water, information, shelter, and food stores to people throughout Fitchburg in the event of a severe winter storm.

Goal Statement for Earthquakes: To educate staff, residents and volunteers about the potential for earthquakes and strategies to minimize the loss of life, damage to property, the disruption of governmental services and general business activities due to earthquakes.

- Objective:** To educate and encourage homeowners and developers to rehab and build using methods to build to code and minimize the effects of earthquakes and other disasters.
- Objective:** To insure that all identified shelters have sufficient back-up utility service in the event of primary power failure and to maintain the City's shelter trailer. Central Mass. Disaster Response Team operates a dog/cat shelter in event of emergency.

Mitigation Action Plans and Prioritization of Actions (STAPLEE)

Initial Mitigation Action Plans for the Montachusett Communities were presented in the communities Hazard Mitigation Plans that were approved by FEMA in 2009 and 2010. The original Mitigation Action Plans were developed through an inventory of potential hazards which could impact the community and an evaluation of a range of alternatives to address these hazards. As part of the plan update process, the original Mitigation Action Plan was reviewed by the community's Local Hazard Mitigation Planning Team/Emergency Management Committee to delete actions which have already been completed, add additional actions which are either underway or planned to be undertaken, and to update the current status of all actions. The goals were reviewed and updated at the second meeting with each community.

An additional step in this process was to conduct a "STAPLEE" analysis for each action to prioritize all actions within each community and a subjective evaluation of each action's perceived cost/benefit. In the 2008 plan, actions were not prioritized so there were no changes in priorities in this update. The revised Community Mitigation Action Plans matrices that follow identify each mitigation action, the responsible department or board responsible for implementation, potential funding sources, the timetable of the action, results of the prioritization of actions through the STAPLEE analysis, and the perceived cost/benefit for each mitigation action.

The goal of each identified strategy, or mitigation action, is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each action to establish priorities for implementation, using the "STAPLEE" method. The STAPLEE methodology was developed by the Federal Emergency Management Agency as a tool to help communities prioritize their hazard mitigation strategies and determine the most appropriate actions for implementation. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of an action and is designed to be used by public officials and planners for making planning decisions.

To conduct the STAPLEE exercise, the community's Hazard Mitigation Team was asked to rate each action in their Mitigation Action Plan on each of the following criteria, using a score of 1 to 3 (Good = 3, Average = 2, Poor = 1):

- **Social:** Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- **Technical:** Will the proposed strategy work? Will it create more problems than it solves?
- **Administrative:** Can the community implement the action? Is there someone to coordinate and lead the effort?
- **Political:** Is the action politically acceptable? Is there public support both to implement and to maintain the action?
- **Legal:** Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- **Economic:** What are the costs of this action? Does the cost seem reasonable for the size of the problem and the likely benefits?
- **Environmental:** How will the action impact the environment? Will the action need environmental regulatory approvals?

These scores were then totaled, resulting in a final score of 7 (least priority) to 21 (highest priority) for each action. The higher the final score, the higher the relative priority of that action for implementation. This information can then be utilized in each community as they conduct and administer relevant municipal functions and activities. The final STAPLEE score for each action is shown in the following mitigation action plan.

The Hazard Mitigation team was also asked to do a relative cost/benefit of each action. This assessment was intended to informally indicate if an action will either have more benefits accrued to the Town than the Cost of implementing the action, or if the costs would exceed any benefits. Responses include: “Benefits Exceed Costs”, “Benefits Equal Costs, or “Costs Exceed Benefits”.

FITCHBURG IMPLEMENTATION STRATEGY FOR PRIORITY MITIGATION ACTIONS

Type of Natural Hazard	Description of Action	Implementation Responsibility	Resources/Funding*	Timeframe	Priority (STAPLEE SCORE)	Cost/Benefit Evaluation	Status Update from 2008 Plan**
Wildland Fire	Increase awareness by educating property owners regarding actions that they can take to reduce risk to property by hosting an Open House at the Fire Department, develop and distribute Pamphlets on Fire Safety and Prevention (SAFE PROGRAM) (SENIOR SAFE) and wildfire prevention.	Fire Department	Municipal Staff	2015 - 2020;	21	Benefits Exceed Costs	Completed but Carried forward. Open House held annually. Developing and distributing educational pamphlets undertaken on a periodic basis.

All Natural Hazards	Increase hazard education and risk awareness to public by updating, and Disseminating Information on Local Radio/TV Stations to educate the public and alert them of emergency information including shelter locations and other instructions related to all natural hazards	Emergency Management Director	Municipal Staff	2015 – 2020	21	Benefits Exceed Costs	Completed but Carried forward. This action is undertaken on a periodic basis.
Atmospheric and Winter Related Hazards	Develop a Mitigation Plan to provide access to Water, Information, Shelter and Food Stores to People in Remote Locations of the town and integrate this information into community comprehensive plans.	Emergency Management Director	Municipal Staff / Volunteers	2015 – 2020	21	Benefits Exceed Costs	Carried forward due to lack of funding.

All Natural Hazards	Develop a Preliminary Project Proposal and Cost Estimate for Updating Current 911 System including Feasibility of Reverse 911 to reduce or eliminate the long-term risk to human life and property from hazards.	Emergency Management Director	Municipal Staff / Volunteers	2016	21	Benefits Equal Costs	Completed. Carried forward. Code Red is in place but training is necessary.
All Natural Hazards	Ensure that all identified shelters have sufficient back-up utility service in the event of a primary power failure to reduce or eliminate risk to human life.	Building Inspector, Emergency Management Director	School Department and City General Fund	2015 – 2020	20	Benefits Equal Costs	Carried forward due to expense.
Flood Related Hazards	Implement the Standards in the Subdivision Rules and Regulations to require Temporary and Permanent Erosion Control Measures to improve floodplain management.	Planning Board	Municipal Staff / Volunteers	2015 – 2020	20	Benefits Exceed Costs	Carried forward. Standards are implemented on an ongoing basis.

Flood Related Hazards	To Develop a priority list and possibly seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town to reduce or eliminate flooding risk.	Highway Department	Municipal Staff FEMA HMGP grant 75%	2016 (12 months)	21	Benefits Equal Costs	Development of list carried forward due to time constraints.
Flood Related Hazards	Continue Participation in the National Flood Insurance Program to enable property owners to purchase insurance protection against flood losses.	Conservation Commission, City Council	FEMA/MEMA	2015-2020	21	Benefits Exceed Costs	City continues its participation in the NFIP.
Other natural Hazards (wildlands) and Atmospheric Related Hazards	Develop storm related Debris Management plan to mitigate identified hazards.	Department of Public Works, Board of Health	Municipal Staff, Board of Health	2018 (12 months)	21	Benefits Exceed Costs	New action.
Other Natural Hazards (Major Urban Fires and Wildland)	Pursue efforts to demolish vacant buildings to mitigate the potential of a fire related hazard.	Building Department Program	Municipal Staff, Federal Community Development Block Grant funds	2015 – 2020	20	Benefits Equal Costs	New action.

All Natural Hazards	Utilize interactive mapping application prepared by MRPC/CMRPC to update critical infrastructure and simulate real time evacuation scenarios to mitigate hazards to the public.	Emergency Management Director, Police Department mostly responsible for emergency evacuation plan.	Emergency Management Director	2015 - 2020	21	Benefits Exceed Costs	New action.
Flood Related Hazards	Install "beaver diverters" and water control devices to mitigate flooding caused by beaver dams.	Department of Public Works	Municipal Staff	2015 – 2020 as needed	20	Costs Exceed Benefit	Carried forward. Ongoing. This action is undertaken as necessary.
Flood Related Hazards	Hire trapper for removal of beavers to mitigate flooding caused by beaver dams.	Department of Public Works	Municipal Staff	2015 – 2020	21	Cost Exceed Benefits	Carried forward. Ongoing. This action is undertaken as necessary.
All Natural Hazards	Implement recommendations regarding natural hazard mitigation in existing planning documents the, five year action plan of the open space and recreation plan and the emergency evacuation plan	Conservation Commission, City Council, Planning Board, Emergency Management Director, Fire Department and Police Department	Municipal Staff, Conservation Commission, City Council, Planning Board, Emergency Management Director	2015 - 2020	21	Benefits Equal Costs	Completed but Carried forward. This is an ongoing effort. For example, City recently adopted a flexible development bylaw which preserves open space and mitigates possible flooding and erosion from excess development. This was a recommendation of city's master plan.

*Unless otherwise noted, Fitchburg's Resources/Funding consists of elected/appointed boards and commissions and municipal staff whose

positions are funded through local taxes.

**Actions identified as carried forward were not completed in the previous planning cycle unless otherwise stated.

Mitigation actions from the 2008 Montachusett Region Hazard Mitigation Plan that are complete include:

- Identify existing shelters that are earthquake resistant as well as outside of floodplain (and Dam Inundation) areas.
- Amend the Special Permit and Site Plan Approval Provisions in the Zoning Bylaw adding more specific requirements to address flood related issues.
- Prepare a Water Conservation Plan.
- Work the Neighboring Communities to Establish a Community Emergency Response Team (CERT)
- Amend the Subdivision rules and regulations of required improvements section to include fire and suppression provisions for new residential development.

Gardner Natural Hazard Risk Assessment

While this annex focus' pertains to critical facilities, flooding, risk assessment, existing protections and mitigation strategy in the community, more detailed descriptions of each natural hazard's impact on the region and its communities and summary of vulnerability can be located in the regional section entitled " 4. Identification of Natural Hazards, Identifying and Profiling Hazards".

Community Profile

The City of Gardner is located in North Central Massachusetts, bordered by Winchendon and Ashburnham on the North, Templeton on the west, Westminster on the east, and Hubbardston on the south. Gardner is 28 miles northwest of Worcester, 59 miles northwest of Boston, 61 miles northeast of Springfield, and 195 miles from New York City.

The City of Gardner covers an area of 23 square miles and has a resident population of 20,228, according to the 2010 US Census. The population density is 880 people per square mile. There are 9,126 housing units in the City, and the average household size is 2.30 people. The median age of Gardner's residents is 40.

Gardner has a proud history of furniture manufacturing. The City achieved international recognition as a major center for chair fabrication to the point that it became known as the "chair city of the world", a testament to this is a 20 foot tall chair sitting in front of the Helen Mae Sauter School. Gardner is home to numerous fine furniture outlets and is often called the "Furniture Capital of New England". Manufacturing is a significant part of its local economy, but now it is diversified rather than concentrated in chair and furniture manufacturing. Gardner is also home to Mount Wachusett Community College, Heywood Hospital, many unique shops and wide array of recreational opportunities including a municipal golf course and the southern terminus of the North Central Pathway. Henry Heywood Memorial Hospital is the largest employers in the City.

Critical Facilities

In general usage, the term "critical facilities" is used to describe all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired.

Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even access to damaged areas.

The number and nature of critical facilities in a community can differ greatly from one jurisdiction to another, and usually comprise both public and private facilities. In this sense, each community needs to determine the relative importance of the publicly and privately owned facilities that deliver vital services, provide important functions, and protect special populations. *Source: Federal Emergency Management Administration, Risk Management Series, Design Guide for Improving Critical Facility Safety from Flooding and High Winds, FEMA 543, January 2007.*

A list of the critical facilities within the community is shown in Table 41. This data was obtained from the community’s Comprehensive Emergency Management Plan (CEMP). The data was then reviewed by the Emergency Management Director. These facilities were digitized into GIS and used for determining vulnerability to the various hazards. The map that follows entitled FEMA Q3 Flood Zones and Critical Infrastructure depicts Critical Facilities in the community.

Table 41: Gardner Critical Facilities

Feature Type	Name	Address
Animal Shelters	Gardner Animal Control Facility	899 West Broadway
City/Town Halls	Gardner City Hall	95 Pleasant Street
Clinics	North Central Human Services	31 Lake Street, Suites 181 & 9
	Community Health Link Lipton Couns	10 Parker St 3rd Floor
	Greater Gardner Community Health	175 Connors Street, 1st & 2nd
	You Inc. Family Center	205 School Street 1st Floor
College	Mount Wachusett Community College	444 Green Street
District Court	Gardner District Courthouse	108 Mathews Street
Public Water *Supply	Snake Pond Well	
	Cowee Pond	
	Perley Brook Reservoir	
	Crystal Lake	
	Camp Collier	
	Gardner Municipal Golf Course	
DPW Facilities	Gardner Highway Department	416 West Broadway
Early Education Childcare Facilities	MOC Child Care & Head Start Services/School Age	208 Coleman St. Ext.
	O’Leary, Nancy	22 A Street
	Meridian Gymnastics And Youth Fitness Preschool	871 W Broadway
	Dennis, Billie-Jo	90 Bear Hill Road
	Leger, Shauna	79 Ashley Drive
	Moschan, Heather	262 Temple Street
	Klever Kids Preschool & Extended Day Program	1055 West Street
	Bethany Christian Nursery	72 Ryan Street
	Dubey, Heidi	25 June Street
	King, Stephen	76 Grant Street
	Pellecchia, Laurie	66 Crestwood Drive

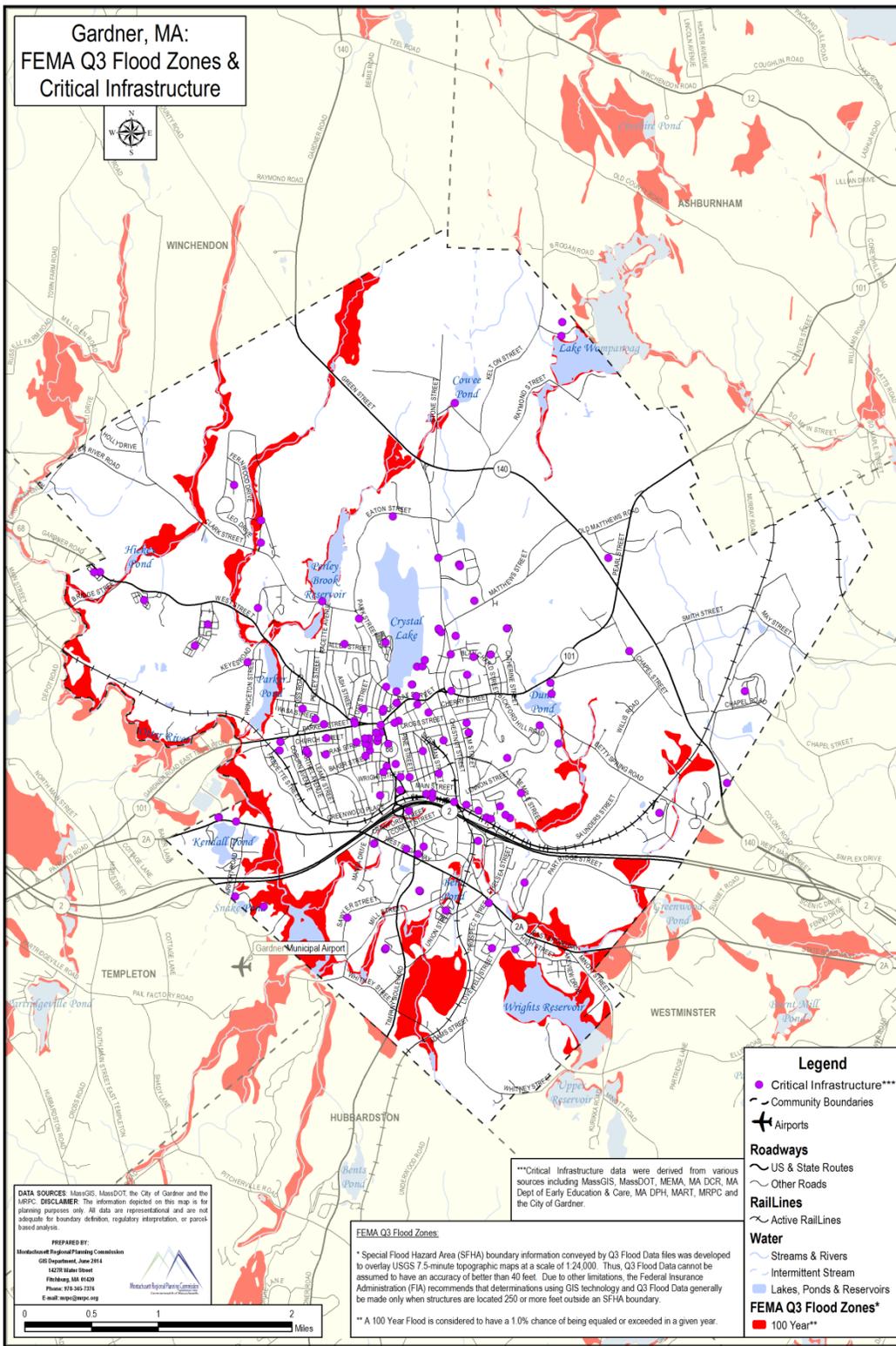
	Leblanc, Jane T.	66 Oak Street
	Leblanc, Roberta M.	62 Leamy Street
	L'etoile, Melanie N.	100 Chapel Street
	MOC Child Care & Head Start Services - Garrison	444 Green Street
	Goguen, Christine	306 Pine Street
	Guild Of St. Agnes - Gardner	155 Green Street
	Aukstikalnis, Deana M.	70 Sawyer Street
	Levasseur, Cynthia	52 Warwick Road
	Chaban, Paula	68 Norman Street
	Burgess, Doreen	79 Keyes Road
	Beauregard, Laura	24 Mayfield Road
	Coleman Child Care & Head Start Center	68 Coleman Street
	Saner, April L.	64 Snake Pond Road
	Maillet, Paula A.	29 Brookside Drive
	Mccaie, Georgette	196 Nichols Street
	Cormier, Suzanne	79 Robillard Street
	Mcgrath, Deborah Ann	63 Leamy Street
	Bradley, Becky	105 Brookside Drive
	Bushee, Janine	362 Park Street
Elderly Housing	Colonial Apartments	19 City Hall Avenue
	Heritage Village	55 Sunrise Lane
	Heywood Place Apartments	61 Lake Street
	Hillside Gardens	137 Blanchard Street
	The Binnall House	125 Connors Street
	Garwest	116 Church Street
Assisted Living	Heywood Commons	50 Pine Street
Electric Substations	National Grid Substation	53 Park Street
Emergency Dispensing Sites	Gardner High School	200 Catherine Street
	Gardner Middle School	297 Catherine Street
	Mount Wachusett Community College	444 Green Street
Emergency Shelters	Gardner High School	200 Catherine Street
	Elm Street School	160 Elm Street
	Mount Wachusett Community College	444 Green Street
	Gardner Middle School	297 Catherine Street
End of Life Facilities	Gardner Veterans Skating Rink	45 Veterans Dr.
	Boucher Funeral Home	110 Nichols St
	Smith Funeral Home Inc.	69 Vernon St
	Green Bower Cemetery	

	Crystal Lake Cemetery	
	Saint John's Cemetery	
	Notre Dame Cemetery	
	Wildwood Cemetery	
	Saint Joseph's Cemetery	
	Lamoureux Fletcher Community Funeral Home	105 Central Street
	John H Mack Funeral Home	91 Vernon Street
	Poliks Funeral Home	431 Pleasant Street
Emergency Operations Centers	Gardner Police Station	31 City Hall Avenue
	Gardner EOC	61 East Broadway
Fire	Gardner Fire Station	70 City Hall Avenue
	South Gardner Fire Station	61 East Broadway
Freight	Gardner Freight Rail Yard	
HazMat Sites	National Grid Substation	53 Park Street
	Verizon C.O.	43 West Street
	Pan Am	Union Square
	Data Guide Cable	232 Sherman Street
Hospice	Gardner VNA Inc. - Hospice	34 Pearly Lane
	Heywood Hospital	242 Green Street
	Heywood Rehabilitation Center	69 Pearson Boulevard
Long Term Care Facility	Gardner Center for Nursing and Rehabilitation	59 Eastwood Circle
	Wachusett Manor	32 Hospital Hill Road
	Swing Bed Coop with Athol Hospital	242 Green Street, Second Floor
Other Critical Facilities	Stop & Shop	384 Timpany Boulevard
	CVS	314 Main Street
	Price Chopper	560 Main Street
	Camp Collier	Camp Collier Road
	Lynde Hardware Store	483 Main Street
	Woods Ambulance	457 Main Street
	National Guard Unit	321 West Broadway
	Reservoir Hill	James Street
	Shell Oil	6 Pearson Boulevard
	Sunoco	17 Pearson Boulevard
	Hess	19 Pearson Boulevard
	Taylor Rental	22 Union Square
	Heritage State Park	Pearl/Smith Street
	Walmart	677 Timpany Boulevard
Walmart (Pharmacy)	677 Timpany Boulevard	

	Hannaford Supermarket	21 Timpany Boulevard
	Life Skills	95 Mechanic Street
	GAAMHA	208 Coleman Street
	Rite Aid	232 Main Street
	Rite Aid	52 Pearson Boulevard
	Heywood Hospital (family pharmacy)	242 Green Street
	Stop & Shop (pharmacy)	384 Timpany Boulevard
	Wheelen Supply	114 Main Street
	Aubuchon Hardware	34 Pearson Boulevard
	Maki Building Supply	35 Linus Allain Avenue
	Shell Station	4 Oak Street
	BP Station	221 Main Street
	Gulf Station	76 City Hall Avenue
	Shell Station	264 Timpany Boulevard
	Medstar	
Other Government Buildings	Gardner Highway Department	416 West Broadway
	Levi Heywood Memorial Library	55 West Lynde Street
	Gardner Post Office	
	Gardner Animal Control Facility	899 West Broadway
	Gardner Senior Center	294 Pleasant Street
Police	Gardner Police Station	31 City Hall Avenue
Prisons	North Central Corr. Institute (Gardner - Medium)	500 Colony Road
Pumping Stations	Crystal Lake Pumping Station	99 Heywood Street
School	Gardner High School	200 Catherine Street
	Helen Mae Sauter Elementary School	130 Elm Street
	Elm Street School	160 Elm Street
	Waterford Street School	62 Waterford Street
	Gardner Middle School	297 Catherine Street
	Our Lady of Holy Rosary	99 Nichols Street
	Sacred Heart of Jesus Elementary School	53 Lynde Street
	Wachusett Hills Christian School	100 Colony Road
	CAPS Educational Collaborative	53 School Street
Sports And Cultural Areas	Gardner Museum	28 Pearl Street
	Gardner Veterans Skating Rink	45 Veterans Dr.
	Greenwood Memorial Park & Pool	Park Street
	Dunn State Park Visitor Center	289 Pearl Street
Potable Water Treatment Plants	Crystal Lake Water Treatment Plant	99 Heywood Street

As stated in 310 CMR 22.02, a Public Water System means a system for the provision to the public of

pipled water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year” (Mass GIS, 2014).



Flood Prone Areas

Particular areas within the community where the risk of flood areas are or could occur were determined at the first meeting of the Gardner Local Hazard Mitigation Team held on May 30, 2012. This information can be found on Gardner's Local Hazard Map which is located under the section entitled Risk Assessment.

Flooding Vulnerability Assessment

An analysis of the FIRM flood hazard area maps indicates that there is a total of 1421.9 acres of 100-year floodplain within Gardner. This amounts to 9.65% of the total city. Based on additional analysis, 37.75 acres (2.66%) of the floodplain are developed. Currently there are 109 structures in the floodplain which is about 1.36% of the total structures in the community. The buildings are then multiplied by the building value, as determined by the MA Department of Revenue, to come up with a potential loss of \$75,140,300.

Excluding dams and bridges the table below lists critical facilities within the 100 year flood zone.

Table 42: Gardner Critical Facilities in the 100 year flood zone

<i>Feature Type</i>	<i>Name</i>	<i>Address</i>
Early Education Childcare Facilities	Bradley, Becky	105 Brookside Dr

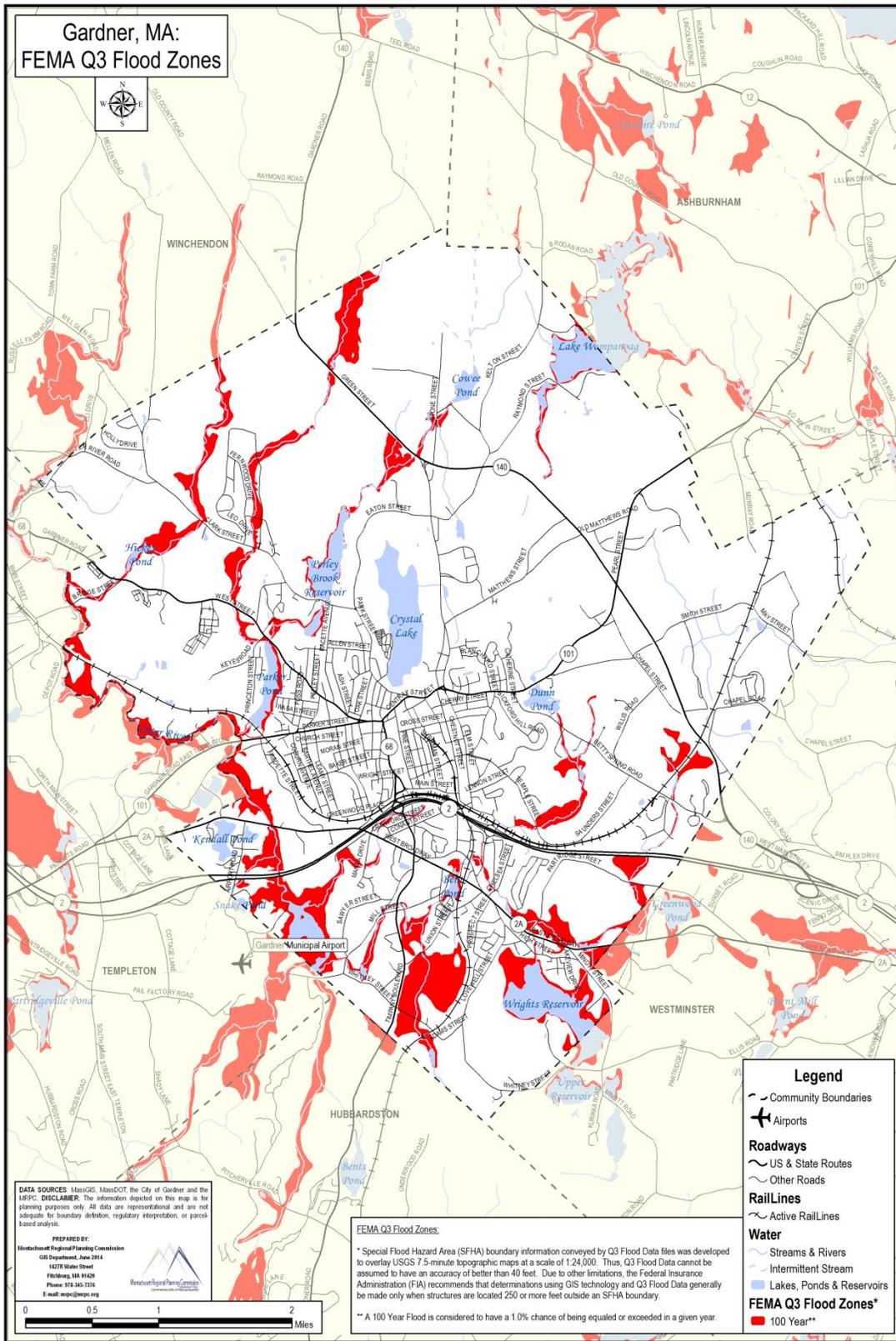
Since the initiation of the National Flood Insurance Program (NFIP), there have been no flood insurance claims in the City of Gardner. There are no repetitive loss properties in Gardner. Statistics from the NFIP BureauNet indicate in the City of Gardner there are nine flood insurance policies in force.

Floodplain Management and Compliance with NFIP

The City supports floodplain management activities in an effort to meet compliance of the National Floodplain Insurance Program. These efforts include:

- Implementing the MA Wetlands Protection Act and the City's Wetland's Protection Bylaw regulating development and activity within the wetlands buffer zone and regulating stormwater and other point source discharge.
- Implementing the City Flood Plain District Bylaw regulating development in the floodplain district.
- Continued maintenance of municipal stormwater drainage system which includes regular cleaning of catch basins, storm drains and culverts.
- Continued maintenance of public water bodies to reduce flooding caused by erosion and water displacement.
- Enforcement of the Open Space Residential Bylaw which mitigates possible flooding events by designating protected open space within a development which in turn treats stormwater runoff through the means of natural infiltration.

The map entitled FEMA Q3 Flood Zones which follows depicts the 100 year flood zones in the community.



Structurally Deficient Bridges Over Waterways

Gardner has one bridge over water that is classified by MassDOT as “structurally deficient”. The bridge is located on West Broadway over Bent Travers Pond.

Hazard Potential of Dams

The DCR Office of Dams Safety lists 21 dams in the City of Gardner as shown in Table 43. Wrights Reservoir Dam, Cowee Pond Dam and Perley Brook Reservoir Dam are classified as high hazard. Classifications for potential hazards are in accordance with the chart below.

Hazard Potential Classification

High Hazard	Refers to dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
Significant Hazard	Refers to dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities
Low Hazard	Refers to dams located where failure may cause minimal property damage to others. Loss of life is not expected.

Source: MA Department of Conservation and Recreation Office of Dam Safety

High hazard dams must be inspected every two year, significant hazard every five years, and low Hazards dams every 10 years. Owners of dams are responsible for having their dam inspected. MGL Chapter 253 and 302 CMR 10.00 requires that dam owners prepare, maintain and update Emergency Action Plans for all High Hazard Potential dams and certain Significant Hazard Potential dams.

Non-jurisdictional dams are not regulated by the Office of Dam Safety or under their jurisdiction. Typically these dams are under 6 feet in height and/or under 15 acre-feet in storage and do not have an assigned 'Hazard Code'. Dams owned and regulated by the Federal Government are also typically non-jurisdictional but DO have an assigned Hazard Code.

Table 43: Dams – Gardner

City	Dam	Hazard Code	Owner
Gardner	Wright's Reservoir Dam	High Hazard	Public
Gardner	Cowee Pond Dam	High Hazard	Public
Gardner	Perley Brook Reservoir Dam	High Hazard	Public
Gardner	Bents Pond Dam	Low Hazard	Public
Gardner	Farm Pond Dam	Low Hazard	Public

Gardner	Old Duck Pond Dam	Low Hazard	Public
Gardner	Crystal Lake Dike	N/A	Public
Gardner	Old Mill Storage Pond Dam	N/A	Private
Gardner	Farm Pond Dam	N/A	Private
Gardner	Stump Pond Dam	N/A	Public
Gardner	Distribution Reservoir Dam	N/A	Public
Gardner	Old Poor Farm Pond Dam	N/A	Public
Gardner	Murdock Pond Dam	N/A	Private
Gardner	Beagle Pond Dam	Significant Hazard	Private
Gardner	Parker Pond Dam	Significant Hazard	Public
Gardner	Dunn Pond Dam	Significant Hazard	Public
Gardner	Ramsdall Pond Dam	Significant Hazard	Private
Gardner	Hobbys Pond Dam	Significant Hazard	Private
Gardner	Hilchey Pond Dam	Significant Hazard	Private
Gardner	Wayside Pond Dam	Significant Hazard	Public
Gardner	Mahoney Pond Dam	Significant Hazard	Public

*N/A – Information not available as the dam is non-jurisdictional.

Risk Assessment

As previously stated, located in Section 4. Identification of Natural Hazards, Identifying and Profiling Hazards”, there is a description of each identified hazards’ impact on the region and its communities as well as an overall summary of vulnerability. Based on the hazards identified in this plan and the assessment of risks by the City of Gardner, the City considers itself to be at a high risk for Heavy Rain, Ice Jams, Beavers, Nor’easters, Severe Thunderstorms, Heavy Snow, Ice Storms, Blizzard, and Major Urban Fires; moderate risk for Snow Melt, Dam Failure, High Winds, Hurricanes, Tornados, Drought and Extreme Temperatures; low risk for Wildland Fire, Earthquakes, and Landslides; and tsunamis as not applicable.

This information is documented in Gardner’s’ Natural Hazard Matrix below which was obtained from participants at Gardner’s Local Hazard Mitigation Team Meeting held on May 30, 3012.

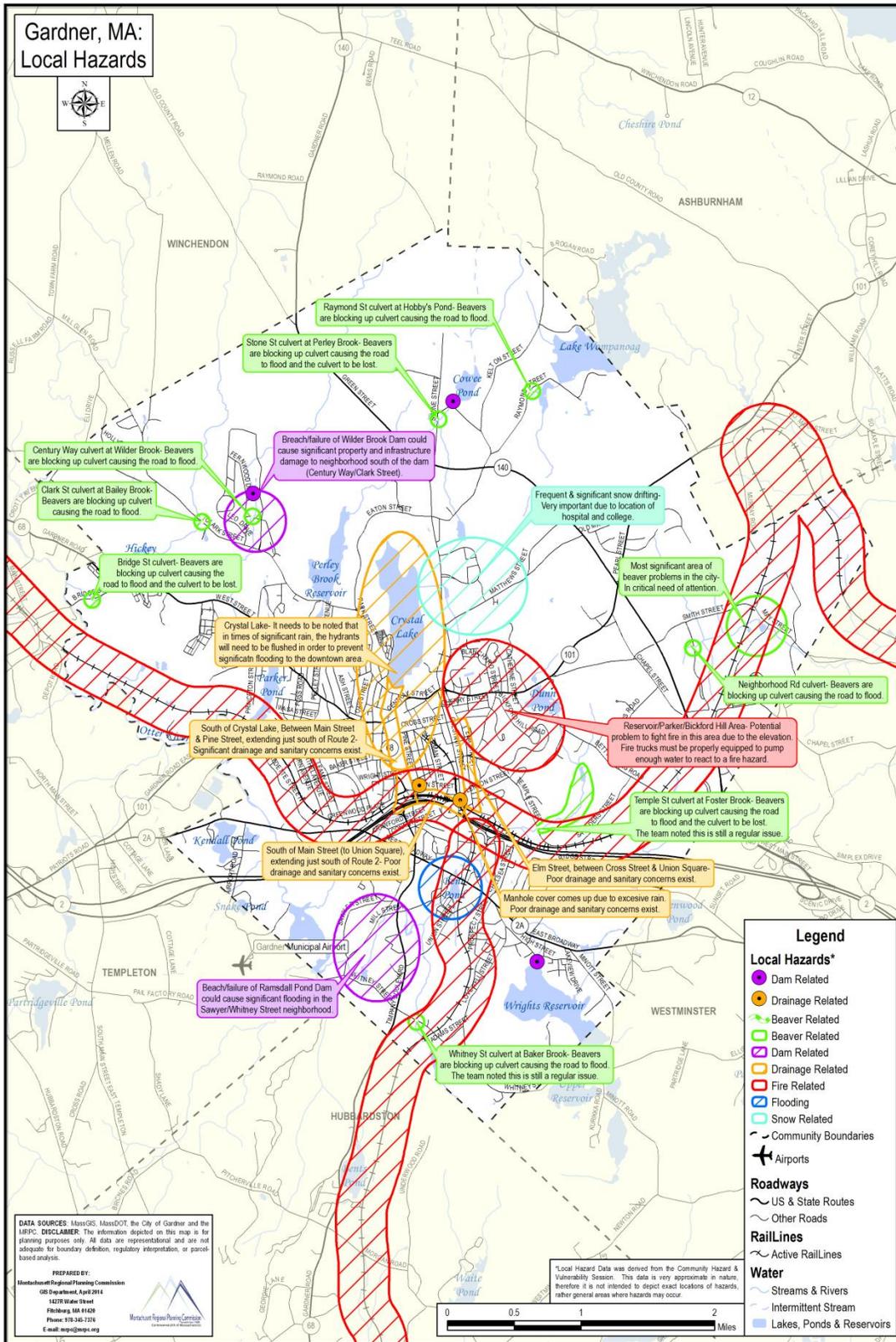
Gardner Natural Hazard Matrix

Natural Hazard	Likelihood of Occurrence	Location	Impacts	Hazard Index
Natural Hazard Separated by Flood, Atmospheric Related and Winter Related, Other Natural Hazards, and Geologic Hazards	3 = Highly Likely 2 = Possible 1 = Unlikely	3 = Regional/State 2 = Multi Community/Regional 1 = Local/Town	4 = Catastrophic 3 = Critical 2 = Limited 1 = Negligible	Ranking Determined by Combining the Likelihood, Location and Impacts of a Natural Hazard
Flood-Related Hazards				
• Heavy Rain	3	2	3	7
• Snow Melt	2	2	2	6
• Dam Failure	2	2	4	8
• Ice Jams	3	1	2	6
• Beavers	3	1	2	6
Atmospheric Related and Winter Related Hazards				
• High Winds	2	2	3	7
• Hurricanes	2	3	3	8
• Tornadoes	2	2	4	8
• Nor'easters	3	3	3	9
• Severe Thunderstorms	3	2	2	7
• Heavy Snow	3	3	3	9
• Ice Storms	3	2	4	9
• Blizzard	3	3	3	9
Other Natural Hazards				
• Major Urban Fires	3	1	2	6
• Wildland Fire	1	2	2	5
• Drought	2	3	2	7
• Extreme Temperatures	2	3	2	7
Geologic Hazards				
• Earthquakes	1	2	4	7
• Landslides	1	1	1	3
• Tsunami	NA	NA	NA	NA

Key

Highly likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
 Possible: 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.
 Unlikely: Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.
 Catastrophic: Immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.
 Critical: Fast speed of onset or long duration of event resulting in devastating damage and loss of services for weeks or months.
 Limited: Moderate speed of onset or moderate duration of event, resulting in some damage.
 Negligible: Slow speed of onset or short duration of event resulting in little to no damage.

Also discussed at this meeting were the hazards that affect each community and the identification of specific problem areas in the community that need to be addressed. This included the identification of new hazards that were determined to pose a threat or community vulnerability which are detailed in Gardner's Local Hazards Map on the following page. The entire community is equally at risk to the following hazards: heavy rain, snow melt, ice jams, high winds, hurricanes, tornados, nor'easters, severe thunderstorms, ice storms, blizzards, drought, extreme temperatures, earthquakes and landslides.



Existing Protections

The original inventory of hazard mitigation actions which the Montachusett communities undertook for the 2008 Montachusett Region Hazard Mitigation Plan was reviewed and updated by each community at a meeting held in each community with the MRPC and the community's Local Hazard Mitigation Planning Team and, in some communities, the Emergency Management Committee. The attendees of the meetings can be found in Appendix A. The following matrices depict the updated inventory of what is currently being done to mitigate hazards by listing the programs and activities already in place. It includes a description of the protection measure, who is responsible, and improvements and changes that may be needed. This inventory was used by the Planning Team/Emergency Management Committee to identify gaps in existing protections that were then addressed through the development of this plan update.

Gardner

Type of Existing Protection	Description	Area Covered	Implementation Resources and Funding*	Improvements or Changes Needed
Flood Related Hazards				
Storm water management standards	State Regulation under the Wetlands Protection Act to regulate storm water and other point source discharge	City-Wide	Enforced by the Gardner Conservation Comm. (Wetlands Protection Act) staffed by the municipal Conservation Agent and Gardner Planning Board (Subdivision Control Law and site plan review) staffed by the municipal Community Development and Planning Department.	Storm water management standards are and continue to be enforced. No improvements or changes needed.
Wetlands Protection Act (state)	State law regulating development and activity within wetland buffer zone	100-foot state buffer around wetland area; 200 foot buffer around river front areas	Enforced by the Conservation Commission staffed by the municipal Conservation Agent.	No improvements or changes needed.
Wetlands Protection Bylaw (local)	Local bylaw supplementing the Wetlands Protection Act	100-foot state buffer around wetland area; 200 foot buffer around river front areas	Enforced by the Conservation Commission staffed by the municipal Conservation Agent.	No improvements or changes needed.

100 Year Flood Zone	Federal law requiring elevation above 100-year flood level of new and substantially improved residential structures in floodplain	100-year floodplain as shown on Flood Insurance Rate Map dated July 2, 1981	Enforced by the Building Inspector (municipal staff) and Gardner Conservation Commission staffed by the municipal Conservation Agent.	Insurance Flood Rate Maps need to be updated.
City Bylaw Flood Plain Overlay District	Local bylaw enhancing federal/state laws and regulating any development in the flood plain district	100-year floodplain as shown on Flood Insurance Rate Map dated July 2, 1981	Enforced by the Building Inspector (municipal staff) and regulated by Board of Appeals.	Insurance Flood Rate Maps need to be updated.
Maintenance of municipal storm water drainage system	Regular cleaning of catch basins, storm drains, and culverts	City-Wide	Undertaken by the Department of Public Works municipal staff.	Maintenance continues, but Additional Personnel and Equipment Needed to undertake this task.
Maintenance of public water bodies (ponds, streams, brooks, wetlands)	Periodic cleaning of waterways is undertaken, i.e., remove trash, debris	City Wide	Undertaken by the Department of Public Works municipal staff with guidance from Conservation Commission staffed by the municipal Conservation Agent.	Maintenance continues. No improvements or changes needed.
Inspection of major dams	Periodic inspections of the structural integrity of the dam	Major Dams	Undertaken by the Massachusetts Department of Conservation and Recreation, Office of Dam Safety	Update Dam failure studies for the dams rated as high hazard
Wind Related Hazards				
State Building Code	State Law related to design loads to include wind effects	City-Wide	Enforced by Building Department (municipal staff).	Continued enforcement remains in place. No improvements or changes needed.
Tree Maintenance	Regular inspection and tree maintenance to cut branches threatening power lines and overhead utilities	City-Wide	National Grid staff (Electric Company) and Gardner Department of Public Works municipal staff.	Additional Staff needed by the city to undertake this task.
Fire Related Hazards				

Limited Brush Clearing	Brush clearing to provide access to Emergency Service vehicles.	City-Wide	Undertaken by the Department of Public Works municipal staff.	Continue to Identify additional Areas with Potential for Brushfires.
Winter Storms Related				
Parking Bans	Parking Bans to Enable Snow Removal Effectively from Residential Streets	City-wide	Department of Public Works municipal staff.	Additional personnel and equipment needed to enforce parking bans.
Clearing Snow from Major Arterial Routes	Clear snow to Ensure Access to Emergency Service vehicles.	City-wide	Department of Public Works municipal staff.	Snow clearing continues but Additional personnel and equipment needed.

*Gardner's enforcement/implementation is generally carried out by elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

Mitigation Goals, Objectives and Strategies

As discussed earlier in this Plan, MRPC previously prepared the 2008 Montachusett Region Hazard Mitigation Plan which consisted of individual annexes for each MRPC community. Similarly, as part of the multi-jurisdictional plan update, each community also developed their own individual goals, objectives and strategies which are listed in this section.

Gardner Overall Goal Statement: To reduce the loss of life, property, infrastructure and cultural resources throughout the city of Gardner from natural disasters through a multiple hazard mitigation program that involves increased coordination, planning, education, and capital improvements.

1. **Objective:** To provide adequate shelter, water, food, and basic first aid to displaced residents in the event of a natural disaster, and to provide adequate notification and information regarding evacuation procedures, etc., to residents in the event of a natural disaster.
2. **Objective:** to increase coordination between inter-departments in pre-disaster planning, post-disaster recovery and continuous hazard mitigation implementation.
3. **Objective:** Increase awareness of hazard mitigation among city officials, private organizations, businesses, and the general public.
4. **Objective:** To ensure that critical infrastructure sites are protected from natural hazards, and to maintain existing mitigation infrastructure in good condition.
5. **Objective:** To educate the public about the threat of natural hazards and the possible mitigation measures that can be taken to protect public health and safety, as well as infrastructure and property; and to educate the public as well about zoning and building regulations, particularly regulations that relate to new construction.
6. **Objective:** To encourage future development in areas that is not prone to natural disasters.
7. **Objective:** To identify existing shelters that is earthquake resistant as well as outside of floodplain and inundation areas. Disseminate this information to appropriate city departments.
8. **Objective:** To inventory supplies at existing shelters and develop a needs list and storage requirements; and to establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster.
9. **Objective:** To maintain Code Red notification system.
10. **Objective:** To collect, periodically update, and disseminate information on which local radio and

TV stations and cable TV provide emergency information, what to include in a 'home survival kit,' how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to follow during a natural disaster.

Specific Natural Hazard Goals for Gardner

Goal Statement for Flooding: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to flooding. And to pursue prevention activities which include planning, zoning, open space preservation, floodplain and wetland development regulations, storm water management, waterway dumping regulations, watershed protection measures, and best management practices, as well as, soil erosion, building ordinances, and subdivision regulations.

- 1. Objective:** To implement standards in the Subdivision Rules and Regulations to require temporary and permanent erosion control measures for streams and surface water bodies.
- 2. Objective:** To add more specific requirements to address flood related issues in the Special Permit and Site Plan Approval provisions in the Gardner Zoning Bylaw including topographic change, removal of cover vegetation, risk of erosion or siltation and increased storm water runoff.
- 3. Objective:** To identify all structures throughout city that needs to be elevated above the base-flood elevation.
- 4. Objective:** To Develop a priority list and seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout the city.

Goal Statement for Protection from Beavers: To minimize the threat to health, the damage to roads and property, and the disruption of governmental services and general business activities due to flooding caused by beavers.

- 1. Objective:** Support local city departments to continue present method to prevent beaver caused flooding.
- 2. Objective:** Seek assistance from beaver management professionals, including trappers.
- 3. Objective:** Install beaver management devices

Goal Statement for Hurricanes and Tornadoes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to high winds associated with hurricanes and tornadoes. (The objectives listed above, under flooding, address the flooding that can result from a hurricane.)

- 1. Objective:** To educate residents and volunteers regarding the safe methods and actions necessary to deal with Hurricanes and Tornados.

Goal Statement for Winter Related Hazards: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to severe snow and ice storms.

- 1. Objective:** To develop a plan for providing access to water, information, shelter, and food stores to people in remote locations in Gardner in the event of a severe winter storm.

Goal Statement for Dam Failure: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to dam failures.

- 1. Objective:** To identify sources of funding for dam safety inspections.

Goal Statement for Earthquakes: To minimize the loss of life, damage to property, and the disruption of

governmental services and general business activities due to earthquakes.

1. **Objective:** To evaluate all Shelters and Reception Centers to determine if they are earthquake resistant.
2. **Objective:** To insure that all identified shelters have sufficient back-up utility service in the event of primary power failure.

Goal Statement for Drought: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to drought.

1. **Objective:** Prepare a Water Conservation Plan for Gardner.

Goal Statement for Wildfires/Brushfires: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to wildfires/brushfires.

1. **Objective:** Develop and distribute an educational pamphlet on fire safety and prevention.

Goal Statement for Weather Extremes: To minimize the loss of life and the threats to public health and safety.

1. **Objective:** To develop and distribute educational information regarding the threats from extreme heat and cold.
2. **Objective:** To educate the residents as to the causes and effects of global warming; and how it affects the residents of Gardner, and what they could be doing to help improve the situation.

Mitigation Action Plans and Prioritization of Actions (STAPLEE)

Initial Mitigation Action Plans for the Montachusett Communities were presented in the communities Hazard Mitigation Plans that were approved by FEMA in 2009 and 2010. The original Mitigation Action Plans were developed through an inventory of potential hazards which could impact the community and an evaluation of a range of alternatives to address these hazards. As part of the plan update process, the original Mitigation Action Plan was reviewed by the community's Local Hazard Mitigation Planning Team/Emergency Management Committee to delete actions which have already been completed, add additional actions which are either underway or planned to be undertaken, and to update the current status of all actions. The goals were reviewed and updated at the second meeting with each community.

An additional step in this process was to conduct a "STAPLEE" analysis for each action to prioritize all actions within each community and a subjective evaluation of each action's perceived cost/benefit. In the 2008 plan, actions were not prioritized so there were no changes in priorities in this update. The revised Community Mitigation Action Plans matrices that follow identify each mitigation action, the responsible department or board responsible for implementation, potential funding sources, the timetable of the action, results of the prioritization of actions through the STAPLEE analysis, and the perceived cost/benefit for each mitigation action.

The goal of each identified strategy, or mitigation action, is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each action to establish priorities for implementation, using the "STAPLEE" method. The STAPLEE methodology was developed by the Federal Emergency Management Agency as a tool to help communities prioritize their hazard mitigation strategies and determine the most appropriate actions

for implementation. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of an action and is designed to be used by public officials and planners for making planning decisions.

To conduct the STAPLEE exercise, the community's Hazard Mitigation Team was asked to rate each action in their Mitigation Action Plan on each of the following criteria, using a score of 1 to 3 (Good = 3, Average = 2, Poor = 1):

- **Social:** Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- **Technical:** Will the proposed strategy work? Will it create more problems than it solves?
- **Administrative:** Can the community implement the action? Is there someone to coordinate and lead the effort?
- **Political:** Is the action politically acceptable? Is there public support both to implement and to maintain the action?
- **Legal:** Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- **Economic:** What are the costs of this action? Does the cost seem reasonable for the size of the problem and the likely benefits?
- **Environmental:** How will the action impact the environment? Will the action need environmental regulatory approvals?

These scores were then totaled, resulting in a final score of 7 (least priority) to 21 (highest priority) for each action. The higher the final score, the higher the relative priority of that action for implementation. This information can then be utilized in each community as they conduct and administer relevant municipal functions and activities. The final STAPLEE score for each action is shown in the following mitigation action plan.

The Hazard Mitigation team was also asked to do a relative cost/benefit of each action. This assessment was intended to informally indicate if an action will either have more benefits accrued to the Town than the Cost of implementing the action, or if the costs would exceed any benefits. Responses include: "Benefits Exceed Costs", "Benefits Equal Costs, or "Costs Exceed Benefits".

GARDNER IMPLEMENTATION STRATEGY FOR PRIORITY MITIGATION ACTIONS

Type of Natural Hazard	Description of Action	Implementation Responsibility	Resources/ Funding	Timetable	Priority (STAPLEE SCORE)	Cost/ Benefit Evaluation	Status Update from 2008 Plan**
Wildland Fire	Increase awareness by educating property owners regarding actions that they can take to reduce risk to property by hosting an Open House at the Fire Department, Develop and Distribute an Educational Pamphlet on Fire Safety and Prevention (SAFE PROGRAM) (SENIOR SAFE) and wildfire prevention.	Fire Department	Municipal Staff	2015 - 2020	19	Benefits exceeds costs	Completed but carried forward. Action undertaken annually.
All Natural Hazards	Increase hazard education and risk awareness to public by Collecting, Updating, and Disseminating Information on Local Radio/TV Stations to educate the public and alert them of emergency information including shelter locations and other instructions	Emergency Management Director	Municipal Staff	2015 - 2020	21	Benefits exceeds costs	Completed but carried forward. Ongoing. This action is undertaken periodically.

	related to all natural hazards						
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All Natural Hazards	Inventory Supplies at Existing Shelters and Develop a Needs List and Storage Requirements to ensure the available of adequate supplies during a natural hazard. Supplies must be adequate to eliminate or reduce risk to human life.	Emergency Management Planning Committee, School Facilities Manager	Municipal Staff	2015 - 2020	21	Benefits exceeds costs	Completed but carried forward as this action is undertaken as necessary.
Other Natural Hazards – (Major Urban Fires and Wildland)	Maintain the Low Pressure Water Hydrants to ensure existing mitigation infrastructure is in good condition.	Fire Department, Department of Public Works	Grants if Available	2015 - 2020	19	Benefits exceeds costs	New action.
Flood Related Hazards.	Identify all structures throughout the town that need to be Elevated above the Base-Flood Elevation. Once identified educate those property owners about mitigation options.	Building Inspector, Fire Department	Municipal Staff. Also 75% FEMA FUNDING AVAILABLE. Remaining 25% (non-federal)	2015 - 2020	13	Benefits exceeds costs	Carried forward due to time constraints.

Flood Related Hazards	To Develop a priority list and possibly seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town to reduce or eliminate flooding risk.	City Council, Highway Department	Municipal Staff/ FEMA HMGP grant 75%	2015-2020	21	Benefits exceeds costs	Carried forward due to time constraints.
Flood Related Hazards	Educate property owners regarding options for mitigating their properties from flooding through outreach programs that address measures that residents can take (i.e installing backflow valves, securing debris, etc.)	Emergency Management Director, Fire Department	Property Owners	2015 - 2020	21	Benefits exceeds costs	New Action.
Flood Related Hazards	Continue participation in the National Flood Insurance Program to enable property owners to purchase insurance protection	City Council, Conservation Commission	FEMA/MEMA	2015 - 2020	21	Benefits exceeds costs	Completed but carried forward. The city continues its participation in this program.

	against flood losses.						
Flood Related Hazards	Evaluate and relocate furnaces, water heaters, and electrical equipment in municipal owned buildings that are located in areas prone to flooding to reduce flood damage.	Emergency Management Director, Fire Department	Municipal Staff and Property Owners	2015-2020	19	Benefits exceeds costs	Carried forward due to time constraints and lack of municipal funding.
All Natural Hazards	Utilize interactive mapping application prepared by MRPC/CMRPC to update critical infrastructure and simulate real time evacuation scenarios to mitigate hazards to the public.	Emergency Management Director	Emergency Management Director	2015-2020	21	Benefits exceeds costs	New action.
Flood Related Hazards	Install "beaver diverters" and water control devices to mitigate flooding caused by beaver dams.	Department of Public works	Municipal Staff	2015 – 2020	19	Benefits exceeds costs	Completed but carried forward. Action undertaken as needed.
Flood Related Hazards	Hire trapper for removal of beavers to mitigate flooding caused by beaver dams.	Department of Public works	Municipal Staff	2015 – 2020 as needed	19	Benefits exceeds costs	Completed but carried forward. Action undertaken as needed.

All Natural Hazards	Implement recommendations regarding natural hazard mitigation in existing planning documents including the five year action plan of the open space and recreation plan and the emergency evacuation plan.	Conservation Commission, City Council, Planning Board, Emergency Management Director	Conservation Commission, City Council, Planning Board, Emergency Management Director	2015 – 2020	21	Benefits exceeds costs	Completed but carried forward. This is an ongoing effort. For example, City recently applied for site assessment money to clean-up brownfield sites. Re-use of former brownfield sites could reduce stormwater runoff/flooding. This was a recommendation of the Urban Renewal Plan.
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***Unless otherwise noted, Gardner’s Resources/Funding consists of elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.**

****Actions identified as carried forward were not completed in the previous planning cycle unless otherwise stated.**

Mitigation Actions from the 2008 Montachusett Region Hazard Mitigation Plan that are complete include:

- Identify Existing Shelters that are Earthquake Resistant as well as Outside of Floodplain (and Dam Inundation)
- Develop a plan for providing access to water, information, shelter, and food stores to people in remote locations of the city in the event of a severe winter storm.
- Identify shelters and publicize locations.
- Expand Residential parking bans to enable snow removal from all streets.
- Work with Neighboring Communities to Establish a Community Emergency Response Team (CERT).

Groton Natural Hazard Risk Assessment

While this annex focus’ pertains to critical facilities, flooding, risk assessment, existing protections and

mitigation strategy in the community, more detailed descriptions of each natural hazard's impact on the region and its communities and summary of vulnerability can be located in the regional section entitled " 4. Identification of Natural Hazards, Identifying and Profiling Hazards".

Community Profile

The Town of Groton is located in North Central Massachusetts, bordered by Pepperell and Dunstable to the north, Tyngsborough and Westford to the east, Littleton and Ayer to the south, and Shirley and Townsend on the west. Groton is located 15 miles west of Lowell, 31 miles northwest of Boston, and is 90.6 miles to Springfield, 36.2 to Worcester, and 210 miles from New York City.

Groton covers a total area of 33.72 square miles and a resident population of 10,646, according to the 2010 US Census. The population density is 316 people per square mile. There are 3989 housing units in Groton, and the average household size is 2.79 people. The median age of Groton's residents is 42.

Groton is a community of homes around a historic village core that still maintains its charm and beauty. Groton was settled in 1655 as a plantation. Dean Winthrop, one of the first petitioners and son of Governor Winthrop, named the town after Groton Manor, the Winthrop Estate in England where he was born. The earliest settlers pushed northwest from Concord into the heavily forested Native American hunting grounds. The land was cleared for agriculture that included farms, orchards, and pastures. Throughout the 19th Century the Town of Groton grew slowly. Agriculture was Groton's chief economic activity, and was supplemented by four or five mills. Several apple orchards that remain today are evidence of this farming activity that also enhanced roadside views.

Groton home to two prep schools: Groton School, founded in 1884, and Lawrence Academy at Groton, founded in 1793. Groton has an extensive trail system that provides opportunities for hiking, running and bird watching. The Nashua River Rail Trail which passes through Groton, an 11-mile long, beautifully maintained, pastoral corridor connecting five New England towns, a popular attraction. Largest employers in Groton are Deluxe Corporation, followed by Hollingsworth and Vose Company.

Critical Facilities

In general usage, the term "critical facilities" is used to describe all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired.

Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even access to damaged areas.

The number and nature of critical facilities in a community can differ greatly from one jurisdiction to another, and usually comprise both public and private facilities. In this sense, each community needs to determine the relative importance of the publicly and privately owned facilities that deliver vital services, provide important functions, and protect special populations. *Source: Federal Emergency Management Administration, Risk Management Series, Design Guide for Improving Critical Facility Safety from Flooding and High Winds, FEMA 543, January 2007.*

A list of the critical facilities within the community is shown in Table 44. This data was obtained from the community’s Comprehensive Emergency Management Plan (CEMP). The data was then reviewed by the Emergency Management Director. These facilities were digitized into GIS and used for determining vulnerability to the various hazards. The map that follows entitled FEMA Q3 Flood Zones and Critical Infrastructure depicts Critical Facilities in the community.

Table 44: Groton Critical Facilities

<i>Feature Type</i>	<i>Name</i>	<i>Address</i>
Animal Shelters	Groton Veterinary Hospital	171 Lowell Rd
City/Town Halls	Groton Town Hall	173 Main Street
Clinics	Seven Hills Pediatric Hospital	22 Hillside Avenue
Dpw Facilities	Groton Highway Department	Cow Pond Brook Road
Early Education Childcare Facilities	Country Kids Preschool	501 Main St
	Donaghue, Luzdari	600 Boston Rd
	Emslie, Heather L.	20 Fairview Ave
	Grant, Patricia	96 Pleasant St
	Groton Community School	110 Boston Rd
	Sunshine School	1 Powderhouse Rd.
	The Children's Center At Groton, Inc.	20 JOY LN
Elderly Housing	Groton Commons	74 Willowdale Road
	Petapawag Place	19 Lowell Road
	Winthrop Place (Some Of Elderly)	371-375 Main Street
Electric Substations	Groton Sub Station	444 Lowell Road
Emergency Dispensing Sites	Groton Dunstable Regional Middle School (North)	346 Main Street
Emergency Operations Centers	Groton Fire Station 3 Secondary	185 Lost Lake Drive
	Groton Public Safety Building Primary	99 Pleasant Street
	Groton Center Fire Station	45 Farmers Road
Emergency Shelters	Florence Roche School	342 Main Street
	Groton Dunstable Regional High School	703 Chicopee Row
	Groton Dunstable Regional Middle School (North)	346 Main Street
	Groton Senior Center	163 West Main Street
	Grotonwood Baptist Camp And Conference Center	167 Prescott Street

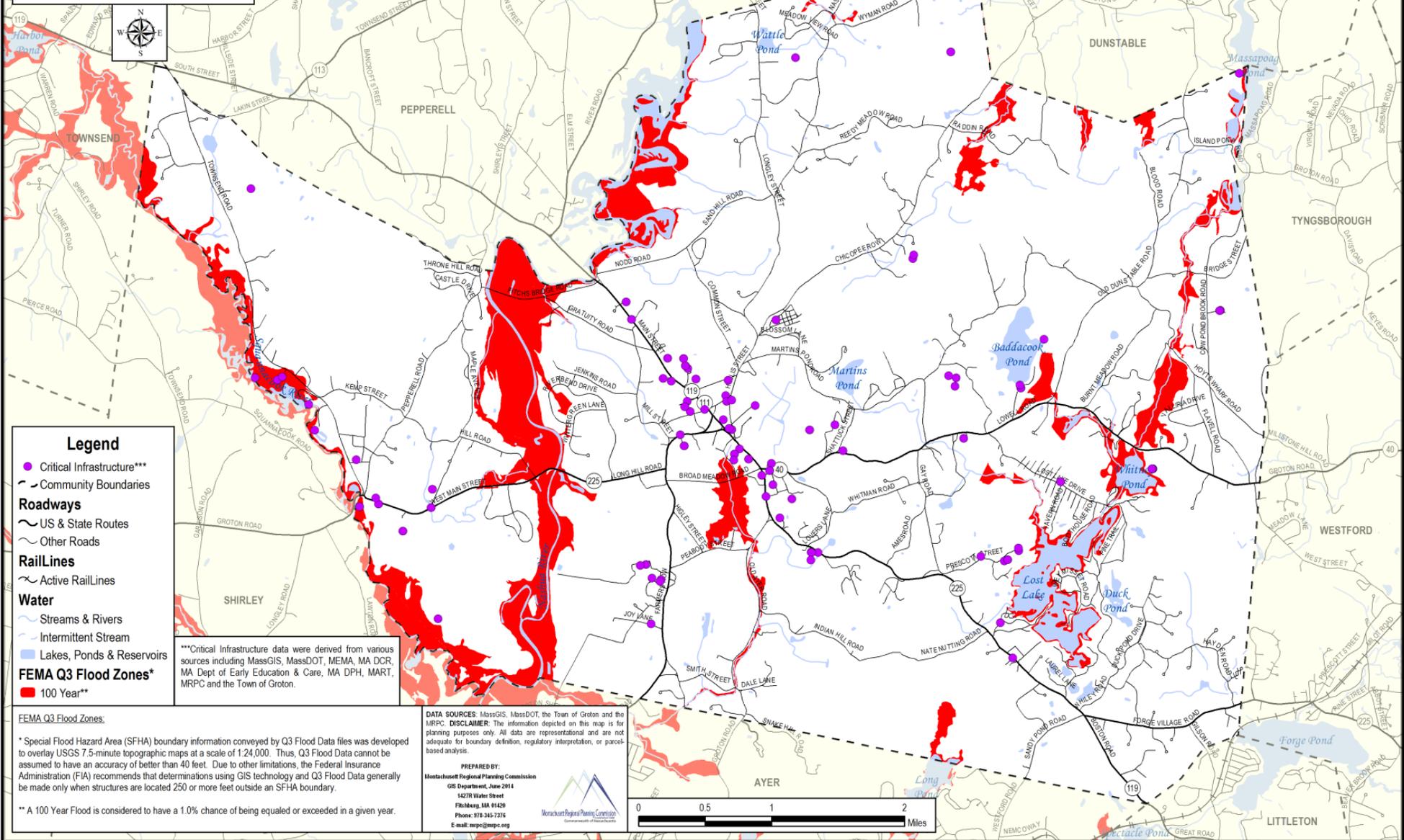
	Groton Cemetery	Chicopee Row
	Groton School, New Rink #1	Farmers Row
	Groton School, Pratt Rink #2	Farmers Row
	Lawrence Academy, Grant Rink	56 Powder House Rd.
Fire	Groton Fire Administration	99 Pleasant Street
	Fire Station Central	45 Farmers Road
	Groton- Station 2	46 West Main Street
	Groton- Station 3	185 Lost Lake Drive
	Groton- Station 3	185 Lost Lake Drive
Hazmat Sites	Baddacook Pond Water Treatment Plant	Lowell Road
	Baddacook Pond Water Treatment Plant	Lowell Road
	Blood Cell Tower	94 West Main Street
	Cell Tower Lease Acquisition Co	149 Lowell Road
	Groton Highway Department	600 Cow Brook Pond Road
	Groton Telephone Building	17 Hollis Street
	Grotonwood Baptist Camp & Conference Center	167 Prescott Street
	Insko Corp.	412 Main Street
	Jeffery Crowley	550 Main Street
	Town Forest Well Site 18	160 West Main Street
	Town Of Groton	173 Main Street
	Whitney Well Water Treatment Plant	864 Lowell Road
Long Term Care Facility	Rivercourt Residences	8 West Main Street
	Seven Hills At Groton, Inc.	22 Hillside Avenue
Other Critical Facilities	Baddock Pond Water Treatment Plant	541 Lowell Road
	Blood Cell Tower	94 West Main Street
	Cell Tower Lease Acquisition Co	149 Lowell Road
	Cooperative Elder Services	8 West Main Street
	CVS	110 Boston Road
	Donelans Of Groton	240 Main Street
	First Baptist Church Of Groton	365 Main Street
	First Parish Unitarian Church	1 Powderhouse Road
	Groton Highway Department	600 Cow Brook Pond Road
	Groton Telephone Building	17 Hollis Street
	Grotonwood Baptist Camp & Conference Center	167 Prescott Street
	Grotonwood Baptist Camp & Conference Center	167 Prescott Street
	Hollingsworth & Vose	219 Townsend Road
	Insko Corp.	412 Main Street
	Jeffery Crowley/Cell Tower	550 Main Street
	Peter Twomey Youth Ctr Extended Day	348 Main Street

	Peter Twomey Youth Ctr Extended Day	348 Main Street
	Sacred Heart & Saint James Church	29 Saint James Avenue
	Sacred Heart Rectory And Educ. Center	271 Main Street
	Sheperd Of The Valley Lutheran Church	80 Champney Street
	Town Forest Well Site 18	160 West Main Street
	Town Of Groton	600 Cow Pond Brook Road
	Union Congregational Church	218 Main Street
	Whitney Well Water Treatment Plant	864 Lowell Road
Other Government Buildings	Groton Dunstable Regional School District Office	145 Main Street
	Groton Electric Light	23 Station Avenue
	Groton Highway Department	600 Cow Pond Brook Road
	Groton Public Library	99 Main Street
	Groton Senior Center	163 West Main Street
	Legion Hall	79 Hollis Street
	Squannacook Hall	33 West Main Street
	Groton Country Club	94 Lovers Lane
	Water Tank	143 Lowell Road
	Water Tank (West Groton)	700 Townsend Road
Police	Groton Public Safety Building	99 Pleasant Street
Potable Water Treatment Plants	Baddacook Pond Water Treatment Plant	541 Lowell Road
	Town Forest Well Site #18	160 West Main Street
	Whitney Well Water Treatment Plant	864 Lowell Road
Public Health Office	Groton Board Of Health	173 Main Street
Public Water Supply*	Baddacook Pond Dug Well	
	Groton Convenience	
	Grotonwood Baptist Camp And Conf.Ctr.	
	Proposed Shattuck Road Brook Well #1	
	Proposed Shattuck Road Brook Well #2	
	Rock Well #1	
	Shattuck Well	
	Town Forest Gp Well	
	Tubular Well Field (47 X 2.5")	
	Whitney Pond Well #1	
	Whitney Pond Well #2	
	Ymca Camp Massapoag	
Pumping Stations	Badacook Pond Pumping Station	541 Lowell Road
	West Groton Pumping Station	309 Townsend Road
	Whitney Well	864 Lowell Road
School	Boutwell School	78 Hollis Street

	Country Day Of Holy Union	14 Main Street
	Country Kids	501 Main Street
	Florence Roche School	342 Main Street
	Groton Community School	110 Boston Road
	Groton Dunstable Regional High School	703 Chicopee Row
	Groton Dunstable Regional Middle School	344 Main Street
	Groton School	282 Farmers Row
	Lawrence Academy	26 Powder House Road
	Prescott Elementary School	145 Main Street
	Seven Hills At Groton	22 Hillside Avenue
	Sunshine School	1 Powderhouse Road
Sports And Cultural Areas	Groton Dunstable Performing Arts	344 Main Street
Wastewater Treatment Plant	Hollingsworth And Vose	219 Townsend Road

*As stated in 310 CMR 22.02, a Public Water System means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year” (Mass GIS, 2014).

Groton, MA: FEMA Q3 Flood Zones & Critical Infrastructure



Flood Prone Areas

Particular areas within the community where the risks of flood areas are or could occur were determined at the first meeting of the Groton Local Hazard Mitigation Team held on April 16, 2013. This information can be found on Groton’s Local Hazard Map which is located under the section entitled Risk Assessment.

Flooding Vulnerability Assessment

An analysis of the FIRM flood hazard area maps indicates that there is a total of 2178.62 acres of 100-year floodplain within Groton. This amounts to 10.08% of the total town. Based on additional analysis, 53.91 acres (2.47%) of the floodplain are developed. Currently there are 138 structures in the floodplain which is about 2.54% of the total structures in the community. The buildings are then multiplied by the building value, as determined by the MA Department of Revenue, to come up with a potential loss of \$266,400,800.

Excluding dams and bridges there following table lists critical facilities within the 100 year flood zone.

Table 45: Groton Critical Facilities within 100-Year Flood Zones

<i>Feature Type</i>	<i>Name</i>	<i>Address</i>
Long Term Care Facility	River court Residences	8 West Main Street
Other Critical Facilities	Cooperative Elder Services	8 West Main Street
Public Water Supply	Tubular Well Field (47 X 2.5")	
Pumping Stations	West Groton Pumping Station	309 Townsend Road

Since the initiation of the National Flood Insurance Program (NFIP), two flood insurance claims in the town of Groton have been made totaling \$12,395.47 in payments. There are no repetitive loss properties in Groton. Statistics from the NFIP BureauNet indicate in the town of Groton there are flood insurance policies in force.

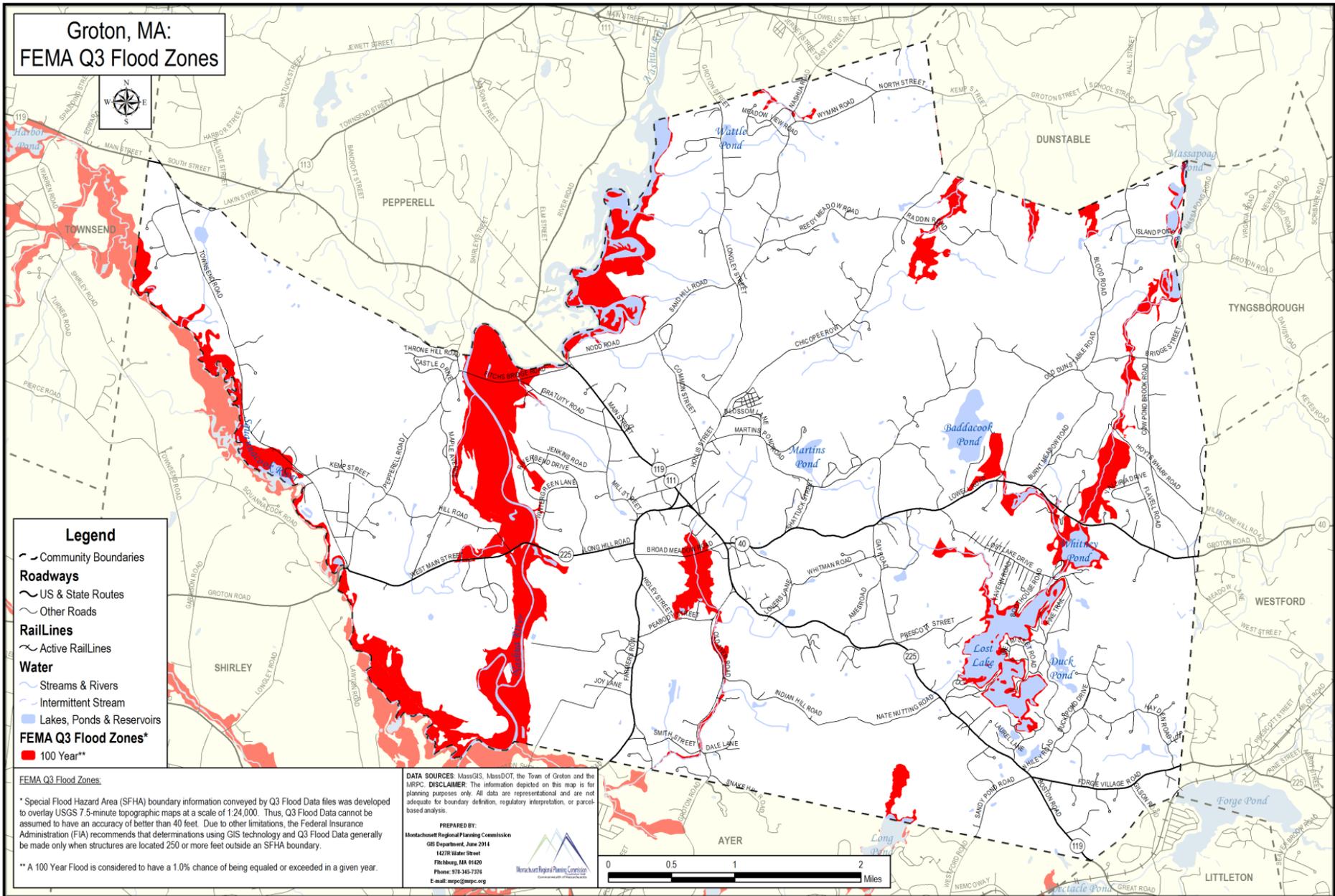
Floodplain Management and Compliance with NFIP

The town supports floodplain management activities in an effort to meet compliance of the National Floodplain Insurance Program. These efforts include:

- Implementing the MA Wetlands Protection Act and the town’s Wetland’s Protection Bylaw regulating development and activity within the wetlands buffer zone and regulating stormwater and other point source discharge.
- Implementing the Town Flood Plain District Bylaw (April 26, 2010) regulating development in the floodplain district.
- Continued maintenance of municipal stormwater drainage system which includes regular cleaning of catch basins, storm drains and culverts.

- Continued maintenance of public water bodies to reduce flooding caused by erosion and water displacement.
- Maintain the Town's Low Impact Development Bylaw which establishes minimum requirements and procedures to control the adverse effects of increased post-development stormwater runoff and nonpoint source pollution associated with new development and redevelopment.
- Enforcement of the Flexible Development Bylaw which mitigates possible flooding events by designating protected open space within a development which in turn treats stormwater runoff through the means of natural infiltration.

The map that follows entitled FEMA Q3 Flood Zones depicts the 100 year flood zones in the community.



Structurally Deficient Bridges Over Waterways

Groton does not have any bridges over water that are classified by MassDOT as “structurally deficient”.

Hazard Potential of Dams

The DCR Office of Dams Safety lists four dams in the Town of Groton as shown in Table 46. Lost Lake Dam is classified as high hazard.

Classifications for potential hazards are in accordance with the chart below.

Hazard Potential Classification

High Hazard	Refers to dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
Significant Hazard	Refers to dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities
Low Hazard	Refers to dams located where failure may cause minimal property damage to others. Loss of life is not expected.

Source: MA Department of Conservation and Recreation Office of Dam Safety

High hazard dams must be inspected every two year, significant hazard every five years, and low Hazards dams every 10 years. Owners of dams are responsible for having their dam inspected. MGL Chapter 253 and 302 CMR 10.00 requires that dam owners prepare, maintain and update Emergency Action Plans for all High Hazard Potential dams and certain Significant Hazard Potential dams.

Non-jurisdictional dams are not regulated by the Office of Dam Safety or under their jurisdiction. Typically these dams are under 6 feet in height and/or under 15 acre-feet in storage and do not have an assigned 'Hazard Code'. Dams owned and regulated by the Federal Government are also typically non-jurisdictional but DO have an assigned Hazard Code.

Table 46: Dams – Groton

Town	Dam	Hazard Code	Owner
Groton	Lost Lake Dam	High Hazard	Public
Groton	Hollingsworth & Vose Co. Dam	Low Hazard	Private
Groton	Woods Mill Pond Dam	Low Hazard	Private
Groton**	Squannacook River Dam	Significant Hazard	Public

*N/A – Information not available as the dam is non-jurisdictional.

**This dam is owned by Groton but located in Shirley.

Risk Assessment

As previously stated, located in Section 4. Identification of Natural Hazards, Identifying and Profiling Hazards”, there is a description of each identified hazards’ impact on the region and its communities as well as an overall summary of vulnerability. Based on the hazards identified in this plan and the assessment of risks by the Town of Groton, the town considers itself to be at a high risk for Heavy Rain, Beavers, High Winds, Nor’easters, Severe Thunderstorms, Heavy Snow, Major Urban Fires; moderate risk for Snow Melt, Dam Failure, Ice Jams, Hurricanes, Tornados, Ice Storms, Blizzard, Wildland Fire, Drought, Extreme Temperatures, Earthquakes, and Landslides; and tsunamis as not applicable.

This information is documented in Groton’s Natural Hazard Matrix on the page that follows which was obtained from participants at Groton’s Local Hazard Mitigation Team Meeting held on April 13, 2013.

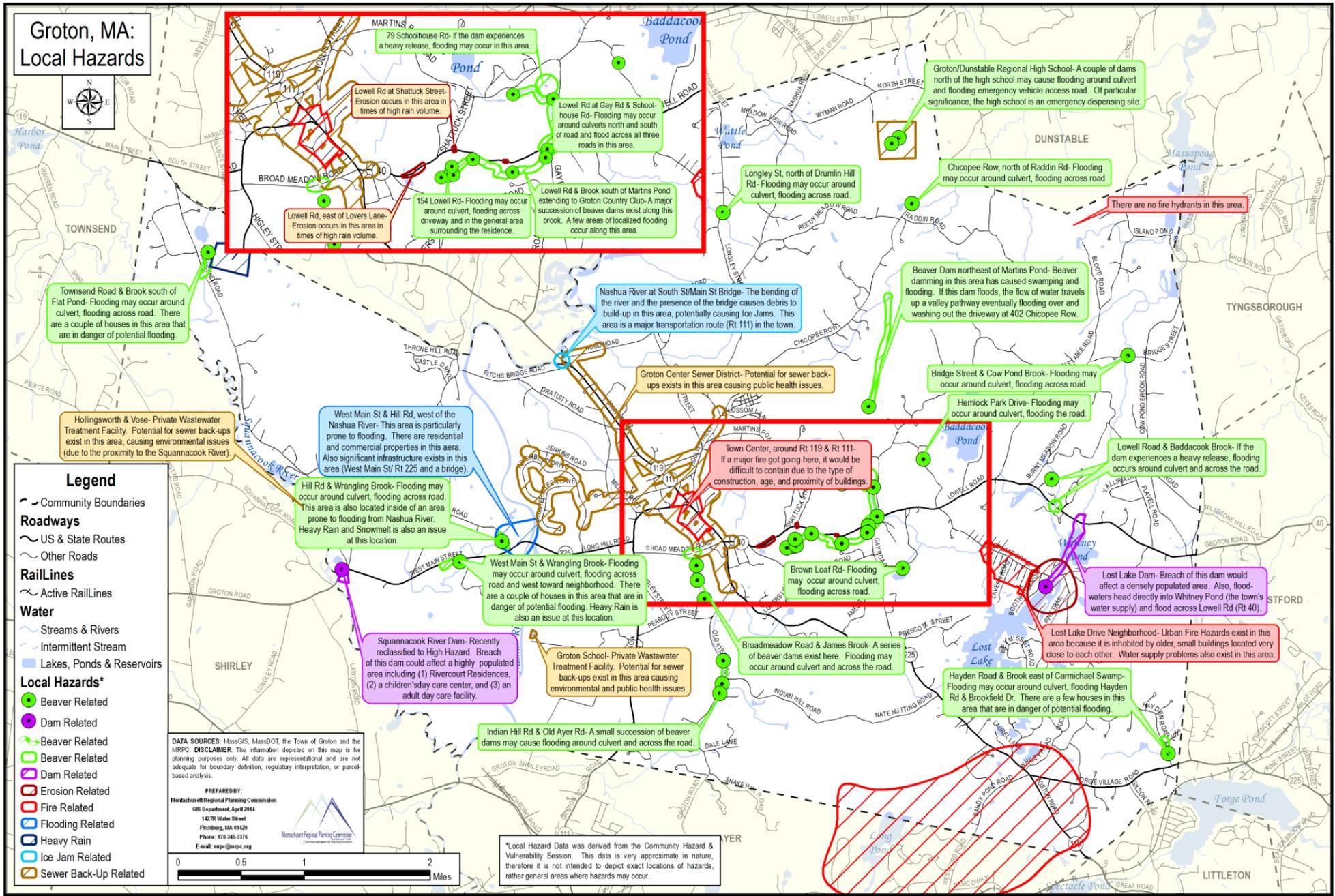
Groton Natural Hazard Matrix

Natural Hazard	Likelihood of Occurrence	Location	Impacts	Hazard Index
Natural Hazard Separated by Flood, Atmospheric Related and Winter Related, Other Natural Hazards, and Geologic Hazards	3 = Highly Likely 2 = Possible 1 = Unlikely	3 = Regional/State 2 = Multi Community/Regional 1 = Local/Town	4 = Catastrophic 3 = Critical 2 = Limited 1 = Negligible	Ranking Determined by Combining the Likelihood, Location and Impacts of a Natural Hazard
Flood-Related Hazards				
• Heavy Rain	3	3	2	8
• Snow Melt	3	2	2	7
• Dam Failure	2	2	4	8
• Ice Jams	2	1	2	5
• Beavers	3	1	2	6
Atmospheric Related and Winter Related Hazards				
• High Winds	3	2	3	8
• Hurricanes	2	3	4	9
• Tornados	1	2	4	7
• Nor'easters	3	3	3	9
• Severe Thunderstorms	3	2	2	7
• Heavy Snow	3	2	3	8
• Ice Storms	2	2	3	7
• Blizzard	3	3	3	9
Other Natural Hazards				
• Major Urban Fires	2	1	4	7
• Wildland Fire	3	1	3	7
• Drought	2	3	2	7
• Extreme Temperatures	2	3	2	7
Geologic Hazards				
• Earthquakes	1	2	4	7
• Landslides	1	1	2	4
• Tsunami	NA	NA	NA	NA

Key

Highly likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
 Possible: 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.
 Unlikely: Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.
 Catastrophic: Immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.
 Critical: Fast speed of onset or long duration of event resulting in devastating damage and loss of services for weeks or months.
 Limited: Moderate speed of onset or moderate duration of event, resulting in some damage.
 Negligible: Slow speed of onset or short duration of event resulting in little to no damage.

Also discussed at this meeting were the hazards that affect each community and the identification of specific problem areas in the community that need to be addressed. This included the identification of new hazards that were determined to pose a threat or community vulnerability which are detailed in Groton's Local Hazards Map on the following page. The entire community is equally at risk to the following hazards: snow melt, high winds, hurricanes, tornados, nor'easters, severe thunderstorms, heavy snow, ice storms, blizzards, drought, extreme temperatures, earthquakes and landslides.



Existing Protections

The original inventory of hazard mitigation actions which the Montachusett communities undertook for the 2008 Montachusett Region Hazard Mitigation Plan was reviewed and updated by each community at a meeting held in each community with the MRPC and the community's Local Hazard Mitigation Planning Team and, in some communities, the Emergency Management Committee. The attendees of the meetings can be found in Appendix A. The following matrices depict the updated inventory of what is currently being done to mitigate hazards by listing the programs and activities already in place. It includes a description of the protection measure, who is responsible, and improvements and changes that may be needed. This inventory was used by the Planning Team/Emergency Management Committee to identify gaps in existing protections that were then addressed through the development of this plan update.

Groton

Type of Existing Protection	Description	Area Covered	Implementation Resources and Funding*	Improvements or Changes Needed
Flood Related Hazards				
Storm water management standards	State Regulation under the Wetlands Protection Act to regulate storm water and other point source discharge Local Stormwater Management bylaw.	Town-Wide	Enforced by the Groton Conservation Commission (Wetlands Protection Act) staffed by the municipal conservation administrator and Groton Planning Board (Subdivision Control Law and site plan review) staffed by the municipal Town Planner.	Storm water management standards remain in place and continue to be enforced. No improvements or changes needed.
Wetlands Protection Act (state)	State law regulating development and activity within wetland buffer zone	100-foot state buffer around wetland area; 200 foot buffer around river front areas.	Enforced by the Groton Conservation Commission staffed by the municipal conservation administrator.	No improvements or changes needed.
Wetlands Protection Bylaw (local)	Local bylaw regulating development and activity within wetland buffer zone	requires a 100 foot buffer to wetlands and a 200 foot buffer to rivers and streams.	Enforced by the Groton Conservation Commission staffed by the municipal conservation administrator.	No improvements or changes needed.

100 Year Flood Zone	Federal law requiring elevation above 100-year flood level of new and substantially improved residential structures in floodplain	100-year floodplain as shown on Flood Insurance Rate Map dated June 4, 2010.	Enforced by the Building Inspector (municipal staff) and Groton Conservation Commission staffed by the municipal conservation administrator.	No improvements or changes needed.
Town Bylaw Flood Plain Districts	Local bylaw enhancing federal/state laws and regulating any development in the flood plain district	100-year floodplain as shown on Flood Insurance Rate Map dated June 4, 2010.	Enforced by the Building Inspector (municipal staff)	Insurance Flood Rate Maps need to be updated.
Maintenance of municipal storm water drainage system	Regular cleaning of catch basins, storm drains, and culverts	Town-Wide	Undertaken by the Department of Public Works municipal staff.	Maintenance continues but Additional Personnel and Equipment Needed
Maintenance of public water bodies (ponds, streams, brooks, wetlands)	Periodic cleaning of waterways needed, i.e., remove trash, debris	Town-Wide	Undertaken by the Department of Public Works municipal staff with guidance from Conservation Commission staffed by the municipal conservation administrator.	Maintenance continues. No improvements or changes needed.

Wind Related Hazards				
State Building Code	State Law related to design loads to include wind effects	Town-Wide	Enforced by Building Department (municipal staff).	Continued enforcement remains in place. No improvements or changes needed.
Tree Maintenance	Regular inspection and tree maintenance to cut branches threatening power lines and overhead utilities	Town-Wide	Groton Electric Light Department municipal staff.	Tree maintenance continues. No improvements or changes needed.
Winter Storms Related				
Clearing Snow from Major Arterial Routes	Ensure Access to Emergency Service vehicles.	Town-Wide	Department of Public Works municipal staff.	Snow clearing continues but additional personnel and equipment needed.

*Groton's enforcement/implementation is generally carried out by elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

Mitigation Goals, Objectives and Strategies

As discussed earlier in this Plan, MRPC previously prepared the 2008 Montachusett Region Hazard Mitigation Plan which consisted of individual annexes for each MRPC community. Similarly, as part of the multi-jurisdictional plan update, each community also developed their own individual goals, objectives and strategies which are listed in this section.

Groton Overall Goal Statement: To prepared to reduce the loss of life, property, infrastructure and cultural resources throughout the town of Groton from natural disasters through a multiple hazard mitigation program that involves increased coordination, planning, education, and capital improvements.

- 1. Objective:** To organize and prepare to provide adequate shelter, water, food, and basic first aid to displaced residents in the event of a natural disaster, and to provide adequate notification and information regarding evacuation procedures, *etc.*, to residents in the event of a natural disaster.
- 2. Objective:** To inventory supplies at existing shelters and develop a needs list and storage requirements; and to establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster.
- 3. Objective:** To have the Emergency Management Director (EMD) lead an effort to increase coordination between inter-departments in pre-disaster planning and implementation of hazard mitigation projects including holding monthly meetings.
- 4. Objective:** Increase awareness of hazard mitigation among town officials, private organizations, businesses, and the general public.
- 5. Objective:** To examine and update the current notification system including development of a local Reverse 911 system.
- 6. Objective:** To collect, periodically update, and disseminate information on which local radio stations provide emergency information, what to include in a “home survival kit, how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to follow during a natural disaster.

Specific Natural Hazard Goals for Groton

Goal Statement for Flooding: To prepare emergency staff and volunteers in order to minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to flooding.

- 1. Objective:** To continue to participate in the National Flood Insurance Program and to have the flood maps periodically updated.
- 2. Objective:** To Develop a priority list and seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town.

Goal Statement for Protection from Beavers: To minimize the threat to health, the damage to roads and property, and the disruption of governmental services and general business activities due to flooding caused by beavers.

- 1. Objective:** Support local town departments to continue present methods to prevent beaver caused flooding.
- 2. Objective:** Seek assistance from beaver management professionals, including trappers.
- 3. Objective:** Install pond flow-leveling devices.

Goal Statement for Hurricanes and Tornadoes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to high winds associated with hurricanes and tornadoes. (The objectives listed above, under flooding, address the flooding that can result from a hurricane.)

1. **Objective:** To educate residents and volunteers regarding the safe methods and actions necessary to deal with Hurricanes and Tornados.
2. **Objective:** Continue to maintain current tree lines.
3. **Objective:** Educate residents and volunteers to shelter in place.

Goal Statement for Winter Related Hazards: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to severe snow and ice storms.

1. **Objective:** To develop a plan for providing access to water, information, shelter, and food stores to remote or needy people in Groton in the event of a severe winter storm.
2. **Objective:** To look into the possibility of a local driving ban in the event of severe winter storms.

