Springfield's 2018 – 2023
Local Hazard Mitigation Plan
(Final DRAFT)

September 10, 2018

The Town of Springfield is seeking comment on its 2018 – 2023 Local Hazard Mitigation Plan (Final DRAFT). The purpose of this planning effort is to improve Springfield's resiliency to natural hazards. The plan is newly organized to allow the reader quick and easy browsing if desired. We hope you'll take a look.

You are invited to attend the Springfield Selectboard Meeting of Monday, September 10, 2018 at 7:00 PM for a brief review of the DRAFT Plan. The meeting will be at the Springfield Town Hall on the Third Floor located at 96 Main Street, Springfield, VT 05156.

Please forward any questions or comments to Cindy Ingersoll, Community Development Specialist, at cingersoll@swcrpc.or or (802) 674-9201 by 09/10/2018.
We welcome all input.

Springfield Hazard Mitigation Committee
August 28, 2018

Town of Springfield, Vermont: Local Hazard Mitigation Plan

Adopted _____

Prepared by the Town of Springfield
and
Southern Windsor County
Regional Planning Commission

2018-2023

Draft of _8-26-2018_

CERTIFICATE OF ADOPTION

Town of Springfield, VT
Selectboard

A Resolution Adopting the
Town of Springfield 2018-2023 Local Hazard Mitigation Plan

WHEREAS, the Town of Springfield has worked with the Southern Windsor County Regional Planning Commission to prepare an updated hazard mitigation plan for the town, to identify natural hazards, analyze past and potential future damages due to natural and man-made caused disasters, and identify strategies for mitigating future damages; and

WHEREAS, duly-noticed public meetings were held by the Springfield Selectboard on _____, to present and receive public comment on the draft Plan; and

WHEREAS, the updated 2018-2023 Springfield Local Hazard Mitigation Plan was submitted to the Division of Emergency Management and Homeland Security and the Federal Emergency Management Agency for review on _____; and

WHEREAS, the updated 2018-2023 Springfield Local Hazard Mitigation Plan demonstrates the community's commitment to implementing the mitigation strategy and authorizes responsible agencies to execute their actions; and

NOW, THEREFORE BE IT RESOLVED that the Town of Springfield Selectboard hereby adopts the Local Hazard Mitigation Plan for municipal use and implementation.

Duly adopted this ____ day of _____, 20__.

Springfield Selectboard:

_____
Chair, Springfield Selectboard

_____
Member

_____
Member

_____
Member

_____
Member

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1. INTRODUCTION

The goal of this stand-alone Hazard Mitigation Plan is to help the community identify risks and provide local mitigation strategies that can be taken to make Springfield more disaster resilient.

What is Hazard Mitigation?

Hazard mitigation is an action taken to reduce or eliminate the long-term risk to human life and property from both natural and man-made hazards. The work done to minimize the impact of hazard events is called Hazard Mitigation Planning. This plan will focus on assessment of natural hazards and mitigating actions to improve the Town's resiliency to those hazards.

This Plan is organized and presented to provide the reader with the option to browse through the sections using the large font 'call-out' narratives and delve into the detail, data and tables of interest.

The sections below provide discussion around the following topics:

Section 2: Why Should the Town Have a Hazard Mitigation Plan and What are the Benefits?
Section 3: What Are the Characteristics of Springfield that Determine its Susceptibility to Hazards?
Section 4: How is the Plan Prepared and How is the Public Involved?
Section 5: What Hazards Occur in Springfield and How Have They Affected Our Community?
Section 6: What Can be Done to Minimize the Impact on the Community in the Future?

2. PURPOSE

The Federal Emergency Management Agency (FEMA), the Vermont Division of Emergency Management and Homeland Security (DEMHS), and local towns have come to recognize that it is less costly to take action to minimize the impact of natural hazards than to repeatedly repair damage after a disaster has struck. Hazards cannot be eliminated, but it is possible to determine what the hazards are and which are more likely to occur and tend to have the greatest impact on a community. With some research and outreach, a local community can also determine the extent and impact of these hazards and which assets and areas are most at risk. A culmination of these efforts would be to identify what local strategies and actions can be taken to reduce the severity of the hazard and reduce their impacts on the community.

It is less expensive to prevent disasters than to repeatedly repair damage after a disaster has struck.

This plan recognizes that communities have opportunities to identify mitigation strategies and measures during all of the other phases of emergency management; preparedness, response, and recovery.

Hazard mitigation planning and strategies include the following benefits:

- structural or land improvements
- increased public education and awareness of hazards
- altering the hazard area to remove the hazard occurrence
- reducing the hazard frequency through structure or land treatment
- increased community support for specific actions to reduce future losses
- reduction in financial and physical losses caused by hazard events
- eligibility for hazard mitigation grants and aid
- strengthened partnerships
- Flood-proofing structures
- Securing propane/fuel tanks in flood-prone areas
- Elevating furnaces and water heaters in flood-prone areas
- Identifying and modifying high traffic incident locations and routes
- Ensuring adequate water supply
- Elevating structures or utilities above flood levels
- Identifying and upgrading undersized culverts
- Proactive land use planning for floodplains and other flood-prone areas
- Proper road maintenance and construction
- Ensuring critical facilities are safely located
- Establish and enforce appropriate building codes
- Providing public information

The Town of Springfield Local Hazard Mitigation Plan is a stand-alone plan to assist the town in identifying hazards within the town and identify strategies to reduce or eliminate these hazard risks. Previously, the Town of Springfield Local Hazard Mitigation Plan was an annex to the Southern Windsor County Regional Planning Commission Multi-Jurisdictional Local Hazard Mitigation Plan. The updated plan is intended to serve as a 'stand-alone' plan for the Town of Springfield and will focus on the hazards and mitigation programs best suited for the town.

3. TOWN PROFILE

Springfield is located within Windsor County in southeastern Vermont and is bordered by the Towns of Weathersfield, Chester, Rockingham and Charlestown, NH, with its eastern boundary along the Connecticut River. It is one of the larger communities with the highest concentration of commercial and industrial activity within the county with local access to Interstate I-91 and State highways including US Route 5, VT Routes 10, 11 and 106, which connect with large population areas outside the Town.

Much of the town lies within the Black River watershed, a sub-watershed of the Connecticut River. Future plans envision both the Black and Connecticut Rivers as potential scenic and recreational resources with improvements in visibility, access and use.