Goal Statement for Earthquakes: To educate staff, residents and volunteers about the potential for earthquakes and strategies to minimize the loss of life, damage to property, the disruption of governmental services and general business activities due to earthquakes.

1. **Objective:** To educate and encourage homeowners and developers to rehab and build using methods to minimize the effects of earthquakes and other disasters.
2. **Objective:** To insure that all identified shelters have sufficient back-up utility service in the event of primary power failure.

Mitigation Action Plans and Prioritization of Actions (STAPLEE)

Initial Mitigation Action Plans for the Montachusett Communities were presented in the communities Hazard Mitigation Plans that were approved by FEMA in 2009 and 2010. The original Mitigation Action Plans were developed through an inventory of potential hazards which could impact the community and an evaluation of a range of alternatives to address these hazards. As part of the plan update process, the original Mitigation Action Plan was reviewed by the community's Local Hazard Mitigation Planning Team/Emergency Management Committee to delete actions which have already been completed, add additional actions which are either underway or planned to be undertaken, and to update the current status of all actions. The goals were reviewed and updated at the second meeting with each community.

An additional step in this process was to conduct a "STAPLEE" analysis for each action to prioritize all actions within each community and a subjective evaluation of each action's perceived cost/benefit. In the 2008 plan, actions were not prioritized so there were no changes in priorities in this update. The revised Community Mitigation Action Plans matrices that follow identify each mitigation action, the responsible department or board responsible for implementation, potential funding sources, the timetable of the action, results of the prioritization of actions through the STAPLEE analysis, and the perceived cost/benefit for each mitigation action.

The goal of each identified strategy, or mitigation action, is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each action to establish priorities for implementation, using the "STAPLEE" method. The

STAPLEE methodology was developed by the Federal Emergency Management Agency as a tool to help communities prioritize their hazard mitigation strategies and determine the most appropriate actions for implementation. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of an action and is designed to be used by public officials and planners for making planning decisions.

To conduct the STAPLEE exercise, the community's Hazard Mitigation Team was asked to rate each action in their Mitigation Action Plan on each of the following criteria, using a score of 1 to 3 (Good = 3, Average = 2, Poor = 1):

- **Social:** Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- **Technical:** Will the proposed strategy work? Will it create more problems than it solves?
- **Administrative:** Can the community implement the action? Is there someone to coordinate and lead the effort?
- **Political:** Is the action politically acceptable? Is there public support both to implement and to maintain the action?
- **Legal:** Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- **Economic:** What are the costs of this action? Does the cost seem reasonable for the size of the problem and the likely benefits?
- **Environmental:** How will the action impact the environment? Will the action need environmental regulatory approvals?

These scores were then totaled, resulting in a final score of 7 (least priority) to 21 (highest priority) for each action. The higher the final score, the higher the relative priority of that action for implementation. This information can then be utilized in each community as they conduct and administer relevant municipal functions and activities. The final STAPLEE score for each action is shown in the following mitigation action plan.

The Hazard Mitigation team was also asked to do a relative cost/benefit of each action. This assessment was intended to informally indicate if an action will either have more benefits accrued to the Town than the Cost of implementing the action, or if the costs would exceed any benefits. Responses include: "Benefits Exceed Costs", "Benefits Equal Costs, or "Costs Exceed Benefits".

GROTON IMPLEMENTATION STRATEGY FOR PRIORITY MITIGATION ACTIONS

Type of Hazard	Description of Action	Implementation Responsibility	Resources/ Funding*	Timeframe	Priority (STAPLEE SCORE)	Cost/Benefit Evaluation	Status Update from 2008 Plan**
All Natural Hazards	Work with Neighboring Communities to Establish a Community Emergency Response Team (CERT) to more effectively respond to all natural hazards thus mitigating any damage.	Board of Selectmen, Police & Fire Departments, Emergency Management Director	Municipal Staff/ Volunteers	Project Initiated/ 2020	21	Benefit exceeds cost	Initiated. Carried forward due to time constraints.
Flood Related Hazards and Geologic Hazards	Identify Existing Shelters that are Earthquake Resistant as well as Outside of Floodplain (and Dam Inundation) Areas to ensure that shelters are available to the public during these type of hazards to reduce or eliminate risk to human life.	Building Inspector, Emergency Management Director	Municipal Staff	Project Initiated/ 2020	19	Benefit exceeds cost	Initiated. Carried forward due to time constraints.

Wildland Fire	Increase awareness by educating property owners regarding actions that they can take to reduce risk to property by hosting an Open House at the Fire Department, Develop and Distribute an Educational Pamphlet on Fire Safety and Prevention (SAFE PROGRAM) (SENIOR SAFE) and wildfire prevention.	Fire Department	Municipal Staff	2015- 2020	20	Benefit exceeds cost	Completed but carried forward. This action is undertaken periodically.
Natural All Hazards	Increase hazard education and risk awareness to public by Collecting, Updating, and Disseminating Information on Local Radio/TV Stations to educate the public and alert them of emergency information including shelter locations and other instructions related to all natural hazards	Emergency Management Director	Municipal Staff	2015-2020	19	Benefit exceeds cost	Completed but carried forward. This action is undertaken on an annual basis.

All Natural Hazards	Inventory Supplies at Existing Shelters and Develop a Needs List and Storage Requirements to ensure the available of adequate supplies during a natural hazard. Supplies must be adequate to eliminate or reduce risk to human life.	Emergency Management Planning Committee, School Facilities Manager	Municipal Staff	Project Initiated/ 2020	21	Benefit exceeds cost	Completed but carried forward. This action is undertaken on a periodic basis.
Flood Related Hazards	Identify all structures throughout the town that need to be Elevated above the Base-Flood elevation. Once identified educate those property owners regarding options for mitigation.	Building Commissioner, Fire Inspector	Municipal Staff. Also 75% FEMA FUNDING AVAILABLE. Remaining 25% (non-federal)	2015-2020	19	Benefit exceeds cost	Carried forward. Structures have been identified. Educate of property owners needs to be undertaken.
Flood Related Hazards	To Develop a priority list and possibly seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town to reduce or eliminate flooding risk.	Board of Selectmen, Highway Department	Municipal Staff/ FEMA HMGP grant 75%	2015 - 2020	17	Benefit exceeds cost	Development of list carried forward. Due to time constraints.

Flood Related Hazards	Educate property owners regarding options for mitigating their properties from flooding through outreach programs that address measures that residents can take (i.e installing backflow valves, securing debris, etc.)	Emergency Management Director, Fire Department	Town of Groton Property Owners	2015 - 2020	18	Benefit exceeds cost	New Action.
Flood Related Hazards	Continue participation in the National Flood Insurance Program to enable property owners to purchase insurance protection against flood losses.	Conservation Commission, Board of Selectmen	FEMA/MEM A	2015 - 2020	21	Benefit exceeds cost	Completed but carried forward. Town continues to participate in NFIP.
Other Natural Hazards (Wildland fire)	Identify areas with potential for brush fires to track community vulnerability by developing and maintaining a data base.	Department of Public Works, G.E.L.D. (Groton Electric Light Department)	Municipal Staff	2015 - 2020	18	Benefit exceeds cost	New Action.
Winter Related Hazards	Expand residential parking bans to enable snow removal from all streets.	Department of Public Works, Board of Selectmen	Board of Selectmen	2017	21	Benefit exceeds cost	Carried forward. Additional time needed.

All Natural Hazards	Identify shelters and publicize locations to reduce or eliminate risk to human life.	Emergency Management Director	Emergency Management Director /Fire Department	2015 - 2020	21	Benefit exceeds cost	Completed. Carried forward as this action is undertaken on an ongoing basis.
All Natural Hazards	Utilize interactive mapping application prepared by MRPC/CMRPC to update critical infrastructure and simulate real time evacuation scenarios to mitigate hazards to the public.	Emergency Management Director	Emergency Management Director	2015 (12 months)	20	Benefit exceeds cost	New Action.
Flood Related Hazards	Install "beaver diverters" and water control devices to mitigate flooding caused by beaver dams.	Department of Public Works	Municipal Staff	2015 – 2020	17	Benefit exceeds cost	Completed but carried forward. This action is undertaken as needed.

All Natural Hazards	Implement recommendations regarding natural hazard mitigation in existing planning documents including the master plan, five year action plan of the open space and recreation plan and the emergency evacuation plan.	Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	2015 - 2020	16 J	Very favorable cost benefit	Completed but Carried forward. This is an ongoing effort. For example, Town recently adopted a Wetlands Bylaw which will enhance the State's Wetland Protection Act by protecting water supplies and flood protection. This was a recommendation of the town's master plan.
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*Unless otherwise noted, Groton's Resources/Funding consists of elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

**Actions identified as carried forward were not completed in the previous planning cycle unless otherwise stated.

Mitigation Actions from the 2008 Montachusett Region Hazard Mitigation Plan that are complete include:

- Developed a Preliminary Project Proposal and Cost Estimate for Updating Current 911 System including Feasibility of Reverse 911.
- Update Insurance Flood Rate Maps.
- Hired Trapper for Removal of Beavers.
- Developed a Mitigation Plan to provide access to Water, Information, Shelter and Food Stores to People in Remote Locations of the town in the Event of a Severe Winter Storm

Harvard Natural Hazard Risk Assessment

While this annex focus' pertains to critical facilities, flooding, risk assessment, existing protections and mitigation strategy in the community, more detailed descriptions of each natural hazard's impact on the region and its communities and summary of vulnerability can be located in the regional section entitled " 4. Identification of Natural Hazards, Identifying and Profiling Hazards".

Community Profile

The Town of Harvard is located on the eastern end of the Montachusett Region in North Central Massachusetts. It is bordered by Ayer and Shirley to the north, Littleton, Boxborough, and Stow to the east, Bolton to the south, and Lancaster to the west. It is located 22 miles northeast of Worcester, 31 miles northwest of Boston, 81 miles from Springfield, and 206 miles from New York City.

The town of Harvard covers an area of 26.97 square miles with a resident population of 6,520, according to the 2010 US Census. It has a population density of 242 people per square mile. There are 2,047 housing units in the town, and the average household size is 2.76 people. The median age of Harvard residents is 42.

Throughout its 250 years, the town has been known for a series of unusual sociological and religious experiments. The most well-known of these were carried out by Mother Ann Lee, who came to live in Harvard in 1781 and founded a Shaker Village, still to be seen today, and Bronson Alcott, who carried out a transcendental experiment in living with his family and friends here in 1843. The farmhouse where the Alcotts lived was called Fruitlands and is now part of the Fruitlands Museum on Prospect Hill. Harvard is characterized by colonial and Victorian homes, churches, town hall and library clustered around a historic common; winding roads lined with trees and often marked by stone walls; many historic farm houses and several working apple and peach orchards in outlying areas; and the four centuries old village of Still River with its stunning western vistas.

Residents enjoy the intimacy of a small town, with its Fourth of July parade, Apple Blossom Festival and many other events, the majority of which take place in the vicinity of the historic town common. Another amenity is Bare Hill Pond, a 330-acre lake where swimming, sailing and canoeing lessons are offered in the summer and cross country skiing and skating take place in winter. There are over 2,000 acres of conservation land throughout the town, much of it interconnected by walking trails. Harvard's top four employers are Bromfield School, Enterprise Tech Inc., Eze Software Group, and Harvard Elementary.

Critical Facilities

In general usage, the term "critical facilities" is used to describe all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired.

Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even access to damaged areas.

The number and nature of critical facilities in a community can differ greatly from one jurisdiction to another, and usually comprise both public and private facilities. In this sense, each community needs to determine the relative importance of the publicly and privately owned facilities that deliver vital services, provide important functions, and protect special populations. *Source: Federal Emergency Management Administration, Risk Management Series, Design Guide for Improving Critical Facility*

Safety from Flooding and High Winds, FEMA 543, January 2007.

A list of the critical facilities within the community is shown in Table 47. This data was obtained from the community’s Comprehensive Emergency Management Plan (CEMP). The data was then reviewed by the Emergency Management Director. These facilities were digitized into GIS and used for determining vulnerability to the various hazards. The map that follows entitled FEMA Q3 Flood Zones and Critical Infrastructure which depicts Critical Facilities in the community.

Table 47: Harvard Critical Facilities

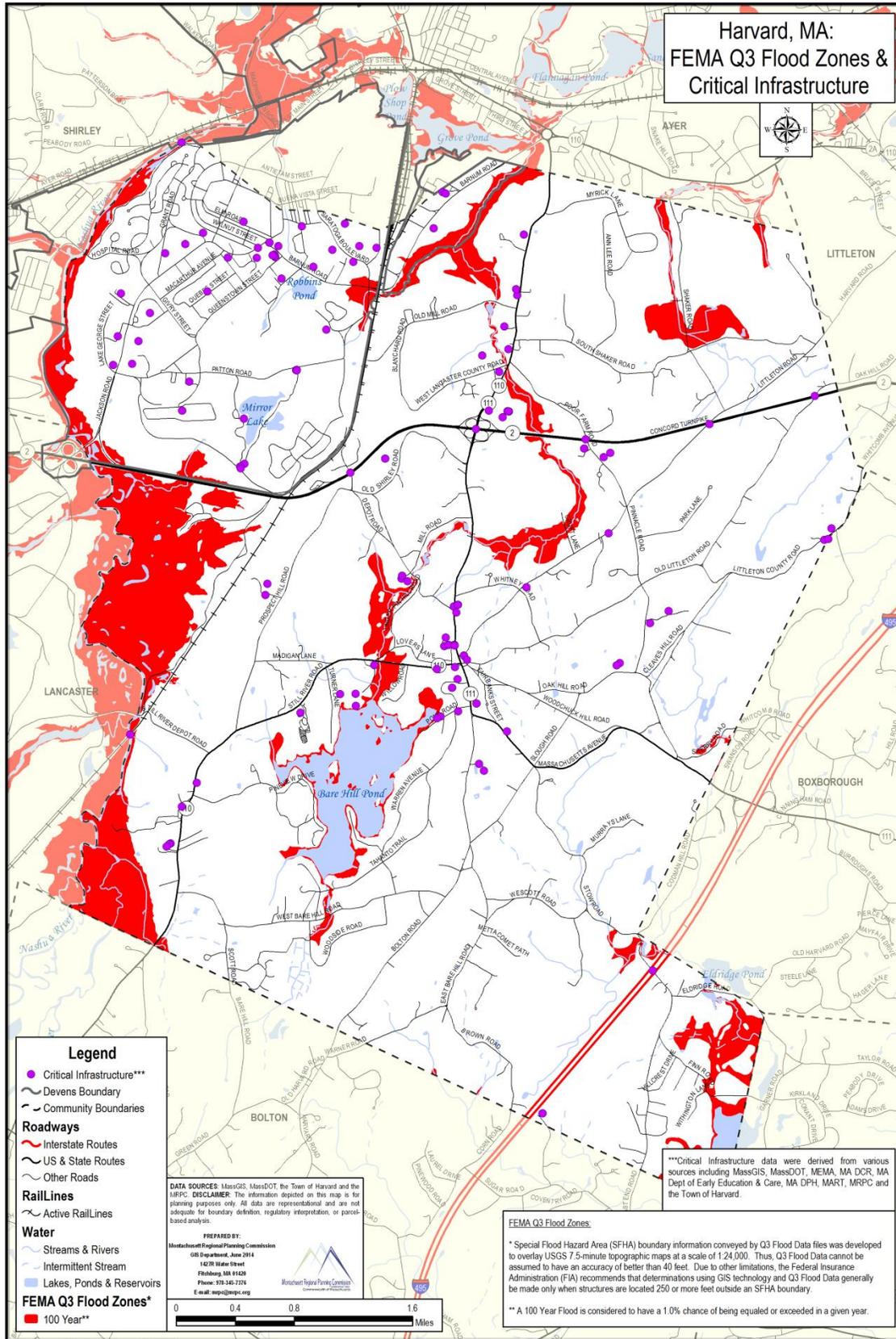
Feature Type	Name	Address
City/Town Halls	Harvard Town Hall	13 Ayer Road
College	Mt. Wachusett Comm. College, Adult Learning Ctr.	27 Jackson Road
Communication Towers	Harvard Cell Tower	60 Old Shirley Rd
	Harvard Cell Tower	47 Poor Farm Rd
	Harvard Cell Tower	Brown Rd
	DCR Fire tower	44 Pinnacle Road
	Harvard Fire Department Center Station	13 Elm St
	Carlson Orchards Alt. Cell Tower	115 Oak Hill Road
	Communication Tower	Barnum Road
Public Water Supply*	Offices At Harvard Park Llc	
	The Appleworks	
	Cosgrove Realty	
	Pond Road Rock Well #2 (02g)	
	Pond Road Rock Well #5 (05g)	
	Immaculate Heart Of Mary School	
	Harvard Plaza	
	Village Nursery School	40 Poor Farm Road
	Proposed Sheridan Rd Well (Tw9b-08)	
	Shabokin Replacement Well	
	Camp Green Eyre Girl Scout Camp	
	Camp Green Eyre Girl Scout Camp	65 Still River Road
	Camp Green Eyre Girl Scout Camp	
	Offices At Harvard Park Lilac	
	Concord Hillside / Renaissance	
	Friendly Crossways	
	Camp Green Eyre Girl Scout Camp	
	Immaculate Heart Of Mary School	
	Offices At Harvard Park Lilac	
	Cosgrove Realty	
Jill Realty Trust		

	Fruitlands Museum	102 Prospect Hill Road
	Bolton Road Rock Well #3 (03g)	
	Fruitlands Museum	102 Prospect Hill Road
	Patton Replacement Well	
	Shabokin Gravel Packed Well	
	Patton Gravel Packed Well	
	Dunkin Donuts	188 Ayer Road
DPW Facilities	Harvard DPW	47 Depot Road
Early Education Childcare Facilities	Guild Of St. Agnes - Eec - Devens	172 Jackson Road
	Evergreen Garden	270 Barnum Road
	The Barn School	33 Ayer Road
	Cheshire Barn Preschool	68 Littleton Road
	Geezil, Barbara	142 Littleton Road
	Village Nursery School	40 Poor Farm Road
Elderly Housing	Foxglove Apartments	253 Ayer Road
Emergency Shelters	Devens Community Center	100 Sherman Ave
	Spring Hill Suites by Marriott	27 Andrews Parkway
	Hildreth House	15 Elm Street
	Bromfield School	14 Massachusetts Avenue
	Harvard Elementary School	27 Massachusetts Avenue
	Harvard Town Hall	13 Ayer Road
	Center Cemetery/Harvard Center Cemetery	
	Bellevue Cemetery	
	Anheuser Busch	
Emergency Operations Centers	Harvard Police Station	40 Ayer Road
	Harvard Fire Department Center Station	11 Elm Street
	Devens Fire Station	182 Jackson Road
Fire	Devens Fire Station	182 Jackson Rd
	Harvard Fire Station #1	13 Ayer Road
	Harvard Fire Department Still River Station	231 Still River Road
	Harvard Fire Department Center Station	11 Elm St
HazMat Sites	Verizon Station	4 Littleton Rd
	Harvard DPW	47 Depot Road
	American Superconductor	64 Jackson Rd.
	Army National Guard Complex	87 Barnum Road
	Bionostics	7 Jackson Rd.
	Bristol Meyers Squibb	38 Jackson Road
	Comrex	19 Pine St.

	Integra	29 Saratoga Blvd.
	Johnson-Matthey	25 Patton Rd.
	MEMA M&C	87 Barnum Rd. Bldg. 3768
	Netstal Machinery	57 Jackson Rd.
	New England Sheets	
	Parker Hannifin Aerospace FSD	14 Robbins Pond Rd.
	RFTA Fort Devens	30 & 31 Quebec St.
	Rapid Refill	4 Andrews Parkway
	Red Tail Golf Course	15 Buldge Rd.
	Ryerson Corp.	45 Saratoga Blvd.
	Waiteco Machine	18 Saratoga Blvd
	Xinetics, Inc.	115 Jackson Rd.
	FMC Devens - Federal Medical Center	42 Patton Road
	Harvard Fire Department Center Station	13 Elm St
	Harvard Transfer Station	47 Depot Road
Other Critical Facilities	Rollstone Bank & Trust	283 Ayer Road
	Oak Ridge Observatory (Smithsonian)	
	Depot Road underpass/Route 2	
	Harvard Cell Tower	60 Old Shirley Rd
	Route 110/111 overpass/Route 2	
	Hillside Garage	
	Verizon Station	
	Harvard Cell Tower	Brown Road
	Stow Road underpass/Route 495	
	Poorfarm Road overpass/ Route 2	
	Harvard Cell Tower	47 Poor Farm Road
	Littleton Road overpass/Route 2	
	Old Littleton Road overpass/Route 2	
	Railroad Overpass	Rail Line & Nashua River
	Mirror Lake Recreational Area (Seasonal)	Patton Road
	Our Fathers House	18 Cavite Street
	Bowers Brook Apartments	196 Ayer Road
	Carlson Solar Farm	115 Oak Hill Road
	Barnum Bridge	West Main Street
	Nashoba Valley Regional Emergency Comm. Center	270 Barnum Road
Saint Gobain	112 Barnum Road	
Quiet Logistics	66 Saratoga Blvd.	
Other Government	Harvard Highway Department	47 Depot Road

Buildings	Harvard Public Library (Old)	7 Fairbanks Street
	Harvard Post Office	215 Ayer Road
	DCR Fire tower	44 Pinnacle Road
	Bolton Road Water Tower	Bolton Road
	Harvard Public Safety Building	40 Ayer Road
	Harvard Ambulance Squad	40 Ayer Road
	Harvard Public Library	9 Pond Road
Police	Harvard Police Station	40 Ayer Road
Prisons	FMC Devens - Federal Medical Center	42 Patton Road
	FMC Devens - Satellite Camp	42 Patton Road
School	Bromfield School	14 Massachusetts Avenue
	Harvard Elementary School	27 Massachusetts Avenue
	Seven Hills Academy	22 Grant Road
	Immaculate Heart of Mary	282 Still River Road
	Evergreen Garden	270 Barnum Street
	Devens School	270 Barnum Street
	Oxbow Schoolhouse	270 Barnum Rd
Sports And Cultural Areas	St. Benedicts Church	
	Unitarian Church	
	Congregational Church	5 Still River Rd
	St. Theresa's Church	
Potable Water Treatment Plants	Patton Well	168 Patton Road
Wastewater Treatment Plant	Harvard Waste Water Treatment Plant	Mass Avenue

*As stated in 310 CMR 22.02, a Public Water System means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year” (Mass GIS, 2014).



Flood Prone Areas

Particular areas within the community where the risks of flood areas are or could occur were determined at the first meeting of the Harvard Local Hazard Mitigation Team held on January 29, 2012. This information can be found on Harvard's Local Hazard Map which is located under the section entitled Risk Assessment.

Flooding Vulnerability Assessment

An analysis of the FIRM flood hazard area maps indicates that there is a total of 2022.04 acres of 100-year floodplain within Harvard. This amounts to 11.64% of the total town. Based on additional analysis, 12.43 acres (0.61%) of the floodplain are developed. Currently there are 23 structures in the floodplain which is about .68% of the total structures in the community. The buildings are then multiplied by the building value, as determined by the MA Department of Revenue, to come up with a potential loss of \$120,114,600.

Excluding dams and bridges the table below depicts the critical facilities within the 100 year flood zone.

Table 48
Harvard Critical Facilities within 100-Year Flood Zone

Feature Type	Name	Address
Other Critical Facilities	Railroad Overpass	Rail Line & Nashua River
Other Critical Facilities	Barnum Bridge	West Main Street

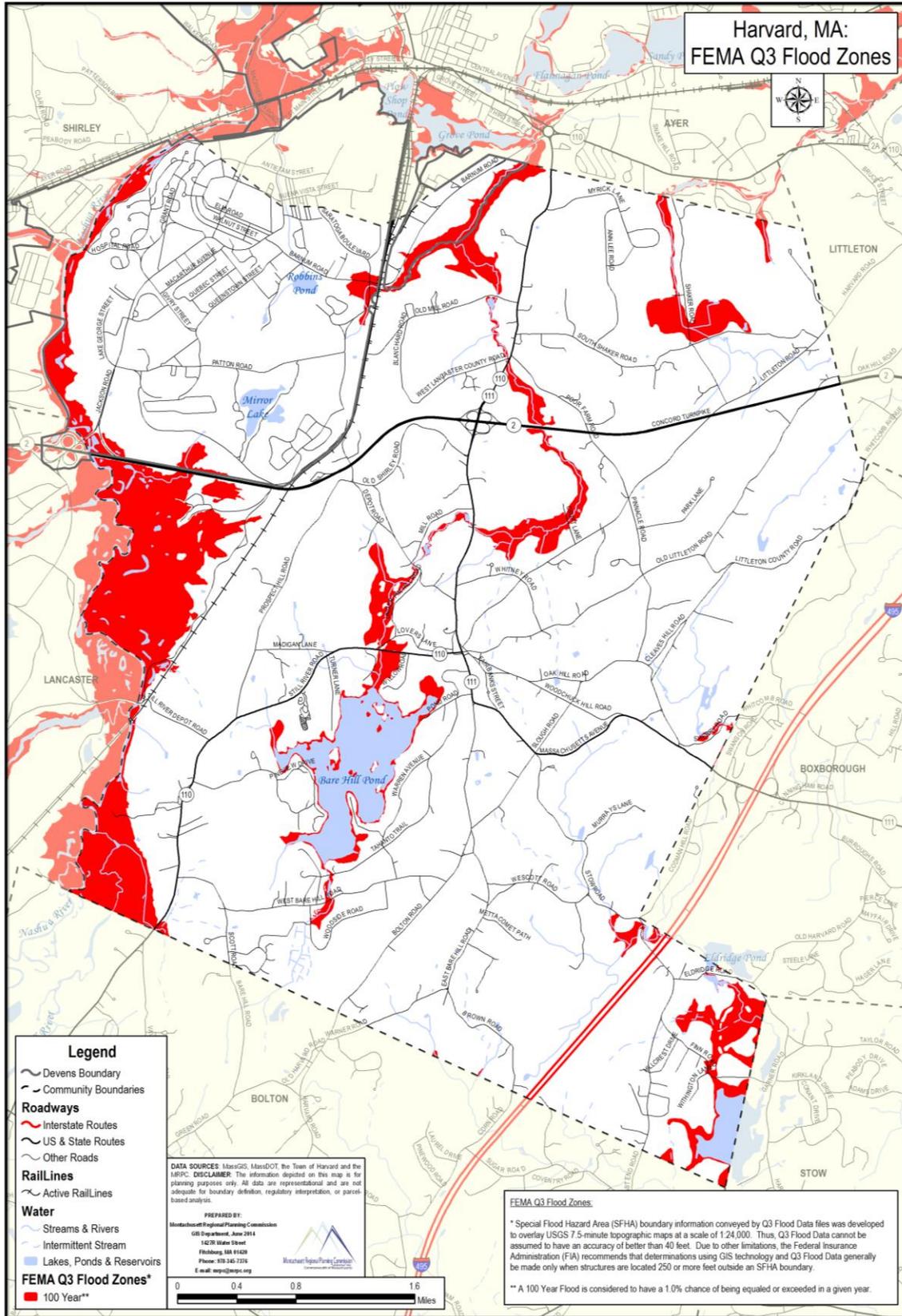
Since the initiation of the National Flood Insurance Program (NFIP), there have been no flood insurance claims in Harvard. There are no repetitive loss properties in Harvard. Statistics from the NFIP BureauNet indicate in the town of Harvard there are 13 flood insurance policies in force.

Floodplain Management and Compliance with NFIP

The town supports floodplain management activities in an effort to meet compliance of the National Floodplain Insurance Program. These efforts include:

- Implementing the MA Wetlands Protection Act and the town's Wetland's Protection Bylaw regulating development and activity within the wetlands buffer zone and regulating stormwater and other point source discharge.
- Implementing the Town Flood Plain District Bylaw (April 2, 2011) regulating development in the floodplain district.
- Continued maintenance of municipal stormwater drainage system which includes regular cleaning of catch basins, storm drains and culverts.
- Continued maintenance of public water bodies to reduce flooding caused by erosion and water displacement.
- Enforcement of the Open Space and Conservation Planned Residential Bylaw which mitigates possible flooding events by designating protected open space within a development which in turn treats stormwater runoff through the means of natural infiltration.

The map entitled FEMA Q3 Flood Zones which follows depicts the 100 year flood zones in the community.



Structurally Deficient Bridges Over Waterways

Harvard does not have any bridges over water that are classified by MassDOT as “structurally deficient”.

Hazard Potential of Dams

The DCR Office of Dams Safety lists 11 dams in the Town of Harvard as shown in Table 49. Bare Hill Pond Dam and Horse Meadows Dam are classified as significant hazards.

Classifications for potential hazards are in accordance with the chart below.

Hazard Potential Classification

High Hazard	Refers to dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
Significant Hazard	Refers to dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities
Low Hazard	Refers to dams located where failure may cause minimal property damage to others. Loss of life is not expected.

Source: MA Department of Conservation and Recreation Office of Dam Safety

High hazard dams must be inspected every two year, significant hazard every five years, and low Hazards dams every 10 years. Owners of dams are responsible for having their dam inspected. MGL Chapter 253 and 302 CMR 10.00 requires that dam owners prepare, maintain and update Emergency Action Plans for all High Hazard Potential dams and certain Significant Hazard Potential dams.

Non-jurisdictional dams are not regulated by the Office of Dam Safety or under their jurisdiction. Typically these dams are under 6 feet in height and/or under 15 acre-feet in storage and do not have an assigned 'Hazard Code'. Dams owned and regulated by the Federal Government are also typically non-jurisdictional but DO have an assigned Hazard Code.

Table 49: Dams

Town	Dam	Hazard Code	Owner
Harvard	Elizabeth Pond Dam	Low Hazard	Private
Harvard	Saw Mill Pond Dam	N/A	Private
Harvard	Old Mill Pond Dam	N/A	Private
Harvard	Burt Mill Pond Dam	N/A	Private
Harvard	Lower Wegatepa Pond Dam	N/A	Private
Harvard	Farm Pond Dam	N/A	Public

Harvard	Fish Pond Dam	N/A	Public
Harvard	Water Supply Reservoir Dam	N/A	Public
Harvard	Old Reservoir Dam	N/A	Public
Harvard	Bare Hill Pond Dam	Significant Hazard	Public
Harvard	Horse Meadows Dam	Significant Hazard	Private

*N/A – Information not available as the dam is non-jurisdictional.

Risk Assessment

As previously stated, located in Section 4. Identification of Natural Hazards, Identifying and Profiling Hazards”, there is a description of each identified hazards’ impact on the region and its communities as well as an overall summary of vulnerability. Based on the hazards identified in this plan and the assessment of risks by the Town of Harvard, the town considers itself to be at a high risk for Heavy Rain, Snow Melt, Beavers, High Winds, Nor’easters, Heavy Snow, Wildland Fire; moderate risk for Hurricanes, Tornados, Severe Thunderstorms, Ice Storms, Blizzard, Drought, Extreme Temperatures; low risk for Dam Failure, Ice Jams, Major Urban Fires, Earthquakes, and Landslides; and tsunamis as not applicable.

This information is documented in the Harvard Natural Hazard Matrix (below). and is shown on the a Harvard Local Assessment Map (Appendix 2) which was reviewed at the first meeting of the Harvard Local Hazard Mitigation Team held on

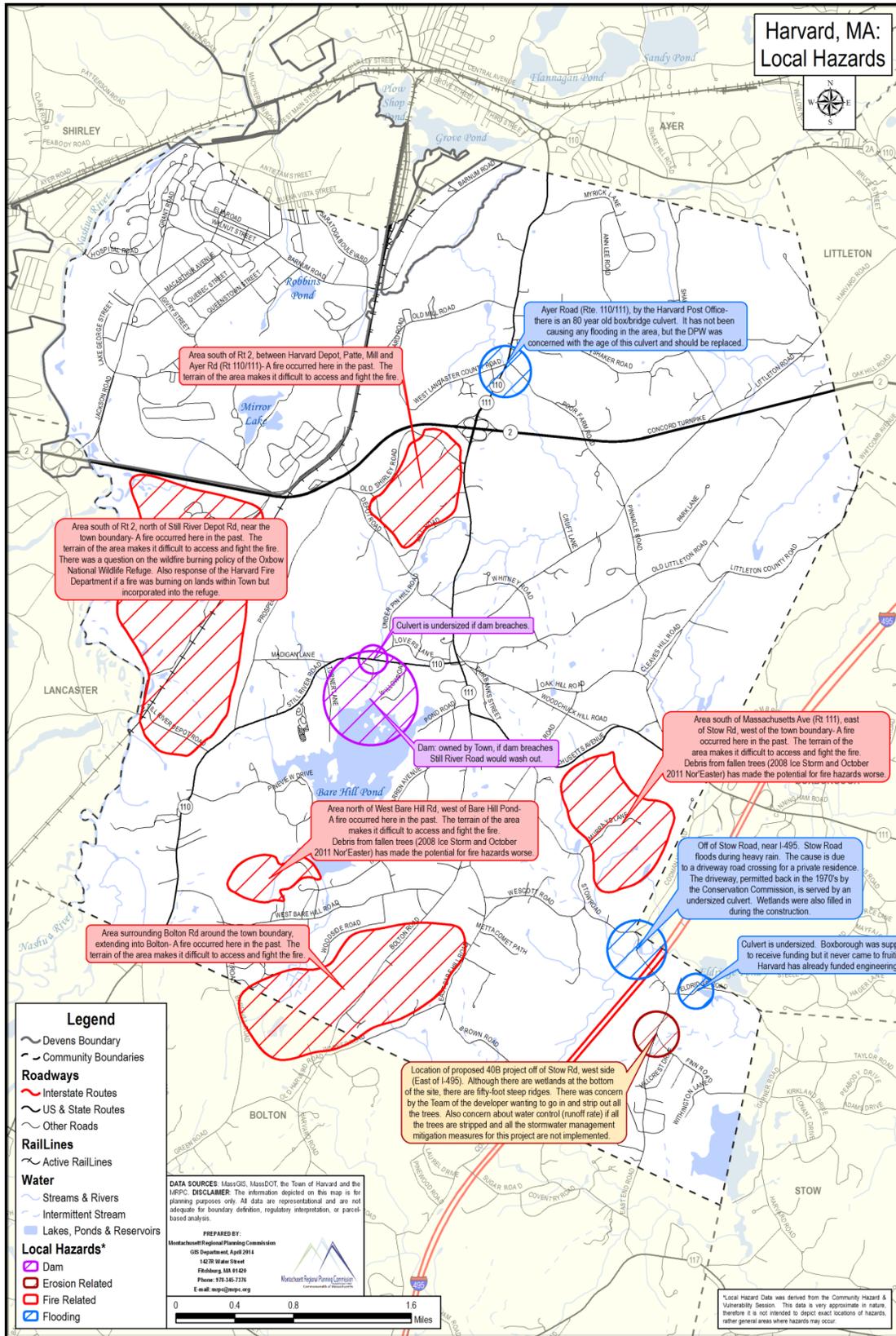
This information is documented in Harvard’s Natural Hazard Matrix below which was obtained from participants at Harvard’s Local Hazard Mitigation Team Meeting held on January 29, 2012.

<u>Natural Hazard</u>	<u>Likelihood of Occurrence</u>	<u>Location</u>	<u>Impacts</u>	<u>Hazard Index</u>
Natural Hazard Separated by Flood, Atmospheric Related and Winter Related, Other Natural Hazards, and Geologic Hazards	3 = Highly Likely 2 = Possible 1 = Unlikely	3 = Regional/State 2 = Multi Community/Regional 1 = Local/Town	4 = Catastrophic 3 = Critical 2 = Limited 1 = Negligible	Ranking Determined by Combining the Likelihood, Location and Impacts of a Natural Hazard
<u>Flood-Related Hazards</u>				
• Heavy Rain	3	1	2	6
• Snow Melt	3	1	2	6
• Dam Failure	1	1	3	5
• Ice Jams	1	1	1	3
• Beavers	3	1	2	6
<u>Atmospheric Related and Winter Related</u>				
• High Winds	3	1	3	7
• Hurricanes	2	3	4	9
• Tornadoes	2	2	4	8
• Nor'easters	3	3	2	8
• Severe Thunderstorms	2	2	2	6
• Heavy Snow	3	3	3	9
• Ice Storms	2	2	3	7
• Blizzard	2	3	3	8
<u>Other Natural Hazards</u>				
• Major Urban Fires	1	1	1	3
• Wildland Fire	3	2	2	7
• Drought	2	3	3	8
• Extreme Temperatures	2	3	2	7
<u>Geologic Hazards</u>				
• Earthquakes				0
• Landslides	1	1	1	3
• Tsunami	N/A	N/A	N/A	N/A

Key

Highly likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
Possible: 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.
Unlikely: Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.
Catastrophic: Immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.
Critical: Fast speed of onset or long duration of event resulting in devastating damage and loss of services for weeks or months.
Limited: Moderate speed of onset or moderate duration of event, resulting in some damage.
Negligible: Slow speed of onset or short duration of event resulting in little to no damage.

Also discussed at this meeting were the hazards that affect each community and the identification of specific problem areas in the community that need to be addressed. This included the identification of new hazards that were determined to pose a threat or community vulnerability which are detailed in Harvard's Local Hazards Map on the following page. The entire community is equally at risk to the following hazards: heavy rain, snow melt, ice jams, high winds, hurricanes, tornados, nor'easters, severe thunderstorms, heavy snow, ice storms, blizzards, drought, extreme temperatures, earthquakes and landslides.



Existing Protections

The original inventory of hazard mitigation actions which the Montachusett communities undertook for the 2008 Montachusett Region Hazard Mitigation Plan was reviewed and updated by each community at a meeting held in each community with the MRPC and the community's Local Hazard Mitigation Planning Team and, in some communities, the Emergency Management Committee. The attendees of the meetings can be found in Appendix A. The following matrices depict the updated inventory of what is currently being done to mitigate hazards by listing the programs and activities already in place. It includes a description of the protection measure, who is responsible, and improvements and changes that may be needed. This inventory was used by the Planning Team/Emergency Management Committee to identify gaps in existing protections that were then addressed through the development of this plan update.

Harvard

Type of Existing Protection	Description	Area Covered	Implementation Resources and Funding*	Improvements or Changes Needed
Flood Related Hazards				
Storm water management standards	State Regulation under the Wetlands Protection Act to regulate storm water and other point source discharge	Town-Wide	Enforced by the Harvard Conservation Commission (Wetlands Protection Act) staffed by the municipal Conservation Agent and Harvard Planning Board (Subdivision Control Law and site plan review) staffed by the municipal Town Planner.	Storm water management standards are and continue to be enforced. No improvements or changes needed.
Wetlands Protection Act (state)	State law regulating development and activity within wetland buffer zone	100-foot state buffer around wetland area; 200 foot buffer around river front areas.	Enforced by the Harvard Conservation Commission staffed by the municipal Conservation Agent.	No improvements or changes needed.
Wetlands Protection Bylaw (local)	Local bylaw supplementing the Wetlands Protection Act	100-foot state buffer around wetland area; 200 foot buffer around river front areas	Enforced by the Conservation Commission staffed by the Town's Conservation Agent.	No improvement or changes needed.

100 Year Flood Zone	Federal law requiring elevation above 100-year flood level of new and substantially improved residential structures in floodplain	100-year floodplain as shown on Flood Insurance Rate Map dated July 16, 2014.	Enforced by the Building Inspector (municipal staff) and Harvard Conservation Commission staffed by the municipal Conservation Agent.	No improvements or changes needed.
Town Bylaw Flood Plain District	Local bylaw enhancing federal/state laws and regulating any development in the flood plain district	100-year floodplain as shown on Flood Insurance Rate Map dated July 16, 2014.	Enforced by the Building Commissioner (municipal staff) and Conservation Commission staffed by the Town's Conservation Agent.	Flood Rate Maps
Maintenance of municipal storm water drainage system	Regular cleaning of catch basins, storm drains, and culverts	Town-Wide	Undertaken by the Department of Public Works municipal staff.	Maintenance continues but Additional Personnel and Equipment Needed to effectively conduct this task.
Maintenance of public water bodies (ponds, streams, brooks, wetlands)	Periodic cleaning of waterways needed, i.e., remove trash, debris	Town-Wide	Undertaken by the Department of Public Works municipal staff with guidance from Harvard Conservation Commission staffed by the municipal Conservation Agent.	Maintenance continues. No improvements or changes needed.
Inspection of major dams	Periodic inspections of the structural integrity of the dam	Major Dams	Undertaken by the Massachusetts Department of Conservation and Recreation, Office of Dam Safety. Funded by municipality.	Update Dam failure studies for the dams rated as high hazard
Wind Related Hazards				
State Building Code	State Law related to design loads to include wind effects	Town-Wide	Enforced by Building Department municipal staff.	Continued enforcement remains in place. No improvements or changes needed.
Tree Maintenance	Regular inspection and tree maintenance to cut branches threatening power lines and overhead utilities	Town-Wide	National Grid staff (Electric Company). Town responsible for trees in public way. Town has tree warden.	Tree maintenance continues. Additional Staff needed.

Fire Related Hazards				
Limited Brush Clearing along town roads.	Brush clearing to provide access to Emergency Service vehicles.	Town-Wide	Directed by the Department of Public Works municipal staff.	Continue to Identify Areas with Potential for Brushfires.
Winter Storms Related				
Clearing Snow from Major Arterial Routes	Ensure Access to Emergency Service vehicles	Town-Wide	Department of Public Works municipal staff.	Snow clearing continues but additional personnel and equipment needed.

*Harvard's enforcement/implementation is generally carried out by elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

Mitigation Goals, Objectives and Strategies

As discussed earlier in this Plan, MRPC previously prepared the 2008 Montachusett Region Hazard Mitigation Plan which consisted of individual annexes for each MRPC community. Similarly, as part of the multi-jurisdictional plan update, each community also developed their own individual goals, objectives and strategies which are listed in this section.

Harvard Overall Goal Statement: To reduce the loss of life, property, infrastructure and cultural resources throughout the town of Harvard from natural disasters through a multiple hazard mitigation program that involves increased coordination, planning, education, and capital improvements.

1. **Objective:** To provide adequate shelter, water, food, and basic first aid to displaced residents in the event of a natural disaster, and to provide adequate notification and information regarding evacuation procedures, *etc.*, to residents in the event of a natural disaster.
2. **Objective:** to increase coordination between inter-departments in pre-disaster planning, post-disaster recovery and continuous hazard mitigation implementation.
3. **Objective:** Increase awareness of hazard mitigation among town officials, private organizations, businesses, and the general public.
4. **Objective:** To ensure that critical infrastructure sites are protected from natural hazards, and to maintain existing mitigation infrastructure in good condition. (Town wells are outside of identified hazard areas.)
5. **Objective:** To educate the public about the threat of natural hazards and the possible mitigation measures that can be taken to protect public health and safety, as well as infrastructure and property; and to educate the public as well about zoning and building regulations, particularly regulations that relate to new construction.
6. **Objective:** To encourage future development in areas that are not prone to natural disasters.
7. **Objective:** To identify existing shelters that are earthquake resistant as well as outside of floodplain and inundation areas. Disseminate this information to appropriate Town departments.
8. **Objective:** To inventory supplies at existing shelters and develop a needs list and storage requirements; and to establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster.
9. **Objective:** To collect, periodically update, and disseminate information through the Board of Health and Fire Department website to provide emergency information on what to include in a 'home

survival kit,' how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to follow during a natural disaster.

10. Objective: Provide expanded emergency radio communications capabilities throughout the community for public safety services.

Specific Natural Hazard Goals for Harvard

Goal Statement for Flooding: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to flooding. And to pursue prevention activities which include planning, zoning, open space preservation, floodplain and wetland development regulations, storm water management, waterway dumping regulations, watershed protection measures, and best management practices, as well as, soil erosion, building ordinances, and subdivision regulations.

1. Objective: To implement standards in the Subdivision Rules and Regulations to require temporary and permanent erosion control measures for streams and surface water bodies.

2. Objective: To add more specific requirements to address flood related issues in the Special Permit and Site Plan Approval provisions in the Harvard Zoning Bylaw including topographic change, removal of cover vegetation, risk of erosion or siltation and increased stormwater runoff.

3. Objective: To identify all structures throughout Town that needs to be elevated above the base-flood elevation. (Few areas in Town are in flood protection areas.)

4. Objective: To Develop a priority list and seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town.

Goal Statement for Protection from Beavers: To minimize the threat to health, the damage to roads and property, and the disruption of governmental services and general business activities due to flooding caused by beavers.

1. Objective: Support local town departments to continue present method to prevent beaver caused flooding.

2. Objective: Seek assistance from beaver management professionals, including trappers.

3. Objective: Install and maintain beaver management devices

Goal Statement for Hurricanes and Tornadoes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to high winds associated with hurricanes and tornadoes. (The objectives listed above, under flooding, address the flooding that can result from a hurricane.)

1. Objective: To educate residents and volunteers regarding the safe methods and actions necessary to deal with Hurricanes and Tornados in advance of an event.

Goal Statement for Winter Related Hazards: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to severe snow and ice storms.

1. Objective: To get permanent generators for emergency power when required for library and schools, or to enable hook-up with currently available generators.

Goal Statement for Dam Failure: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to dam failures.

1. **Objective:** To identify sources of funding for dam safety inspections.

Goal Statement for Earthquakes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to earthquakes.

1. **Objective:** To evaluate all Shelters and Reception Centers to determine if they are earthquake resistant.
2. **Objective:** To insure that all identified shelters have sufficient back-up utility service in the event of primary power failure. Could be a potential problem because most generators are run off of natural gas which could be affected by earthquake damage.

Goal Statement for Drought: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to drought.

1. **Objective:** Prepare a Water Conservation Plan for Harvard. (A Town bylaw is already in effect.)

Goal Statement for Wildfires/Brushfires: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to wildfires/brushfires.

1. **Objective:** Develop and distribute an educational pamphlet on fire safety and prevention. A flyer describing the "Safe Program" is distributed with burn permits.
2. **Objective:** Consider amending the Subdivision Rules and Regulations and Required Improvements section to include fire suppression provisions for new residential developments.

Goal Statement for Weather Extremes: To minimize the loss of life and the threats to public health and safety.

1. **Objective:** To develop and distribute educational information regarding the threats from extreme heat and cold. Currently, information is provided on the Town website and through the Council on Aging.
2. **Objective:** To educate the residents as to the effects of weather extremes; and how it impacts the residents of Harvard.

Mitigation Action Plans and Prioritization of Actions (STAPLEE)

Initial Mitigation Action Plans for the Montachusett Communities were presented in the communities Hazard Mitigation Plans that were approved by FEMA in 2009 and 2010. The original Mitigation Action Plans were developed through an inventory of potential hazards which could impact the community and an evaluation of a range of alternatives to address these hazards. As part of the plan update process, the original Mitigation Action Plan was reviewed by the community's Local Hazard Mitigation Planning Team/Emergency Management Committee to delete actions which have already been completed, add additional actions which are either underway or planned to be undertaken, and to update the current status of all actions. The goals were reviewed and updated at the second meeting with each community.

An additional step in this process was to conduct a "STAPLEE" analysis for each action to prioritize all actions within each community and a subjective evaluation of each action's perceived cost/benefit. In the 2008 plan, actions were not prioritized so there were no changes in priorities in this update. The revised Community Mitigation Action Plans matrices that follow identify each mitigation action, the responsible department or board responsible for implementation, potential funding sources, the timetable of the action, results of the prioritization of actions through the STAPLEE analysis, and the

perceived cost/benefit for each mitigation action.

The goal of each identified strategy, or mitigation action, is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each action to establish priorities for implementation, using the “STAPLEE” method. The STAPLEE methodology was developed by the Federal Emergency Management Agency as a tool to help communities prioritize their hazard mitigation strategies and determine the most appropriate actions for implementation. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of an action and is designed to be used by public officials and planners for making planning decisions.

To conduct the STAPLEE exercise, the community’s Hazard Mitigation Team was asked to rate each action in their Mitigation Action Plan on each of the following criteria, using a score of 1 to 3 (Good = 3, Average = 2, Poor = 1):

- **Social:** Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- **Technical:** Will the proposed strategy work? Will it create more problems than it solves?
- **Administrative:** Can the community implement the action? Is there someone to coordinate and lead the effort?
- **Political:** Is the action politically acceptable? Is there public support both to implement and to maintain the action?
- **Legal:** Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- **Economic:** What are the costs of this action? Does the cost seem reasonable for the size of the problem and the likely benefits?
- **Environmental:** How will the action impact the environment? Will the action need environmental regulatory approvals?

These scores were then totaled, resulting in a final score of 7 (least priority) to 21 (highest priority) for each action. The higher the final score, the higher the relative priority of that action for implementation. This information can then be utilized in each community as they conduct and administer relevant municipal functions and activities. The final STAPLEE score for each action is shown in the following mitigation action plan.

The Hazard Mitigation team was also asked to do a relative cost/benefit of each action. This assessment was intended to informally indicate if an action will either have more benefits accrued to the Town than the Cost of implementing the action, or if the costs would exceed any benefits. Responses include: “Benefits Exceed Costs”, “Benefits Equal Costs, or “Costs Exceed Benefits”.

HARVARD IMPLEMENTATION STRATEGY FOR PRIORITY MITIGATION ACTIONS

Type of Natural Hazard	Description of Action	Implementa-tion Responsibility	Resources/ Funding*	Time-frame	Priority (STAPLEE SCORE)	Cost/Benefit Evaluation	Status Update from 2008 Plan**
Flood Related Hazards and Geologic Hazards	Identify Existing Shelters that are Earthquake Resistant as well as Outside of Floodplain (and Dam Inundation) Areas to ensure that shelters are available to reduce or eliminate risk to human life.	Building Commissioner, Emergency Management Director	Municipal Staff	2015-2020	17	Cost outweighs benefit	Carried forward due to time constraints.
Wildland Fire	Increase awareness by educating property owners on actions that they can take to reduce risk to property through internet and by hosting an Open House at the Fire Department, Develop and Distribute an Educational Pamphlet on Fire Safety and Prevention (SAFE PROGRAM) (SENIOR SAFE) and wildfire prevention.	Fire Department	Municipal Staff	2015 - 2020	20	Benefit exceeds costs	Completed but carried forward. Ongoing. This action is undertaken periodically and as funding allows.

All Natural Hazards	Inventory Supplies at Existing Shelters and Develop a Needs List and Storage Requirements to ensure the available of adequate supplies during a natural hazard. Supplies must be adequate to eliminate or reduce risk to human life.	Emergency Management Planning Committee, School Facilities Manager	Municipal Staff	2015 - 2020	21	Benefit exceeds costs	Completed but carried forward as this action is undertaken on an as needed basis.
Flood Related Hazards	Identify all structures throughout the town that need to be Elevated above the Base-Flood Elevation. Once identified educate those property owners regarding their options for mitigation.	Building Commissioner, Fire Department	Municipal Staff. Also 75% FEMA FUNDING AVAILABLE. Remaining 25% (non-federal)	2015-2020	21	Benefit exceeds costs	Carried forward. Structures have been identified.
Flood Related Hazards	To Develop a priority list and possibly seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town to reduce or eliminate flooding risk.	Board of Selectmen, Highway Department	Municipal Staff/ FEMA HMGP grant 75% MEMA/ FEMA	2015-2020	21	Benefit exceeds costs	Carried forward due to time constraints.

Flood Related Hazards	Educate property owners regarding options for mitigating their properties from flooding through outreach programs that address measures that residents can take (i.e installing backflow valves, securing debris, etc.)	Emergency Management Director, Fire Department	Municipal Staff/ Property Owners	2015 - 2020	21	Benefit exceeds costs	New Action.
Flood Related Hazards	Continue participation in the National Flood Insurance Program to enable property owners to purchase insurance protection against flood losses.	Board of Selectmen, Conservation Commission	FEMA/ MEMA	2015 - 2020	21	Benefit exceeds costs	Completed but carried forward. The town continues to participate in the NFIP.
Atmospheric Related Hazards	Enforce state building codes related to design loads to include wind effects generated from atmospheric related hazards.	Building Commissioner, Emergency Management Director	Contractor and Property Owners	2015 - 2020	21	Benefit exceeds costs	Completed but carried forward. Town continues to enforce state building codes.

Other Natural Hazards (Wildland fire)	Identify areas with potential for brush fires to track community vulnerability by developing and maintaining a data base.	Department of Public Works	Municipal Staff	2015 - 2020	21	Benefit exceeds costs	New Action.
All Natural Hazards	Utilize interactive mapping application prepared by MRPC/CMRPC to update critical infrastructure and simulate real time evacuation scenarios to mitigate hazards to the public.	Emergency Management Director	Emergency Management Director with MRPC	2015	21	Benefit exceeds costs	New action.
Flood Related Hazards	Maintain "beaver diverters" and water control devices to mitigate flooding.	Department of Public Works	Municipal Staff	2015 - 2020	21	Benefit exceeds costs	New Action.
All Natural Hazards	Implement recommendations regarding natural hazard mitigation in existing planning documents including the the master plan, five year action plan of the open space and recreation plan and the emergency evacuation plan	Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	Municipal Staff, Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	2015 - 2020	21	Benefit exceeds costs	Carried forward due to lack of funding.

All Natural Hazards	Establish Asset Management Inventory and Condition Database and Management Plan to ensure that vital equipment needed for hazards is in working condition to mitigate natural hazards.	Department of Public Works	Municipal Staff	2018 (12 months)	18	Benefit exceeds costs	New Action.
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*Unless otherwise noted, Harvard’s Resources/Funding consists of elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

**Actions identified as carried forward were not completed in the previous planning cycle unless otherwise stated.

Mitigation Actions from the 2008 Montachusett Region Hazard Mitigation Plan that are complete include:

- Collected, updated and disseminated information on local radio/tv stations emergency information.
- Developed a plan for providing access to water, information, shelter, and food stores to people in remote locations of the town in the event of a severe storm.
- Update Insurance Flood Rate Maps.
- Identified shelters and publicize locations.
- Hired trapper for removal of beavers.
- Installed beaver diverters and water control devices.
- Worked with Neighboring Communities to enhance a Community Emergency Response Team (CERT).

Hubbardston Natural Hazard Risk Assessment

While this annex focus’ pertains to critical facilities, flooding, risk assessment, existing protections and mitigation strategy in the community, more detailed descriptions of each natural hazard’s impact on the region and its communities and summary of vulnerability can be located in the regional section entitled “ 4. Identification of Natural Hazards, Identifying and Profiling Hazards”.

Community Profile

The Town of Hubbardston is located in North Central Massachusetts. It is bordered by Gardner and Westminster on the northeast, Princeton and Rutland on the southeast, Barre on the southwest, and Phillipston and Templeton on the northwest. Hubbardston is 19 miles northwest of Worcester, 56 miles northwest of Boston, 44 miles from Amherst, 51 miles from Springfield, 60 miles from Providence, Rhode Island, and 186 miles from New York City.

The town of Hubbardston covers an area of 41.95 square miles and has a resident population of 4,382, according to the 2010 US Census and the population density is 105 people per square mile. The total number of housing units is 1,662, and the average household size is 2.80 people. Hubbardston residents' median age is 41.

Originally called the "Northeast Quarter", Hubbardston was part of Rutland until it became a town in 1767. It was named for Thomas Hubbard, one of the original proprietors. The first European settlers were recorded in 1737. The community has been described by historians as a poor town in its early years, sparsely settled and almost solely agricultural. By the 18th century, there were sawmills, potash works and cottage industries, including the making of palm leaf hats, chairs, cabinets, shoes, and horse blankets. By the 19th century, dairy and berry farming and market gardening were major enterprises. Immigrants from Ireland, French Canada, England, Sweden and Finland moved to town to work on local farms. The town's early economy was based on agriculture and small-scale chair, boot and shoe manufacturing. Dairy and berry farming and market gardening were major pursuits in the town.

Hubbardston is primarily a residential town and residents enjoy a quiet rural environment with several small industries, retail and service businesses with numerous home based endeavors. Hubbardston offers thousands of acres of open space where people may enjoy many non-consumptive opportunities. Hubbardston is home to Hubbardston State Forest, and Mt. Jefferson Conservation area. There are numerous ponds in the town which provide opportunities for boating, swimming fish and other past times. Comet Pond is ranked by its residents as the primary open space recreational opportunity in town. Hubbardston's largest employers are Aecom and Hubbardston Center School.

Critical Facilities

In general usage, the term "critical facilities" is used to describe all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired.

Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even access to damaged areas.

The number and nature of critical facilities in a community can differ greatly from one jurisdiction to another, and usually comprise both public and private facilities. In this sense, each community needs to determine the relative importance of the publicly and privately owned facilities that deliver vital services, provide important functions, and protect special populations. *Source: Federal Emergency Management Administration, Risk Management Series, Design Guide for Improving Critical Facility Safety from Flooding and High Winds, FEMA 543, January 2007.*

A list of the critical facilities within the community is shown in Table 50. This data was obtained from the community's Comprehensive Emergency Management Plan (CEMP). The data was then reviewed by the Emergency Management Director. These facilities were digitized into GIS and used for determining vulnerability to the various hazards. The map that follows entitled FEMA Q3 Flood Zones and Critical Infrastructure depicts the Critical Facilities in the community.

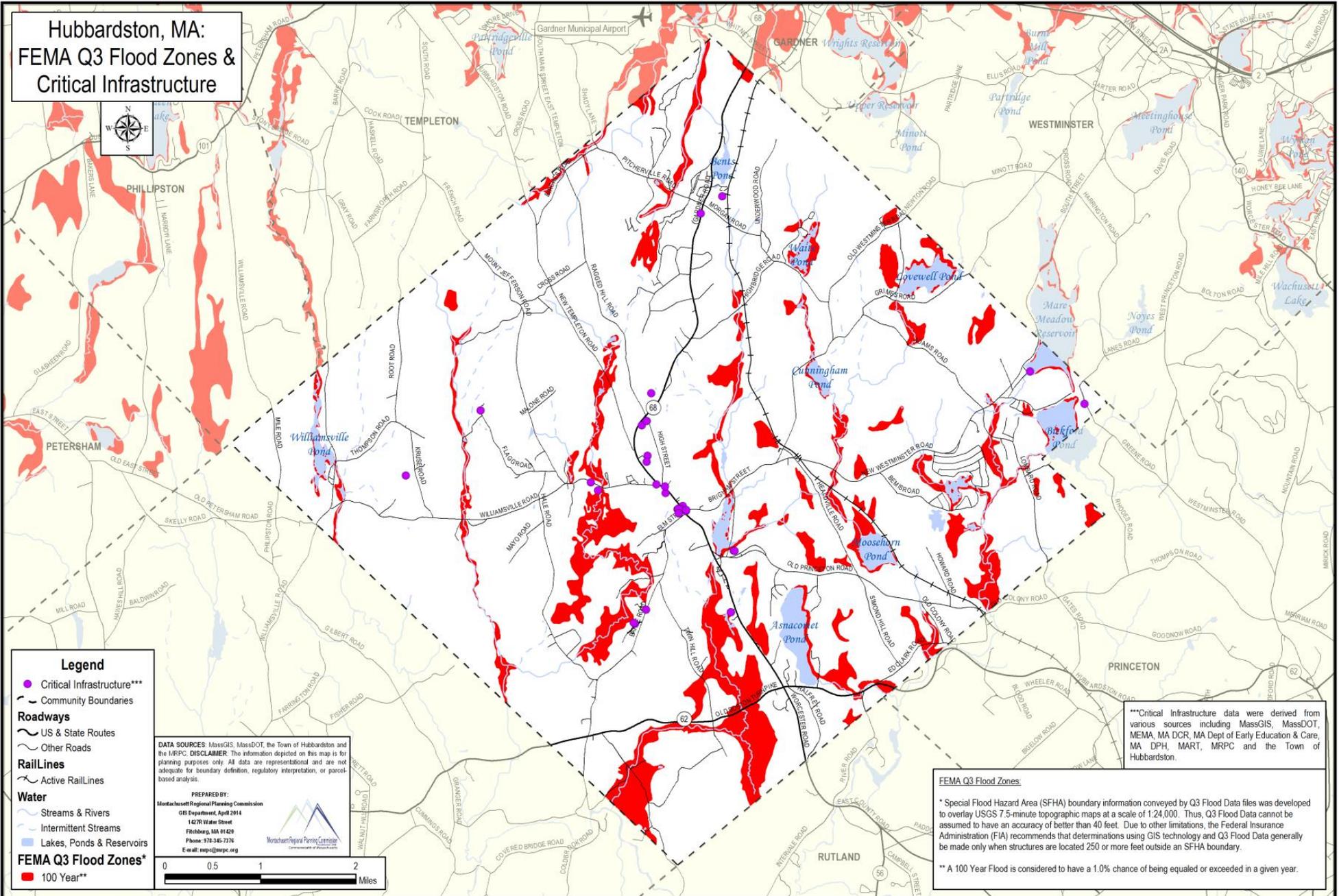
Table 50: Hubbardston Critical Facilities

Feature Type	Name	Address
City/Town Halls	Hubbardston Town Hall	7 Main Street
Public Water Supply*	Well 1	
	Peaceful Acres Campground	
	Mass Palettes	
	Rock Well 1	
	Hubbardston Rod & Gun Club	
	Mr. Mikes Hubbardston	
	Breezy Hill Plaza	
	Well #1	
	Well #2	
	Hubbardston Center School	
	Stamatias Plaza	
	Bickford Pond	
	Mare Meadow Reservoir	
DPW Facilities	Hubbardston Highway Department	68 Worcester Road
Early Education Childcare Facilities	Spring, Sandra	165 Gardner Rd
	Perry, Antonella	37 Williamsville Rd
	1-2-3 Grow Child Center	48 Barre Rd
Elderly Housing	Housing for Elderly Hubbardston House	1 Old Princeton Road
Emergency Shelters	Hubbardston Senior Center	7 Main Street
Emergency Operations Centers	Hubbardston Fire Station	48 Gardner Road
	Hubbardston Town Hall	7 Main Street
Fire	Hubbardston Fire Station 2	48 Gardner Road
	Hubbardston Fire Station 1	36 Main Street
Other Critical Facilities	Curtis Field	
	Hubbardston Admin Offices	7A Main Street
	Hubbardston Highway Department	68 Worcester Road
	Hubbardston Public Library	7 Main Street
	Communication Tower #1	29 Cruise Road
	U.S. Post Office	6 Main Street
	Communication Tower #2	36 Main Street

Police	Hubbardston Police Station	7 Main Street
Public Health Office	Hubbardston Center School	8 Elm Street
School	Hubbardston Center School	8 Elm Street
Sports And Cultural Areas	Evangelical Congregational Church	Gardner Road
	First Parish Unitarian Church	2 Main Street

“As stated in 310 CMR 22.02, a Public Water System means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year” (MassGIS, 2014).

Hubbardston, MA: FEMA Q3 Flood Zones & Critical Infrastructure



Legend

- Critical Infrastructure***
- - - Community Boundaries
- Roadways**
- ~ US & State Routes
- ~ Other Roads
- RailLines**
- ~ Active RailLines
- Water**
- ~ Streams & Rivers
- ~ Intermittent Streams
- Lakes, Ponds & Reservoirs
- FEMA Q3 Flood Zones***
- 100 Year**

DATA SOURCES: MassGIS, MassDOT, the Town of Hubbardston and the MRPC. **DISCLAIMER:** The information depicted on this map is for planning purposes only. All data are representational and are not adequate for boundary definition, regulatory interpretation, or parcel-based analysis.

PREPARED BY:
Montachusett Regional Planning Commission
GIS Department, April 2014
1427R Water Street
Fitchburg, MA 01426
Phone: 978-346-7376
E-mail: mrpc@mrpc.org



***Critical Infrastructure data were derived from various sources including MassGIS, MassDOT, MEMA, MA DCR, MA Dept of Early Education & Care, MA DPH, MART, MRPC and the Town of Hubbardston.

FEMA Q3 Flood Zones:
* Special Flood Hazard Area (SFHA) boundary information conveyed by Q3 Flood Data files was developed to overlay USGS 7.5-minute topographic maps at a scale of 1:24,000. Thus, Q3 Flood Data cannot be assumed to have an accuracy of better than 40 feet. Due to other limitations, the Federal Insurance Administration (FIA) recommends that determinations using GIS technology and Q3 Flood Data generally be made only when structures are located 250 or more feet outside an SFHA boundary.

** A 100 Year Flood is considered to have a 1.0% chance of being equaled or exceeded in a given year.

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Flood Prone Areas

Particular areas within the community where the risk of flood areas are or could occur were determined at the first meeting of the Hubbardston Local Hazard Mitigation Team held on July 2, 2013. This information can be found on Hubbardston's Local Hazard Map which is located under the section entitled Risk Assessment.

Flooding Vulnerability Assessment

An analysis of the Flood Insurance Rate Map (FIRM) flood hazard area maps indicates that there is a total of 3365.78 acres of 100-year floodplain within Hubbardston. This amounts to 12.53% of the total town. Based on additional analysis, 18.51 acres (0.55%) of the floodplain are developed. Currently there are 57 structures in the floodplain which is about 2.06% of the total structures in the community. The buildings are then multiplied by the building value, as determined by the MA Department of Revenue, to come up with a potential loss of \$62,718,000.

Critical facilities in Hubbardston that are within the 100 year floodplain are listed in the table below.

Table 51: Hubbardston Critical Facilities within 100-Year Flood Zone

Feature Type	Name	Address
Public Water Supply	Mare Meadow Reservoir	

Since the initiation of the National Flood Insurance Program (NFIP), there have been no flood insurance claims in Hubbardston. There are no repetitive loss properties in Hubbardston. Statistics from the NFIP BureauNet indicate in the town of Hubbardston there are five flood insurance policies in force.

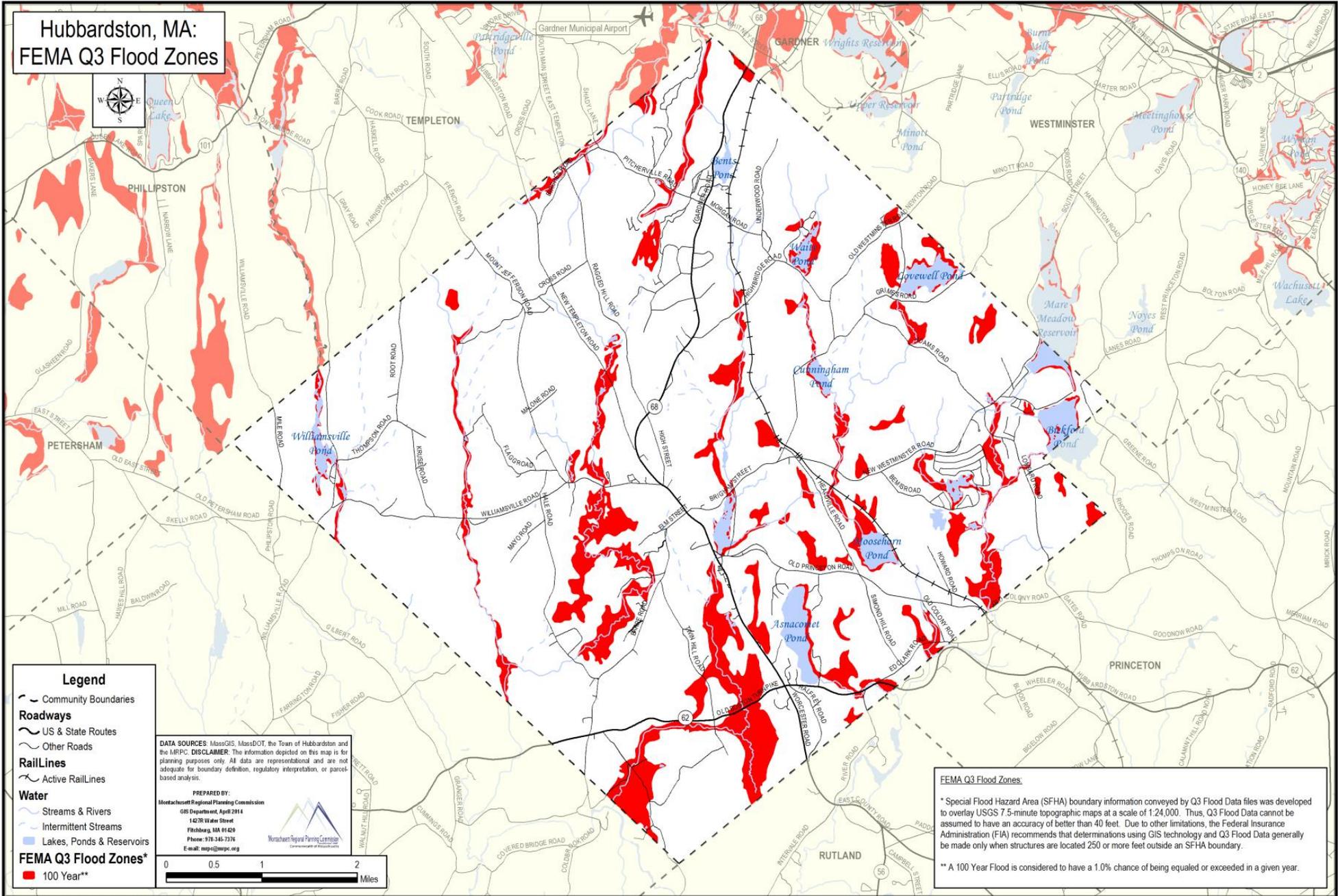
Floodplain Management and Compliance with NFIP

The town supports floodplain management activities in an effort to meet compliance of the National Floodplain Insurance Program. These efforts include:

- Implementing the MA Wetlands Protection Act and the town's Wetland's Protection Bylaw regulating development and activity within the wetlands buffer zone and regulating stormwater and other point source discharge.
- Implementing the Town Flood Plain District Bylaw regulating development in the floodplain district.
- Continued maintenance of municipal stormwater drainage system which includes regular cleaning of catch basins, storm drains and culverts.
- Continued maintenance of public water bodies to reduce flooding caused by erosion and water displacement.
- Enforcement of the Open Space Residential Bylaw which mitigates possible flooding events by designating protected open space within a development which in turn treats stormwater runoff through the means of natural infiltration.

The map entitled FEMA Q3 Flood Zones that follows depicts the 100 year flood zones in the community.

Hubbardston, MA: FEMA Q3 Flood Zones

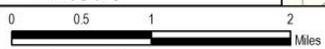


Legend

- Community Boundaries
- Roadways**
 - US & State Routes
 - Other Roads
- Rail Lines**
 - Active Rail Lines
- Water**
 - Streams & Rivers
 - Intermittent Streams
 - Lakes, Ponds & Reservoirs
- FEMA Q3 Flood Zones***
 - 100 Year**

DATA SOURCES: MassGIS, MassDOT, the Town of Hubbardston and the IRFPC. **DISCLAIMER:** The information depicted on this map is for planning purposes only. All data are representational and are not adequate for boundary definition, regulatory interpretation, or parcel-based analysis.

PREPARED BY:
 Montachusett Regional Planning Commission
 GIS Department, April 2014
 1427R Water Street
 Fitchburg, MA 01420
 Phone: 978-345-7376
 E-mail: mrpc@mrpc.org

FEMA Q3 Flood Zones:

* Special Flood Hazard Area (SFHA) boundary information conveyed by Q3 Flood Data files was developed to overlay USGS 7.5-minute topographic maps at a scale of 1:24,000. Thus, Q3 Flood Data cannot be assumed to have an accuracy of better than 40 feet. Due to other limitations, the Federal Insurance Administration (FIA) recommends that determinations using GIS technology and Q3 Flood Data generally be made only when structures are located 250 or more feet outside an SFHA boundary.

** A 100 Year Flood is considered to have a 1.0% chance of being equaled or exceeded in a given year.

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Structurally Deficient Bridges Over Waterways

Hubbardston has three bridges over water that are classified by MassDOT as “structurally deficient”. The bridges locations and associated water bodies are as follows: Burnshirt Road and Burnshirt River; Old Boston Turnpike over West Branch Ware River and Evergreen Road over Mason Brook.

According to MASSDOT Project Information, the bridge on Burnshirt Road over Burnshirt River is in the construction stage.

Hazard Potential of Dams

The Division of Conservation and Recreation (DCR) Office of Dams Safety lists 21 dams in the Town of Hubbardston as shown in Table 52. Reservoir Dam and Damon Pond Dam are classified as high hazard.

Classifications for potential hazards are in accordance with the chart below.

Hazard Potential Classification

High Hazard	Refers to dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
Significant Hazard	Refers to dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities
Low Hazard	Refers to dams located where failure may cause minimal property damage to others. Loss of life is not expected.

Source: MA Department of Conservation and Recreation Office of Dam Safety

High hazard dams must be inspected every two year, significant hazard every five years, and low Hazards dams every 10 years. Owners of dams are responsible for having their dam inspected. MGL Chapter 253 and 302 CMR 10.00 requires that dam owners prepare, maintain and update Emergency Action Plans for all High Hazard Potential dams and certain Significant Hazard Potential dams.

Non-jurisdictional dams are not regulated by the Office of Dam Safety or under their jurisdiction. Typically these dams are under 6 feet in height and/or under 15 acre-feet in storage and do not have an assigned 'Hazard Code'. Dams owned and regulated by the Federal Government are also typically non-jurisdictional but DO have an assigned Hazard Code

Table 52: Dams – Hubbardston

Town	Dam	Hazard Code	Owner
Hubbardston	Bickford Pond Dike	High Hazard	Public
Hubbardston	Love well Pond Dam	Low Hazard	Private

Hubbardston	Bents Pond Dam	Low Hazard	Private
Hubbardston	Williamsville Pond Dam	Low Hazard	Public
Hubbardston	Williamsville Pond Dam	Low Hazard	Private
Hubbardston	Bems Pond Dam	Low Hazard	Private
Hubbardston	Cross Pond Dam	Low Hazard	Private
Hubbardston	Waite Pond Dam	Low Hazard	Private
Hubbardston	Fish Pond Dam	Low Hazard	Private
Hubbardston	Chandler Pond Dam	Low Hazard	Public
Hubbardston	Gates Pond Dam	N/A	Private
Hubbardston	Peaceful Acres Dam	N/A	Private
Hubbardston	Natty Pond Dam	N/A	Public
Hubbardston	Cunningham Pond Dam	N/A	Public
Hubbardston	Maury Pond Dam	N/A	Public
Hubbardston	Moose Horn Pond Dam	N/A	Public
Hubbardston	Brigham Pond Dam	Significant Hazard	Public
Hubbardston	Wax Factory Pond Dam	Significant Hazard	Public
Hubbardston	Mare Meadow Reservoir Dam	Significant Hazard	Public
Hubbardston	Asnacomet Pond Dam	Significant Hazard	Public
Hubbardston	Bennett Pond Dam	Significant Hazard	Private

*N/A – Information not available as the dam is non-jurisdictional.

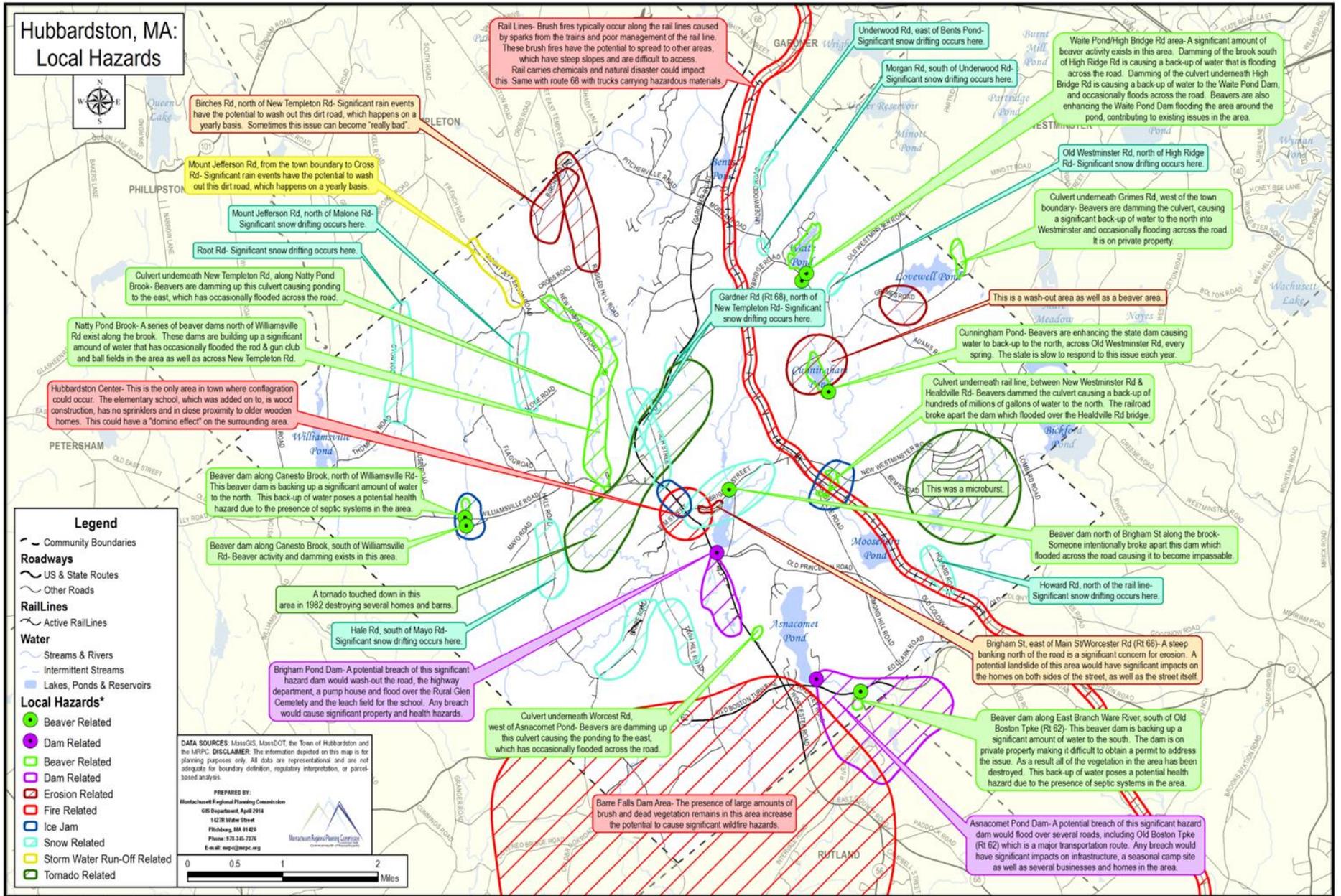
Risk Assessment

As previously stated, located in Section 4. Identification of Natural Hazards, Identifying and Profiling Hazards”, there is a description of each identified hazards’ impact on the region and its communities as well as an overall summary of vulnerability. Based on the hazards identified in this plan and the assessment of risks by the Town of Hubbardston, the town considers itself to be at a high risk for Heavy Rain, Snow Melt, Beavers, High Winds, Nor’easters, Severe Thunderstorms, Heavy Snow, Ice Storms, Blizzard; moderate risk for Dam Failure, Ice Jams, Hurricanes, Tornados, Wild land Fire, Extreme Temperatures; low risk for Major Urban Fires, Drought, Earthquakes, and Landslides; and tsunamis as not applicable.

This information is documented in Hubbardston’s Natural Hazard Matrix below which was obtained from participants at the Hubbardston Local Hazard Mitigation Team Meeting held on July 2, 2013.

Hubbardston Natural Hazard Matrix				
Natural Hazard	Likelihood of Occurrence	Location	Impacts	Hazard Index
Natural Hazard Separated by Flood, Atmospheric Related and Winter Related, Other Natural Hazards, and Geologic Hazards	3 = Highly Likely 2 = Possible 1 = Unlikely	3 = Regional/State 2 = Multi Community/Regional 1 = Local/Town	4 = Catastrophic 3 = Critical 2 = Limited 1 = Negligible	Ranking Determined by Combining the Likelihood, Location and Impacts of a Natural Hazard
Flood-Related Hazards				
• Heavy Rain	3	3	2	8
• Snow Melt	3	3	2	8
• Dam Failure	2	2	3	7
• Ice Jams	2	2	2	6
• Beavers	3	2	3	8
Atmospheric Related and Winter Related Hazards				
• High Winds	3	3	3	9
• Hurricanes	2	3	3	8
• Tornadoes	2	2	4	8
• Nor'easters	3	3	3	9
• Severe Thunderstorms	3	2	2	7
• Heavy Snow	3	2	3	8
• Ice Storms	3	2	3	8
• Blizzard	3	3	3	9
Other Natural Hazards				
• Major Urban Fires	1	1	2	4
• Wildland Fire	2	2	2	6
• Drought	1	3	1	5
• Extreme Temperatures	2	3	1	6
Geologic Hazards				
• Earthquakes	1	3	1	5
• Landslides	1	1	1	3
• Tsunami	NA	NA	NA	NA
<p>Key</p> <p>Highly likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.</p> <p>Possible : 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.</p> <p>Unlikely: Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.</p> <p>Catastrophic: Immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.</p> <p>Critical: Fast speed of onset or long duration of event resulting in devastating damage and loss of services for weeks or months.</p> <p>Limited: Moderate speed of onset or moderate duration of event, resulting in some damage.</p> <p>Negligible: Slow speed of onset or short duration of event resulting in little to no damage.</p>				

Also discussed at this meeting were the hazards that affect each community and the identification of specific problem areas in the community that need to be addressed. This included the identification of new hazards that were determined to pose a threat or community vulnerability which are detailed in Hubbardston's Local Hazards Map on the following page. The entire community is equally at risk to the following hazards: heavy rain, snow melt, high winds, hurricanes, tornados, nor'easters, severe thunderstorms, heavy snow, ice storms, blizzards, drought, extreme temperatures, earthquakes and landslides.



Existing Protections

The original inventory of hazard mitigation actions which the Montachusett communities undertook for the 2008 Montachusett Region Hazard Mitigation Plan was reviewed and updated by each community at a meeting held in each community with the MRPC and the community's Local Hazard Mitigation Planning Team and, in some communities, the Emergency Management Committee. The attendees of the meetings can be found in Appendix A. The following matrices depict the updated inventory of what is currently being done to mitigate hazards by listing the programs and activities already in place. It includes a description of the protection measure, who is responsible, and improvements and changes that may be needed. This inventory was used by the Planning Team/Emergency Management Committee to identify gaps in existing protections that were then addressed through the development of this plan update.

Hubbardston

Type of Existing Protection	Description	Area Covered	Effectiveness and/or Enforcement	Improvements or Changes Needed
Flood Related Hazards				
Storm water management standards	State Regulation under the Wetlands Protection Act to regulate storm water and other point source discharge	Town-Wide	Enforced by the Hubbardston Conservation Commission (Wetlands Protection Act) and Hubbardston Planning Board (Subdivision Control Law and site plan review) both staffed by the municipal Administrative Clerk.	No improvements or changes needed. Storm water management standards are and continue to be enforced.
Wetlands Protection Act (state)	State law regulating development and activity within wetland buffer zone	100-foot state buffer around wetland area; 200 foot buffer around river front areas.	Enforced by the Conservation Commission staffed by the municipal Administrative Clerk.	No improvements or changes needed.
Wetlands Protection Bylaw (local)	Local bylaw supplementing the Wetlands Protection Act	100-foot state buffer around wetland area; 200 foot buffer around river front areas	Enforced by the Conservation Commission staffed by the Town's Conservation Agent.	No improvement or changes needed.

100 Year Flood Zone	Federal law requiring elevation above 100-year flood level of new and substantially improved residential structures in floodplain	100-year floodplain as shown on Flood Insurance Rate Map dated June 1, 1984.	Enforced by the Building Inspector (municipal staff) and Conservation Commission staffed by the municipal Administrative Clerk.	Insurance Flood Rate Maps Need to be updated.
Town Bylaw Flood Plain District	Local bylaw enhancing federal/state laws and regulating any development in the flood plain district	100-year floodplain as shown on Flood Insurance Rate Map dated June 1, 1984.	Enforced by the Building Inspector (municipal staff) and regulated by the Planning Board.	Insurance Flood Rate Maps need to be updated.
Maintenance of municipal storm water drainage system	Regular cleaning of catch basins, storm drains, and culverts	Town-Wide	Undertaken by the Department of Public Works municipal staff.	Maintenance continues but additional personnel and equipment is needed to undertake this task.
Maintenance of public water bodies (ponds, streams, brooks, wetlands)	Periodic cleaning of waterways needed, e.g., remove trash, debris	Town-Wide	Undertaken by the Department of Public Works with guidance from Conservation Commission staffed by the municipal Administrative Clerk.	Maintenance continues. No improvements or changes needed.
Inspection of major dams	Periodic inspections of the structural integrity of the dam	Major Dams	Undertaken by the Massachusetts Department of Conservation and Recreation, Office of Dam Safety	Update Dam failure studies for the dams rated as high hazard.
Wind Related Hazards				
State Building Code	State Law related to design loads to include wind effects	Town-Wide	Enforced by Building Department (municipal staff).	Continued enforcement remains in place. No improvements or changes needed.
Code Red	Code red will be used in case of emergency and upcoming storms.	Town-wide	Emergency Management	Code Red remains in effect. No improvements or changes needed.

Tree Maintenance	Regular inspection and tree maintenance to cut branches threatening power lines and overhead utilities	Town-Wide	National Grid staff (Electric Company).	Tree maintenance continues. No improvements or changes needed.
<u>Fire Related Hazards</u>				
Limited Brush Clearing	Brush clearing to provide access to Emergency Service vehicle	Town-Wide	Department of Public Works municipal staff.	Identify additional Areas with Potential for Brushfires.
<u>Winter Storms Related</u>				
Residential Parking Bans	Parking Bans to Enable Snow Removal Effectively from Residential Streets	Town-Wide	Department of Public Works municipal staff.	Enforcement continues but additional personnel and equipment needed.
Clearing Snow from Major Arterial Routes	Snow clearing to ensure Access to Emergency Service vehicles	Town-Wide	Department of Public Works municipal staff.	Snow clearing continues but additional personnel and equipment needed.

*Hubbardston is a smaller community and enforcement/implementation is generally carried out by elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

Mitigation Goals, Objectives and Strategies

As discussed earlier in this Plan, MRPC previously prepared the 2008 Montachusett Region Hazard Mitigation Plan which consisted of individual annexes for each MRPC community. Similarly, as part of the multi-jurisdictional plan update, each community also developed their own individual goals, objectives and strategies which are listed in this section.

Overall Goal Statement: To reduce the loss of life, property, infrastructure and cultural resources throughout the town of Hubbardston from natural disasters through a multiple hazard mitigation program that involves increased coordination, planning, education, and capital improvements.

1. **Objective:** To provide adequate shelter, water, food, and basic first aid to displaced residents in the event of a natural disaster, and to provide adequate notification and information regarding evacuation procedures, etc., to residents in the event of a natural disaster.
2. **Objective:** to increase coordination between inter-departments in pre-disaster planning, post-disaster recovery and continuous hazard mitigation implementation.
3. **Objective:** Increase awareness of hazard mitigation among town officials, private organizations, businesses, and the general public.
4. **Objective:** To ensure that critical infrastructure sites are protected from natural hazards, and to maintain existing mitigation infrastructure in good condition.

5. **Objective:** To educate the public about the threat of natural hazards and the possible mitigation measures that can be taken to protect public health and safety, as well as infrastructure and property; and to educate the public as well about zoning and building regulations, particularly regulations that relate to new construction.
6. **Objective:** To encourage future development in areas that are not prone to natural disasters.
7. **Objective:** To identify existing shelters that are earthquake resistant as well as outside of floodplain and inundation areas. Disseminate this information to appropriate Town departments. Senior Center in Slade Building is only formal shelter in town.
8. **Objective:** To inventory supplies at existing shelters and develop a needs list and storage requirements; and to establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster. (Cots, blankets, and a small amount of food and water are stored at the Senior Center.)
9. **Objective:** To continue to maintain the Code Red local notification system.
10. **Objective:** To collect, periodically update, and disseminate information on which local radio stations provide emergency information, what to include in a 'home survival kit,' how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to follow during a natural disaster. ("Emergency Go" kit is being distributed to senior citizens.)

Specific Natural Hazard Goals for Hubbardston

Goal Statement for Flooding: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to flooding. And to pursue prevention activities which include planning, zoning, open space preservation, floodplain and wetland development regulations, storm water management, waterway dumping regulations, watershed protection measures, and best management practices, as well as, soil erosion, building ordinances, and subdivision regulations.

1. **Objective:** To implement standards in the Subdivision Rules and Regulations to require temporary and permanent erosion control measures for streams and surface water bodies. Implemented by the Conservation Commission.
2. **Objective:** To add more specific requirements to address flood related issues in the Special Permit and Site Plan Approval provisions in the Hubbardston Zoning Bylaw including topographic change, removal of cover vegetation, risk of erosion or siltation and increased stormwater runoff. Implemented by the Conservation Commission.
3. **Objective:** To identify all structures throughout Town that need to be elevated above the base-flood elevation.
4. **Objective:** To Develop a priority list and seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town.