According to the Town Plan, Springfield is considered "a commercial, educational, industrial, and healthcare hub for the surrounding area. It historically has developed commercially in a tight elongated cluster alongside the Black River from its juncture with the Connecticut River to the State Rt. 10 intersection. This cluster is surrounded by hills upon which the dense residential neighborhoods are located with small pockets of retail establishments serving them. This dense residential development is

surrounded by rural areas." [1] **Map #1 – Current Land Use in Appendix A** shows the majority of Springfield's landscape to be forested or maintained as open fields with clusters of urban development in the downtown area and in Northern Springfield along major thoroughfares. Elevations in town range from a low point along the Connecticut River to a high point of 1,490 feet at the summit of Mount Ephraim.

As is typical for Vermont towns, higher density of development can be found in river valleys such as the Black River valley with residential clusters on higher ground around the town center.

Downtown Springfield is listed on the National Register of Historical Places and is home to historic mill buildings and a mix of urban land uses. This mixed land use is also present in North Springfield, although at a smaller-scale than in downtown Springfield. Many of Springfield's historic sites and structures are found in the valley along the Black River, a major tributary to the Connecticut River, as small industries settled to take advantage of the readily available hydro-electric power generated for the numerous falls on the Black River. The Town is also home to Springfield Medical Care Systems/Springfield Hospital and the Hartness State Airport which is located in North Springfield and serves general aviation as well as military and civil air patrol uses. Another important community asset includes the Springfield Recycling Center situated on the banks of the Black River, which manages recycled and solid waste for the district.

The North Springfield Reservoir is approximately 90 acres in size and is impounded by the North Springfield Flood Control Dam.

The flood control dam and impoundment waters are managed by the US Army Corp of Engineers, and provide significant access to the general public for recreation. Springfield's public water supply comes from an aquifer serving the Town's shallow well field in North Springfield.

The 2010 U.S. Census Bureau indicated a population of 9,373 in Springfield, a 3.52% increase from the 2000 U.S. Census. This is considerably higher than the -1.3% percent growth rate for Windsor County and higher than the estimated 2.8% growth rate for the state during the same period. Springfield's population has remained steady but is aging which has strained the towns capacity to service the needs of an older population.

Residents 65 years of age and older made up 17.7% of the total population in 2010 and has increased to 21.2% in 2016 based on the 2012-2016 American Community Survey 5-yesr Estimate. [2]

A decline in the precision machine tool industry has resulted in a significant loss of jobs in the last few decades as well as a large inventory of brownfields sites. The Town Plan details the Town's commitment to the clean-up and re-development of these sites as part of its economic and downtown development plans. Although there has been some new commercial development in recent years, there is still vacant commercial space in downtown and in the plaza shopping center. Two vacant buildings along the Black River on Main St. were removed to plan for open space and other downtown brownfield sites are in the process of being assessed and cleaned-up. Non-commercial permits issued over the past plan period are shown in the table below. Commercial permits for new structures could not be determined from the total

[1] 2017 Springfield Town Plan
[2] 2012-2016 American Community Survey 5-year Estimate, American fact Finder, US Census Bureau

commercial permits and are not included here. Development over the previous plan period did not increase the Town's vulnerability to hazard risk.

Permit Type[3]	2013-2014	2014-2015	2015-2016	2016	2017
Non-Commercial Permits*					
New Single Family Residence	5	5	4	4	5
Single Family Additions	6	8	7	7	3
Accessory Structures	28	32	8	8	6
Garages	N/A**	11	22	22	3
Agricultural Structures	10	4	2	2	1
Total for All Permits	85 (2013)	79 (2014)	89 (2015)	89	70

*Includes permits that are related to increased or additional structure footprint
**Reported by calendar year in latest FY2017 Town Report. Prior data is for Fiscal Years.

Springfield's Town Plan encourages future growth in concentrated patterns, preserving the prevailing forested landscape and open fields outside those built-up areas. Areas for future growth are:

- Downtown Springfield – Retail, residential and parking
- Village of North Springfield – Higher density residential and commercial
- River Street – Commercial growth area, with appropriate access management
- Former industrial areas on Clinton Street (VT 11) – Redevelopment to allow a mix of uses, including concentrated residential, commercial and light or clean industrial development
- North Springfield Industrial Park – Continued industrial uses, access by small residential streets
- "Springfield East" Industrial Park – Next to the Southeast Vermont Correctional Facility near I-91.

In addition, the Town Plan calls for protection of the Connecticut and Black Rivers and their tributaries, with development restrictions and mitigation required for stormwater runoff.

The Town Plan also seeks to protect other special use and hazard areas from future development, including floodplains, wetlands, steep slopes, wildlife habitat areas, and other natural areas.

The climate in Springfield, as in Vermont, is generally temperate with moderately cool summers and cold winters. However, as is true throughout the state, the town is experiencing more extreme climate conditions. The weather is unpredictable, and large variations in temperature, precipitation, and other conditions may occur both within and between seasons.

4. PLANNING PROCESS

The local planning process used to develop this hazard mitigation plan follows guidance by the Federal Emergency Management Agency (FEMA) and the Vermont Division of Emergency Management and

[3] FY 2014 to FY2017 Springfield Town Reports

Homeland Security (DEMHS). Beginning in the fall of 2017, Southern Windsor County Regional Planning Commission (SWCRPC) staff reviewed the previously adopted 2014 Multi-Jurisdictional All Hazard Mitigation Plan for Springfield to identify key areas for update. At that time the hazard mitigation plan was an annex to the 2012 Southern Windsor County Regional Planning Commission Multi-Jurisdictional All Hazard Mitigation Plan. The State of Vermont also recently adopted an updated Hazard Mitigation Plan in 2018 which was also consulted during this update.

In late fall of 2017, staff member and Community Development Specialist, Cindy Ingersoll, from the Southern Windsor County Regional Planning Commission, reached out to the Springfield Selectboard for volunteers to spearhead the planning effort.

A Hazard Mitigation Committee was formed and tasked with updating the plan and overseeing the public process.