Goal Statement for Protection from Beavers: To minimize the threat to health, the damage to roads and property, and the disruption of governmental services and general business activities due to flooding caused by beavers.

1. **Objective:** Support local town departments to continue present method to prevent beaver caused flooding.
2. **Objective:** Seek assistance from beaver management professionals, including trappers.
3. **Objective:** Install beaver management devices

Goal Statement for Hurricanes and Tornadoes: To minimize the loss of life, damage to property, and

the disruption of governmental services and general business activities due to high winds associated with hurricanes and tornadoes. (The objectives listed above, under flooding, address the flooding that can result from a hurricane.)

1. Objective: To educate residents and volunteers regarding the safe methods and actions necessary to deal with Hurricanes and Tornados. Information is distributed by EMD and also through social media and the town website.

Goal Statement for Winter Related Hazards: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to severe snow and ice storms.

1. Objective: To develop a plan for providing access to water, information, shelter, and food stores to people in remote locations in Hubbardston in the event of a severe winter storm. EMD provides information as necessary.

Goal Statement for Dam Failure: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to dam failures.

1. Objective: [Dam safety inspections are conducted by the Massachusetts Department of Conservation and Recreation. Not a town responsibility.]

Goal Statement for Earthquakes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to earthquakes.

1. Objective: To evaluate all Shelters and Reception Centers to determine if they are earthquake resistant.

2. Objective: To insure that all identified shelters have sufficient back-up utility service in the event of primary power failure.

Goal Statement for Drought: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to drought.

1. Objective: [Entire town is on private wells. Therefore no town-wide water conservation plan.]

Goal Statement for Wildfires/Brushfires: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to wildfires/brushfires.

1. Objective: Distribute an educational pamphlet on fire safety and prevention.

2. Objective: Consider amending the Subdivision Rules and Regulations and Required Improvements section to include fire suppression provisions for new residential developments.

Goal Statement for Weather Extremes: To minimize the loss of life and the threats to public health and safety.

1. Objective: Distribute educational information through pamphlets and social media regarding the threats from extreme heat and cold.

Mitigation Action Plans and Prioritization of Actions (STAPLEE)

Initial Mitigation Action Plans for the Montachusett Communities were presented in the communities Hazard Mitigation Plans that were approved by FEMA in 2009 and 2010. The original Mitigation Action Plans were developed through an inventory of potential hazards which could impact the community and an evaluation of a range of alternatives to address these hazards. As part of the plan update process, the original Mitigation Action Plan was reviewed by the community's Local Hazard Mitigation Planning Team/Emergency Management Committee to delete actions which have already been completed, add

additional actions which are either underway or planned to be undertaken, and to update the current status of all actions. The goals were reviewed and updated at the second meeting with each community.

An additional step in this process was to conduct a “STAPLEE” analysis for each action to prioritize all actions within each community and a subjective evaluation of each action’s perceived cost/benefit. In the 2008 plan, actions were not prioritized so there were no changes in priorities in this update. The revised Community Mitigation Action Plans matrices that follow identify each mitigation action, the responsible department or board responsible for implementation, potential funding sources, the timetable of the action, results of the prioritization of actions through the STAPLEE analysis, and the perceived cost/benefit for each mitigation action.

The goal of each identified strategy, or mitigation action, is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each action to establish priorities for implementation, using the “STAPLEE” method. The STAPLEE methodology was developed by the Federal Emergency Management Agency as a tool to help communities prioritize their hazard mitigation strategies and determine the most appropriate actions for implementation. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of an action and is designed to be used by public officials and planners for making planning decisions.

To conduct the STAPLEE exercise, the community’s Hazard Mitigation Team was asked to rate each action in their Mitigation Action Plan on each of the following criteria, using a score of 1 to 3 (Good = 3, Average = 2, Poor = 1):

- Social: Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- Technical: Will the proposed strategy work? Will it create more problems than it solves?
- Administrative: Can the community implement the action? Is there someone to coordinate and lead the effort?
- Political: Is the action politically acceptable? Is there public support both to implement and to maintain the action?
- Legal: Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- Economic: What are the costs of this action? Does the cost seem reasonable for the size of the problem and the likely benefits?
- Environmental: How will the action impact the environment? Will the action need environmental regulatory approvals?

These scores were then totaled, resulting in a final score of 7 (least priority) to 21 (highest priority) for each action. The higher the final score, the higher the relative priority of that action for implementation. This information can then be utilized in each community as they conduct and administer relevant municipal functions and activities. The final STAPLEE score for each action is shown in the following mitigation action plan.

The Hazard Mitigation team was also asked to do a relative cost/benefit of each action. This assessment was intended to informally indicate if an action will either have more benefits accrued to the Town than

the Cost of implementing the action, or if the costs would exceed any benefits. Responses include: “Benefits Exceed Costs”, “Benefits Equal Costs, or “Costs Exceed Benefits”.

HUBBARDSTON IMPLEMENTATION STRATEGY FOR PRIORITY MITIGATION ACTIONS							
Type of Natural Hazard	Description of Action	Implementation Responsibility	Resources/ Funding*	Timeframe	Priority (STAPLEE SCORE)	Cost/Benefit Evaluation	Status Update from 2008 Plan**
Flood Related Hazards and Geologic Hazards	Identify Existing Shelters that are Earthquake Resistant as well as Outside of Floodplain (and Dam Inundation) Areas to eliminate or reduce risk to human life.	Building Inspector, Emergency Management Director	Municipal Staff	2015 - 2020	21	Benefit exceeds cost	Carried forward due to time constraints.
Wildland Fire	Increase awareness by educating property owners on actions that they can take to reduce risk to property by hosting an Open House at the Fire Department, Develop and Distribute an Educational Pamphlet on Fire Safety and Prevention (SAFE PROGRAM) (SENIOR SAFE) and wildfire prevention.	Fire Department	Municipal Staff	2015 - 2020	21	Benefit exceeds cost	Completed but carried forward. Ongoing. This action is undertaken periodically.

Natural All Hazards	Increase hazard education and risk awareness to public by Collecting, Updating, and Disseminating Information on Local Radio/TV Stations to educate the public and alert them of emergency information including shelter locations and other instructions related to all natural hazards	Emergency Management Director	Municipal Staff	2015 - 2020	21	Benefit exceeds cost	Completed but carried forward. Ongoing. This action is undertaken as needed.
Atmospheric and Winter Related Hazards	Develop a Mitigation Plan to provide access to Water, Information, Shelter and Food Stores to People in Remote Locations of the town in the Event of a Severe natural hazard and integrate this information into community comprehensive plans.	Emergency Management Director	Municipal Staff/ Volunteers	2020 (12 months)	21	Benefit exceeds cost	Carried forward due to lack of funding.

Flood Related Hazards	Identify all structures throughout the town that need to be Elevated above the Base-Flood Elevation. Once identified educate those property owners regarding their options for mitigation.	Building Inspector, Fire Department	Municipal Staff. Also 75% FEMA FUNDING AVAILABLE. Remaining 25% (non-federal)	2015 - 2020	21	Benefit exceeds cost	Initiated but Carried forward due to time constraints.
Flood Related Hazards	To Develop a priority list and possibly seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town to reduce or eliminate flooding risk.	Board of Selectmen, Highway Department	Municipal Staff/ FEMA HMGP grant 75%	2016 (12 months)	21	Benefit exceeds cost	Carried forward due to time constraints.
Flood Related Hazards	Educate property owners regarding options for mitigating their properties from flooding through outreach programs that address measures that residents can take (i.e installing backflow valves, securing debris, etc.)	Emergency Management Director, Fire Department	Municipal Staff, Property Owners	2015 - 2020	21	Benefit exceeds cost	New Action.

Flood Related Hazards	Continue participation in the National Flood Insurance Program to enable property owners to purchase insurance protection against flood losses.	Board of Selectmen, Conservation Commission	FEMA/MEMA	2015 - 2020	21	Benefit exceeds cost	Completed but carried forward. Town continues to participate in NFIP.
Flood Related Hazards	Evaluate and relocate furnaces, water heaters, and electrical equipment in municipal owned building that are located in areas prone to flooding to reduce flood damage.	Emergency Management Director, Fire Department	Municipal Staff	2015 - 2020	21	Benefit exceeds cost	Carried forward due to lack of municipal funding.
Other Natural Hazards (Wildland fire)	Identify areas with potential for brush fires to track community vulnerability by developing and maintaining a data base.	Department of Public Works	Municipal Staff	2015 - 2020	21	Benefit exceeds cost	New Action.
Winter Storm Related Hazards	Expand residential parking bans to enable snow removal from all streets	Department of Public Works, Board of Selectmen	Board of Selectmen	2020 (12 months)	21	Benefit exceeds cost	Carried forward due to time constraints.
All Natural Hazards	Identify shelters and publicize locations to eliminate or reduce risk to human life.	Emergency Management Director	Emergency Management Director /Fire Department	2015 - 2020	21	Benefit exceeds cost	Completed but carried forward. This action is undertaken periodically and as needed.

All Natural Hazards	Utilize interactive mapping application prepared by MRPC/CMRPC to update critical infrastructure and simulate real time evacuation scenarios to mitigate hazards to the public.	Emergency Management Director	Emergency Management Director / MRPC	2015 (12 months)	21	Benefit exceeds cost	New Action.
Flood Related Hazards	Hire trapper for removal of beavers to mitigate flooding caused by beaver dams.	Department of Public Works	Municipal Staff	2015 – 2020	21	Benefit exceeds cost	Completed but carried forward. This action is undertaken periodically and as needed.
All Natural Hazards	Implement recommendations regarding natural hazard mitigation in existing planning documents including the five year action plan of the open space and recreation plan and the emergency evacuation plan	Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	2015 - 2020	21	Benefit exceeds cost	Carried forward due to lack of funding

*Unless otherwise noted, Hubbardston’s Resources/Funding consists of elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

**Actions identified as carried forward were not completed in the previous planning cycle unless otherwise stated.

Mitigation actions from the 2008 Montachusett Region Hazard Mitigation Plan that are complete follow:

- Inventoried Supplies at Existing Shelters and Develop a Needs List and Storage Requirements.
- Developed a Preliminary Project Proposal and Cost Estimate for Updating Current 911 System including Feasibility of Reverse 911.
- Evacuation Routes
- Worked with Neighboring Communities to Establish a Community Emergency Response Team (CERT)

Lancaster Natural Hazard Risk Assessment

While this annex focus' pertains to critical facilities, flooding, risk assessment, existing protections and mitigation strategy in the community, more detailed descriptions of each natural hazard's impact on the region and its communities and summary of vulnerability can be located in the regional section entitled " 4. Identification of Natural Hazards, Identifying and Profiling Hazards".

Community Profile

The Town of Lancaster is located in North Central Massachusetts. It is bordered by Lunenburg and Shirley on the north, Harvard and Bolton on the east, Clinton on the south, and Sterling and Leominster on the west. Lancaster is about 36 miles west of Boston, 18 miles north of Worcester, 192 miles from New York City.

Lancaster covers a total area of 28.2 square miles with a resident population of 8,055, according to the 2010 US Census. The population density is 286 people per square mile. There are 2,614 housing units in the town, and the average household size of 2.66 people. The median age of Lancaster residents is 38.

Lancaster was first settled as 'Nashaway" (named after the local Nashaway Indian Tribe) in 1643. Settlement began when the Nashaway sold 80 square miles to the English. It was officially incorporated and renamed "Lancaster" in 1653, making it the oldest town in Worcester County. Lancaster claims boasts being the official "mothertown" of much of east-central Massachusetts. Towns such as Harvard, Stow, Bolton, Hudson, Marlborough, Leominster, Clinton, Berlin, and Boylston were all once considered part of Lancaster. The town seal reads "Lancaster on the Nashua" and the Nashua forms much of the eastern boundary of the town. It is the Nashua River and its tributaries that are said to define much of the community's character.

The Town of Lancaster originated as a compact, linear village surrounded by agricultural fields. In the early 19th century it emerged from its farming tradition as a popular summer residence for wealthy Bostonians.

Today the town is a bedroom community that possesses little industry, but does contain some working farms. Commercial activity is concentrated along Route 2 in the northern part of town, and in commercial/industrial zones to the south.

Lancaster is the site of a half-dozen private schools including; South Lancaster Academy, the Dr. Franklin Perkins School, a comprehensive service agency for children, adolescents, adults and senior citizens, and the Atlantic Union College, a Seventh - day Adventist school. Dr. Franklin Perkins School is the largest employer in the town.

Critical Facilities

In general usage, the term "critical facilities" is used to describe all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired.

Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even access to damaged areas.

The number and nature of critical facilities in a community can differ greatly from one jurisdiction to another, and usually comprise both public and private facilities. In this sense, each community needs to determine the relative importance of the publicly and privately owned facilities that deliver vital services, provide important functions, and protect special populations. *Source: Federal Emergency Management Administration, Risk Management Series, Design Guide for Improving Critical Facility Safety from Flooding and High Winds, FEMA 543, January 2007.*

A list of the critical facilities within the community is shown in Table 53. This data was obtained from the community’s Comprehensive Emergency Management Plan (CEMP). The data was then reviewed by the Emergency Management Director. These facilities were digitized into GIS and used for determining vulnerability to the various hazards. The map that follows entitled FEMA Q3 Flood Zones and Critical Infrastructure depicts Critical Facilities in the community.

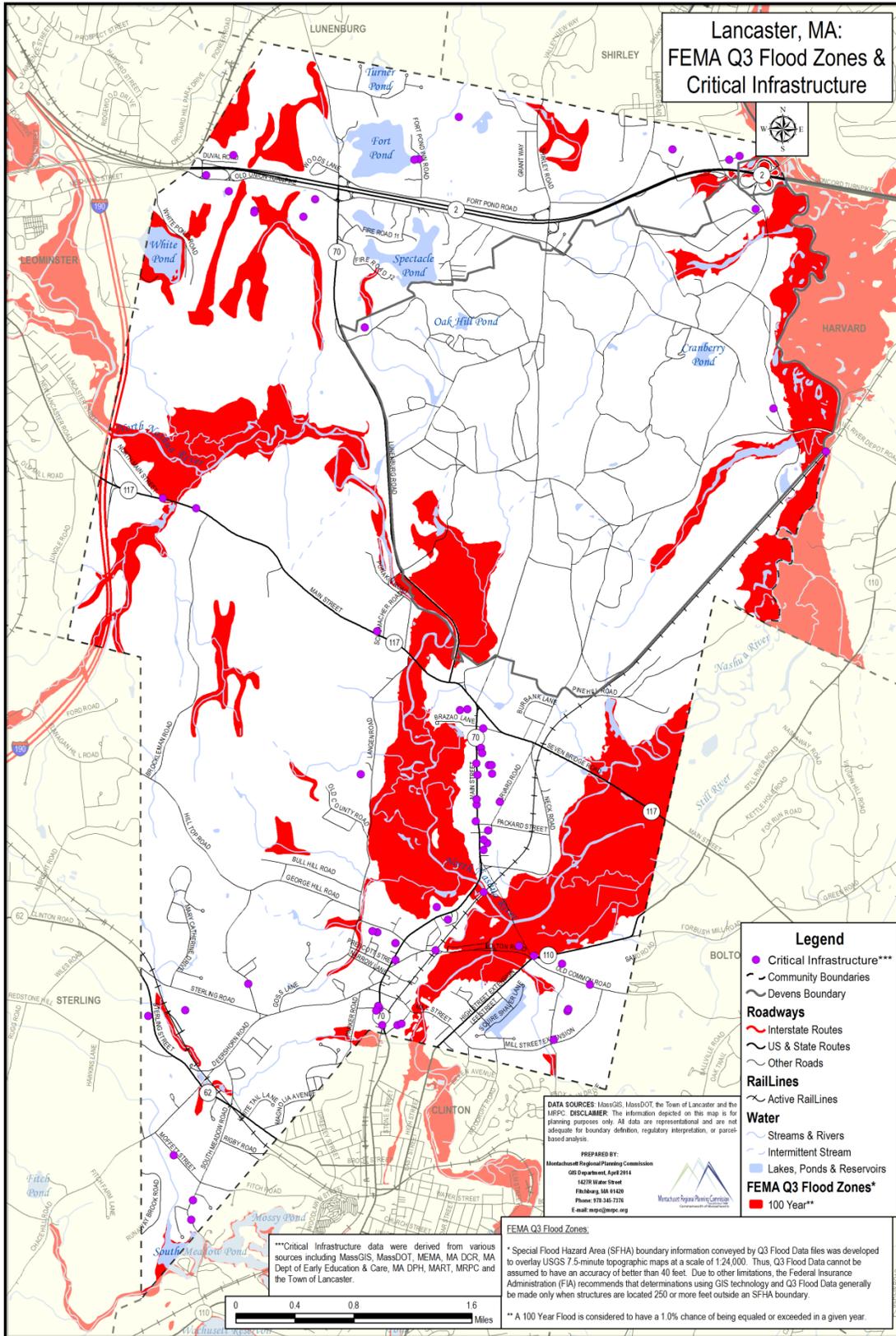
Table 53: Lancaster Critical Facilities

Feature Type	Name	Address
City/Town Halls	Lancaster Town Hall	695 Main Street
College	Atlantic Union College	338 Main Street
Public Water Supply*	Dambrosio Eye Care, Inc.	479 Old Union Turnpike
	Gp Well # 1	
	U.S. Army Devens (South Post)	
	Out Water LLC	Old Union Turnpike
	Gp Well 2	
	Norm Wagner Toyota	700 Old Union Turnpike
	Gp Well # 1	
	Gp Well # 2	
	YMCA Camp Lowe	Fort Pond Inn Road
	Lancaster Golf And Learning Center	438 Old Union Turnpike
	Horn Packaging	580 Fort Pond Road
	Kimball Farm At Oakridge	1543 Lunenburg Road
DPW Facilities	Lancaster Highway Department	432 Center Bridge Road
Early Education Childcare Facilities	Nashoba Montessori School, Inc.	94 Main Street
	Foss, Mary	2567 Main Street

	Kittredge, Nettie M.	558 S Meadow Road
	Brooks, Amy	658 S Meadow Road
	Costa, Marilyn	88 Carter Street
	Leblanc, Michelle	113 Carter Street
	Perkins Child Development Center	25 Creamery Rd
	Marchilli, Martha	114 Moffett Street
	Joyce, Michelle T.	2455 Main Street
	Discovery Program-Day Care Browning School	180 George Hill Road
Elderly Housing	Bigelow Gardens	449 Main Street
Emergency Shelters	Atlantic Union College	338 Main Street
Emergency Operations Centers	Lancaster Police Station	1053 Main Street
	Lancaster Fire Station	1055 Main Street
Fire	South Lancaster Fire Station	283 South Main Street
	Lancaster Fire Station	1055 Main Street
HazMat Sites	Best Way of New England	840 Sterling Road
	Cumberland Farms #0177	110/Five Corners
	Cumberland Farms #2147	114 Main Street
	US Govt. South Post	Rt. 2
Hospitals	Physical Therapy Plus @ Orchard	100 Duval Road Ground Floor
Long Term Care Facility	Davis Manor	200 Harvard Street
	River Terrace Health Care (Kindred)	1675 Main Street
Other Critical Facilities	YMCA Camp Lowe	Fort Pond
	Mass Youth Soccer	512 Old Union Turnpike
	Sterling Mfg. Co.	640 Sterling Street
	Lancaster Sewer District	94 Main Street
	Thayer Symphony Hall	438 Main Street
	Railroad Overpass	Rail Line & Bolton Road
	Railroad Overpass	Rail Line & Main Street
	Railroad Overpass	Rail Line & Nashua River
	Railroad Overpass	Rail Line & Nashua River
	Lancaster Community/Senior Center	39 Harvard Road
Other Government Buildings	Lancaster Highway Department	432 Center Bridge Road
	Thayer Memorial Library	717 Main Street
	Lancaster DPW Office	392 Mill Street Extension
	Lancaster Water Department	392 Mill Street Ext
	Fifth Meeting House	725 Main Street
	Lancaster EMS Dept.	1055 Main Street
Police	Lancaster Police Station	1053 Main Street
Prisons	Souza-Baranowski Correctional Center	Shaker Road

Residential Program Facilities	Perkins School--Crisis Unit	60 Pinfeather Lane
	Perkins--Manor House	971 Main Street
	Perkins School--Weymouth Program	850 Main Street
	RFK-Residence Hall	120 Old Common Road
	Perkins School--White Hall	1006 Main Street
	Perkins School--Friends Hall	40 Pin Feather Lane
	Perkins School--Duplex	60 Pinfeather Lane
	Perkins School--Curtis Hall	868 Main Street
School	Luther Burbank Middle School	1 Hollywood Drive
	Mary Rowlandson Elementary School	103 Hollywood Drive
	Dr. Franklin Perkins School	971 Main Street
	Trivium School	471 Langen Road
	RF Kennedy Action Corps	220 Old Common Road
	Browning Elementary School	198 George Hill Road
	South Lancaster Academy	162 George Hill Road

*As stated in 310 CMR 22.02, a Public Water System means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year” (Mass GIS, 2014).



Flood Prone Areas

Particular areas within the community where the risk of flood areas are or could occur were determined at the first meeting of the Lancaster Local Hazard Mitigation Team held on January 31, 2012. This information can be found on Lancaster's Local Hazard Map which is located under the section entitled Risk Assessment.

Flooding Vulnerability Assessment

An analysis of the FIRM flood hazard area maps indicates that there is a total of 3246.78 acres of 100-year floodplain within Lancaster. This amounts to 18.13% of the total town. Based on additional analysis, 87.35 acres (2.69%) of the floodplain are developed. Currently there are 146 structures in the floodplain which is about 3.8% of the total structures in the community. The buildings are then multiplied by the building value, as determined by the MA Department of Revenue, to come up with a potential loss of \$503,168,400.

Excluding dams and bridges there are there are no critical facilities within the 100 year flood zone.

Table 51

Lancaster Critical Facilities within 100-Year Flood Zone		
<i>Feature Type</i>	<i>Name</i>	<i>Address</i>
DPW Facilities	Lancaster Highway Department	432 Center Bridge Road
Other Critical Facilities	Railroad Overpass	Rail Line & Nashua River
Other Critical Facilities	Railroad Overpass	Rail Line & Nashua River
Other Government Buildings	Lancaster Highway Department	432 Center Bridge Road

Since the initiation of the National Flood Insurance Program (NFIP), 34 flood insurance claims in the Town of Lancaster have been made totaling \$327,168.99 in payments. There are five repetitive loss properties in Lancaster totaling \$230,261.59 in claims. Statistics from the NFIP BureauNet indicate in the town of Lancaster there are 48 flood insurance policies in force.

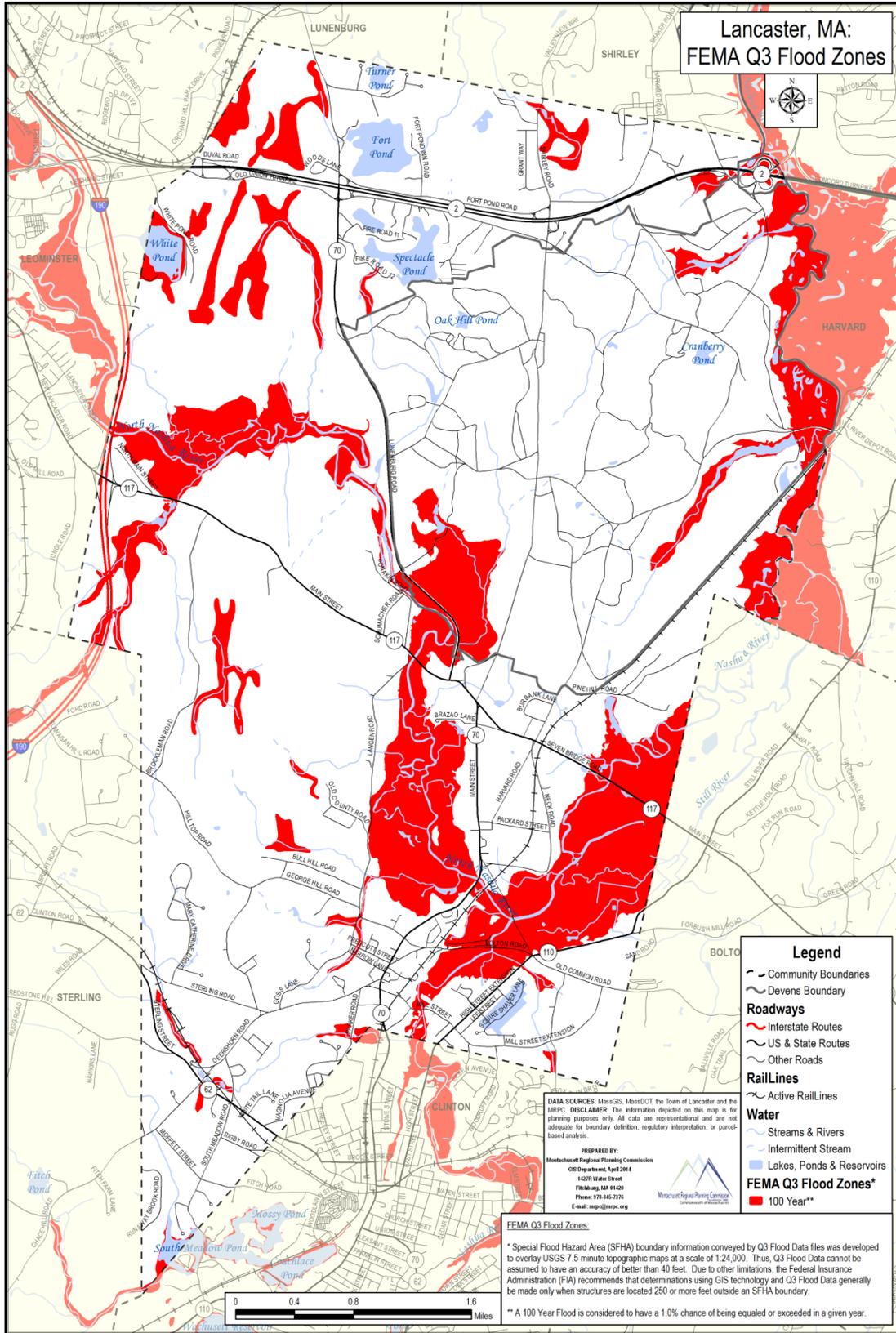
Floodplain Management and Compliance with NFIP

The town supports floodplain management activities in an effort to meet compliance of the National Floodplain Insurance Program. These efforts include:

- Implementing the MA Wetlands Protection Act and the town's Wetland's Protection Bylaw regulating development and activity within the wetlands buffer zone and regulating stormwater and other point source discharge.
- Implementing the Town Flood Plain District Bylaw (May 2, 2011) regulating development in the floodplain district.
- Continued maintenance of municipal stormwater drainage system which includes regular

- cleaning of catch basins, storm drains and culverts.
- Continued maintenance of public water bodies to reduce flooding caused by erosion and water displacement.
 - Enforcement of Stormwater Control Bylaw which regulates land alterations, disturbances and construction activities that may impact stormwater flow that could unduly cause flooding events.
 - Enforcement of the Flexible Development Bylaw which mitigates possible flooding events by designating protected open space within a development which in turn treats stormwater runoff through the means of natural infiltration.

The map which follows entitled FEMA Q3 Flood Zones depicts the 100 year flood zones in the community.



Structurally Deficient Bridges Over Waterways

Lancaster does not have any bridges over water that are classified by MassDOT as “structurally deficient.

Hazard Potential of Dams

The Division of Conservation and Recreation (DCR) Office of Dams Safety lists six dams in the Town of Lancaster as shown in Table 54. Bartlett Dam is classified as a significant hazard.

Classifications for potential hazards are in accordance with the chart below.

Hazard Potential Classification

High Hazard	Refers to dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
Significant Hazard	Refers to dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities
Low Hazard	Refers to dams located where failure may cause minimal property damage to others. Loss of life is not expected.

Source: MA Department of Conservation and Recreation Office of Dam Safety

High hazard dams must be inspected every two year, significant hazard every five years, and low Hazards dams every 10 years. Owners of dams are responsible for having their dam inspected. MGL Chapter 253 and 302 CMR 10.00 requires that dam owners prepare, maintain and update Emergency Action Plans for all High Hazard Potential dams and certain Significant Hazard Potential dams.

Non-jurisdictional dams are not regulated by the Office of Dam Safety or under their jurisdiction. Typically these dams are under 6 feet in height and/or under 15 acre-feet in storage and do not have an assigned 'Hazard Code'. Dams owned and regulated by the Federal Government are also typically non-jurisdictional but DO have an assigned Hazard Code.

Table 54: Dams

Town	Dam	Hazard Code	Owner
Lancaster	Fort Pond Dam	N/A	Private
Lancaster**	White Dam	N/A	Private
Lancaster	Old Ice Pond Dam	N/A	Private
Lancaster	Spectacle Pond Dam	N/A	Private
Lancaster	Four Ponds Dam	N/A	Private
Lancaster	Bartlett Pond Dam	Significant Hazard	Public

*N/A – Information not available as the dam is non-jurisdictional.

**This dam is owned by Lancaster but located in Leominster.

Risk Assessment

As previously stated, located in Section 4. Identification of Natural Hazards, Identifying and Profiling Hazards”, there is a description of each identified hazards’ impact on the region and its communities as well as an overall summary of vulnerability. Based on the hazards identified in this plan and the assessment of risks by the Town of Lancaster, the Town considers itself to be at a high risk for Heavy Rain and Beavers; moderate risk for Snow Melt, Dam Failure, Ice Jams, High Winds, Hurricanes, Tornados, Nor’easters, Severe Thunderstorms, Heavy Snow, Ice Storms, Blizzard, Major Urban Fires, Wild land Fire, Drought, Extreme Temperatures, and Earthquakes; low risk for Landslides; and tsunamis as not applicable.

This information is documented in Lancaster’s Natural Hazard Matrix below which was obtained from participants at the Lancaster Local Hazard Mitigation Team Meeting held on January 31, 2012.

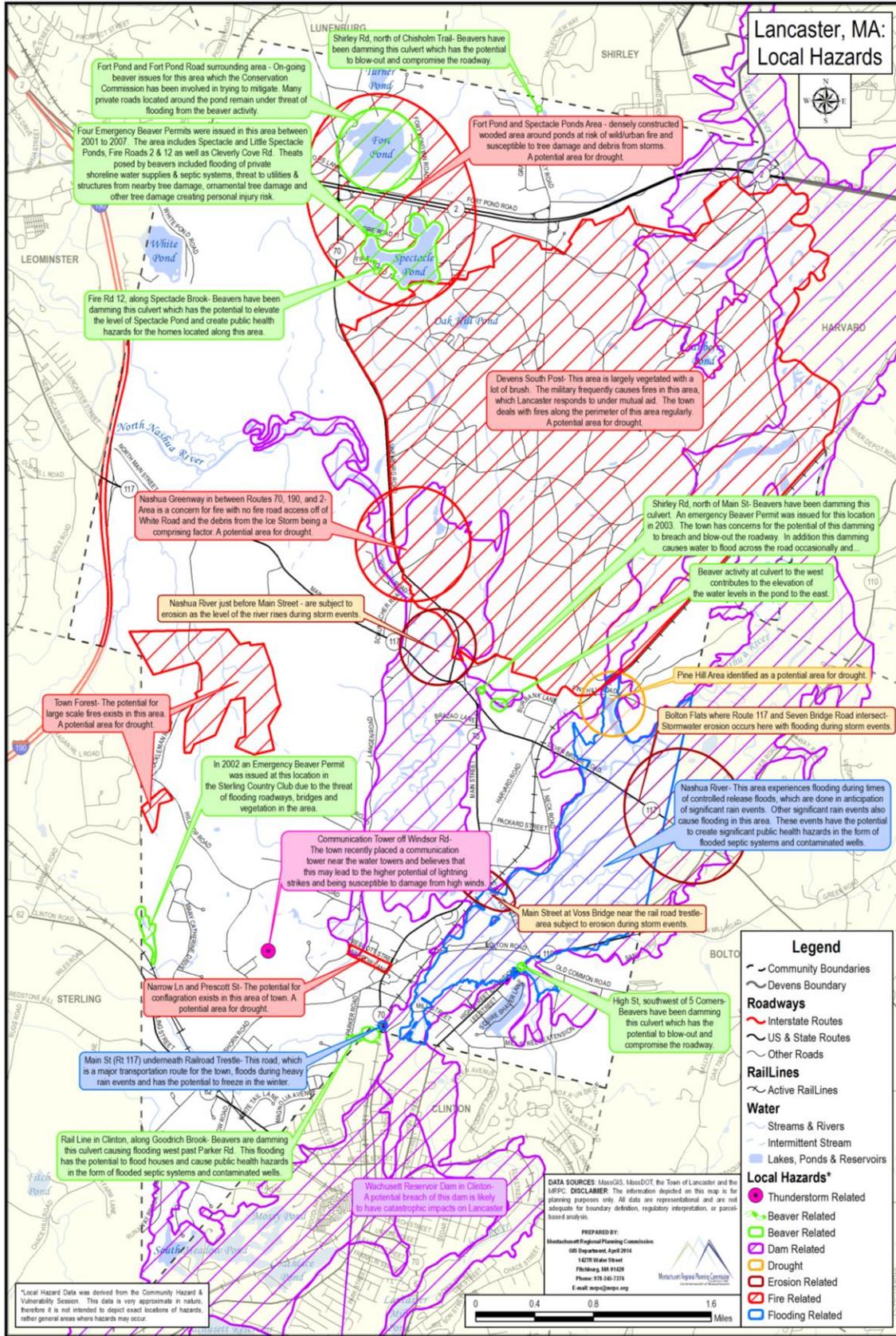
Lancaster Natural Hazard Matrix

Natural Hazard	Likelihood of Occurrence	Location	Impacts	Hazard Index
Natural Hazard Separated by Flood, Atmospheric Related and Winter Related, Other Natural Hazards, and Geologic Hazards	3 = Highly Likely 2 = Possible 1 = Unlikely	3 = Regional/State 2 = Multi Community/Regional 1 = Local/Town	4 = Catastrophic 3 = Critical 2 = Limited 1 = Negligible	Ranking Determined by Combining the Likelihood, Location and Impacts of a Natural Hazard
Flood-Related Hazards				
• Heavy Rain	3	3	3	9
• Snow Melt	2	2	2.5	6.5
• Dam Failure	2	2	3.5	7.5
• Ice Jams	2	1	2	5
• Beavers	3	1	2	6
Atmospheric Related and Winter Related Hazards				
• High Winds	2	2	3	7
• Hurricanes	2	3	3.5	8.5
• Tornadoes	2	3	3.5	8.5
• Nor'easters	2	3	3.5	8.5
• Severe Thunderstorms	2	2	2.5	6.5
• Heavy Snow	2	3	3	8
• Ice Storms	2	3	3	8
• Blizzard	2	3	3	8
Other Natural Hazards				
• Major Urban Fires	2	1	4	7
• Wildland Fire	2	2	3	7
• Drought	2	3	3	8
• Extreme Temperatures	2	3	2	7
Geologic Hazards				
• Earthquakes	2	2	4	8
• Landslides	1	1	1	3
• Tsunami	NA	NA	NA	NA

Key

Highly likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
 Possible: 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.
 Unlikely: Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.
 Catastrophic: Immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.
 Critical: Fast speed of onset or long duration of event resulting in devastating damage and loss of services for weeks or months.
 Limited: Moderate speed of onset or moderate duration of event, resulting in some damage.
 Negligible: Slow speed of onset or short duration of event resulting in little to no damage.

Also discussed at this meeting were the hazards that affect each community and the identification of specific problem areas in the community that need to be addressed. This included the identification of new hazards that were determined to pose a threat or community vulnerability which are detailed in Lancaster's Local Hazards Map on the following page. The entire community is equally at risk to the following hazards: heavy rain, snow melt, ice jams, high winds, hurricanes, tornados, nor'easters, heavy snow, ice storms, blizzards, extreme temperatures, earthquakes and landslides.



Existing Protections

The original inventory of hazard mitigation actions which the Montachusett communities undertook for the 2008 Montachusett Region Hazard Mitigation Plan was reviewed and updated by each community at a meeting held in each community with the MRPC and the community's Local Hazard Mitigation Planning Team and, in some communities, the Emergency Management Committee. The attendees of the meetings can be found in Appendix A. The following matrices depict the updated inventory of what is currently being done to mitigate hazards by listing the programs and activities already in place. It includes a description of the protection measure, who is responsible, and improvements and changes that may be needed. This inventory was used by the Planning Team/Emergency Management Committee to identify gaps in existing protections that were then addressed through the development of this plan update.

Lancaster

Type of Existing Protection	Description	Area Covered	Effectiveness and/or Enforcement	Improvements or Changes Needed
Flood Related Hazards				
Storm water management standards	State Regulation under the Wetlands Protection Act to regulate storm water and other point source discharge	Town-Wide	Enforced by the Lancaster Conservation Commission (Wetlands Protection Act) staffed by the municipal Conservation Agent and Lancaster Planning Board (Subdivision Control Law and site plan review) staffed by the municipal Planning Director.	Storm water management standards continue to be enforced. No improvements or changes needed.
Stormwater Management Bylaw	Local regulation to regulate stormwater and other point source discharge	Town-wide	Stormwater Management Permit issued by the Planning Board	Storm water management standards continue to be enforced. No improvements or changes needed.
Wetlands Protection Act (state)	State law regulating development and activity within wetland buffer zone	100-foot buffer around wetland area; 200 foot buffer around river front areas.	Enforced by the Lancaster Conservation Commission staffed by the municipal Conservation Agent.	No improvements or changes needed.

Wetlands Protection Bylaw (local)	Local law supplementing the Wetland Protection Area	Any area the Conservation Commission deems a water resource area	Enforced by the Lancaster Conservation Commission staffed by the municipal Conservation Agent.	No improvements or changes needed.
100 Year Flood Zone	Federal law requiring elevation above 100-year flood level of new and substantially improved residential structures in floodplain	100-year floodplain as shown on Flood Insurance Rate Map dated July 16, 2014.	Enforced by the Building Inspector (municipal staff) and Lancaster Conservation Commission staffed by the municipal Conservation Agent.	No improvements or changes needed.
Town Bylaw Flood Plain District	Local bylaw enhancing federal/state laws and regulating any development in the flood plain district	100-year floodplain as shown on Flood Insurance Rate Map dated July 16, 2014.	Enforced and administered by the Planning Board.	No improvements or changes needed.
Maintenance of municipal storm water drainage system	Regular cleaning of catch basins, storm drains, and culverts	Town-Wide	Undertaken by the Department of Public Works municipal staff.	Maintenance continues but additional personnel and equipment Needed to undertake this task.
Maintenance of public water bodies (ponds, streams, brooks, wetlands)	Periodic cleaning of waterways is undertaken, i.e. remove trash, debris	Town-Wide	Undertaken by the Department of Public Works municipal staff with guidance from Conservation Commission staffed by the municipal Conservation Agent.	Maintenance continues. No improvements or changes needed.
Local Stormwater management Bylaw	The Bylaw establishes requirements and procedures to control the adverse effects of increased post-development stormwater runoff, flooding and non-point source pollution associated with new development and re-development and to comply with Phase II NPDES Stormwater requirements.	Town-Wide	Enforced by Planning Board	No improvements or changes needed.

Water Conservation Bylaw	Restrict use of public water resources for non-essential usage during periods of drought.	Public Water System Users	Board of Water Commissioners	No improvements or changes needed.
Wind Related Hazards				
State Building Code	State Law related to design loads to include wind effects	Town-Wide	Enforced by Building Department (municipal staff).	Enforcement continues. No improvements or changes needed.
Tree Maintenance	Regular inspection and tree maintenance to cut branches threatening power lines and overhead utilities	Town-Wide	National Grid (Electric Company).	Tree maintenance continues. No improvements or changes needed.
Fire Related Hazards				
Limited Brush Clearing	Brush clearing to provide access to Emergency Services	Town-Wide	Undertaken by the Department of Public Works municipal staff.	Continue to identify additional areas with potential for Brushfires.
Winter Storms Related				
Residential Parking Bans	Parking Bans to Enable Snow Removal Effectively from Residential Streets	Town-Wide	Department of Public Works municipal staff.	Enforcement continues but additional personnel and equipment needed.
Clearing Snow from Major Arterial Routes	Ensure Access to Emergency Service vehicles.	Town-Wide	Department of Public Works municipal staff.	Snow clearing continues but additional personnel and equipment needed.

*Lancaster's enforcement/implementation is generally carried out by elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

Mitigation Goals, Objectives and Strategies

As discussed earlier in this Plan, MRPC previously prepared the 2008 Montachusett Region Hazard Mitigation Plan which consisted of individual annexes for each MRPC community. Similarly, as part of the multi-jurisdictional plan update, each community also developed their own individual goals, objectives and strategies which are listed in this section.

Overall Goal Statement: To prepared to reduce the loss of life, property, infrastructure and cultural resources throughout the town of Lancaster from natural disasters through a multiple hazard mitigation program that involves increased coordination, planning, education, and capital improvements.

1. Objective: To organize and prepare to provide adequate shelter, water, food, and basic first aid to displaced residents in the event of a natural disaster, and to provide adequate notification and

information regarding evacuation procedures, *etc.*, to residents in the event of a natural disaster.

2. **Objective:** To inventory supplies at existing shelters and develop a needs list and storage requirements; and to establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster.
3. **Objective:** To have the Emergency Management Director (EMD) led an effort to increase coordination between inter-departments in pre-disaster planning and implementation of hazard mitigation projects.
4. **Objective:** Increase awareness of hazard mitigation among town officials, private organizations, businesses, and the general public.
5. **Objective:** To utilize the Code Red emergency notification system to notify the public about emergency situations or events.
6. **Objective:** To collect, periodically update, and disseminate information on which local radio stations provide emergency information, what to include in a “home survival kit, how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to follow during a natural disaster.

Specific Natural Hazard Goals for Lancaster

Goal Statement for Flooding: To prepare emergency staff and volunteers in order to minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to flooding.

1. **Objective:** To continue to participate in the National Flood Insurance Program and to have the flood maps periodically updated.
2. **Objective:** To Develop a priority list and seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town.

Goal Statement for Protection from Beavers: To minimize the threat to health, the damage to roads and property, and the disruption of governmental services and general business activities due to flooding caused by beavers.

1. **Objective:** Support local town departments to continue present methods to prevent beaver caused flooding.
2. **Objective:** Seek assistance from beaver management professionals, including trappers.
3. **Objective:** Install beaver management devices.

Goal Statement for Hurricanes and Tornadoes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to high winds associated with hurricanes and tornadoes. (The objectives listed above, under flooding, address the flooding that can result from a hurricane.)

1. **Objective:** To educate residents and volunteers regarding the safe methods and actions necessary to deal with Hurricanes and Tornados.

Goal Statement for Winter Related Hazards: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to severe snow and ice storms.

1. **Objective:** To develop a plan for providing access to water, information, shelter, and food stores to people in remote locations in Lancaster in the event of a severe winter storm.

Goal Statement for Earthquakes: To educate staff, residents and volunteers about the potential for

earthquakes and strategies to minimize the loss of life, damage to property, the disruption of governmental services and general business activities due to earthquakes.

1. **Objective:** To educate and encourage homeowners and developers to rehab and build using methods to minimize the effects of earthquakes and other disasters.
2. **Objective:** To insure that all identified shelters have sufficient back-up utility service in the event of primary power failure.

Mitigation Action Plans and Prioritization of Actions (STAPLEE)

Initial Mitigation Action Plans for the Montachusett Communities were presented in the communities Hazard Mitigation Plans that were approved by FEMA in 2009 and 2010. The original Mitigation Action Plans were developed through an inventory of potential hazards which could impact the community and an evaluation of a range of alternatives to address these hazards. As part of the plan update process, the original Mitigation Action Plan was reviewed by the community's Local Hazard Mitigation Planning Team/Emergency Management Committee to delete actions which have already been completed, add additional actions which are either underway or planned to be undertaken, and to update the current status of all actions. The goals were reviewed and updated at the second meeting with each community.

An additional step in this process was to conduct a "STAPLEE" analysis for each action to prioritize all actions within each community and a subjective evaluation of each action's perceived cost/benefit. In the 2008 plan, actions were not prioritized so there were no changes in priorities in this update. The revised Community Mitigation Action Plans matrices that follow identify each mitigation action, the responsible department or board responsible for implementation, potential funding sources, the timetable of the action, results of the prioritization of actions through the STAPLEE analysis, and the perceived cost/benefit for each mitigation action.

The goal of each identified strategy, or mitigation action, is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each action to establish priorities for implementation, using the "STAPLEE" method. The STAPLEE methodology was developed by the Federal Emergency Management Agency as a tool to help communities prioritize their hazard mitigation strategies and determine the most appropriate actions for implementation. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of an action and is designed to be used by public officials and planners for making planning decisions.

To conduct the STAPLEE exercise, the community's Hazard Mitigation Team was asked to rate each action in their Mitigation Action Plan on each of the following criteria, using a score of 1 to 3 (Good = 3, Average = 2, Poor = 1):

- Social: Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- Technical: Will the proposed strategy work? Will it create more problems than it solves?
- Administrative: Can the community implement the action? Is there someone to coordinate and lead the effort?
- Political: Is the action politically acceptable? Is there public support both to implement and to maintain the action?
- Legal: Is the community authorized to implement the proposed action? Is there a clear legal basis or

precedent for this activity?

- Economic: What are the costs of this action? Does the cost seem reasonable for the size of the problem and the likely benefits?
- Environmental: How will the action impact the environment? Will the action need environmental regulatory approvals?

These scores were then totaled, resulting in a final score of 7 (least priority) to 21 (highest priority) for each action. The higher the final score, the higher the relative priority of that action for implementation. This information can then be utilized in each community as they conduct and administer relevant municipal functions and activities. The final STAPLEE score for each action is shown in the following mitigation action plan.

The Hazard Mitigation team was also asked to do a relative cost/benefit of each action. This assessment was intended to informally indicate if an action will either have more benefits accrued to the Town than the Cost of implementing the action, or if the costs would exceed any benefits. Responses include: “Benefits Exceed Costs”, “Benefits Equal Costs, or “Costs Exceed Benefits”.

LANCASTER IMPLEMENTATION STRATEGY FOR PRIORITY MITIGATION ACTIONS

Type of Natural Hazard	Description of Action	Implementation Responsibility	Resources/ Funding*	Timetable	Priority (STAPLEE SCORE)	Cost/Benefit Evaluation	Status Update from 2008 Plan**
Wildland Fire	Increase awareness by educating property owners regarding actions that they can take to reduce risk to property by hosting an Open House at the Fire Department, Develop and Distribute an Educational Pamphlet on Fire Safety and Prevention (SAFE PROGRAM) (SENIOR SAFE) and wildfire prevention.	Fire Department	Municipal Staff	2015 – 2020	20	Benefit exceeds cost	Completed by carried forward. This action is undertaken periodically.

All Natural Hazards	Increase hazard education and risk awareness to public by Collecting, Updating, and Disseminating Information on Local Radio/TV Stations to educate the public and alert them of emergency information including shelter locations and other instructions related to all natural hazards	Emergency Management Director	Municipal Staff	2015 – 2020	21	Benefit exceeds cost	Completed by carried forward. This action is undertaken periodically.
All Natural Hazards	Inventory Supplies at Existing Shelters and Develop a Needs List and Storage Requirements to ensure the available of adequate supplies during a natural hazard. Supplies must be adequate to eliminate or reduce risk to human life.	Emergency Management Planning Committee, School Facilities Manager	Municipal Staff	2015 – 2020	21	Benefit exceeds cost	Completed by carried forward. This action is undertaken on an as needed basis.
Flood Related Hazards	Identify all structures throughout the town that need to be Elevated above the Base-Flood Elevation. Once identified educate those property owners	Building Inspector, Fire Department	Municipal Staff. Also 75% FEMA FUNDING AVAILABLE. Remaining 25% (non-federal)	2015 – 2020	10	Costs exceed benefits	Carried forward due to time constraints.

	regarding options for mitigation.						
Flood Related Hazards	Ongoing inspection of undersized/degraded culverts through town. Seek funding from FEMA to replace undersized/degraded culverts.	Board of Selectmen, Highway Department	Municipal Staff/ FEMA HMGP grant 75%	2015 – 2020;	21	Benefit exceeds cost	Completed. Inspections are undertaken annually. Carried forward lack of municipal non-federal funding match.
Flood Related Hazards	Continue participation in the National Flood Insurance Program to enable property owners to purchase insurance protection against flood losses.	Board of Selectmen, Conservation commission	FEMA/ MEMA	2015 – 2020	21	Benefit exceeds cost	Completed but carried forward. Town continues its participation in the NFIP.
Flood Related Hazards	Disseminate Flood emergency information in anticipation of an event through radio, TV, Code Red, Signboards and Social Media to inform the public to reduce or eliminate risk to property.	Emergency Management Director , Fire Department, Schools	Emergency Management Director / Fire Department	2015 – 2020	21	Benefit exceeds cost	New action.
Other Natural Hazards (Wildland fire)	Identify areas with potential for brush fires to track community vulnerability by developing and maintaining a data base.	Department of Public Works	Municipal Staff	2015 – 2020	21	Benefit exceeds cost	New Action.
All Natural Hazards	Identify shelters and publicize	Emergency Management	Municipal Staff/ Fire	2015 – 2020	21	Benefit exceeds cost	Completed but carried forward.

	locations to mitigate the effects of all hazards on the general population.	Director	Department				This action is undertaken on as needed basis.
All Natural Hazards	Utilize interactive mapping application prepared by MRPC/CMRPC to update critical infrastructure and simulate real time evacuation scenarios to mitigate hazards to the public.	Emergency Management Director	Emergency Management Director	2015 (12 months)	21	Benefit exceeds cost	New action.
Flood Related Hazards	Install "beaver diverters" and water control devices to mitigate flooding caused by beaver dams.	Department of Public Works	Municipal Staff	2015 – 2020	19	Benefit exceeds cost	Completed but carried forward. Action is undertaken as necessary.
Flood Related Hazards	Hire trapper for removal of beavers to mitigate flooding caused by beaver dams.	Department of Public works	Municipal Staff	2015 – 2020 as necessary	18	Benefit equals cost	Completed but carried forward. Action is undertaken as necessary.
All Natural Hazards	Implement recommendations regarding natural hazard mitigation in existing planning documents including the master plan, five year action plan of the open space and recreation plan and the	Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	Municipal Staff, Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	2015 - 2020	21	Benefit exceeds cost	Completed but Carried forward. This is an ongoing effort. For example, town recently expanded the boundaries of its Water Resource District thereby further regulating land use areas prone to flooding. This was a

emergency evacuation plan						recommendation of the open space and recreation plan.
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*Unless otherwise noted, Lancaster’s Resources/Funding consists of elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

**Actions identified as carried forward were not completed in the previous planning cycle unless otherwise stated.

Mitigation Actions from the 2008 Montachusett Region Hazard Mitigation Plan that are complete include:

- Identified Existing Shelters that are Earthquake Resistant as well as Outside of Floodplain (and Dam Inundation) Areas.
- Developed a Plan for Providing Access to Water, Information, Shelter, and Food Stores to People in Remote Locations of the town in the Event of a Severe Winter Storm.
- Developed a Preliminary Project Proposal and Cost Estimate for Updating Current 911 System including Feasibility of Reverse 911.

2008 Mitigation Actions that were removed from this update include:

- Work with Neighboring Communities to Establish a Community Emergency Response Team (CERT). Town no longer wants to pursue.
- Encourage property owners to engage in mitigation efforts. Removed due to vagueness.

Leominster Natural Hazard Risk Assessment

While this annex focus’ pertains to critical facilities, flooding, risk assessment, existing protections and mitigation strategy in the community, more detailed descriptions of each natural hazard’s impact on the region and its communities and summary of vulnerability can be located in the regional section entitled “ 4. Identification of Natural Hazards, Identifying and Profiling Hazards”.

Community Profile

Leominster is located in North-Central Worcester County in Massachusetts. It is bordered by Fitchburg and Lunenburg on the north, Lancaster on the east, Sterling and Princeton on the south, and Westminster on the west. Leominster is about 20 miles north of Worcester, 41 miles northwest of Boston, 42 miles from Manchester, New Hampshire, and 198 miles from New York City, and is located on route 2 and Route 190.

The city of Leominster covers a total area of 29.76 square miles with a resident population of 40,759, according to the 2010 US Census with a density of 1,370 people per square mile. There are 17,873 housing units in the city, and the average household size is 2.71 people. The median age of Leominster residents is 42.

Leominster’s roots stretch back to 1701 when “Lancaster New” was purchased from Chief Sholan of the Nashua Indian tribe. During the first century of its history, Obadiah Hills started the manufacture of

combs in the kitchen of his home around 1775. John Chapman was born in Leominster and his legendary role as “Johnny Appleseed” is famous in American Folklore.

Leominster is the “Pioneer Plastic City”. The City of Leominster’s stature in the manufacturing of plastics is legendary, with over 120 plastics companies currently located within the city. The first comb factories in the United States were located here, which originally earned Leominster the moniker “Comb Capital of the World.” The City is home of the National Plastics Center and Museum, which is nationally known for its perspectives on the development of the plastics industry and its impact on modern society. Leominster has a strong retail and industrial base with over 1.2 million square feet of industrial space added in the past several years.

Leominster is also home to the Mall at Whitney Field, which currently boasts more than 150 stores. In addition, its Historic Downtown Retail continues to thrive with specialty shops and services.

The City has preserved over 3,000 acres of open space over the past 10 years, including the preservation of the 169 acre Sholan Farms on Upper Pleasant Street. Leominster State Forest is an important open space resource that provides year round outdoor activities including hiking, cross country skiing and swimming. BF Goodrich Tire manufacturing is the largest employer in the City followed by Georgia Pacific Corporation and Hannaford Supermarket.

Critical Facilities

In general usage, the term “critical facilities” is used to describe all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired.

Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even access to damaged areas.

The number and nature of critical facilities in a community can differ greatly from one jurisdiction to another, and usually comprise both public and private facilities. In this sense, each community needs to determine the relative importance of the publicly and privately owned facilities that deliver vital services, provide important functions, and protect special populations. *Source: Federal Emergency Management Administration, Risk Management Series, Design Guide for Improving Critical Facility Safety from Flooding and High Winds, FEMA 543, January 2007.*

A list of the critical facilities within the community is shown in Table 55. This data was obtained from the Leominster’s Emergency Management Director. These facilities were digitized into GIS and used for determining vulnerability to the various hazards. The map that follows entitled FEMA Q3 Flood Zones

and Critical Infrastructure depicts Critical Facilities in the community.

Table 55: Leominster Critical Facilities

<i>Feature Type</i>	<i>Name</i>	<i>Address</i>
City/Town Halls	Leominster City Hall	25 West Street
Clinics	Community Health link Lipton Couns Ctr	100-110 Erdman Way
	Community Health link Lipton Couns Ctr	40 Spruce Street 3 Floor
	Leominster Community Health Center	14 Manning Avenue Suite #402
	Reliant Medical Group	165 Mill Street
College	Mt. Wachusett Community College- Satellite Campus	Erdman Way
District Court	Leominster District Courthouse	25 School Street
Public Water Supply*	Morse Reservoir	
	S.E. Well #160, S.E. Corner	
	Distributing Reservoir	
	S.E. Well #110, S.E. Corner	
	S.E. Well #120, S.E. Corner	
	Notown Reservoir	
	Haynes Reservoir	
	Fall Brook Reservoir	
	Simonds Pond	
	Goodfellow Pond	
Rocky Pond		
Dpw Facilities	Leominster Dpw	109 Graham Street
Early Education Childcare Facilities	Poultney, Amy	78 Colburn St
	Pre-Adventures Early Childhood Center	80 Pleasant St
	Kochanski, Catherine	98 Dogwood Rd
	Melanson-Doiron, Kimberly	5 Christine St
	Academy For Little People	2 Weathervane Dr
	Ray, Carmen M.	103 Leland Ave
	Creed, Gail	67 Union St
	Abreu, Lina	46 Princeton St.
	Cicccone, Tina	10 Duggan Dr
	Rivera, Betsey L	335 Lancaster St
	Mcewan-Gesell, Lee A.	325 Hill St
	Rivers, Katherine	9 Hoover St
	Hands On Learning Pre School	248 Lincoln St
	Rodriguez, Chong O.	179 Old Farm Rd
	Griffin, Kelly J.	269 Johnny Appleseed Ln
Rodriguez, Maria	22 State St Fl 2	

L'bahy, Rebecca S.	1211 Elm St
Moc Child Care And Head Start / Family Education *	1000 Lancaster St
Matley, Julie	53 Thayer St
Mascitti, Erna	337 North St
1-2-3 Grow Child Center Inc.	109 Allen St
Thibodeau, Kelley	92 Highland Ave
Gagne, Sally	21 Graham St
Edmands, Jacqueline M.	27 Burrage Ave
The Northwest Child Development Center	194 Arlington St
De Oliveira, Suzy	179 Willard St. - #107
Malone, Donna	455 Litchfield St
Doyle, Tammy L.	286 Day St
Byington, Redina	4 Olive Dr
Boudreau, Moraima	526 Pleasant St
Gosson, Gina	74 Nichols St
Mabie, Hilary	620 Pierce St
Sambito, Loraine	620 Lancaster St
Pantano, Joan	170 Pleasant Ter
The Bonjour Too Preschool	50 Hall St
Schofield, Samira	116 Dogwood Rd
Gonzalez, Judy	618 Abbott Ave
Armfield, Susan	87 King Ave
Adventure Kids	116 2nd St
Adventures After School Program	84 Pleasant St
Piccolo Mondo Child Care And Learning Center	680 Mechanic St
Arsenault, Judith	35 Mooreland Ave
Alejandro, Rosa	86 Exchange St
Smith, Susan L.	89 Colburn St
Teaching Wonders Child Learning Center, Inc.	59b New Lancaster Rd
Piermarini, Dorothy E.	54 Anthony Rd
Tata, Pamela	12 Lynnhaven Rd
Piland, Tammy	68 Daley St
Leblanc, Vicki Lynn	27 Karen St
Boissoneau, Christine	20 Sharimar Dr
Barnaby, Chabre	86 Belmont Rd
Bartlett, Ann A.	45 Peach Tree Ln
King's Corner Day Nursery & Kindergarten	20-24 Norwood Ave
Swett, June E.	96 Sunrise Ave
Munoz, Virgen Dalia	27 Wheeler St

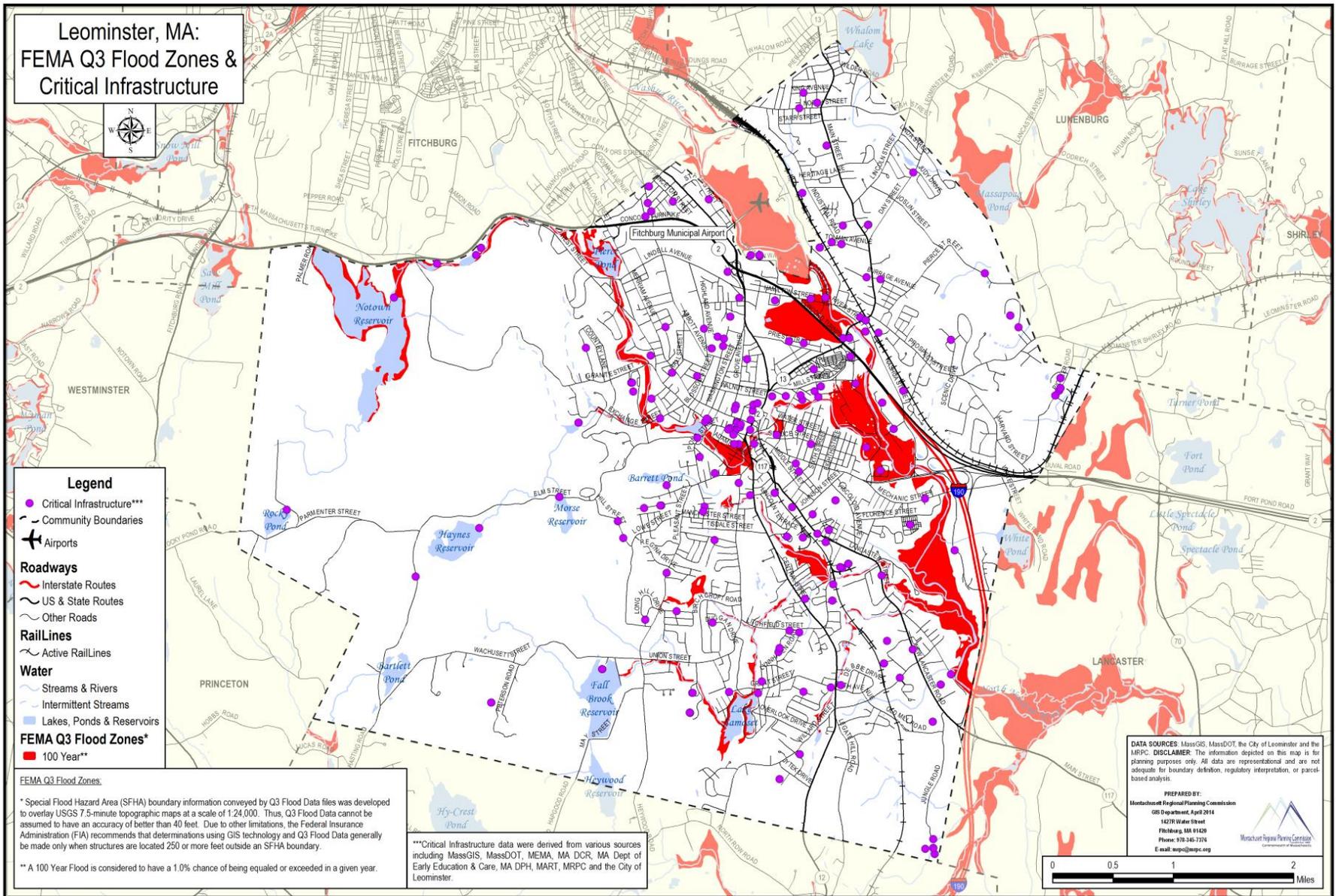
Elderly Housing	Anne O'connor Village	23 George Street
	La Pierre East	161 Spruce Street
	Laurie Drive Housing	47 Laurie Drive
	Notre Dame Street Housing	22 Notre Dame Street
	Sunset Towers	100 Main Street
	Notre Dame	214-216 Arlington Street
Emergency Shelters	Fall Brook School	25 Decicco Drive
	Johnny Appleseed School	845 Main Street
	Leominster Senior High School	122 Granite Street
	Northwest School	45 Stearns Avenue
	Samoset School	100 Decicco Drive
	Sky View Middle School	500 Kennedy Way
	Southeast Middle School	100 Viscoloid Avenue
End Of Life Facilities	Curley Masciarelli Funeral Home	89 West St
	M A Simard & Son Inc.	14 Walker St
	Silas F Richardson & Son Inc.	106 West St
	Wright-Roy Funeral Home	109 West St
	Saint Leo Cemetery	
	Evergreen Cemetery	
	Pine Grove Cemetery	
	St Cecilia's Cemetery	
Emergency Operations Centers	Leominster Office Of Emergency Management	37 Carter Street
	Leominster City Hall	25 West Street
Fire	Leominster Fire Station Headquarters	19 Church Street
	Leominster Fire Station 3 (The Village)	534 Main Street
	Leominster Fire Station 2 (Central Street)	598 Central Street
Hazmat Sites	Alpha Wire Company	128 Tolman Avenue
	Alphagary Corp. Warehouse Facility	10 Powers Street
	Alphagary Corporation	170 Pioneer Drive
	BJ's Wholesale Club (0058)	115 Erdman Way
	Camco Manufacturing, Inc.	165 Pioneer Drive
	Carbon Composites, Inc.	12 Jytek Drive
	Claremont Flock Co.	107 Scott Drive
	Continental Polymer Corp	25 Patriots Cir
	Dixie Consumer Products LLC	149 Hamilton Street
	Fosta-Tek Optics Inc.	320 Hamilton St
	Fratlicelli Oil Co.-Litchfield St.	239 Litchfield Street
	Health Alliance Hosp-Leominster	60 Hospital Road
	Home Depot #2676	135 Commercial Road

	Hudson Color Concentrates - Midwest Color	50 Francis Street
	International Rectifier	205 Crawford Street
	Leominster Wastewater Treatment Facility	436 Mechanic Street
	Leominster Water Treatment-Dist. Reservoir	300 Exchange Street
	Leominster Water Treatment-Notown	300 Route 2 East
	Leominster Water Treatment-South East Well Field	100 Jungle Road
	Leominster Water Treatment Fac.-Fallbrook	100 Wachusett Street
	Liberty Supply, Inc.	195 Hamilton Street
	Lowe's Of Leominster (#1858)	198 New Lancaster Road
	Modern Dispersions	78 Marguerite Avenue
	Monson Chemicals, Inc.	154 Pioneer Drive
	Monson Co.- Lancaster Street	465 Lancaster Street
	Monson Companies Inc. Leased Warehouse	465 Lancaster Street
	National Grid- Leominster Facility	164 Viscoloid Ave
	National Grid- Sub-Station #207	Litchfield Street
	National Grid- Sub-Station #219	Prospect Street
	North Atlantic Medical Service	125 Tolman Avenue
	Plastican Inc.	196 Industrial Rd
	Quad Graphics	27 Nashua Street
	South/Win LTD	272 Nashua Street
	Teknor Apex Thermoplastic Elastomers	33 Fuller Street
	United Comb & Novelty, Inc.	33 Patriot Circle
	US Pack Inc.	300 Whitney St
	Verizon	2 School Street
	Verizon Cell Tower	Sawmill Road
	Walmart #2964	11 Jungle Road
Hospice	Beacon Hospice Inc.	36 William Street
	Health Alliance Home Health and Hospital	25 Tucker Drive
Hospitals	Health Alliance Hospital	60 Hospital Road
	Pt Plus @ Whitney Field	21 Cinema Boulevard
Long Term Care Facility	Leominster Crossing	1160 Main Street
	Manor On The Hill	450 North Main Street
	Sunrise Assisted Living Of Leominster	6 Beth Avenue
	Summit Eldercare	55 Cinema Blvd.
	Life Care Center Of Leominster	370 West Street
	Keystone Center	44 Keystone Drive
	Village Rest Home	446 Main Street
	Presentation Health Care Center, Inc.	99 Church Street
Other Critical Facilities	Home Depot #2676	135 Commercial Road

International Rectifier	205 Crawford Street
Hudson Color Concentrates - Midwest Color	50 Francis Street
DSM Thermoplastic Elastomers Inc.	33 Fuller Street
Dixie Consumer Products LLC	149 Hamilton Street
Liberty Supply, Inc.	195 Hamilton Street
Rinchem Co., Inc. (Monson)	465 Lancaster Street
Monson Co.- Lancaster Street	465 Lancaster Street
Fratlicelli Oil Co.-Litchfield St.	239 Litchfield Street
Jiffy Lube	535 Main Street
Modern Dispersions	78 Marguerite Avenue
Mohawk CDT	9 Mohawk Drive
Northwin LTD	272 Nashua Street
Quebecor World Eusey Press	27 Nashua Street
CVS Store #1198	9 Nelson Street
Lowe's Of Leominster (#1858)	198 New Lancaster Road
Fratlicelli Oil - Nobile Place	4 Nobile Place
Alphagary Corporation	170 Pioneer Drive
Monson Chemicals, Inc.	154 Pioneer Drive
Camco Manufacturing, Inc.	165 Pioneer Drive
Norampac	175 Pioneer Drive
Verizon	2 School Street
Claremont Flock Co.	107 Scott Drive
North Atlantic Medical Service	125 Tolman Avenue
Alpha Wire Company	128 Tolman Avenue
Alternatives Unlimited	45 Pearl Street
Armistice Homestead	16 Pearl Street
Center For Health & Development	42 West Street
Group Home	58 Grove Avenue
Group Home	8 Elm Street
Hero Homestead	25 Grove Avenue
Entertainment Cinema	45 Sack Boulevard
Walmart	
Verizon Cell Tower	Saw Mill Rd
American Red Cross	Main Street
Other Government Buildings	
Leominster Dpw	109 Graham Street
Leominster Public Library	30 West Street
Leominster Rec Department	40 Barrett Park Drive
United States Postal Service	68 Main Street
Leominster PD Repeater Site	Saw Mill Road

	Registry Of Motor Vehicles	
	National Guard Armory	Mill Street
	Gallagher Building	Church Street
Police	Leominster Police Station	29 Church Street
	State Police Barracks- Leominster (Station C-4)	30 Hawes Street
Pumping Stations	Pumping Station	Kennedy Drive
Residential Program Facilities	Seven Hills-Hill Street	280 Hill St
Schools**	Johnny Appleseed School	845 Main Street
	Leominster Senior High School	122 Granite Street
	Samoset School	100 Decicco Drive
	Fall Brook School	25 Decicco Drive
	Southeast Middle School	95 Viscoloid Avenue
	Bennett School	145 Pleasant Street
	Priest Street School	115 Priest Street
	Northwest School	45 Stearns Avenue
	Leominster Center For Technical Education	122 Granite Street
	Sky View Middle School	500 Kennedy Way
	St. Anna's School	213 Lancaster Street
	St. Leo's School	120 Main Street
	The Bonjour Too Preschool	50 Hall Street
Potable Water Treatment Plants	Leominster Water Treatment-South East Well Field	1000 Jungle Road
	Leominster Water Treatment-Dist. Reservoir	300 Exchange Street
	Leominster Water Treatment-Notown	Route 2 East
	Leominster Water Trtmnt Fac.-Fallbrook	100 Wachusett Street
Wastewater Treatment Plant	Leominster Wastewater Treatment Facility	436 Mechanic Street

*As stated in 310 CMR 22.02, a Public Water System means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year” (Mass GIS, 2014).



Flood Prone Areas

Particular areas within the community where the risks of flood areas are or could occur were determined at the first meeting of the Leominster Local Hazard Mitigation Team held on July 17, 2012. This information can be found on Ashburnham’s Local Hazard Map which is located under the section entitled Risk Assessment.

Flooding Vulnerability Assessment

An analysis of the FIRM flood hazard area maps indicates that there is a total of 1260.39 acres of 100-year floodplain within Leominster. This amounts to 6.64% of the total town. Based on additional analysis, 230.33 acres (18.27%) of the floodplain are developed. Currently there are 301 structures in the floodplain which is about 2.06% of the total structures in the community. The buildings are then multiplied by the building value, as determined by the MA Department of Revenue, to come up with a potential loss of \$457,185,900.

Excluding dams and bridges, the following table lists the critical facilities within the 100 year flood zone.

Table 56: Leominster Critical Facilities within 100-Year Flood Zone		
HazMat Sites	Home Depot #2676	135 Commercial Road
	Dixie Consumer Products LLC	149 Hamilton Street
	Leominster Wastewater Treatment Facility	436 Mechanic Street
Other Critical Facilities	Home Depot #2676	135 Commercial Road
	Dixie Consumer Products LLC	149 Hamilton Street
	Alternatives Unlimited	45 Pearl Street
	Entertainment Cinema	45 Sack Boulevard
Public Water Supply	Notown Reservoir	
	Simonds Pond	
	Goodfellow Pond	
Wastewater Treatment Plant	Leominster Wastewater Treatment Facility	436 Mechanic Street

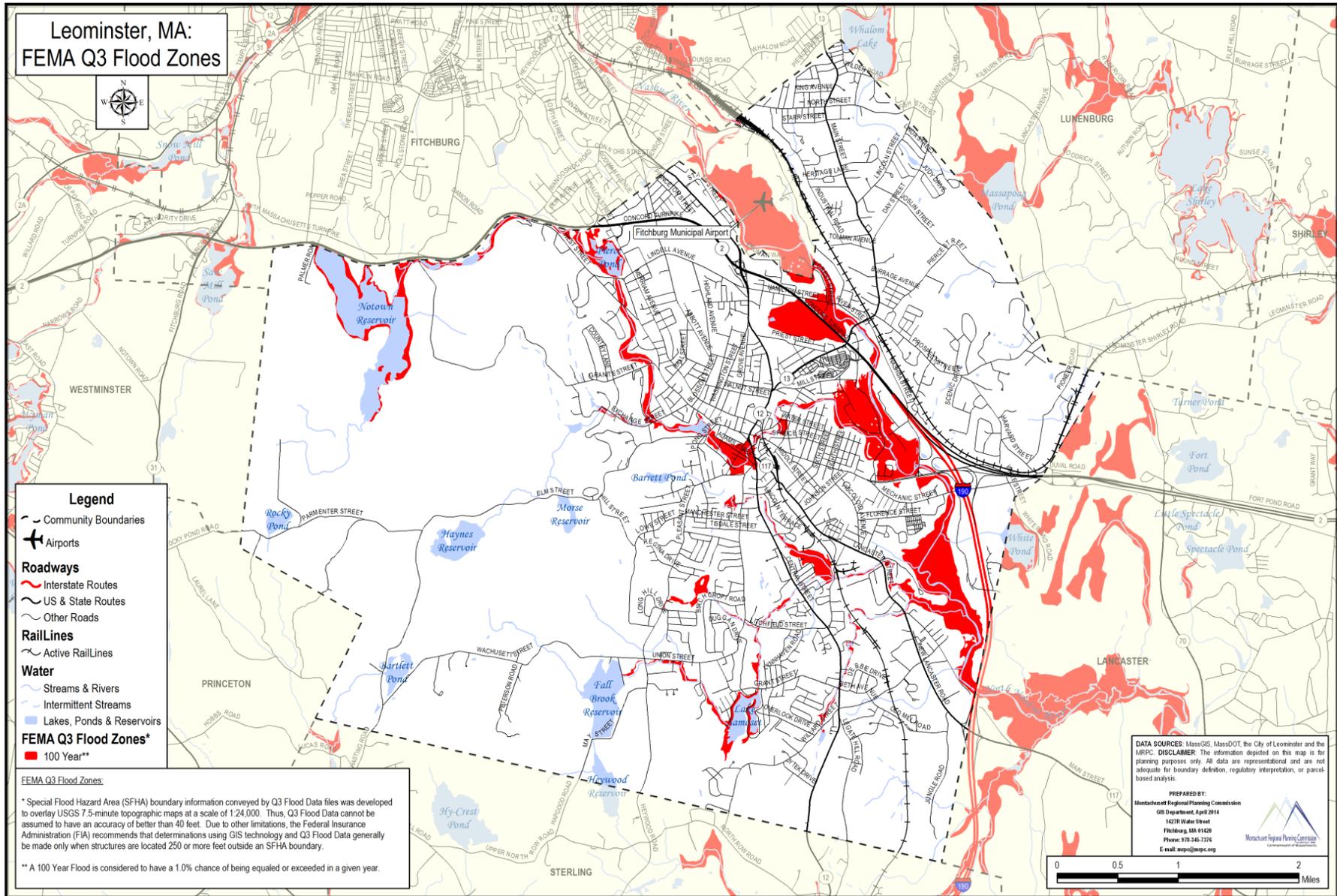
Since the initiation of the National Flood Insurance Program (NFIP), 25 flood insurance claims in the City of Leominster have been made totaling \$98,076.97 in payments. There are four repetitive loss properties in Leominster totaling \$38,274.40 in claims. Statistics from the NFIP BureauNet indicate in the City of Leominster there are 108 flood insurance policies in force.

Floodplain Management and Compliance with NFIP

The City supports floodplain management activities in an effort to meet compliance of the National Floodplain Insurance Program. These efforts include:

- Implementing the MA Wetlands Protection Act regulating development and activity within the wetlands buffer zone and regulating stormwater and other point source discharge.
- Implementing the City Flood Plain District Bylaw regulating development in the floodplain district.
- Continued maintenance of municipal stormwater drainage system which includes regular cleaning of catch basins, storm drains and culverts.
- Continued maintenance of public water bodies to reduce flooding caused by erosion and water displacement.
- Enforcement of Stormwater and Erosion Control Ordinance which regulates land alterations, disturbances and construction activities that may impact stormwater flow that could unduly cause flooding events.
- Enforcement of the Open Space Community Regulation which mitigates possible flooding events by designating protected open space within a development which in turn treats stormwater runoff through the means of natural infiltration.

The map which follows entitled FEMA Q3 Flood Zones depicts the 100 year flood zones in the community.



Structurally Deficient Bridges Over Waterways

Leominster has one bridge over water that is classified by MassDOT as “structurally deficient”. The bridge is on Whitney Street over Monoosnoc Brook.

Dams

The DCR Office of Dams Safety lists 22 dams in the City of Leominster as shown in Table 57. Six dams are classified as high hazard.

Classifications for potential hazards are in accordance with the chart below.

Hazard Potential Classification

High Hazard	Refers to dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
Significant Hazard	Refers to dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities
Low Hazard	Refers to dams located where failure may cause minimal property damage to others. Loss of life is not expected.

Source: MA Department of Conservation and Recreation Office of Dam Safety

High hazard dams must be inspected every two year, significant hazard every five years, and low Hazards dams every 10 years. Owners of dams are responsible for having their dam inspected. MGL Chapter 253 and 302 CMR 10.00 requires that dam owners prepare, maintain and update Emergency Action Plans for all High Hazard Potential dams and certain Significant Hazard Potential dams.

Non-jurisdictional dams are not regulated by the Office of Dam Safety or under their jurisdiction. Typically these dams are under 6 feet in height and/or under 15 acre-feet in storage and do not have an assigned 'Hazard Code'. Dams owned and regulated by the Federal Government are also typically non-jurisdictional but DO have an assigned Hazard Code.

Table 57: Dams – Leominster

City	Dam	Hazard Code	Owner
Leominster	Fall Brook Reservoir Dam and Dike	High Hazard	Public
Leominster	Notown Reservoir Dam	High Hazard	Public
Leominster	Rockwell Pond Dam	High Hazard	Public
Leominster	Pierce Pond Dam	High Hazard	Private
Leominster	Lake Samoset Dam	High Hazard	Private
Leominster	Notown Reservoir Dike	High Hazard	Public
Leominster	Goodfellow Pond Dam	Low Hazard	Public

Leominster	Distribution Reservoir Dam	Low Hazard	Public
Leominster	Mill Pond Dam	N/A	Private
Leominster	Mill Pond Dam	N/A	Private
Leominster	Dam Above Lincoln St.	N/A	Public
Leominster	Mill Pond Dam	N/A	Private
Leominster	Old Power House Pond Dam	N/A	Private
Leominster	Smith Pond Dam	N/A	Public
Leominster	Little Morse Pond Dam	N/A	Public
Leominster	Rocky Pond Dam	N/A	Public
Leominster	Bartlett Pond Dam	Significant Hazard	Private
Leominster	Simonds Pond Dam	Significant Hazard	Public
Leominster	Morse Reservoir Dam	Significant Hazard	Public
Leominster	Haynes Reservoir Dam	Significant Hazard	Public
Leominster	Day Street Dam	Significant Hazard	Private
Leominster	Barrett Park Pond Dam	Significant Hazard	Public

*N/A – Information not available as the dam is non-jurisdictional.

Risk Assessment

As previously stated, located in Section 4. Identification of Natural Hazards, Identifying and Profiling Hazards”, there is a description of each identified hazards’ impact on the region and its communities as well as an overall summary of vulnerability. Based on the hazards identified in this plan and the assessment of risks by the City of Leominster, the City considers itself to be at a high risk for Heavy Rain, Snow Melt, Beavers Nor’easters, Severe Thunderstorms, Heavy Snow; moderate risk for Ice Jams, High Winds, Hurricanes, Tornados Ice Storms, Blizzard, Major Urban Fires, Wild land Fire, Drought Extreme Temperatures, and Landslides; low risk for Dam Failure, and Earthquakes; and tsunamis as not applicable.

This information is documented in Leominster’s Natural Hazard Matrix below which was obtained from participants at Leominster’s Local Hazard Mitigation Team Meeting held on July 17, 2012.

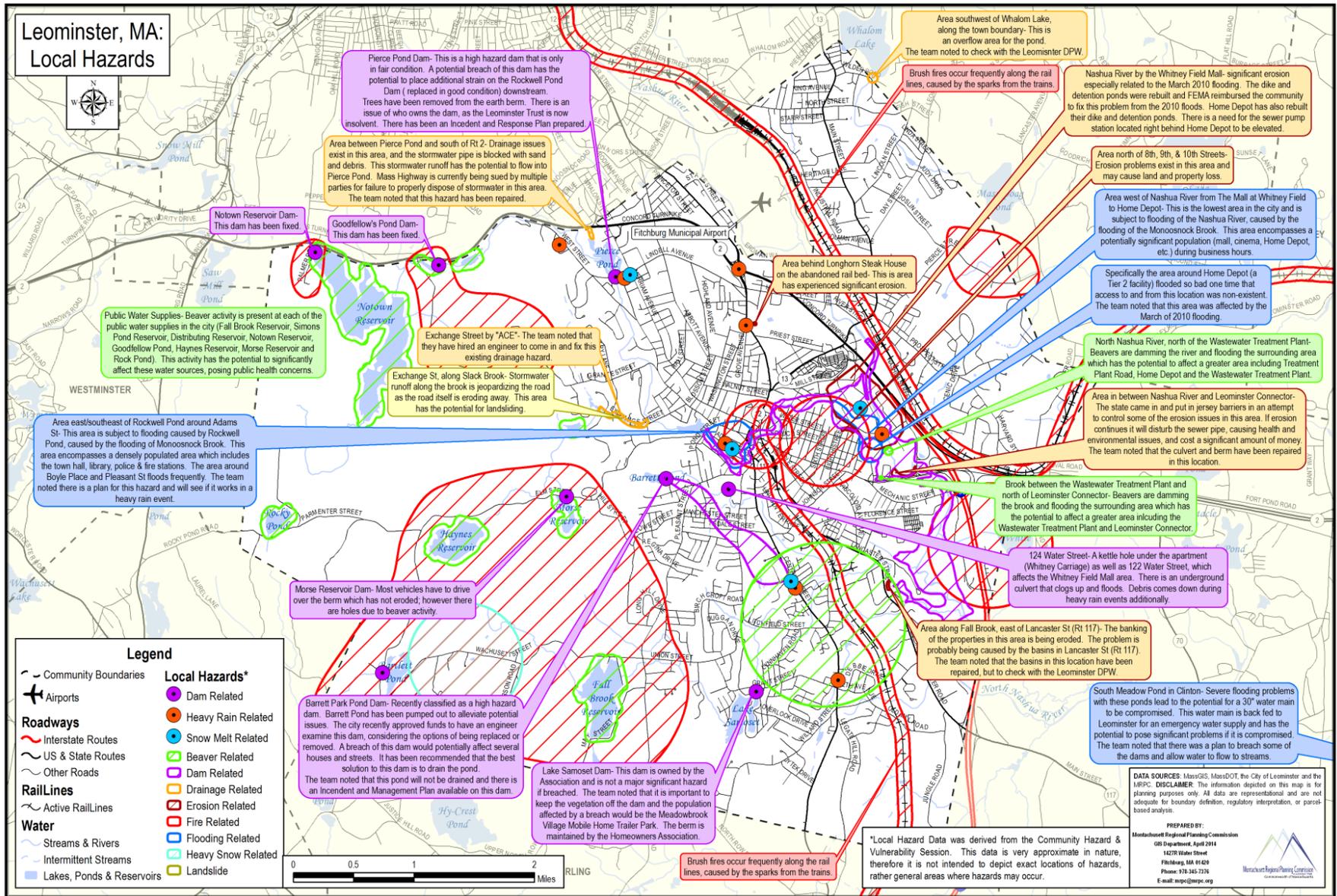
Leominster Natural Hazard Matrix

Natural Hazard	Likelihood of Occurrence	Location	Impacts	Hazard Index
Natural Hazard Separated by Flood, Atmospheric Related and Winter Related, Other Natural Hazards, and Geologic Hazards	3 = Highly Likely 2 = Possible 1 = Unlikely	3 = Regional/State 2 = Multi Community/Regional 1 = Local/Town	4 = Catastrophic 3 = Critical 2 = Limited 1 = Negligible	Ranking Determined by Combining the Likelihood, Location and Impacts of a Natural Hazard
Flood-Related Hazards				
• Heavy Rain	3	2	3	8
• Snow Melt	3	2	3	8
• Dam Failure	1	1	3.5	5.5
• Ice Jams	2	1	2	5
• Beavers	3	1	2.5	6.5
Atmospheric Related and Winter Related Hazards				
• High Winds	2	2	2	6
• Hurricanes	2	2	3	7
• Tornadoes	2	2	3	7
• Nor'easters	3	3	2.5	8.5
• Severe Thunderstorms	3	2	2	7
• Heavy Snow	3	3	3	9
• Ice Storms	2	3	3	8
• Blizzard	2	3	3	8
Other Natural Hazards				
• Major Urban Fires	2	1	2	5
• Wildland Fire	2	1	2	5
• Drought	2	2	2	6
• Extreme Temperatures	2	2	2	6
Geologic Hazards				
• Earthquakes	1	2	3	6
• Landslides	2	1	2	5
• Tsunami	NA	NA	NA	NA

Key

Highly likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
 Possible: 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.
 Unlikely: Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.
 Catastrophic: Immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.
 Critical: Fast speed of onset or long duration of event resulting in devastating damage and loss of services for weeks or months.
 Limited: Moderate speed of onset or moderate duration of event, resulting in some damage.
 Negligible: Slow speed of onset or short duration of event resulting in little to no damage.

Also discussed at this meeting were the hazards that affect each community and the identification of specific problem areas in the community that need to be addressed. This included the identification of new hazards that were determined to pose a threat or community vulnerability which are detailed in Leominster's Local Hazards Map on the following page. The entire community is equally at risk to the following hazards: ice jams, high winds, hurricanes, tornados, nor'easters, ice storms, blizzard, drought, extreme temperatures and earthquakes.



Existing Protections

The original inventory of hazard mitigation actions which the Montachusett communities undertook for the 2008 Hazard Mitigation Plan was reviewed and updated by each community at a meeting held in each community with the MRPC and the community's Local Hazard Mitigation Planning Team and, in some communities, the Emergency Management Committee. The attendees of the meetings can be found in Appendix A: The following matrices depict the updated inventory of what is currently being done to mitigate hazards by listing the programs and activities already in place. It includes a description of the protection measure, who is responsible, and improvements and changes that may be needed. This inventory was used by the Planning Team/Emergency Management Committee to identify gaps in existing protections that were then addressed through the development of this plan update.

Leominster

Type of Existing Protection	Description	Area Covered	Implementation Resources and Funding*	Improvements or Changes Needed
Flood Related Hazards				
Storm water management standards	State Regulation under the Wetlands Protection Act to regulate storm water and other point source discharge	City-Wide	Enforced by the Leominster Conservation Commission (Wetlands Protection Act) staffed by the municipal Environmental Inspector and Leominster Planning Board (Subdivision Control Law and site plan review) staffed by the municipal Office of Planning and Development.	Storm water management standards remain in effect. No improvements or changes needed.
Wetlands Protection Act (state)	State law regulating development and activity within wetland buffer zone	100-foot state buffer around wetland area; 200 foot buffer around river front areas.	Enforced by the Leominster Conservation Commission staffed by the municipal Environmental Inspector.	No improvements or changes needed.
100 Year Flood Zone	Federal law requiring elevation above 100-year flood level of new and substantially improved residential structures in floodplain	100-year floodplain as shown on Flood Insurance Rate Map dated April 3, 1989.	Enforced by the Building Inspector (municipal staff) and Planning Board	Update Insurance Flood Rate Maps

City Zoning Bylaw Flood Plain Districts	Local bylaw enhancing federal/state laws and regulating any development in the flood plain district	100-year floodplain as shown on Flood Insurance Rate Map dated April 3, 1989.	Enforced by the Building Inspector (municipal staff) and Planning Board	Update Insurance Flood Rate Maps
Maintenance of municipal storm water drainage system	Regular cleaning of catch basins, storm drains, and culverts	City-Wide	Undertaken by the Department of Public Works municipal staff.	Maintenance continues but additional Personnel and Equipment Needed to complete this task.
Culverts replacement	Replacement of Culverts that are Undersized and/or Deteriorated	City-Wide	Directed by the Department of Public Works municipal staff.	No improvements or changes needed. Culvert in flood areas to be replaced.
Maintenance of public water bodies (ponds, streams, brooks, wetlands)	Periodic cleaning of waterways undertaken, i.e., remove trash, debris	City-Wide	Undertaken by the Department of Public Works municipal staff with guidance from Leominster Conservation Commission	Maintenance continues. No improvements or changes needed.
Inspection of major dams	Annual inspections of the structural integrity of the dam	Major Dams	Coordinated by dam owners as directed by Massachusetts Department of Conservation and Recreation.	Update dam failure studies for the dams rated as high hazard.
Emergency action plans are developed	Develop EAPS for all dams private and publicly owned.	All dams	Dam Owners	All dam inspections must be completed and EAPS be developed and available in the event of a crisis.
Develop Maintenance and Operational Manuals	Maintenance and operational manuals do not exist for most dams	All dams	Developed by Dam Owners as directed by the Massachusetts Department of Conservation and Recreation, Office of Dam Safety.	Manuals will be available to engineers during a possible crisis.
Wind Related Hazards				

State Building Code	State Law related to design loads to include wind effects	City-Wide	Enforced by Building Department municipal staff.	Enforcement continues. No improvements or changes needed.
Tree Maintenance	Regular inspection and tree maintenance to cut branches threatening power lines and overhead utilities	City-Wide	Utility company and DPW	Tree maintenance continues but additional staff and equipment needed.
Fire Related Hazards				
Limited Brush Clearing	Brush clearing to provide access to Emergency Service vehicles.	City-Wide	Department of Public Works municipal staff.	Continue to identify additional Areas with Potential for Brushfires
Winter Storms Related				
Residential Parking Bans	Parking Bans to Enable Snow Removal Effectively from Residential Streets	City-Wide	Department of Public Works municipal staff and Police Dept.	Enforcement continues but additional personnel and equipment needed
Clearing Snow from Major Arterial Routes	Ensure Access to Emergency Services	City-Wide	Department of Public Works municipal staff.	Snow clearing continues but additional personnel and equipment needed.

*Leominster enforcement/implementation is generally carried out by elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

Mitigation Goals, Objectives and Strategies

As discussed earlier in this Plan, MRPC previously prepared the 2008 Montachusett Region Hazard Mitigation Plan which consisted of individual annexes for each MRPC community. Similarly, as part of the multi-jurisdictional plan update, each community also developed their own individual goals, objectives and strategies which are listed in this section.

Leominster Overall Goal Statement: To reduce the loss of life and damage to property, infrastructure and cultural resources throughout the community from natural and/or manmade disasters through a multiple hazard mitigation program that involves increased coordination, planning, education, exercising and capital improvements.

- Objective:** to increase coordination between departments in pre-disaster planning, disaster recovery and continuous hazard mitigation implementation.
- Objective:** Increase awareness of hazard mitigation among city officials, private organizations, businesses, and the general public.

3. **Objective:** To ensure that critical infrastructure sites are protected from natural hazards, and to ensure these sites are maintained and in good functional order.
4. **Objective:** To educate the public about the threat of natural hazards and the possible mitigation measures that can be taken to protect public health and safety, as well as infrastructure and property; and to educate the public as well about zoning and building regulations, particularly regulations that relate to new construction.
5. **Objective:** To encourage future development in areas that are not prone to natural disasters.
6. **Objective:** To develop a pre-disaster warning system that effectively, efficiently and in a timely fashion warns citizens and business owners of impending weather events.
 - Implement the Code Red system
 - Media
 - Community-wide siren
 - Evaluate current evacuation processes
7. **Objective:** Emergency distribution sites and plans exist.
8. **Objective:** Community resources are identified and in place.
9. **Objective:** MOU's are developed.
10. **Objective:** Needs of elderly, sick and disabled are addressed.
11. **Objective:** To develop, implement and communicate a shelter strategy that ensures that the city meets FEMA and ARC accepted shelter standards including shelter capacity, accessibility, structured integrity and support services.
 - Shelter specific plans are in place.
 - ARC contracts are in place.
 - Shelter management and operational staff are trained.

Specific Natural Hazard Goals for Leominster

Goal Statement for Flooding: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to flooding. And to pursue prevention activities which include planning, zoning, open space preservation, floodplain and wetland development regulations, storm water management, waterway dumping regulations, watershed protection measures, and best management practices, as well as, soil erosion, building ordinances, and subdivision regulations.

1. **Objective:** To implement standards in the Subdivision Rules and Regulations to require temporary and permanent erosion control measures for streams and surface water bodies.
2. **Objective:** To add more specific requirements to address flood related issues in the Special Permit and Site Plan Approval provisions in the Zoning City Ordinance and including topographic change, removal of cover vegetation, risk of erosion or siltation and increased stormwater runoff.
3. **Objective:** To identify all structures throughout community that need to be elevated above the base-flood elevation.
4. **Objective:** To develop a priority list and seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout the community.

Goal Statement for Protection from Beavers: To minimize the threat to health, the damage to roads and property, and the disruption of governmental services and general business activities due to flooding caused by beavers.

1. **Objective:** Support local city departments to continue present methods to prevent beaver

caused flooding.

- Objective:** Seek assistance from beaver management professionals, including trappers.
- Objective:** Install beaver management devices.

Goal Statement for Hurricanes and Tornadoes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to high winds associated with hurricanes and tornadoes. (The objectives listed above, under flooding, address the flooding that can result from a hurricane.) Overall goal objectives included:

- Objective:** To develop debris management plans and MOUs with vendors who can assist the city with debris removal.
- Objective:** To educate residents and volunteers regarding the safe methods and actions necessary to deal with Hurricanes and Tornadoes.

Goal Statement for Winter Related Hazards: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to severe snow and ice storms.

- Objective:** To develop a plan for providing access to water, information, shelter, and food stores to people in remote locations in the event of a severe winter storm.

Goal Statement for Dam Failure: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to dam failures.

- Objective:** To identify sources of funding for dam safety inspections.
- Objective:** Ensure that an emergency action plan exists for every dam in the community including private and public dam owners.
- Objective:** Develop lines of communications with all dam owners to ensure maintenance, testing status changes are brought to the community in a timely fashion.
- Objective:** Exchange dam data including EAPs with neighboring downstream communities.
- Objective:** Inter-jurisdictional alerts.

Goal Statement for Earthquakes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to earthquakes.

- Objective:** To evaluate all shelters and reception centers to determine if they are earthquake resistant.
- Objective:** To ensure that all identified shelters have sufficient back-up utility service in the event of primary power failure.

Goal Statement for Drought: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to drought.

- Objective:** Prepare a Water Conservation Plan for Leominster.

Goal Statement for Wildfires/Brushfires: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to wildfires/brushfires.

- Objective:** Develop and distribute an educational pamphlet on fire safety and prevention.
- Objective:** Consider amending the Subdivision Rules and Regulations and required improvements section of ordinance to include fire suppression provisions for new residential developments.

Goal Statement for Weather Extremes: To minimize the loss of life and the threats to public health and safety.

1. **Objective:** To develop and distribute educational information regarding the threats from extreme heat and cold.
2. **Objective:** To educate the residents as to the causes and effects of global warming; and how it affects the residents of the community and what they could be doing to help improve the situation.

Goal Statement for the Continuity of Government and Government Operations Planning:

1. **Objective:** Develop community-wide plans
2. **Objective:** Develop departmental plans.

Mitigation Action Plans and Prioritization of Actions (STAPLEE)

Initial Mitigation Action Plans for the Montachusett Communities were presented in the communities Hazard Mitigation Plans that were approved by FEMA in 2009 and 2010. The original Mitigation Action Plans were developed through an inventory of potential hazards which could impact the community and an evaluation of a range of alternatives to address these hazards. As part of the plan update process, the original Mitigation Action Plan was reviewed by the community's Local Hazard Mitigation Planning Team/Emergency Management Committee to delete actions which have already been completed, add additional actions which are either underway or planned to be undertaken, and to update the current status of all actions. The goals were reviewed and updated at the second meeting with each community.

An additional step in this process was to conduct a "STAPLEE" analysis for each action to prioritize all actions within each community and a subjective evaluation of each action's perceived cost/benefit. In the 2008 plan, actions were not prioritized so there were no changes in priorities in this update. The revised Community Mitigation Action Plans matrices that follow identify each mitigation action, the responsible department or board responsible for implementation, potential funding sources, the timetable of the action, results of the prioritization of actions through the STAPLEE analysis, and the perceived cost/benefit for each mitigation action.

The goal of each identified strategy, or mitigation action, is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each action to establish priorities for implementation, using the "STAPLEE" method. The STAPLEE methodology was developed by the Federal Emergency Management Agency as a tool to help communities prioritize their hazard mitigation strategies and determine the most appropriate actions for implementation. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of an action and is designed to be used by public officials and planners for making planning decisions.

To conduct the STAPLEE exercise, the community's Hazard Mitigation Team was asked to rate each action in their Mitigation Action Plan on each of the following criteria, using a score of 1 to 3 (Good = 3, Average = 2, Poor = 1):

- **Social:** Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- **Technical:** Will the proposed strategy work? Will it create more problems than it solves?

- Administrative: Can the community implement the action? Is there someone to coordinate and lead the effort?
- Political: Is the action politically acceptable? Is there public support both to implement and to maintain the action?
- Legal: Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- Economic: What are the costs of this action? Does the cost seem reasonable for the size of the problem and the likely benefits?
- Environmental: How will the action impact the environment? Will the action need environmental regulatory approvals?

These scores were then totaled, resulting in a final score of 7 (least priority) to 21 (highest priority) for each action. The higher the final score, the higher the relative priority of that action for implementation. This information can then be utilized in each community as they conduct and administer relevant municipal functions and activities. The final STAPLEE score for each action is shown in the following mitigation action plan.

The Hazard Mitigation team was also asked to do a relative cost/benefit of each action. This assessment was intended to informally indicate if an action will either have more benefits accrued to the Town than the Cost of implementing the action, or if the costs would exceed any benefits. Responses include: "Benefits Exceed Costs", "Benefits Equal Costs, or "Costs Exceed Benefits".

LEOMINSTER IMPLEMENTATION STRATEGY FOR PRIORITY MITIGATION ACTIONS

Type of Natural Hazard	Description of Action	Implementation Responsibility	Resources/ Funding*	Timetable	Priority (STAPLEE SCORE)	Cost/ Benefit Evaluation	Status Update from 2008 Plan**
Wildland Fire	Increase awareness by educating property owners regarding actions that they can take to reduce risk to property by hosting an Open House at the Fire Department, Develop and Distribute an Educational Pamphlet on Fire Safety and Prevention (SAFE PROGRAM) (SENIOR SAFE) and wildfire prevention.	Fire Department	Municipal Staff	2015 - 2020	21	benefits exceed costs	Completed but carried forward. This action is undertaken on a periodic basis.
All Natural Hazards	Increase hazard education and risk awareness to public by Collecting, Updating, and Disseminating Information on Local Radio/TV Stations to educate the public and alert them of emergency information including shelter locations and other instructions related to all natural hazards	Emergency Management Director	Municipal Staff	2015 - 2020	21	benefits exceed costs	Completed but carried forward. This action is undertaken on a periodic basis.

All Natural Hazards	Ensure that all identified shelters have sufficient back-up utility service in the event of a primary power failure to eliminate or reduce risk to human life.	Building Inspector, Emergency Management Director	School Department	2015 - 2020;	14	benefits equal/ exceed costs	Carried forward. Many shelters are deficient in back-up utility service. Lack of funding.
Flood Related Hazards	To Develop a priority list and possibly seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town to reduce or eliminate flooding risk.	Highway Department	Municipal Staff/ FEMA HMGP grant 75%	2015 - 2020	19	benefits equal costs	Carried forward due to time constraints.
Other Natural Hazards (wildland fire)	Consider amending the Subdivision Rules and Regulations of Required Improvements Section to include fire and suppression provisions for new residential development.	Fire Department	Municipal Staff/ Volunteers	2015 – 2020	16	benefits exceed costs	Carried forward due to time constraints.
Flood Related Hazards	Amend the Special Permit and Site Plan Approval Provisions in the Zoning Bylaw adding more specific requirements to address flood related issues.	Conservation Commission, Planning Board	Municipal Staff/ Volunteers	2015 - 2020	21	benefits exceed costs	Carried forward due to time constraints.

Flood Related Hazards	Educate property owners regarding options for mitigating their properties from flooding through outreach programs that address measures that residents can take (i.e installing backflow valves, securing debris, etc.)	Emergency Management Director, Fire Department	Municipal Staff and Property Owners	2015 - 2020	20	benefits exceed costs	New Action.
Wildland Fire	Update Debris Management Plan for local officials to utilize in order to reduce the risk of wildland fire.	City Council, Emergency Management Director	Western Region Homeland Security Advisory Council Funding	2015	18	costs exceed benefits	City's plan is currently being updated and went out to bid at end of 2014.
Flood Related Hazards	Continue Participation in the National Flood Insurance Program to enable property owners to purchase insurance protection against flood losses.	City Council, Conservation Commission	FEMA/ MEMA	2015 - 2020	21	benefits exceed costs	Completed but carried forward. The City continues its participation in the NFIP.
Flood Related Hazards	Evaluate and relocate valuable and historical items and furnaces, Water heaters, and electrical equipment in any municipal owned buildings that might be located in areas prone to flooding to reduce flood damage.	Emergency Management Director, Fire Department	Municipal Staff	2015 - 2020	21	benefits equal costs	Carried forward. Additional time needed due lack of funding.

Atmospheric Related Hazards	Enforce state building codes related to design loads to include wind effects generated from atmospheric related hazards.	Building Inspector	Municipal Staff	2015 - 2020	21	benefits exceed costs	Completed but carried forward. The City continues its enforcement of the State building codes.
Other Natural Hazards (Wildland fire)	Identify areas with potential for brush fires to track community vulnerability by developing and maintaining a data base.	Department of Public Works	Municipal Staff	2015 - 2020	21	benefits exceed costs	New Action.
All Natural Hazards	Utilize interactive mapping application prepared by MRPC/CMRPC to update critical infrastructure and simulate real time evacuation scenarios to mitigate hazards to the public.	Emergency Management Director	Emergency Management Director	2015.	21	benefits exceed costs	New action. Maps are completed and will be distributed to City Department Heads along with updated CEMP.
Flood Related Hazards	Install "beaver diverters" and water control devices to mitigate flooding caused by beaver dams.	Department of Public Works	Municipal Staff	2015 – 2020	21	benefits exceed costs	Completed but carried forward. This action is undertaken as necessary.
Flood Related Hazards	Hire trapper for removal of beavers to mitigate flooding caused by beaver dams.	Department of Public Works	Municipal Staff	2015 – 2020			Completed but carried forward. This action is undertaken as necessary.

All Natural Hazards	Implement recommendations regarding natural hazard mitigation in existing planning documents including the five year action plan of the open space and recreation plan and the emergency evacuation plan	Conservation Commission, City Council, Planning Board, Emergency Management Director, Recreation Commission	Municipal Staff, Conservation Commission, City Council, Planning Board, Emergency Management Director	2015 - 2020	21	benefits exceed costs	Completed but Carried forward. This is an ongoing effort. For example, city recently acquired land that is a brownfield to create more open space. Creating open space helps to mitigate stormwater and flooding. This was a recommendation of the open space and recreation plan.
Flood Related Hazards	Purchase equipment to block streets in case of flood hazard to reduce or eliminate the risk to human life.	Police Department, Emergency Management Director	Grant Money if available	2015 – 2020	21	benefits exceed costs	New action.

*Unless otherwise noted, Leominster’s Resources/Funding consists of elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

**Actions identified as carried forward were not completed in the previous planning cycle unless otherwise stated.

Mitigation actions from the 2008 Montachusett Region Hazard Mitigation Plan that are complete include:

- Inventoried Supplies at Existing Shelters and Develop a Needs List and Storage Requirements to ensure the available of adequate supplies during a natural hazard
- Purchased Code Red.
- Prepare a Water Conservation Plan.
- Identified shelters and publicized locations.
- Worked with Neighboring Communities to Establish a Community Emergency Response Team. Local CERT was developed. Leominster has worked with Fitchburg’s CERT.

Mitigation actions from the 2008 Montachusett Region Hazard Mitigation Plan that were removed from this update include:

- Develop a Plan for Providing Access to Water, Information, Shelter, and Food Stores to People in Remote locations of city in event of severe winter storm. Community does not have remote areas that would require a separate plan. The City’s CEMP covers all areas of the City.

Lunenburg Natural Hazard Risk Assessment

While this annex focus' pertains to critical facilities, flooding, risk assessment, existing protections and mitigation strategy in the community, more detailed descriptions of each natural hazard's impact on the region and its communities and summary of vulnerability can be located in the regional section entitled " 4. Identification of Natural Hazards, Identifying and Profiling Hazards".

Community Profile

The Town of Lunenburg is located in north central Massachusetts, approximately forty-three (43) miles northwest of Boston, twenty-seven (27) miles north of Worcester, and 203 miles from New York City. It is in the Montachusett Region which comprises northern Worcester County. Lunenburg is bordered by the city of Fitchburg to the west and the Town of Ashby to the northwest; the City of Leominster and the Town of Lancaster to the south; and the Town of Shirley to the east and Townsend to the north.

The town of Lunenburg covers an area of 27.69 square miles with a resident population of 10,086, according to the 2010 US Census with a density of 364 people per square mile. There are 4,133 housing units in the town, and the average household size of 2.63 people. Median age of Lunenburg residents is 43.

Lunenburg was incorporated in 1728. Lunenburg's most popular attraction was the former Whalom Amusement Park which operated from 1893 to 2000. Lunenburg has a semi-rural character, typified by single-family residences of large lots. Major concentrations of residential development are in the town Center, Whalom Lake, Lake Shirley, and the Hickory Hills Lake areas. Medium-density residential development, or dwelling on lots less than one acre characterize many of these areas. The lake areas have a concentration of seasonal homes, the majority of which now have been converted to year-round housing. Newer subdivisions are generally small and are scattered throughout the town, creating a sense of sprawl. Non-residential uses occur primarily in the southwest portion of town in the Baker Station area, and along Massachusetts Avenue and Chase Road. These areas are along the major routes of 2A and 13, and are typical convenience and highway type uses such as automotive service and sales, department and variety stores and restaurants. Industrial uses are limited to the southwest and southeast areas of town, and represent a minor portion of the total land area. There are still active farms in Lunenburg.

The remainder of Lunenburg which originally consisted largely of farms and orchards has slowly developed into large lot single family housing. Commercial and industrial development is permitted in several areas of town primarily along the two major arteries (Route 2A and Route 13), and the Town's peripheries, due largely to the close proximity of Leominster and Fitchburg's sewer and water systems. Major employers in Lunenburg are Walmart, Hannaford Supermarket and Maki Corporation.

Critical Facilities

In general usage, the term "critical facilities" is used to describe all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired.

Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even access to damaged areas.

The number and nature of critical facilities in a community can differ greatly from one jurisdiction to another, and usually comprise both public and private facilities. In this sense, each community needs to determine the relative importance of the publicly and privately owned facilities that deliver vital services, provide important functions, and protect special populations. *Source: Federal Emergency Management Administration, Risk Management Series, Design Guide for Improving Critical Facility Safety from Flooding and High Winds, FEMA 543, January 2007.*

A list of the critical facilities within the community is shown in Table 58. This data was obtained from the community’s Comprehensive Emergency Management Plan (CEMP). The data was then reviewed by the Emergency Management Director. These facilities were digitized into GIS and used for determining vulnerability to the various hazards. The map that follows entitled FEMA Q3 Flood Zones and Critical Infrastructure depicts Critical Facilities in the community.

Table 58: Lunenburg Critical Facilities

Feature Type	Name	Address
Animal Shelters	The Pat Brody Shelter for Cats	499 Northfield Road
City/Town Halls	Lunenburg Town Hall	17 Main Street
Clinics	Lunenburg Family Practice	697 Massachusetts Ave.
Communication Towers	Communication Tower #623870	Leominster-Shirley Road
	Communication Tower	621 Chase Road.
	Communication Tower	270 Electric Avenue
	Communication Tower #511821	Pope Road
	Lunenburg Communication Tower #3	2005 Mass Avenue
	Lunenburg Public Safety Communications Tower #4	655 Mass Avenue
	Lunenburg Communication Tower #5	17 Main Street
	Lunenburg Water Tank #1	314 Sunnyhill Rd.
Public Water Supply*	Gpw 6 Hickory Hills	
	Gpw 1 Lancaster Avenue	

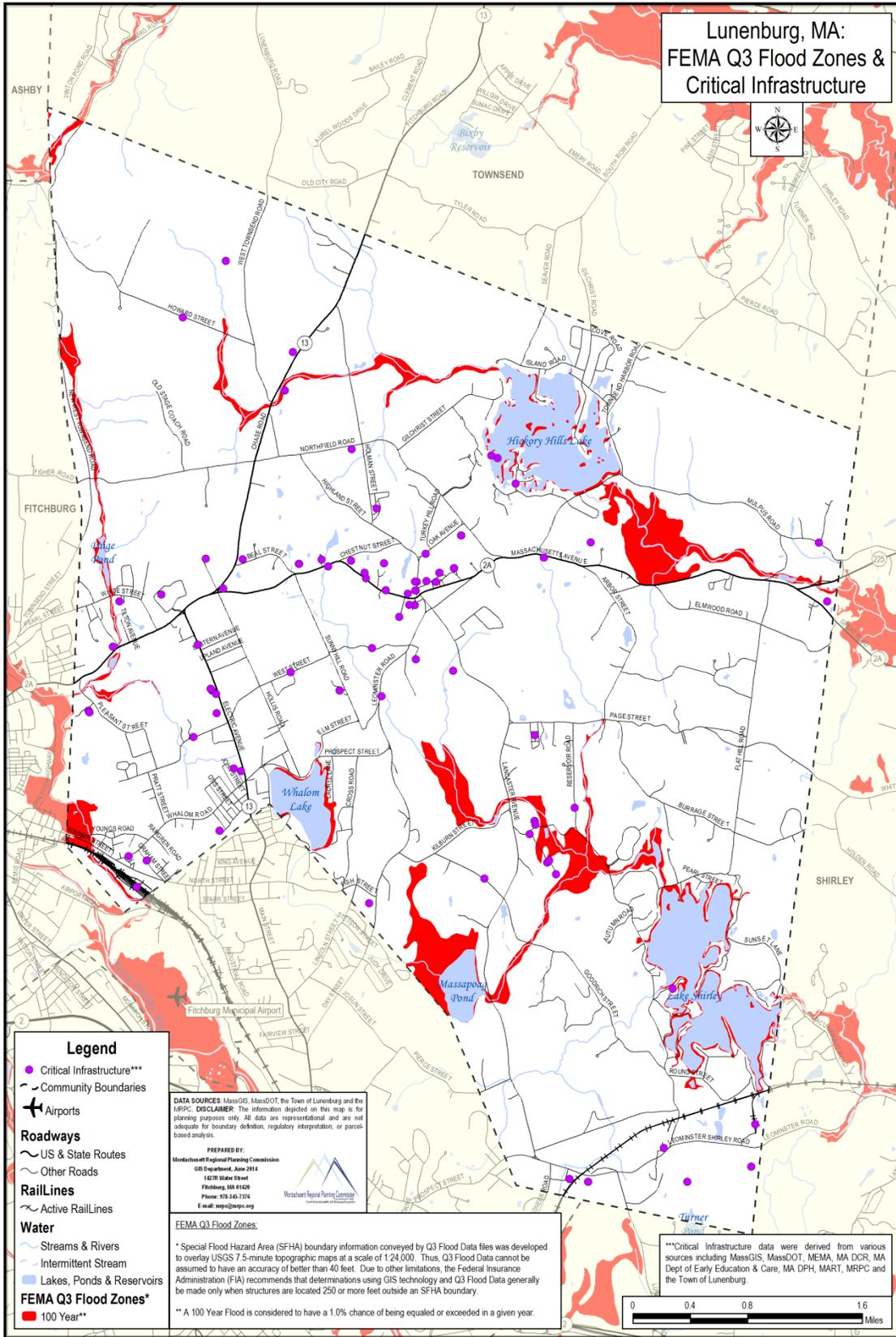
	Gpw 2 Lancaster Ave	
	Gpw 3 Lancaster Avenue	
	Twf 5 Lancaster Ave (7 Gpws 6")	
	Twf# 5a Lancaster Ave. (4 Gp Wells)	
	Keating Well 1	
	Gpw 4 Lancaster Avenue	
DPW Facilities	Lunenburg DPW	520 Chase Road
Early Education Childcare Facilities	Membrino, Louise A.	539 Mulpus Road
	The Bonjour School	742 Massachusetts Avenue
	Mccaulliff, Michelle	610 West Street
	Ciccione, Catherine	155 Hemlock Drive
	Robbins, Carol L.	32 Whalom Road
	St. Boniface Early Education School	817 Massachusetts Avenue
	Jacobson, Heather	189 Howard Street
	Lampi, Patricia	152 Reservoir Road
	Navaroli, Kellie	117 Goodrich Street
	Gengler, Elizabeth	31 Graham Street
	Village Playschool	30 Oak Avenue
Elderly Housing	Pearl Brook Estates	131 White Street
Electric Substations	Unitil Substation	934R Mass. Avenue
	Unitil Substation	80 Pleasant Street
Emergency Dispensing Sites	Turkey Hill Middle School	129 Northfield Road
Emergency Shelters	Turkey Hill Middle School/Primary	129 Northfield Road
	Lunenburg High School/Tertiary/no emergency power	1079 Massachusetts Avenue
	Thomas C Passios Elementary School/Secondary	1025 Massachusetts Avenue
	Twin City Baptist Temple-Tertiary/Overflow	194 Electric Avenue
End of Life Facilities	North Cemetery	Holman Street
	South Cemetery	Page Street
	Sawyer Miller-Masciarelli Funeral Home	763 Massachusetts Avenue
Emergency Operations Centers	Lunenburg Public Safety Complex	655 Massachusetts Avenue

Fire	Lunenburg Public Safety Complex	655 Massachusetts Avenue
Freight	East Fitchburg Yard	Summer Street
HazMat Sites	East Fitchburg Yard	Summer Street
	Unitil	80 Pleasant Street
	PJ Keating Company	998 Reservoir Road
	Lafarge North America	485 Leominster-Shirley Road
	National Grid	Various Locations/220 Leominster-Shirley Road
	S&E Specialty Polymers	140 Leominster-Shirley Rd.
	Verizon Substation MA873306	15 School Street
	Walmart	301 Mass Avenue
Other Critical Facilities	Unitil	80 Pleasant Street
	Electric Ave Citgo	416 Electric Avenue
	Tennessee Gas/Kinder-Morgan**	Various Locations
	Gulf Station	451 Massachusetts Ave
	Mr Mike's Mobil	131 Massachusetts Ave
	Verizon Substation MA873306	15 School Street
	Lunenburg Water Tank #1	314 Sunnyhill Road
	Lunenburg Water Tank #2	Pope Road
	Unitil Substation	934 Massachusetts Avenue
	Honey Farms (fuel dispensing)	134 Leominster-Shirley Road
Other Government Buildings	Lunenburg Public Library	1023 Massachusetts Avenue
	Lunenburg Water District	50 Lesure Avenue
	Eagle House Senior Center Council	25 Memorial Drive
	Lunenburg Post Office	945 Mass Avenue
	Ritter Memorial Building	960 Massachusetts Avenue
Police	Lunenburg Public Safety Complex	655 Massachusetts Avenue
Pumping Stations	Lunenburg Pumping Station #1	671 Lancaster Avenue
	Lunenburg Pumping Station #2	100 Wintergreen Court
	Sewerage Pump Station #1	245 Leominster Road
	Sewerage Pump Station #2	54 West Street
	Sewerage Pump Station #3	23 Francis Street
	Sewerage Pump Station #4	682 Mass Avenue
	Sewerage Pump Station #5	911 Mass Avenue
	Sewerage Pump Station #6	1280 Mass Avenue
Sewerage Pump Station #7	100 Dana Street	

	Sewerage Pump Station #8	100 Electric Avenue
	Sewerage Pump Station #9	194 Electric Avenue
Residential Program Facilities	Seven Hills West Street	308 West Street
	The Institute For Prof. Practice	436 W. Townsend Road
School	Turkey Hill Middle School	129 Northfield Road
	Lunenburg High School	1079 Massachusetts Avenue
	Thomas C Passios Elementary School	1025 Massachusetts Avenue
	Twin City Christian School	194 Electric Avenue
	Lunenburg Primary School	1401 Massachusetts Avenue
Sports And Cultural Areas	Marshall Park	100 Chestnut Street
	Lunenburg Historical Society	10 School Street
	St Bonafice Church	817 Massachusetts Avenue
	Pilgrim Covenant Church	138 Beal Street
	Shady Point Beach Campground	701 Reservoir Road
	Twin City Baptist Temple	194 Electric Avenue
	United Parish of Lunenburg	39 Main Street

*As stated in 310 CMR 22.02, a Public Water System means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year” (Mass GIS, 2014).

**Pipeline in town was upgraded approximately 3-4 years ago.



Flood Prone Areas

Particular areas within the community where the risk of flood areas are or could occur are shown on the Lunenburg Local Hazards Assessment Map (Appendix 2) as determined at the first meeting of the Lunenburg Local Hazard Mitigation Team held on

Particular areas within the community where the risk of flood areas are or could occur were determined at the first meeting of the Lunenburg Local Hazard Mitigation Team held on September 24, 2012. This information can be found on Lunenburg's Local Hazard Map which is located under the section entitled Risk Assessment.

Flooding Vulnerability Assessment

An analysis of the FIRM flood hazard area maps indicates that there is a total of 1617.79 acres of 100-year floodplain within Lunenburg. This amounts to 9.11% of the total town. Based on additional analysis, 69.13 acres (4.27%) of the floodplain are developed. Currently there are 205 structures in the floodplain which is about 3.21% of the total structures in the community. The buildings are then multiplied by the building value, as determined by the MA Department of Revenue, to come up with a potential loss of \$125,270,600.

Excluding dams and bridges the following table lists the critical facilities within the 100 year flood zone.

Table 59: Lunenburg Critical Facilities in the 100 year Flood Zone

<i>Feature Type</i>	<i>Name</i>	<i>Address</i>	
Public Water Supply	Gpw 6 Hickory Hills		

Since the initiation of the National Flood Insurance Program (NFIP), two flood insurance claims in the Town of Lunenburg have been made totaling \$2,537.72 in payment. According to NFIP data, there are no repetitive loss properties in Lunenburg. Statistics from the NFIP BureauNet indicate in the town of Lunenburg there are 23 flood insurance policies in force.

Floodplain Management and Compliance with NFIP

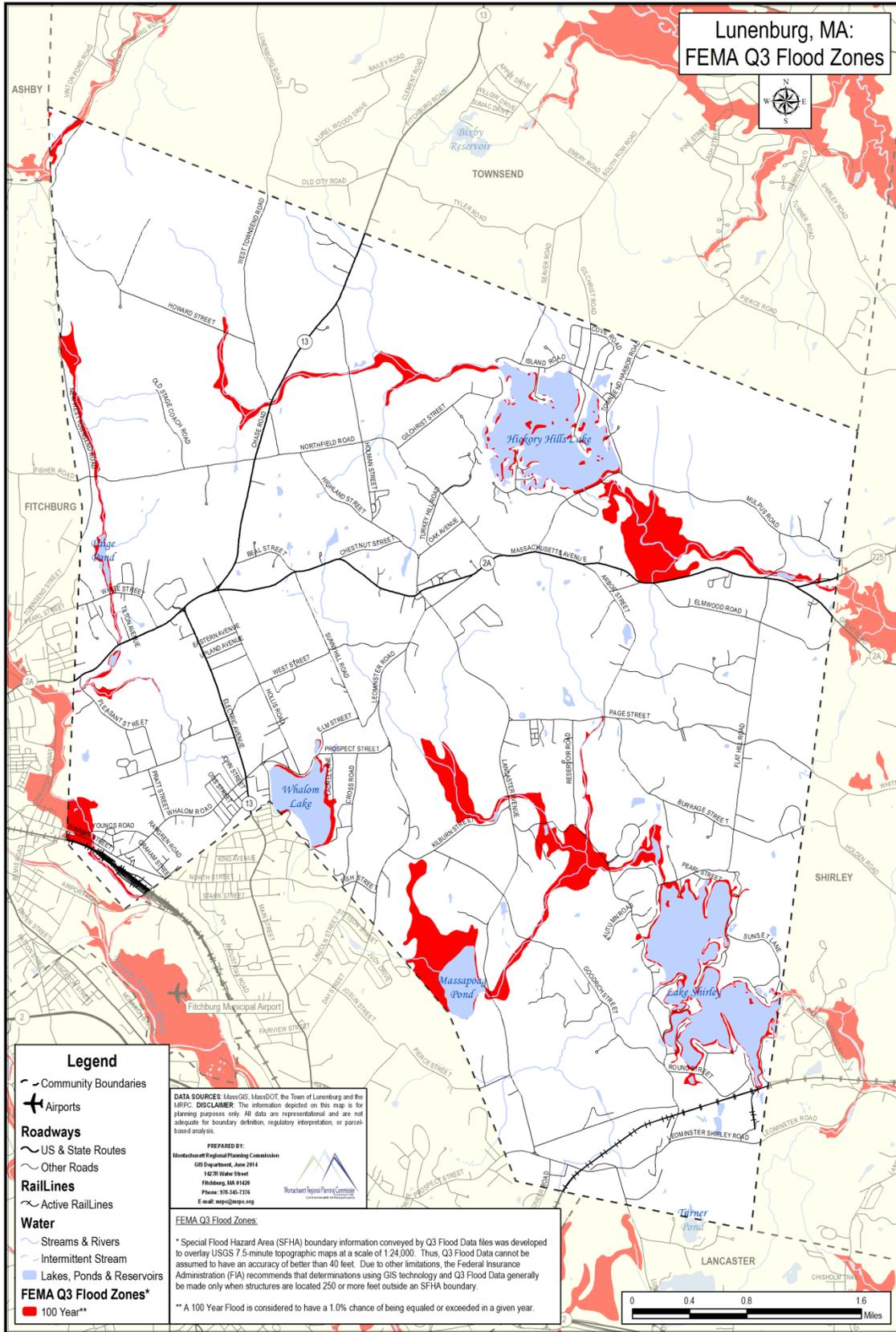
The town supports floodplain management activities in an effort to meet compliance of the National Floodplain Insurance Program. These efforts include:

- Implementing the MA Wetlands Protection Act and the town's Wetland's Protection Bylaw regulating development and activity within the wetlands buffer zone and regulating stormwater and other point source discharge.
- Implementing the Town Flood Plain District Bylaw regulating development in the floodplain district.
- Continued maintenance of municipal stormwater drainage system which includes regular cleaning of catch basins, storm drains and culverts.
- Continued maintenance of public water bodies to reduce flooding caused by erosion and water displacement.
- Enforcement of Stormwater Management and Erosion Control Ordinance which regulates land

alterations, disturbances and construction activities that may impact stormwater flow that could unduly cause flooding events.

- Enforcement of the Cluster Development Bylaw which mitigates possible flooding events by designating protected open space within a development which in turn treats stormwater runoff through the means of natural infiltration.

The map which follows entitled FEMA Q3 Flood Zones depicts the 100 year flood zones in the community.



Structurally Deficient Bridges Over Waterways

Lunenburg does not have any bridges over water classified by MassDOT as “structurally deficient”.

Hazard Potential of Dams

The DCR Office of Dams Safety lists 9 dams in the Town of Lunenburg as shown in Table 60. Hickory Hills Lake Dam and Lake Shirley Dam are classified as high hazard.

Classifications for potential hazards are in accordance with the chart below.

Hazard Potential Classification

High Hazard	Refers to dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
Significant Hazard	Refers to dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities
Low Hazard	Refers to dams located where failure may cause minimal property damage to others. Loss of life is not expected.

Source: MA Department of Conservation and Recreation Office of Dam Safety

High hazard dams must be inspected every two year, significant hazard every five years, and low Hazards dams every 10 years. Owners of dams are responsible for having their dam inspected. MGL Chapter 253 and 302 CMR 10.00 requires that dam owners prepare, maintain and update Emergency Action Plans for all High Hazard Potential dams and certain Significant Hazard Potential dams.

Non-jurisdictional dams are not regulated by the Office of Dam Safety or under their jurisdiction. Typically these dams are under 6 feet in height and/or under 15 acre-feet in storage and do not have an assigned 'Hazard Code'. Dams owned and regulated by the Federal Government are also typically non-jurisdictional but DO have an assigned Hazard Code.

Table 60: Dams

Town	Dam	Hazard Code	Owner
Lunenburg	Hickory Hills Lake Dam	High Hazard	Private
Lunenburg	Lake Shirley Dam	High Hazard	Public
Lunenburg	Paige Pond Dam	Low Hazard	Private
Lunenburg	Old Ice Pond Dam	N/A	Private
Lunenburg	Old Morins Ice Pond Dam	N/A	Private
Lunenburg	Baggetts Pond Dam	N/A	Private
Lunenburg	Lake Whalom Dam	N/A	Private

Lunenburg	Massapoag Pond Dam	N/A	Private
Lunenburg	Farm Pond Dam	Significant Hazard	Private

*N/A – Information not available as the dam is non-jurisdictional.

Risk Assessment

As previously stated, located in Section 4. Identification of Natural Hazards, Identifying and Profiling Hazards”, there is a description of each identified hazards’ impact on the region and its communities as well as an overall summary of vulnerability.. Based on the hazards identified in this plan and the assessment of risks by the Town of Lunenburg, the town considers itself to be at a high risk for High Winds, Severe Thunderstorms, Heavy Snow, Wildland Fire; moderate risk Dam Failure, Beavers, Hurricanes, Nor’easters, Ice Storms, Blizzard, Drought, Extreme Temperatures, Earthquakes; low risk Heavy Rain, Snow Melt, Ice Jams, Tornados Major Urban Fires, and landslides; and tsunamis as not applicable.

This information is documented in Lunenburg’s Natural Hazard Matrix below which was obtained from participants at the Lunenburg Local Hazard Mitigation Team Meeting held on September 24, 2012.

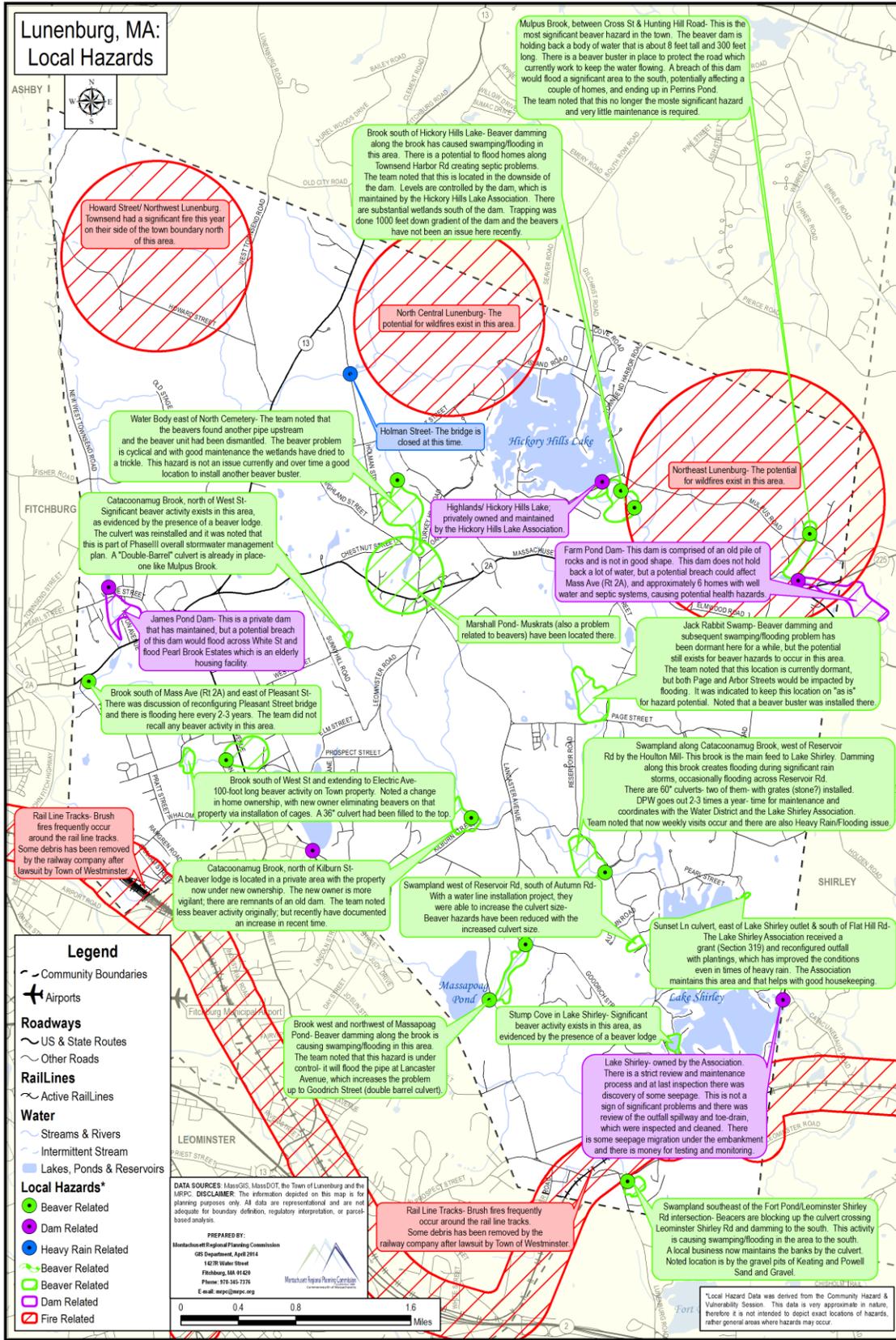
Lunenburg Natural Hazard Matrix

Natural Hazard	Likelihood of Occurrence	Location	Impacts	Hazard Index
Natural Hazard Separated by Flood, Atmospheric Related and Winter Related, Other Natural Hazards, and Geologic Hazards	3 = Highly Likely 2 = Possible 1 = Unlikely	3 = Regional/State 2 = Multi Community/Regional 1 = Local/Town	4 = Catastrophic 3 = Critical 2 = Limited 1 = Negligible	Ranking Determined by Combining the Likelihood, Location and Impacts of a Natural Hazard
Flood-Related Hazards				
• Heavy Rain	1	1	2	4
• Snow Melt	1	1	2	4
• Dam Failure	2	2	2	6
• Ice Jams	1	1	1	3
• Beavers	2.5	1	2	5.5
Atmospheric Related and Winter Related Hazards				
• High Winds	3	2	2	7
• Hurricanes	2	2	3	7
• Tornadoes	1	2	2.5	5.5
• Nor'easters	2	2	2	6
• Severe Thunderstorms	3	2	2	7
• Heavy Snow	3	2	2	7
• Ice Storms	2	2	3	7
• Blizzard	2	2	3	7
Other Natural Hazards				
• Major Urban Fires	1	1	1	3
• Wildland Fire	3	2	2	7
• Drought	2	2	2	6
• Extreme Temperatures	2	2	1	5
Geologic Hazards				
• Earthquakes	2	2	3.5	7.5
• Landslides	1	1	1	3
• Tsunami	NA	NA	NA	NA

Key

Highly likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
 Possible: 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.
 Unlikely: Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.
 Catastrophic: Immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.
 Critical: Fast speed of onset or long duration of event resulting in devastating damage and loss of services for weeks or months.
 Limited: Moderate speed of onset or moderate duration of event, resulting in some damage.
 Negligible: Slow speed of onset or short duration of event resulting in little to no damage.

Also discussed at this meeting were the hazards that affect each community and the identification of specific problem areas in the community that need to be addressed. This included the identification of new hazards that were determined to pose a threat or community vulnerability which are detailed in Lunenburg's Local Hazards Map on the following page. The entire community is equally at risk to the following hazards: snow melt, ice jams, high winds, hurricanes, tornados, nor'easters, severe thunderstorms, heavy snow, ice storms, blizzards, drought, extreme temperatures, earthquakes and landslides.



Existing Protections

The original inventory of hazard mitigation actions which the Montachusett communities undertook for the 2008 Montachusett Region Hazard Mitigation Plan was reviewed and updated by each community at a meeting held in each community with the MRPC and the community's Local Hazard Mitigation Planning Team and, in some communities, the Emergency Management Committee. The attendees of the meetings can be found in Appendix A. The following matrices depict the updated inventory of what is currently being done to mitigate hazards by listing the programs and activities already in place. It includes a description of the protection measure, who is responsible, and improvements and changes that may be needed. This inventory was used by the Planning Team/Emergency Management Committee to identify gaps in existing protections that were then addressed through the development of this plan update.

Lunenburg

Type of Existing Protection	Description	Area Covered	Implementation Resources and Funding*	Improvements or Changes Needed
Flood Related Hazards				
Storm water management standards	State Regulation under the Wetlands Protection Act to regulate storm water and other point source discharge	Town-Wide	Enforced by the Lunenburg Conservation Commission (Wetlands Protection Act) staffed by the Administrative Assistant and Lunenburg Planning Board (Subdivision Control Law and site plan review) staffed by the Land Use Planner.	The Planning Board is reviewing Zoning Bylaws and regulations to determine the best way to accomplish all Flood Related Hazards mitigations.
Wetlands Protection Act (state)	State law regulating development and activity within wetland buffer zone	100-foot state buffer around wetland area; 200 foot buffer around river front areas.	Enforced by the Lunenburg Conservation Commission staffed by the Administrative Assistant.	No improvements or changes needed.
General Wetlands Protection Bylaw (local)	Local bylaw supplementing Wetlands Protection Act	100-foot state buffer around wetland area; 200 foot buffer around river front areas.	Enforced by the Lunenburg Conservation Commission staffed by the Administrative Assistant.	No improvements or changes needed.

100 Year Flood Zone	Federal law requiring elevation above 100-year flood level of new and substantially improved residential structures in floodplain	100-year floodplain as shown on Flood Insurance Rate Map dated June 15, 1982.	Enforced by the Building Inspector (municipal staff) and Lunenburg Conservation Commission staffed by the municipal Administrative Assistant.	Insurance Flood Rate Maps need to be updated.
Town Bylaw - Flood Plain District	Local bylaw enhancing federal/state laws and regulating any development in the flood plain district	100-year floodplain as shown on Flood Insurance Rate Map dated June 15, 1982.	Enforced by the Building Inspector (municipal staff) and Lunenburg Conservation Commission staffed by the municipal Administrative Assistant.	Insurance Flood Rate Maps need to be updated.
Maintenance of municipal storm water drainage system	Regular cleaning of catch basins, storm drains, and culverts	Town-Wide	Undertaken by the Department of Public Works municipal staff.	Maintenance continues but Additional Personnel and Equipment Needed
Maintenance of public water bodies (ponds, streams, brooks, wetlands)	Periodic cleaning of waterways undertaken, i.e., remove trash, debris	Town-Wide	Undertaken by the Department of Public Works municipal staff with guidance from Lunenburg Conservation Commission staffed by the municipal Administrative Assistant.	Maintenance continues. No improvements or changes needed.
Inspection of major dams	Periodic inspections of the structural integrity of the dam	Major Dams	Directed by the Massachusetts Department of Conservation and Recreation, Office of Dam Safety	Update Dam failure studies for the dams rated as high hazard
Wind Related Hazards				
State Building Code	State Law related to design loads to include wind effects	Town-Wide	Enforced by Building Department (municipal staff).	Enforcement continues. No improvements or changes needed.

Tree Maintenance	Regular inspection and tree maintenance to cut branches threatening power lines and overhead utilities. Removal of dead trees along the roadway threatening emergency vehicle passage should they fall during a storm.	Town-Wide	Unitil staff (Electric Company).	No improvements or changes needed.
Fire Related Hazards				
Limited Brush Clearing	Brush clearing to provide access to Emergency Service vehicles.	Town-Wide	Undertaken by the Department of Public Works municipal staff.	Continue to Identify additional Areas with Potential for Brushfires
Winter Storms Related				
Residential Parking Bans	Parking Bans to Enable Snow Removal Effectively from Residential Streets	Town-Wide	Department of Public Works municipal staff.	Enforcement continues but additional personnel and equipment needed
Clearing Snow from Major Arterial Routes	Ensure Access to Emergency Service vehicles.	Town-Wide	Department of Public Works municipal staff.	Snow clearing continues but additional personnel and equipment needed.

*Lunenburg enforcement/implementation is generally carried out by elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

Mitigation Goals, Objectives and Strategies

As discussed earlier in this Plan, MRPC previously prepared the 2008 Montachusett Region Hazard Mitigation Plan which consisted of individual annexes for each MRPC community. Similarly, as part of the multi-jurisdictional plan update, each community also developed their own individual goals, objectives and strategies which are listed in this section.

Overall Goal Statement: To reduce the loss of life, property, infrastructure and cultural resources throughout the town of Lunenburg from natural disasters through a multiple hazard mitigation program that involves increased coordination, planning, education, and capital improvements.

- Objective:** To provide adequate shelter, water, food, and basic first aid to displaced residents in the event of a natural disaster, and to provide adequate notification and information regarding evacuation procedures, *etc.*, to residents in the event of a natural disaster.
- Objective:** to increase coordination between inter-departments in pre-disaster planning, post-disaster recovery and continuous hazard mitigation implementation.
- Objective:** Increase awareness of hazard mitigation among town officials, private organizations, businesses, and the general public.

4. **Objective:** To ensure that critical infrastructure sites are protected from natural hazards, and to maintain existing mitigation infrastructure in good condition.
5. **Objective:** To educate the public about the threat of natural hazards and the possible mitigation measures that can be taken to protect public health and safety, as well as infrastructure and property; and to educate the public as well about zoning and building regulations, particularly regulations that relate to new construction.
6. **Objective:** To encourage future development in areas that are not prone to natural disasters.
7. **Objective:** To identify existing shelters that are earthquake resistant as well as outside of floodplain and inundation areas. Disseminate this information to appropriate Town departments.
8. **Objective:** To inventory supplies at existing shelters and develop a needs list and storage requirements; and to establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster.
9. **Objective:** To maintain a Town-wide notification system including the Town's Public Safety Reverse 911 systems, the School Department's R-911 system and various media outlets.
10. **Objective:** To collect, periodically update, and disseminate information on which local radio stations provide emergency information, what to include in a 'home survival kit,' how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to follow during a natural disaster.

Specific Natural Hazard Goals for Lunenburg

Goal Statement for Flooding: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to flooding. And to pursue prevention activities which include planning, zoning, open space preservation, floodplain and wetland development regulations, storm water management, waterway dumping regulations, watershed protection measures, and best management practices, as well as, soil erosion, building ordinances, and subdivision regulations.

1. **Objective:** To implement standards in the Subdivision Rules and Regulations to require temporary and permanent erosion control measures for streams and surface water bodies.
2. **Objective:** To add more specific requirements to address flood related issues in the Special Permit and Site Plan Approval provisions in the Lunenburg Zoning Bylaw including topographic change, removal of cover vegetation, risk of erosion or siltation and increased stormwater runoff.
3. **Objective:** To identify all structures throughout Town that need to be elevated above the base-flood elevation.
4. **Objective:** To Develop a priority list and seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town.

Goal Statement for Protection from Beavers: To minimize the threat to health, the damage to roads and property, and the disruption of governmental services and general business activities due to flooding caused by beavers.

1. **Objective:** Support local town departments to continue present methods to prevent beaver caused flooding.
2. **Objective:** Seek assistance from beaver management professionals, including trappers.
3. **Objective:** Install beaver management devices.

Goal Statement for Hurricanes and Tornadoes: To minimize the loss of life, damage to property, and

the disruption of governmental services and general business activities due to high winds associated with hurricanes and tornadoes. (The objectives listed above, under flooding, address the flooding that can result from a hurricane.)

1. **Objective:** To educate residents and volunteers regarding the safe methods and actions necessary to deal with hurricanes and tornados.

Goal Statement for Winter Related Hazards: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to severe snow and ice storms.

1. **Objective:** To develop a plan for providing access to water, information, shelter, and food stores to people in remote locations in Lunenburg in the event of a severe winter storm.

Goal Statement for Dam Failure: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to dam failures.

1. **Objective:** To identify sources of funding for dam safety inspections. *My notes "Become maintain a compliance with Office of Dam Safety."*

Goal Statement for Earthquakes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to earthquakes.

1. **Objective:** To evaluate all Shelters and Reception Centers to determine if they are earthquake resistant.
2. **Objective:** To insure that all identified shelters have sufficient back-up utility service in the event of primary power failure.

Goal Statement for Drought: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to drought.

1. **Objective:** Prepare a Water Conservation Plan for Lunenburg.

Goal Statement for Wildfires/Brushfires: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to wildfires/brushfires.

1. **Objective:** Develop and distribute an educational pamphlet on fire safety and prevention.
2. **Objective:** Consider amending the Subdivision Rules and Regulations and Required Improvements section to include fire suppression provisions for new residential developments.

Goal Statement for Weather Extremes: To minimize the loss of life and the threats to public health and safety.

1. **Objective:** To develop and distribute educational information regarding the threats from extreme heat and cold.
2. **Objective:** To educate the residents as to the causes and effects of global warming; and how it affects the residents of Lunenburg, and what they could be doing to help improve the situation.

Mitigation Action Plans and Prioritization of Actions (STAPLEE)

Initial Mitigation Action Plans for the Montachusett Communities were presented in the communities Hazard Mitigation Plans that were approved by FEMA in 2009 and 2010. The original Mitigation Action Plans were developed through an inventory of potential hazards which could impact the community and an evaluation of a range of alternatives to address these hazards. As part of the plan update process,

the original Mitigation Action Plan was reviewed by the community's Local Hazard Mitigation Planning Team/Emergency Management Committee to delete actions which have already been completed, add additional actions which are either underway or planned to be undertaken, and to update the current status of all actions. The goals were reviewed and updated at the second meeting with each community.

An additional step in this process was to conduct a "STAPLEE" analysis for each action to prioritize all actions within each community and a subjective evaluation of each action's perceived cost/benefit. In the 2008 plan, actions were not prioritized so there were no changes in priorities in this update. The revised Community Mitigation Action Plans matrices that follow identify each mitigation action, the responsible department or board responsible for implementation, potential funding sources, the timetable of the action, results of the prioritization of actions through the STAPLEE analysis, and the perceived cost/benefit for each mitigation action.

The goal of each identified strategy, or mitigation action, is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each action to establish priorities for implementation, using the "STAPLEE" method. The STAPLEE methodology was developed by the Federal Emergency Management Agency as a tool to help communities prioritize their hazard mitigation strategies and determine the most appropriate actions for implementation. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**ministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of an action and is designed to be used by public officials and planners for making planning decisions.

To conduct the STAPLEE exercise, the community's Hazard Mitigation Team was asked to rate each action in their Mitigation Action Plan on each of the following criteria, using a score of 1 to 3 (Good = 3, Average = 2, Poor = 1):

- **Social:** Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- **Technical:** Will the proposed strategy work? Will it create more problems than it solves?
- **Administrative:** Can the community implement the action? Is there someone to coordinate and lead the effort?
- **Political:** Is the action politically acceptable? Is there public support both to implement and to maintain the action?
- **Legal:** Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- **Economic:** What are the costs of this action? Does the cost seem reasonable for the size of the problem and the likely benefits?
- **Environmental:** How will the action impact the environment? Will the action need environmental regulatory approvals?

These scores were then totaled, resulting in a final score of 7 (least priority) to 21 (highest priority) for each action. The higher the final score, the higher the relative priority of that action for implementation. This information can then be utilized in each community as they conduct and administer relevant municipal functions and activities. The final STAPLEE score for each action is shown in the following mitigation action plan.

The Hazard Mitigation team was also asked to do a relative cost/benefit of each action. This assessment was intended to informally indicate if an action will either have more benefits accrued to the Town than the Cost of implementing the action, or if the costs would exceed any benefits. Responses include: “Benefits Exceed Costs”, “Benefits Equal Costs, or “Costs Exceed Benefits”.

LUNENBURG IMPLEMENTATION STRATEGY FOR PRIORITY MITIGATION ACTIONS							
Type of Natural Hazard	Description of Action	Implementa- tion Responsibility	Resource/ Funding*	Timetable	Priority (STAPLEE SCORE)	Cost/ Benefit Evaluation	Status Update from 2008 Plan**
All Natural Hazards	Work with Neighboring Communities to Establish a Community Emergency Response Team (CERT) to more effectively respond to all natural hazards thus mitigating any damage.	Board of Selectmen, Police & Fire Departments, Emergency Management Director	Municipal Staff/ Volunteers	2015 - 2020	20	Benefits may exceed cost if grant funding available	Carried forward. Additional time needed due to lack of funding.
Flood Related Hazards and Geologic Hazards	Identify Existing Shelters that are Earthquake Resistant as well as Outside of Floodplain (and Dam Inundation) Areas to ensure that shelters are available to the public to reduce or eliminate the risk to human life.	Building Inspector, Emergency Management Director	Municipal Staff	2015 - 2020	13	Cost exceeds benefit	Carried forward due to time constraints.
Wildland Fire	Increase awareness by educating property owners on actions that they can take to reduce risk to property by hosting an Open House at the Fire Department, develop and distribute an Educational Pamphlet on Fire Safety and Prevention (SAFE PROGRAM) (SENIOR SAFE) and wildfire prevention.	Fire Department	Municipal Staff and State Funding (SAFE PROGRAM)	2015 - 2020	21	Benefit exceeds cost	Carried forward. Trying to prepare pamphlets with State funding. This action is undertaken periodically.

Natural All Hazards	Increase hazard education and risk awareness to public by Collecting, Updating, and Disseminating Information on Local Radio/TV Stations to educate the public and alert them of emergency information including shelter locations and other instructions related to all natural hazards	Emergency Management Director	Municipal Staff	2015 – 2020;	21	Benefit exceeds cost	Completed but carried forward. Ongoing effort. Lunenburg also uses other Media to disseminate such emergency information.
All Natural Hazards	Inventory Supplies at Existing Shelters and Develop a Needs List and Storage Requirements to ensure the available of adequate supplies during a natural hazard. Supplies must be adequate to eliminate or reduce risk to human life.	Emergency Management Planning Committee, School Facilities Manager	Emergency Management Director	2016 (12 months)	20	Benefit exceeds cost	Completed but carried forward. This action is undertaken on a periodic basis.
Flood Related Hazards	Identify all structures throughout the town that need to be Elevated above the Base-Flood Elevation. Once identified educate those property owners regarding their options for mitigation.	Building Inspector, Fire Department	Municipal Staff. Also 75% FEMA FUNDING AVAILABLE. Remaining 25% (non-federal)	2015 – 2020;	14	Cost exceeds benefit	Carried Forward. Building Footprint GIS Data recently became available from Mass GIS.
Flood Related Hazards	Inspect foundations at the time of completion before framing to determine if lowest floor is at or above base-flood elevation thereby limiting or restrict development in flood prone areas.	Building Inspector	Municipal Staff	2015-2020	21	Benefit exceeds cost.	New Action.

Flood Related Hazards	Require use of elevation certificates to improve compliance with NFIP.	Building Inspector	Municipal Staff	2015-2020	20	Benefits exceed cost.	New Action.
Flood Related Hazards	To Develop a priority list and possibly seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town to reduce or eliminate flooding risk.	Board of Selectmen, Highway Department	Municipal Staff/ FEMA HMGP grant 75%	2015 – 2020	19	Benefit exceeds cost	Priority list completed. Town does this on ongoing basis. Lack of municipal match to apply for grant.
Flood Related Hazards	Continue participation in the National Flood Insurance Program to enable property owners to purchase insurance protection against flood losses.	Board of Selectmen, Conservation Commission	FEMA/ME MA	2015 – 2020	14	Benefit exceeds cost	Completed but carried forward. Town continues to participate in NFIP.
Other Natural Hazards (Wildland fire)	Identify areas with potential for brush fires to track community vulnerability by developing and maintaining a data base.	Department of Public Works	Municipal Staff and Unitil (Electric Company)	2015 – 2020	19	Benefit exceeds cost	New Action.
Flood Related Hazards	Install "beaver diverters" and water control devices to mitigate flooding caused by beaver dams.	Department of Public Works	Municipal Staff	2015 – 2020	14		Carried forward. Action will be implemented as necessary.
Flood Related Hazards	Hire trapper for removal of beavers to mitigate flooding caused by beaver dams.	Department of Public Works	Municipal Staff	2015 – 2020	21	Benefit exceeds cost	Completed Carried forward. This action is implemented as necessary.

All Natural Hazards	Increase hazard education and risk awareness to public by purchasing and distributing educational materials at public facilities and events and the town's website regarding protection from natural hazards	Emergency Management Director	Board of Selectmen	2015 – 2020;	20	Benefit exceeds cost	Completed but carried forward.
All Natural Hazards	Implement recommendations regarding natural hazard mitigation in existing planning documents including the master plan, five year action plan of the open space and recreation plan and the emergency evacuation plan	Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	2015 – 2020	20	Benefit exceeds cost	Carried over due to lack of funding and time constraints. New action.
All Natural Hazards	Development of an educational effort that includes distribution of educational materials regarding protection from natural hazards as well as NFIP, insurance and building code explanatory pamphlets or booklets at Public Safety Building, Town Hall as well as on the town's website. Also enhance local officials, builders, developers, local citizens and other stakeholder's knowledge of how to read and interpret the FIRM.						

Flood Related Hazards	Participate in free NFIP training offered by State and/or FEMA that addresses flood hazard planning and management.	EMD	Free training	2015-2020	21	Benefit exceeds cost.	New Action.
Flood Related Hazards	Adopt revisions to Subdivision Regulations, erosion control regulations, board of health regulations to improve flood hazard management.	Planning Board/Board of Health	Municipal Staff	2015-2020	21	Benefit exceeds cost.	New Action.

*Unless otherwise noted, Lunenburg’s Resources/Funding consists of elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

All mitigation actions from the 2008 Montachusett Region Hazard Mitigation plan remain in effect.

Petersham Natural Hazard Risk Assessment

While this annex focus’ pertains to critical facilities, flooding, risk assessment, existing protections and mitigation strategy in the community, more detailed descriptions of each natural hazard’s impact on the region and its communities and summary of vulnerability can be located in the regional section entitled “ 4. Identification of Natural Hazards, Identifying and Profiling Hazards”.

Community Profile

The Town of Petersham is located in the North Quabbin Region of North Central Massachusetts. It is bordered by Athol on the northwest, Phillipston on the northeast, New Salem and the Quabbin Reservoir, and Hardwick on the west and south, and Barre on the southeast. Petersham is 29.4 miles northwest of Worcester, 87 miles west of Boston, 44.3 miles northeast of Springfield, and 186 miles from New York City.

The town of Petersham covers an area of 68.31 square miles with a resident population 1,234, according to the 2010 US Census, with a density of 18 people per square mile. The total number of housing units is 546 with an average household size of 2.43 people. The median age of Petersham residents is 48.

Petersham was first settled in 1733 when Massachusetts granted to 71 proprietors house lots ranging from 55 to 100 acres around Petersham’s central ridge. The remainder of the land was assigned to these same proprietors in four subsequent subdivisions, the last of which occurred in 1770. In most cases the proprietors themselves did not settle on these lots, but relatives or other representatives came instead. Petersham was officially incorporated in 1754. On February 4, 1787, it was the site of the second battle of Shays’ Rebellion. The town is noted for its common, part of the Petersham Historic District. About 45 buildings are listed on the National Register of Historic Places.

The Town is ranked third in the Commonwealth in size, is easily reached from both Route 2 and the Massachusetts Turnpike. The elegant town common is the centerpiece of the Petersham Historic

District, listed in the National Register of Historic Places. Some 45 buildings, mostly built in the early nineteenth century are included in the district. Many of Petersham's 1200+ residents live near the village center, the remainder being scattered throughout the town in an assortment of country dwellings, new and old. Aside from its attractiveness, Petersham is blessed with a varied population desiring both to preserve and enjoy the beauty around them.

An outstanding feature of Petersham is its wealth of conservation land, including not only the thousands of acres of the DCR's Quabbin Reservation, but also a number of large tracts maintained by the Division of Fisheries and Wildlife, the Harvard Forest, the Audubon Society and the Trustees of Reservations. As a result, the sighting of bald eagles, white-tailed deer, wild turkeys, raccoons and many other forms of wildlife is common. Cultural and recreational facilities in Petersham are many and varied, including the Petersham Craft Center, the Historical Society with its museum, the Memorial Library, Curling Club, the Fisher Museum at Harvard Forest, summer band concerts staged at the renovated band stand, impressive Memorial Day ceremonies, numerous hiking and skiing trails, the Gun Club, Cultural Council Art Show and Sale, and other events sponsored by the American Legion, the Grange, the Lions Club and the three churches. Harvard School of Forestry is the largest employers in the Town.

Critical Facilities

In general usage, the term "critical facilities" is used to describe all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired.

Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even access to damaged areas.

The number and nature of critical facilities in a community can differ greatly from one jurisdiction to another, and usually comprise both public and private facilities. In this sense, each community needs to determine the relative importance of the publicly and privately owned facilities that deliver vital services, provide important functions, and protect special populations. *Source: Federal Emergency Management Administration, Risk Management Series, Design Guide for Improving Critical Facility Safety from Flooding and High Winds, FEMA 543, January 2007.*

A list of the critical facilities within the community is shown in Table 61. This data was obtained from the community's Comprehensive Emergency Management Plan (CEMP). The data was then reviewed by the Emergency Management Director. These facilities were digitized into GIS and used for determining vulnerability to the various hazards. The map that follows entitled FEMA Q3 Flood Zones and Critical Infrastructure depicts Critical Facilities in the community.

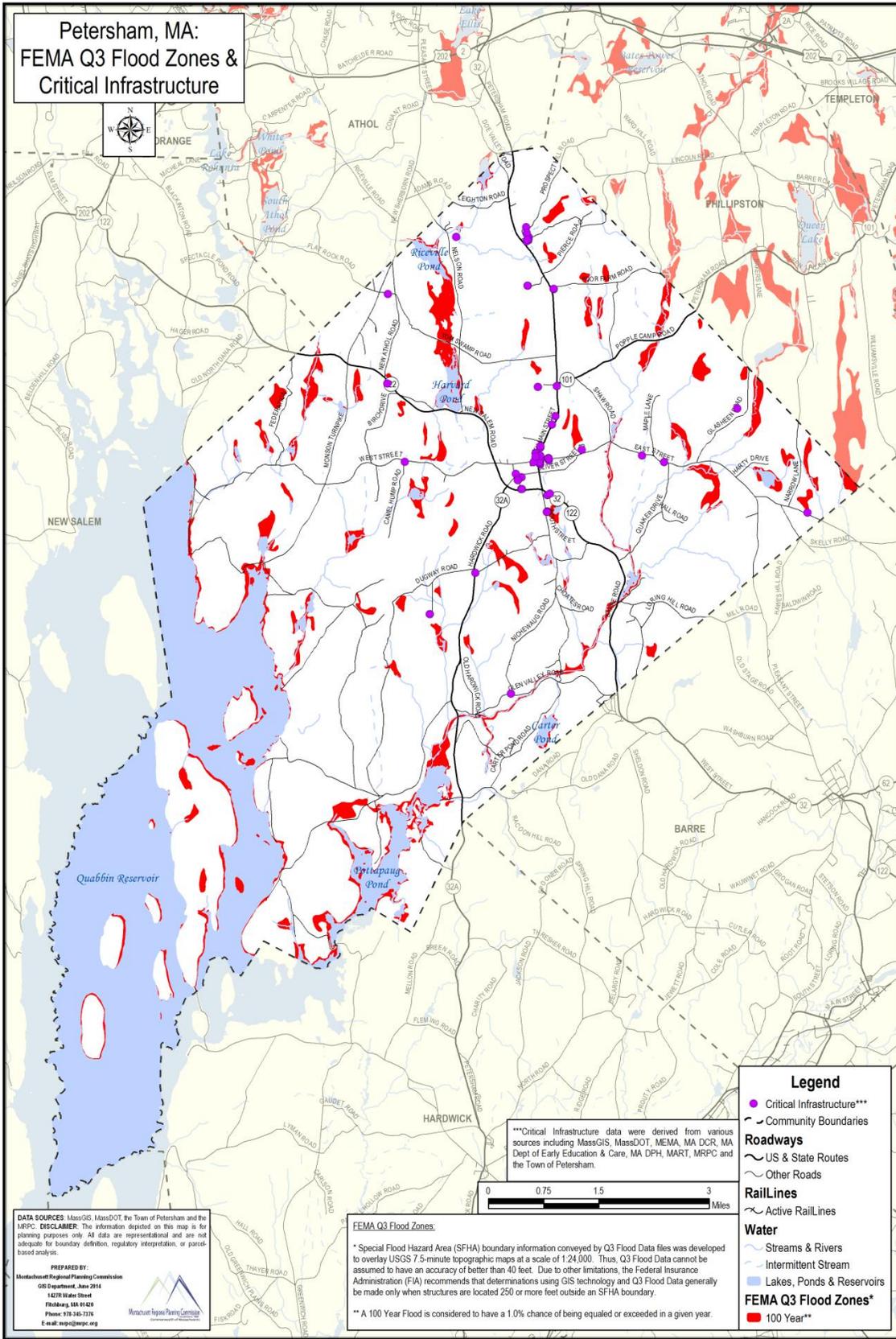
Table 61: Critical Facilities

Feature Type	Name	Address
City/Town Halls	Petersham Town Hall	1 South Main Street
City/Town Halls	Petersham Town Office Building	3 South Main Street
College	Harvard University	324 North Main Street
Public Water Supply*	Petersham Curling Club	250 North Main Street
	Petersham Town Hall	1 South Main Street
	Harvard Forest	
	Harvard Forest	
	Petersham Center School	3 Spring Street
	Petersham Montessori School	
	Petersham Country Store	2 North Main Street
	Quabbin Woods Restaurant	8-10 Barre Road
	Harvard Forest	
	St. Mary's Monastery	271 N Main
	St. Scholastica Priory	271 N Main
	Most Holy Trinity Monastery	67 Dugway Road
	Winterwood B&B	19 North Main
	Clamberhill B&B	111 North Main
DPW Facilities	Petersham Highway Building	31 South Street
Early Education Childcare Facilities	Petersham Montessori School	28 New Salem Road
	Boeri, Islay	107 N Main Street
Emergency Dispensing Sites	Petersham Town Hall	1 South Main Street
	Petersham Center School	2 Spring Street
Emergency Shelters	Petersham Center School	2 Spring Street
	Petersham Town Hall	1 South Main Street
End of Life Facilities	West Road Cemetery	West Road
	Ledgeville Cemetery	East Street
	East Street Cemetery	East Street
	Nichewaug Cemetery	Nichewaug Road
	Coolidge Cemetery	Hardwick Rd
	Northwest Cemetery	Flat Rock Road
	Mann Cemetery at Harvard Forrest	326 N. Main Street
	Center Cemetery	North Main Street
Indian Cemetery	Old East Street	
Emergency Operations Centers	Petersham Police Station	15 East Street
	Petersham Town Office Building	3 South Main Street
Fire	Petersham Fire Station	16 East Street

HazMat Sites**	Harvard Forest Complex	326 N Main Street
	Petersham Highway Department	31 South Street
	Nichewaug Inn	On The Common
Other Critical Facilities	Fisher Museum of Forestry	25 Prospect Hill Road
	Petersham Craft Center	8 North Street
	Harvard Forest Complex	326 N Main Street
	Verizon Switching Station	13 East Street
	Petersham Country Store	2 North Main Street
	St. Mary's Monastery	271 N Main
	St. Scholastica Priory	271 N Main
	Most Holy Trinity Monastery	67 Dugway Road
	Winterwood B&B	19 North Main
	Clamberhill B&B	111 North Main
	Petersham Package Store	9 Barre Road
	Quabbin Reservoir Watershed	Gate 31
	Other Government Buildings	Petersham Highway Department
Petersham Town Office Building		3 South Main Street
Petersham Post Office		32 Spring Street
Nichewaug Inn (uninhabited)		On The Common
Petersham Historical Society		10 North Main Street
Ledgeville School (uninhabited)		191 East Street
Petersham Animal Control Facility		31 South Street
Police	Petersham Police Station	15 East Street
School	Petersham Center School	2 Spring Street
	Petersham Montessori School	28 New Salem Rd
Sports And Cultural Areas	St. Peter's Catholic Church	18 North Main Street
	Petersham Curling Club	250 North Main Street
	First Parish Unitarian Universalist Church	7 Common St
	Petersham Gun Club	158 Nelson Road
	Petersham Congregational Church	21 North Main Street
	Earthlands	39 Glasheen Road
	Petersham Historical Society	10 North Main Street
	Petersham Memorial Library	23 Common Street

*As stated in 310 CMR 22.02, a Public Water System means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year” (Mass GIS, 2014).

**None of the Hazard Sites meet Sara Title 3 requirements.



Flood Prone Areas

Particular areas within the community where the risk of flood areas are or could occur were determined at the first meeting of the Petersham Local Hazard Mitigation Team held on May 14, 2012. This information can be found on Petersham's Local Hazard Map which is located under the section entitled Risk Assessment.

Flooding Vulnerability Assessment

An analysis of the FIRM flood hazard area maps indicates that there is a total of 11204.06 acres of 100-year floodplain within Petersham. This amounts to 25.65% of the total town. Based on additional analysis, 8.64 acres (0.08%) of the floodplain are developed. Currently there are 10 structures in the floodplain which is about 0.87% of the total structures in the community. The buildings are then multiplied by the building value, as determined by the MA Department of Revenue, to come up with a potential loss of \$16,521,200.

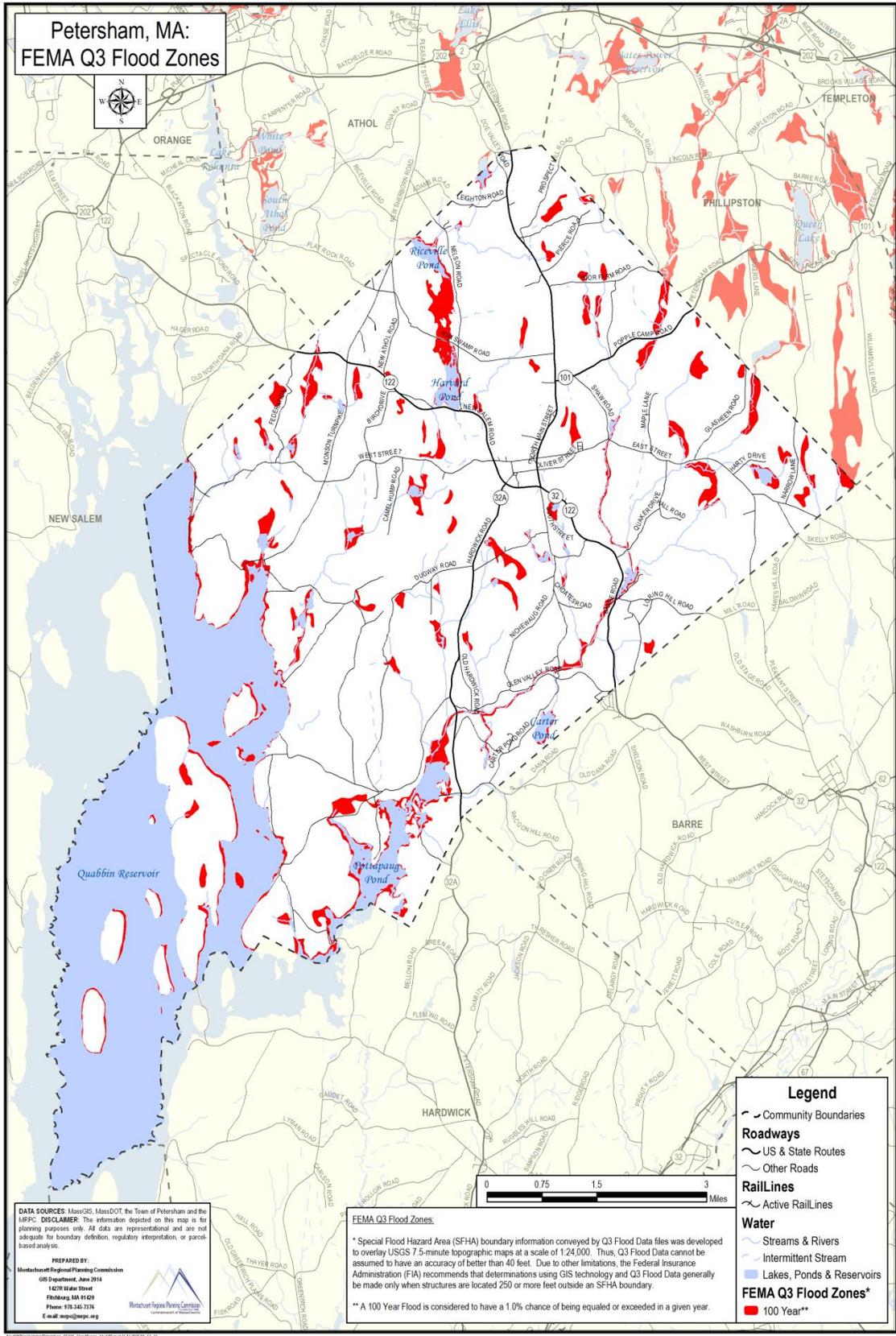
Excluding dams and bridges there are there are no critical facilities within the 100 year flood zone.

Since the initiation of the National Flood Insurance Program (NFIP), there have been no flood insurance claims in the Town of Petersham. There are no repetitive loss properties in Petersham. Statistics from the NFIP BureauNet indicate in the town of Petersham there is one flood insurance policy in force. The map that follows entitled FEMA Q3 Flood Zones depicts the 100 year flood zones in the community.

Floodplain Management and Compliance with NFIP

The town supports floodplain management activities in an effort to meet compliance of the National Floodplain Insurance Program. These efforts include:

- Implementing the MA Wetlands Protection Act regulating development and activity within the wetlands buffer zone and regulating stormwater and other point source discharge.
- Continued maintenance of municipal stormwater drainage system which includes regular cleaning of catch basins, storm drains and culverts.
- Continued maintenance of public water bodies to reduce flooding caused by erosion and water displacement.
- Enforcement of the Natural Resource Protection Bylaw which mitigates possible flooding events by designating protected open space within a development which in turn treats stormwater runoff through the means of natural infiltration.



Structurally Deficient Bridges Over Waterways

Petersham has one bridge over water that is classified by MassDOT as “structurally deficient”. The bridge is on Glen Valley Road over East Branch Swift River.

Hazard Potential of Dams

The DCR Office of Dams Safety lists 11 dams in the Town of Petersham as shown in Table 62. There are three dams that are classified as significant hazards.

Classifications for potential hazards are in accordance with the chart below.

Hazard Potential Classification

High Hazard	Refers to dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
Significant Hazard	Refers to dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities
Low Hazard	Refers to dams located where failure may cause minimal property damage to others. Loss of life is not expected.

Source: MA Department of Conservation and Recreation Office of Dam Safety

High hazard dams must be inspected every two year, significant hazard every five years, and low Hazards dams every 10 years. Owners of dams are responsible for having their dam inspected. MGL Chapter 253 and 302 CMR 10.00 requires that dam owners prepare, maintain and update Emergency Action Plans for all High Hazard Potential dams and certain Significant Hazard Potential dams.

Non-jurisdictional dams are not regulated by the Office of Dam Safety or under their jurisdiction. Typically these dams are under 6 feet in height and/or under 15 acre-feet in storage and do not have an assigned 'Hazard Code'. Dams owned and regulated by the Federal Government are also typically non-jurisdictional but DO have an assigned Hazard Code.

Table 62: Dams

Town	Dam	Hazard Code	Owner
Petersham	Brown Pond	Low Hazard	Private
Petersham	Gavco Pond Dam	Low Hazard	Public
Petersham	Davenport Pond Dam	Low Hazard	Public
Petersham	Marsh Pond Dam	Low Hazard	Private
Petersham	Farm Pond Dam	N/A	Private
Petersham	Trout Pond Dam	N/A	Private
Petersham	Davenport Pond Dike	N/A	Public
Petersham	Fever Brook Dam	N/A	Private
Petersham	Connor Pond Dam	Significant Hazard	Private
Petersham	Carter Pond Dam	Significant Hazard	Private
Petersham	Harvard Pond Dam	Significant Hazard	Private

*N/A – Information not available as the dam is non-jurisdictional.

Risk Assessment

As previously stated, located in Section 4. Identification of Natural Hazards, Identifying and Profiling Hazards”, there is a description of each identified hazards’ impact on the region and its communities as well as an overall summary of vulnerability. Based on the hazards identified in this plan and the assessment of risks by the Town of Petersham, the town considers itself to be at a high risk for Heavy Rain, Snow Melt, Beavers, High Winds, Hurricanes, Nor’easters, Severe Thunderstorms, Heavy Snow, Ice Storms, Blizzard; moderate risk for Dam Failure, Brides, Tornados, Wildland Fire, Extreme Temperatures, and Earthquakes; low risk for Ice Jams, Major Urban Fires, Drought, and Landslides ~~of course zero~~ and unlikely risk for tsunami.

This information is documented in Petersham’s Natural Hazard Matrix below which was obtained from participants at the Petersham Local Hazard Mitigation Team Meeting held on May 14, 2012.

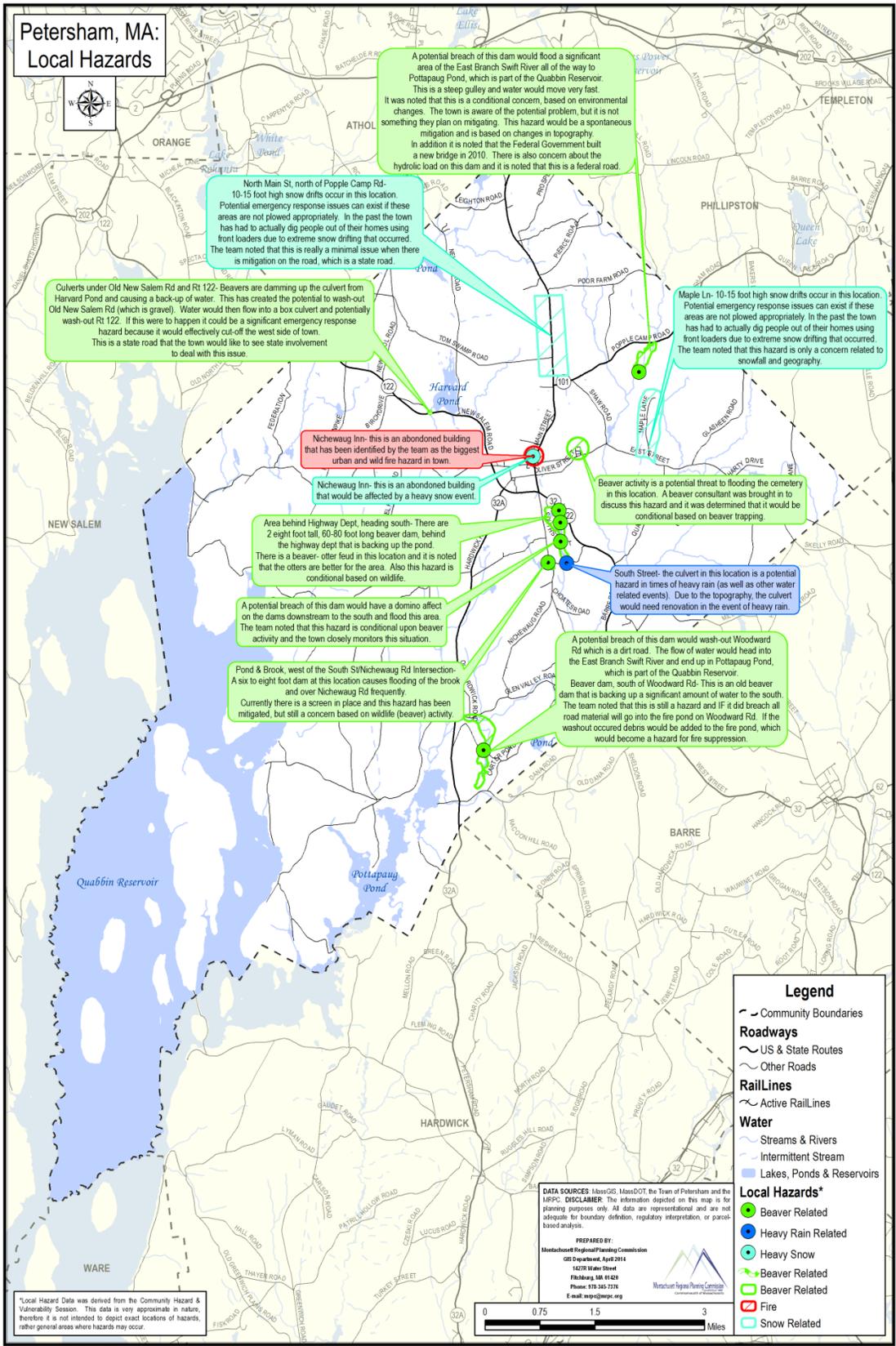
Petersham Natural Hazard Matrix

Natural Hazard	Likelihood of Occurrence	Location	Impacts	Hazard Index
Natural Hazard Separated by Flood, Atmospheric Related and Winter Related, Other Natural Hazards, and Geologic Hazards	3 = Highly Likely 2 = Possible 1 = Unlikely	3 = Regional/State 2 = Multi Community/Regional 1 = Local/Town	4 = Catastrophic 3 = Critical 2 = Limited 1 = Negligible	Ranking Determined by Combining the Likelihood, Location and Impacts of a Natural Hazard
Flood-Related Hazards				
• Heavy Rain	3	2	2	7
• Snow Melt	3	2	2	7
• Dam Failure	2	2	2	6
• Ice Jams	1	1	1	3
• Beavers	3	1	3	7
• Bridges	2	1	3	6
Atmospheric Related and Winter Related Hazards				
• High Winds	3	2	3	8
• Hurricanes	3	2	4	9
• Tornados	2	2	4	8
• Nor'easters	3	2	3	8
• Severe Thunderstorms	3	2	2	7
• Heavy Snow	3	2	2	7
• Ice Storms	3	3	3	9
• Blizzard	3	3	3	9
Other Natural Hazards				
• Major Urban Fires	1	1	1	3
• Wildland Fire	2	2	2	6
• Drought	1	1	1	3
• Extreme Temperatures	2	1	1	4
Geologic Hazards				
• Earthquakes	2	2	4	8
• Landslides	1	1	1	3
• Tsunami	1	1	1	3

Key

Highly likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
 Possible: 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.
 Unlikely: Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.
 Catastrophic: Immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.
 Critical: Fast speed of onset or long duration of event resulting in devastating damage and loss of services for weeks or months.
 Limited: Moderate speed of onset or moderate duration of event, resulting in some damage.
 Negligible: Slow speed of onset or short duration of event resulting in little to no damage.

Also discussed at this meeting were the hazards that affect each community and the identification of specific problem areas in the community that need to be addressed. This included the identification of new hazards that were determined to pose a threat or community vulnerability which are detailed in Petersham's Local Hazards Map on the following page. The entire community is equally at risk to the following hazards: snow melt, ice jams, high winds, hurricanes, tornados, nor'easters, severe thunderstorms, ice storms, blizzards, drought, extreme temperatures, earthquakes and landslides.



Existing Protections

The original inventory of hazard mitigation actions which the Montachusett communities undertook for the 2008 Montachusett Region Hazard Mitigation Plan was reviewed and updated by each community at a meeting held in each community with the MRPC and the community's Local Hazard Mitigation Planning Team and, in some communities, the Emergency Management Committee. The attendees of the meetings can be found in Appendix A. The following matrices depict the updated inventory of what is currently being done to mitigate hazards by listing the programs and activities already in place. It includes a description of the protection measure, who is responsible, and improvements and changes that may be needed. This inventory was used by the Planning Team/Emergency Management Committee to identify gaps in existing protections that were then addressed through the development of this plan update.