Participating Members included:

- Russel Thompson, Fire Chief, Emergency Management
- William Kearns, Zoning Administrator (December 2017 to May 2018)
- Tom Yennerell, Town Manager
- Cindy Ingersoll, SWCRPC Staff

The Hazard Mitigation Committee members participated throughout the planning process either by scheduled group meetings or via committee email correspondence and conference calls as outlined and detailed in **Section 4.1 and 4.2**. SWCRPC also reached out to the following town officials during this process for periodic review and request for input.

- John Johnson, Road Foreman
- Jeff Strong, Public Works Director
- Renee Vondle, Zoning Administrator (May 2017 to present)

4.1 Plan Update Process Summary

The Town of Springfield in partnership with the Southern Windsor County Regional Planning Commission established a process for completion of the Springfield Local Hazard Mitigation Plan update. This plan is an extensive update to the previous annex plan and includes the following partial list of revisions:

- General updates to Town profile
- Formalized Process Flow Chart
- Reorganization/restructuring of the plan contents
- Revaluation of hazards and new methodology for assessment
- Update of data, statistics and maps
- Status and update of mitigation strategies and other resources
- Review and integration of new relevant reports and documents including the Black River Corridor Management Plan and the 2016 Road Erosion Report
- Inclusion of an Asset Vulnerability Chart

- Identification of new mitigation strategies
- Formalized Plan Monitoring Process

*The update process activities and timeline are depicted in the **2018-2023 Springfield Hazard Mitigation Plan Process Flow Chart** in **Appendix C.***

The meeting dates, invitees and tasks performed are identified in the flow chart. Detail on the public process can be found below in Section 4.2.

Beginning in December 2017, and throughout the process, SWCRPC staff made substantial re-writes to reflect input from meeting discussions with new emphasis on some hazards, and new data and hazard profile information from local, regional and state sources and new reports.

*Each hazard as prioritized by the Committee is profiled in **Section 5.2** and includes subsections for discussion on Extent and Historical Trend and Vulnerable Community Assets.*

A number of plans, studies, reports, technical information and web data sources were consulted during the preparation of this plan:

- Southern Windsor County Regional Planning Commission Multi-Jurisdictional All-Hazard Mitigation Plan with Springfield, VT Annex. Adopted October 15, 2012.
- State of Vermont 2018 Hazard Mitigation Plan.
- Hazard Mitigation Plans of other regional or neighboring towns.
- Springfield Zoning By-Laws and Flood Hazard Regulations. Adopted November 10, 2014.
- New Draft Springfield Flood Hazard Regulations. Draft as of April, 2017.
- Draft Springfield River Corridor Regulations. Draft as of March, 2017.
- Previous 2014 Town Plan. Adopted June 16, 2014.
- 2017 Springfield Town Plan. Adopted August 14, 2017.
- Springfield Local Emergency Operations Plan (LEOP). Updated in 2017.
- 2016 Springfield Road Erosion Inventory and Report.
- Black River Corridor Plan, June 2011.
- Vermont Agency of Natural Resources, VT Flood Ready Maps.
- The Federal Emergency Management Agency, National Oceanic and Atmospheric Administration, Vermont Annual Fire Marshall Reports and other sources were consulted for hazard related data.

4.2 Public Process

The public process began in December 2017 with a preliminary meeting of the Hazard Mitigation Committee during which SWCRPC staff gave an overview of the process with a discussion on the purpose of hazard mitigation planning, the planning process and timeline for completing the update, and the importance of community outreach and public involvement. Procedures were also discussed for warning and inviting the public to planning meetings, informing local Boards and Commissions, and making draft plans available for questions and comments. The local community of Springfield was invited to the

scheduled planning meetings identified in the flow chart and were noticed as per the designated meeting notice posting locations per the Town Charter: on the Town website, at the Town Office, at the Springfield Town Library, and the North Springfield Post Office.

Highlights of the Public Process:

- The Hazard Mitigation Committee held three publicly noticed meetings during the drafting of the plan.
- The draft plan was circulated to members of the Planning Commission and Board of Selectmen for review and comment.
- The draft plan was distributed to neighboring town for review and comment.
- SWCRPC staff presented a review of the plan at a publicly noticed Selectboard meeting to which the Planning Commission and neighboring towns were invited to attend and comment.
- A new hazard analysis produced higher impact scores for Flood/Erosion, Extreme Cold and Landslide/Slope Failure reflecting the progression of extreme climate conditions.
- A new addition to the update includes a formalized plan monitoring process to help maintain focus on plan goals and improve progress and reporting on proposed mitigating strategies and actions in Table 7.
- Throughout the process and with the discussion of each hazard, members were encouraged to determine the vulnerability of community assets and potential mitigating actions or strategies to reduce the hazard risk to those assets.

Culmination of public meetings and discussions resulted in the following output:

- An assessment of past plan projects and actions. See **Table 1: Status on Past Plan Mitigation and Preparedness Projects and Actions (Sec 4.3)**
- An evaluation of current town resources and programs and identified opportunities for improving effectiveness. See **Table 2: Existing Springfield Resources for Mitigating Hazards.**
- A review of hazard mitigation policies and recommendations from the Town Plan. See **Appendix D: Town Plan Review of Mitigation Polices and Recommendations.**
- Newly identified hazards, as well as a new methodology for assessing and scoring each hazard. See **Table 3: Hazard Identification and Analysis (Sec. 5.1)**.
- Identification of vulnerable community assets to each profiled hazard. **See 'Vulnerable Community Asset subsection under each hazard profile in Sections 5.2a to 5.2h.**
- Identification of new goals and strategies and actions to achieve those goals and reduce hazard risk to vulnerable assets over the plan period. See **Section 6.0, 6.1 and 6.2, and Table 7: 2018-2023 Springfield Mitigation/Preparedness Strategies and Actions (Sec. 6.2).**
- A process to improve plan monitoring and future plan updates. **See Section 6.3 and Appendix G: Hazard Mitigation Plan Monitoring Forms.**

Throughout this process no one from the public attended the noticed meetings during the drafting of the plan. A final draft was then put out for public review and comment on August 27, 2018 prior to the presentation to the Selectboard. This review process included:

- An electronic copy posted on the Town website requesting comments from the local community.