Petersham

Type of Existing Protection	Description	Area Covered	Implementation Resources and Funding*	Improvements or Changes Needed
<u>Flood Related Hazards</u>				
Storm water management standards	State Regulation under the Wetlands Protection Act to regulate storm water and other point source discharge	Town-Wide	Enforced by the Petersham Conservation Comm. (Wetlands Protection Act) and Petersham Planning Board (Subdivision Control Law and site plan review)	Storm water management standards remain in effect. No improvements or changes needed.
Wetlands Protection Act (state) and	State and local laws regulating development and activity within wetland buffer zone	100-foot state buffer around wetland area; 200 foot buffer around river front areas	Enforced by the Petersham Conservation Commission.	No improvements or changes needed.
100 Year Flood Zone	Federal law requiring elevation above 100-year flood level of new and substantially improved residential structures in floodplain	100-year floodplain as shown on Flood Insurance Rate Map dated January 23, 1979.	Enforced by the Building Inspector (municipal staff) and Petersham Conservation Commission.	Update Insurance Flood Rate Maps
Maintenance of municipal storm water drainage system	Regular cleaning of catch basins, storm drains, and culverts	Town-Wide	Undertaken by the Highway Department municipal staff.	Maintenance continues but additional Personnel and Equipment Needed

Maintenance of public water bodies (ponds, streams, brooks, wetlands)	Periodic cleaning of waterways needed, e.g., remove trash, debris	Town-Wide	Undertaken by the Highway Department municipal staff with guidance from Petersham Conservation Commission.	Maintenance continues. No improvements or changes needed.
Inspection of major dams	Periodic inspections of the structural integrity of the dam	Major Dams	Directed by the Massachusetts Department of Conservation and Recreation, Office of Dam Safety.	Update Dam failure studies for the dams rated as high hazard
Wind Related Hazards				
State Building Code	State Law related to design loads to include wind effects	Town-Wide	Enforced by Building Inspector (municipal staff).	Continued enforcement remains in place. No improvements or changes needed.
Tree Maintenance	Regular inspection and tree maintenance to cut branches threatening power lines and overhead utilities	Town-Wide	National Grid (Electric Company) and tree warden (municipal staff).	Tree maintenance continues but additional Staff and funding needed.
Fire Related Hazards				
Limited Brush Clearing	Provide access to Emergency Service vehicles.	Town-Wide	State Highway Department, Town Highway Department (municipal staff), Harvard State Forest, Private Landowners, Massachusetts Department of Conservation and Recreation.	Brush clearing continues. Continue to identify additional Areas with Potential for Brushfires.
Winter Storms Related				
Residential Parking Bans	Parking Bans to Enable Snow Removal Effectively from Residential Streets	Town-Wide	State Highway Department, Municipal Town Police	Enforcement continues but additional funding, personnel and equipment needed.
Clearing Snow from Major Arterial Routes	Ensure Access for Emergency Service vehicles	Town-Wide	Highway Department (municipal staff) and State Highway Department	Snow removal continues but additional funding, personnel and equipment needed.

*Petersham enforcement/implementation is generally carried out by elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

Mitigation Goals, Objectives and Strategies

As discussed earlier in this Plan, MRPC previously prepared the 2008 Montachusett Region Hazard Mitigation Plan which consisted of individual annexes for each MRPC community. Similarly, as part of the multi-jurisdictional plan update, each community also developed their own individual goals, objectives and strategies which are listed in this section.

Overall Goal Statement: To prepared to reduce the loss of life, property, infrastructure and cultural resources throughout the town of Petersham from natural disasters through a multiple hazard mitigation program that involves increased coordination, planning, education, and capital improvements.

- 1. Objective:** To organize and prepare to provide adequate shelter, water, food, and basic first aid to displaced residents in the event of a natural disaster, and to provide adequate notification and information regarding evacuation procedures, *etc.*, to residents in the event of a natural disaster.
- 2. Objective:** To provide or activate shelters as needed in the event of a natural disaster.
- 3. Objective:** To continue to provide awareness of hazard mitigation and emergency response actions among town officials, private organizations, businesses, and the general public through websites and immediate notifications.
- 4. Objective:** To examine and update the current notification system including potential utilization of Code Red local notification system.

Specific Natural Hazard Goals for Petersham

Goal Statement for Flooding: To prepare emergency staff and volunteers in order to minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to flooding.

- 1. Objective:** To Develop a priority list and seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town.

Goal Statement for Protection from Beavers: To minimize the threat to health, the damage to roads and property, and the disruption of governmental services and general business activities due to flooding caused by beavers.

- 1. Objective:** Support local town departments to continue present methods to prevent beaver caused flooding.
- 2. Objective:** Install beaver management devices.

Goal Statement for Hurricanes and Tornadoes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to high winds associated with hurricanes and tornadoes. (The objectives listed above, under flooding, address the flooding that can result from a hurricane.)

- 1. Objective:** To continue to provide information to residents and volunteers regarding the safe methods and actions necessary to deal with Hurricanes and Tornados.

Goal Statement for Winter Related Hazards: To minimize the loss of life, damage to property, and the

disruption of governmental services and general business activities due to severe snow and ice storms.

1. **Objective:** Activate plans for providing access to water, information, shelter, and food stores to people in remote locations in Petersham in the event of a severe winter storm.

Goal Statement for Earthquakes: To continue to provide information to staff, residents and volunteers about the potential for earthquakes and share information to minimize the loss of life, damage to property, the disruption of governmental services and general business activities due to earthquakes.

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Goal Statement for Earthquakes: To continue to provide information to staff, residents and volunteers about the potential for earthquakes and share information to minimize the loss of life, damage to property, the disruption of governmental services and general business activities due to earthquakes.

Mitigation Action Plans and Prioritization of Actions (STAPLEE)

Initial Mitigation Action Plans for the Montachusett Communities were presented in the communities Hazard Mitigation Plans that were approved by FEMA in 2009 and 2010. The original Mitigation Action Plans were developed through an inventory of potential hazards which could impact the community and an evaluation of a range of alternatives to address these hazards. As part of the plan update process, the original Mitigation Action Plan was reviewed by the community's Local Hazard Mitigation Planning Team/Emergency Management Committee to delete actions which have already been completed, add additional actions which are either underway or planned to be undertaken, and to update the current status of all actions. The goals were reviewed and updated at the second meeting with each community.

An additional step in this process was to conduct a "STAPLEE" analysis for each action to prioritize all actions within each community and a subjective evaluation of each action's perceived cost/benefit. In the 2008 plan, actions were not prioritized so there were no changes in priorities in this update. The revised Community Mitigation Action Plans matrices that follow identify each mitigation action, the responsible department or board responsible for implementation, potential funding sources, the timetable of the action, results of the prioritization of actions through the STAPLEE analysis, and the perceived cost/benefit for each mitigation action.

The goal of each identified strategy, or mitigation action, is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each action to establish priorities for implementation, using the "STAPLEE" method. The STAPLEE methodology was developed by the Federal Emergency Management Agency as a tool to help communities prioritize their hazard mitigation strategies and determine the most appropriate actions for implementation. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of an action and is designed to be used by public officials and planners for making planning decisions.

To conduct the STAPLEE exercise, the community's Hazard Mitigation Team was asked to rate each action in their Mitigation Action Plan on each of the following criteria, using a score of 1 to 3 (Good = 3, Average = 2, Poor = 1):

- Social: Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- Technical: Will the proposed strategy work? Will it create more problems than it solves?
- Administrative: Can the community implement the action? Is there someone to coordinate and lead the effort?
- Political: Is the action politically acceptable? Is there public support both to implement and to maintain the action?
- Legal: Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- Economic: What are the costs of this action? Does the cost seem reasonable for the size of the

problem and the likely benefits?

- Environmental: How will the action impact the environment? Will the action need environmental regulatory approvals?

These scores were then totaled, resulting in a final score of 7 (least priority) to 21 (highest priority) for each action. The higher the final score, the higher the relative priority of that action for implementation. This information can then be utilized in each community as they conduct and administer relevant municipal functions and activities. The final STAPLEE score for each action is shown in the following mitigation action plan.

The Hazard Mitigation team was also asked to do a relative cost/benefit of each action. This assessment was intended to informally indicate if an action will either have more benefits accrued to the Town than the Cost of implementing the action, or if the costs would exceed any benefits. Responses include: "Benefits Exceed Costs", "Benefits Equal Costs, or "Costs Exceed Benefits".

PETERSHAM IMPLEMENTATION STRATEGY FOR PRIORITY MITIGATION ACTIONS

Type of Natural Hazard	Description of Action	Implementation Responsibility	Resources/ Funding*	Timetable	Priority (STAPLEE SCORE)	Cost/Benefit Evaluation	Status Update from 2008 Plan**
Flood Related Hazards and Geologic Hazards	Identify Existing Shelters that are Earthquake Resistant as well as Outside of Floodplain (and Dam Inundation) Areas to ensure that shelters are available to the public during these type of hazards. Shelters must be identified and adequate to eliminate or reduce risk to human life.	Emergency Management Director	Municipal Staff	2015 – 2020	21	Benefit exceeds cost	Completed but carried forward. This is an ongoing effort and is included in the CEMP Plan.
All Natural Hazards	Inventory Supplies at Existing Shelters and Develop a Needs List and Storage Requirements to ensure the available of adequate supplies during a natural hazard. Supplies must be adequate to eliminate or reduce risk to human life.	Emergency Management Planning Committee, School Facilities Manager	Municipal Staff	2015 – 2020.	21	Benefit exceeds cost	Completed but carried forward. This is an ongoing effort and is included in the CEMP Plan.

Atmospheric and Winter Related Hazards	Maintain and integrate a Mitigation Plan into the community comprehensive plans to provide access to Water, Information, Shelter and Food Stores to People in Remote Locations of the town in the Event of a Severe Winter Storm.	Emergency Management Director	Municipal Staff/ Volunteers	2015 - 2020	21	Benefit exceeds cost	Completed. Carried forward as it is updated as needed.
Flood Related Hazards	Increase awareness by educating property owners regarding options for mitigating their properties from flooding through outreach programs that address measures that residents can take (i.e installing backflow valves, securing debris, etc.)	Emergency Management Director, Fire Department, Building Inspector	Municipal Staff, Property Owners	2015 - 2020	17	Benefit equals cost	Completed Carried forward. The town continually explores other options.

Other Natural Hazards (Wildland fire)	Identify areas with potential for brush fires to track community vulnerability by developing and maintaining a data base.	Tree Warden, Highway Department/ National Grid (Electric Company).	Municipal Staff and National Grid Staff funded through rate payers.	2015 - 2020	21	Benefit exceeds cost	New Action.
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*Unless otherwise noted, Petersham’s Resources/Funding consists of elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

**Actions identified as carried forward were not completed in the previous planning cycle unless otherwise stated.

Mitigation actions from the 2008 Montachusett Region Hazard Mitigation Plan that are complete follow:

- Developed and Distribute an Educational Pamphlet on Fire Safety and Prevention (SAFE PROGRAM).
- Ensured that all Identified Shelters have Sufficient Back-Up Utility Service in the Event of a Primary Power Failure.
- Developed a Mitigation Plan to provide access to Water, Information, Shelter and Food Stores to People in Remote Locations of the town in the Event of a Severe Winter Storm.
- Work with Neighboring Communities to Establish a Community Emergency Response Team (CERT).

Phillipston Natural Hazard Risk Assessment

While this annex focus’ pertains to critical facilities, flooding, risk assessment, existing protections and mitigation strategy in the community, more detailed descriptions of each natural hazard’s impact on the region and its communities and summary of vulnerability can be located in the regional section entitled “ 4. Identification of Natural Hazards, Identifying and Profiling Hazards”.

Community Profile

The Town of Phillipston is located in Central Massachusetts. Phillipston is bordered on the north by Royalston, on the east by Templeton, on the south by Barre and Hubbardston, on the southwest by Pete sham, and on the west by Athol. It is 34 miles from Worcester, 65 miles from Boston, and 180 miles from New York City in the Montachusett Region, about 20 miles west of Fitchburg and is bisected by Route 2.

The town of Phillipston covers an area of 24.64 square miles with a resident population of 1,682, according to the 2010 US Census, with a density of 63 people per square mile. The total number of housing units in Phillipston is 802 with an average household size of 3.66. The median age of Phillipston residents is 42.

In 1728 and 1732 the Massachusetts General Court granted land to soldiers who participated in King Phillips War and wars against the Narragansett Indians. The area was known as Narragansett No. 6, and included what are now Templeton and the greater part of Phillipston. Families were given a cash incentive to move into these unsettled areas. In time a number of families moved into the area after 1750, and a church was built on Templeton Common. This location was a long and difficult trek for

those in the western parts of the area to go to church and town meetings. On February 15, 1774 the residents of this area petitioned the General Court to become a separate precinct. This tract of land was partly in Templeton, and partly in Athol, and became Templeton West Precinct.

The West Precinct was granted its request to become a town and this was approved on October 20, 1786. The town became known as “Gerry” after Eldridge Gerry who was on the General Court of Massachusetts, and represented the Commonwealth in Congress, and he was a signer of the Declaration of Independence. The name “Gerry “ was repudiated by a petition to the General Court asking for a change in the name of the town to Phillipston, in honor of William Phillips, Lieutenant Governor of the state for twelve consecutive terms. The change was granted on February 5, 1814.

During the 1700’s the main means of survival was farming. Prior to the coming of the railroad in 1835, stage coaches carried passengers to Boston and freight moved by horse drawn wagons. The wagons carried produce, as well as, beef, pork, veal, butter, eggs, poultry, oats, rye, and other farmed products. These trips were said to take a week to go and return. The return trips brought groceries, cheese, sugar, fish, hardware, New England Rum, and leather for the local shoe making.

Queen Lake was the source for the first dam in 1826. Enough water power was produced to power the Damon and Goulding Mills that in 1837 produced 165,000 yards of cotton cloth and 11,500 yards of wool. In the same year, 65,000 palm-leaf hats were braided at another factory by women residents. Other industries included, sawmills, iron and tin works, leather goods, wood products, tanneries a grist mill, and cane seats for chair manufacturing. By 1900 most of the factories had either been relocated to areas served by the railroad or gone out of business.

Rural and remote, Phillipston is marked by forests, winding roads and historic stone walls; it serves as the northern entrance to the Quabbin Reservoir. Phillipston’s one village - the historic town center - is comprised of a town common ringed by numerous municipal buildings, a school and 19th century homes. A small number of retail and food outlets are located several miles away, along busy Route 2A. Easy access to four-lane state highway Route 2 has made Phillipston an attractive and affordable bedroom community for workers along the Route 2 and 495 corridors.

The four major employers in the town are King Phillip Restaurant, Phillipston Fire Station, Phillipston Memorial Elementary School and the Red Apple Farm.

Critical Facilities

In general usage, the term “critical facilities” is used to describe all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, if destroyed, damaged, or if their functionality is impaired there may be the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if.

Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the

community to be of critical importance for the protection of the health and safety of the population. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even access to damaged areas.

The number and nature of critical facilities in a community can differ greatly from one jurisdiction to another, and usually comprise both public and private facilities. In this sense, each community needs to determine the relative importance of the publicly and privately owned facilities that deliver vital services, provide important functions, and protect special populations. *Source: Federal Emergency Management Administration, Risk Management Series, Design Guide for Improving Critical Facility Safety from Flooding and High Winds, FEMA 543, January 2007.*

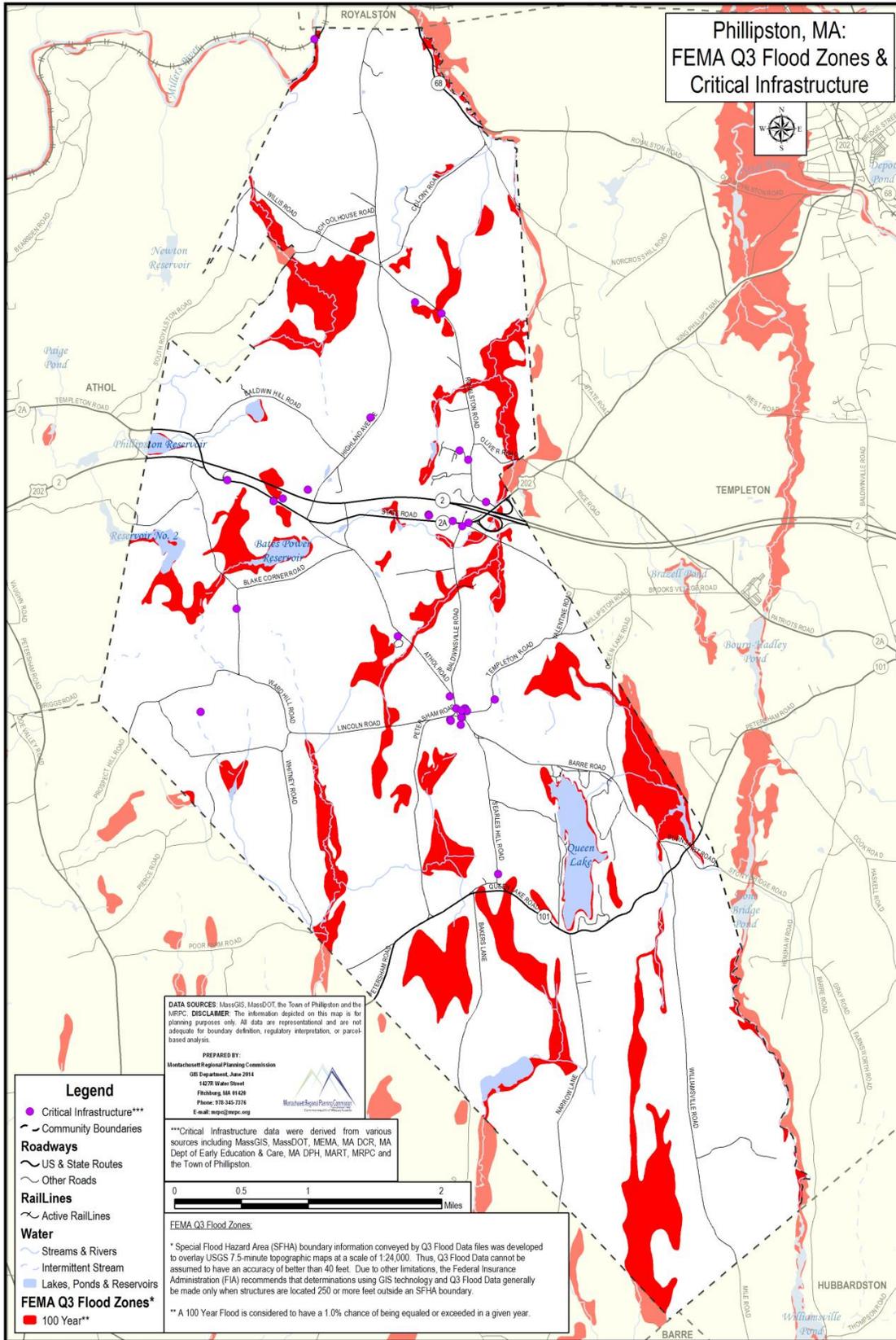
A list of the critical facilities within the community is shown in Table 63. This data was obtained from the community’s Comprehensive Emergency Management Plan (CEMP). The data was then reviewed by the Emergency Management Director and updated through input from town officials. These facilities were digitized into GIS and used for determining vulnerability to the various hazards. That map that follows entitled FEMA_Q3 Flood Zones and Critical Infrastructure depicts Critical Facilities in the community.

Table 63: Phillipston Critical Facilities

Feature Type	Name	Address
City/Town Halls	Phillipston Town Hall	50 The Common
	Town Hall Annex	15 Templeton Road
	Phillipston Memorial School	20 The Common
	Phillipston Liquor and Variety	325 State Road
	Lamb City Campground	85 Royalston Road
	King Phillip Restaurant	35 State Road
DPW Facilities	Phillipston Highway Department	50 The Common
Early Education Childcare Facilities (source:www.eec.state.ma.us)	Champagne, Sandra M.	10 Royalston Road
	Blissful Beginnings Preschool	395 Royalston Road
Emergency Shelters	Phillipston Memorial School	20 The Common
	Phillipston Public Safety Complex	90 State Road
	Phillipston Police Station	40 The Common
End Of Life Facilities	South Cemetery	175 Searles Hill Road
	Lower Cemetery	135 Athol Road
	Upper Cemetery	Junction of Athol and Baldwinville Roads
Emergency Operations Centers	Phillipston Public Safety Complex	90 State Road
	Phillipston Town Hall	50 The Common
	Phillipston Police Department	40 The Common
Fire	Phillipston Public Safety Complex	90 State Road
Hazmat Sites	Phillipston Highway Department	50 The Common

Other Critical Facilities	Red Apple Farm	455 Highland Ave
	Guilford Rail Trestle	Rail Line At Millers River
	Lamb City Campground	85 Royalston Road
	Phillipston Liquor and Variety	325 State Road
	Grace Quality Auto	320 State Road
Other Government Buildings	Phillips Public Library	25 Templeton Road
	Phillipston Highway Department	95 Templeton Road
	Phillipston Communication Tower #3	Fire Tower
	Phillipston Communication Tower #4	50 The Common
	Phillipston Communication Tower #2	Highland Avenue
	Emergency Management Facility	90 State Road
	Phillipston Communication Tower #5	90 State Road
Police	Phillipston Police Department	60 The Common
School	Phillipston Memorial School	20 The Common
Sports And Cultural Areas	Congregational Church	60 The Common
	Phillipston Historical Society	50 State Road

As stated in 310 CMR 22.02, a Public Water System means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year” (Mass GIS, 2014).



Flood Prone Areas

Particular areas within the community where the risk of flood areas are or could occur were determined at the first meeting of the Phillipston Local Hazard Mitigation Team held on June 21, 2012. This information can be found on Phillipston's Local Hazard Map which is located under the section entitled Risk Assessment.

Flooding Vulnerability Assessment

An analysis of the FIRM flood hazard area maps indicates that there is a total of 2277.68 acres of 100-year floodplain within Phillipston. This amounts to 14.45% of the total town. Based on additional analysis, 10.7 acres (0.47%) of the floodplain are developed. Currently there are 55 structures in the floodplain which is about 3.45% of the total structures in the community. The buildings are then multiplied by the building value, as determined by the MA Department of Revenue, to come up with a potential loss of \$43,657,500.

Excluding dams and bridges there are there are no critical facilities within the 100 year flood zone.

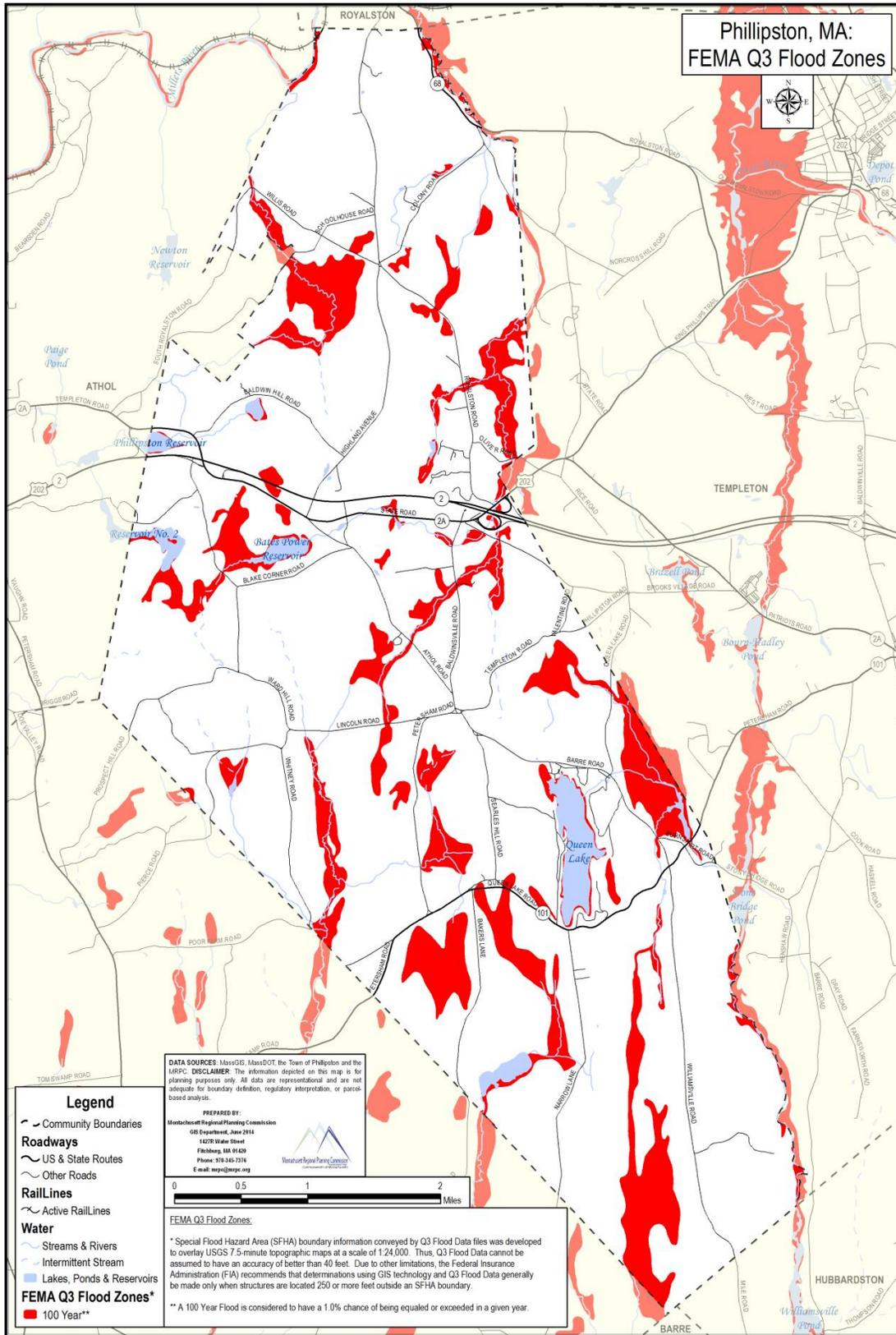
Since the initiation of the National Flood Insurance Program (NFIP), there have been no flood insurance claims in the town of Phillipston. There are no repetitive loss properties in Phillipston. Statistics from the NFIP BureauNet indicate in the town of Phillipston there are no flood insurance policies in force.

Floodplain Management and Compliance with NFIP

The town supports floodplain management activities in an effort to meet compliance of the National Floodplain Insurance Program. These efforts include:

- Implementing the MA Wetlands Protection Act regulating development and activity within the wetlands buffer zone and regulating stormwater and other point source discharge.
- Implementing the Town Flood Plain District Bylaw regulating development in the floodplain district.
- Continued maintenance of municipal stormwater drainage system which includes regular cleaning of catch basins, storm drains and culverts.
- Continued maintenance of public water bodies to reduce flooding caused by erosion and water displacement.

The map that follows entitled FEMA Q3 Flood Zones depicts the 100 year flood zones in the community.



Structurally Deficient Bridges Over Waterways

Phillipston does not have any bridges over water that are classified by MassDOT as “structurally deficient.

Hazard Potential of Dams

The DCR Office of Dams Safety lists 10 dams in the Town of Phillipston as shown in Table 64. There are four dams classified as significant hazards.

Classifications for potential hazards are in accordance with the chart below.

Hazard Potential Classification

High Hazard	Refers to dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
Significant Hazard	Refers to dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities
Low Hazard	Refers to dams located where failure may cause minimal property damage to others. Loss of life is not expected.

Source: MA Department of Conservation and Recreation Office of Dam Safety

High hazard dams must be inspected every two year, significant hazard every five years, and low Hazards dams every 10 years. Owners of dams are responsible for having their dam inspected. MGL Chapter 253 and 302 CMR 10.00 requires that dam owners prepare, maintain and update Emergency Action Plans for all High Hazard Potential dams and certain Significant Hazard Potential dams.

Non-jurisdictional dams are not regulated by the Office of Dam Safety or under their jurisdiction. Typically these dams are under 6 feet in height and/or under 15 acre-feet in storage and do not have an assigned 'Hazard Code'. Dams owned and regulated by the Federal Government are also typically non-jurisdictional but DO have an assigned Hazard Code.

Table 64: Dams

Name	Dam	Hazard Code	Owner
Phillipston	**Stone Bridge Reservoir Dam	Low Hazard	Public
Phillipston	Private Pond Dam	N/A	Private
Phillipston	Old Ice Pond Dam	N/A	Private
Phillipston	Cheney Pond Dam	N/A	Private
Phillipston	Moccasin Brook Dam	N/A	Private

Phillipston	Mill Pond Dam	N/A	Private
Phillipston	Queen Lake Dam	Significant Hazard	Public
Phillipston	Phillipston Reservoir Dam	Significant Hazard	Public
Phillipston	Bates Power Reservoir Dam	Significant Hazard	Public
Phillipston	Burnshirt River Dam	Significant Hazard	Public

*N/A – Information not available as the dam is non-jurisdictional.

**This dam is owned by Phillipston but located in Templeton.

Risk Assessment

As previously stated, located in Section 4. Identification of Natural Hazards, Identifying and Profiling Hazards”, there is a description of each identified hazards’ impact on the region and its communities as well as an overall summary of vulnerability. Based on the hazards identified in this plan and the assessment of risks by the Town of Phillipston, the town considers itself to be at a high risk for Heavy Rain, Snow Melt, Beavers, High Winds, Hurricanes, Nor’easters, Severe Thunderstorms, Heavy Snow, Ice Storms, Blizzard; moderate risk for Dam Failure, Brides, Tornados, Wildland Fire, Drought, and Extreme Temperatures; low risk for Ice Jams, Major Urban Fires, Earthquakes and Landslides; and tsunamis as not applicable.

This information is documented in Phillipston’s Natural Hazard Matrix below which was obtained from participants at Phillipston’s Local Hazard Mitigation Team Meeting held on June 21, 2012.

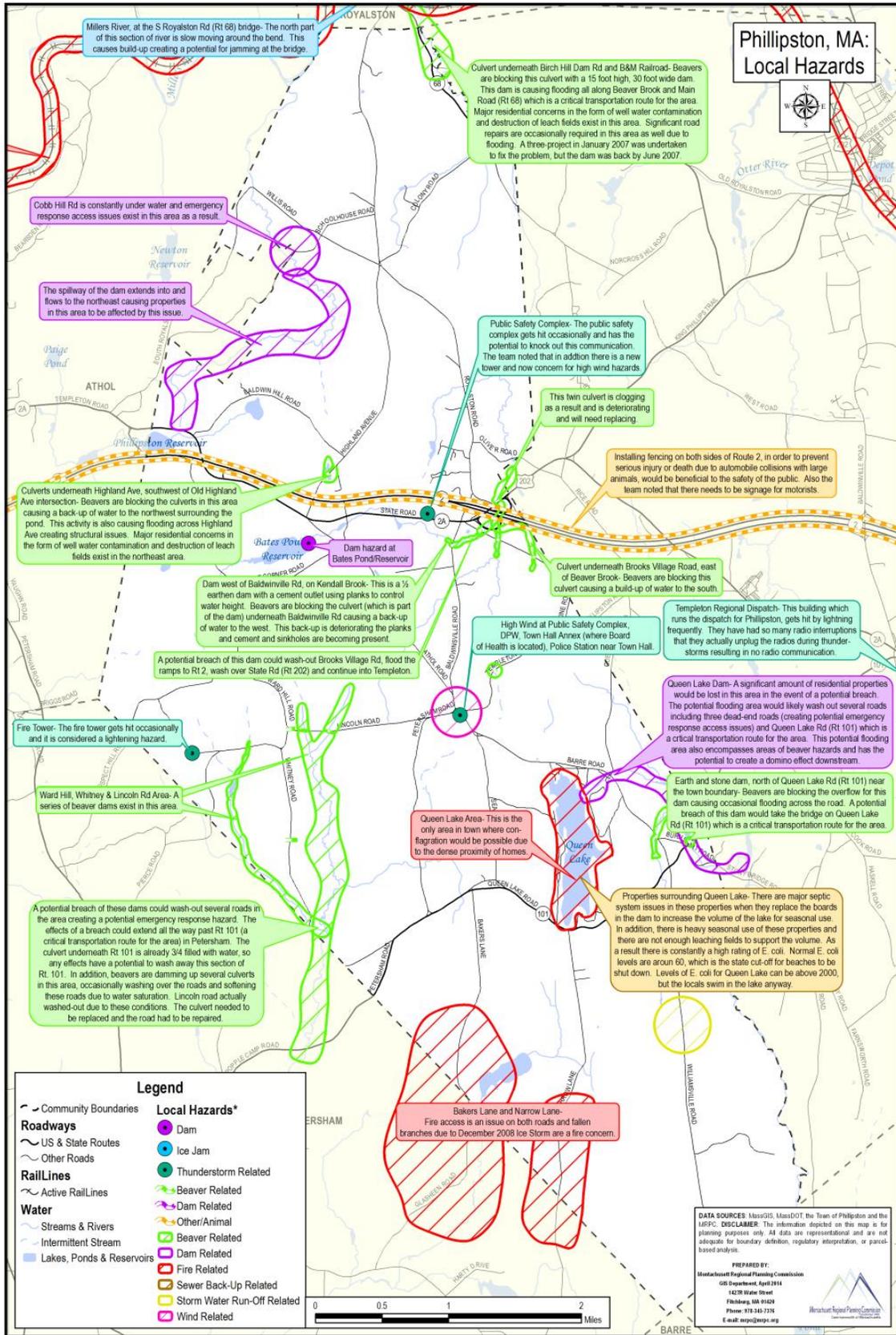
Phillipston Natural Hazard Matrix

Natural Hazard	Likelihood of Occurrence	Location	Impacts	Hazard Index
Natural Hazard Separated by Flood, Atmospheric Related and Winter Related, Other Natural Hazards, and Geologic Hazards	3 = Highly Likely 2 = Possible 1 = Unlikely	3 = Regional/State 2 = Multi Community/Regional 1 = Local/Town	4 = Catastrophic 3 = Critical 2 = Limited 1 = Negligible	Ranking Determined by Combining the Likelihood, Location and Impacts of a Natural Hazard
Flood-Related Hazards				
• Heavy Rain	3	2	2	7
• Snow Melt	3	2	2	7
• Dam Failure	2	2	2	6
• Ice Jams	1	1	1	3
• Beavers	3	1	3	7
Atmospheric Related and Winter Related Hazards				
• High Winds	3	2	3	8
• Hurricanes	3	2	4	9
• Tornadoes	2	2	4	8
• Nor'easters	3	2	3	8
• Severe Thunderstorms	3	2	2	7
• Heavy Snow	3	2	2	7
• Ice Storms	3	3	3	9
• Blizzard	3	3	3	9
Other Natural Hazards				
• Major Urban Fires	1	1	1	3
• Wildland Fire	2	2	2	6
• Drought	2	1	1	4
• Extreme Temperatures	2	1	1	4
Geologic Hazards				
• Earthquakes	1	2	4	7
• Landslides	1	1	1	3
• Tsunami	NA	NA	NA	NA

Key

Highly likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
 Possible : 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.
 Unlikely: Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.
 Catastrophic: Immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.
 Critical: Fast speed of onset or long duration of event resulting in devastating damage and loss of services for weeks or months.
 Limited: Moderate speed of onset or moderate duration of event, resulting in some damage.
 Negligible: Slow speed of onset or short duration of event resulting in little to no damage.

Also discussed at this meeting were the hazards that affect each community and the identification of specific problem areas in the community that need to be addressed. This included the identification of new hazards that were determined to pose a threat or community vulnerability which are detailed in Phillipston's Local Hazards Map on the following page. The entire community is equally at risk to the following hazards: heavy rain, hurricanes, tornados, nor'easters, heavy snow, ice storms, blizzards, drought, extreme temperatures, earthquakes and landslides.



Existing Protections

The original inventory of hazard mitigation actions which the Montachusett communities undertook for the 2008 Montachusett Region Hazard Mitigation Plan was reviewed and updated by each community at a meeting held in each community with the MRPC and the community's Local Hazard Mitigation Planning Team and, in some communities, the Emergency Management Committee. The attendees of the meetings can be found in Appendix 1: Meeting Attendance Table, Meeting #2. The following matrices depict the updated inventory of what is currently being done to mitigate hazards by listing the programs and activities already in place. It includes a description of the protection measure, who is responsible, and improvements and changes that may be needed. This inventory was used by the Planning Team/Emergency Management Committee to identify gaps in existing protections that were then addressed through the development of this plan update.

Phillipston

Type of Existing Protection	Description	Area Covered	Implementation Resources and Funding*	Improvements or Changes Needed
Flood Related Hazards				
Storm water management standards	State Regulation under the Wetlands Protection Act to regulate storm water and other point source discharge	Town-Wide	Enforced by the Phillipston Conservation Commission (Wetlands Protection Act) and Phillipston Planning Board (Subdivision Control Law and site plan review)	Storm water management standards remain in effect. No improvements or changes needed.
Wetlands Protection Act (state)	State law regulating development and activity within wetland buffer zone	100-foot state buffer around wetland area; 200 foot buffer around river front areas	Enforced by the Phillipston Conservation Commission	No improvements or changes needed.
100 Year Flood Zone	Federal law requiring elevation above 100-year flood level of new and substantially improved residential structures in floodplain	100-year floodplain as shown on Flood Insurance Rate Map dated July 16, 1984.	Enforced by the Building Inspector (municipal staff) and Phillipston Conservation Commission	Update Insurance Flood Rate Maps
Town Zoning Bylaw Flood Plain District	Local bylaw enhancing federal/state laws and regulating any development in the flood plain district	100-year floodplain as shown on Flood Insurance Rate Map dated July 16, 1984.	Enforced by the Building Inspector (municipal staff) and Phillipston Conservation Commission	Update Insurance Flood Rate Maps
Maintenance of municipal storm water drainage system	Regular cleaning of catch basins, storm drains, and culverts	Town-Wide	Undertaken by the Highway Department (municipal staff).	Maintenance continues but additional Personnel and Equipment Needed.

Maintenance of public water bodies (ponds, streams, brooks, wetlands)	Periodic cleaning of waterways needed, e.g., remove trash, debris	Town-Wide	Undertaken by the Highway Department municipal staff with guidance from Phillipston Conservation Commission	Maintenance continues. No improvements or changes needed.
Inspection of major dams	Periodic inspections of the structural integrity of the dam. Queen Lake Engineering Study every 5 years by town per state requirement; last completed in 2014.	Major Dams	Directed by the Massachusetts Department of Conservation and Recreation, Office of Dam Safety.	Update Dam failure studies for the dams rated as high hazard.
<u>Wind Related Hazards</u>				
State Building Code	State Law related to design loads to include wind effects	Town-Wide	Enforced by Building Department (municipal staff).	Continued enforcement remains in place. No improvements or changes needed.
Tree Maintenance	Regular inspection and tree maintenance to cut branches threatening power lines and overhead utilities	Town-Wide	Utility Companies	Tree maintenance continues. No improvements or changes needed.
<u>Fire Related Hazards</u>				
Limited Brush Clearing	Provide access to Emergency Service Vehicles	Town-Wide	Highway Department	Brush clearing continues. Additional areas with Potential for Brushfires to be identified.
<u>Winter Storms Related</u>				
Residential Parking Bans	Parking Bans to Enable Snow Removal Effectively from Residential Streets	Town-Wide	Highway Department municipal staff.	Residential parking bans remain in place. Additional personnel and equipment needed to enforce.
Clearing Snow from Major Arterial Routes	Ensure Access to Emergency Service vehicles	Town-Wide	Highway Department municipal staff.	Snow clearing continues however, additional personnel and equipment needed
Ice Storms	Regular inspection and tree maintenance to identify and cut dangerous trees before they block roadways and create power outages.	Town-Wide	Tree Warden/ Highway Department (municipal staff).	Regular inspection and tree maintenance continue but additional Staff and Equipment Needed.

*Phillipston enforcement/implementation is generally carried out by elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

Mitigation Goals, Objectives and Strategies

As discussed earlier in this Plan, MRPC previously prepared the 2008 Montachusett Region Hazard Mitigation Plan which consisted of individual annexes for each MRPC community. Similarly, as part of the multi-jurisdictional plan update, each community also developed their own individual goals, objectives and strategies which are listed in this section.

Overall Goal Statement: To reduce the loss of life, property, infrastructure and cultural resources throughout the town of Phillipston from natural disasters through a multiple hazard mitigation program that involves increased coordination, planning, education, and capital improvements.

- 1. Objective:** to increase coordination between inter-departments in pre-disaster planning, and continuous hazard mitigation implementation.
- 2. Objective:** Increase awareness of hazard mitigation among town officials, private organizations, businesses, and the general public.
- 3. Objective:** To ensure that critical infrastructure sites are protected from natural hazards, and to maintain existing mitigation infrastructure in good condition.
- 4. Objective:** To educate the public about the threat of natural hazards and the possible mitigation measures that can be taken to protect public health and safety, as well as infrastructure and property; and to educate the public as well about zoning and building regulations, particularly regulations that relate to new construction.
- 5. Objective:** To encourage future development in areas that are not prone to natural disasters.

Specific Natural Hazard Goals for Phillipston

Goal Statement for Flooding: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to flooding. And to pursue prevention activities which include planning, zoning, open space preservation, floodplain and wetland development regulations, storm water management, waterway dumping regulations, watershed protection measures, and best management practices, as well as, soil erosion, building ordinances, and subdivision regulations.

- 1. Objective:** To implement standards in the Subdivision Rules and Regulations to require temporary and permanent erosion control measures for streams and surface water bodies.
- 2. Objective:** To add more specific requirements to address flood related issues in the Special Permit and Site Plan Approval provisions in the Phillipston Zoning Bylaw including topographic change, removal of cover vegetation, risk of erosion or siltation and increased stormwater runoff.
- 3. Objective:** To identify all structures throughout Town that need to be elevated above the base flood elevation.
- 4. Objective:** To Develop a priority list and seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town.

Goal Statement for Protection from Beavers: To minimize the threat to health, the damage to roads and property, and the disruption of governmental services and general business activities due to flooding caused by beavers.

- 1. Objective:** To develop and implement a coordinated beaver protection plan.

Goal Statement for Hurricanes and Tornadoes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to high winds associated

with hurricanes and tornadoes. (The objectives listed above, under flooding, address the flooding that can result from a hurricane.)

Goal Statement for Winter Related Hazards: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to severe snow and ice storms.

Goal Statement for Dam Failure: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to dam failures.

1. **Objective:** To identify sources of funding for dam safety inspections.
2. **Objective:** To set and identify dam ~~repair~~, upgrade or removals.

Goal Statement for Earthquakes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to earthquakes.

1. **Objective:** To insure that all identified shelters have sufficient back-up utility service in the event of primary power failure.

Goal Statement for Drought: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to drought.

Goal Statement for Wildfires/Brushfires: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to wildfires/brushfires.

1. **Objective:** Develop and distribute an educational pamphlet on fire safety and prevention.
2. **Objective:** Consider amending the Subdivision Rules and Regulations and Required Improvements section to include fire suppression provisions for new residential developments.

Goal Statement for Weather Extremes: To minimize the loss of life and the threats to public health and safety.

1. **Objective:** To develop and distribute educational information regarding the threats from extreme heat and cold.
2. **Objective:** To educate the residents as to the causes and effects of global warming; and how it affects the residents of Phillipston, and what they could be doing to help improve the situation.
3. **Objective:** To remove or trim trees to prevent road closures and power outages during ice and heavy snow events.

Mitigation Action Plans and Prioritization of Actions (STAPLEE)

Initial Mitigation Action Plans for the Montachusett Communities were presented in the communities Hazard Mitigation Plans that were approved by FEMA in 2009 and 2010. The original Mitigation Action Plans were developed through an inventory of potential hazards which could impact the community and an evaluation of a range of alternatives to address these hazards. As part of the plan update process, the original Mitigation Action Plan was reviewed by the community's Local Hazard Mitigation Planning Team/Emergency Management Committee to delete actions which have already been completed, add additional actions which are either underway or planned to be undertaken, and to update the current status of all actions. The goals were reviewed and updated at the second meeting with each community.

An additional step in this process was to conduct a "STAPLEE" analysis for each action to prioritize all

actions within each community and a subjective evaluation of each action's perceived cost/benefit. In the 2008 plan, actions were not prioritized so there were no changes in priorities in this update. The revised Community Mitigation Action Plans matrices that follow identify each mitigation action, the responsible department or board responsible for implementation, potential funding sources, the timetable of the action, results of the prioritization of actions through the STAPLEE analysis, and the perceived cost/benefit for each mitigation action.

The goal of each identified strategy, or mitigation action, is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each action to establish priorities for implementation, using the "STAPLEE" method. The STAPLEE methodology was developed by the Federal Emergency Management Agency as a tool to help communities prioritize their hazard mitigation strategies and determine the most appropriate actions for implementation. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**dmistrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of an action and is designed to be used by public officials and planners for making planning decisions.

To conduct the STAPLEE exercise, the community's Hazard Mitigation Team was asked to rate each action in their Mitigation Action Plan on each of the following criteria, using a score of 1 to 3 (Good = 3, Average = 2, Poor = 1):

- **Social:** Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- **Technical:** Will the proposed strategy work? Will it create more problems than it solves?
- **Administrative:** Can the community implement the action? Is there someone to coordinate and lead the effort?
- **Political:** Is the action politically acceptable? Is there public support both to implement and to maintain the action?
- **Legal:** Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- **Economic:** What are the costs of this action? Does the cost seem reasonable for the size of the problem and the likely benefits?
- **Environmental:** How will the action impact the environment? Will the action need environmental regulatory approvals?

These scores were then totaled, resulting in a final score of 7 (least priority) to 21 (highest priority) for each action. The higher the final score, the higher the relative priority of that action for implementation. This information can then be utilized in each community as they conduct and administer relevant municipal functions and activities. The final STAPLEE score for each action is shown in the following mitigation action plan.

The Hazard Mitigation team was also asked to do a relative cost/benefit of each action. This assessment was intended to informally indicate if an action will either have more benefits accrued to the Town than the Cost of implementing the action, or if the costs would exceed any benefits. Responses include: "Benefits Exceed Costs", "Benefits Equal Costs, or "Costs Exceed Benefits".

PHILLIPSTON IMPLEMENTATION STRATEGY FOR PRIORITY MITIGATION ACTIONS

Type of Natural Hazard	Description of Action	Implementation Responsibility	Resources/Funding*	Timetable	Priority (STAPLEE SCORE)	Cost/Benefit Evaluation	Status Update from 2008 Plan**
Flood Related Hazards	Replace Queen Lake Dam with higher capacity structure with spillway to mitigate flood damage to private property, public infrastructure, wetlands, historic site and public recreation area.	Board of Selectmen, Highway Department	Municipal funds, borrowing, state and federal grants, private funds	2016-2020	21	Benefit of reduced property damage threat by flooding exceeds cost	New Action.
Flood Related Hazards	Upgrade Ward Hill Road crossing over Bates Pond inlet to increase capacity, add storm water BMPs, and remediate damage to road, public/private property, pond inlet, wetlands, and Bates Pond.	Board of Selectmen, Highway Department	Municipal funds, borrowing, state and federal grants	2015-17	21	Benefit to pond and wetlands, reduced road repairs, less property damage, lost access time exceeds cost	New Action

Flood Related Hazards	Identify Existing Shelters that are Outside of Floodplain (and Dam Inundation) Areas to ensure that shelters are available to the public during these type of hazards to reduce or eliminate risk to human life.	Building Inspector, Emergency Management Director	Municipal Staff	2015 - 2020	21	Costs exceed	Completed but Carried forward. This action is undertaken on an ongoing basis as new potential shelters are identified.
Wildland Fire	Increase awareness by educating property owners on actions that they can take to reduce risk to property by Developing and distributing an educational pamphlet on Fire Safety and Prevention (SAFE PROGRAM) and (SENIOR SAFE) and wildfire prevention.	Fire Department	Fire Department Budget Municipal Staff	2015 - 2020; + programs in schools and for seniors	21	Benefit exceeds cost	Completed but carried forward. This action is undertaken on an annual basis.

All Natural Hazards	Inventory Supplies at Existing Shelters and Develop a Needs List and Storage Requirements to ensure the available of adequate supplies during a natural hazard. Supplies must be adequate to eliminate or reduce risk to human life.	Emergency Management Planning Committee, School Facilities Manager	Municipal Staff	2015 - 2020;	21	Benefit equals cost	Completed but carried forward. This action is undertaken periodically as needed. Town has a trailer with all shelter supplies. Also shares supplies with neighboring towns.
Flood Related Hazards	Implement Standards in the Subdivision Rules and Regulations to require Temporary and Permanent Erosion Control to improve floodplain management.	Planning Board	Municipal Staff/ Volunteers Town General Funds/Planning Board Budget	2015 - 2020	19	Benefit equals cost	Completed but carried forward. Standards in the subdivision rules and regulations continued to be implemented by the Planning Board.
Flood Related Hazard	Amend the Special Permit and Site Plan Approval Provisions in the Zoning Bylaw adding more specific Requirements to Address Flood Related Issues.	Zoning Board Planning Board	Municipal Staff/ Volunteers Town General Funds/Planning and Zoning Board budgets	2015 - 2020	21	Benefit exceeds cost	Carried forward due to time constraints.

Flood Related Hazards	Construct drainage improvements to reduce storm damage through additional culverts, larger diameter pipes, culvert realignment, addition of wingwalls and outfall aprons, and improvements to roadside ditching at Barre Road.	Highway Department	Municipal Staff/FEMA HMPG Grant Highway Department Budget, Mass Highway grant	2016 (12 months)	21	Benefit exceed costs	New Action.
Flood Related Hazards	Replace undersized culverts with larger pipes throughout the town including (Baldwinville Road at Dunn Brook (dam and culvert); Brooks Village Road at Dunn Brook (culvert); Brooks Village Road at Kendall Brook (culvert); Colony Road at Hoyt Brook (culvert); Main Road (Route 68) at Beaver Brook Bridge.	Board of Selectmen/Highway Department	Municipal Staff Highway Department Budget/MA highway Grants/FEMA HMGP grant	2015-2020	21	Benefit exceed costs	New Action.

*Unless otherwise noted, Phillipston's Resources/Funding consists of elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

**Actions identified as carried forward were not completed in the previous planning cycle unless otherwise stated.

Mitigation actions from the 2008 Montachusett Region Hazard Mitigation Plan that are complete include the following:

- Developed a Preliminary Project Proposal and Cost Estimate for Updating Current 911 System including Feasibility of Reverse 911.

- Amended the Subdivision Rules and Regulations of Required Improvements Section to include fire suppression provisions for new residential development.
- Identified Municipal Buildings that need to be elevated above the Base Flood Elevation. There are no town-owned buildings in a flood hazard area.
- There is no CERT in Phillipston, however, Phillipston works with CERT teams in Templeton and neighboring communities.
- Prepared of a priority list for the replacement of undersized culverts
- Collected, updated and disseminated information on local radio/tv stations.
- Ensured that all identified shelters have sufficient back-up utility service in the event of a primary power failure.
- Developed a Plan for providing access to water, information, shelter and food stores to people in remote locations of the town in the event of severe winter storm.

2008 Mitigation Actions that were removed from this update include:

- Prepare a water conservation plan. There is no town water system.

Royalston Natural Hazard Risk Assessment

While this annex focus' pertains to critical facilities, flooding, risk assessment, existing protections and mitigation strategy in the community, more detailed descriptions of each natural hazard's impact on the region and its communities and summary of vulnerability can be located in the regional section entitled " 4. Identification of Natural Hazards, Identifying and Profiling Hazards".

Community Profile

Royalston is located in North Western-Central Massachusetts. It borders Athol and Phillipston to the south, Templeton to the Southeast, Winchendon to the east, Richmond and Fitzwilliam in Cheshire County New Hampshire to the North, Warwick in Franklin County to the West, and Orange in Franklin County to the Southwest. Royalston is 28 miles west of Fitchburg, 43 miles northwest of Worcester, 74 miles northwest of Boston, and 193 miles from New York City.

The town of Royalston covers a total area of 42.47 square miles and has a population of 1,258, according to the 2010 US Census, with a density of 29 people per square mile. The total number of housing units is 574, and the average household size is 2.53 people. Median age of residents in Royalston is 45. Royalshire (which was the original name) was purchased from the General Court of Massachusetts by nine proprietors in 1753, and settlement began in 1762. On February 16, 1765 it was incorporated as Royalston.

Royalston had considerable economic growth from 1776 to 1800 as the harnessing of waterpower made possible the establishment of local tanneries, grist and saw mills. Agriculture and raising sheep were the main means of earning a living for many residents in the early 1800's Royalston had two centers of population. Royalston Center, also called Royalston Commons, was the geographic center of the town; gristmills, brick yards, tanneries, a hattery and cabinet shops stretch from the Common to Doane's Falls. Shoppers came from miles around to do their business in Royalston Common. In the early 1800's the village of South Royalston was established and by 1813 its own mills and small businesses were developing. A cotton and woolen mill was built along the Millers River, furniture shops sprang up, and

palm leaf businesses, mainly making panama hats, thrived there. In the 1840' Irish immigrants who worked on the railroads bought farms in South Royalston or worked in the mills there. A wave of Finnish immigrants came to South Royalston between 1880 and 1920 to work in the mills and today, many of their descendants still live in South Royalston. By the late 1800's Royalston's decline as an industrial center began. Some businesses were destroyed by fire, while others fizzled naturally. Loss of population due to westward migration and epidemics as well as the loss of two banks were also factors in the industrial decline. Population had decreased to 998 by 1900 and by then South Royalston had lost all of its industries.

Royalston today has within its boundaries three waterfalls, state forests and thousands of areas of conservation land that all present a diversity of recreational opportunities. In addition to the magnificent natural landscape, Royalston also has a local historic district that contains the Town Hall, the Village School and the Post Office. The historic district consists of 45 buildings, the majority being private homes. Places such as Doane's Falls, Royalston Falls, Spirit Falls, Jacobs Hill Tully Lake and Recreation area, the many cemeteries, forests and wildlife areas give the town its unique characteristics.

Royalston is also home to Tully Trail and Metacomet-Monadnock trail. Royalston's largest employer is Royalston community school.

Critical Facilities

In general usage, the term "critical facilities" is used to describe all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired.

Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even access to damaged areas.

The number and nature of critical facilities in a community can differ greatly from one jurisdiction to another, and usually comprise both public and private facilities. In this sense, each community needs to determine the relative importance of the publicly and privately owned facilities that deliver vital services, provide important functions, and protect special populations. *Source: Federal Emergency Management Administration, Risk Management Series, Design Guide for Improving Critical Facility Safety from Flooding and High Winds, FEMA 543, January 2007.*

A list of the critical facilities within the community is shown in Table 65. This data was obtained from the community's Comprehensive Emergency Management Plan (CEMP). The data was then reviewed by

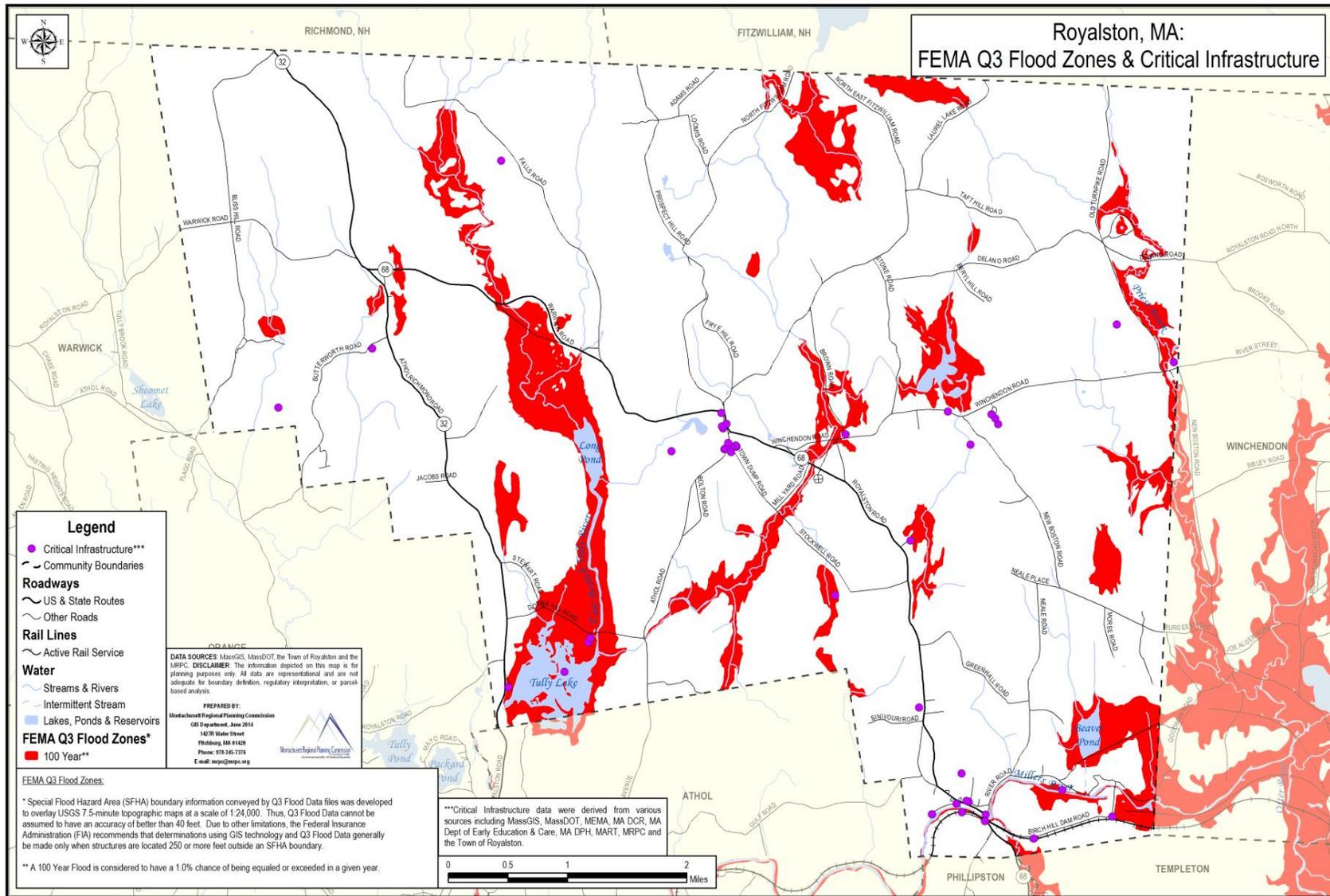
the Emergency Management Director. These facilities were digitized into GIS and used for determining vulnerability to the various hazards. The map that follows entitled FEMA Q3 Flood Zones and Critical Infrastructure depicts Critical Facilities in the community.

Table 65: Royalston’s Critical Facilities

Feature Type	Name	Address
City/Town Halls	Royalston Town Hall	13 On The Common
Public Water Supply*	Tully Lake Campground	Doane Hill Road
	Village School/Raymond School	1 Raymond Place
	Blossom Street Rock Well	
	Camp Caravan	
	Royalston Community School	96 Winchendon Road
	South Royalston Water System	South Royalston
Dpw Facilities	Royalston Dpw Building	19 Winchendon Road
Early Education Childcare Facilities	Little Farmers	88 Winchendon Road
Electric Substations	Royalston Substation #701	95 South Royalston Road
Emergency Dispensing Sites	Royalston Community School	96 Winchendon Road
Emergency Shelters	Royalston Community School	96 Winchendon Road
	The Village School	1 Raymond Place
Emergency Operations Centers	Royalston Police Station	2 Athol Road
	Royalston Fire Station	4 Athol Road
	Royalston Fire Station #2	17 Main Street
Hazmat Sites	South Royalston Wastewater Treatment Plant	
	Royalston DPW Building	19 Winchendon Road
	Royalston Fire Station	14 Athol Road
	The Village School	1 Raymond Place
Other Critical Facilities	Town Common	
	Helicopter Lz 1	N42° 38' 36" W72° 13' 21"
	Helicopter Lz 3	96 Winchendon Road
	Landing Zone 2 - Royalston Fish & Game	
	Birch Hill State Wildlife Management Area	
	Millers River	
	Royalston State Forest	0 Athol- Richmond Road
	State Wildlife Management Area	0 Winchendon Road
	Tully Lake Res.	Athol-Richmond Road
	Warwick State Forest	0 Butterworth Road
	South Royalston Railroad	

Other Government Buildings	Phinehas S Newton Library	19 The Common
	Whitney Hall	5 School Street
	Royalston Post Office/Royalston Historic Society	1 Athol Road
Police	Royalston Police Station	2 Athol Road
Pumping Stations	Wastewater Pumping Station 96-4557-Am	Main St. At River Road
	Wastewater Pumping Station 96-4555-Am	Adjacent To 10 King Street
	Wastewater Pumping Station 96-4556-Am	King St. At Bridge
School	Royalston Community School	96 Winchendon Road
	The Village School	1 Raymond Place
Sports And Cultural Areas	First Congregational Church	15 On The Common
	Second Congregational Church	3 School Street
	Royalston Historical Society	1 Athol Road
	Tully Campgrounds	Off Doane Hill Road
	Winchendon Rod & Gun Club	175 Winchendon Road
	Bullock Park	1 Athol Road
Potable Water Treatment Plants	Royalston Water Treatment Plant (Tank)	42° 38' 02.00" N 72° 08' 53.87" W
Wastewater Treatment Plant	South Royalston Wastewater Treatment Plant	

As stated in 310 CMR 22.02, a Public Water System means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year” (Mass GIS, 2014).



Flood Prone Areas

Particular areas within the community where the risk of flood areas are or could occur were determined at the first meeting of the Royalston Local Hazard Mitigation Team held on February 22, 2013. This information can be found on Royalston's Local Hazard Map which is located under the section entitled Risk Assessment.

Flooding Vulnerability Assessment

An analysis of the FIRM flood hazard area maps indicates that there is a total of 3104.81 acres of 100-year floodplain within Royalston. This amounts to 11.4% of the total town. Based on additional analysis, 32.84 acres (1.06%) of the floodplain are developed. Currently there are 17 structures in the floodplain which is about 1.28% of the total structures in the community. The buildings are then multiplied by the building value, as determined by the MA Department of Revenue, to come up with a potential loss of \$15,037,300.

Excluding dams and bridges the table below depicts critical facilities within the 100 year flood zone.

<i>Feature Type</i>	<i>Name</i>	<i>Address</i>
Public Water Supply	Tully Lake Campground	Doane Hill Road
Other Critical Facilities	Helicopter LZ 1	
Other Critical Facilities	State Wildlife Management Area	0 Winchendon Road
Other Critical Facilities	Tully Lake Res.	Athol-Richmond Rd.
Sports And Cultural Areas	Tully Campgrounds	Off Doane Hill Rd

Since the initiation of the National Flood Insurance Program (NFIP), there have been no flood insurance claims in the Town of Royalston. There are no repetitive loss properties in Royalston. Statistics from the NFIP BureauNet indicate in the town of Royalston there are two flood insurance policies in force.

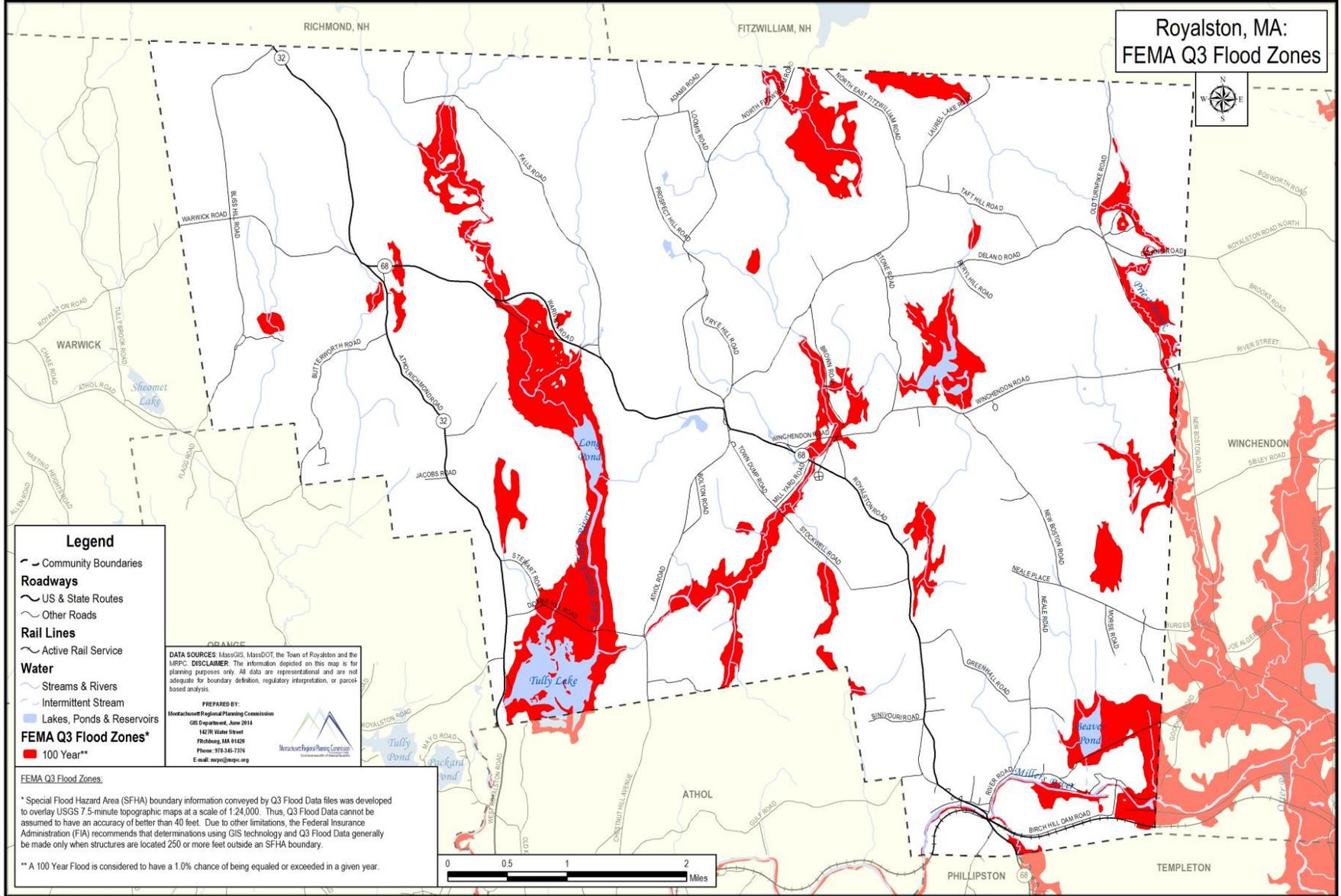
Floodplain Management and Compliance with NFIP

The town supports floodplain management activities in an effort to meet compliance of the National Floodplain Insurance Program. These efforts include:

- Implementing the MA Wetlands Protection Act regulating development and activity within the wetlands buffer zone and regulating stormwater and other point source discharge.
- Implementing the Town Flood Plain District Bylaw regulating development in the floodplain district.
- Continued maintenance of municipal stormwater drainage system which includes regular cleaning of catch basins, storm drains and culverts.
- Continued maintenance of public water bodies to reduce flooding caused by erosion and water displacement.
- Enforcement of the Open Space Residential Bylaw which mitigates possible flooding events by

designating protected open space within a development which in turn treats stormwater runoff through the means of natural infiltration.

The map that follows entitled FEMA Q3 Flood Zones depicts the 100 year flood zones in the community.



Structurally Deficient Bridges Over Waterways

Royalston has two bridges over water bodies that are classified by MassDOT as “structurally deficient”. The bridges are Stockwell Road over Lawrence Brook and North Fitzwilliam Road over Lawrence Brook.

According to MASSDOT Project Information both bridges are in the construction stage.

Hazard Potential of Dams

The DCR Office of Dams Safety lists 4 dams in the Town of Royalston as shown in Table 67. Birch Hill Dam and Tully Lake Dam are classified as high hazard.

Classifications for potential hazards are in accordance with the chart below.

Hazard Potential Classification

High Hazard	Refers to dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
Significant Hazard	Refers to dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities
Low Hazard	Refers to dams located where failure may cause minimal property damage to others. Loss of life is not expected.

Source: MA Department of Conservation and Recreation Office of Dam Safety

High hazard dams must be inspected every two year, significant hazard every five years, and low Hazards dams every 10 years. Owners of dams are responsible for having their dam inspected. MGL Chapter 253 and 302 CMR 10.00 requires that dam owners prepare, maintain and update Emergency Action Plans for all High Hazard Potential dams and certain Significant Hazard Potential dams.

Non-jurisdictional dams are not regulated by the Office of Dam Safety or under their jurisdiction. Typically these dams are under 6 feet in height and/or under 15 acre-feet in storage and do not have an assigned 'Hazard Code'. Dams owned and regulated by the Federal Government are also typically non-jurisdictional but DO have an assigned Hazard Code.

Table 67: Dams

Name	Dam	Hazard Code	Owner
Royalston	Birch Hill Dam	High Hazard	Public
Royalston	Tully Lake Dam	High Hazard	Public
Royalston	Putney Mill Dam	N/A	Private
Royalston	Fish Pool Dam	N/A	Private

*N/A – Information not available as the dam is non-jurisdictional.

Risk Assessment

As previously stated, located in Section 4. Identification of Natural Hazards, Identifying and Profiling Hazards”, there is a description of each identified hazards’ impact on the region and its communities as well as an overall summary of vulnerability. Based on the hazards identified in this plan and the assessment of risks by the Town of Royalston, the town considers itself to be at a high risk for Heavy Rain, Beavers, Nor’easters, Severe Thunderstorms, Heavy Snow, an Wildland Fire; moderate risk for Snow Melt, Dam Failure, High Winds, Hurricanes, Tornados, Ice Storms and Blizzards; low risk for Major Urban Fires, Drought, Extreme Temperatures, Earthquakes, landslides; and tsunamis as not applicable.

This information is documented in Royalston’s Natural Hazard Matrix below which was obtained from participants at the Royalston Local Hazard Mitigation Team Meeting held on February 22, 2013.

Royalston Natural Hazard Matrix

Natural Hazard	Likelihood of Occurrence	Location	Impacts	Hazard Index
Natural Hazard Separated by Flood, Atmospheric Related and Winter Related, Other Natural Hazards, and Geologic Hazards	3 = Highly Likely 2 = Possible 1 = Unlikely	3 = Regional/State 2 = Multi Community/Regional 1 = Local/Town	4 = Catastrophic 3 = Critical 2 = Limited 1 = Negligible	Ranking Determined by Combining the Likelihood, Location and Impacts of a Natural Hazard
Flood-Related Hazards				
• Heavy Rain	3	1	2.5	6.5
• Snow Melt	3	1	2	6
• Dam Failure	1	3	4	8
• Ice Jams	1	1	2	4
• Beavers	3	1	2	6
Atmospheric Related and Winter Related Hazards				
• High Winds	3	1	3	7
• Hurricanes	2	3	3	8
• Tornadoes	2	2	3	7
• Nor'easters	3	3	3	9
• Severe Thunderstorms	3	2	2	7
• Heavy Snow	2	3	2	7
• Ice Storms	2	2	2.5	6.5
• Blizzard	2	3	2	7
Other Natural Hazards				
• Major Urban Fires	1	1	4	6
• Wildland Fire	3	2	2	7
• Drought	2	2	2	6
• Extreme Temperatures	2	2	2	6
Geologic Hazards				
• Earthquakes	2	2	2	6
• Landslides	2	1	2	5
• Tsunami	NA	N	NA	NA

Key

Highly likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
 Possible: 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.
 Unlikely: Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.
 Catastrophic: Immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.
 Critical: Fast speed of onset or long duration of event resulting in devastating damage and loss of services for weeks or months.
 Limited: Moderate speed of onset or moderate duration of event, resulting in some damage.
 Negligible: Slow speed of onset or short duration of event resulting in little to no damage.

Also discussed at this meeting were the hazards that affect each community and the identification of specific problem areas in the community that need to be addressed. This included the identification of new hazards that were determined to pose a threat or community vulnerability which are detailed in Royalston's Local Hazards Map on the following page. The entire community is equally at risk to the following hazards: heavy rain, snow melt, high winds, hurricanes, tornados, nor'easters, heavy snow, ice storms, blizzards, drought, extreme temperatures, earthquakes and landslides.

Existing Protections

The original inventory of hazard mitigation actions which the Montachusett communities undertook for the 2008 Montachusett Region Hazard Mitigation Plan was reviewed and updated by each community at a meeting held in each community with the MRPC and the community's Local Hazard Mitigation Planning Team and, in some communities, the Emergency Management Committee. The attendees of the meetings can be found in Appendix A. The following matrices depict the updated inventory of what is currently being done to mitigate hazards by listing the programs and activities already in place. It includes a description of the protection measure, who is responsible, and improvements and changes that may be needed. This inventory was used by the Planning Team/Emergency Management Committee to identify gaps in existing protections that were then addressed through the development of this plan update.

Royalston

Type of Existing Protection	Description	Area Covered	Implementation Resources and Funding*	Improvements or Changes Needed
Flood Related Hazards				
Storm water management standards	State Regulation under the Wetlands Protection Act to regulate storm water and other point source discharge	Town-Wide	Enforced by the Royalston Conservation Commission (Wetlands Protection Act) and Royalston Planning Board (Subdivision Control Law and site plan review)	Storm water management standards remain in place. No improvements or changes needed.
Wetlands Protection Act (state)	State and local laws regulating development and activity within wetland buffer zone	100-foot state buffer around wetland area; 200 foot buffer around river front areas	Enforced by the Royalston Conservation Commission.	No improvements or changes needed.
100 Year Flood Zone	Federal law requiring elevation above 100-year flood level of new and substantially improved residential structures in floodplain	100-year floodplain as shown on Flood Insurance Rate Map dated June 15, 1983.	Enforced by the Building Inspector (municipal staff) and Royalston Conservation Commission	Update Insurance Flood Rate Maps
Town Bylaw Flood Plain Districts	Local bylaw enhancing federal/state laws and regulating any development in the flood plain district	100-year floodplain as shown on Flood Insurance Rate Map dated June 15, 1983.	Enforced by the Building Inspector (municipal staff) and Royalston Conservation Commission	Update Insurance Flood Rate Maps

Maintenance of municipal storm water drainage system	Regular cleaning of catch basins, storm drains, and culverts	Town-Wide	Undertaken by the Department of Public Works municipal staff.	Maintenance continues but additional Personnel and Equipment Needed.
Maintenance of public water bodies (ponds, streams, brooks, wetlands)	Periodic cleaning of waterways needed, i.e., remove trash, debris	Town-Wide	Undertaken by the Department of Public Works municipal staff with guidance from Royalston Conservation Commission	Maintenance continues. No improvements or changes needed.
Inspection of major dams	Periodic inspections of the structural integrity of the dam	Major Dams including:	Directed by the Massachusetts Department of Conservation and Recreation, Office of Dam Safety	Update Dam failure studies for the dams rated as high hazard
Wind Related Hazards				
State Building Code	State Law related to design loads to include wind effects	Town-Wide	Enforced by Building Department (municipal staff).	Continued enforcement remains in place. No improvements or changes needed.
Tree Maintenance	Regular inspection and tree maintenance to cut branches threatening power lines and overhead utilities	Town-Wide	Utility Companies	Tree maintenance continues. No municipal improvements or changes needed.
Fire Related Hazards				
Limited Brush Clearing	provide access to Emergency Service vehicles	Town-Wide	Undertaken by the Department of Public Works municipal staff.	Limited brush clearing continues. Identify Additional Areas with Potential for Brushfires
Winter Storms Related				
Residential Parking Bans	Parking Bans to Enable Snow Removal Effectively from Residential Streets	Town-Wide	Department of Public Works municipal staff.	Residential parking bans remain in effect. Additional personnel and equipment needed to enforce.

Clearing Snow from Major Arterial Routes	Ensure Access to Emergency Service vehicles	Town-Wide	Department of Public Works municipal staff.	Snow clearing continues but additional personnel and equipment needed.
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*Royalston enforcement/implementation is generally carried out by elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

Mitigation Goals, Objectives and Strategies

As discussed earlier in this Plan, MRPC previously prepared the 2008 Montachusett Region Hazard Mitigation Plan which consisted of individual annexes for each MRPC community. Similarly, as part of the multi-jurisdictional plan update, each community also developed their own individual goals, objectives and strategies which are listed in this section.

Overall Goal Statement: To reduce the loss of life, property, infrastructure and cultural resources throughout the town of Royalston from natural disasters through a multiple hazard mitigation program that involves increased coordination, planning, education, and capital improvements.

1. **Objective:** To provide adequate shelter, water, food, and basic first aid to displaced residents in the event of a natural disaster, and to provide adequate notification and information regarding evacuation procedures, *etc.*, to residents in the event of a natural disaster.
2. **Objective:** to increase coordination between departments in pre-disaster planning, post-disaster recovery and continuous hazard mitigation implementation.
3. **Objective:** Increase awareness of hazard mitigation among town officials, private organizations, businesses, and the general public.
4. **Objective:** To ensure that critical infrastructure sites are protected from natural hazards, and to maintain existing mitigation infrastructure in good condition.
5. **Objective:** To educate the public about the threat of natural hazards and the possible mitigation measures that can be taken to protect public health and safety, as well as infrastructure and property; and to educate the public as well about zoning and building regulations, particularly regulations that relate to new construction.
6. **Objective:** To encourage future development in areas that are not prone to natural disasters.
7. **Objective:** To identify existing shelters that are earthquake resistant as well as outside of floodplain and inundation areas. Disseminate this information to appropriate Town departments.
8. **Objective:** To inventory supplies at existing shelters and develop a needs list and storage requirements; and to establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster.
9. **Objective:** To collect, periodically update, and disseminate information on which local radio stations provide emergency information, what to include in a 'home survival kit,' how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to follow during a natural disaster.
10. **Objective:** Continue to work with utility companies to strengthen emergency response capabilities.
11. **Objective:** To Regionalize emergency services.

Specific Natural Hazard Goals for Royalston

Goal Statement for Flooding: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to flooding. And to pursue prevention activities which include planning, zoning, open space preservation, floodplain and wetland development regulations, storm water management, waterway dumping regulations, watershed protection measures, and best management practices, as well as, soil erosion, building ordinances, and subdivision regulations.

1. **Objective:** To implement standards in the Subdivision Rules and Regulations to require temporary and permanent erosion control measures for streams and surface water bodies.
2. **Objective:** To add more specific requirements to address flood related issues in the Special Permit and Site Plan Approval provisions in the Royalston Zoning Bylaw including topographic change, removal of cover vegetation, risk of erosion or siltation and increased stormwater runoff.
3. **Objective:** To identify all structures throughout Town that need to be elevated above the base-flood elevation.
4. **Objective:** To Develop a priority list and seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town.
5. **Objective:** To identify measures to keep rights-of-way open due to beaver-caused flooding.

Goal Statement for Protection from Beavers: To minimize the threat to health, the damage to roads and property, and the disruption of governmental services and general business activities due to flooding caused by beavers.

1. **Objective:** Support local town departments to continue present methods to prevent beaver caused flooding.
2. **Objective:** Seek assistance from beaver management professionals, including trappers.
3. **Objective:** Install beaver management devices.

Goal Statement for Hurricanes and Tornadoes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to high winds associated with hurricanes and tornadoes. (The objectives listed above, under flooding, address the flooding that can result from a hurricane.)

1. **Objective:** To educate residents and volunteers regarding the safe methods and actions necessary to deal with Hurricanes and Tornados.
2. **Objective:** Continue tree maintenance work with National Grid and Verizon and plan for tree removal in advance of storm events.

Goal Statement for Winter Related Hazards: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to severe snow and ice storms.

1. **Objective:** To develop a plan for providing access to water, information, shelter, and food stores to people in remote locations in Royalston in the event of a severe winter storm.
2. **Objective:** To improve electric infrastructure.
3. **Objective:** To harden the Verizon infrastructure

Goal Statement for Dam Failure: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to dam failures.

1. **Objective:** Continue to work with the Army Corps of Engineers to maintain Birch Hill Dam.

Goal Statement for Earthquakes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to earthquakes.

1. **Objective:** Look into how to evaluate all Shelters and Reception Centers to determine if they are earthquake resistant in conjunction with the Building Inspector.
2. **Objective:** To insure that all identified shelters have sufficient back-up utility service in the event of primary power failure.

Goal Statement for Drought: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to drought.

Goal Statement for Wildfires/Brushfires: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to wildfires/brushfires.

1. **Objective:** Continue to distribute an educational pamphlet on fire safety and prevention.

Goal Statement for Weather Extremes: To minimize the loss of life and the threats to public health and safety.

1. **Objective:** To develop and distribute educational information regarding the threats from extreme heat and cold.
2. **Objective:** To educate the residents as to the causes and effects of global warming; and how it affects the residents of Royalston, and what they could be doing to help improve the situation.

Mitigation Action Plans and Prioritization of Actions (STAPLEE)

Initial Mitigation Action Plans for the Montachusett Communities were presented in the communities Hazard Mitigation Plans that were approved by FEMA in 2009 and 2010. The original Mitigation Action Plans were developed through an inventory of potential hazards which could impact the community and an evaluation of a range of alternatives to address these hazards. As part of the plan update process, the original Mitigation Action Plan was reviewed by the community's Local Hazard Mitigation Planning Team/Emergency Management Committee to delete actions which have already been completed, add additional actions which are either underway or planned to be undertaken, and to update the current status of all actions. The goals were reviewed and updated at the second meeting with each community.

An additional step in this process was to conduct a "STAPLEE" analysis for each action to prioritize all actions within each community and a subjective evaluation of each action's perceived cost/benefit. In the 2008 plan, actions were not prioritized so there were no changes in priorities in this update. The revised Community Mitigation Action Plans matrices that follow identify each mitigation action, the responsible department or board responsible for implementation, potential funding sources, the timetable of the action, results of the prioritization of actions through the STAPLEE analysis, and the perceived cost/benefit for each mitigation action.

The goal of each identified strategy, or mitigation action, is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each action to establish priorities for implementation, using the "STAPLEE" method. The STAPLEE methodology was developed by the Federal Emergency Management Agency as a tool to help communities prioritize their hazard mitigation strategies and determine the most appropriate actions

for implementation. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of an action and is designed to be used by public officials and planners for making planning decisions.

To conduct the STAPLEE exercise, the community's Hazard Mitigation Team was asked to rate each action in their Mitigation Action Plan on each of the following criteria, using a score of 1 to 3 (Good = 3, Average = 2, Poor = 1):

- Social: Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- Technical: Will the proposed strategy work? Will it create more problems than it solves?
- Administrative: Can the community implement the action? Is there someone to coordinate and lead the effort?
- Political: Is the action politically acceptable? Is there public support both to implement and to maintain the action?
- Legal: Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- Economic: What are the costs of this action? Does the cost seem reasonable for the size of the problem and the likely benefits?
- Environmental: How will the action impact the environment? Will the action need environmental regulatory approvals?

These scores were then totaled, resulting in a final score of 7 (least priority) to 21 (highest priority) for each action. The higher the final score, the higher the relative priority of that action for implementation. This information can then be utilized in each community as they conduct and administer relevant municipal functions and activities. The final STAPLEE score for each action is shown in the following mitigation action plan.

The Hazard Mitigation team was also asked to do a relative cost/benefit of each action. This assessment was intended to informally indicate if an action will either have more benefits accrued to the Town than the Cost of implementing the action, or if the costs would exceed any benefits. Responses include: "Benefits Exceed Costs", "Benefits Equal Costs, or "Costs Exceed Benefits".

ROYALSTON IMPLEMENTATION STRATEGY FOR PRIORITY MITIGATION ACTIONS

Type of Natural Hazard	Description of Action	Implementation Responsibility	Resources/ Funding*	Timeframe	Priority (STAPLEE SCORE)	Cost/Benefit Evaluation	Status Update From 2008 Plan**
All Natural Hazards	Work with Neighboring Communities to Establish a Community Emergency Response Team (CERT) to more effectively respond to all natural hazards thus mitigating any damage.	Board of Selectmen, Police & Fire Departments, Emergency Management Director	Municipal Staff/ Volunteers	2015 – 2020;	21	Benefits exceed Costs	Carried forward. Royalston CERT Members are managed by Templeton EMD and attend monthly meetings in Templeton. Training is done by both Royalston and Templeton.
Other Natural Hazards Wildland Fire	Increase awareness by educating property owners on actions that they can take to reduce risk to property by developing and distributing an Educational Pamphlet on Fire Safety and Prevention (SAFE PROGRAM) and (SENIOR SAFE) and wildfire prevention.	Fire Department	Municipal Staff	2015 - 2020	19	Costs exceed Benefits	Completed but carried forward. This action is undertaken on a periodic basis.

All Natural Hazards	Inventory Supplies at Existing Shelters and Develop a Needs List and Storage Requirements. Supplies must be adequate to eliminate or reduce risk to human life.	Emergency Management Planning Committee, School Facilities Manager	Municipal Staff	2015 - 2020	20	Benefits exceed Costs	Carried forward. Royalston community school is marginally useful as shelter. Working to change this. Royalston has inventories of all supplies.
Atmospheric and Winter Related Hazards	Develop a Mitigation Plan to provide access to Water, Information, Shelter and Food Stores to People in Remote Locations of the town and incorporate into community's comprehensive plans.	Emergency Management Director	Municipal Staff / Volunteers	2015-2020	19	Benefits exceed Costs	Carried forward. Initiated. Additional time needed due to lack of funding.
All Natural Hazards	Ensure that Identified Shelter has Sufficient Back-up Utility Service in the Event of a Primary Power Failure to reduce or eliminate risk to human life.	Building Inspector, Emergency Management Director	DHS	2015 - 2016	18	Benefits exceed Costs	Carried forward Royalston Community School has none. Working on that issue this year.
Other natural Hazards (wildlands)and, Atmospheric Related Hazards	Participate in the Creation of a Regional Debris Management Plan to mitigate identified hazards in order to reduce the risk of wildland fire and atmospheric related hazards.	Board of Selectmen, Planning Board, Emergency Management Director	Municipal Staff, Central Region Homeland Security Advisory Council Funding	2015 - 2020	18	Benefits exceed Costs	Carried forward due to lack of funding.

Flood Related Hazards	To Develop a priority list and possibly seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town to reduce or eliminate flooding risk.	Board of Selectmen, Highway Department	Municipal Staff/ FEMA HMGP grant 75%	2015 - 2020	16	Benefits exceed Costs	Carried forward. Undersized culverts have been identified. Lack of 25% match funding.
All Natural Hazards	Develop Regulation sheltering Plan w/ Templeton to provide shelter resources in case of a natural hazard to reduce or eliminate risks to human life.	Emergency Management Director	Municipal Staff	2015 - 2020	18	Benefits exceed Costs	New Action.
All Natural Hazards	Explore a viable way to improve communication to the public in addition to public radio in case of a natural hazard to reduce or eliminate risk to property and human life.	Emergency Management Director	Municipal Staff	2015 - 2020	20	Benefits exceed Costs	New Action.

*Unless otherwise noted, Royalston's Resources/Funding consists of elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

**Actions identified as carried forward were not completed in the previous planning cycle unless otherwise stated.

Mitigation actions from the 2008 Montachusett Region Hazard Mitigation plan that are completed include the following:

- Identified existing shelters that are earthquake resistant as well as outside of floodplain (and Dam Inundation) areas. Royalston Community School is being equipped to be the local Mass Care Shelter. Shelter is brick and steel structure built within the last ten years and is compliant with current building codes.

Shirley Natural Hazard Risk Assessment

While this annex focus' pertains to critical facilities, flooding, risk assessment, existing protections and mitigation strategy in the community, more detailed descriptions of each natural hazard's impact on the region and its communities and summary of vulnerability can be located in the regional section entitled

“ 4. Identification of Natural Hazards, Identifying and Profiling Hazards”.

Community Profile

The Town of Shirley is located in North Central Massachusetts, bordered by Townsend and Groton to the north, Ayer and Harvard to the east, Lancaster to the south, and Lunenburg to the west. Shirley is located 11 miles east of Fitchburg, 25 miles northeast of Worcester, 39 miles northwest of Boston and 179 miles from New York City.

The town of Shirley covers an area of 15.91 square miles, with a resident population of 7,211, according to the 2010 US Census, with a density of 453 people per square mile. The total number of housing units is 2,427, and the average household size is 2.54 people. Median age of Shirley residents is 39.

Settled in 1720 and incorporated in 1753, Shirley was named for a former governor. Some names in town are those of founding families and many historic homes still stand, particularly in the picture-perfect Town Center, where the gracious white spire of Shirley’s Historic Meetinghouse rises high above the trees. The original section of the First Parish Meetinghouse was erected in 1773 and formerly housed religious congregations.

The town offers modern amenities and a slice of quiet, small town life, with rural ambience, a sense of civic pride and volunteer spirit among residents and well-preserved historic roots. Shirley’s small but friendly business community has growth potential. A new Regional school system shared with the neighboring Town of Ayer officially launched in 2011. Other perks include reasonably-priced homes, convenient commuter rail service via the train station in Shirley Village and highway access via Route 2A and nearby Route 2.

Shirley’s population as of the 2010 Federal Census was 7,211, swelled some by the populations of two state prisons. Tucked away in a remote section of town, the sprawling MCI Shirley and Sousa Baranowski grounds include the site of a former Shaker village whose spiritual name was Pleasant Garden. The Shakers were a religious sect that thrived during the late 19th and early 20th century. Noted for their industry and celibate, communal lifestyle, there were several Shaker villages in New England, including Harvard, Lancaster and Shirley.

The Shirley Shaker Meeting House was built in 1793 by architect Moses Johnson and held its first service the same year. The building was later relocated to the Hancock Shaker Village in Pittsfield, Mass. The Shirley Shaker community was one of the sect’s smallest. Its highest membership was 150 in the 1840s. By the late 1880’s, there were only about 15 people left, including the last Shirley Elder, John Whiteley, after whom the town’s war memorial park is named. His death in 1905 signaled the closing of the village. Sister Annie Belle Tuttle was one of the last Shirley Shakers. At age 20, she was most likely the caretaker of several young girls and apparently enjoyed her life. “There is no place like Shirley,” she wrote. Many modern-day Shirley residents might echo that sentiment. The town’s largest employer is MCI Shirley, followed by Bemis Associates, Shirley Middle School and Thermafab.

Critical Facilities

In general usage, the term “critical facilities” is used to describe all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to

cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired.

Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even access to damaged areas.

The number and nature of critical facilities in a community can differ greatly from one jurisdiction to another, and usually comprise both public and private facilities. In this sense, each community needs to determine the relative importance of the publicly and privately owned facilities that deliver vital services, provide important functions, and protect special populations. *Source: Federal Emergency Management Administration, Risk Management Series, Design Guide for Improving Critical Facility Safety from Flooding and High Winds, FEMA 543, January 2007.*

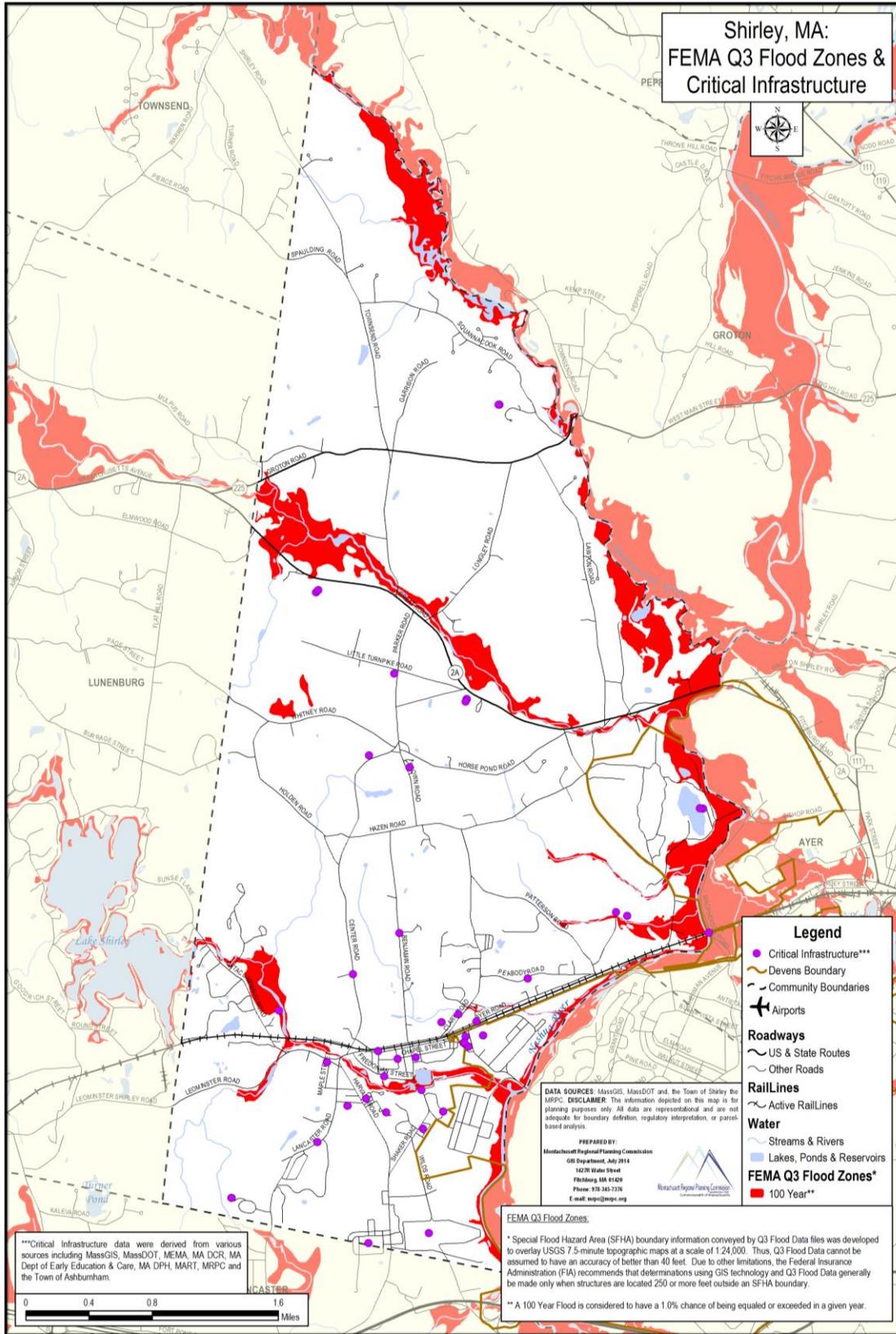
A list of the critical facilities within the community is shown in Table 68. This data was obtained from the community’s Comprehensive Emergency Management Plan (CEMP). The data was then reviewed by the Emergency Management Director. These facilities were digitized into GIS and used for determining vulnerability to the various hazards. The map which follows entitled FEMA Q3 Flood Zones and Critical Infrastructure depicts Critical Facilities in the community.

Table 68: Shirley Critical Facilities

Feature Type	Name	Address
Animal Shelters	Shirley Animal Clinic	38 Parker Rd
City/Town Halls	Shirley Town Hall	7 Keady Way
Public Water Supply*	Well #1	
	Well 2	
	Well 1	
	Well 2	
	Catacunemaug Road Gravel Packed Well	
	Patterson Road Gravel Packed Well	
	Proposed Walker Well	
Dpw Facilities	Shirley DPW	158 Great Road
Early Education Childcare Facilities	Warila, Lori A.	3 Weatherbee Road
	Hanson, Sheryl	136 Ayer Road
	The Wonderful World Of Children	43 Peabody Road
	Baker, Laura M.	44 Fredonian Street
	Oakes, Erica C.	1 Hill Lane

	Warila, Karen L	57 Lancaster Road
	Landry, Victoria J.	2 Mosland Drive
	Sauer, Michelle	25 Chapel Street
Elderly Housing	Shaker Meadows	32 Harvard Road
Electric Substations	National Grid Substation	Mount Laurel Circle
Emergency Shelters	Lura A White School	34 Lancaster Road
	Shirley Town Hall	7 Keady Way
	Shirley Police Station	11 Keady Way
	Hazen Memorial Library	3 Keady Way
	St. Anthony's Church	14 Phoenix Street
	Shirley Middle School	1 Hospital Road
End Of Life Facilities	Saint Anthony's Cemetery	
	Village Cemetery	
	Center Cemetery	Brown Road
Emergency Operations Centers	Shirley Police Station	11 Keady Way
	Shirley Fire Station	8 Leominster Road
Fire	Shirley Fire Station	8 Leominster Road
	Shirley Fire Station	158 Great Road
Hazmat Sites	National Grid Substation	Mount Laurel Circle
	Bemis Associates	1 Bemis Way
	Mount Laurel Circle	Mount Laurel Circle
	United Water Waste Water Treatment Plant	31 Macpherson Road.
	Devens Regional Wastewater Treatment	85 Walker Road
Hospice	Hospice Of Nashoba Nursing Service	Two Shaker Road Suite D225
Other Critical Facilities	Bemis Associates	1 Bemis Way
	Mount Laurel Circle	Mount Laurel Circle
	Guilford Rail Bridge	Rail Line & Nashua River
	Bill's Citgo	Front Street
Other Government Buildings	Shirley DPW Building	158 Great Road
	Lucy Longley Memorial Building	182 Center Road
	DPW Building #2	Clark Road
Police	Shirley Police Station	11 Keady Way
Prisons	MCI-Shirley (Medium)	Harvard Road
	MCI-Shirley (Minimum)	Harvard Road
Public Health Office	Shirley Town Offices	7 Keady Way
School	Lura A White School	34 Lancaster Road
	Ayer/ Shirley Middle School (Asrd)	1 Hospital Road
Wastewater Treatment Plant	Devens Regional Wastewater Treatment	85 Walker Road

*As stated in 310 CMR 22.02, a Public Water System means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year” (Mass GIS, 2014).



Flood Prone Areas

Particular areas within the community where the risk of flood areas are or could occur were determined at the first meeting of the Ashburnham Local Hazard Mitigation Team held on September 11, 2013. This information can be found on Shirley's Local Hazard Map which is located under the section entitled Risk Assessment.

Flooding Vulnerability Assessment

An analysis of the FIRM flood hazard area maps indicates that there is a total of 980.09 acres of 100-year floodplain within Shirley. This amounts to 9.63% of the total town. Based on additional analysis, 35.08 acres (3.58%) of the floodplain are developed. Currently there are 53 structures in the floodplain which is about 1.71% of the total structures in the community. The buildings are then multiplied by the building value, as determined by the MA Department of Revenue, to come up with a potential loss of \$74,666,800.

Excluding dams and bridges the table below depicts critical facilities within the 100 year flood zone.

<i>Feature Type</i>	<i>Name</i>	<i>Address</i>
Public Water Supply	Catacunemaug Road Gravel Packed Well	
Other Critical Facilities	Guilford Rail Bridge	Rail Line & Nashua River

Since the initiation of the National Flood Insurance Program (NFIP), thirteen flood insurance claims in the Town of Shirley have been made totaling \$159,633.55 in payments. According to NFIP data there is one repetitive loss structure in Shirley totaling \$67,092 in claims. Statistics from the NFIP BureauNet indicate in the town of Shirley there are 12 flood insurance policies in force.

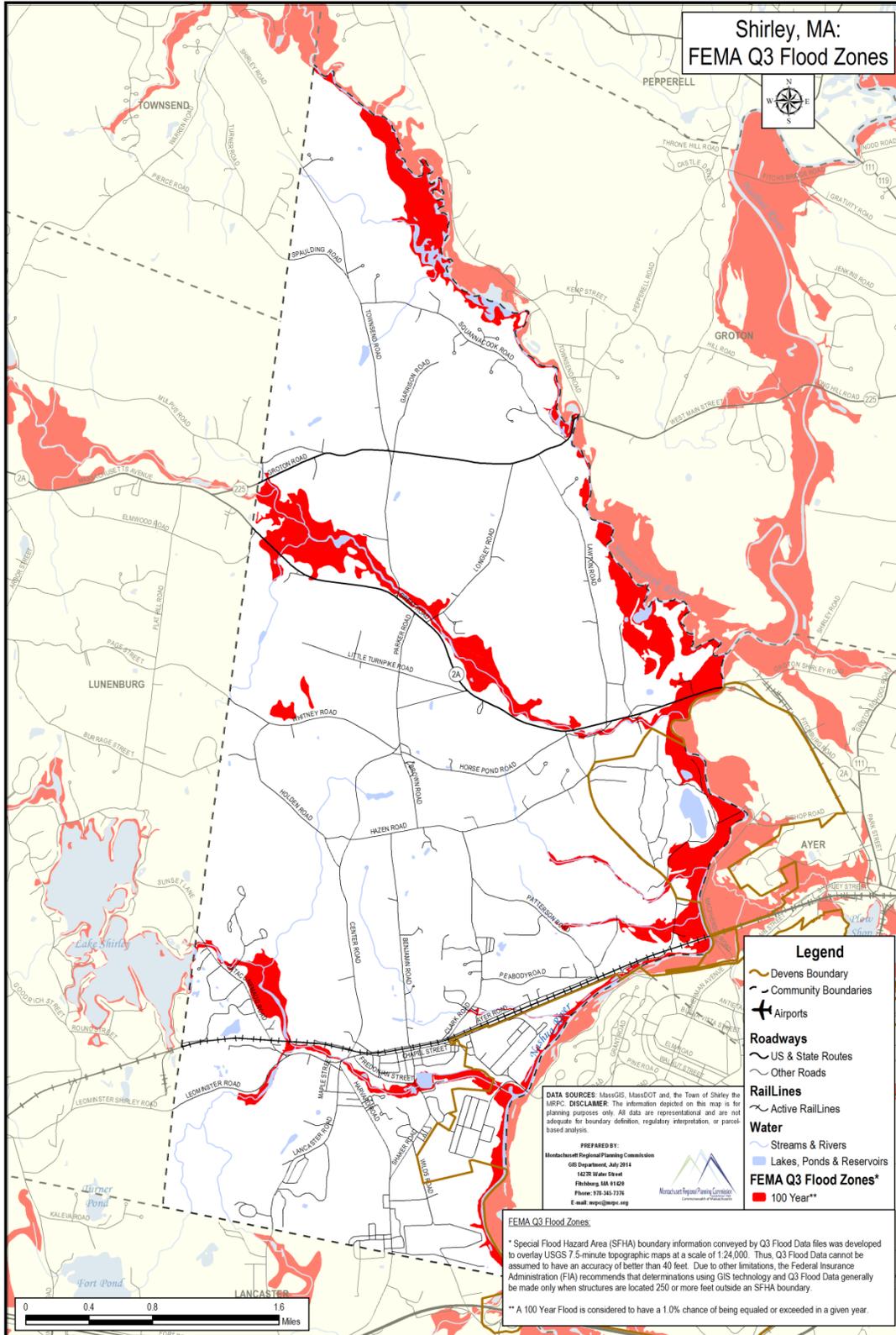
Floodplain Management and Compliance with NFIP

The town supports floodplain management activities in an effort to meet compliance of the National Floodplain Insurance Program. These efforts include:

- Implementing the MA Wetlands Protection Act and the town's Wetland's Protection Bylaw regulating development and activity within the wetlands buffer zone and regulating stormwater and other point source discharge.
- Implementing the Town Flood Plain District Bylaw (June 7, 2010) regulating development in the floodplain district.
- Continued maintenance of municipal stormwater drainage system which includes regular cleaning of catch basins, storm drains and culverts.
- Continued maintenance of public water bodies to reduce flooding caused by erosion and water displacement.
- Enforcement of Stormwater Management Control Bylaw which regulates land alterations, disturbances and construction activities that may impact stormwater flow that could unduly

cause flooding events.

The map that follows entitled FEMA Q3 Flood Zones depicts the 100 year flood zones in the community.



Structurally Deficient Bridges Over Waterways

Shirley has one bridge over water that is classified by MassDOT as “structurally deficient”; Longley Road over Mulpus Brook.

Hazard Potential of Dams

The DCR Office of Dams Safety lists 2 dams in the Town of Shirley as shown in Table 70. Phoenix Pond Dam is classified as low hazard.

Classifications for potential hazards are in accordance with the chart below.

Hazard Potential Classification

High Hazard	Refers to dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
Significant Hazard	Refers to dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities
Low Hazard	Refers to dams located where failure may cause minimal property damage to others. Loss of life is not expected.

Source: MA Department of Conservation and Recreation Office of Dam Safety

High hazard dams must be inspected every two year, significant hazard every five years, and low Hazards dams every 10 years. Owners of dams are responsible for having their dam inspected. MGL Chapter 253 and 302 CMR 10.00 requires that dam owners prepare, maintain and update Emergency Action Plans for all High Hazard Potential dams and certain Significant Hazard Potential dams.

Non-jurisdictional dams are not regulated by the Office of Dam Safety or under their jurisdiction. Typically these dams are under 6 feet in height and/or under 15 acre-feet in storage and do not have an assigned 'Hazard Code'. Dams owned and regulated by the Federal Government are also typically non-jurisdictional but DO have an assigned Hazard Code.

Table 70: Dams

Name	Dam	Hazard Code	Owner
Shirley	Phoenix Pond Dam	Low Hazard	Private
Shirley	Bow Brook Dam	N/A	Private

*N/A – Information not available as the dam is non-jurisdictional.

Risk Assessment

As previously stated, located in Section 4. Identification of Natural Hazards, Identifying and Profiling Hazards”, there is a description of each identified hazards’ impact on the region and its communities as well as an overall summary of vulnerability. Based on the hazards identified in this plan and the assessment of risks by the Town of Shirley, the town considers itself to be at a moderate risk for Heavy Rain, Snow Melt, Dam Failure, Ice Jams, Beavers, High Winds Hurricanes, Tornados, Nor’easters, Severe Thunderstorms, Heavy Snow, Ice Storms, Blizzard, Major Urban Fire, Wildland Fire, Drought, Extreme Temperatures, Earthquakes; low risk for landslides; and tsunamis as not applicable.

This information is documented in Shirley’s Natural Hazard Matrix below which was obtained from participants at the Shirley Local Hazard Mitigation Team Meeting held on September 11, 2013.

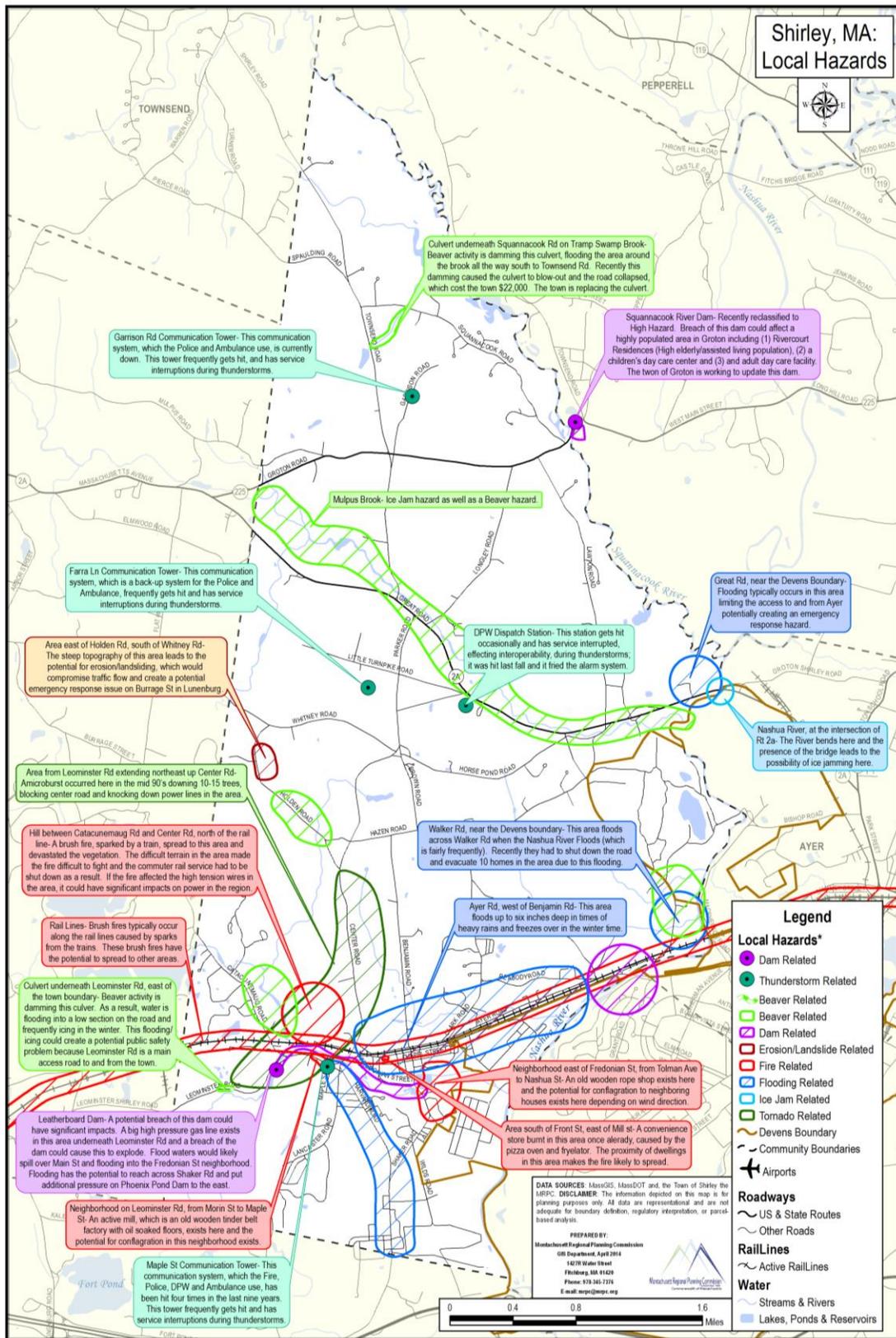
Shirley Natural Hazard Matrix

Natural Hazard	Likelihood of Occurrence	Location	Impacts	Hazard Index
Natural Hazard Separated by Flood, Atmospheric Related and Winter Related, Other Natural Hazards, and Geologic Hazards	3 = Highly Likely 2 = Possible 1 = Unlikely	3 = Regional/State 2 = Multi Community/Regional 1 = Local/Town	4 = Catastrophic 3 = Critical 2 = Limited 1 = Negligible	Ranking Determined by Combining the Likelihood, Location and Impacts of a Natural Hazard
Flood-Related Hazards				
• Heavy Rain	2	2	3	7
• Snow Melt	2	2	3	7
• Dam Failure	2	2	3	7
• Ice Jams	2	2	3	7
• Beavers	2	2	3	7
Atmospheric Related and Winter Related Hazards				
• High Winds	2	1	3	6
• Hurricanes	2	2	4	8
• Tornadoes	2	1	4	7
• Nor'easters	2	3	3	8
• Severe Thunderstorms	2	1	3	6
• Heavy Snow	2	2	3	7
• Ice Storms	2	2	4	8
• Blizzard	2	3	4	9
Other Natural Hazards				
• Major Urban Fires	2	2	4	8
• Wildland Fire	2	2	3	7
• Drought	2	3	4	9
• Extreme Temperatures	2	3	4	9
Geologic Hazards				
• Earthquakes	2	2	4	8
• Landslides	1	1	2	4
• Tsunami	NA	NA	NA	NA

Key

Highly likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
 Possible: 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.
 Unlikely: Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.
 Catastrophic: Immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.
 Critical: Fast speed of onset or long duration of event resulting in devastating damage and loss of services for weeks or months.
 Limited: Moderate speed of onset or moderate duration of event, resulting in some damage.
 Negligible: Slow speed of onset or short duration of event resulting in little to no damage.

Also discussed at this meeting were the hazards that affect each community and the identification of specific problem areas in the community that need to be addressed. This included the identification of new hazards that were determined to pose a threat or community vulnerability which are detailed in Shirley's Local Hazards Map on the following page. The entire community is equally at risk to the following hazards: heavy rain, snow melt, high winds, hurricanes, tornados, nor'easters, heavy snow, ice storms, blizzards, drought, extreme temperatures, earthquakes and landslides.



Existing Protections

The original inventory of hazard mitigation actions which the Montachusett communities undertook for the 2008 Montachusett Region Hazard Mitigation Plan was reviewed and updated by each community at a meeting held in each community with the MRPC and the community's Local Hazard Mitigation Planning Team and, in some communities, the Emergency Management Committee. The attendees of the meetings can be found in Appendix A. The following matrices depict the updated inventory of what is currently being done to mitigate hazards by listing the programs and activities already in place. It includes a description of the protection measure, who is responsible, and improvements and changes that may be needed. This inventory was used by the Planning Team/Emergency Management Committee to identify gaps in existing protections that were then addressed through the development of this plan update.

Shirley

Type of Existing Protection	Description	Area Covered	Implementation Resources and Funding*	Improvements or Changes Needed
<u>Flood Related Hazards</u>				
Storm water management standards	State Regulation under the Wetlands Protection Act to regulate storm water and other point source discharge	Town-Wide	Enforced by the Shirley Conservation Commission staffed by the municipal Conservation Agent (Wetlands Protection Act) and Shirley Planning Board (Subdivision Control Law and site plan review) staffed by the Planning Board Clerk.	Storm water management standards are and continue to be enforced. No improvements or changes needed.
Wetlands Protection Act (state)	State law regulating development and activity within wetland buffer zone	100-foot state buffer around wetland area; 200 foot buffer around river front areas	Enforced by the Shirley Conservation Commission staffed by the municipal Conservation Agent.	Any brook holding water is considered a river. Too restrictive.
Non-zoning Wetlands Bylaw (local)	Local law supplementing the Wetlands Protection Act	100-foot state buffer around wetland area; 200 foot buffer around river front areas	Enforced by the Shirley Conservation Commission staffed by the municipal Conservation Agent.	Any brook holding water is considered a river. Too restrictive.

100 Year Flood Zone	Federal requiring elevation above 100-year flood level of new and substantially improved residential structures in floodplain	100-year floodplain as shown on Flood Insurance Rate Map dated June 4, 2010.	Enforced by the Building Inspector (municipal staff) and Shirley Conservation Commission staffed by the municipal Conservation Agent.	No improvements or changes needed.
Town Zoning Bylaw - Flood Plain Districts	Local bylaw enhancing federal/state laws and regulating any development in the flood plain district	100-year floodplain as shown on Flood Insurance Rate Map dated June 4, 2010.	Enforced by the Building Inspector (municipal staff) and Shirley Conservation Commission staffed by the municipal Conservation Agent.	No improvements or changes needed.
Maintenance of municipal storm water drainage system	Regular cleaning of catch basins, storm drains, and culverts	Town-Wide	Undertaken by the Department of Public Works municipal staff.	Maintenance continues but Additional Personnel and Equipment Needed.
Maintenance of public water bodies (ponds, streams, brooks, wetlands)	Periodic cleaning of waterways is undertaken, i.e. remove trash, debris	Town-Wide	Directed by the Department of Public Works municipal staff with guidance from Shirley Conservation Commission staffed by the municipal Conservation Agent.	Maintenance continues. No improvements or changes needed.
<u>Wind Related Hazards</u>				
State Building Code	State Law related to design loads to include wind effects	Town-Wide	Enforced by Building Department municipal staff.	Enforcement remains in effect. No improvements or changes needed.
Tree Maintenance	Regular inspection and tree maintenance to cut branches threatening power lines and overhead utilities	Town-Wide	National Grid (Electric Company) and municipality.	Tree maintenance continues. Additional Staff needed. Not enough funding to do full extent of work. National Grid provides substantial assistance.
<u>Fire Related Hazards</u>				
Limited Brush Clearing	Provide access to Emergency Service vehicles	Town-Wide	Undertaken by the Department of Public Works municipal staff.	Limited brush clearing continues. Identify Additional areas with Potential for Brushfires
<u>Winter Storms Related</u>				

Residential Parking Bans	Parking Bans to Enable Snow Removal Effectively from Residential Streets	Town-Wide	Department of Public Works municipal staff.	Residential parking bans remain in effect. Additional personnel and equipment needed for enforcement
Clearing Snow from Major Arterial Routes	Ensure Access to Emergency Service vehicles	Town-Wide	Department of Public Works municipal staff.	Snow clearing continues but additional personnel and equipment needed

*Shirley enforcement/implementation is generally carried out by elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

Mitigation Goals, Objectives and Strategies

As discussed earlier in this Plan, MRPC previously prepared the 2008 Montachusett Region Hazard Mitigation Plan which consisted of individual annexes for each MRPC community. Similarly, as part of the multi-jurisdictional plan update, each community also developed their own individual goals, objectives and strategies which are listed in this section.

Overall Goal Statement: To prepare to reduce the loss of life, property, infrastructure and cultural resources throughout the community from natural disasters through a multiple hazard mitigation program that involves increased coordination, planning, education, and capital improvements.

1. **Objective:** To organize and prepare to provide adequate shelter, water, food, and basic first aid to displaced residents in the event of a natural disaster, and to provide adequate notification and information regarding evacuation procedures, etc., to residents in the event of a natural disaster.
2. **Objective:** To inventory supplies at existing shelters and develop a needs list and storage requirements; and to establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster.
3. **Objective:** to have the EMD lead an effort to increase coordination between inter-departments in pre-disaster planning, and implementation of hazard mitigation projects.
4. **Objective:** Increase awareness of hazard mitigation among town officials, private organizations, businesses, and the general public.
5. **Objective:** To examine and update the current notification system including the progress made by the Central Mass Homeland Security Committee's development of a county-wide Reverse 911.
6. **Objective:** To collect, periodically update, and disseminate information on which local radio stations provide emergency information, what to include in a 'home survival kit,' how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to follow during a natural disaster.

Goal Statement for Flooding: To prepare emergency staff and volunteers in order to minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to flooding.

1. **Objective:** To continue to participate in the National Flood Insurance Program, and to have the flood maps periodically updated.
2. **Objective:** To Develop a priority list and seek funding through the Hazard Mitigation Grant

Program (HMGP) for the replacement of undersized culverts throughout the town. (Town currently does not have funding to cover local share under available grant programs.)

Goal Statement for Protection from Beavers: To minimize the threat to health, the damage to roads and property, and the disruption of governmental services and general business activities due to flooding caused by beavers.

1. **Objective:** Support local town departments to continue present methods to prevent beaver caused flooding.
2. **Objective:** Seek assistance from beaver management professionals, including trappers.
3. **Objective:** Install beaver management devices.

Goal Statement for Hurricanes and Tornadoes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to high winds associated with hurricanes and tornadoes. (The objectives listed above, under flooding, address the flooding that can result from a hurricane.)

1. **Objective:** To educate residents and volunteers regarding the safe methods and actions necessary to deal with Hurricanes and Tornadoes.

Goal Statement for Winter Related Hazards: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to severe snow and ice storms.

1. **Objective:** To develop a plan for providing access to water, information, shelter, and food stores to people in remote locations in the event of a severe winter storm. (The Town Senior Center has a program in place to check on seniors and the local ambulance service checks on oxygen supplies.)

Goal Statement for Earthquakes: To educate staff, residents and volunteers about the potential for earthquakes and strategies to minimize the loss of life, damage to property, the disruption of governmental services and general business activities due to earthquakes.

1. **Objective:** To educate and encourage homeowners and developers to rehab and build using methods to minimize the effects of earthquakes and other disasters.

Mitigation Action Plans and Prioritization of Actions (STAPLEE)

Initial Mitigation Action Plans for the Montachusett Communities were presented in the communities Hazard Mitigation Plans that were approved by FEMA in 2009 and 2010. The original Mitigation Action Plans were developed through an inventory of potential hazards which could impact the community and an evaluation of a range of alternatives to address these hazards. As part of the plan update process, the original Mitigation Action Plan was reviewed by the community's Local Hazard Mitigation Planning Team/Emergency Management Committee to delete actions which have already been completed, add additional actions which are either underway or planned to be undertaken, and to update the current status of all actions. The goals were reviewed and updated at the second meeting with each community.

An additional step in this process was to conduct a "STAPLEE" analysis for each action to prioritize all actions within each community and a subjective evaluation of each action's perceived cost/benefit. In the 2008 plan, actions were not prioritized so there were no changes in priorities in this update. The revised Community Mitigation Action Plans matrices that follow identify each mitigation action, the

responsible department or board responsible for implementation, potential funding sources, the timetable of the action, results of the prioritization of actions through the STAPLEE analysis, and the perceived cost/benefit for each mitigation action.

The goal of each identified strategy, or mitigation action, is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each action to establish priorities for implementation, using the “STAPLEE” method. The STAPLEE methodology was developed by the Federal Emergency Management Agency as a tool to help communities prioritize their hazard mitigation strategies and determine the most appropriate actions for implementation. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of an action and is designed to be used by public officials and planners for making planning decisions.

To conduct the STAPLEE exercise, the community’s Hazard Mitigation Team was asked to rate each action in their Mitigation Action Plan on each of the following criteria, using a score of 1 to 3 (Good = 3, Average = 2, Poor = 1):

- **Social:** Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- **Technical:** Will the proposed strategy work? Will it create more problems than it solves?
- **Administrative:** Can the community implement the action? Is there someone to coordinate and lead the effort?
- **Political:** Is the action politically acceptable? Is there public support both to implement and to maintain the action?
- **Legal:** Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- **Economic:** What are the costs of this action? Does the cost seem reasonable for the size of the problem and the likely benefits?
- **Environmental:** How will the action impact the environment? Will the action need environmental regulatory approvals?

These scores were then totaled, resulting in a final score of 7 (least priority) to 21 (highest priority) for each action. The higher the final score, the higher the relative priority of that action for implementation. This information can then be utilized in each community as they conduct and administer relevant municipal functions and activities. The final STAPLEE score for each action is shown in the following mitigation action plan.

The Hazard Mitigation team was also asked to do a relative cost/benefit of each action. This assessment was intended to informally indicate if an action will either have more benefits accrued to the Town than the Cost of implementing the action, or if the costs would exceed any benefits. Responses include: “Benefits Exceed Costs”, “Benefits Equal Costs, or “Costs Exceed Benefits”.

SHIRLEY IMPLEMENTATION STRATEGY FOR PRIORITY MITIGATION ACTIONS

Type of Natural Hazard	Description of Action	Implementa- tion Responsibility	Resources / Funding*	Timetable	Priority (STAPLEE SCORE)	Cost/ Benefit Evaluation	Status Update From 2008 Plan**
All Hazards	Work with Neighboring Communities to Establish a Community emergency Response Team (CERT) to more effectively respond to all natural hazards thus mitigating any damage.	Board of Selectmen, Police & Fire Departments, Emergency Management Director	Municipal Staff/ Volunteers	2015 – 2020;	21	Benefit exceed costs	Carried forward. Additional time needed. Have a mutual aid agreement w/ neighboring towns.
Wildland Fire	Increase awareness by educating property owners on actions that they can take to reduce risk to property by hosting an Open House at the Fire Department, Develop and Distribute an Educational Pamphlet on Fire Safety and Prevention (SAFE PROGRAM) and (SENIOR SAFE) and wildfire prevention. Town also provides tours of fire department as requested.	Fire Department	Municipal Staff	2015 – 2020;	21	Benefit exceed costs	Completed. Carried forward. Action undertaken periodically.

All Hazards	Increase hazard education and risk awareness to public by Collecting, Updating, and Disseminating Information on Billboards, Message Boards, and Newspapers to educate the public and alert them of emergency information including shelter locations and other instructions related to all natural hazards.	Emergency Management Director	Municipal Staff	2015 – 2020	21	Benefit exceed costs	Completed. Carried forward. This action is undertaken on an as needed basis.
Atmospheric and Winter Related Hazards	Develop a Mitigation Plan to provide access to Water, Information, Shelter and Food Stores to People in Remote Locations of the town in the Event of a Severe natural hazard and integrate this information into community comprehensive plans.	Emergency Management Director	Municipal Staff / Volunteers	2015 – 2020;	21	Benefit exceed costs	Carried forward. This action has been initiated. Town is utilizing sign boards and cable networks to disseminate information. Plan is in place for shelters. Senior Center has program to check on seniors.

All Natural Hazards	Develop a Preliminary Project Proposal and Cost Estimate for Updating Current 911 System including Feasibility of Reverse 911 to reduce or eliminate the long-term risk to human life and property from hazards.	Board of Selectmen, Emergency Management Director	Municipal Staff / Volunteers	2015 – 2020;	21	Benefit exceed costs	Carried forward. In 2016 MRPC will assist the town to conduct a feasibility study for Shirley to participate in a regional dispatch system.
Flood Related Hazards	Explore options to encourage property owners to engage in hazard mitigation efforts.	Emergency Management Director, Fire Department	Municipal Staff/ Property Owners	2015 – 2020	14	Benefit exceed costs	Completed but carried over. Ongoing effort. Harvard Road recently flooded. Town developed some water diversion methods in cooperation with property owners.
Flood Related Hazards	Continue participation in the National Flood Insurance Program to enable property owners to purchase insurance protection against flood losses.	Board of Selectmen, Conservation Commission	FEMA/ME MA	2015 – 2020	21	Benefit exceed costs	Completed but carried forward. Town continues its participation in the NFIP.
Other Natural Hazards (Wildland fire)	Identify areas with potential for brush fires to track community vulnerability by developing and maintaining a data base.	Department of Public Works, National Grid (Electric Company)	Municipal Staff	2015 – 2020;	21	Benefit exceed costs	New Action.

Flood Related Hazards	Hire trapper for removal of beavers to mitigate flooding caused by beaver dams.	Department of Public Works	Municipal Staff. Funds through local taxes to be utilized for hiring of a trapper.	2015 – 2020	14	Benefit exceed costs	Completed but carried forward. Trappers are hired as necessary.
All Natural Hazards	Increase hazard education and risk awareness to public by purchase and distributing educational materials at public facilities and events regarding protection from natural hazards	Emergency Management Director	Municipal Staff, Board of Selectmen.	2015 – 2020	21	Benefit exceed costs	Carried forward. Lack of funding. No budget. "We do the best we can we what we can get our hands on"
All Natural Hazards	Implement recommendations regarding natural hazard mitigation in existing planning documents including the master plan, five year action plan of the open space and recreation plan and the emergency evacuation plan	Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	Municipal Staff, Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	2015 – 2020	21	Benefit exceed costs	Completed but Carried forward. This is an ongoing effort. For example, town recently amended Floodplain district bylaw and wellhead protection bylaw to further enhance protection from flooding. This was a recommendation of the open space and recreation plan.

*Unless otherwise noted, Shirley's Resources/Funding consists of elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

**Actions identified as carried forward were not completed in the previous planning cycle unless otherwise stated.

Mitigation actions from the 2008 Montachusett Region Hazard Mitigation Plan that are complete include the following:

- Identified Existing Shelters that are Earthquake Resistant as well as Outside of Floodplain (and Dam Inundation) Areas.
- Inventoried Supplies at Existing Shelters and Developed a Needs List and Storage Requirements.
- Identified municipal structures that need to be elevated above the Base Flood Elevation. All municipal buildings are above floodplain.
- Prepared a priority list for the Replacement of Undersized Culverts throughout the town. All culverts adequate except Ayer Road.
- Expanded Residential Parking Ban to enable snow removal from all streets.
- Identified shelters and publicize locations.
- Evacuation routes have been identified and mapped.
- Evaluate and relocate valuable and historical items and furnaces, water heaters and electrical equipment. All town-owned properties have been determined to be above the floodplain.

2008 Mitigation Actions that were removed from this update includes:

-Install beaver diverters and water control devices. Town uses trappers only.

Sterling Natural Hazard Risk Assessment

While this annex focus' pertains to critical facilities, flooding, risk assessment, existing protections and mitigation strategy in the community, more detailed descriptions of each natural hazard's impact on the region and its communities and summary of vulnerability can be located in the regional section entitled " 4. Identification of Natural Hazards, Identifying and Profiling Hazards".

Community Profile

The town of Sterling is bordered by Leominster on the north, Lancaster and Clinton on the east, Boylston and West Boylston on the south, and Princeton and Holden on the west. Sterling is about 41 miles west of Boston, 12 miles north of Worcester, and 186 miles from New York City.

The town of Sterling covers an area of 31.61 square mile and has a resident population of 7,808, according to the 2010 US Census, with a density of 247 people per square mile. The total number of housing units is 2,965, and the average household size is 2.73 people. The median age of Sterling residents is 44.

Sterling is a small, mainly residential community. Sterling was incorporated in 1781. The town is named for the Earl of Stirling, a Scottish lord. At various times in its history, clocks, hats, cider, pottery and other goods were manufactured in Sterling, but most recently has been mostly a farming community of rolling hills, pastures and some spectacular views of Mount Wachusett. Sterling is the home of Mary Sawyer of "Mary Had a Little Lamb" fame. There is a statue of the lamb in the Town Common which attracts many visitors. Sterling is also the home of the Butterick dress pattern, which was originally designed and patented by Ebenezer Butterick in 1896. Residents enjoy the rural atmosphere of the town and also have easy access to museums, plays, Worcester Centrum activities and skiing at Mount Wachusett. Each year in early September, the Sterling Town Fair attracts people from far and near who enjoy the many attractions of the fair; horse and oxen pulls, game booths, rides, good food, and music. Sterling's largest employers are Northeast Polybag and Sterling Village.

Critical Facilities

In general usage, the term “critical facilities” is used to describe all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired.

Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even access to damaged areas.

The number and nature of critical facilities in a community can differ greatly from one jurisdiction to another, and usually comprise both public and private facilities. In this sense, each community needs to determine the relative importance of the publicly and privately owned facilities that deliver vital services, provide important functions, and protect special populations. *Source: Federal Emergency Management Administration, Risk Management Series, Design Guide for Improving Critical Facility Safety from Flooding and High Winds, FEMA 543, January 2007.*

A list of the critical facilities within the community is shown in Table 71. This data was obtained from the community’s Comprehensive Emergency Management Plan (CEMP). The data was then reviewed by the Emergency Management Director. These facilities were digitized into GIS and used for determining vulnerability to the various hazards. The map that follows entitled FEMA Q3 Flood Zones and Critical Infrastructure depicts Critical Facilities in the community.

Table 71: Sterling Critical Facilities

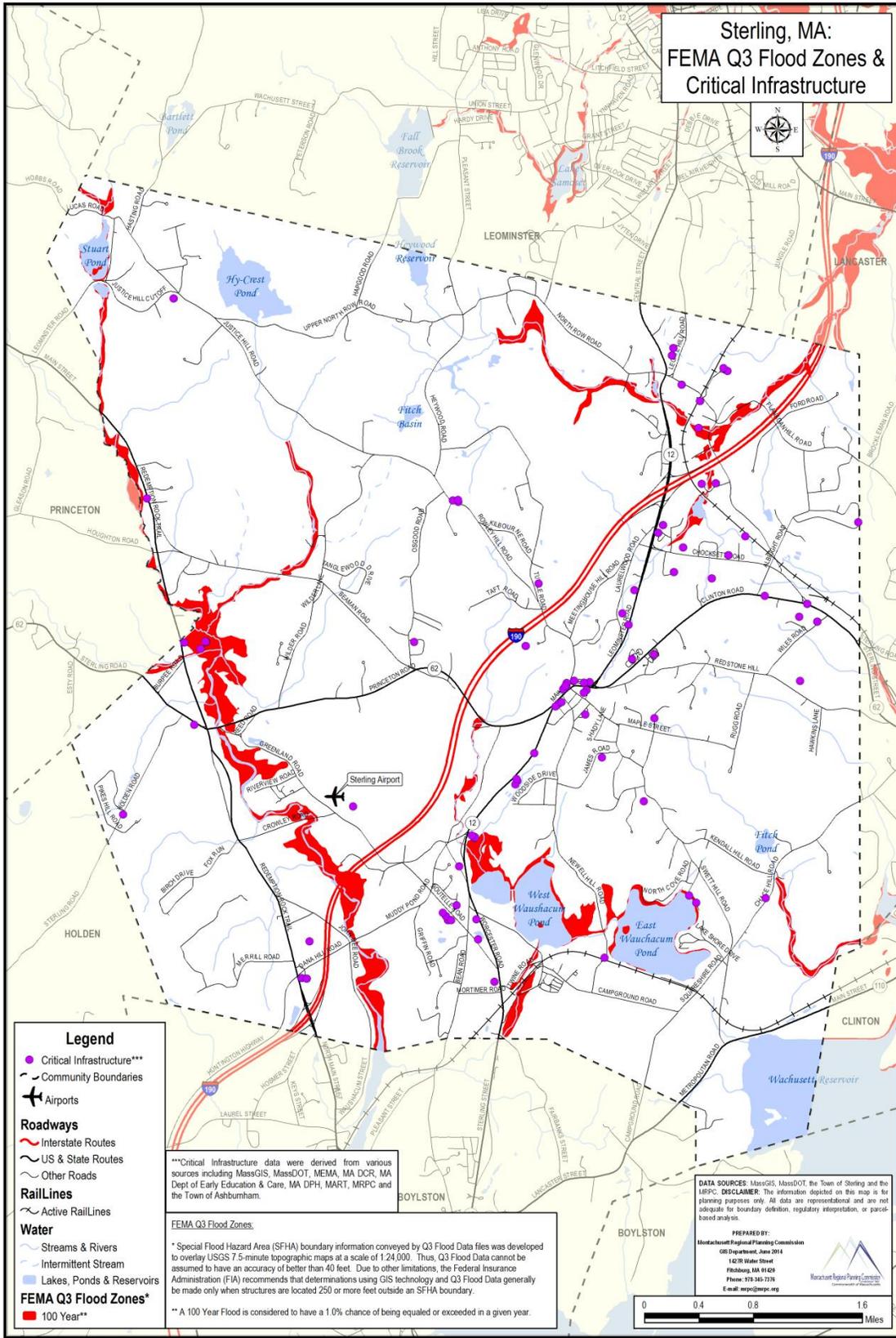
Feature Type	Name	Address
Airports	Sterling	Greenland Road
Animal Shelters	Sterling Animal Shelter	17 Laurel wood Road
City/Town Halls	Sterling Town Hall	1 Park Street
Public Water Supply*	Sterling Nursery School	
	Worcester Road Well 2a	
	Gp 4 Redemption Rock Trail Well	
	Worcester Road Well 2b	
	Worcester Road Well 2c	
	Gp 5 Redemption Rock Trail Well	
	Gp 3 Redemption Rock Trail Well	
DPW Facilities	Sterling DPW	171 Worcester Road

Early Education Childcare Facilities	Moroney, Jessica L.	76 Holden Road
	Abell, Helen	5 Walnut Drive
	Sterling Nursery School	123 Rowley Hill Road
	Jordan, Karyn	17 Jewett Road
	Amazing Kids	64 Leominster Road
	Hanson, Carol M.	110 Clinton Road
	Tremblay, Jennifer L.	175 Newell Hill Road
	Citro, Shannon	28 Sandy Ridge Road
	Shepardson, Joyce	14 Redstone Place
	Village Green Preschool	First Church
Elderly Housing	Sholan Terrace	7 Bird Street
Electric Substations	Sterling Light Department	40 Chocksett Road
	National Grid	29 Pratts Junction Road
Emergency Dispensing Sites	Chocksett Middle School	40 Boutelle Road
	Houghton Elementary School	32 Boutelle Road
Emergency Shelters	First Church	6 Meetinghouse Hill Rd.
	Houghton Elementary School	30 Boutelle Road
	Chocksett Middle School	40 Boutelle Road
	Saint Richard's Of Chichester Church	4 Bridge Street
	Hope Chapel	35 Chocksett Road
	Butterick Municipal Building	1 Park Street
End Of Life Facilities	Miles Funeral Home	100 Worcester Road
	Reed Cemetery	13 Boutelle Road
	Oak Hill Cemetery	
	Hillside Cemetery	
	Legg Cemetery	43 Redemption Rock Trail
	Fairbanks Cemetery	112 Chace Hill Road
Emergency Operations Centers	Sterling Police Department	135 Leominster Road
	Sterling Fire Department	5 Main Street
Fire	Sterling Fire Department	5 Main Street
Hazmat Sites	Birch Point Paper	11 Dana Hill Road
	Colonial Wire And Cable	11 Dana Hill Road
	Comcast	163 Clinton Road
	Anderson Power Products	13 Pratts Junction Road
	Verizon Cell Tower	7 Chocksett Road
	Osterman Gas	22 Legate Hill Road
	Crop Production Services	18 Legate Hill Road
	Fiber optic Components	2 Spratt Technology Way
	Polyflow	100 Pratts Junction Road

	Verizon Switching Office	51 Main Street
	Mass Hwy. Dept.	14 Chocksett Road
	National Grid	29 Pratts Junction Road
	Northeast Grower Supply	150 Clinton Road
Long Term Care Facility	Sterling Village	18 Dana Hill Road
Other Critical Facilities	Justice Hill Receiver Site	
	Redemption Rock Trail Receiver Site	
	West Sterling Uv Treatment Facility	
	J&J West Sterling Garage	240 Redemption Rock Trail
	Birch Point Paper	11 Dana Hill Rd
	Colonial Wire And Cable	11 Dana Hill Rd
	Hall Avenue Receiver Site	1 Hall Ave
	Lehigh Gas	205 Worcester Road
	Comcast	161 Clinton Road
	Northeast Grower Supply	150 Clinton Road
	Anderson Power Products	9-13 Pratts Junction Road
	Horace Mann Educational Association	153 Clinton Road
	Verizon Cell Tower	9 Chocksett Road
	Sterling Emergency Communications	135 Leominster Road
	Wireway Husky	150 Pratts Junction Road
	Osterman Gas	22 Legate Hill Road
	Uap Northeast	18 Legate Hill Road
	Pratt's Junction Road Receiver Site	27 Pratts Junction Road
	Fiber optic Components	2 Spratt Technology Way
	Polyflow	100 Pratts Junction Road
	Sprint Cell Tower	5 Pinewoods Lane
	Pinewoods Lane Base Antenna Site	5 Pinewoods Lane
	Apple Town Market	9 Main Street
	Verizon Switching Office	51 Main Street
	Seven Hills Foundation	1 Pheasant Hill Lane
	Sholan Park	5 Hall Avenue
	Institute Of Professional Practice	26 James Rd
Institute Of Professional Practice	287 Redemption Rock Trail	
Davis Solar Farm	145 Redstone Hill Road	
Maki Home Center	36 Worcester Road	
Other Government Buildings	Conant Public Library	4 Meetinghouse Hill Road
	Sterling DPW	171 Worcester Road
	Sterling Municipal Light Plant	50 Main Street

	DPW Fueling Station	171 Worcester Road
	Mass Hwy. Dept.	14 Chocksett Road
	Sterling Municipal Light Dept. Substation	Chocksett Road
	Osgood Road Water Tank	13 Osgood Road
	Tuttle Road Water Tank	11 Tuttle Road
	Fire Station Back-Up Antenna	5 Main Street
	Sterling Municipal Light Department Radio Antenna	50 Main Street
	Kendall Hill Water Tank	61 Kendall Hill Road
	Justice Hill Receiver Site	1 Roper Road
	Redemption Rock Trail Receiver Site	283 Redemption Rock Trail
	Sterling Emergency Communications	135 Leominster Road
	Pratt's Junction Road Receiver Site	27 Pratts Junction Road
Police	Sterling Police Department	135 Leominster Road
Pumping Stations	West Sterling Pumping Station	275 Redemption Rock Trail
	Worcester Road Pumping Station	109 Worcester Road
School	Houghton Elementary School	32 Boutelle Road
	Chocksett Middle School	40 Boutelle Road
	Sterling Nursery School	123 Rowley Hill Road
Sports And Cultural Areas	Sterling Academy Of Gymnastics	15 Industrial Drive
	First Church	6 Meetinghouse Hill Road
	Seventh-Day Adventist Church	82 Leominster Road
	Saint Richard Of Chichester Church	4 Bridge Street
	Hope Chapel	35 Chocksett Road

* As stated in 310 CMR 22.02, a Public Water System means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year” (Mass GIS, 2014).



Flood Prone Areas

Particular areas within the community where the risk of flood areas are or could occur were determined at the first meeting of the Sterling’s Local Hazard Mitigation Team held on June 28, 2012. This information can be found on Sterling’s Local Hazard Map which is located under the section entitled Risk Assessment.

Flooding Vulnerability Assessment

An analysis of the FIRM flood hazard area maps indicates that there is a total of 1135.56 acres of 100-year floodplain within Sterling. This amounts to 5.6% of the total town. Based on additional analysis, 35.08 acres (2.91%) of the floodplain are developed. Currently there are 69 structures in the floodplain which is about 1.48% of the total structures in the community. The buildings are then multiplied by the building value, as determined by the MA Department of Revenue, to come up with a potential loss of \$58,654,000.

Excluding dams and bridges, the following table lists the critical facilities within the 100 year flood zone.

Table 72: Sterling Critical Facilities within 100-Year Flood Zone

<i>Feature Type</i>	<i>Name</i>	<i>Address</i>
HazMat Sites	Fiber optic Components	2 Spratt Technology Way
Other Critical Facilities	Redemption Rock Trail Receiver Site	
	West Sterling UV Treatment Facility	
	Hall Avenue Receiver Site	1 Hall Ave
	Fiber optic Components	2 Spratt Technology Way
	Sholan Park	5 Hall Avenue
Other Government Buildings	Redemption Rock Trail Receiver Site	283 Redemption Rock Trail
Public Water Supply	Gp 4 Redemption Rock Trail Well	
	Gp 5 Redemption Rock Trail Well	
	Gp 3 Redemption Rock Trail Well	
Pumping Stations	West Sterling Pumping Station	275 Redemption Rock Trail

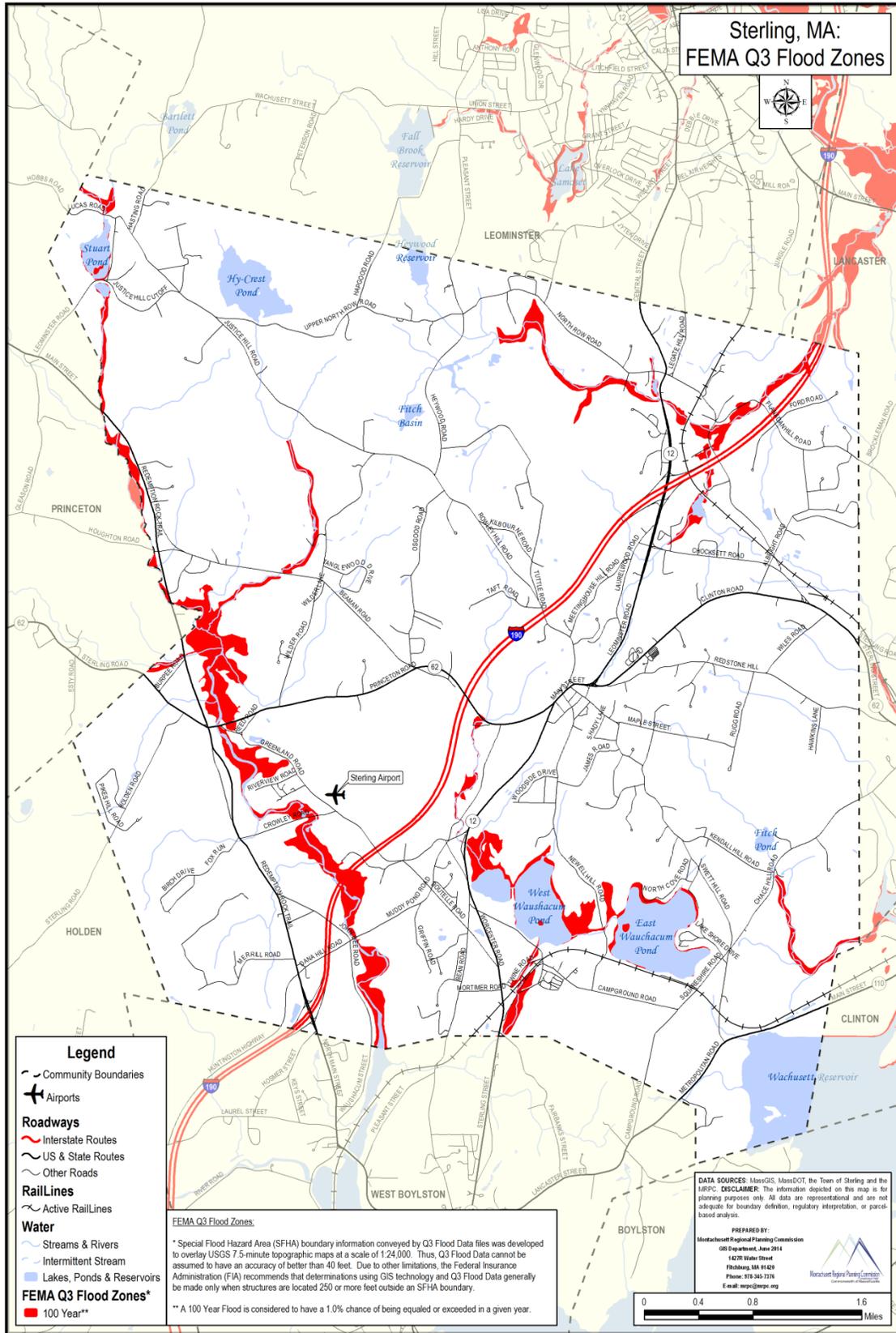
Since the initiation of the National Flood Insurance Program (NFIP), one flood insurance claim in the Town of Sterling has been made totaling \$6,545.78 in payments. There are no repetitive loss properties in Sterling. Statistics from the NFIP BureauNet indicate in the town of Sterling there are nine flood insurance policies in force.

Floodplain Management and Compliance with NFIP

The town supports floodplain management activities in an effort to meet compliance of the National Floodplain Insurance Program. These efforts include:

- Implementing the MA Wetlands Protection Act and the town’s Stillwater River Protection Bylaw regulating development and activity within the wetlands buffer zone and regulating stormwater and other point source discharge.
- Implementing the Town Flood Plain District Bylaw regulating development in the floodplain district.
- Continued maintenance of municipal stormwater drainage system which includes regular cleaning of catch basins, storm drains and culverts.
- Continued maintenance of public water bodies to reduce flooding caused by erosion and water displacement.

The map that follows entitled FEMA Q3 Flood Zones depicts the 100 year flood zones in the community.



Structurally Deficient Bridges Over Waterways

Sterling does not have any bridges over water that are classified by MassDOT as “structurally deficient.

Hazard Potential of Dams

The DCR Office of Dams Safety lists 21 dams in the Town of Sterling as shown in Table 73. Five dams are classified as significant hazard.

Classifications for potential hazards are in accordance with the chart below.

Hazard Potential Classification

High Hazard	Refers to dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
Significant Hazard	Refers to dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities
Low Hazard	Refers to dams located where failure may cause minimal property damage to others. Loss of life is not expected.

Source: MA Department of Conservation and Recreation Office of Dam Safety

High hazard dams must be inspected every two year, significant hazard every five years, and low Hazards dams every 10 years. Owners of dams are responsible for having their dam inspected. MGL Chapter 253 and 302 CMR 10.00 requires that dam owners prepare, maintain and update Emergency Action Plans for all High Hazard Potential dams and certain Significant Hazard Potential dams.

Non-jurisdictional dams are not regulated by the Office of Dam Safety or under their jurisdiction. Typically these dams are under 6 feet in height and/or under 15 acre-feet in storage and do not have an assigned 'Hazard Code'. Dams owned and regulated by the Federal Government are also typically non-jurisdictional but DO have an assigned Hazard Code.

Table 73: Dams

Name	Dam	Hazard Code	Owner
Sterling	Stuart Pond Dam	Low Hazard	Private
Sterling	Lower Lynde Basin Dam	Low Hazard	Public
Sterling	Petruzzi Pond Dam	N/A	Private
Sterling	John Tagg Pond Dam	N/A	Private
Sterling	Tuttle Lake Dam	N/A	Private
Sterling	Saddle River Dam	N/A	Private
Sterling	Duck Pond Dam	N/A	Private

Sterling	Thomas Pond Dam	N/A	Private
Sterling	Farm Pond Dam	N/A	Private
Sterling	Old Mill Pond Dam	N/A	Private
Sterling	Lower Spring Basin Dam	N/A	Public
Sterling	Upper Spring Basin Dam	N/A	Public
Sterling	Waushacum Pond Dam - West	N/A	Public
Sterling	Waushacum Pond Dam - East	N/A	Public
Sterling	Stump Pond Dam	N/A	Private
Sterling	Waushacum Pd Dam Middle Diversion	N/A	Public
Sterling	Hycrest Pond Dam	Significant Hazard	Private
Sterling	Heywood Reservoir Dam	Significant Hazard	Public
Sterling	Fitch Basin Dam	Significant Hazard	Public
Sterling	Upper Lynde Basin Dam	Significant Hazard	Public
Sterling	Pratts Pond Dam	Significant Hazard	Private

*N/A – Information not available as the dam is non-jurisdictional.

Risk Assessment

As previously stated, located in Section 4. Identification of Natural Hazards, Identifying and Profiling Hazards”, there is a description of each identified hazards’ impact on the region and its communities as well as an overall summary of vulnerability. Based on the hazards identified in this plan and the assessment of risks by the Town of Sterling, the town considers itself to be at a high risk for Heavy Rain, Beavers, High Winds, Hurricanes, Tornados, Nor’easters, Severe Thunderstorms, Heavy Snow, Ice Storms, Blizzard; moderate risk for Snow Melt, Dam Failure, Wildland Fire, Drought, Extreme Temperatures, Earthquakes; low risk for Landslides; and tsunamis as not applicable-

This information is documented in Sterling’s Natural Hazard Matrix below which was obtained from participants at the Shirley Local Hazard Mitigation Team Meeting held on June 28, 2012.

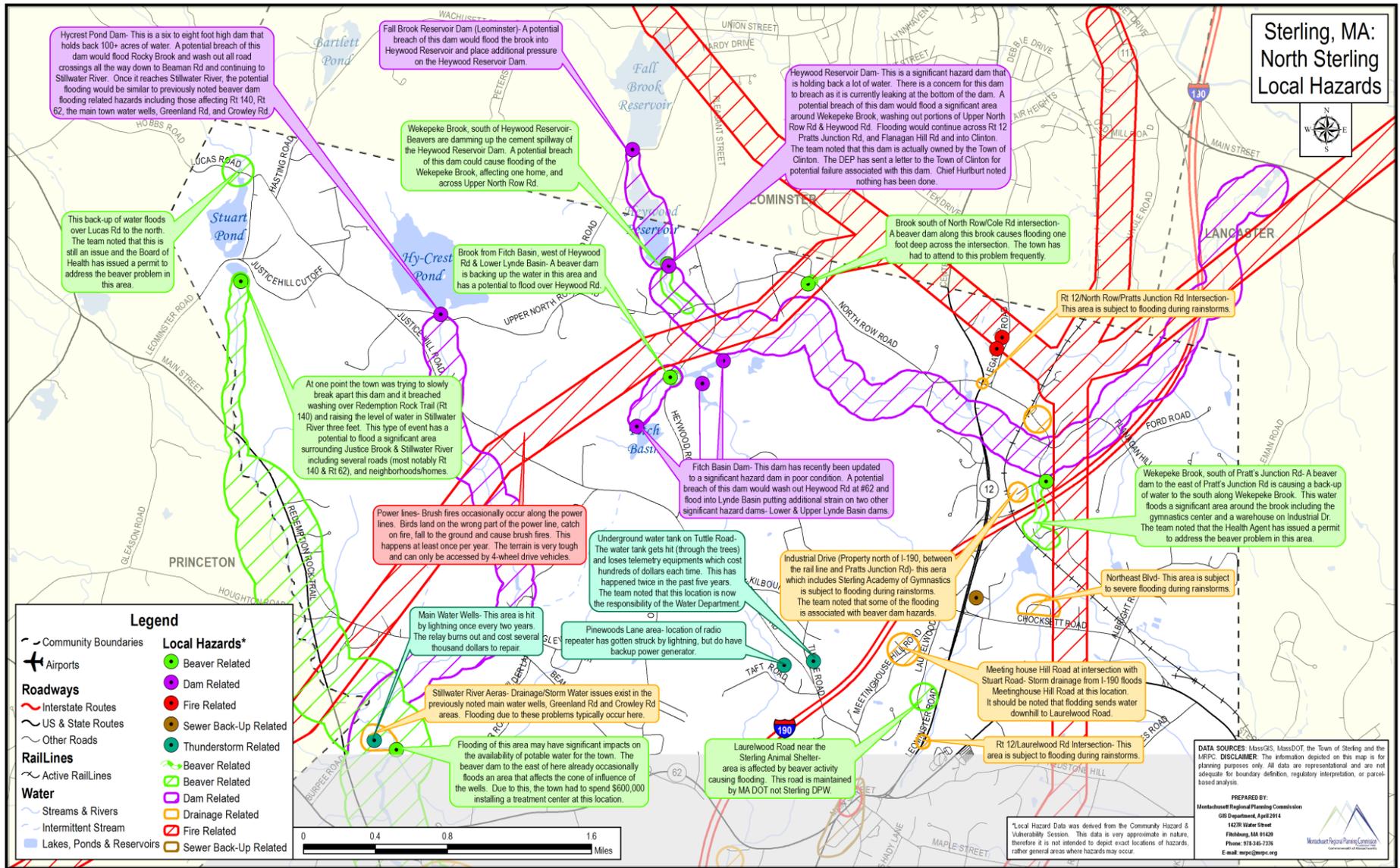
Sterling Natural Hazard Matrix

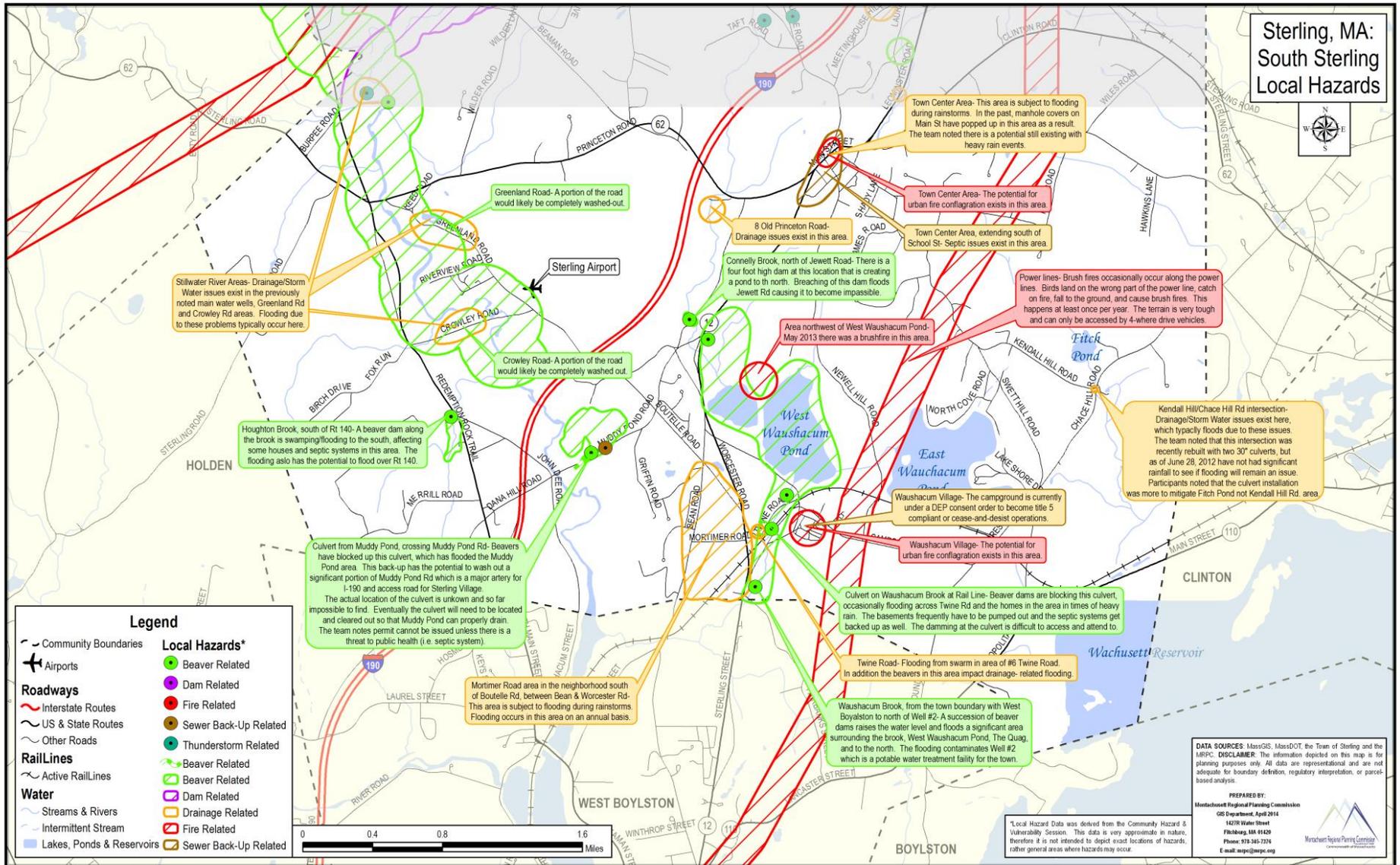
Natural Hazard	Likelihood of Occurrence	Location	Impacts	Hazard Index
Natural Hazard Separated by Flood, Atmospheric Related and Winter Related, Other Natural Hazards, and Geologic Hazards	3 = Highly Likely 2 = Possible 1 = Unlikely	3 = Regional/State 2 = Multi Community/Regional 1 = Local/Town	4 = Catastrophic 3 = Critical 2 = Limited 1 = Negligible	Ranking Determined by Combining the Likelihood, Location and Impacts of a Natural Hazard
Flood-Related Hazards				
• Heavy Rain	3	1	2	6
• Snow Melt	2	2	2	6
• Dam Failure	2	2	2	6
• Ice Jams	1	1	1	3
• Beavers	3	2	2	7
Atmospheric Related and Winter Related Hazards				
• High Winds	3	3	3	9
• Hurricanes	3	3	3	9
• Tornadoes	3	2	3	8
• Nor'easters	3	3	3	9
• Severe Thunderstorms	3	1	2	6
• Heavy Snow	3	2	3	8
• Ice Storms	3	2	3	8
• Blizzard	3	2	3	8
Other Natural Hazards				
• Major Urban Fires	2	1	2	5
• Wildland Fire	2	2	3	7
• Drought	2	2	3	7
• Extreme Temperatures	2	2	2	6
Geologic Hazards				
• Earthquakes	2	2	2	6
• Landslides	1	1	2	4
• Tsunami	NA	NA	NA	NA

Key

Highly likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
 Possible : 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.
 Unlikely: Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.
 Catastrophic: Immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.
 Critical: Fast speed of onset or long duration of event resulting in devastating damage and loss of services for weeks or months.
 Limited: Moderate speed of onset or moderate duration of event, resulting in some damage.
 Negligible: Slow speed of onset or short duration of event resulting in little to no damage.

Also discussed at this meeting were the hazards that affect each community and the identification of specific problem areas in the community that need to be addressed. This included the identification of new hazards that were determined to pose a threat or community vulnerability which are detailed in Sterling's Local Hazards Map on the following page. The entire community is equally at risk to the following hazards: heavy rain, snow melt, ice jams, high winds, hurricanes, tornados, nor'easters, heavy snow, ice storms, blizzards, drought, extreme temperatures, earthquakes and landslides.





Existing Protections

The original inventory of hazard mitigation actions which the Montachusett communities undertook for the 2008 Montachusett Region Hazard Mitigation Plan was reviewed and updated by each community at a meeting held in each community with the MRPC and the community's Local Hazard Mitigation Planning Team and, in some communities, the Emergency Management Committee. The attendees of the meetings can be found in Appendix A. The following matrices depict the updated inventory of what is currently being done to mitigate hazards by listing the programs and activities already in place. It includes a description of the protection measure, who is responsible, and improvements and changes that may be needed. This inventory was used by the Planning Team/Emergency Management Committee to identify gaps in existing protections that were then addressed through the development of this plan update.

Sterling

Type of Existing Protection	Description	Area Covered	Implementation Resources and Funding*	Improvements or Changes Needed
Flood Related Hazards				
Storm water management standards	State Regulation under the Wetlands Protection Act to regulate storm water and other point source discharge	Town-Wide	Enforced by the Sterling Conservation Comm. (Wetlands Protection Act) staffed by the municipal Conservation Agent and Sterling Planning Board (Subdivision Control Law and site plan review) staffed by the Planning Board Administrative Assistant.	Storm water management standards are and continue to be enforced. No improvements or changes needed.
Wetlands Protection Act (state)	State law regulating development and activity within wetland buffer zone	100-foot state buffer around wetland area; 200 foot buffer around river front areas.	Enforced by the Sterling Conservation Commission staffed by the municipal Conservation Agent.	No improvements or changes needed.
Stillwater River Protection District Bylaw (local)	Local law regulating development and activity within the buffer of the Stillwater River	100-foot state buffer around wetland area; 200 foot buffer around river front areas. Floodplains of Stillwater River area	Enforced by the Sterling Conservation Commission staffed by the municipal Conservation Agent.	No improvements or changes needed.

100 Year Flood Zone	Federal law requiring elevation above 100-year flood level of new and substantially improved residential structures in floodplain	100-year floodplain as shown on Flood Insurance Rate Map dated June 15, 1982.	Enforced by the Building Inspector (municipal staff) and Sterling Conservation Commission staffed by the municipal Conservation Agent.	Update Insurance Flood Rate Maps
Town Zoning Bylaws. Flood Plain Districts	Local bylaw enhancing federal/state laws and regulating any development in the flood plain district	100-year floodplain as shown on Flood Insurance Rate Map dated June 15, 1982.	Enforced by the Building Inspector (municipal staff) and Sterling Conservation Commission staffed by the municipal Conservation Agent.	Update Insurance Flood Rate Maps
Maintenance of municipal storm water drainage system	Regular cleaning of catch basins, storm drains, and culverts	Town-Wide	Undertaken by the Department of Public Works municipal staff.	Maintenance continues but Additional Personnel and Equipment Needed.
Maintenance of public water bodies (ponds, streams, brooks, wetlands)	Periodic cleaning of waterways needed, e.g., remove trash, debris	Town-Wide	Undertaken by the Department of Public Works municipal staff with guidance from Sterling Conservation Commission	Maintenance continues. No improvements or changes needed.
Inspection of major dams	Periodic inspections of the structural integrity of the dam	Major Dams	Directed by the DCR Office of Dam Safety	Update Dam failure studies for the dams rated as high hazard
<u>Wind Related Hazards</u>				
State Building Code	State Law related to design loads to include wind effects	Town-Wide	Enforced by Building Department municipal staff.	Continued enforcement remains in place. No improvements or changes needed.
Tree Maintenance	Regular inspection and tree maintenance to cut branches threatening power lines and overhead utilities	Town-Wide	Sterling Municipal Light Plant Staff.	Tree maintenance continues but Additional Staff needed.
<u>Fire Related Hazards</u>				
Limited Brush Clearing	Provide access to Emergency Services	Town-Wide	Undertaken by the Department of Public Works municipal staff.	Limited brush clearing continues. Identify additional Areas with Potential for Brushfires.

Winter Storms Related				
Residential Parking Bans	Parking Bans to Enable Snow Removal Effectively from Residential Streets	Town-Wide	Department of Public Works municipal staff.	Parking bans remain in place but additional personnel and equipment needed for enforcement.
Clearing Snow from Major Arterial Routes	Ensure Access to Emergency Service vehicles	Town-Wide	Department of Public Works municipal staff.	Snow clearing continues but additional personnel and equipment needed.

*Sterling enforcement/implementation is generally carried out by elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

Mitigation Goals, Objectives and Strategies

As discussed earlier in this Plan, MRPC previously prepared the 2008 Montachusett Region Hazard Mitigation Plan which consisted of individual annexes for each MRPC community. Similarly, as part of the multi-jurisdictional plan update, each community also developed their own individual goals, objectives and strategies which are listed in this section.

Overall Goal Statement: To prepared to reduce the loss of life, property, infrastructure and cultural resources throughout the town of Sterling from natural disasters through a multiple hazard mitigation program that involves increased coordination, planning, education, and capital improvements.

1. **Objective:** To organize and prepare to provide adequate shelter, water, food, and basic first aid to displaced residents in the event of a natural disaster, and to provide adequate notification and information regarding evacuation procedures, *etc.*, to residents in the event of a natural disaster.
2. **Objective:** To inventory supplies at existing shelters and develop a needs list and storage requirements; and to establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster.
3. **Objective:** To continue to have the Emergency Management Director (EMD) led an effort to increase coordination between inter-departments in pre-disaster planning and implementation of hazard mitigation projects.
4. **Objective:** Increase awareness of hazard mitigation among town officials, private organizations, businesses, and the general public.
5. **Objective:** To maintain the Town’s current (Reverse) R-911 notification system including the Town’s Code-Red Notification System.
6. **Objective:** To collect, periodically update, and disseminate information on which local radio stations provide emergency information, what to include in a “home survival kit, how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to follow during a natural disaster.

Specific Natural Hazard Goals for Sterling

Goal Statement for Flooding: To prepare emergency staff and volunteers in order to minimize the loss of life, damage to property, and the disruption of governmental services and general business activities

due to flooding.

1. **Objective:** To continue to participate in the National Flood Insurance Program, and to have the flood maps periodically updated.
2. **Objective:** To continue to develop a priority list and seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town.

Goal Statement for Protection from Beavers: To minimize the threat to health, the damage to roads and property, and the disruption of governmental services and general business activities due to flooding caused by beavers.

1. **Objective:** Support local town departments to continue present methods to prevent beaver caused flooding.
2. **Objective:** Continue to seek assistance from beaver management professionals, including trappers.
3. **Objective:** Install beaver management devices.

Goal Statement for Hurricanes and Tornadoes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to high winds associated with hurricanes and tornadoes. (The objectives listed above, under flooding, address the flooding that can result from a hurricane.)

1. **Objective:** To educate residents and volunteers regarding the safe methods and actions necessary to deal with Hurricanes and Tornados.

Goal Statement for Winter Related Hazards: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to severe snow and ice storms.

1. **Objective:** To develop a plan for providing access to water, information, shelter, and food stores to people in remote locations in Sterling in the event of a severe winter storm.

Goal Statement for Earthquakes: To educate staff, residents and volunteers about the potential for earthquakes and strategies to minimize the loss of life, damage to property, the disruption of governmental services and general business activities due to earthquakes.

1. **Objective:** To educate and encourage homeowners and developers to rehab and build using methods to minimize the effects of earthquakes and other disasters.
2. **Objective:** To insure that all identified shelters have sufficient back-up utility service in the event of primary power failure.

Mitigation Action Plans and Prioritization of Actions (STAPLEE)

Initial Mitigation Action Plans for the Montachusett Communities were presented in the communities Hazard Mitigation Plans that were approved by FEMA in 2009 and 2010. The original Mitigation Action Plans were developed through an inventory of potential hazards which could impact the community and an evaluation of a range of alternatives to address these hazards. As part of the plan update process, the original Mitigation Action Plan was reviewed by the community's Local Hazard Mitigation Planning Team/Emergency Management Committee to delete actions which have already been completed, add additional actions which are either underway or planned to be undertaken, and to update the current status of all actions. The goals were reviewed and updated at the second meeting with each community.

An additional step in this process was to conduct a "STAPLEE" analysis for each action to prioritize all actions within each community and a subjective evaluation of each action's perceived cost/benefit. In the 2008 plan, actions were not prioritized so there were no changes in priorities in this update. The revised Community Mitigation Action Plans matrices that follow identify each mitigation action, the responsible department or board responsible for implementation, potential funding sources, the timetable of the action, results of the prioritization of actions through the STAPLEE analysis, and the perceived cost/benefit for each mitigation action.

The goal of each identified strategy, or mitigation action, is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each action to establish priorities for implementation, using the "STAPLEE" method. The STAPLEE methodology was developed by the Federal Emergency Management Agency as a tool to help communities prioritize their hazard mitigation strategies and determine the most appropriate actions for implementation. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of an action and is designed to be used by public officials and planners for making planning decisions.

To conduct the STAPLEE exercise, the community's Hazard Mitigation Team was asked to rate each action in their Mitigation Action Plan on each of the following criteria, using a score of 1 to 3 (Good = 3, Average = 2, Poor = 1):

- **Social:** Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- **Technical:** Will the proposed strategy work? Will it create more problems than it solves?
- **Administrative:** Can the community implement the action? Is there someone to coordinate and lead the effort?
- **Political:** Is the action politically acceptable? Is there public support both to implement and to maintain the action?
- **Legal:** Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- **Economic:** What are the costs of this action? Does the cost seem reasonable for the size of the problem and the likely benefits?
- **Environmental:** How will the action impact the environment? Will the action need environmental regulatory approvals?

These scores were then totaled, resulting in a final score of 7 (least priority) to 21 (highest priority) for each action. The higher the final score, the higher the relative priority of that action for implementation. This information can then be utilized in each community as they conduct and administer relevant municipal functions and activities. The final STAPLEE score for each action is shown in the following mitigation action plan.

The Hazard Mitigation team was also asked to do a relative cost/benefit of each action. This assessment was intended to informally indicate if an action will either have more benefits accrued to the Town than the Cost of implementing the action, or if the costs would exceed any benefits. Responses include: "Benefits Exceed Costs", "Benefits Equal Costs, or "Costs Exceed Benefits".

STERLING IMPLEMENTATION STRATEGY FOR PRIORITY MITIGATION ACTIONS

Type of Natural Hazard	Description of Action	Implementation Responsibility	Resources/ Funding*	Timetable	Priority (STAPLEE SCORE)	Cost/Benefit Evaluation	Status Update from 2008 Plan**
All Natural Hazards	Maintain the Inventory of Supplies at Existing Shelters and Develop a Needs List and Storage Requirements to ensure the available of adequate supplies during a natural hazard. Supplies must be adequate to eliminate or reduce risk to human life.	Emergency Management Planning Committee, School Facilities Manager	Municipal Staff	2015 – 2020; Identified School Supplies, shelter is run by a generator and certified by	20	Benefits exceed costs	Completed but carried forward. This action is undertaken on a periodic basis.
Flood Related Hazards	Identify all structures throughout the town that need to be Elevated above the Base-Flood Elevation Once identified, educate those property owners regarding their options for mitigation.	Building Inspector, Conservation Commission	Municipal Staff. Also 75% FEMA FUNDING AVAILABLE. Remaining 25% (non-federal)	2015 – 2020; Mass GIS now has a building footprint GIS data layer which will assist in this task	17	Benefits exceed costs	Carried forward. GIS data recently became available which will be used to assist with this task.
Flood Related Hazards	To Develop a priority list and possibly seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town to reduce or eliminate flooding risk.	Board of Selectmen, Highway Department	Municipal Staff for labor; FEMA HMGP grant 75%	2015 – 2020	21	Benefits exceed costs	Carried forward due to time constraints.

Flood Related Hazards	Evaluate and relocate valuable and historical items and furnaces, water heaters, and electrical equipment in municipal owned buildings that are located in areas prone to flooding to reduce flood damage.	Emergency Management Director, Fire Department	Municipal Staff and Property Owners	2015 – 2020;	19	Benefits exceed costs	Carried forward. Town has recently installed a fire-rated vault in Town Hall to relocate valuable historical items. Evaluation of water heaters, furnaces, etc. has not yet been completed due to time constraints.
All Hazards	Increase hazard education and risk awareness to public by distributing educational materials regarding protection from natural hazards, including such materials related to NFIP, insurance and building codes explanatory pamphlets or booklets .	Emergency Management Director, Fire Department, Schools	Emergency Management Director /Fire Department	2015 – 2020	21	Benefits exceed costs	Completed but carried forward. Ongoing. This action undertaken periodically.
Other Natural Hazards (Wildland fire)	Identify areas with potential for brush fires to track community vulnerability by developing and maintaining a data base.	Department of Public Works; Municipal Light Department	Municipal Staff; Light Department Revenue	2015 – 2020	20	Benefits equal costs	New Action.

All Natural Hazards	Utilize interactive mapping application prepared by MRPC/CMRPC to update critical infrastructure and simulate real time evacuation scenarios to mitigate hazards to the public. Sterling also participates in the Worcester County Evacuation Route Planning Process.	Emergency Management Director	Emergency Management Director	2015; (12 months)	20	Benefits exceed costs	New Action.
Flood Related Hazards	Continue to install "beaver diverters" and water control devices to mitigate flooding caused by beaver dams.	Department of Public Works; Board of Health	Municipal Staff	2015 – 2020	17	Benefits equal costs	Completed but carried forward. This action is undertaken on an as needed basis.
All Natural Hazards	Implement recommendations regarding natural hazard mitigation in existing planning documents including the implementation element of the master plan, five year action plan of the open space and recreation plan and the emergency evacuation plan	Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	Municipal Staff, Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	2015 – 2020	21	Benefits equal costs	Carried forward due to lack of funding and time constraints.

Flood Related Hazards	Participate in NFIP training offered by the State and/or FEMA that addresses flood hazard planning and management.	Emergency Management Director, Building Department, and Board of Health	Municipal Staff	2015 – 2020	19	Benefits exceed costs	New Action.
Flood Related Hazards	Establish mutual aid agreements with neighboring communities to address administering the NFIP following a major loss .	Board of Selectmen, Police & Fire Departments, Emergency Management Director	Municipal Staff	2015 – 2020	20	Benefits exceed costs	New Action.
Flood Related Hazards	Participate in the Community Rating System Program to reduce flood damage to insurable property; strengthen and support the insurance aspects of the NFIP, and to Encourage a comprehensive approach to floodplain management.	Board of Selectmen, Conservation Commission, Building Department	Municipal Staff	2015 – 2020	16	Benefits equal costs	New action.
Flood Related Hazards	Identify any non-compliance structures located in Sterling in floodprone areas and develop a mitigation strategy.	Building Inspector	Municipal Staff	2015 – 2020	18	Benefits exceed costs	New action.
Flood Related Hazards	Identify and become knowledgeable of any submit-to-rate structures located in Sterling to determine mitigation actions.	Building Inspector	Municipal Staff	2015 – 2020	17	Benefits equal costs	New Action.

Flood Related Hazards	Inspect foundations at time of completion before framing to determine if lowest floor is at or above Base Flood Elevation thereby limiting or restricting development in flood prone areas.	Building Inspector	Municipal Staff, FEMA HMGP grant 75%	2015 – 2020	18	Benefits equal costs	New Action.
Flood Related Hazards	Require use of elevation certificates-to ensure compliance with the floodplain management bylaw to better comply with NFIP.	Building Inspector and Board of Health	Municipal Staff	2015 – 2020	19	Benefits equal costs	New Action.
Flood Related Hazards	Enhance local officials, builders, developers, local citizens and other stakeholder’s knowledge of how to read and interpret the FIRM to ensure awareness of areas located in flood zone.	Emergency Management Director, Building Department, and Board of Health	Municipal Staff	2015 – 2020	20	Benefits equal costs	New Action.
Other Natural Hazards (Wildland Fire)	Prepare a Community Wildfire Protection Plan for local officials to utilize to reduce Wildland fire risks	Fire Department	Municipal Staff	2015 – 2020	20	Benefits exceed costs	New Action.

*Unless otherwise noted, Sterling’s Resources/Funding consists of elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

**Actions identified as carried forward were not completed in the previous planning cycle unless otherwise stated.

Mitigation actions from the 2008 Montachusett Region Hazard Mitigation Plan that were completed follow:

- Establishment of a Community Emergency Response Team (CERT).

- Completed analysis on floodplain and dam inundation areas. Existing shelters are the School and Butterick Municipal Building.
- Established a CERT and are working with their Regional Emergency Planning Committee. REPC - with towns of Holden, Boylston, West Boylston.

Templeton Natural Hazard Risk Assessment

While this annex focus' pertains to critical facilities, flooding, risk assessment, existing protections and mitigation strategy in the community, more detailed descriptions of each natural hazard's impact on the region and its communities and summary of vulnerability can be located in the regional section entitled " 4. Identification of Natural Hazards, Identifying and Profiling Hazards".

Community Profile

The Town of Templeton is located in North Central Massachusetts in the Montachusett Region, 5 miles west of Gardner, 15 miles west of Fitchburg, 62 miles northwest of Boston and 212 miles from New York City. Templeton is bisected by Route 2. Templeton is bordered by Royalston and Winchendon on the north, Gardner on the east, Hubbardston on the southeast, and Phillipston on the west.

The town of Templeton covers an area of 32.42 square miles, with a resident population of 8,013, according to the 2010 US Census, with a density of 247 people per square mile. The total number of housing units is 3,139 with an average household size of 2.70 people. The median age of Templeton's resident is 41.

Templeton was part of the Narragansett #6 land grant for colonists fighting in the King Philip Wars and was incorporated in 1762. Templeton has an industrial past and contains significant historic architecture. In 1883 much of the population centered in Templeton Center. Other settlements of note in 1831 include the village of Baldwinville (home of Baldwin's Saw and Grist Mill) and Baptist Common, located between the villages of Baldwinville and Templeton Center. Several sawmills existed at this time, including the Day and Holman Sawmill and Shinglemill on Trout Brook in an area now known as Day Mill. Other businesses include tanneries, taverns and wheelwright shops as well as a mining site on Mine Hill near the Hubbardston border.

The map of Templeton from 1870 shows the Vermont and Massachusetts Railroad passing through Otter River and Baldwinville. The Otter River section shows much industrial development, including Dyer's Brick Yard, the Stone Lumberyard, the Lord and Walker Foundry, and manufacturers of chair making machinery, woolen goods and blankets.

The Town has seen much industry come and go over the years. The Otter River was home to several businesses in Baldwinville that were lost in the flooding from the hurricane that hit the Region in 1938. There were also many furniture factories, most notable Temple Stuarts in Baldwinville and a Conant & Ball factory in Templeton. Several employment institutions have closed over the last decade, including American Tissue Mills in Baldwinville and Lilly Chemicals in Templeton Center. Currently the Seaman Paper Company is the only large industrial business in town. In addition to businesses lost over the years has been the loss of some historic buildings. Most notably of these are the Landlord's Inn in Templeton Center and the Grand Army of the Republic Building in East Templeton. Each of these was razed following their decay, the Landlord's Inn in the 1960's and the GAR Building in the 1970's.

Templeton is a rural community with significant historic architecture. The town has four villages; Templeton, East Templeton, Baldwinville and Otter River. The Town of Templeton is fortunate to be within natural surroundings that offer a multitude of recreational opportunities. There are two major forests located within town boundaries, the Otter River State Forest (12,000 acres), also partially located in Winchendon (over 500 acres in Templeton) and Templeton State Forest (over 700 acres).

Templeton is a place to enjoy the outdoors and fish, hike, walk or enjoy a scenic view. In addition to its attractive outdoor features, Templeton also has three nationally recognized historic sites. The Baldwinville Village Historic District Templeton Common Historic District and Templeton Farm Colony are all significant historic landmarks. The largest employer in Templeton is the Templeton Developmental Center.