- An electronic copy posted on the SWCRPC website requesting comments from regional partners.
- A hard copy available at the Springfield Town Hall Office.
- Distribution to adjacent towns (Weathersfield, Chester, Baltimore, Rockingham and Grafton) was made via email by SWCRPC to respective Town Clerks with a request to post on their websites and provide a copy to their Planning Commission and Selectboard members, and to include the following: *"The Town of Springfield is seeking comment on its 2018-2023 Local Hazard Mitigation Plan final draft. The purpose of this planning effort is to improve Springfield's resiliency to natural hazards through hazard assessment, recognition of vulnerable assets, and identification and implementation of mitigating strategies to reduce the impact of these hazards on the community. The neighboring town communities are also invited to attend the Springfield Selectboard meeting of September 10, 2018 at 7:00 PM for a review of the draft plan. The meeting will be at Selectman's Hall, 3rd. Floor, Springfield Town Hall, 96 Main St., Springfield, VT. Please feel free to forward any questions or comments to Cindy Ingersoll, Community Development Specialist, at cingersoll@swcrpc.org or (802) 674-9201 by 9/10/2018. We welcome all input."*
- SWCRPC met with the Springfield Selectboard and reviewed the draft plan at the publicly noticed meeting on September 10, 2018. All Springfield Planning Commission members were extended individual email invitations. Any Comments received after circulation via email or at SB meeting?

Subsequently, the plan will complete the Vermont State Hazard Mitigation Officer review for referral to FEMA for Approval Pending Adoption (APA). Following APA, the town may then adopt the Springfield Local Hazard Mitigation Plan and forward a copy of the adoption resolution for FEMA to complete the plan approval and adoption process. Following VT State and FEMA review, the final adopted Springfield Local Hazard Mitigation Plan will also be posted on the SWCRPC website and available at the Springfield Town Offices and on their website.

4.3 Review of Previous Hazard Mitigation Plan

Table 1 below lists the mitigation and preparedness projects and actions from the previous *2014 Multi-Jurisdictional Local Hazard Mitigation Plan for Springfield*. Mitigation actions, listed in order of priority set at that time, are shown here with an additional column to indicate the status of each as determined by the Hazard Mitigation Committee. Most of these actions have been completed. Other actions have been revaluated and/or incorporated into this plan update and included in **Table 7: 2018-2023 Mitigation/ Preparedness Strategies and Actions** at the end of this document.

TABLE 1: Status on Past Plan Mitigation and Preparedness Projects and Actions

MITIGATION ACTION	TYPE*	HAZARD ADDRESSED	STATUS
Annual culvert upgrade & maintenance program	M	Transportation Disruption, Flooding	Ongoing program is maintained per State Standards. Prioritization can be enhanced using Road Erosion Inventories and supported with

			new funding sources to comply with new 2018 Municipal Roads General Permit Standards.
Storage structure for HazMat Trailer	P	Hazardous Materials, Water Contamination	Completed
Installation of Radio Tower	M, P	Severe Winter Weather, High Wind, Flooding, Fire	An engineered system was built in lieu of this, comprised of emergency back-up power and equipment on Ararat Mt. Status – Completed.
Town bridge and culvert inventory	M	Transportation Disruption, Flooding	Moved to Existing Resources
Installation of a water cistern on Old Connecticut River Road	M	Fire	Cost to implement and maintain is cost prohibitive. Better cost-effective alternative is planned mobile sourcing.
Develop and adopt an Incident Action Plan for the Weathersfield Reservoir/Dam	M	Flooding	Dam does not pose a problem per USACE as floodwaters flow to North Springfield Lake.
Coordinate with appropriate electric power providers to trim hazard trees along power lines	M	High Winds, Severe Winter Weather	Green Mountain Power has taken the lead and coordinates with the Town, to the Town's satisfaction
Encourage the installation of smoke detectors in residential structures	P	Fire	A program to install smoke detectors at no cost to resident is on-going and publicized through Meals-On-Wheels.
Encourage back-up power for at-risk residents	M	High Winds, Severe Winter Weather	Dropped. Determined to be unrealistic.
Review 2011 LEPC 3 Commodity Flow Study to assess hazardous materials being transported through town	P	Hazardous Materials	On-going Tier 2 Assessment Program.
Implement a town education program on mitigating flood risks	M	Flooding	Have begun first step – working with State to amend river corridor map. Carry-over to this plan update.
Modify flood hazard regulations to incorporate fluvial erosion hazard zones	M	Flooding	In process. Carry-over to this plan update.
Conduct engineering study to assess vulnerability of critical facilities to earthquake	M	Earthquake	Dropped. Low probability of occurrence.

Develop inundation mapping for the North Springfield dam	M	Flooding	Not needed. USACE had an existing inundation map. Data can be used in conjunction with new Vermont Alert System to warn or inform residents on high-water events.
Identify additional potable water supply for town use	M, P	Water Supply, Hazardous Materials	Upon initial evaluation, there does not appear to be any available alternative potable water resources.
Encourage the creation of natural buffer zones around existing structures	M	Wildfire	Determined not to be necessary. Few properties are at risk.
Continually update the Springfield Basic EOP	M, P	All Hazards	Moved to Existing Resources
Continue to build at-risk population registry	M	Severe Winter Weather, Power Failure	Had been established. Needs to be updated to be useful and effective. Carry-over to this plan update.
Institute public education system of shelter locations and evacuation routes	M	All Hazards	In process through Vermont Alert. Carry-over to this plan update.
Establish ongoing public education on safety during floods including driving hazards	M	Flooding	In process through Vermont Alert. Carry-over to this plan update.

* M- Mitigation, P- Preparedness

4.4 Review of Town Plan

The 2017 Springfield Town Plan has made strides, compared to earlier plans, in supporting sustainable development, natural resource conservation, flood resiliency and hazard mitigation efforts, either directly or indirectly. However, better integration and coordination of hazard mitigation planning goals, objectives and strategies in the town planning process is needed. To help achieve this, integration of hazard mitigation in town planning has been identified as a high priority action item in **Table 7: 2018-2023 Mitigation/Preparedness Strategies and Actions.**

The related policies and recommendations are outlined in **Appendix D**. Some have been selected as action items for this plan update and can be found in **Table 7: 2018-2023 Mitigation/Preparedness Strategies and Actions.**

4.5 Review of Existing Town Resources

Currently, the town participates in the NFIP program and will continue to regulate floodplain use through the Town of Springfield's Zoning By-Laws and Flood Hazard Regulations, Adopted November 10, 2014. The town has adopted the FEMA floodplain maps, last amended by FEMA in 2007.