Critical Facilities

In general usage, the term “critical facilities” is used to describe all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired.

Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even access to damaged areas.

The number and nature of critical facilities in a community can differ greatly from one jurisdiction to another, and usually comprise both public and private facilities. In this sense, each community needs to determine the relative importance of the publicly and privately owned facilities that deliver vital services, provide important functions, and protect special populations. *Source: Federal Emergency Management Administration, Risk Management Series, Design Guide for Improving Critical Facility Safety from Flooding and High Winds, FEMA 543, January 2007.*

A list of the critical facilities within the community is shown in Table 74. This data was obtained from the community’s Comprehensive Emergency Management Plan (CEMP). The data was then reviewed by the Emergency Management Director. These facilities were digitized into GIS and used for determining vulnerability to the various hazards. The map that follows entitled FEMA Q3 Flood Zones and Critical Infrastructure depicts Critical Facilities in the community.

Table 74: Templeton Critical Facilities

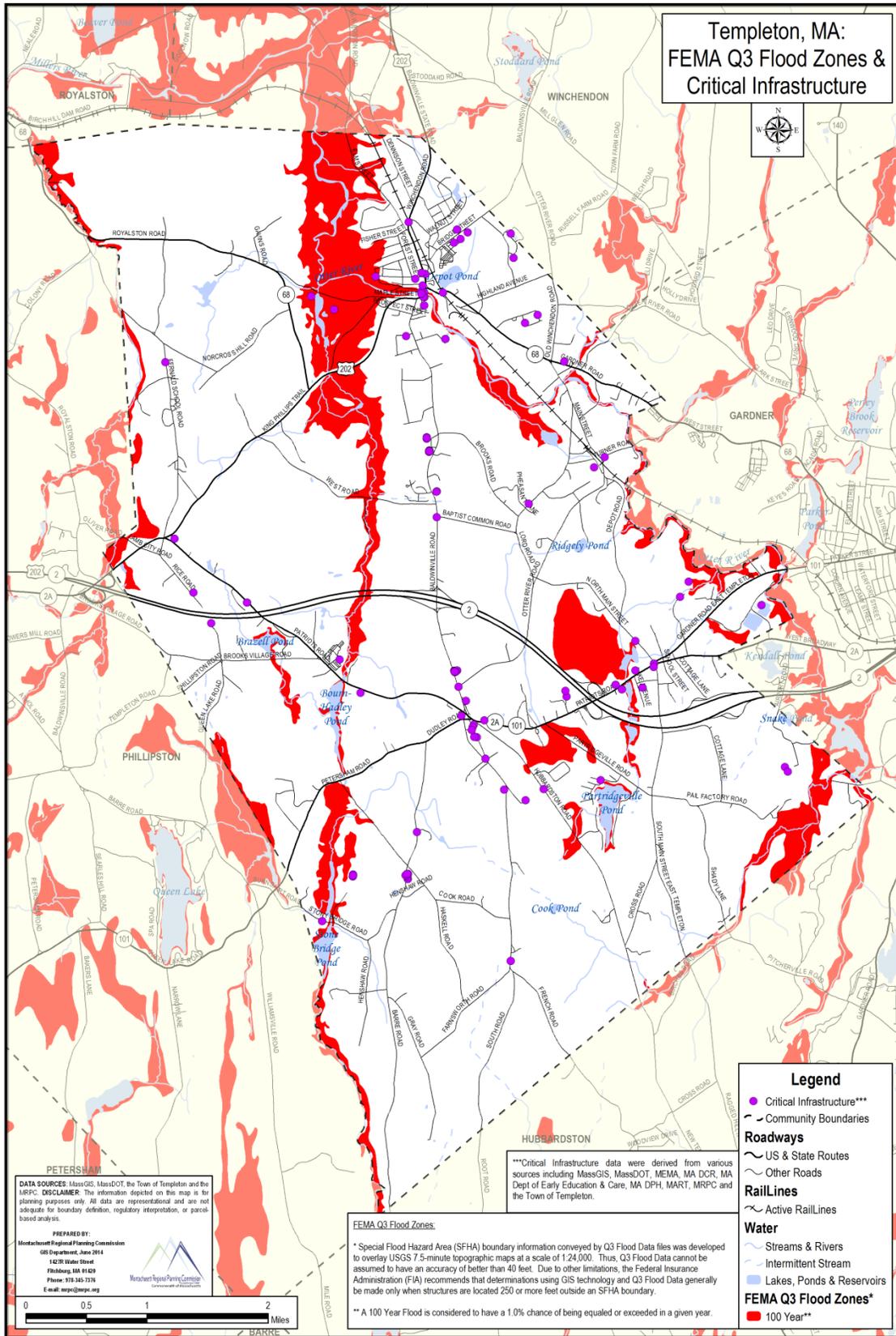
Feature Type	Name	Address
Airports	Gardner Municipal	

City/Town Halls	Templeton Town Hall	690 Patriots Road
Clinics	Tufts Dental @ Templeton Development	212 Freight Shed Rd Med Bldg
	Mountain View Family Practice	570 Baldwinville Road
Communication Towers	Templeton Communication Tower #1	South Road
	Templeton Communication Tower #2	Graves Avenue
	Templeton Communication Tower #3	Rice Road
	Templeton Communication Tower #4	Patriots Road
	Templeton Communication Tower #5	Johnson Avenue
	Cell Tower	Rice Road
	Cell Tower	Rice Road
	Logan Tower	Dolbier Hill Road
Public Water Supply*	Maple Street Well 1	
	Maple Street Well 2	
	Sawyer Street Gpw	
	Otter River Gpw	
Dpw Facilities	Templeton Dpw Building	381 Baldwinville Road
Early Education Childcare Facilities	Dunn, Donna J.	18 Sunrise Drive
	Roy, Carla L.	108 Baldwin Drive
	Hill, Sandra M.	29 Turner Road
	Paul, Renee	66 Baldwin Drive
	White, Sonia M.	69 South Road
	Balchuinas, Amy	162 Barre Road
	Fuller, Courtney	46 N Main Street
	Favreau, Christine A.	34 South Road
	Harkins, Lisa	180 Hubbardston Road
	Little People Nursery School	156 Lord Road
	Klever Kids Preschool	1107 Patriots Road
Elderly Housing	Pine View	79 Bridge Street
	Phoenix Court	99 Bridge Street
Emergency Shelters	Narragansett Regional High School (Primary)	464 Baldwinville Road
	Baldwinville Elementary School	16 School Street
	Holy Cross	26 Lake Avenue
	Narragansett Regional Middle School	460 Baldwinville Road
	Cottage Hill Academy	83 Hospital Road
End Of Life Facilities	Greenlawn Cemetery	
	Pine Grove Cemetery	
Emergency Operations Centers	Emergency Operations Center (Primary)	1 Elm Street
	Narragansett Regional Middle School	460 Baldwinville Road
Fire	Templeton Center Fire Station #1	2 South Road

	Baldwinville Fire Station #2	2 School Street
Hazmat Sites	Gardner Municipal Airport	499 Airport Road
	Narragansett Regional High School	464 Baldwinville Road
	Narragansett Regional Middle School	460 Baldwinville Road
	People's Fuel Inc.	400 State Road
	Ici Explosives	67 Stone Bridge Road
	Amerigas Gas Service	14 Edgar Street
	Bankowski Oil	272 Gardner Road
	Seaman Paper Company	51 Main Street
	Huhtala Oil	198 Patriots Road
	Wilson Bus Lines	203 Patriots Road
	Templeton Highway Department	381 Baldwinville Road
	Templeton Municipal Light & Water	86 Bridge Street
	Narragansett Regional High School	464 Baldwinville Road
	Narragansett Regional Middle School	460 Baldwinville Road
	Templeton Wastewater Treatment Facility	33 Reservoir Street
	Templeton Waste Water Treatment	52 Plant Road
	Glenwood Kitchen	657 Patriots Road
	Long Term Care Facility	Baldwinville Nursing & Rehab Center
Other Critical Facilities	People's Fuel Inc.	
	Ici Explosives	
	Templeton Railroad Bridge	Gardner Road
	Glenwood Kitchen	
	Amerigas Gas Service	
	Bankowski Oil	
	Birch Hill Recreation Area	
	Cumberland Farms	163 Patriots Road
	Templeton Fish & Game	
	Verizon Switching Station Ma874706	
	Templeton Development Center	212 Freight Road
	Templeton Communication Tower #1	
	Templeton Communication Tower #2	
	Templeton Communication Tower #3	
	Templeton Communication Tower #4	
	Templeton Communication Tower #5	
	Templeton Pumping Station #1	
	Templeton Pumping Station #2	
Seaman Paper Company		
Huhtala Oil	198 Patriots Road	

	Wilson Bus Lines	203 Patriots Road
	Logan Beacon - For Planes	
	Otter River State Forest	State Park/Camping Area
	Templeton State Forest	604 Acres
	Cumberland Farms	35 Elm Street
	Templeton Railroad Bridge	Winchendon Road
Other Government Buildings	Boynton Public Library	27 Boynton Road
	Templeton Highway Department	381 Baldwinville Road
	Templeton Municipal Light & Water	86 Bridge Street
	Templeton Food Pantry	4 Elm Street
	Templeton Town Offices	2 School Street
	Narragansett Historical Society	
	Templeton Water Tank #2	
	Templeton Water Tank #1	
	Templeton Ambulance	
	Templeton Post Office	449 Patriots Road
	Baldwinville Post Office	38 Elm Street
	East Templeton Post Office	132 Patriots Road
	Johnson Ave Communication Tower	Johnson Avenue
	Police Station Dispatch Center	South Road
Police	Templeton Police Station	33 South Road
Power Plant	Templeton Municipal Light Co	Maple Street
Pumping Stations	Baldwinville Sewer Pumping Station	Pleasant Street
	Templeton Well Head- Pumping Station	
	Pumping Station #1	Baldwinville Road
	Pumping Station #2	
School	Templeton Center School	17 South Road
	Narragansett Regional High School	464 Baldwinville Road
	Baldwinville Elementary School	16 School Street
	Narragansett Regional Middle School	460 Baldwinville Road
Sports And Cultural Areas	Holy Cross Church	26 Lake Avenue
	First Church	1 Wellington Street
	St. Vincent De Paul	18 Pleasant Street
	Memorial Congregational Church	4 Memorial Street
	St. Martin's Rectory	248 State Road
Potable Water Treatment Plants	Templeton Municipal Light & Water Plant	86 Bridge Street
Wastewater Treatment Plant	Templeton Wastewater Treatment Facility	Reservoir Street
	Gardner Wastewater Treatment Facility	Gardner Road (Route 101)

*As stated in 310 CMR 22.02, a Public Water System means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year” (MassGIS,2014).



Flood Prone Areas

Particular areas within the community where the risk of flood areas are or could occur were determined at the first meeting of the Templeton Hazard Mitigation Team held on May 5, 2012. This information can be found on Templeton’s Local Hazard Map which is located under the section entitled Risk Assessment.

Flooding Vulnerability Assessment

An analysis of the FIRM flood hazard area maps indicates that there is a total of 2300.54 acres of 100-year floodplain within Templeton. This amounts to 11.1% of the total town. Based on additional analysis, 41.92 acres (1.82%) of the floodplain are developed. Currently there are 73 structures in the floodplain which is about 1.52% of the total structures in the community. The buildings are then multiplied by the building value, as determined by the MA Department of Revenue, to come up with a potential loss of \$153,879,000.

Excluding dams and bridges the table below depicts the critical facilities within the 100 year flood zone.

<i>Feature Type</i>	<i>Name</i>	<i>Address</i>
Emergency Operations Centers	Emergency Operations Center (Primary)	1 Elm Street
Public Water Supply	Maple Street Well 1	
	Maple Street Well 2	
Pumping Stations	Baldwinville Sewer Pumping Station	Pleasant Street

Since the initiation of the National Flood Insurance Program (NFIP), there have been no flood insurance claims in the Town of Templeton. There have been no repetitive loss properties in Templeton. Statistics from the NFIP BureauNet indicate in the town of Templeton there are five flood insurance policies in force.

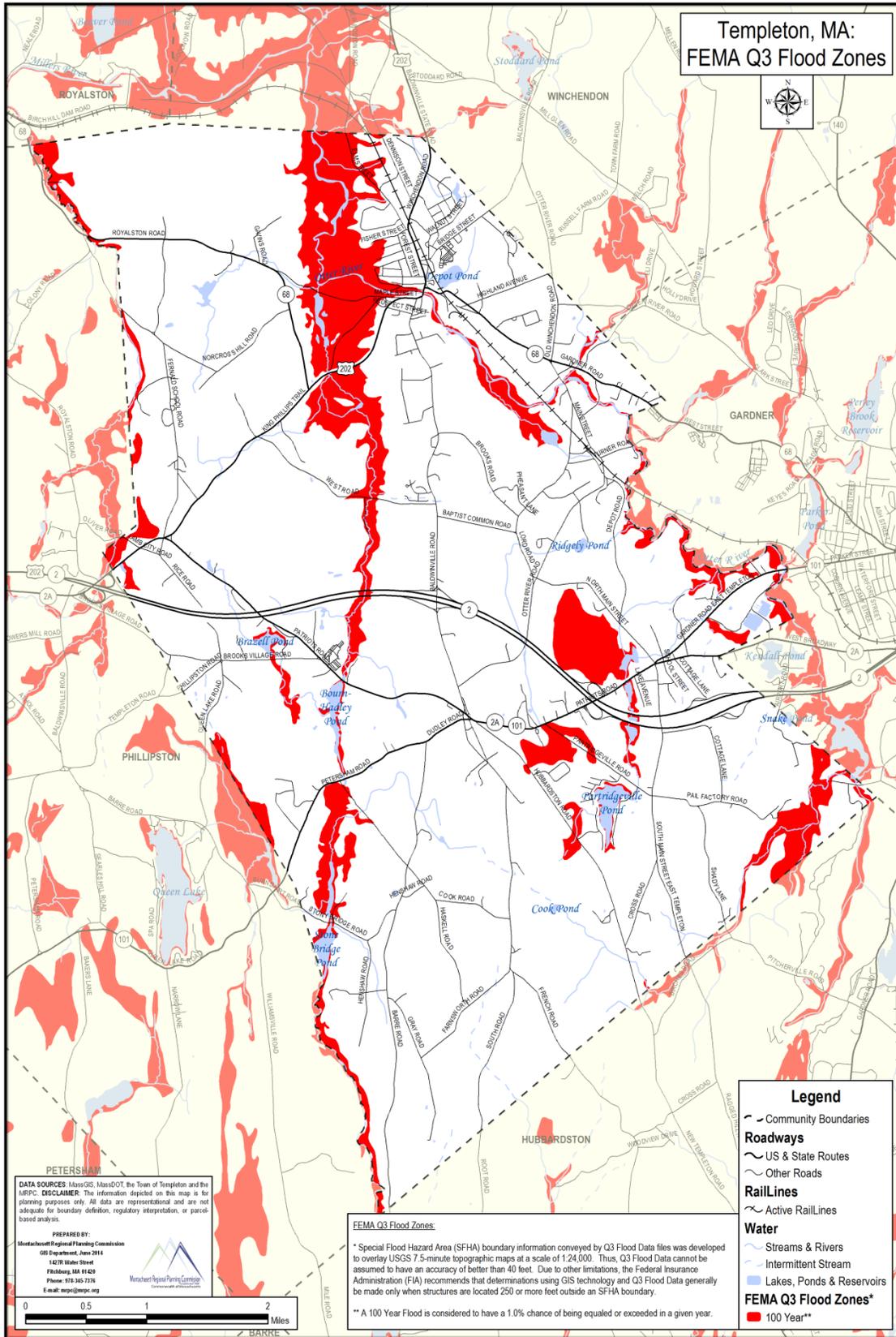
Floodplain Management and Compliance with NFIP

The town supports floodplain management activities in an effort to meet compliance of the National Floodplain Insurance Program. These efforts include:

- Implementing the MA Wetlands Protection Act regulating development and activity within the wetlands buffer zone and regulating stormwater and other point source discharge.
- Implementing the Town Flood Plain District Bylaw regulating development in the floodplain district.
- Continued maintenance of municipal stormwater drainage system which includes regular cleaning of catch basins, storm drains and culverts.

- Continued maintenance of public water bodies to reduce flooding caused by erosion and water displacement.
- Enforcement of Stormwater Management Bylaw which regulates land alterations, disturbances and construction activities that may impact stormwater flow that could unduly cause flooding events.
- Enforcement of the Open Space Residential Bylaw which mitigates possible flooding events by designating protected open space within a development which in turn treats stormwater runoff through the means of natural infiltration.

The map which follows entitled FEMA Q3 Flood Zones depicts the 100 year flood zones in the community.



Structurally Deficient Bridges Over Waterways

Templeton has one bridge over water that is classified by MassDOT as “structurally deficient”. This bridge is on North Main Street over the East Templeton Pond Outlet. According to MASSDOT project information the bridge is in construction stage.

Hazard Potential of Dams

The DCR Office of Dams Safety lists 12 dams in the Town of Templeton as shown in Table 76. Five dams are classified as significant hazard.

Classifications for potential hazards are in accordance with the chart below.

Hazard Potential Classification

High Hazard	Refers to dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
Significant Hazard	Refers to dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities
Low Hazard	Refers to dams located where failure may cause minimal property damage to others. Loss of life is not expected.

Source: MA Department of Conservation and Recreation Office of Dam Safety

High hazard dams must be inspected every two year, significant hazard every five years, and low Hazards dams every 10 years. Owners of dams are responsible for having their dam inspected. MGL Chapter 253 and 302 CMR 10.00 requires that dam owners prepare, maintain and update Emergency Action Plans for all High Hazard Potential dams and certain Significant Hazard Potential dams.

Non-jurisdictional dams are not regulated by the Office of Dam Safety or under their jurisdiction. Typically these dams are under 6 feet in height and/or under 15 acre-feet in storage and do not have an assigned 'Hazard Code'. Dams owned and regulated by the Federal Government are also typically non-jurisdictional but DO have an assigned Hazard Code.

Table 76: Dams

Town	Dam	Hazard Code	Owner
Templeton	Bourn-Hadley Pond Dam	Low Hazard	Private
Templeton	Otter River Dam	Low Hazard	Private
Templeton	Stone Bridge Reservoir Dam	Low Hazard	Public**
Templeton	Brazell Pond Dam	N/A	Private
Templeton	Brickyard Pond Dam	N/A	Private

Templeton	Peaceful Pines Pond Dam	N/A	Private
Templeton	Templeton Center Dam	N/A	Public
Templeton	Otter River Pool Dam	N/A	Public
Templeton	Partridgeville Pond Dam	Significant Hazard	Private
Templeton	Baldwin Water Supply Pond Dam	Significant Hazard	Private
Templeton	Wetmore Pond Dam	Significant Hazard	Private
Templeton	Ridgley Pond Dam	Significant Hazard	Private
Templeton	Graves Pond Dam	Significant Hazard	Private

*N/A – Information not available as the dam is non-jurisdictional.

**This dam is owned by the Town of Phillipston.

Risk Assessment

As previously stated, located in Section 4. Identification of Natural Hazards, Identifying and Profiling Hazards”, there is a description of each identified hazards’ impact on the region and its communities as well as an overall summary of vulnerability. Based on the hazards identified in this plan and the assessment of risks by the Town of Templeton, the town considers itself to be at a high risk for Heavy Rain, Beavers, Nor’easters, Severe Thunderstorms, Heavy Snow, and Wildland Fire; moderate risk Snow Melt, Dam Failure, High Winds, Hurricanes, Tornados, Ice Storms, Blizzard; low risk for Ice Jams, Major Urban Fires, Drought, Extreme Temperatures, Earthquakes, and landslides; and tsunamis as not applicable.

This information is documented in Templeton’s Natural Hazard Matrix below which was obtained from participants at the Templeton Local Hazard Mitigation Team Meeting held on May 5, 2012.

Templeton Natural Hazard Matrix				
Natural Hazard	Likelihood of Occurrence	Location	Impacts	Hazard Index
Natural Hazard Separated by Flood, Atmospheric Related and Winter Related, Other Natural Hazards, and Geologic Hazards	3 = Highly Likely 2 = Possible 1 = Unlikely	3 = Regional/State 2 = Multi Community/Regional 1 = Local/Town	4 = Catastrophic 3 = Critical 2 = Limited 1 = Negligible	Ranking Determined by Combining the Likelihood, Location and Impacts of a Natural Hazard
Flood-Related Hazards				
• Heavy Rain	3	2	2	7
• Snow Melt	2	2	2	6
• Dam Failure	2	1	2	5
• Ice Jams	1	1	1	3
• Beavers	3	3	2	8
Atmospheric Related and Winter Related Hazards				
• High Winds	2	1	1	4
• Hurricanes	2	2	3	7
• Tornadoes	2	2	3	7
• Nor'easters	3	2	2	7
• Severe Thunderstorms	3	1	2	6
• Heavy Snow	3	2	2	7
• Ice Storms	2	2	2	6
• Blizzard	2	2	2	6
Other Natural Hazards				
• Major Urban Fires	1	1	2	4
• Wildland Fire	3	1	3	7
• Drought	1	1	2	4
• Extreme Temperatures	1	1	1	3
Geologic Hazards				
• Earthquakes	1	1	2	4
• Landslides	1	1	1	3
• Tsunami	NA	NA	NA	NA

Key

Highly likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.

Possible: 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.

Unlikely: Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.

Catastrophic: Immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.

Critical: Fast speed of onset or long duration of event resulting in devastating damage and loss of services for weeks or months.

Limited: Moderate speed of onset or moderate duration of event, resulting in some damage.

Negligible: Slow speed of onset or short duration of event resulting in little to no damage.

Also discussed at this meeting were the hazards that affect each community and the identification of specific problem areas in the community that need to be addressed. This included the identification of new hazards that were determined to pose a threat or community vulnerability which are detailed in Templeton's Local Hazards Map on the following page. The entire community is equally at risk to the following hazards: snow melt, ice jams, high winds, hurricanes, tornados, nor'easters, , ice storms, blizzards, drought, extreme temperatures, earthquakes and landslides.

Existing Protections

The original inventory of hazard mitigation actions which the Montachusett communities undertook for the 2008 Montachusett Region Hazard Mitigation Plan was reviewed and updated by each community at a meeting held in each community with the MRPC and the community's Local Hazard Mitigation Planning Team and, in some communities, the Emergency Management Committee. The attendees of the meetings can be found in Appendix A. The following matrices depict the updated inventory of what is currently being done to mitigate hazards by listing the programs and activities already in place. It includes a description of the protection measure, who is responsible, and improvements and changes that may be needed. This inventory was used by the Planning Team/Emergency Management Committee to identify gaps in existing protections that were then addressed through the development of this plan update.

Templeton

Type of Existing Protection	Description	Area Covered	Implementation Resources and Funding*	Improvements or Changes Needed
Flood Related Hazards				
Storm water management standards	State Regulation under the Wetlands Protection Act to regulate storm water and other point source discharge	Town-Wide	Enforced by the Templeton Conservation Commission (Wetlands Protection Act) and Templeton Planning Board (Subdivision Control Law and site plan review)	Storm water management standards are and continue to be enforced. No improvements or changes needed.
Wetlands Protection Act (state)	State law regulating development and activity within wetland buffer zone	100-foot state buffer around wetland area; 200 foot buffer around river front areas.	Enforced by the Templeton Conservation Commission.	No improvements or changes needed.
100 Year Flood Zone	Federal law requiring elevation above 100-year flood level of new and substantially improved residential structures in floodplain	100-year floodplain as shown on Flood Insurance Rate Map dated May 17, 1982	Enforced by the Building Inspector (municipal staff) and Templeton Conservation Commission.	Insurance Flood Rate Maps need to be updated
Town Zoning Bylaw. Flood Plain Districts	Local bylaw enhancing federal/state laws and regulating any development in the flood plain district	100-year floodplain as shown on Flood Insurance Rate Map dated May 17, 1982	Enforced by the Building Inspector (municipal staff) and Templeton Conservation Commission.	Insurance Flood Rate Maps need to be updated

Maintenance of municipal storm water drainage system	Regular cleaning of catch basins, storm drains, and culverts	Town-Wide	Undertaken by the Department of Public Works municipal staff.	Maintenance continues but Additional Personnel and Equipment Needed.
Maintenance of public water bodies (ponds, streams, brooks, wetlands)	Periodic cleaning of waterways undertaken, i.e., remove trash, debris	Town-Wide	Undertaken by the Department of Public Works municipal staff with guidance from Templeton Conservation Commission	Maintenance continues but Additional Personnel and Equipment Needed.
Inspection of major dams	Periodic inspections of the structural integrity of the dam	Major Dams including:	Directed by the Massachusetts Department of Conservation and Recreation, Office of Dam Safety.	Update Dam failure studies for the dams rated as high hazard
Wind Related Hazards				
State Building Code	State Law related to design loads to include wind effects	Town-Wide	Enforced by Building Department municipal staff.	Continued enforcement remains in place. No improvements or changes needed.
Tree Maintenance	Regular inspection and tree maintenance to cut branches threatening power lines and overhead utilities	Town-Wide	Templeton Municipal Light and Water Plant staff.	Tree maintenance continues but Additional Staff needed.
Fire Related Hazards				
Limited Brush Clearing	provide access to Emergency Services	Town-Wide	Directed by the Department of Public Works municipal staff.	Limited brush clearing continues. Identify additional Areas with Potential for Brushfires
Winter Storms Related				
Residential Parking Bans	Parking Bans to Enable Snow Removal Effectively from Residential Streets	Town-Wide	Department of Public Works municipal staff.	Residential parking ban remains in place but Additional personnel and equipment needed for enforcement.

Clearing Snow from Major Arterial Routes	Ensure Access to Emergency Service vehicles	Town-Wide	Department of Public Works municipal staff.	Snow clearing continues but additional personnel and equipment needed.
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*Templeton enforcement/implementation is generally carried out by elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

Mitigation Goals, Objectives and Strategies

As discussed earlier in this Plan, MRPC previously prepared the 2008 Montachusett Region Hazard Mitigation Plan which consisted of individual annexes for each MRPC community. Similarly, as part of the multi-jurisdictional plan update, each community also developed their own individual goals, objectives and strategies which are listed in this section.

Overall Goal Statement: To prepare to reduce the loss of life, property, infrastructure and cultural resources throughout the community from natural disasters through a multiple hazard mitigation program that involves increased coordination, planning, education, and capital improvements.

1. **Objective:** To organize and prepare to provide adequate shelter, water, food, and basic first aid to displaced residents in the event of a natural disaster, and to provide adequate notification and information regarding evacuation procedures, *etc.*, to residents in the event of a natural disaster.
2. **Objective:** To inventory supplies at existing shelters and develop a needs list and storage requirements; and to establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster.
3. **Objective:** to have the EMD lead an effort to increase coordination between inter-departments in pre-disaster planning, and implementation of hazard mitigation projects.
4. **Objective:** Increase awareness of hazard mitigation among town officials, private organizations, businesses, and the general public.
5. **Objective:** Maintain the current Code Red notification system.
6. **Objective:** To collect, periodically update, and disseminate information the town website and local radio stations to provide emergency information on what to include in a 'home survival kit,' how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to follow during a natural disaster. Also consider establishing an official social media site for emergency information.

Specific Natural Hazard Goals for Templeton

Goal Statement for Flooding: To prepare emergency staff and volunteers in order to minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to flooding.

1. **Objective:** To continue to participate in the National Flood Insurance Program, and to have the flood maps periodically updated.
2. **Objective:** To Develop a priority list and seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout the town.

Goal Statement for Protection from Beavers: To minimize the threat to health, the damage to roads and property, and the disruption of governmental services and general business activities due to

flooding caused by beavers.

1. **Objective:** Support local town departments to continue present methods to prevent beaver caused flooding.
2. **Objective:** Seek assistance from beaver management professionals, including trappers.
3. **Objective:** Install beaver management devices.

Goal Statement for Hurricanes and Tornadoes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to high winds associated with hurricanes and tornadoes. (The objectives listed above, under flooding, address the flooding that can result from a hurricane.)

1. **Objective:** To educate residents and volunteers regarding the safe methods and actions necessary to deal with Hurricanes and Tornadoes.

Goal Statement for Winter Related Hazards: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to severe snow and ice storms.

1. **Objective:** To develop a plan for providing access to water, information, shelter, and food stores to people in remote locations in the event of a severe winter storm.

Goal Statement for Earthquakes: To educate staff, residents and volunteers about the potential for earthquakes and strategies to minimize the loss of life, damage to property, the disruption of governmental services and general business activities due to earthquakes.

1. **Objective:** To educate and encourage homeowners and developers to rehab and build using methods to minimize the effects of earthquakes and other disasters.

Mitigation Action Plans and Prioritization of Actions (STAPLEE)

Initial Mitigation Action Plans for the Montachusett Communities were presented in the communities Hazard Mitigation Plans that were approved by FEMA in 2009 and 2010. The original Mitigation Action Plans were developed through an inventory of potential hazards which could impact the community and an evaluation of a range of alternatives to address these hazards. As part of the plan update process, the original Mitigation Action Plan was reviewed by the community's Local Hazard Mitigation Planning Team/Emergency Management Committee to delete actions which have already been completed, add additional actions which are either underway or planned to be undertaken, and to update the current status of all actions. The goals were reviewed and updated at the second meeting with each community.

An additional step in this process was to conduct a "STAPLEE" analysis for each action to prioritize all actions within each community and a subjective evaluation of each action's perceived cost/benefit. In the 2008 plan, actions were not prioritized so there were no changes in priorities in this update. The revised Community Mitigation Action Plans matrices that follow identify each mitigation action, the responsible department or board responsible for implementation, potential funding sources, the timetable of the action, results of the prioritization of actions through the STAPLEE analysis, and the perceived cost/benefit for each mitigation action.

The goal of each identified strategy, or mitigation action, is reduction or prevention of damage from a

hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each action to establish priorities for implementation, using the “STAPLEE” method. The STAPLEE methodology was developed by the Federal Emergency Management Agency as a tool to help communities prioritize their hazard mitigation strategies and determine the most appropriate actions for implementation. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of an action and is designed to be used by public officials and planners for making planning decisions.

To conduct the STAPLEE exercise, the community’s Hazard Mitigation Team was asked to rate each action in their Mitigation Action Plan on each of the following criteria, using a score of 1 to 3 (Good = 3, Average = 2, Poor = 1):

- Social: Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- Technical: Will the proposed strategy work? Will it create more problems than it solves?
- Administrative: Can the community implement the action? Is there someone to coordinate and lead the effort?
- Political: Is the action politically acceptable? Is there public support both to implement and to maintain the action?
- Legal: Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- Economic: What are the costs of this action? Does the cost seem reasonable for the size of the problem and the likely benefits?
- Environmental: How will the action impact the environment? Will the action need environmental regulatory approvals?

These scores were then totaled, resulting in a final score of 7 (least priority) to 21 (highest priority) for each action. The higher the final score, the higher the relative priority of that action for implementation. This information can then be utilized in each community as they conduct and administer relevant municipal functions and activities. The final STAPLEE score for each action is shown in the following mitigation action plan.

The Hazard Mitigation team was also asked to do a relative cost/benefit of each action. This assessment was intended to informally indicate if an action will either have more benefits accrued to the Town than the Cost of implementing the action, or if the costs would exceed any benefits. Responses include: “Benefits Exceed Costs”, “Benefits Equal Costs, or “Costs Exceed Benefits”.

TEMPLETON IMPLEMENTATION STRATEGY FOR PRIORITY MITIGATION ACTIONS

Type of Natural Hazard	Description of Action	Implementation Responsibility	Resources/ Funding*	Timetable	Priority (STAPLEE SCORE)	Cost/ Benefit Evaluation	Status Update from 2008 Plan**
Flood Related Hazards and Geologic Hazards	Identify Existing Shelters that are Earthquake Resistant as well as Outside of Floodplain (and Dam Inundation) Areas to ensure that shelters are available to the public to reduce or eliminate risk to human life.	Building Inspector, Emergency Management Director	Municipal Staff	2015 - 2020	21	Benefit exceeds cost	Completed. Carried forward. This task is undertaken periodically.
Wildland Fire	Increase awareness by educating property owners on actions that they can take to reduce risk to property by hosting an Open House at the Fire Department, Develop and Distribute an Educational Pamphlet on Fire Safety and Prevention (SAFE PROGRAM) (SENIOR SAFE) and wildfire prevention.	Fire Department	Municipal Staff/	2015 - 2020	20.5	Benefit exceeds cost	Completed but carried forward. This action is undertaken on a periodic basis if grant money is available.

Natural All Hazards	Increase hazard education and risk awareness to public by Collecting, Updating, and Disseminating Information on Local Radio/TV Stations to educate the public and alert them of emergency information including shelter locations and other instructions related to all natural hazards	Emergency Management Director, Council on Aging	Municipal Staff,	2015 - 2020	19.5	Benefit exceeds cost	Completed but carried forward. Town now uses Facebook and twitter to disseminate information in addition to media outlets. This action is undertaken as necessary.
All Natural Hazards	Inventory Supplies at Existing Shelters and Develop a Needs List and Storage Requirements to ensure the available of adequate supplies during a natural hazard. Supplies must be adequate to eliminate or reduce risk to human life.	Emergency Management Planning Committee, School Facilities Manager	Municipal Staff	2015 - 2020	21	Benefit exceeds cost	Completed but carried forward. This action is undertaken on a periodic basis.
Atmospheric and Winter Related Hazards	Develop a Mitigation Plan to provide access to Water, Information, Shelter and Food Stores to People in Remote Locations of the town and integrate this information into community comprehensive plans.	Emergency Management Director	Municipal Staff/ Volunteers	2015 - 2020	21	Benefit exceeds cost	Carried forward due to lack of funding.

Flood Related Hazards.	Identify all structures throughout the town that need to be Elevated above the Base-Flood Elevation and Once identified educate those property owners regarding their options for mitigation.	Building Inspector, Fire Department	Municipal Staff. Also 75% FEMA FUNDING AVAILABLE. Remaining 25% (non-federal)	2015 - 2020	13	Cost exceeds benefit	Carried forward due to time constraints.
Flood Related Hazards	To Develop a priority list and possibly seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town to reduce or eliminate flooding risk.	Board of Selectmen, Highway Department	Municipal Staff/MEMA/FEMA	2015 - 2020	18.5	Benefit exceeds cost	Carried forward due to time constraints.
Flood Related Hazards	Educate property owners regarding options for mitigating their properties from flooding through outreach programs that address measures that residents can take (i.e installing backflow valves, securing debris, etc.)	Emergency Management Director, Fire Department	Municipal Staff, Property Owners	2015 - 2020	13	Cost equals benefit	New Action.

Flood Related Hazards	Continue participation in the National Flood Insurance Program to enable property owners to purchase insurance protection against flood losses.	Board of Selectmen, Conservation Commission	FEMA/MEMA	2015 - 2020	21	Benefit exceeds cost	Completed but carried forward. Town continues to participate in NFIP.
Flood Related Hazards	Evaluate and relocate furnaces, water heaters, and electrical equipment in municipal owned buildings that are located in areas prone to flooding to reduce flood damage.	Emergency Management Director, Fire Department	Municipal Staff and Property Owners	2015 - 2020	13	Cost exceeds benefit	Carried forward due to time constraints and lack of funding.
Other Natural Hazards (Wildland fire)	Identify areas with potential for brush fires to track community vulnerability by developing and maintaining a data base.	Department of Public Works	Municipal Staff	2015 - 2020	16.5	Benefit exceeds cost	New Action.
All Natural Hazards	Identify shelters and publicize locations to the public to reduce or eliminate risk to human life.	Emergency Management Director	Emergency Management Director / Fire Department	2015 - 2020.	20	Benefit exceeds cost	Completed but carried forward. The town continues to identify new and publicize locations.
All Natural Hazards	Utilize interactive mapping application prepared by MRPC/CMRPC to update critical infrastructure and simulate real time evacuation scenarios to mitigate hazards to the public.	Emergency Management Director	Emergency Management Director	2015 (12 months)	21	Benefit exceeds cost	New action.

Flood Related Hazards	Install "beaver diverters" and water control devices to mitigate flooding caused by beaver dams.	Department of Public Works	Municipal Staff	2015 – 2020	15	Cost exceeds benefit	Completed but carried forward. This action is undertaken as needed.
Flood Related Hazards	Hire trapper for removal of beavers to mitigate flooding caused by beaver dams.	Department of Public Works	Municipal Staff	2015 – 2020	13	Benefit equals cost	Completed but carried forward. This action is undertaken as needed.
All Natural Hazards	Implement recommendations regarding natural hazard mitigation in existing planning documents including the implementation element of the master plan, five year action plan of the open space and recreation plan and the emergency evacuation plan	Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	Municipal Staff, Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	2015 - 2020	16	Benefit equals cost	Carried forward due to lack of funding.

*Unless otherwise noted Templeton's Resources/Funding consists of elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

**Actions identified as carried forward were not completed in the previous planning cycle unless otherwise stated.

Mitigation actions from the 2008 Montachusett Region Hazard Mitigation Plan that were completed include the following:

- Worked with Neighboring Communities to Establish a Community Emergency Response Team (CERT).
- Implemented "Code Red" pre-disaster warning system that effectively, efficiently and in a timely fashion warns citizens and business owners of impending weather events.

Townsend Natural Hazard Risk Assessment

While this annex focus' pertains to critical facilities, flooding, risk assessment, existing protections and mitigation strategy in the community, more detailed descriptions of each natural hazard's impact on the region and its communities and summary of vulnerability can be located in the regional section entitled " 4. Identification of Natural Hazards, Identifying and Profiling Hazards".

Community Profile

Townsend is located in the northwestern part of Middlesex County, in north central Massachusetts. It is north of Worcester on the New Hampshire border, and it is part of the Montachusett Region. It is bordered by Ashby on the west, Mason and Brookline on the north, Pepperell, Groton and Shirley on the east, and Lunenburg on the South.

The town of Townsend covers an area of 33.11 square miles, with a resident population of 8,926, according to the 2010 US Census, with a density of 251 people per square mile. The total number of housing units is 3,385 and the average household size is 2.75 people. Median age of Townsend residents is 41.

Townsend was settled in the late 1600s. The first meetinghouse in Townsend was built in 1730. Incorporation followed shortly thereafter in 1732 with the town taking its name from Viscount Charles Townshend, the British Secretary of State. About 1780, residents and town clerks began to spell Townsend by omitting the "H" and giving it its present spelling. The early economy, based on manufacturing, was jump-started with the 1733 construction of its first mill and a dam for the mill at Townsend Harbor. The dam sits on the Squannacook River, which runs through the town. It provided the majority of power necessary for the operation of this and other mills, such as saw and grist mills, a clothing mill, a machine shop and a large two-story cooperage materials factory. The success of such factories was further empowered by a canal constructed in 1790 on the Squannacook. In the 1800s, many factories were built, producing stockings, clothing, tubs and pails. In 1867, a factory built to develop coopering stock became the principal industry of the town. Despite the amount of product being exported to Boston and the success of these factories in the 18th and 19th centuries, few industries survived into the 20th century.

Townsend is recognized for its historic character, and citizens appreciate the rural nature of the Town. This appreciation is based on a long history of agricultural activities by local families throughout the last 300 years, sometimes lasting within particular families for over eight generations. In recent years, some of the farms have been sold and the land divided, yet despite increased exponential growth in past years, and the increase in commercial presence along major roadways, Townsend maintains its rural image in the minds of the majority of residents and their neighbors. The largest employer in Townsend is Sterilite, followed by Deluxe Corporation, North Middlesex Regional High School and Townsend Ridge Country Club.

Critical Facilities

In general usage, the term "critical facilities" is used to describe all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if

they are destroyed, damaged, or if their functionality is impaired.

Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even access to damaged areas.

The number and nature of critical facilities in a community can differ greatly from one jurisdiction to another, and usually comprise both public and private facilities. In this sense, each community needs to determine the relative importance of the publicly and privately owned facilities that deliver vital services, provide important functions, and protect special populations. *Source: Federal Emergency Management Administration, Risk Management Series, Design Guide for Improving Critical Facility Safety from Flooding and High Winds, FEMA 543, January 2007.*

A list of the critical facilities within the community is shown in Table 77. This data was obtained from the community's Comprehensive Emergency Management Plan (CEMP). The data was then reviewed by the Emergency Management Director. These facilities were digitized into GIS and used for determining vulnerability to the various hazards. The map that follows entitled FEMA Q3 Flood Zones and Critical Infrastructure which depicts Critical Facilities in the community.

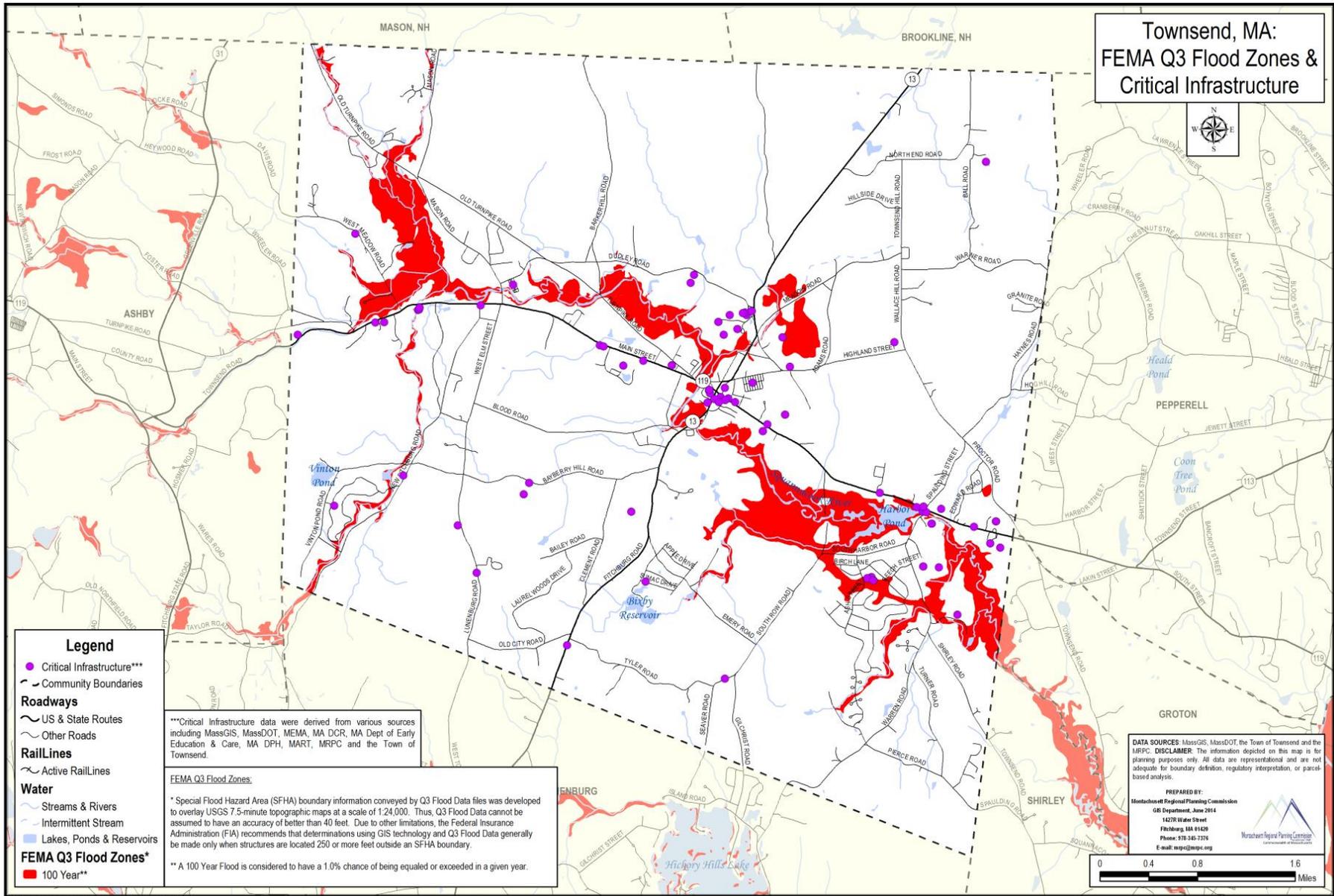
Table 77: Townsend Critical Facilities

<i>Feature Type</i>	<i>Name</i>	<i>Address</i>
Animal Shelters	Town of Ashby/Townsend Animal Control	352 Main Street
	Townsend Veterinary Hospital	354 Main St
City/Town Halls	Townsend Town Hall	272 Main Street
DPW Facilities	Townsend Highway Department	177 Main Street
Early Education Childcare Facilities	Dussault, Tracy	271 S. ROW RD.
	Greer, Debora Ann	198 Fitchburg Rd
	Lecuyer, Jeanne	173 Lunenburg Rd
	Michalczyk, Elizabeth	14 Sumac Dr
	Rainbow Childcare	27 Main St
	Village Common Children's Center	5 Brookline St
	Walsh, Karen	105 Main St
Elderly Housing	Atwood Acres	66 Dudley Road
	Townsend Woods	70 Dudley Road
Electric Substations	Electric Substation	West Main Street
	Electrical Substation	Main Street
Emergency Dispensing Sites	North Middlesex Regional High School	19 Main Street
Emergency Operations Centers	Townsend Memorial Hall	272 Main Street
	Townsend Police Station	70 Brookline Road
Emergency Shelters	Hawthorne Brook Middle School	64 Brookline Road
	North Middlesex Regional High School (Alternate)	19 Main Street
	Spaulding Memorial School (Alternate)	1 Whitcomb Street
	Squannacook Elementary School (Alternate)	66 Brookline Road
End of Life Facilities	Hillside Cemetery	Highland Street
		Highland Street/ Old Meetinghouse Hill Road
	Old Burial Ground	
	Riverside Cemetery	Dudley Road
Fire	TJ Anderson & Son Funeral Home	250 Main Street
	Fire Station (Townsend)	272R Main Street
	Townsend Fire Department Headquarters	13 Elm Street
	Townsend Fire Station 1	8 Elm Street
	Townsend Harbor Fire Station	47 Main Street
	West Townsend Fire Station	460 Main Street
HazMat Sites	Sterilite Corporation	198 Main Street
Other Critical Facilities	"82"	82 Bayberry Hill Road

	Cell Tower	12 Dudley Road
	Cell Tower	82 Bayberry Road
	Cell Tower	60 Warren Rd
	Cell Tower	Ball Rd
	Cooperage	1 South Street
	Deluxe Corp	12 South Street
	Energy To Go	197 Main Street
	Grist Mill	South Street
	Hannaford Supermarket	18 Main Street
	McNabbs Pharmacy	233 Main Street
	Mr. Mike's Mini Mart	Main Street
	Rite Aid Pharmacy	18 Main Street
	Sterilite Corporation	198 Main Street
	Sterilite Corporation	30 Scales Lane
	Townsend Fuel	324 Main Street
	Verizon Switching Station MA873406	
Other Government Buildings	DCR Forest Fire Station	65 Main Street
	Gp Well # 2	14 Ash Street
	Repeater Site	139 Lunenburg
	Townsend Capital Meeting Room	14 Dudley Road
	Townsend Highway Department	177 Main Street
	Townsend Historical Society	72 Main Street
	Townsend Police Communication Center	70 Brookline Road
	Townsend Public Library	12 Dudley Road
	Townsend Senior Center COA	16 Dudley Road
	Townsend Storage Tank	Highland Street
	Townsend Storage Tank	Fitchburg Road
	Townsend Water Department	540 Main Street
	US Post Office	227 Main Street
	Police	Townsend Police Station
Potable Water Treatment Plants	Townsend Water Plant	Cross Street
	Townsend Water Plant	Main Street (Rt 119)
	Townsend Water Plant	25 Harbor Trace Road
	Townsend Water Plant	14 Ash Street
Public Health Office	Board of Health	272 Main Street
Public Water Supply*	Cross Street Gravel Packed Well 2	
	Dcr Pearl Hill State Park	
	Dcr Pearl Hill State Park	
	Dcr Willard Brook State Forest	

	Harbor Trace Gp Well	
	Main Street Tubular Well Field #1	
	Well Site 3-98	
	Witches Brook Well 1	
	Witches Brook Well 2	
Pumping Stations	Booster Pumping Station	West Meadow Road
	Harbor Trace Pump Station	25 Harbor Trace Road
	Townsend Water Dept/Witches Brook Pumping Station1	14 Ash Street
	Townsend Water Dept/Witches Brook Pumping Station2	14 Ash Street
	Townsend Well & Pumping Station	512 Main Street
	Townsend Well & Pumping Station	Off Cross Street
School	Hawthorne Brook Middle School	64 Brookline Road
	North Middlesex Regional High School	19 Main Street
	Spaulding Memorial School	1 Whitcomb Street
	Squannacook School	66 Brookline Road
Wastewater Treatment Plant	Wastewater Treatment Plant/ Septic System	66 Brookline Road

As stated in 310 CMR 22.02, a Public Water System means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year” (Mass GIS, 2014).



Flood Prone Areas

Particular areas within the community where the risk of flood areas are or could occur were determined at the first meeting of the Townsend Local Hazard Mitigation Team held on March 6, 2013. This information can be found on Townsend's Local Hazard Map which is located under the section entitled Risk Assessment.

Flooding Vulnerability Assessment

An analysis of the FIRM flood hazard area maps indicates that there is a total of 1575.41 acres of 100-year floodplain within Townsend. This amounts to 7.46% of the total town. Based on additional analysis, 77.87 acres (4.94%) of the floodplain are developed. Currently there are 119 structures in the floodplain which is about 2.51% of the total structures in the community. The buildings are then multiplied by the building value, as determined by the MA Department of Revenue, to come up with a potential loss of \$145,800,300.

Excluding dams and bridges there are there are no critical facilities within the 100 year flood zone.

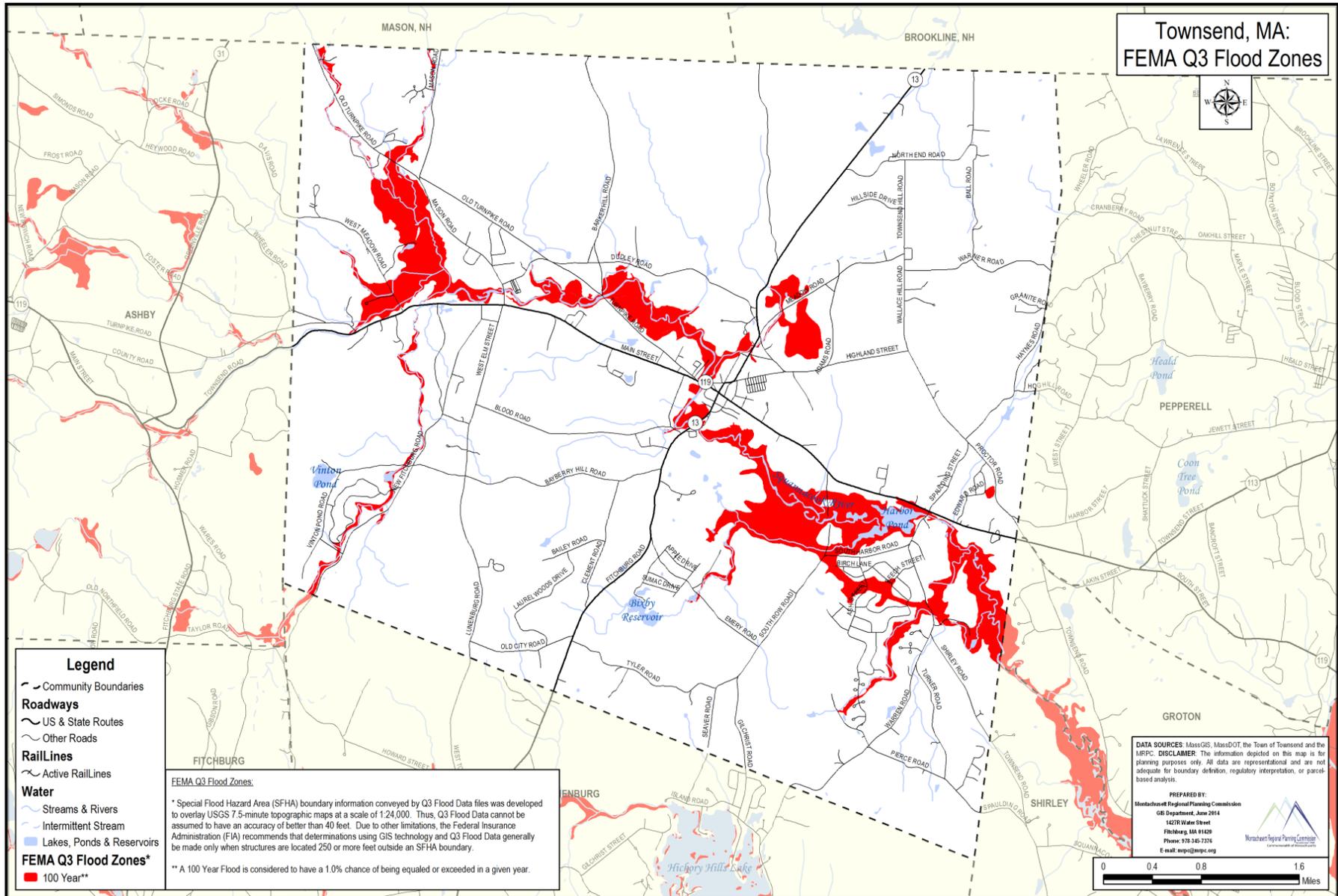
Since the initiation of the National Flood Insurance Program (NFIP), 16 flood insurance claims in the Town of Townsend have been made totaling \$43,801.11 in payments. According to NFIP data, there are two repetitive loss properties in Townsend totaling \$19,477.43 in claims. Statistics from the NFIP BureauNet indicate in the town of Townsend there are 30 flood insurance policies in force.

Floodplain Management and Compliance with NFIP

The town supports floodplain management activities in an effort to meet compliance of the National Floodplain Insurance Program. These efforts include:

- Implementing the MA Wetlands Protection Act and the town's Wetland's Protection Bylaw regulating development and activity within the wetlands buffer zone and regulating stormwater and other point source discharge.
- Implementing the Town Flood Plain District Bylaw (January 17, 1989) regulating development in the floodplain district.
- Continued maintenance of municipal stormwater drainage system which includes regular cleaning of catch basins, storm drains and culverts.
- Continued maintenance of public water bodies to reduce flooding caused by erosion and water displacement.
- Enforcement of Stormwater Management Bylaw which regulates land alterations, disturbances and construction activities that ma impact stormwater flow that could unduly cause flooding events.
- Enforcement of the Open Space Preservation Development Bylaw which mitigates possible flooding events by designating protected open space within a development which in turn treats stormwater runoff through the means of natural infiltration.

The map that follows entitled FEMA Q3 Flood Zones depicts the 100 year flood zones in the community.



Structurally Deficient Bridges Over Waterways

Townsend has three bridges over water that are classified by MassDOT as “structurally deficient”. The bridges locations and associated water bodies are as follows: Canal Street over Squannacook River; West Meadow Road over Locke Brook and Main Street over Pearl Hill Brook.

Hazard Potential of Dams

The DCR Office of Dams Safety lists 7 dams in the Town of Townsend as shown in Table 78. There are three dams that are classified as significant hazards. Classifications for potential hazards are in accordance with the chart below.

Hazard Potential Classification

High Hazard	Refers to dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
Significant Hazard	Refers to dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities
Low Hazard	Refers to dams located where failure may cause minimal property damage to others. Loss of life is not expected.

Source: MA Department of Conservation and Recreation Office of Dam Safety

High hazard dams must be inspected every two year, significant hazard every five years, and low Hazards dams every 10 years. Owners of dams are responsible for having their dam inspected. MGL Chapter 253 and 302 CMR 10.00 requires that dam owners prepare, maintain and update Emergency Action Plans for all High Hazard Potential dams and certain Significant Hazard Potential dams.

Non-jurisdictional dams are not regulated by the Office of Dam Safety or under their jurisdiction. Typically these dams are under 6 feet in height and/or under 15 acre-feet in storage and do not have an assigned 'Hazard Code'. Dams owned and regulated by the Federal Government are also typically non-jurisdictional but DO have an assigned Hazard Code.

Table 78: Dams

Townsend	Bixby Reservoir Dam	Low Hazard	Private
Townsend	Pearl Hill Brook Dam	Low Hazard	Public
Townsend	Adams Dam	N/A	Public
Townsend	Graves Pond Dam	N/A	Private
Townsend	Townsend Harbor Dam	Significant Hazard	Private
Townsend	Mason Road Dam	Significant Hazard	Private
Townsend	VFW Dam	Significant Hazard	Public

*N/A – Information not available as the dam is non-jurisdictional.

Risk Assessment

As previously stated, located in Section 4. Identification of Natural Hazards, Identifying and Profiling Hazards”, there is a description of each identified hazards’ impact on the region and its communities as well as an overall summary of vulnerability. Based on the hazards identified in this plan and the assessment of risks by the Town of Townsend, the town considers itself to be at a high risk for Heavy Rain, Snow Melt, Beavers, Nor’easters, Severe Thunderstorms, Heavy Snow, Ice Storms, Blizzard, Wildland Fire, Drought; moderate risk for Dam Failure, High Winds, Hurricanes, Tornados, Major Urban Fires, Extreme Temperatures, Earthquakes, and Landslides; low risk for Ice Jams ; and tsunamis as not applicable.

This information is documented in Townsend’s Natural Hazard Matrix below which was obtained from participants at the Townsend Local Hazard Mitigation Team Meeting held on March 6, 2013.

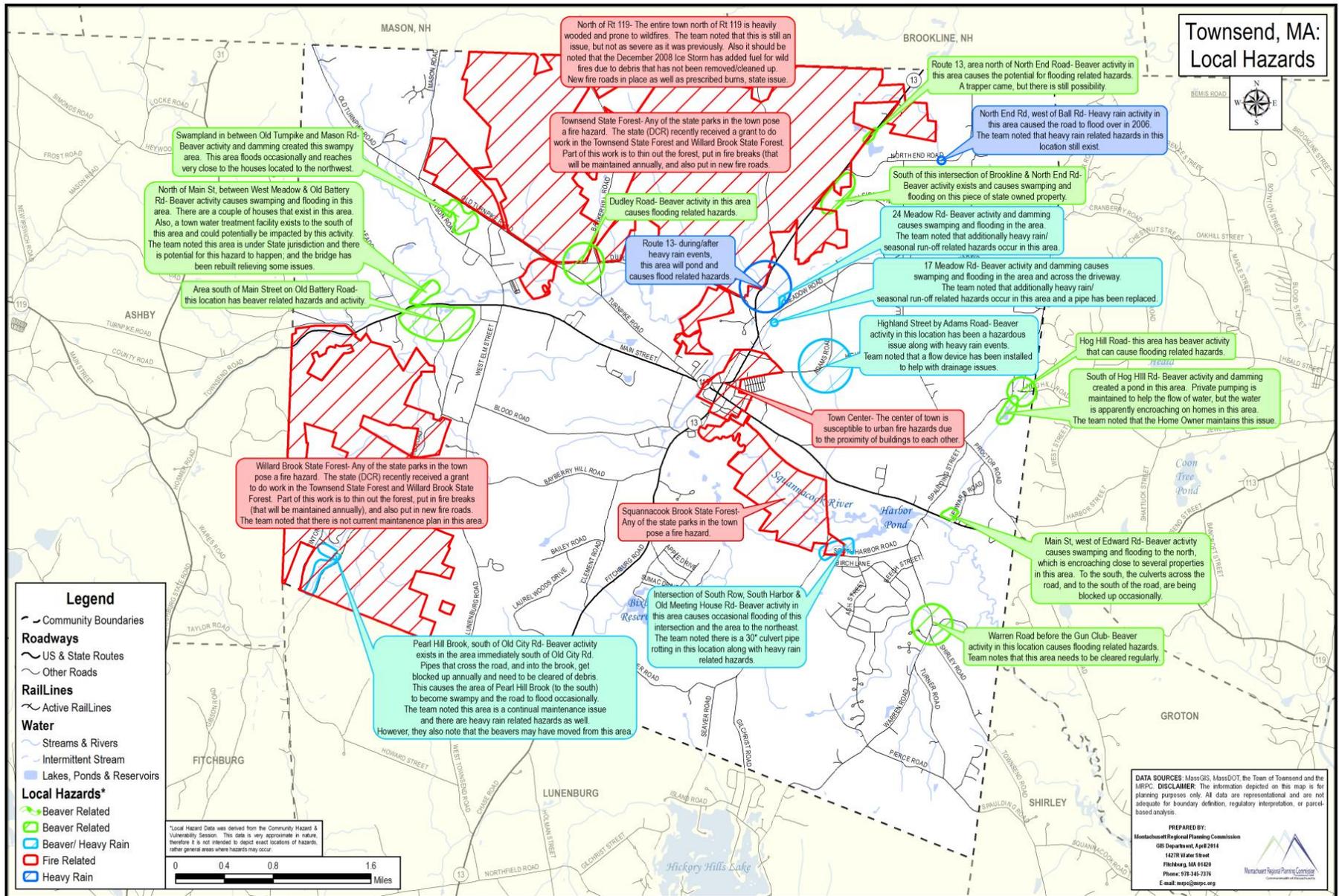
Townsend Natural Hazard Matrix

Natural Hazard	Likelihood of Occurrence	Location	Impacts	Hazard Index
Natural Hazard Separated by Flood, Atmospheric Related and Winter Related, Other Natural Hazards, and Geologic Hazards	3 = Highly Likely 2 = Possible 1 = Unlikely	3 = Regional/State 2 = Multi Community/Regional 1 = Local/Town	4 = Catastrophic 3 = Critical 2 = Limited 1 = Negligible	Ranking Determined by Combining the Likelihood, Location and Impacts of a Natural Hazard
Flood-Related Hazards				
• Heavy Rain	3	3	3	9
• Snow Melt	3	3	2	8
• Dam Failure	2	1	1	4
• Ice Jams	1	1	1	3
• Beavers	3	2	2.5	7.5
Atmospheric Related and Winter Related Hazards				
• High Winds	2	2	2	6
• Hurricanes	2	2	4	8
• Tornadoes	2	2	4	8
• Nor'easters	3	3	3	9
• Severe Thunderstorms	3	2	2	7
• Heavy Snow	3	2	3	8
• Ice Storms	3	2	4	9
• Blizzard	3	2	3	8
Other Natural Hazards				
• Major Urban Fires	2	1	2	5
• Wildland Fire	3	2	3	8
• Drought	3	2	3	8
• Extreme Temperatures	2	2	1	5
Geologic Hazards				
• Earthquakes	2	2	3	7
• Landslides	2	1	2	5
• Tsunami	NA	NA	NA	NA

Key

Highly likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
 Possible : 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.
 Unlikely: Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.
 Catastrophic: Immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.
 Critical: Fast speed of onset or long duration of event resulting in devastating damage and loss of services for weeks or months.
 Limited: Moderate speed of onset or moderate duration of event, resulting in some damage.
 Negligible: Slow speed of onset or short duration of event resulting in little to no damage.

Also discussed at this meeting were the hazards that affect each community and the identification of specific problem areas in the community that need to be addressed. This included the identification of new hazards that were determined to pose a threat or community vulnerability which are detailed in Townsend's Local Hazards Map on the following page. The entire community is equally at risk to the following hazards: snow melt, ice jams, high winds, hurricanes, tornados, nor'easters, severe thunderstorms, heavy snow, ice storms, blizzards, drought, extreme temperatures, earthquakes and landslides.



Existing Protections

The original inventory of hazard mitigation actions which the Montachusett communities undertook for the 2008 Montachusett Region Hazard Mitigation Plan was reviewed and updated by each community at a meeting held in each community with the MRPC and the community's Local Hazard Mitigation Planning Team and, in some communities, the Emergency Management Committee. The attendees of the meetings can be found in Appendix A.. The following matrices depict the updated inventory of what is currently being done to mitigate hazards by listing the programs and activities already in place. It includes a description of the protection measure, who is responsible, and improvements and changes that may be needed. This inventory was used by the Planning Team/Emergency Management Committee to identify gaps in existing protections that were then addressed through the development of this plan update.

Townsend

Type of Existing Protection	Description	Area Covered	Implementation Resources and Funding*	Improvements or Changes Needed
Flood Related Hazards				
Storm water management standards	State Regulation under the Wetlands Protection Act to regulate storm water and other point source discharge	Town-Wide	Enforced by the Townsend Conservation Commission (Wetlands Protection Act) staffed by the municipal Conservation Agent and Townsend Planning Board (Subdivision Control Law and site plan review) staffed by the municipal Planning Board Administrator.	Storm water management standards are and continued to be enforced. No improvements or changes needed.
Wetlands Protection Act (state)	State law regulating development and activity within wetland buffer zone.	100-foot state buffer around wetland area; 200 foot buffer around river front areas.	Enforced by the Townsend Conservation Commission staffed by the municipal Conservation Agent.	No improvements or changes needed.
Wetlands Protection Bylaw (local)	Local bylaw supplementing the Wetlands Protection Act	100-foot state buffer around wetland area; 200 foot buffer around river front areas.	Enforced by the Townsend Conservation Commission staffed by the municipal Conservation Agent.	No improvements or changes needed.

100 Year Flood Zone	Federal law requiring elevation above 100-year flood level of new and substantially improved residential structures in floodplain	100-year floodplain as shown on Flood Insurance Rate Map dated June 4, 2010.	Enforced by the Building Inspector and Townsend Conservation Commission staffed by the municipal Conservation Agent.	No improvements or changes needed.
Town Zoning Bylaws. Flood Plain District	Local bylaw enhancing federal/state laws and regulating any development in the flood plain district	100-year floodplain as shown on Flood Insurance Rate Map dated June 4, 2010.	Enforced by the Building Inspector and Townsend Conservation Commission staffed by the municipal Conservation Agent.	No improvements or changes needed.
Maintenance of municipal storm water drainage system	Regular cleaning of catch basins, storm drains, and culverts	Town-Wide	Directed by the Department of Public Works municipal staff.	Maintenance continues but Additional Personnel and Equipment Needed
Maintenance of public water bodies (ponds, streams, brooks, wetlands)	Periodic cleaning of waterways undertaken, e.g., remove trash, debris	Town-Wide	Undertaken by the Department of Public Works with guidance from Townsend Conservation Commission staffed by the municipal Conservation Agent.	Maintenance continues. No improvements or changes needed.
Inspection of major dams	Periodic inspections of the structural integrity of the dam	Major Dams	Directed by the Massachusetts Department of Conservation and Recreation, Office of Dam Safety.	Update Dam failure studies for the dams rated as high hazard
<u>Wind Related Hazards</u>				
State Building Code	State Law related to design loads to include wind effects	Town-Wide	Enforced by Building Department municipal staff.	Continued enforcement remains in place. No improvements or changes needed.
Tree Maintenance	Regular inspection and tree maintenance to cut branches threatening power lines and overhead utilities	Town-Wide	National Grid staff (Electric Company).	Tree maintenance continues. No municipal improvement or changes needed.
<u>Fire Related Hazards</u>				

Limited Brush Clearing	Provide access to Emergency Services	Town-Wide	Undertaken by the Department of Public Works municipal staff.	Limited brush clearing continues. Identify additional Areas with Potential for Brushfires
<u>Winter Storms Related</u>				
Residential Parking Bans	Parking Bans to Enable Snow Removal Effectively from Residential Streets	Town-Wide	Department of Public Works municipal staff.	Residential parking bans remain in effect but additional personnel and equipment needed for enforcement.
Clearing Snow from Major Arterial Routes	Ensure Access to Emergency Service vehicles	Town-Wide	Department of Public Works municipal staff.	Snow clearing continues but additional personnel and equipment needed

*Townsend enforcement/implementation is generally carried out by elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

Mitigation Goals, Objectives and Strategies

As discussed earlier in this Plan, MRPC previously prepared the 2008 Montachusett Region Hazard Mitigation Plan which consisted of individual annexes for each MRPC community. Similarly, as part of the multi-jurisdictional plan update, each community also developed their own individual goals, objectives and strategies which are listed in this section.

Overall Goal Statement: To prepare to reduce the loss of life, property, infrastructure and cultural resources throughout the community from natural disasters through a multiple hazard mitigation program that involves increased coordination, planning, education, and capital improvements.

1. **Objective:** To organize and prepare to provide adequate shelter, water, food, and basic first aid to displaced residents in the event of a natural disaster, and to provide adequate notification and information regarding evacuation procedures, *etc.*, to residents in the event of a natural disaster.
2. **Objective:** To inventory supplies at existing shelters and develop a needs list and storage requirements; and to establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster.
3. **Objective:** to have the EMD lead an effort to increase coordination between inter-departments in pre-disaster planning, and implementation of hazard mitigation projects.
4. **Objective:** Increase awareness of hazard mitigation among town officials, private organizations, businesses, and the general public.
5. **Objective:** To maintain and continue to participate in the current county-wide Reverse 911 notification system.
6. **Objective:** To collect, periodically update, and disseminate information on which local radio stations provide emergency information, what to include in a 'home survival kit,' how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to

follow during a natural disaster.

Specific Natural Hazard Goals for Townsend

Goal Statement for Flooding: To prepare emergency staff and volunteers in order to minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to flooding.

- Objective:** To continue to participate in the National Flood Insurance Program and to have the flood maps periodically updated.
- Objective:** To Develop a priority list and seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout the town.

Goal Statement for Protection from Beavers: To minimize the threat to health, the damage to roads and property, and the disruption of governmental services and general business activities due to flooding caused by beavers.

- Objective:** Support local town departments to continue present methods to prevent beaver caused flooding.
- Objective:** Seek assistance from beaver management professionals, including trappers.
- Objective:** To continue to install beaver management devices as necessary.

Goal Statement for Hurricanes and Tornadoes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to high winds associated with hurricanes and tornadoes. (The objectives listed above, under flooding, address the flooding that can result from a hurricane.)

- Objective:** To educate residents and volunteers regarding the safe methods and actions necessary to deal with Hurricanes and Tornadoes.

Goal Statement for Winter Related Hazards: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to severe snow and ice storms.

- Objective:** To develop a plan for providing access to water, information, shelter, and food stores to people in remote locations in the event of a severe winter storm.

Goal Statement for Earthquakes: To educate staff, residents and volunteers about the potential for earthquakes and strategies to minimize the loss of life, damage to property, the disruption of governmental services and general business activities due to earthquakes.

- Objective:** To educate and encourage homeowners and developers to rehab and build using methods to minimize the effects of earthquakes and other disasters.

Mitigation Action Plans and Prioritization of Actions (STAPLEE)

Initial Mitigation Action Plans for the Montachusett Communities were presented in the communities Hazard Mitigation Plans that were approved by FEMA in 2009 and 2010. The original Mitigation Action Plans were developed through an inventory of potential hazards which could impact the community and an evaluation of a range of alternatives to address these hazards. As part of the plan update process, the original Mitigation Action Plan was reviewed by the community's Local Hazard Mitigation Planning Team/Emergency Management Committee to delete actions which have already been completed, add additional actions which are either underway or planned to be undertaken, and to update the current

status of all actions. The goals were reviewed and updated at the second meeting with each community.

An additional step in this process was to conduct a “STAPLEE” analysis for each action to prioritize all actions within each community and a subjective evaluation of each action’s perceived cost/benefit. In the 2008 plan, actions were not prioritized so there were no changes in priorities in this update. The revised Community Mitigation Action Plans matrices that follow identify each mitigation action, the responsible department or board responsible for implementation, potential funding sources, the timetable of the action, results of the prioritization of actions through the STAPLEE analysis, and the perceived cost/benefit for each mitigation action.

The goal of each identified strategy, or mitigation action, is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each action to establish priorities for implementation, using the “STAPLEE” method. The STAPLEE methodology was developed by the Federal Emergency Management Agency as a tool to help communities prioritize their hazard mitigation strategies and determine the most appropriate actions for implementation. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of an action and is designed to be used by public officials and planners for making planning decisions.

To conduct the STAPLEE exercise, the community’s Hazard Mitigation Team was asked to rate each action in their Mitigation Action Plan on each of the following criteria, using a score of 1 to 3 (Good = 3, Average = 2, Poor = 1):

- **Social:** Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- **Technical:** Will the proposed strategy work? Will it create more problems than it solves?
- **Administrative:** Can the community implement the action? Is there someone to coordinate and lead the effort?
- **Political:** Is the action politically acceptable? Is there public support both to implement and to maintain the action?
- **Legal:** Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- **Economic:** What are the costs of this action? Does the cost seem reasonable for the size of the problem and the likely benefits?
- **Environmental:** How will the action impact the environment? Will the action need environmental regulatory approvals?

These scores were then totaled, resulting in a final score of 7 (least priority) to 21 (highest priority) for each action. The higher the final score, the higher the relative priority of that action for implementation. This information can then be utilized in each community as they conduct and administer relevant municipal functions and activities. The final STAPLEE score for each action is shown in the following mitigation action plan.

The Hazard Mitigation team was also asked to do a relative cost/benefit of each action. This assessment was intended to informally indicate if an action will either have more benefits accrued to the Town than the Cost of implementing the action, or if the costs would exceed any benefits. Responses include:

“Benefits Exceed Costs”, “Benefits Equal Costs, or “Costs Exceed Benefits”.

TOWNSEND IMPLEMENTATION STRATEGY FOR PRIORITY MITIGATION ACTIONS

Type of Natural Hazard	Description of Action	Implementation Responsibility	Resources/ Funding*	Timetable	Priority (STAPLE SCORE)	Cost/Benefit Evaluation	Status Update from the 2008 Plan**
Flood Related Hazards and Geologic Hazards	Identify Existing Shelters that are Earthquake Resistant as well as Outside of Floodplain (and Dam Inundation) Areas to ensure that shelters are available to the public to reduce or eliminate risk to human life.	Building Inspector, Emergency Management Director	Municipal Staff	2015 – 2020	21	Benefits exceed costs	Completed. Carried forward. Task is undertaken periodically.
Wildland Fire	Increase awareness by educating property owners on actions that they can take to reduce risk to property by hosting an Open House at the Fire Department, Develop and Distribute an Educational Pamphlet on Fire Safety and Prevention (SAFE PROGRAM)and wildfire prevention.	Fire Department	Municipal Staff	2015 – 2020.	21	Benefits exceed costs	Completed Carried Forward. Action undertaken periodically. SENIOR SAFE Program was added to this action.

All Natural Hazards	Increase hazard education and risk awareness to public by Collecting, Updating, and Disseminating Information on Local Radio/TV Stations to educate the public and alert them of emergency information including shelter locations and other instructions related to all natural hazards	Emergency Management Director	Municipal Staff	2015 – 2020	21	Benefits exceed costs	Completed Carried forward. This action is a continuous effort.
All Natural Hazards	Inventory Supplies at Existing Shelters and Develop a Needs List and Storage Requirements to ensure the available of adequate supplies during a natural hazard. Supplies must be adequate to eliminate or reduce risk to human life.	Emergency Management Planning Committee, School Facilities Manager	Municipal Staff	2015 – 2020;.	21	Benefits exceed costs	Carried forward. Previously completed but updated as necessary.

Atmospheric and Winter Related Hazards	Develop a Mitigation Plan to provide access to Water, Information, Shelter and Food Stores to People in Remote Locations of the town in the Event of a Severe Winter Storm and integrate this information into community comprehensive plans.	Emergency Management Director	Municipal Staff / Volunteers	2015 – 2020	21	Benefits exceed costs	Carried forward due to lack of funding.
Flood Related Hazards	Identify all structures throughout the town that need to be Elevated above the Base-Flood Elevation. Once identified educate those property owners regarding their options for mitigation.	Building Inspector, Fire Department	Municipal Staff. Also 75% FEMA FUNDING AVAILABLE. Remaining 25% (non-federal)	2015 – 2020;	18	Benefits exceed costs	Carried forward. Identification Partially complete.
Flood Related Hazards	To Develop a priority list and possibly seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town to reduce or eliminate flooding risk.	Board of Selectmen, Highway Department	Municipal Staff/ FEMA HMGP grant 75%	2015 – 2020	19	Benefits exceed costs	Carried forward due to time constraints.

Flood Related Hazards	Educate property owners regarding options for mitigating their properties from flooding through outreach programs that address measures that residents can take i.e installing backflow valves, securing debris, etc.)	Emergency Management Director, Fire Department	Municipal Staff	2015 – 2020;	21	Benefits exceed costs	New action.
Flood Related Hazards	Continue participation in the National Flood Insurance Program to enable property owners to purchase insurance protection against flood losses.	Board of Selectmen, Conservation Commission	FEMA/MEMA	2015 – 2020	21	Benefits exceed costs	Completed but carried forward. Town continues to participate in the NFIP.
Flood Related Hazards	Evaluate and relocate furnaces, water heaters, and electrical equipment in municipal owned buildings that are located in areas prone to flooding to reduce flood damage.	Emergency Management Director, Fire Department	Municipal Staff and Property Owners	2015 – 2020		Benefits exceed costs	Carried forward due to time constraints and lack of funding.
Other Natural Hazards (Wildland fire)	Identify areas with potential for brush fires to track community vulnerability by developing and maintaining a data base.	Department of Public Works, Tree Warden	Municipal Staff	2015 – 2020	21	Benefits exceed costs	New Action.

All Natural Hazards	Identify shelters and publicize locations to the general public during hazard events to reduce and or eliminate risk to human life.	Emergency Management Director	Emergency Management Director / Fire Department	2015 – 2020;	21	Benefits exceed costs	Carried forward. Partially complete. Town needs to identify additional shelters.
All Natural Hazards	Utilize interactive mapping application prepared by MRPC/CMRPC to update critical infrastructure and simulate real time evacuation scenarios to mitigate hazards to the public.	Emergency Management Director	Emergency Management Director	2015 (12 months)	21	Benefits exceed costs	New Action.
Flood Related Hazards	Install "beaver diverters" and water control devices to mitigate flooding caused by beaver dams.	Department of Public Works, Conservation Commission	Municipal Staff	2015 – 2020	18	Benefits exceed costs	Completed. Carried forward. This action is undertaken as needed.
Flood Related Hazards	Hire trapper for removal of beavers to mitigate flooding caused by beaver dams.	Department of Public Works, Conservation Commission	Municipal Staff	2015 – 2020	17	Benefits exceed costs	Completed. Carried forward. This action is undertaken as needed.
All Natural Hazards	Implement recommendations regarding natural hazard mitigation in existing planning documents including the implementation element of the master plan, five year action plan of the open space and recreation plan and the emergency evacuation plan	Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	Municipal Staff Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	2015-2020	18	Benefits exceed costs	Completed but carried forward. This action is an ongoing effort. For example, Planning Board Subdivision Regulations were amended to include Low Impact Design (LID) Standards. This was a recommendation of the town's master plan.

*Unless otherwise noted, Townsend's Resources/Funding consists of elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

**Actions identified as carried forward were not completed in the previous planning cycle unless otherwise stated.

Mitigation actions from the 2008 Montachusett Region Hazard Mitigation Plan that are complete include:

- Inventoried Supplies at Existing Shelters and Developed a Needs List and Storage Requirements to ensure the availability of adequate supplies during a natural hazard.
- Developed a Preliminary Project Proposal and Cost Estimate for Updating Current 911 System including Feasibility of Reverse 911.
- Established "Code Red" pre-disaster warning system that effectively, efficiently and in a timely fashion warns citizens and business owners of impending weather events.

Mitigation actions from the 2008 Plan that were removed from this update include:

- As Townsend is a member of the NERAC and LEC the mitigation action of Work with Neighboring Communities to Establish a Community Emergency Response Team (CERT) was removed.

Westminster Natural Hazard Risk Assessment

While this annex focus' pertains to critical facilities, flooding, risk assessment, existing protections and mitigation strategy in the community, more detailed descriptions of each natural hazard's impact on the region and its communities and summary of vulnerability can be located in the regional section entitled "4. Identification of Natural Hazards, Identifying and Profiling Hazards".

Community Profile

The Town of Westminster is located in North Central Massachusetts, bordered by Ashburnham on the north, Fitchburg and Leominster on the east, Princeton and Hubbardston on the south, and Gardner on the West. Westminster is 6 miles west of Fitchburg, 24 miles north of Worcester, 53 miles northwest of Boston and 198 miles from New York City.

The town of Westminster covers an area of 37.34 square miles, with a resident population of 8,926, according to the 2010 US Census, with a density of 239 people per square mile. The total number of housing units is 2,960, and the average household size is 2.68 people. Median age of Westminster residents is 42.

The Town of Westminster is a suburban hill town which was originally the six-square mile Narragansett Township Number 2, granted to veterans and heirs of veterans of King Philip's War in 1728. Used by Indians for hunting and fishing, the town was founded in 1733 although the first permanent settlement of the town didn't take place until 1737 and the community wasn't accepted as a town until 1770. Originally the economy was focused on agriculture, but farming provided a poor return and manufacturing quickly became the dominant economic force in the Region. Industry was a dominant focus in Westminster but a number of manufacturing operations did take place over time. There were once over 40 chair and cabinet shops in town, in addition to saw and grist mills, leather tanning,

blacksmithing, shoemaking and tin ware manufacture. The making of Bonnets was a significant cottage industry during the first half of the 19th century. The landmark Westminster Cracker Factory began operation in 1828. The building is the only historic cracker baker remaining in New England. A paper mill was at one time located at the Narrows, and had supplanted a previous textile operation. The Town of Westminster is a rural community, which has the character of a small New England village. Just over the town line to the south in Princeton, is Wachusett Mountain, the largest Monadnock, or stand-alone, mountain east of the Berkshires. Its northern slope covers considerable acreage within the Town of Westminster, and the base lodge for Wachusett Mountain Ski Area is located within the bounds of town.

Westminster has the distinction of being able to suit all these needs and still retain the flavor of a small New England village. Many of the older homes and farms of Westminster are New England vernacular architecture that is rich in historic appeal. The two largest employers in Westminster are Simplex Grinnell LLP and TRW automotive.

Critical Facilities

In general usage, the term “critical facilities” is used to describe all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired.

Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even access to damaged areas.

The number and nature of critical facilities in a community can differ greatly from one jurisdiction to another, and usually comprise both public and private facilities. In this sense, each community needs to determine the relative importance of the publicly and privately owned facilities that deliver vital services, provide important functions, and protect special populations. *Source: Federal Emergency Management Administration, Risk Management Series, Design Guide for Improving Critical Facility Safety from Flooding and High Winds, FEMA 543, January 2007.*

A list of the critical facilities within the community is shown in Table 79. This data was obtained from the community’s Comprehensive Emergency Management Plan (CEMP). The data was then reviewed by the Emergency Management Director. These facilities were digitized into GIS and used for determining vulnerability to the various hazards. The map that follows entitled FEMA Q3 Flood Zones and Critical Infrastructure which depicts Critical Facilities in the community.

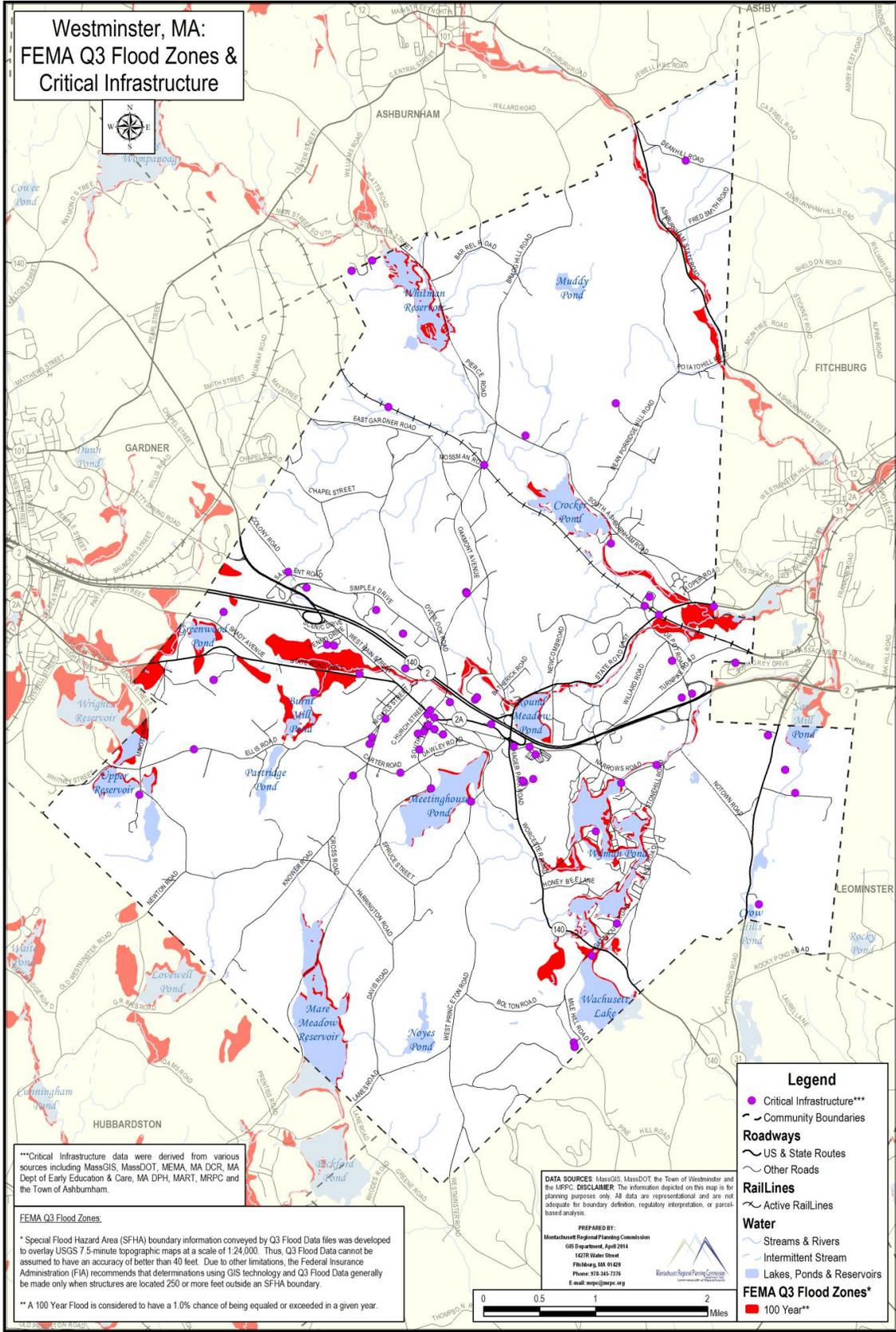
Table 79: Westminster Critical Facilities

Feature Type	Name	Address
City/Town Halls	Westminster Town Hall	11 South Street
Public Water Supply*	Wyman Pond	
	Ranor Incorporated - 3 Wells	
	Shore Bible Camp - Inact.	
	Meetinghouse Pond	
	DC Leominster State Forest	
	Wachusett Lake	
	Wachusett Mountain Ski Area - 2 Wells	
	Meetinghouse Reservoir	
	The Woods At Westminster - 2 Wells	
	Crocker Pond Recreation Area	
Dpw Facilities	Westminster Dpw	3 Oakmont Avenue
Early Education Childcare Facilities	Muscara, Janet M.	27 South Street
	Sunshine Garden Nursery School	40 Nichols Street
	Konich, Jennifer M.	62 Knowler Road
	Velez, Jessenia	18 Wachusett Drive
	Brown, Hannelore	28 Colony Road
	Forbes, Vivien	201 Ellis Road
	Condon, Jennifer B.	74 Carter Road
	Appleseed Academy Of Child Development	138 Main Street
	Swedberg, Lori	34 Edro Isle Road
	Bourgeois, Karen	20 Kurikka Place
	Parenteau, Mary	99 Dean Hill Road
	Kimber, Victoria	18 Fenno Drive
Elderly Housing	The Wellington House	5 Meeting House Road
Electric Substations	National Grid	1 State Road West
	National Grid	Depot Road
Emergency Shelters	Meetinghouse School	8 South Street
	Westminster Elementary School (Primary)	9 Academy Hill Road
	Oakmont Regional High School	9 Oakmont Drive
	Overlook Middle School	10 Oakmont Drive
End Of Life Facilities	Mount Pleasant Cemetery	Ellis Road
	Woodside Cemetery	Narrows Road
	Sawyer Miller-Masciarelli Funeral Home	123 Main Street
	Whitmanville Cemetery	South Ashburnham Road
Emergency Operations Centers	Westminster Public Safety Building	7 South Street
	Westminster Dpw	2 Oakmont Avenue

Fire	Westminster Fire Station	7 South Street
Freight Hazmat Sites	Westminster Depot	4 Theodore Drive
	Fitchburg Gas & Elec. Lng Facility	122 State Road West
	Wachusett Mountain Ski Area	Wachusett Mountain Ski Area
	100 Simplex Drive Building	100 Simplex Drive
	Aubuchon Hardware Warehouse	95 Aubuchon Drive
	Ranor Incorporated	1 Bella Drive
	Advance Coatings Company	42 Depot Road
	Trw Fasteners	180 State Road East
	Mass Highway	400 Simplex Drive
	Westminster Landfill	Fitchburg Road
	Verizon	18 Elliott Street
	Pinetree Power Fitchburg, Inc.	170 Fitchburg Road
	Fitchburg Water Treatment Plant	18 Hager Park Road
	Westminster Water Filtration & Treatment Facility	18 Hager Park Road
	Fitchburg Water Treatment Plant	140 Narrows
	Gas Station	78 Main Street
	Proposed Cumberland Farms Gas Station	68 Main Street
	Irving Gas Station	21 Village Inn Road
Other Critical Facilities	Fitchburg Welding Co., Inc.	4 Depot Road
	Fitchburg Gas & Elec. Lng Facility	122 State Road West
	Wachusett Mountain Ski Area	Wachusett Mountain Ski Area
	100 Simplex Drive Building	100 Simplex Drive
	Aubuchon Hardware Warehouse	95 Aubuchon Drive
	Ranor Incorporated	1 Bella Drive
	Advance Coatings Company	42 Depot Road
	Chemdesign Corporation	142 Turnpike Road/Development Road
	Trw Fasteners	180 State Road East
	Guilford Rail Bridge #1	Rail Line & State Road East
	Guilford Rail Bridge #2	Rail Line & Oakmont Avenue
	Unitil Gas Valve	State Road East
	Guilford Rail Bridge #3	Rail Line & Swamp
	Mass Highway	400 Simplex Drive
	Westminster Landfill	Fitchburg Road
	Verizon	18 Elliott Street
	Tyco Headquarters	50 Technology Drive
	Other Government Buildings	Forbush Memorial Library

	Westminster Dpw	2 Oakmont Avenue
	Ellis Road Water Tank	18 Ellis Road
	Westminster Public Safety Building	7 South Street
	Cemetery Department	Narrows Road
	Goodridge Water Tank	Shady Avenue
	Meetinghouse Pond Gate Valve	
Police	Westminster Police Station	7 South Street
Power Plant	Pinetree Power Fitchburg, Inc.	170 Fitchburg Road
	Rci	101 Fitchburg Road
	Solar Panels, Aubuchon Hardware	100 Simplex Drive
Pumping Stations	Westminster Water Pumping Station	18 Hager Park Road
	Westminster Water Pumping Station	South Street
	Kendall Court Pumping Station	Kendall Court
Schools	Westminster Golf Course	51 Ellis Road
	Meetinghouse School	8 South Street
	Westminster Elementary School	9 Academy Hill Road
	The Center For Education	2 Narrows Rd. Suite B3
	Oakmont Regional High School	9 Oakmont Drive
	Overlook Middle School	10 Oakmont Drive
	Montachusett Regional Vocational Technical School	
Potable Water Treatment Plants	Fitchburg Water Treatment Plant	18 Hager Park Road
	Fitchburg Water Building	Narrows Road
Wastewater Treatment Plant	Westminster Water Filtration & Treatment Facility	18 Hager Park Road

*As stated in 310 CMR 22.02, a Public Water System means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year” (Mass GIS, 2014).



Flood Prone Areas

Particular areas within the community where the risk of flood areas are or could occur were determined at the first meeting of the Westminster Local Hazard Mitigation Team held on October 1, 2012. This information can be found on Westminster’s Local Hazard Map which is located under the section entitled Risk Assessment.

Flooding Vulnerability Assessment

An analysis of the FIRM flood hazard area maps indicates that there is a total of 1769.54 acres of 100-year floodplain within Westminster. This amounts to 7.42% of the total town. Based on additional analysis, 33.75 acres (1.91%) of the floodplain are developed. Currently there are 149 structures in the floodplain which is about 3.24% of the total structures in the community. The buildings are then multiplied by the building value, as determined by the MA Department of Revenue, to come up with a potential loss of \$93,409,800.

Excluding dams and bridges the table below depicts the critical facilities within the 100 year flood zone.

Table 80
Westminster Critical Facilities within 100-Year Flood Zone

<i>Feature Type</i>	<i>Name</i>	<i>Address</i>
Other Critical Facilities	Unitil Gas Valve	State Road East
Other Government Buildings	Meetinghouse Pond Gate Valve	
Public Water Supply	Wyman Pond	
Public Water Supply	Wachusett Lake	
Public Water Supply	Meetinghouse Reservoir	

Since the initiation of the National Flood Insurance Program (NFIP), six flood insurance claims in the Town of Westminster have been made totaling \$7,894.43 in payments. According to the NFIP, there is one repetitive loss property in Westminster totaling \$6,526.90 in claims. Statistics from the NFIP BureauNet indicate in the town of Westminster there are 18 flood insurance policies in force.

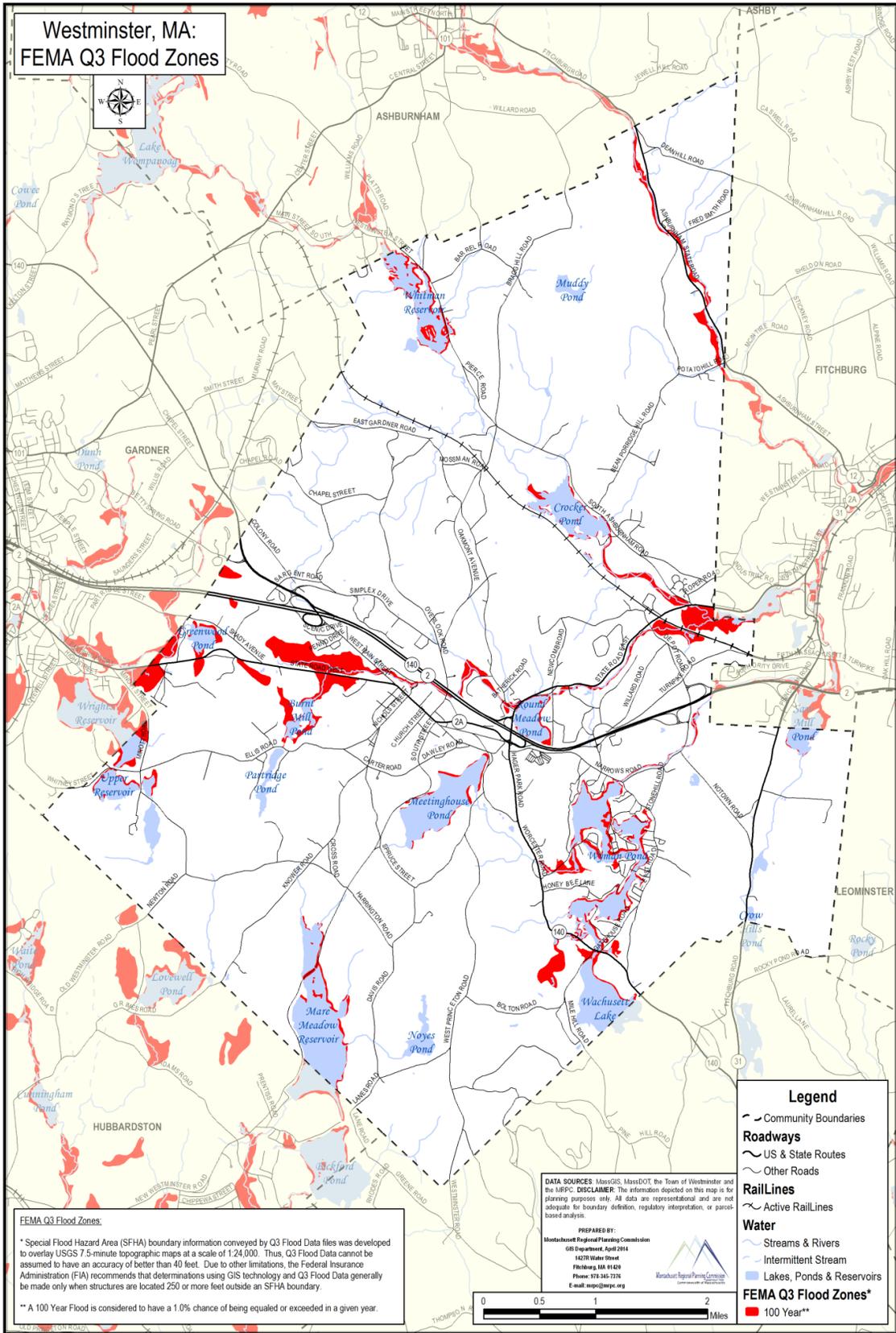
Floodplain Management and Compliance with NFIP

The town supports floodplain management activities in an effort to meet compliance of the National Floodplain Insurance Program. These efforts include:

- Implementing the MA Wetlands Protection Act regulating development and activity within the wetlands buffer zone and regulating stormwater and other point source discharge.
- Implementing the Town Flood Plain District Bylaw (December 13, 1982) regulating development in the floodplain district.
- Maintain the Town’s Low Impact Development Bylaw which establishes minimum requirements and procedures to control the adverse effects of increased post-development stormwater runoff and nonpoint source pollution associated with new development and redevelopment.

- Continued maintenance of municipal stormwater drainage system which includes regular cleaning of catch basins, storm drains and culverts.
- Continued maintenance of public water bodies to reduce flooding caused by erosion and water displacement.
- Enforcement of the Exceptions for Cluster Development Bylaw which mitigates possible flooding events by designating protected open space within a development which in turn treats stormwater runoff through the means of natural infiltration.

The map that follows entitled FEMA Q3 Flood Zones which depicts the 100 year flood zones in the community.



Structurally Deficient Bridges Over Waterways

Westminster has two bridges over water that are classified by MassDOT as “structurally deficient”. The bridges locations and associated water bodies are as follows: Ashburnham State Road over Phillips Brook and Whitmanville Road over Whitman River.

Hazard Potential of Dams

The DCR Office of Dams Safety lists 20 dams in the Town of Westminster as shown in Table 81. There are three dams classified as high hazard.

Classifications for potential hazards are in accordance with the chart below.

Hazard Potential Classification

High Hazard	Refers to dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
Significant Hazard	Refers to dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities
Low Hazard	Refers to dams located where failure may cause minimal property damage to others. Loss of life is not expected.

Source: MA Department of Conservation and Recreation Office of Dam Safety

High hazard dams must be inspected every two year, significant hazard every five years, and low Hazards dams every 10 years. Owners of dams are responsible for having their dam inspected. MGL Chapter 253 and 302 CMR 10.00 requires that dam owners prepare, maintain and update Emergency Action Plans for all High Hazard Potential dams and certain Significant Hazard Potential dams.

Non-jurisdictional dams are not regulated by the Office of Dam Safety or under their jurisdiction. Typically these dams are under 6 feet in height and/or under 15 acre-feet in storage and do not have an assigned 'Hazard Code'. Dams owned and regulated by the Federal Government are also typically non-jurisdictional but DO have an assigned Hazard Code.

Table 81: Dams- Westminster

Town	Dam	Hazard Code	Owner
Westminster	Crocker Pond Dam	High Hazard	Private
Westminster	Westminster Reservoir Dam	High Hazard	Private
Westminster	Wyman Pond Compensating Reservoir Dam	High Hazard	Public
Westminster	Crocker Fish Pond Dam	Low Hazard	Public
Westminster	Burnt Mill Pond Dam	Low Hazard	Private

Westminster	Rice Meadow Fly Pond Dam	Low Hazard	Private
Westminster	Smith Pond Dam	N/A	Public
Westminster	Narrows Mill Pond Dam	N/A	Private
Westminster	Holmes Park Pond Dam	N/A	Public
Westminster	Storage Pond Dam	N/A	Private
Westminster	Round Meadow Pond Dam	Significant Hazard	Private
Westminster	Pierce Pond Dam	Significant Hazard	Private
Westminster	Wachusett Reservoir Dam	Significant Hazard	Public
Westminster	Noyes Pond Dam	Significant Hazard	Private
Westminster	Crow Hills Pond Dam	Significant Hazard	Public
Westminster	Upper Reservoir Dam	Significant Hazard	Public
Westminster	Ellis Pond Dam	Significant Hazard	Private
Westminster	Meetinghouse Pond Dam	Significant Hazard	Public
Westminster	Minott Pond Dam	Significant Hazard	Private
Westminster	Upper Crow Hills Pond Dam	Significant Hazard	Public

*N/A – Information not available as the dam is non-jurisdictional.

Risk Assessment

As previously stated, located in Section 4. Identification of Natural Hazards, Identifying and Profiling Hazards”, there is a description of each identified hazards’ impact on the region and its communities as well as an overall summary of vulnerability. Based on the hazards identified in this plan and the assessment of risks by the Town of Westminster, the town considers itself to be at a high risk for Snow Melt; moderate risk for Heavy Rain, Beavers, Nor’easters, Severe Thunderstorms, Heavy Snow, Ice Storms, Blizzard; low risk for Dam Failure, Ice Jams, High Winds, Hurricanes, Tornados, Major Urban Fires, Wildland Fire, Drought, Extreme Temperatures, Earthquakes, and Landslides; and tsunamis as not applicable.

This information is documented in Westminster’s Natural Hazard Matrix below which was obtained from participants at the Westminster Local Hazard Mitigation Team Meeting held on October 1, 2012.

Westminster Natural Hazard Matrix

Natural Hazard	Likelihood of Occurrence	Location	Impacts	Hazard Index
Natural Hazard Separated by Flood, Atmospheric Related and Winter Related, Other Natural Hazards, and Geologic Hazards	3 = Highly Likely 2 = Possible 1 = Unlikely	3 = Regional/State 2 = Multi Community/Regional 1 = Local/Town	4 = Catastrophic 3 = Critical 2 = Limited 1 = Negligible	Ranking Determined by Combining the Likelihood, Location and Impacts of a Natural Hazard
Flood-Related Hazards				
• Heavy Rain	2	1	2	5
• Snow Melt	3	1	2	6
• Dam Failure	1	3	2	6
• Ice Jams	1	1	1	3
• Beavers	2	1	2	5
Atmospheric Related and Winter Related Hazards				
• High Winds	1	1	1	3
• Hurricanes	1	1	1	3
• Tornados	1	1	1	3
• Nor'easters	2	1	2	5
• Severe Thunderstorms	2	1	2	5
• Heavy Snow	2	1	2	5
• Ice Storms	2	2	2	6
• Blizzard	2	2	2	6
Other Natural Hazards				
• Major Urban Fires	1	1	1	3
• Wildland Fire	1	1	1	3
• Drought	1	1	1	3
• Extreme Temperatures	1	1	1	3
Geologic Hazards				
• Earthquakes	1	1	1	3
• Landslides	1	1	1	3
• Tsunami	NA	NA	NA	NA

Key

Highly likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
 Possible : 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.
 Unlikely: Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.
 Catastrophic: Immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.
 Critical: Fast speed of onset or long duration of event resulting in devastating damage and loss of services for weeks or months.
 Limited: Moderate speed of onset or moderate duration of event, resulting in some damage.
 Negligible: Slow speed of onset or short duration of event resulting in little to no damage.

Also discussed at this meeting were the hazards that affect each community and the identification of specific problem areas in the community that need to be addressed. This included the identification of new hazards that were determined to pose a threat or community vulnerability which are detailed in Westminster's Local Hazards Map on the following page. The entire community is equally at risk to the following hazards: heavy rain, snow melt, ice jams, high winds, hurricanes, tornados, severe thunderstorms, nor'easters, heavy snow, fires, blizzards, drought, extreme temperatures, earthquakes and landslides.

Existing Protections

The original inventory of hazard mitigation actions which the Montachusett communities undertook for the 2008 Montachusett Region Hazard Mitigation Plan was reviewed and updated by each community at a meeting held in each community with the MRPC and the community's Local Hazard Mitigation Planning Team and, in some communities, the Emergency Management Committee. The attendees of the meetings can be found in Appendix A. The following matrices depict the updated inventory of what is currently being done to mitigate hazards by listing the programs and activities already in place. It includes a description of the protection measure, who is responsible, and improvements and changes that may be needed. This inventory was used by the Planning Team/Emergency Management Committee to identify gaps in existing protections that were then addressed through the development of this plan update.

Westminster

Type of Existing Protection	Description	Area Covered	Implementation Resources and Funding*	Improvements or Changes Needed
Flood Related Hazards				
Storm water management standards	State Regulation under the Wetlands Protection Act to regulate storm water and other point source discharge	Town-Wide	Enforced by the Westminster Conservation Commission (Wetlands Protection Act) staffed by the municipal Conservation Agent and Westminster Planning Board (Subdivision Control Law and site plan review) staffed by the municipal Town Planner.	Storm water management standards are and continue to be enforced. No improvements or changes needed.
Low Impact Development	General Bylaw	Town – Wide	Westminster Planning Board staffed by the municipal Town Planner.	General Bylaw and enforcement remain in effect. No improvements or changes needed.
Wetlands Protection Act (state)	State law regulating development and activity within wetland buffer zone	100-foot state buffer around wetland area; 200 foot buffer around river front areas.	Enforced by the Westminster Conservation Commission staffed by the municipal Conservation Agent.	No improvements or changes needed.

100 Year Flood Zone	Federal law requiring elevation above 100-year flood level of new and substantially improved residential structures in floodplain	100-year floodplain as shown on Flood Insurance Rate Map dated July 19, 1982.	Enforced by the Building Inspector (municipal staff) and Westminster Conservation Commission staffed by the municipal Conservation Agent.	Update Insurance Flood Rate Maps
Town Zoning Bylaw Flood Plain District	Local bylaw enhancing federal/state laws and regulating any development in the flood plain district	100-year floodplain as shown on Flood Insurance Rate Map dated July 19, 1982.	Enforced by the municipal Building Inspector and Conservation Commission staffed by the municipal Conservation Agent	Update Insurance Flood Rate Maps
Maintenance of municipal storm water drainage system	Regular cleaning of catch basins, storm drains, and culverts	Town-Wide	Directed by the Department of Public Works municipal staff.	Additional Personnel and Equipment Needed
Maintenance of public water bodies (ponds, streams, brooks, wetlands)	Periodic cleaning of waterways undertaken, e.g., remove trash, debris	Town-Wide	Undertaken by the Department of Public Works with guidance from Westminster Conservation Commission staffed by the municipal Conservation Agent.	Maintenance continues. No improvements or changes needed.
Inspection of major dams	Periodic inspections of the structural integrity of the dam	Major Dams	Directed by the Massachusetts Department of Conservation and Recreation, Office of Dam Safety.	Update Dam failure studies for the dams rated as high hazard
<u>Wind Related Hazards</u>				
State Building Code	State Law related to design loads to include wind effects	Town-Wide	Enforced by Building Department municipal staff.	Continued enforcement remains in place. No improvements or changes needed.
National Grid's Tree Maintenance Program	Regular inspection and tree maintenance to cut branches threatening power lines and overhead utilities	Town-Wide	National Grid staff (Electric Company).	Tree maintenance continues. No improvements or changes needed.
<u>Fire Related Hazards</u>				

Limited Brush Clearing	Provide access to Emergency Service vehicles	Town-Wide	Department of Public Works municipal staff.	Limited brush clearing continues. Identify additional Areas with Potential for Brushfires
Winter Storms Related				
Residential Parking Bans	Parking Bans to Enable Snow Removal Effectively from Residential Streets	Town-Wide	Department of Public Works municipal staff.	Residential parking bans remain in effect but additional personnel and equipment needed for enforcement .
Clearing Snow from Major Arterial Routes	Ensure Access to Emergency Service vehicles	Town-Wide	Department of Public Works municipal staff.	Snow clearing continues but additional personnel and equipment needed.

*Westminster enforcement/implementation is generally carried out by elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

Mitigation Goals, Objectives and Strategies

As discussed earlier in this Plan, MRPC previously prepared the 2008 Montachusett Region Hazard Mitigation Plan which consisted of individual annexes for each MRPC community. Similarly, as part of the multi-jurisdictional plan update, each community also developed their own individual goals, objectives and strategies which are listed in this section.

Overall Goal Statement: To prepare to reduce the loss of life, property, infrastructure and cultural resources throughout the community from natural disasters through a multiple hazard mitigation program that involves increased coordination, planning, education, and capital improvements.

1. **Objective:** To organize and prepare to provide adequate shelter, water, food, and basic first aid to displaced residents in the event of a natural disaster, and to provide adequate notification and information regarding evacuation procedures, *etc.*, to residents in the event of a natural disaster.
2. **Objective:** To inventory supplies at existing shelters and develop a needs list and storage requirements; and to establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster.
3. **Objective:** to have the EMD lead an effort to increase coordination between inter-departments in pre-disaster planning, and implementation of hazard mitigation projects.
4. **Objective:** Increase awareness of hazard mitigation among town officials, private organizations, businesses, and the general public.
5. **Objective:** To examine options for a local emergency notification system such as Code Red.
6. **Objective:** To collect, periodically update, and disseminate information on which local radio stations provide emergency information, what to include in a 'home survival kit,' how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to follow during a natural disaster.

Specific Natural Hazard Goals for Westminster

Goal Statement for Flooding: To prepare emergency staff and volunteers in order to minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to flooding.

1. **Objective:** To continue to participate in the National Flood Insurance Program, and to have the flood maps periodically updated.
2. **Objective:** To Develop a priority list and seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout the town.
3. **Objective:** To investigate the possibility of bundling the Route 140 flooding problem and culvert improvements with a larger Route 140 improvement project and get it on the Regional Transportation Improvement Program (TIP).

Goal Statement for Protection from Beavers: To minimize the threat to health, the damage to roads and property, and the disruption of governmental services and general business activities due to flooding caused by beavers.

1. **Objective:** Support local town departments to continue present methods to prevent beaver caused flooding.
2. **Objective:** Seek assistance from beaver management professionals, including trappers.
3. **Objective:** Install beaver management devices.

Goal Statement for Hurricanes and Tornadoes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to high winds associated with hurricanes and tornadoes. (The objectives listed above, under flooding, address the flooding that can result from a hurricane.)

1. **Objective:** To educate residents and volunteers regarding the safe methods and actions necessary to deal with Hurricanes and Tornadoes.

Goal Statement for Winter Related Hazards: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to severe snow and ice storms.

1. **Objective:** To develop a plan for providing access to water, information, shelter, and food stores to people in remote locations in the event of a severe winter storm.

Goal Statement for Earthquakes: To educate staff, residents and volunteers about the potential for earthquakes and strategies to minimize the loss of life, damage to property, the disruption of governmental services and general business activities due to earthquakes.

1. **Objective:** To educate and encourage homeowners and developers to rehab and build using methods to minimize the effects of earthquakes and other disasters.

Mitigation Action Plans and Prioritization of Actions (STAPLEE)

Initial Mitigation Action Plans for the Montachusett Communities were presented in the communities Hazard Mitigation Plans that were approved by FEMA in 2009 and 2010. The original Mitigation Action Plans were developed through an inventory of potential hazards which could impact the community and an evaluation of a range of alternatives to address these hazards. As part of the plan update process, the original Mitigation Action Plan was reviewed by the community's Local Hazard Mitigation Planning

Team/Emergency Management Committee to delete actions which have already been completed, add additional actions which are either underway or planned to be undertaken, and to update the current status of all actions. The goals were reviewed and updated at the second meeting with each community.

An additional step in this process was to conduct a “STAPLEE” analysis for each action to prioritize all actions within each community and a subjective evaluation of each action’s perceived cost/benefit. In the 2008 plan, actions were not prioritized so there were no changes in priorities in this update.. The revised Community Mitigation Action Plans matrices that follow identify each mitigation action, the responsible department or board responsible for implementation, potential funding sources, the timetable of the action, results of the prioritization of actions through the STAPLEE analysis, and the perceived cost/benefit for each mitigation action.

The goal of each identified strategy, or mitigation action, is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each action to establish priorities for implementation, using the “STAPLEE” method. The STAPLEE methodology was developed by the Federal Emergency Management Agency as a tool to help communities prioritize their hazard mitigation strategies and determine the most appropriate actions for implementation. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of an action and is designed to be used by public officials and planners for making planning decisions.

To conduct the STAPLEE exercise, the community’s Hazard Mitigation Team was asked to rate each action in their Mitigation Action Plan on each of the following criteria, using a score of 1 to 3 (Good = 3, Average = 2, Poor = 1):

- Social: Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- Technical: Will the proposed strategy work? Will it create more problems than it solves?
- Administrative: Can the community implement the action? Is there someone to coordinate and lead the effort?
- Political: Is the action politically acceptable? Is there public support both to implement and to maintain the action?
- Legal: Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- Economic: What are the costs of this action? Does the cost seem reasonable for the size of the problem and the likely benefits?
- Environmental: How will the action impact the environment? Will the action need environmental regulatory approvals?

These scores were then totaled, resulting in a final score of 7 (least priority) to 21 (highest priority) for each action. The higher the final score, the higher the relative priority of that action for implementation. This information can then be utilized in each community as they conduct and administer relevant municipal functions and activities. The final STAPLEE score for each action is shown in the following mitigation action plan.

The Hazard Mitigation team was also asked to do a relative cost/benefit of each action. This assessment

was intended to informally indicate if an action will either have more benefits accrued to the Town than the Cost of implementing the action, or if the costs would exceed any benefits. Responses include: “Benefits Exceed Costs”, “Benefits Equal Costs, or “Costs Exceed Benefits”.

WESTMINSTER IMPLEMENTATION STRATEGY FOR PRIORITY MITIGATION ACTIONS

Type of Natural Hazard	Description of Action	Implementation Responsibility	Resources/Funding*	Timetable	Priority (STAPLEE SCORE)	Cost/Benefit Evaluation	Status Update from 2008 Plan**
All Natural Hazards	Work with Neighboring Communities (Gardner) to Establish a Community Emergency Response Team (CERT) to more effectively respond to all natural hazards thus mitigating any damage.	Board of Selectmen, Police & Fire Departments , Emergency Management Director	Municipal Staff/ Volunteers	2015 – 2020;	21	Benefit exceeds cost	Carried forward. Town is active in CERT classes provided by the Gardner CERT.
Flood Related Hazards and Geologic Hazards	Identify Existing Shelters that are Earthquake Resistant as well as Outside of Floodplain (and Dam Inundation) Areas to ensure that shelters are available to the public during hazards to reduce or eliminate risk to human life.	Building Inspector, Emergency Management Director	Municipal Staff	2015 – 2020;	21	Benefit exceeds cost	Carried forward. Identification of shelters outside of floodplain is complete, but need to identify earthquake resistance.
Wildland Fire	Increase awareness by educating property owners regarding actions that they can take to reduce risk to property by hosting an Open House	Fire Department	Municipal Staff, Funding from the state.	2015 – 2020.	21	Benefit exceeds cost	Completed but carried forward. Town undertakes this action periodically . Visits to schools and seniors.

	at the Fire Department, Educate public on Fire Safety and Prevention (SAFE PROGRAM) and wildfire prevention.						
Flood Related Hazards	Continue participation in the National Flood Insurance Program to enable property owners to purchase insurance protection against flood losses.	Building Inspector	FEMA/ MEMA	2015 – 2020	21	Benefit exceeds cost	Completed but carried forward. Town continues its participation in the NFIP.
Other Natural Hazards (Wildland fire)	Identify areas with potential for brush fires to track community vulnerability by developing and maintaining a data base.	Department of Public Works	Municipal Staff	2015 – 2020	17	Benefit exceeds cost	New Action.
All Natural Hazards	Utilize interactive mapping application prepared by MRPC/CMRPC to update critical infrastructure and simulate real time evacuation scenarios to mitigate	Emergency Management Director	Emergency Management Director	2015 (12 months)	21	Benefit exceeds cost	New action.

	hazards to the public.						
Flood Related Hazards	Install "beaver diverters" and water control devices to mitigate flooding caused by beaver dams.	Department of Public Works	Municipal Staff	2015 – 2020	19	Benefit exceeds cost	Completed but carried forwarded. This action is undertaken as needed.
Flood Related Hazards	Hire trapper for removal of beavers to mitigate flooding caused by beaver dams.	Department of Public Works	Municipal Staff	2015 – 2020	19	Benefit exceeds cost	Completed but carried forwarded. This action is undertaken as needed.
All Natural Hazards	Implement recommendations regarding natural hazard mitigation in existing planning documents including the master plan, the open space and recreation plan.	Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	Municipal Staff, Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	2015 – 2020	21	Benefit exceeds cost	Carried forward. Master Plan and Open Space Plan were recently completed.
Flood Related Hazards	Identify all structures throughout the town that need to be Elevated above the Base-Flood Elevation. Once identified educate those property owners regarding options for	Building Inspector, Fire Department	Town Staff 75% FEMA FUNDING AVAILABLE	2015 – 2020	21	Benefit exceeds cost	Carried forward due to time constraints

	mitigation.						
Flood Related Hazards.	To Develop a priority list and possibly seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town to reduce or eliminate flooding risk.	Board of Selectmen, Highway Department	Municipal Staff FEMA HMGP grant 75%	2015 – 2020	15	Benefit exceeds cost	Carried forward. Town continues to identify undersized culverts.
Flood Related Hazards	Replace the undersized culvert along Route 140 in the vicinity of Wyman Pond to mitigate flooding.	Board of Selectmen, Highway Department	Municipal Staff, Potential of PDM Grant (Fed or State)	2015 - 2016	21	Benefit exceeds cost	New Action.
Flood Related Hazards	Revise town's earth removal bylaw to mitigate flooding/run off.	Planning Board	Municipal Staff	2015-2020	21	Benefit exceeds	New Action.
Flood Related Hazards	Implement Well inventory. Enact Registration Program for wells in floodplain areas to decrease exposure to flood hazards.	Board of Health	Municipal Staff	2015-2020	21	Benefit exceeds	New Action.

*Westminster enforcement/implementation is generally carried out by elected/appointed boards and commissions and municipal staff whose

positions are funded through local taxes.

**Actions identified as carried forward were not completed in the previous planning cycle unless otherwise stated.

Mitigation Actions from the 2008 Montachusett Region Hazard Mitigation Plan that are complete include the following:

- Inventoried supplies at existing shelters and developed a needs list and storage requirements.
- Developed a plan for providing access to water, information, shelter, and food stores to people in remote locations of the town in the event of a severe winter storm.
- Developed a preliminary project proposal and cost estimate for updating current 911 system including feasibility of Reverse 911. (The Town now has Code Red).
- Collected, updated and disseminated emergency information on local tv/radio stations. This information is now available on town's website and Reverse 911.
- Identified shelters and publicized locations.

2008 Mitigation actions that were removed from this update include:

- Purchase and distribute educational materials regarding protection from natural hazards. Town decided this was "not an action".

Winchendon Natural Hazard Risk Assessment

While this annex focus' pertains to critical facilities, flooding, risk assessment, existing protections and mitigation strategy in the community, more detailed descriptions of each natural hazard's impact on the region and its communities and summary of vulnerability can be located in the regional section entitled " 4. Identification of Natural Hazards, Identifying and Profiling Hazards".

Community Profile

The Town of Winchendon is located in North Central Massachusetts, bordered by Rindge, and Fitzwilliam, New Hampshire on the north, Royalston on the west, Gardner on the southeast, and Templeton to the south. Winchendon is 17 miles northwest of Fitchburg, 40 miles west of Greenfield, 45 miles north of Worcester, 63 miles northwest of Boston, and 199 miles from New York City.

The town of Winchendon covers an area of 44.07 square miles, with a resident population of 10,300, according to the 2010 US Census, with a density of 233 people per square mile. The total number of housing units is 4,199, with an average household size of 2.64 people. The median age of Winchendon residents is 38.

The earliest known people to live in and around Winchendon were Pennacooks who hunted and fished here and are believed to have regarded "Yellow Spring" as having special healing capacities. More than 300 years ago the Pennacooks moved to Canada, and the Nipmucs came to regard this as their territory. It is believed that during this time the glacially deposited formation known as "King Phillip's Rock" in the Birch Hill area was a meeting place of these people, who continued to seek out the healing Yellow Spring.

In 1735, a six square mile grant was allocated to 60 veterans and descendants of veterans of the Colonial army's 1690 expedition to Canada during the French and Indian Wars. Many of the veterans were from the Town of Ipswich in eastern Massachusetts, so the grant-created place was named Ipswich, Canada until 1764, when it was incorporated as Winchendon. Colonization was slow due to the risks posed by frontier warfare, so the first permanent settlement in town was not until 1752. Old Centre was originally the center of this settlement, and this quiet area still contains physical vestiges of this period: The Day House, the Moses Hale house, Reverend Brown's Parsonage, the First Congregational Church, the Burying Ground, and the Training Field on Hall Road where local militia trained before, during and after the Revolutionary War. During the nineteenth century, the Industrial Revolution brought both manufacturing and the railroad to Winchendon. In 1816, textile manufacturing began drawing power from the Millers River, and as the years passed the town's forests provided materials for a series of specialty wood products and woodworking technologies. Early on, Winchendon became so large a manufacturer of shingles that it became known as "Shingletown". As the century progressed, mills proliferated specializing in wooden tubs, pails, chairs, barrels, and clothes pins. Following the Civil War, twelve local wooden-ware factories produced 90% of the state's wooden ware. Winchendon also became known as "Toy Town" due to the Converse Company's world reputation for quality wooden toys.

Winchendon's is a New England industrial town with a high-density village center. Waterville, to the west of the downtown, and Spring Village, to the northeast of the downtown, are two secondary villages with small scale commercial activities, some industry, and high density residential uses. Lake Monomonac, which is in the extreme northeast of the Town, is also the site of high-density residential development, mainly due to the conversion of small, seasonal structures to year-round residences.

The Town has an abundance of forestlands, wetlands and surface waters, which offer a wide variety of wildlife habitats and recreational opportunities. The Millers River, Lake Monomonac, Lake Denison, Bailey's Brook, Whitney Pond, White's Mill Pond and Stoddard Pond are among the major local water bodies.

Otter River State Forest and Birch Hill Wildlife Management Area provide opportunities for hiking, fishing, hunting, camping and swimming. Lake Dennison Recreational Area also provides these opportunities as well as non-motorized boating and horseback riding. Winchendon Open Space and recreation plan 2004

Memorial School, Murdock Middle High School and the Winchendon Public School District are the three major employers in the town.

Critical Facilities

In general usage, the term "critical facilities" is used to describe all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired.

Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include

emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even access to damaged areas.

The number and nature of critical facilities in a community can differ greatly from one jurisdiction to another, and usually comprise both public and private facilities. In this sense, each community needs to determine the relative importance of the publicly and privately owned facilities that deliver vital services, provide important functions, and protect special populations. *Source: Federal Emergency Management Administration, Risk Management Series, Design Guide for Improving Critical Facility Safety from Flooding and High Winds, FEMA 543, January 2007.*

A list of the critical facilities within the community is shown in Table 82. This data was obtained from the community’s Comprehensive Emergency Management Plan (CEMP). The data was then reviewed by the Emergency Management Director. These facilities were digitized into GIS and used for determining vulnerability to the various hazards. The map that follows entitled FEMA Q3 Flood Zones and Critical Infrastructure depicts Critical Facilities in the community.

Table 82: Winchendon Critical Facilities

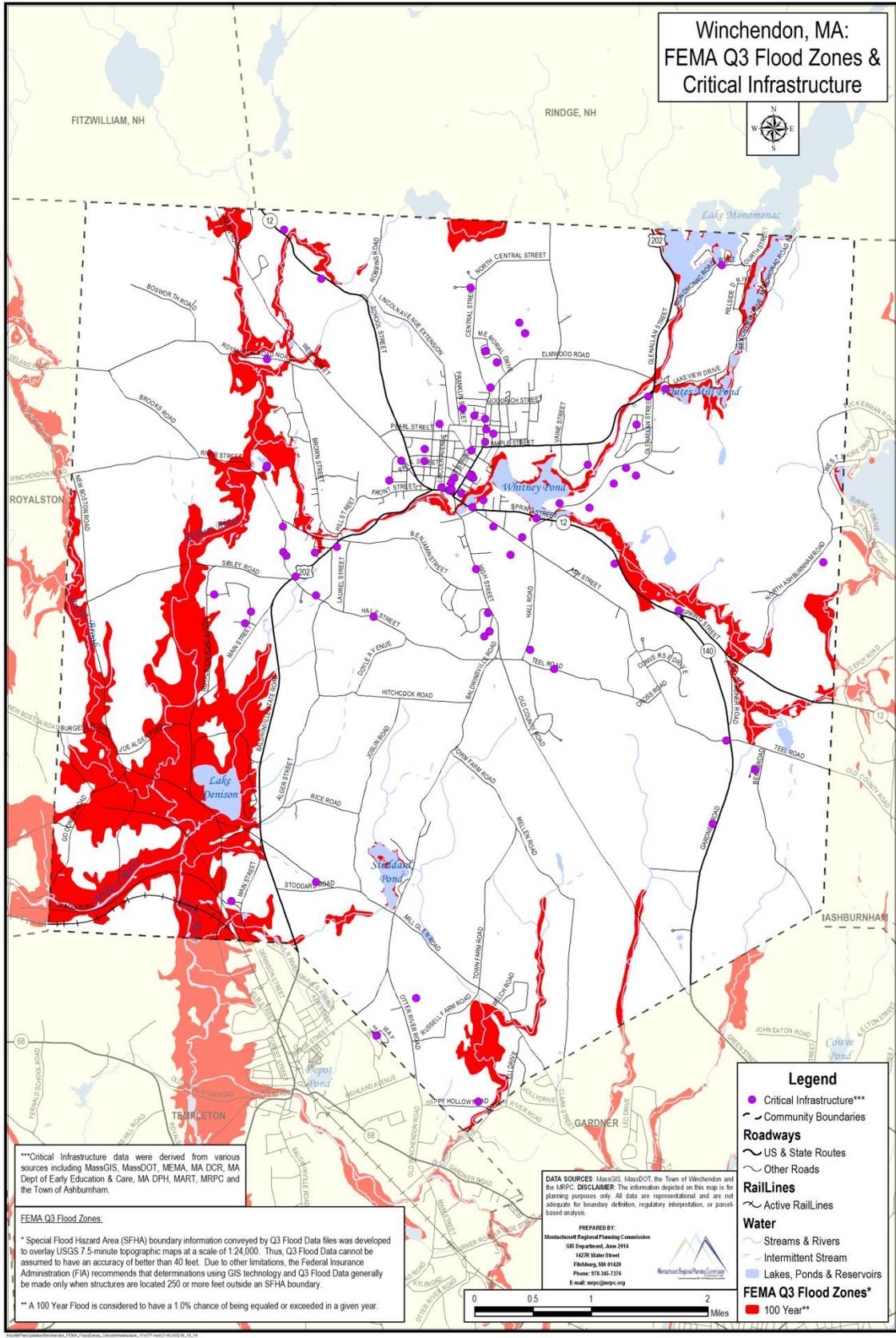
Feature Type	Name	Address
Animal Shelters	Winchendon Animal Shelter	637 River Street
City/Town Halls	Winchendon Town Hall	109 Front Street
Clinics	Winchendon Health Center	55 Hospital Drive
Public Water Supply	Camp Riverwood	
	Pops Hot Dog Stand	
	Nouria Energy Corp/Dunkin Donuts	
	Winchendon Water Storage Tank	
	Winchendon Water Storage Tank	
Dpw Facilities	Winchendon Dpw Building	105 Glenallen Street
Early Education Childcare Facilities	Adams, Nikki	101 Lakeshore Dr
	Haggett, Carla	7 Hale St
	Boutelle, Nadine	201b High St
	Ingman, Jane M.	46 Chase Ln
	Kelley, JOLENE	95 Krantz Rd
	Labarge, Angela	170 Teel Rd
	Black, Tracy Lee	445 Central St
	Martin, Chris	103 West St
	Mitchell, Dianne E.	295 Monomonac Rd W
Nelson, Jennifer	34 Royalston Rd N	

	Rocheleau, Paula	208 Hale St
	Clark Memorial YMCA Afterschool	89 Ash St.
	Fitch, Joanne V.	17 Whitney St
	Rocheleau, Susan	36 Phyllis Rd
	Sevigny, Cathleen	41 Hale St
	Connor, Donna	24 Candy Lane
	Sevigny, Tina	209 Main St
Elderly Housing	Hyde Park Elderly Housing	67 Hyde Park Drive
	Ipswich Drive Elderly Housing	108 Ipswich Drive
	Family & Elderly Housing	1 Ready Drive
	Elderly Housing	Glen Allen Street
Electric Substations	National Grid	Spring Street
	National Grid	Mill Glen Road
Emergency Dispensing Sites	Murdock Middle/High School	3 Memorial Drive
	Old Murdock Senior Center	52 Murdock Avenue
Emergency Shelters	Memorial School	32 Elmwood Road
	Murdock Middle/High School	3 Memorial Drive
	Toy Town Elementary School	175 Grove Street
	Winchendon Town Hall	109 Front Street
End Of Life Facilities	Fletcher-Hebert Funeral Home	70 Pleasant St
	Snow-Ladeau Funeral Home Inc	343 Central St
	Old Center Cemetery	
	Riverside Cemetery	
	Calvary Cemetery	
	New Boston Cemetery	
	Winchendon School Rink	172 Ash Street
	Riverside Cemetery Extension	
	Massachusetts Veterans Cemetery	
Emergency Operations Centers	Winchendon Police Station	15 Pleasant Street
	Winchendon Town Hall	109 Front Street
	Murdock Middle/High School	3 Memorial Drive
Fire	Winchendon Fire Station	405 Central Street
Hazmat Sites	Eastern Propane Gas, Inc.	600 School Street
	White's Mill Building	155 Mill Circle
	WP Clark Memorial	155 Central St.
	Winchendon Wastewater Treatment Facility	637 River Street
Hospitals	Murdock Health Ctr Middle Sch/	3 Memorial Drive 2nd Fl
	Winchendon Health Center	Hospital Drive
Long Term Care Facility	Broadview, Inc	547 Central Street

Other Critical Facilities	Toy Town Liquors	672 Spring Street
	Waterville Plaza	Main Street
	Fred's Buses	108 Hale Street
	Toy Town Pit Stop	110 Spring Street
	State Line Auction	
	Eastern Propane Gas, Inc.	600 School Street
	Ray's Plastics, Inc.	155 Mill Circle
	Harbour Restaurant (Gabby's)	463 Maple Street
	IGA, Central Market	49 Central Street
	Family Housing	Pearl Street
	Rite Aid Pharmacy	250 Central Street
	Winchendon Community Residence	105 Linden Street
	WP Clark Memorial	155 Central St.
	Smith Country Cheese	20 Otter River Road
	Other Government Buildings	Beals Memorial Library
Winchendon Highway Department		101 Glenallen Street
Winchendon Communication Tower #3		Bemis Road
Winchendon Town Government Communication Tower		Hospital Drive
Winchendon Communication Tower #2		26 Hale Street
Communication Tower #4		29 Happy Hollow
Communication Tower #1		40 Elmwood Road
Winchendon Water Storage Tank		
Winchendon Water Storage Tank		
Police	Winchendon Police Station	15 Pleasant Street
Pumping Stations	Spring Street Sewer Pumping Station (Sewer)	Spring Street
	Spring Place Pumping Station (Sewer)	Spring Place
Residential Program Facilities	Y.O.U. Inc.-Cottage Hill Academy - Cottage 2 (Cro*)	83 Hospital Rd
	Y.O.U. Inc.-Cottage Hill Academy - Cottage 3 (Ful*)	83 Hospital Rd
	Y.O.U. Inc.-Cottage Hill Academy - Cottage 1 (Wet*)	83 Hospital Rd
School	Memorial School	32 Elmwood Road
	Winchendon School	172 Ash Street
	Murdock Middle/High School	3 Memorial Drive
	Toy Town Elementary School	175 Grove Street
	Marvin School	89 Ash Street
Sports And Cultural Areas	W.P. Clark Memorial Ymca	155 Central Street
	Winchendon Historical Society	151 Front Street
Wastewater Treatment Plant	Winchendon Wastewater Treatment Facility	637 River Street

*As stated in 310 CMR 22.02, a Public Water System means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly

serves an average of at least 25 individuals daily at least 60 days of the year” (Mass GIS, 2014).



**Winchendon, MA:
FEMA Q3 Flood Zones &
Critical Infrastructure**



***Critical Infrastructure data were derived from various sources including MassGIS, MassDOT, MEMA, MA DCR, MA Dept of Early Education & Care, MA DPH, MART, MRPC and the Town of Ashburnham.

FEMA Q3 Flood Zones:
* Special Flood Hazard Area (SFHA) boundary information conveyed by Q3 Flood Data files was developed to overlay USGS 7.5-minute topographic maps at a scale of 1:24,000. Thus, Q3 Flood Data cannot be assumed to have an accuracy of better than 40 feet. Due to other limitations, the Federal Insurance Administration (FIA) recommends that determinations using GIS technology and Q3 Flood Data generally be made only when structures are located 250 or more feet outside an SFHA boundary.
** A 100 Year Flood is considered to have a 1.0% chance of being equalled or exceeded in a given year.

DATA SOURCES: MassGIS, MassDOT, the Town of Winchendon and the MRPC. **DISCLAIMER:** The information depicted on this map is for planning purposes only. All data are representational and are not adequate for boundary definition, regulatory interpretation, or parcel-based analysis.
PREPARED BY:
Montachusett Regional Planning Commission
625 Department Ave 2014
14270 Water Street
Fitchburg, MA 01520
Phone: 978-348-2114
E-mail: mrpc@mrpc.org

Legend

- Critical Infrastructure***
- - - Community Boundaries
- Roadways**
- US & State Routes
- Other Roads
- RailLines**
- Active RailLines
- Water**
- Streams & Rivers
- Intermittent Stream
- Lakes, Ponds & Reservoirs
- FEMA Q3 Flood Zones***
- 100 Year**



Flood Prone Areas

Particular areas within the community where the risk of flood areas are or could occur were determined at the first meeting of the Winchendon Local Hazard Mitigation Team held on August 14, 2012. This information can be found on Winchendon's Local Hazard Map which is located under the section entitled Risk Assessment.

Flooding Vulnerability Assessment

An analysis of the FIRM flood hazard area maps indicates that there is a total of 3670.45 acres of 100-year floodplain within Winchendon. This amounts to 3.34% of the total town. Based on additional analysis, 122.41 acres (3.34%) of the floodplain are developed. Currently there are 245 structures in the floodplain which is about 4.45% of the total structures in the community. The buildings are then multiplied by the building value, as determined by the MA Department of Revenue, to come up with a potential loss of \$66,484,490.

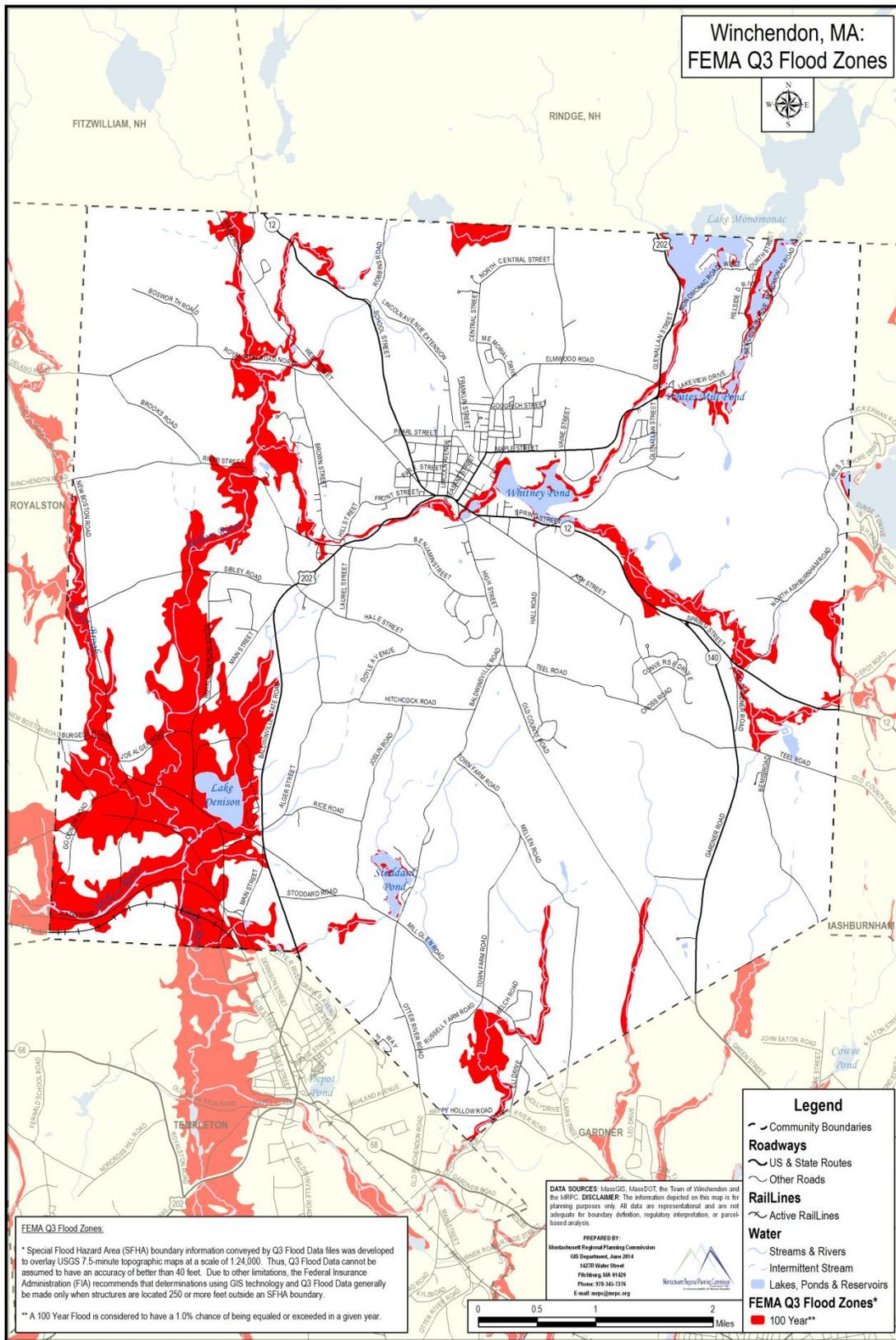
Excluding dams and bridges there are no critical facilities within the 100 year flood zone. Since the initiation of the National Flood Insurance Program (NFIP), two flood insurance claims in the Town of Winchendon have been made totaling \$419.80 in payments. According to the NFIP there are no repetitive loss properties in Winchendon. Statistics from the NFIP BureauNet indicate in the town of Winchendon there are nine flood insurance policies in force.

Floodplain Management and Compliance with NFIP

The Town supports floodplain management activities in an effort to meet compliance of the National Floodplain Insurance Program. These efforts include:

- Implementing the MA Wetlands Protection Act and the Town's Wetland Protection Bylaw regulating development and activity within the wetlands buffer zone and regulating stormwater and other point source discharge.
- Implementing the Town Flood Plain District Bylaw regulating development in the floodplain district.
- Maintain the Town's Low Impact Development Bylaw which establishes minimum requirements and procedures to control the adverse effects of increased post-development stormwater runoff and nonpoint source pollution associated with new development and redevelopment.
- Continued maintenance of municipal stormwater drainage system which includes regular cleaning of catch basins, storm drains and culverts.
- Continued maintenance of public water bodies to reduce flooding caused by erosion and water displacement.
- Enforcement of the Residential Development with Open Space Requirement Bylaw which mitigates possible flooding events by designating protected open space within a development which in turn treats stormwater runoff through the means of natural infiltration.

The map that follows entitled FEMA Q3 Flood Zones depicts the 100 year flood zones in the community.



Structurally Deficient Bridges Over Waterways

Winchendon has five bridges over water that are classified by MassDOT as “structurally deficient”. The bridges locations and associated water bodies are as follows: Front Street over Millers River; North Royalston Road over Tarbell Brook; River Street over Millers River; Harris Road over Tarbell Brook and Maple Street over North Branch Millers River.

The DCR Office of Dams Safety lists 12 dams in the Town of Winchendon as shown in Table 83. Lake Monomonac Dam, Whitney Pond Dam and Red Dam are classified as high hazard.

Classifications for potential hazards are in accordance with the chart below.

Hazard Potential Classification

High Hazard	Refers to dams located where failure will likely cause loss of life and serious damage to home(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
Significant Hazard	Refers to dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities
Low Hazard	Refers to dams located where failure may cause minimal property damage to others. Loss of life is not expected.

Source: MA Department of Conservation and Recreation Office of Dam Safety

High hazard dams must be inspected every two year, significant hazard every five years, and low Hazards dams every 10 years. Owners of dams are responsible for having their dam inspected. MGL Chapter 253 and 302 CMR 10.00 requires that dam owners prepare, maintain and update Emergency Action Plans for all High Hazard Potential dams and certain Significant Hazard Potential dams.

Non-jurisdictional dams are not regulated by the Office of Dam Safety or under their jurisdiction. Typically these dams are under 6 feet in height and/or under 15 acre-feet in storage and do not have an assigned 'Hazard Code'. Dams owned and regulated by the Federal Government are also typically non-jurisdictional but DO have an assigned Hazard Code.

Table 83: Dams

Name	Dam	Hazard Code	Owner
Winchendon	Lake Monomonac Dam	High Hazard	Public
Winchendon	Whitney Pond Dam	High Hazard	Public
Winchendon	Red Dam	High Hazard	Public
Winchendon	Beaman Pond Dam	Low Hazard	Public
Winchendon	Flis Pond Dam	N/A	Private

Winchendon	Merrill Pond Dam	N/A	Private
Winchendon	Norsky Dam	N/A	Private
Winchendon	Town Pumping Station Dam	N/A	Public
Winchendon	Brow's Pond Dam	N/A	Public
Winchendon	Hunts Pond Dam	Significant Hazard	Private
Winchendon	Stoddard Pond Dam	Significant Hazard	Private
Winchendon	Tannery Pond Dam	Significant Hazard	Private

*N/A – Information not available as the dam is non-jurisdictional.

Risk Assessment

As previously stated, located in Section 4. Identification of Natural Hazards, Identifying and Profiling Hazards”, there is a description of each identified hazards’ impact on the region and its communities as well as an overall summary of vulnerability. Based on the hazards identified in this plan and the assessment of risks by the Town of Winchendon, the town considers itself to be at a high risk for Heavy Rain, Snow Melt, Beavers, Nor’easters, Severe Thunderstorms, Heavy Snow, Ice Storms, Blizzard, Wildland Fire; moderate risk Dam Failure, Ice Jams, High Winds, Hurricanes, Tornados, Major Urban Fires, Drought, Extreme Temperatures; low risk for Earthquakes, and landslides; and tsunamis as not applicable.

This information is documented in Winchendon’s Natural Hazard Matrix below which was obtained from participants at the Winchendon’s Local Hazard Mitigation Team Meeting held on August 14, 2012.

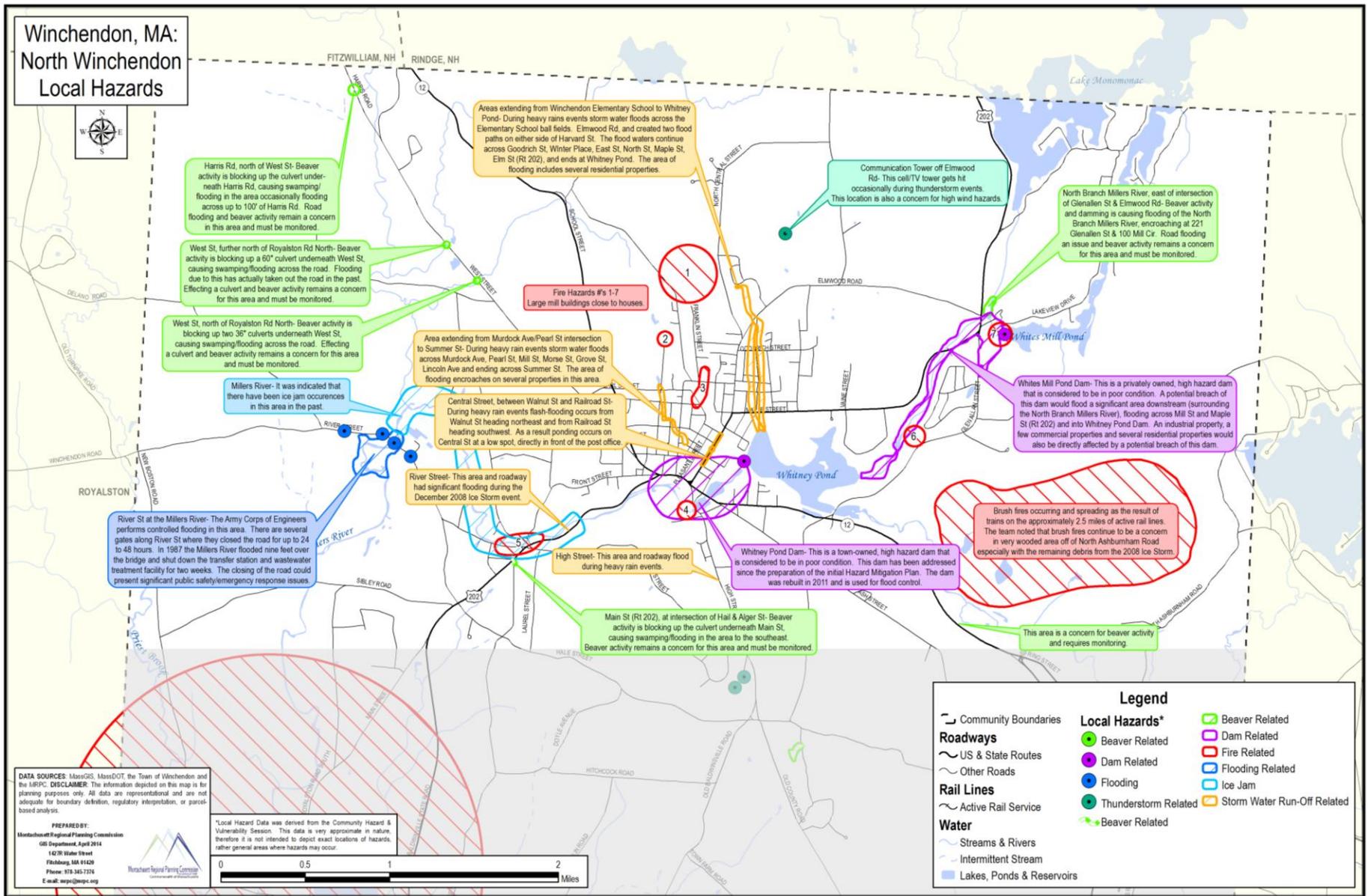
Winchendon Natural Hazard Matrix

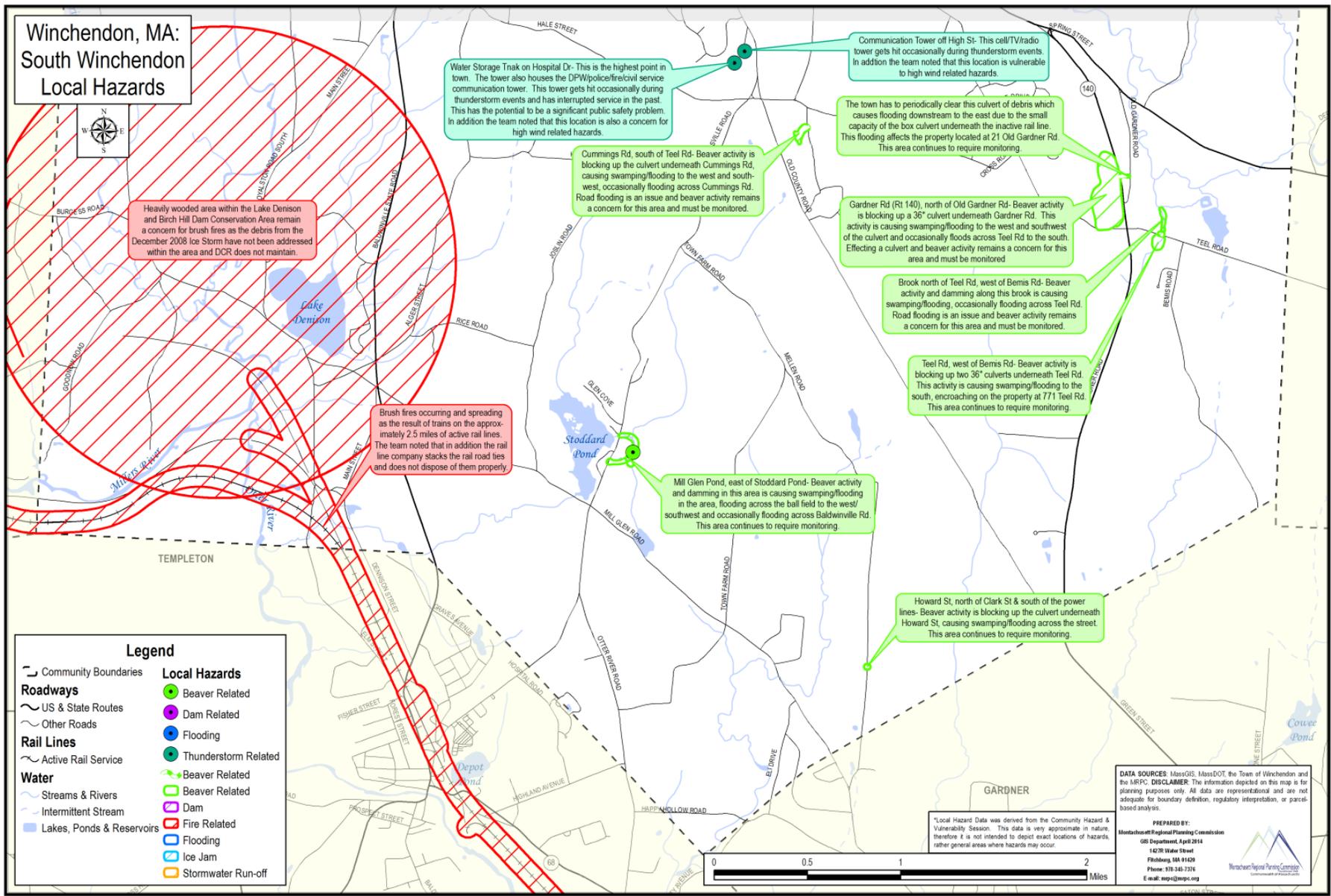
Natural Hazard	Likelihood of Occurrence	Location	Impacts	Hazard Index
Natural Hazard Separated by Flood, Atmospheric Related and Winter Related, Other Natural Hazards, and Geologic Hazards	3 = Highly Likely 2 = Possible 1 = Unlikely	3 = Regional/State 2 = Multi Community/Regional 1 = Local/Town	4 = Catastrophic 3 = Critical 2 = Limited 1 = Negligible	Ranking Determined by Combining the Likelihood, Location and Impacts of a Natural Hazard
Flood-Related Hazards				
• Heavy Rain	3	2	3	8
• Snow Melt	3	2	3	8
• Dam Failure	2	1	4	7
• Ice Jams	2	1	3	6
• Beavers	3	1	2	6
Atmospheric Related and Winter Related Hazards				
• High Winds	2	2	4	8
• Hurricanes	2	2	4	8
• Tornadoes	2	2	4	8
• Nor'easters	3	2	4	9
• Severe Thunderstorms	3	2	4	9
• Heavy Snow	3	2	4	9
• Ice Storms	3	2	4	9
• Blizzard	3	2	4	9
Other Natural Hazards				
• Major Urban Fires	2	2	3	7
• Wildland Fire	3	2	3	8
• Drought	2	2	3	7
• Extreme Temperatures	2	2	3	7
Geologic Hazards				
• Earthquakes	1	2	3	6
• Landslides	1	1	2	4
• Tsunami	NA	NA	NA	NA

Key

Highly likely: 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
 Possible : 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.
 Unlikely: Less than 10 percent probability of occurrence in the next year or a recurrence interval of greater than 11 years.
 Catastrophic: Immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions.
 Critical: Fast speed of onset or long duration of event resulting in devastating damage and loss of services for weeks or months.
 Limited: Moderate speed of onset or moderate duration of event, resulting in some damage.
 Negligible: Slow speed of onset or short duration of event resulting in little to no damage.

Also discussed at this meeting were the hazards that affect each community and the identification of specific problem areas in the community that need to be addressed. This included the identification of new hazards that were determined to pose a threat or community vulnerability which are detailed in Winchendon's Local Hazards Maps on the following page. The entire community is equally at risk to the following hazards: heavy rain, snow melt, ice jams, high winds, hurricanes, tornados, nor'easters, heavy snow, ice storms, blizzards, drought, extreme temperatures, earthquakes and landslides.





**Winchendon, MA:
South Winchendon
Local Hazards**

Heavily wooded area within the Lake Denison and Birch Hill Dam Conservation Area remain a concern for brush fires as the debris from the December 2008 Ice Storm have not been addressed within the area and DCR does not maintain.

Brush fires occurring and spreading as the result of trains on the approximately 2.5 miles of active rail lines. The team noted that in addition the rail line company stacks the rail road ties and does not dispose of them properly.

Water Storage Tank on Hospital Dr. This is the highest point in town. The tower also houses the DPW/police/fire/civil service communication tower. This tower gets hit occasionally during thunderstorm events and has interrupted service in the past. This has the potential to be a significant public safety problem. In addition the team noted that this location is also a concern for high wind related hazards.

Cummings Rd, south of Teel Rd- Beaver activity is blocking up the culvert underneath Cummings Rd, causing swamping/flooding to the west and southwest, occasionally flooding across Cummings Rd. Road flooding is an issue and beaver activity remains a concern for this area and must be monitored.

Communication Tower off High St- This cell/TV/radio tower gets hit occasionally during thunderstorm events. In addition the team noted that this location is vulnerable to high wind related hazards.

The town has to periodically clear this culvert of debris which causes flooding downstream to the east due to the small capacity of the box culvert underneath the inactive rail line. This flooding affects the property located at 21 Old Gardner Rd. This area continues to require monitoring.

Gardner Rd (Rt 140), north of Old Gardner Rd- Beaver activity is blocking up a 36" culvert underneath Gardner Rd. This activity is causing swamping/flooding to the west and southwest of the culvert and occasionally floods across Teel Rd to the south. Effecting a culvert and beaver activity remains a concern for this area and must be monitored.

Brook north of Teel Rd, west of Bemis Rd- Beaver activity and damming along this brook is causing swamping/flooding, occasionally flooding across Teel Rd. Road flooding is an issue and beaver activity remains a concern for this area and must be monitored.

Teel Rd, west of Bemis Rd- Beaver activity is blocking up two 36" culverts underneath Teel Rd. This activity is causing swamping/flooding to the south, encroaching on the property at 771 Teel Rd. This area continues to require monitoring.

Mill Glen Pond, east of Stoddard Pond- Beaver activity and damming in this area is causing swamping/flooding in the area, flooding across the ball field to the west/southwest and occasionally flooding across Baldwinville Rd. This area continues to require monitoring.

Howard St, north of Clark St & south of the power lines- Beaver activity is blocking up the culvert underneath Howard St, causing swamping/flooding across the street. This area continues to require monitoring.

Legend

Community Boundaries	Local Hazards
Roadways	Beaver Related
US & State Routes	Dam Related
Other Roads	Flooding
Rail Lines	Thunderstorm Related
Active Rail Service	Beaver Related
Water	Beaver Related
Streams & Rivers	Dam
Intermittent Stream	Fire Related
Lakes, Ponds & Reservoirs	Flooding
	Ice Jam
	Stormwater Run-off

*Local Hazard Data was derived from the Community Hazard & Vulnerability Session. This data is very approximate in nature, therefore it is not intended to depict exact locations of hazards, rather general areas where hazards may occur.

DATA SOURCES: MassGIS, MassDOT, the Town of Winchendon and the MRPC. **DISCLAIMER:** The information depicted on this map is for planning purposes only. All data are representational and are not adequate for boundary definition, regulatory interpretation, or parcel-based analysis.

PREPARED BY:
Montachusett Regional Planning Commission
687 Water Street
Pittsfield, MA 01201
Phone: 413-343-7374
E-mail: mrpc@mrpc.org

Montachusett Regional Planning Commission
COMMISSIONERS OF ASSOCIATED TOWNS

Existing Protections

The original inventory of hazard mitigation actions which the Montachusett communities undertook for the 2008 Montachusett Region Hazard Mitigation Plan was reviewed and updated by each community at a meeting held in each community with the MRPC and the community's Local Hazard Mitigation Planning Team and, in some communities, the Emergency Management Committee. The attendees of the meetings can be found in Appendix A. The following matrices depict the updated inventory of what is currently being done to mitigate hazards by listing the programs and activities already in place. It includes a description of the protection measure, who is responsible, and improvements and changes that may be needed. This inventory was used by the Planning Team/Emergency Management Committee to identify gaps in existing protections that were then addressed through the development of this plan update.

Winchendon

Type of Existing Protection	Description	Area Covered	Implementation Resources and Funding*	Improvements or Changes Needed
Flood Related Hazards				
Storm water management standards	State Regulation under the Wetlands Protection Act to regulate storm water and other point source discharge	Town-Wide	Enforced by the Winchendon Conservation Commission (Wetlands Protection Act) staffed by the municipal Conservation Agent and Planning Board (Subdivision Control Law and site plan review) staffed by the municipal Planning Agent.	Storm water management standards are and continue to be enforced. No improvements or changes needed.
Low Impact Development Bylaw	Town General Bylaw that requires low impact development techniques to mitigate storm water to help with water quality within the town.	Town-Wide	Enforced by the Winchendon Planning Board staffed by the municipal Planning Agent.	Bylaw remains in effect and is enforced. No improvements or changes needed.
Wetlands Protection Act (state)	State law regulating development and activity within wetland buffer zone	100-foot state buffer around wetland area; 200 foot buffer around river front areas.	Enforced by the Winchendon Conservation Commission (Wetlands Protection Act) staffed by the municipal Conservation Agent.	No improvements or changes needed.

Town Zoning Bylaw – Wetlands Conservancy Districts	Local law regulating development	Overlay District Identified in Town Zoning Map	Enforced by the Winchendon Conservation Commission staffed by the municipal Conservation Agent and Board of Appeals.	No improvements or changes needed.
100 Year Flood Zone	Federal and state laws requiring elevation above 100-year flood level of new and substantially improved residential structures in floodplain	100-year floodplain as shown on Flood Insurance Rate Map dated June 15, 1982.	Enforced by the municipal Building Inspector and Conservation Commission staffed by the municipal Conservation Agent.	Update Insurance Flood Rate Maps
Town Zoning Bylaw - Flood Plain Conservancy District	Local bylaw enhancing federal/state laws and regulating any development in the flood plain district	100-year floodplain as shown on Flood Insurance Rate Map dated June 15, 1982.	Enforced by the municipal Building Inspector and Conservation Commission staffed by the municipal Conservation Agent	Update Insurance Flood Rate Maps
Maintenance of municipal storm water drainage system	Regular cleaning of catch basins, storm drains, and culverts	Town-Wide	Undertaken by the Department of Public Works municipal staff.	Maintenance continues but additional personnel and equipment needed.
Maintenance of public water bodies (ponds, streams, brooks, wetlands)	Periodic cleaning of waterways undertaken, i.e., remove trash, debris	Town-Wide	Undertaken by the Department of Public Works municipal staff with guidance from Conservation Commission staffed by the municipal Conservation Agent.	Maintenance continues. No improvements or changes needed.
Inspection of major dams	Periodic inspections of the structural integrity of the dam	Major Dams including:	Directed by the Massachusetts Department of Conservation and Recreation, Office of Dam Safety	Update Dam failure studies for the dams rated as high hazard
Wind Related Hazards				
State Building Code	State Law related to design loads to include wind effects	Town-Wide	Enforced by Building Department municipal staff.	Continued enforcement remains in place. No improvements or changes needed.

Tree Maintenance	Regular inspection and tree maintenance to cut branches threatening power lines and overhead utilities	Town-Wide	National Grid staff (Electric Company).	Tree maintenance continues. No municipal improvements or changes needed.
Fire Related Hazards				
Limited Brush Clearing	Provide access to Emergency Service vehicles	Town-Wide	Undertaken by the Department of Public Works municipal staff.	Limited brush clearing continues. Identify additional Areas with Potential for Brushfires.
Winter Storms Related				
Residential Parking Bans	Parking Bans to Enable Snow Removal Effectively from Residential Streets	Town-Wide	Department of Public Works municipal staff and municipal Police Department	Residential parking bans remain in effect. Additional personnel and equipment needed for enforcement.
Clearing Snow from Major Arterial Routes	Ensure Access to Emergency Service vehicles.	Town-Wide	Department of Public Works municipal staff.	Additional personnel and equipment needed

*Winchendon enforcement/implementation is generally carried out by elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

Mitigation Goals, Objectives and Strategies

As discussed earlier in this Plan, MRPC previously prepared the 2008 Montachusett Region Hazard Mitigation Plan which consisted of individual annexes for each MRPC community. Similarly, as part of the multi-jurisdictional plan update, each community also developed their own individual goals, objectives and strategies which are listed in this section.

Overall Goal Statement: To reduce the loss of life, property, infrastructure and cultural resources throughout the town of Winchendon from natural disasters through a multiple hazard mitigation program that involves increased coordination, planning, education, and capital improvements.

1. **Objective:** To provide adequate shelter, water, food, and basic first aid to displaced residents in the event of a natural disaster, and to provide adequate notification and information regarding evacuation procedures, etc., to residents in the event of a natural disaster.
2. **Objective:** to increase coordination between inter-departments in pre-disaster planning, post-disaster recovery and continuous hazard mitigation implementation.
3. **Objective:** Increase awareness of hazard mitigation among town officials, private organizations, businesses, and the general public.
4. **Objective:** To ensure that critical infrastructure sites are protected from natural hazards, and to maintain existing mitigation infrastructure in good condition.
5. **Objective:** To educate the public about the threat of natural hazards and the possible mitigation measures that can be taken to protect public health and safety, as well as infrastructure and property;

and to educate the public as well about zoning and building regulations, particularly regulations that relate to new construction.

6. Objective: To encourage future development in areas that are not prone to natural disasters.

7. Objective: To identify existing shelters that are earthquake resistant as well as outside of floodplain and inundation areas. Disseminate this information to appropriate Town departments.

8. Objective: To inventory supplies at existing shelters and develop a needs list and storage requirements; and to establish arrangements with local or neighboring vendors for supplying shelters with food and first aid supplies in the event of a natural disaster.

9. Objective: To maintain and utilize the Code Red local notification system.

10. Objective: To collect, periodically update, and disseminate information on which local radio stations provide emergency information, what to include in a 'home survival kit,' how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to follow during a natural disaster.

Specific Natural Hazard Goals for Winchendon

Goal Statement for Flooding: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to flooding. And to pursue prevention activities which include planning, zoning, open space preservation, floodplain and wetland development regulations, storm water management, waterway dumping regulations, watershed protection measures, and best management practices, as well as, soil erosion, building ordinances, and subdivision regulations.

1. Objective: To implement standards in the Subdivision Rules and Regulations to require temporary and permanent erosion control measures for streams and surface water bodies.

2. Objective: To add more specific requirements to address flood related issues in the Special Permit and Site Plan Approval provisions in the Winchendon Zoning Bylaw including topographic change, removal of cover vegetation, risk of erosion or siltation and increased stormwater runoff.

3. Objective: To identify all structures throughout Town that need to be elevated above the base-flood elevation.

4. Objective: To Develop a priority list and seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town.

Goal Statement for Protection from Beavers: To minimize the threat to health, the damage to roads and property, and the disruption of governmental services and general business activities due to flooding caused by beavers.

1. Objective: To develop and implement a coordinated beaver protection plan.

Goal Statement for Hurricanes and Tornadoes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to high winds associated with hurricanes and tornadoes. (The objectives listed above, under flooding, address the flooding that can result from a hurricane.)

Goal Statement for Winter Related Hazards: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to severe snow and ice storms.

1. Objective: To develop a plan for providing access to water, information, shelter, and food stores to people in remote locations in Winchendon in the event of a severe winter storm.

Goal Statement for Dam Failure: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to dam failures.

1. **Objective:** To identify sources of funding for dam safety inspections.

Goal Statement for Earthquakes: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to earthquakes.

1. **Objective:** To evaluate all Shelters and Reception Centers to determine if they are earthquake resistant.
2. **Objective:** To insure that all identified shelters have sufficient back-up utility service in the event of primary power failure.

Goal Statement for Drought: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to drought.

1. **Objective:** Prepare a Water Conservation Plan for Winchendon.

Goal Statement for Wildfires/Brushfires: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to wildfires/brushfires.

1. **Objective:** Develop and distribute an educational pamphlet on fire safety and prevention.
2. **Objective:** Consider amending the Subdivision Rules and Regulations and Required Improvements section to include fire suppression provisions for new residential developments.

Goal Statement for Weather Extremes: To minimize the loss of life and the threats to public health and safety.

1. **Objective:** To develop and distribute educational information regarding the threats from extreme heat and cold.
2. **Objective:** To educate the residents as to the causes and effects of global warming; and how it affects the residents of Winchendon, and what they could be doing to help improve the situation.

Mitigation Action Plans and Prioritization of Actions (STAPLEE)

Initial Mitigation Action Plans for the Montachusett Communities were presented in the communities Hazard Mitigation Plans that were approved by FEMA in 2009 and 2010. The original Mitigation Action Plans were developed through an inventory of potential hazards which could impact the community and an evaluation of a range of alternatives to address these hazards. As part of the plan update process, the original Mitigation Action Plan was reviewed by the community's Local Hazard Mitigation Planning Team/Emergency Management Committee to delete actions which have already been completed, add additional actions which are either underway or planned to be undertaken, and to update the current status of all actions. The goals were reviewed and updated at the second meeting with each community.

An additional step in this process was to conduct a "STAPLEE" analysis for each action to prioritize all actions within each community and a subjective evaluation of each action's perceived cost/benefit. In the 2008 plan, actions were not prioritized so there were no changes in priorities in this update. The revised Community Mitigation Action Plans matrices that follow identify each mitigation action, the responsible department or board responsible for implementation, potential funding sources, the timetable of the action, results of the prioritization of actions through the STAPLEE analysis, and the

perceived cost/benefit for each mitigation action.

The goal of each identified strategy, or mitigation action, is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each action to establish priorities for implementation, using the “STAPLEE” method. The STAPLEE methodology was developed by the Federal Emergency Management Agency as a tool to help communities prioritize their hazard mitigation strategies and determine the most appropriate actions for implementation. The STAPLEE method analyzes the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental aspects of an action and is designed to be used by public officials and planners for making planning decisions.

To conduct the STAPLEE exercise, the community’s Hazard Mitigation Team was asked to rate each action in their Mitigation Action Plan on each of the following criteria, using a score of 1 to 3 (Good = 3, Average = 2, Poor = 1):

- **Social:** Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- **Technical:** Will the proposed strategy work? Will it create more problems than it solves?
- **Administrative:** Can the community implement the action? Is there someone to coordinate and lead the effort?
- **Political:** Is the action politically acceptable? Is there public support both to implement and to maintain the action?
- **Legal:** Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- **Economic:** What are the costs of this action? Does the cost seem reasonable for the size of the problem and the likely benefits?
- **Environmental:** How will the action impact the environment? Will the action need environmental regulatory approvals?

These scores were then totaled, resulting in a final score of 7 (least priority) to 21 (highest priority) for each action. The higher the final score, the higher the relative priority of that action for implementation. This information can then be utilized in each community as they conduct and administer relevant municipal functions and activities. The final STAPLEE score for each action is shown in the following mitigation action plan.

The Hazard Mitigation team was also asked to do a relative cost/benefit of each action. This assessment was intended to informally indicate if an action will either have more benefits accrued to the Town than the Cost of implementing the action, or if the costs would exceed any benefits. Responses include: “Benefits Exceed Costs”, “Benefits Equal Costs, or “Costs Exceed Benefits”.

WINCHENDON IMPLEMENTATION STRATEGY FOR PRIORITY MITIGATION ACTIONS

Type of Hazard	Description of Action	Implementation Responsibility	Resources/ Funding*	Timetable	Priority (STAPLEE Score)	Cost/ Benefit Evaluation	Status Update from 2008 Plan**
Flood Related Hazards and Geologic Hazards	Identify Existing Shelters with Red Cross generators that are Earthquake Resistant as well as Outside of Floodplain (and Dam Inundation) Areas to ensure that adequate shelters are available to the public during hazards to reduce or eliminate risk to human life.	Building Inspector, Emergency Management Director	Municipal Staff	2015 - 2020	19	Benefit exceeds cost	Carried forward. Task is in progress.

Wildland Fire	Increase awareness by educating property owners on actions that they can take to reduce risk to property by hosting an Open House at the Fire Department, Develop and Distribute an Educational Pamphlet on Fire Safety and Prevention (SAFE PROGRAM that includes information on wildfire prevention and provide outreach to elderly and schools.	Fire Department	Municipal Staff	2015 - 2020	21	Benefit exceeds cost	Completed but carried forward. Open House held every Fall. Developing and Distributing education pamphlets undertaken periodically. Grant was obtained this year.
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All Natural Hazards	Increase hazard education and risk awareness to public by Collecting, Updating, and Disseminating Emergency Information on on 211, Cable Access, and Webpage - to educate the public and alert them of emergency information including shelter locations and other instructions related to all natural hazards.	Emergency Management Director	Municipal Staff	2015 - 2020	18	Benefit exceeds cost	Completed but carried forward. This action is undertaken on a continuous basis.
All Natural Hazards	Maintain Supplies at Existing Shelters, Develop a Needs List, and identify + find additional Storage to mitigate the effects of all hazards on the general population. Supplies must be adequate to eliminate or reduce risk to human life.	Emergency Management Planning Committee, School Facilities Manager	Municipal Staff	2015 - 2020	19.5	Cost exceeds benefit	Completed but carried forward. This action is undertaken on a continuous basis.

Atmospheric and Winter Related Hazards	Develop a Mitigation Plan to provide access to Water, Information, Shelter and Food Stores to People in Remote Locations of the town and integrate this information into community comprehensive plans.	Emergency Management Director	Municipal Staff/Volunteers	2015 – 2020	20	Benefit exceeds cost	Completed but carried forward. Plan is updated as needed.
All Natural Hazards	Maintain and Update "Code Red" pre-disaster warning system that effectively, efficiently and in a timely fashion warns citizens and business owners of impending weather events to reduce or eliminate risk to property and human life.	Fire Department, Police Department, Emergency Management Director	Municipal Staff/Volunteers	2015 - 2020	20	Benefit exceeds cost	New Action.
Flood Related Hazards	Identify all structures throughout the town that need to be Elevated above the Base-Flood Elevation. Once identified educate those property owners regarding their options for mitigation.	Building Inspector, Fire Department	Municipal Staff. Also, 75% FEMA FUNDING AVAILABLE. remaining 25% (non-federal)	2015 - 2020	19	Benefit exceeds cost	Carried forward. Building footprint layer now available.

Flood Related Hazards	To Develop a priority list and possibly seek funding through the Hazard Mitigation Grant Program (HMGP) for the replacement of undersized culverts throughout Town to reduce or eliminate flooding risk.	Department of Public Works	Municipal Staff/ FEMA HMGP grant 75%	2017 (12 months)	19.5	Benefit exceeds cost	Development of list carried forward due to time constraints.
Flood Related Hazards	Educate property owners regarding options for mitigating their properties from flooding through outreach programs that address measures that residents can take (i.e installing backflow valves, securing debris, etc.)	Emergency Management Director, Fire Department	Municipal Staff	2015 - 2020	17	Benefit exceeds cost	New Action.
Flood Related Hazards	Continue participation in the National Flood Insurance Program to enable property owners to purchase insurance protection against flood losses.	Board of Selectmen, Conservation Commission	FEMA/MEMA	2015 - 2020	20	Benefit exceeds cost	Completed but carried forward. Town continues to participate in the NFIP.

Flood Related Hazards	Evaluate and relocate furnaces, water heaters, and electrical equipment in municipal owned buildings that are located in areas prone to flooding to reduce flood damage.	Emergency Management Director, Fire Department	Municipal Staff	2015 - 2020	18	Benefit exceeds cost	Carried forward due to time constraints and lacking of funding.
All Natural Hazards	Identify shelters and publicize through website the locations to ensure that shelters are available to the public during these types of hazards to reduce or eliminate risk to human life.	EMD	Emergency Management Director /Fire Department	2015 - 2020	18	Benefit exceeds cost	Completed. Carried forward. Shelters have been identified and continue to be identified.
All Natural Hazards	Utilize interactive mapping application prepared by MRPC/CMRPC to update critical infrastructure and simulate real time evacuation scenarios to mitigate hazards to the public.	Emergency Management Director	Emergency Management Director	2015 - 2020	17	Benefit exceeds cost	New action.

Flood Related Hazards	Install "beaver diverters" and water control devices to mitigate flooding caused by beaver dams.	Department of Public Works	Department of Public Works	2015 – 2020	17	Benefit exceeds cost	Carried forward. This action is undertaken on an as needed basis.
Flood Related Hazards	Hire trapper for removal of beavers to mitigate flooding caused by beaver dams.	Department of Public Works	Municipal Department of Public Works Staff	2015 – 2020	17.5	Benefit exceeds cost	Carried forward. This action is undertaken on an as needed basis
All Natural Hazards	Implement recommendations regarding natural hazard mitigation in existing planning documents including the implementation element of the master plan, five year action plan of the open space and recreation plan and the emergency evacuation plan	Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	Conservation Commission, Board of Selectmen, Planning Board, Emergency Management Director	2015 - 2020	18.5	Benefit exceeds cost	Completed but Carried forward. This is an ongoing effort. For example, Town adopted a Low Impact Development (LID) bylaw and LID design standard regulations. This was a recommendation of the town's master plan.

*Unless otherwise noted, Winchendon's Resources/Funding consists of elected/appointed boards and commissions and municipal staff whose positions are funded through local taxes.

**Actions identified as carried forward were not completed in the previous planning cycle unless otherwise stated.

Mitigation actions from the 2008 Montachusett Region Hazard Mitigation Plan that are complete follow:

- Work with Neighboring Communities to Establish a Community Emergency Response Team (CERT) and look for volunteers to assist with this program

7. Plan Adoption

Adoption by the local governing body demonstrates the community's commitment to implementing the mitigation strategy. The final plan is not approved until the community adopts the plan and FEMA receives documentation of formal adoption. Final adoption makes a community eligible for FEMA hazard mitigation assistance programs.

An example of the formal adoption certificate is below. Each of the 22 communities (Ashburnham, Ashby, Athol, Ayer, Clinton, Fitchburg, Gardner, Groton, Harvard, Hubbardston, Lancaster, Leominster, Lunenburg, Petersham, Phillipston, Royalston, Shirley, Sterling, Templeton, Townsend, Westminster and Winchendon) and Devens will use the Certificate of Adoption below. The Certificate of Adoption will be on each of the 22 communities and Devens letterhead with the appropriate blocks for signature.

Certificate of Adoption (to be added to plan after adopted by communities)

(Letterhead)

**CERTIFICATE OF ADOPTION
TOWN/CITY/DEVENS OF MASSACHUSETTS**

**A RESOLUTION ADOPTING THE MONTACHUSETT REGION
NATURAL
HAZARD MITIGATION PLAN 2015 Update**

WHEREAS, the Town/City of _____ recognizes the threat that natural hazards pose to people and property within the community; and

WHEREAS, the Town/City of _____ has prepared a multi-hazard mitigation plan, hereby known as the Montachusett Region Natural Hazard Mitigation Plan 2015 Update in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS the Montachusett Region Natural Hazard Mitigation Plan 2015 Update identifies goals and actions to reduce or eliminate long-term risk to people and property in the community from the impacts of future hazards and disasters; and

WHEREAS, public and committee meetings were held between _____ and _____ regarding the development and review of the Montachusett Region Natural Hazard Mitigation Plan 2015 Update; and

WHEREAS adoption by the community demonstrates our commitment to hazard mitigation and achieving goals outlined in the Montachusett Region Natural Hazard Mitigation Plan 2015 Update.

NOW THEREFORE, BE IT RESOLVED by the TOWN/CITY OF _____ adopts the Montachusett Region Natural Hazard Mitigation Plan 2015 Update at meeting of the Board of

Selectmen/Council held on _____
(date)

By: _____
(print name)
Board of Selectmen/Town
Mayor/City

(Signature)
Vice President of Operations, Devens

(Date)

Adoption by Communities

The formal adoption of the plan by each community follows:

Community	Date Adopted
Ashburnham	
Ashby	
Athol	
Ayer	
Clinton	
Devens	
Fitchburg	
Gardner	
Groton	
Harvard	
Hubbardston	
Lancaster	
Leominster	
Lunenburg	
Petersham	
Phillipston	
Royalston	
Shirley	
Sterling	
Templeton	
Townsend	
Westminster	
Winchendon	