Continued enforcement of these regulations by the Springfield Administrative Officer will maintain the town's compliance with the NFIP. The Administrative Officer is charged with implementing these

regulations and, together with the Development Review Board, advises residents on floodplain development. Future developments will be strongly encouraged not to develop in floodplain areas and to build to FEMA standards to maintain the town residents' ability to purchase flood insurance. Roads and bridges should be maintained, constructed or rebuilt based on the relevant identified Hazard Mitigation Plan actions to mitigate future flooding events and ice jams to protect public investment and infrastructure. As of the writing of this plan, no structures within Springfield have been identified as repetitive loss properties due to flood.

The following town authorities, policies, programs, and resources which help to reduce the effects of hazards to the community were evaluated for opportunities for improving effectiveness.

These resources help to reduce the effects of hazards to existing buildings and new development, town infrastructure, and critical facilities by encouraging or regulating development location, building design, environmental conservation and best management practices to reduce flooding and erosion. The Committee analyzed these programs for their effectiveness and noted any potential for improvement and the capacity to implement these improvements.

TABLE 2: Existing Springfield Resources for Mitigating Hazards

Resource	Description	Effectiveness in implementing HM Goals	Opportunities for Improving Effectiveness
2017 Town Plan	Plan for coordinated town-wide planning for land use, municipal facilities, etc.	Effective in addressing development in hazard areas including floodplains; last updated was 8/17/2017	Plan is updated on a five-year cycle or as plan elements are required. It can be strengthened to be more effective by incorporating HMP strategies.
Town Plan Addendum on Flood Resilience	Added 2/2015. Identifies flood and fluvial erosion hazard areas and vulnerable structures. Recommends policies and strategies to mitigate risks.	Effective in providing guidance to restrict new development in identified flood hazard, fluvial erosion, and river corridor areas, and encourage floodplain protection and restoration and flood emergency preparedness.	Can be more effective if incorporated into hazard mitigation planning and zoning and flood hazard by-laws
Town of Springfield Basic Emergency Operations Plan	Municipal procedures for emergency response	Effectively outlines the procedures for call-outs, evacuation, etc.; last updated in 2017	Plan is updated every year following town meeting. The update requirements have recently been revised to allow towns more flexibility in responding to emergencies.

School Emergency Response Plan	School procedures for emergency response	Effective in providing checklists for schools and response agencies for use in emergency situations	Now coordinated with the Basic EOP. Addition of crisis teams and improved training has increased effectiveness.
Mutual Aid – Emergency Services	Agreement for regional coordinated emergency services	Effective through continued implementation	None Identified
Mutual Aid – Public Works	Agreement for regional coordinated emergency highway maintenance services	Effective through continued implementation	None Identified
State Road Standards	Design and construction standards for roads and drainage systems	Effective through continued use and implementation. Currently being updated for 2018	Greater consideration of hydrological nature of road segments with new MRGP standards will improve effectiveness
Subdivision Regulations	Regulates the division of land and standards for site access and utilities. Last Update 4/2009	Effective through their continued implementation. Regulates drainage and stormwater management and erosion control for new developments	Continued updates and enforcement are important for continued effectiveness
Zoning By-Laws & Flood Hazard Area Regulations	Regulates development in flood zones and FEMA flood hazard areas including surface water setbacks and buffer management. Last complete update Adopted 11/10/2014, currently under revision.	Effective in standardizing the permitting and review process for development within a flood hazard area.	Flood Hazard Area Regulations could be revised to be easier to understand and enforce
Development Review Board - Site Plan Review Process	Ensures compliance with site development standards	Effective in limiting development in hazard areas to minimize risk of flooding to community	Continued use of this tool will help prevent additional hazards
National Flood Insurance Program (NFIP)	Provides ability for residents to acquire flood insurance	Effective, Springfield is compliant with NFIP program	Flood maps should be revised as needed, town could pursue CRS rating
Annual Road Maintenance Programs	Bridge & Culvert Inventory	Effective at tracking and planning infrastructure upgrades. Updates are required every 3 years	New State Road Erosion Inventories and Planning requirements will improve effectiveness over the next five years

Access Permits	Regulates driveway access along town-maintained roads and in flood hazard areas	Effective in limiting the number of road cuts and in reducing the potential for flooding and erosion with culvert size requirements	Continued enforcement of access permit regulations and incorporating FHA requirements as updated, remain critical in maintaining effectiveness.
Local Emergency Planning Committee 3	Volunteer organization involved in regional hazard mitigation efforts	Effective and important contributor in the hazard mitigation planning process	Greater town participation at the regional level may be beneficial if core mission is better identified
Southern Windsor County RPC	Regional organization working to further Emergency Management and Hazard Mitigation goals	Effective in assisting towns in the adoption of new ordinances and the revision of planning documents	The RPC can help improve effectiveness by encouraging coordination of all planning efforts, goals and recommendations, improving the planning process and investigate additional sources of historical and statistical data for identified hazards
Road Erosion Reports	These reports are produced every 5 yrs and are based on the road erosion inventories-Report Date 2016	Identifies and prioritizes road erosion issues and recommended actions with cost estimates	This report is most effective when considered for capital budgeting, infrastructure upgrades and planning
Black River Stream Geomorphic Assessments and River Corridor Plan	These reports provide detailed analyses of current conditions and watershed-wide and site-specific recommendations.	Recommended actions are prioritized based on effectiveness for improving flood resiliency and water quality in rivers and streams	Effectiveness can be improved if these documents are consulted for project implementation on a periodic basis and incorporate these projects into other town planning activities
Flood Hazard Prevention Regulations (April, 2017 DRAFT)	To manage development in all flood hazard areas to ensure that development in these areas minimizes or eliminates the potential for flood loss or damage to life and property.	Will be effective in providing guidance to restrict new development in identified flood hazard, areas, and encourage floodplain protection and restoration and flood emergency preparedness.	Due to flooding and flood related hazards Ensures design construction and development, minimizes or eliminates

2017 River Corridor Regulations (March 2017, DRAFT)	To manage development in river corridor protection areas and to provide protection against fluvial erosion	Will be effective in providing guidance to restrict new development in identified river corridor areas not covered in FHA regulations and will minimize or eliminate the potential for fluvial erosion and loss or damage to life and property	Town adoption of River Corridor Regulations will allow opportunities for further refinement

5. HAZARD RISK AND VULNERABILITY ASSESSMENT

The following assessment addresses the Town of Springfield's vulnerability to all of the hazards identified by the Hazard Mitigation Committee during the hazard analysis. The probability of occurrence and impact to the town were used to assess the town's vulnerability to each hazard.

5.1 Hazard Identification and Impact Assessment

A hazard vulnerability assessment for the town began with identifying all possible natural hazards.

The hazard assessment considers the probability of occurrence, the anticipated amount of warning time and potential impact to the community of each hazard to determine the relative risk each poses.

To this overall hazard score was added an additional score to assess of the 'Probability of Occurrence Over the Plan Cycle' in order to give more relative weight, and therefore priority, to those hazards that are more likely to occur. The total sum of the scores in these four categories reflects the Final Hazard Score. The results of this analysis are shown in **Table 3: Springfield Hazard Identification and Analysis.** The ranking methodology used is detailed below.

A discussion of each of these hazards is given in the proceeding subsections under Sections 5.2a through 5.2h. The Hazard Profile and Assessment (Section 5) provided a basis for the selected implementation strategies listed in **Table 7: 2018-2023 Mitigation/Preparedness Strategies and Actions.**

TABLE 3: Springfield Hazard Identification and Analysis

Hazard	Probability of Occurrence	Warning Time	Potential Impact	Likely to Occur Over Plan Period	Hazard Score	Section***
Score Range	**1 - 4**	**1 - 3**	**1 - 4**	**0 - 3**	**3 - 14**	
Hurricanes/Tropical Storms[1]	2	1	3	1	7	5.2c
Flood/Flash Flood/Fluvial Erosion	4	1	3	3	11	5.2b

Severe Weather *	4	3	2	3	12	5.2f
Hail Storms	1	3	1	1	6	5.2f
Landslide/Slope Failure	2	3	1	2	8	5.2h
Severe Winter Weather **	4	1	2	3	10	5.2g
Ice Storms	4	3	2	3	12	5.2g
Wildfire	1	3	4	1	9	5.2a
Structure Fire	4	3	2	3	12	5.2a
Brush Fire	4	3	2	3	12	5.2a
Ice Jams	2	3	2	2	9	5.2d
Extreme Temperatures-Cold[2]	3	1	2	3	9	5.2g
Earthquake[3]	1	2	3	0	6	N/P
Tornado	1	2	3	0	6	N/P
Drought	1	1	4	0	6	N/P
Dam Failure	1	2	4	0	7	5.2e
Dam Dewatering	3	2	2	3	10	5.2e

* 'Severe Weather' defined to include two or more of the following hazards: Thunderstorm, Lightning, High Wind, Micro/Marco Bursts, Power Outage. Warning times can vary for these hazards.
** 'Severe Winter Weather' profile includes ice storms, heavy snow, blizzards, and N'oresters.
*** *Hazards that scored below '7' are not profiled in this plan as they are not likely to occur in Springfield or are a way of life in Vermont and handled well by the Town. For these hazards the reader is referred the* ***State of Vermont Hazard Mitigation Plan*** *for more information.*
N/P- Not Profiled
[1] *The Tropical Storm/Hurricane Hazard Score is low as the region would not be expected to bear the brunt of hurricane sustained winds, but the secondary hazard of flooding scores high and is covered under 'Flooding'.*
[2] *Extreme temperatures were evaluated separately for Heat which scored a 3 and Cold which is shown here.*
[3] *The Earthquake score assumes that were an event to occur during the plan period, it would be minor or less than a 6 magnitude on the Richter Scale. Although this can be a significant hazard at magnitudes above 6, the likelihood of occurring in Springfield over the plan period would be negligible based on the location distance from known epicenters and probability of occurrence data for New England, per the 2011 Southern Windsor County Regional Hazard Mitigation Plan (p27)*

Methodology Used for Hazard Analysis

Probability of Occurrence: Probability of local occurrence of hazard over time period below

1 = Unlikely	<1% probability of occurrence in the next 100 years (less than 1 occurrence in 100 years)
2 = Occasionally	1–10% probability of occurrence per year, or at least 1 chance in next 100 years (1 to 10 occurrences in 100 years)
3 = Likely	>10% but <100% probability per year (at least 1 chance in next 10 years)
4 = Highly Likely	100% probable in a year (an annual occurrence)

Probability of Occurrence over Plan Cycle: Probability of local occurrence of hazard over next 5 years.

0 = Unlikely
1 = Rarely
2 = Occasionally
3 = Likely

Warning Time: Amount of time generally given to alert people to hazard

1 = More than 24 hours
2 = 12-24 hours
3 = less than 12 hours
4 = None–Minimal

Potential Impact: Severity and extent of property damage, facilities disruption, impact on residents caused by hazard.

1 = Negligible - Isolated occurrences of minor property damage, minor disruption of critical facilities and infrastructure, and potential for minor injuries
2 = Minor - Isolated occurrences of moderate to severe property damage, brief disruption of critical facilities and infrastructure, and potential for injuries, few people in town are impacted
3 = Moderate - Severe property damage on a neighborhood scale, temporary shutdown of critical facilities, and/or injuries or fatalities, many people in town are impacted
4 = Major - Severe property damage on a town-wide or regional scale, shutdown of critical facilities, and/or multiple injuries or fatalities, most of the people in town are impacted

5.2 Hazard Profile and Analysis, Extent and Vulnerability

Overview

This section includes a profile of each of the hazards most relevant to the Town of Springfield. Each hazard is profiled under subsections 5.2a through 5.2h and includes:

1. a description of the hazard and its general impact on a community,
2. a discussion of historical occurrences including trends and extent of the hazard based on available data, and
3. an assessment of the vulnerability of community assets to that hazard.

Springfield is a small rural town and much of the town-specific data for these localized hazards does not exist. Previous occurrence hazard data specific to Springfield has been provided where available. However, where no town-specific data exists, the most relevant available data or information has been provided, such as county, regional or state data, or data from a bordering town. Springfield, together with SWCRPC will strive to improve the recording and maintenance of local hazard data and have included this as part of the monitoring process for this plan.

The Hazard Committee had decided that only those hazards which scored an '8' or greater were considered for inclusion and are profiled in this plan.

For other hazards which scored a '7' or less, the HMC decided that these hazards be excluded as the likelihood of occurrence is very low with no account of previous local occurrence. For these hazards the reader is directed to the Vermont State Hazard Mitigation Plan (SHMP) for additional information.

Note that the Town of Springfield determines the extent of impact of natural hazards by its effect on the community and its residents with regard to their safety and the availability of town services, as well as property and infrastructure damage. The safety of residents is considered in terms of both the potential level of risk, such as death due to local home fires, as well as the number of residents affected, as with damage to town infrastructure or loss of town services from a flood event. It should also be noted that the town considers secondary hazards in its assessment of the primary hazard.

For example, of the hazards assessed, those that were determined to be a "way of life" in rural Vermont, are typically considered less significant hazards, though they occur frequently such as snow or blizzard hazards. Small rural towns in Vermont, like Springfield, are accustomed to dealing with this type of weather and the town and its residents are well prepared to handle it. However, the secondary hazards from severe winter weather, such as structural fires from indoor heating methods and power outages from downed power lines, would have a significant impact on the town and be reflected in the Severe Winter Weather score.

The following hazards scored an '8' or higher total impact score in the hazard analysis activity and are detailed in the Hazard Assessment and Hazard Mitigation Program sections of this plan.

Profiled Hazards:

SCORE	HAZARD
12	Severe Weather (primarily to high wind events)
12	Structure Fire
12	Ice Storms
12	Brush Fire
11	Flash Flood / Inundation Flood / Fluvial Erosion
10	Severe Winter Weather
10	Dam Dewatering Flood
9	Extreme Temperatures (Cold)
9	Wildfire
9	Ice Jams
8	Landslides/Slope Failure

The types of hazards having the greatest impact on a regional basis can be gleaned from **Table 4**, a listing of **FEMA Disaster Declarations for Windsor County** since 1990. It can be seen from this table that these are typically severe storms with heavy rains that cause flooding. Severe Winter Storms also occur; however, harsh winters are a 'way-of-life' in Vermont and the Springfield Town Highway Department is accustomed to operating in heavy snows and low temperatures. Other hazards such as flooding, wildfires, ice jams and landslides are more localized and characteristic of a town's topography, roadways, infrastructure, location of critical facilities, and land use.

TABLE 4: Federal Disaster Declarations for Windsor County VT

Federal Disaster Declarations: Windsor County 1990 – 2018(current)		
FEMA Disaster Number	**Date of Declaration**	**Description**
4330	August 16, 2017	Severe Storms and Flooding
4207	February 3, 2015	Severe Winter Storm
4140	August 2, 2013	Severe Storms and Flooding
4120	June 13, 2013	Severe Storms and Flooding
4066	June 22, 2012	Severe Storm, Tornado, and Flooding
4043	November 8, 2011	Severe Storms And Flooding
4022	September 1, 2011	Tropical Storm Irene
4001	July 8, 2011	Severe Storms And Flooding
1995	June 15, 2011	Severe Storms And Flooding
1951	December 22, 2010	Severe Storm
1790	September 12, 2008	Severe Storms and Flooding
1784	August 15, 2008	Severe Storms, Tornado, and Flooding
1778	July 15, 2008	Severe Storms and Flooding
1715	August 3, 2007	Severe Storms and Flooding
1698	May 4, 2007	Severe Storms and Flooding
1559	September 23, 2004	Severe Storms and Flooding
1488	September 12, 2003	Severe Storms and Flooding
1428	July 12, 2002	Severe Storms and Flooding
1358	January 18, 2001	Severe Winter Storm
1336	July 27, 2000	Severe Storms And Flooding
1307	November 10, 1999	Tropical Storm Floyd
1228	June 30, 1998	Severe Storms and Flooding
1184	July 25, 1997	Excessive Rainfall, High Winds, Flooding
1124	June 27, 1996	Flooding
1101	February 13, 1996	Storms and Flooding
1063	August 16, 1995	Heavy Rain, Flooding
990	May 12, 1993	Flooding, Heavy Rain, Snowmelt
938	March 18, 1992	Flooding, Heavy Rain, Ice Jams
875	July 25, 1990	Flooding, Severe Storm

5.2a Structural Fire/Wildfire/Brush Fire

Fires, including structure fires, brushfires and wildfires, were identified during the hazard analysis and vulnerability assessment as relatively high hazards to the Town of Springfield with scores of 13, 12 and 8, respectively.

Structural fires were specifically identified as having the highest possible risk to the town, with a score of 12, due to their high probability of occurrence, short warning time and potential for catastrophic loss. Structure fires are common throughout Vermont during the winter months as residents heat their homes

with wood or wood pellet burning stoves. With little or no warning, these fires can affect a single residential structure or spread to other homes, businesses or apartment complexes and can result in loss of property and life. Fires can be caused by improperly disposing of ashes with live coals from wood stoves or by faulty electrical wiring and misuse of space heaters. The Vermont Fire Marshal Reports identify the leading causes of structure fires to be the result of heating and cooking incidents. The most significant common factor in fire fatalities in Vermont continues to be the absence of a functioning smoke detector in the sleeping area of residential structures.

"*While the fire problem varies across the country, there are several common contributing factors such as poverty, climate, education, code enforcement, demographics and other factors that impact the statistics.*

Like the rest of the country, heating appliance and cooking fires in Vermont continue to be the leading causes of structure fires. The leading factor contributing to home heating fires was failure to clean creosote from solid-fueled heating equipment chimneys.

The long cold Vermont winters put added stress on heating systems. Further-more, fluctuating fuel prices can force people to use alternative heating sources that may not be safe. An improperly installed and maintained heating appliance is dangerous and can result in carbon monoxide poisoning or be the source of a fire."[4]

According to the National Fire Protection, 25% of all structure fires are in residential construction. In Vermont, residential related fires accounted for 68% of total structure fires in 2017.[5] Over the past 10 years, the top cause for residential fires has consistently been related to home heating. Although the number of fire deaths has ticked higher in 2016 and 2017, the state has seen a substantial reduction in fire deaths since the early 2000's.[6] Historically, Vermont's fire fatality rate has been disproportionately high based on population compared to the national average. This is due, in part, to the large percentage of residents that live in small rural communities where emergency response time is delayed. Other state characteristics that lend toward greater loss from fire compared to other states are[7]

- Age of Housing Structures - 33% of all homes were built before 1950.
- Extreme Winter Temperatures – Vermont is the 7th coldest state.
- Higher Risk Population -2nd oldest median age where the elderly is at higher risk. Over the last 4 years, 68% of Vermont's fire deaths have been seniors over the age of 60.
- Home Heating Methods - 1st for per capita use of wood for heating.

Wildland Fires, which for discussion here include forest, brush, crop or grassland fires, are relatively less common events in the State of Vermont, particularly large forest wildfire events. A wildfire is defined as *'An uncontrolled burning of woodlands, brush or grasslands."* [8] Wildland fires have the potential to damage structures and utilities as well as forest and croplands.

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[4] 2015 Vermont Fire Marshal Annual Report
[5] 2017 Vermont Fire Marshal Annual Report
[6] 2015-2017 Vermont Fire Marshal Annual Report
[7] 2013-2015 Vermont Fire Marshal Annual Report
[8] 2018 Vermont State Hazard Mitigation Plan

The State Hazard Mitigation Plan's analysis of wildfire threat states that

"Wildfire conditions in Vermont are typically at their worst either in spring when dead grass and fallen leaves from the previous year are dry and new leaves and grass have not come out yet, or in late summer and early fall when that year's growth is dry". [9]

In addition to lack of precipitation, a particular town's vulnerability to large wildfires is directly related to the proportion and continuity of acreage that is forested, pasture and cropland. Although large wildfires are always a threat, particularly for rural communities with large tracts of forested and vegetative land, the Town's vulnerability is mostly dependent upon weather conditions, climate change, and continued efforts on outreach to provide information on steps to prevent wildland fires and enforcement of 'red flag' warnings to restrict controlled burning during dry season.

Extent and Historical Trend - Structural Fire/Wildfire/Brush Fire

Both structure fires, brush fires and wildland fires have historically been reported in the annual *Vermont State Fire Marshal Report* which provides yearly fire statistics from reporting departments and by county. In the 2017 State Report, there were over 40,000 emergency incidents statewide, 2,500 of which were related to fire. A total of 10 civilian fatalities were reported as a result of a fire incident with 77% over the age of 40.[10]

	2013	2014	2015	2016	2017	5 - year Total
Heating Equipment	0	0	2	3	0	5
Cooking	0	0	0	0	1	1
Smoking Materials	0	4	0	1	1	6
Open Flame	1	0	1	1	2	5
Explosion	0	0	1	0	0	1
Electrical	1	0	0	1	1	3
Undetermined	2	2	2	6	5	17
Homicide	0	0	1	0	0	1
Totals	4	6	7	12	10	33

Vermont Fire Death Causes by Type of Fire, 2017 Vermont Report of the State Fire Marshal

[9] 2018 Vermont State Hazard Mitigation Plan
[10] 2017 Vermont Report of the State Fire Marshal

5 - Year Fire Deaths by age 2013-2017				
Age group		Age	Deaths	%
Childhood (0 - 12)	1	Neonatal (0 -1 mo)	0	0
	2	Infancy (2 - 23 mo)	0	0
	3	Preschool Age (2 - 5)	0	0
	4	School Age (6 - 12)	1	2.5%
Teen	5	Adolescence (13 - 17)	0	0
Adulthood (18 +)	6	Young Adulthood (18 - 29)	1	2.5%
	7	Thirties (30 - 39)	5	12.8%
	8	Middle Age (40 - 64)	14	35.8%
Senior	19	Aged (65+)	11	28.2%
	10	Very Old (85+)	5	12.8%

Vermont Fire Deaths by Age, 2017 Vermont Report of the State Fire Marshal

According to the 2017 data compiled by the National Fire Incident Reporting System (NFIRS) shown below for Vermont, fire departments reported a total of 2,458 incidences relating to structure fires with an estimated dollar loss of $21,029,493, or $8,555 per incident. Applying this cost per incident to Springfield, the annual loss due to structural fire is estimated to be $360,000 based on an estimated average annual number of structure fires of 42. [11]

Year	Fire Departments Reporting	Fires Reported	Estimated Dollar Loss by Fire Departments	Insurance Companies Reporting/ Total	Fire Claims Reported	Reported Dollar Loss by Insurance Companies
2012	194	2,233	$ 17,840,192	860	839	44,510,095
2013	194	2,116	$ 26,485,951	615	878	50,911,724
2014	228	2,114	$ 30,412,139	615	1,130	50,589,356
2015	230	2,198	$ 25,112,224	606	939	45,574,673
2016	228	3,138	$16,919,906	**644**	**706**	**57,098,292**
2017	**172**	**2,458**	**$ 21,029,493**	Data not currently available		

NFIRS and Insurance Company Data, 2017 Vermont Report of the State Fire Marshal

Vermont's prime seasonal conditions for **wildland fires** are in the spring and fall. ́Despite the drought in 2016-2017, Vermont's 2017 Wildland Fire Program Annual Report notes that 2017 fire season was well below normal at 49 acres burned from 51 fires. The average between 2012 and 2016 was 109 fires and

[11] Average number of structural fires over previous plan period in Springfield is estimated to be 42 as calculated- average annual wildland fires from 2009 to 2014 (excluding 2011 outlier of 100 wildland fires) is 10 as reported in the Vermont Report of the State Fire Marshal. Average total fire incidences 2012-2016 in Springfield as reported to NFIRS is 52 (See Table 5). Estimated number of structural fires is 52-10 or 42.

317 acres per year. These numbers were below normal and lowest since 2011.'[12] This was, in part, due to heavy winter snow melt and wetter and cooler spring months.

According to the State of Vermont Hazard Mitigation Plan, 'there has not been a major wildfire in Vermont in the last 50 years. Vermont has a reliable system of local fire suppression infrastructure coordinated at the state-level. Vermont's climate, vegetation type, and landscape discourage major wildfire.'[13] However, brush fires or burning debris are the major causes for wildland fires according to the Vermont Department of Forests, Parks and Recreation.

Table 5 below shows historical data for structure and wildland fires in Windsor County, where available, from the *Annual Report of the State Fire Marshal* and data from the Town of Springfield as reported to the National Fire Incident Reporting System. As of 2016, the Fire Marshall Report no longer reports fire statistics by county nor does it breakdown fire by structure and wildland. The large majority of these incidents are structure related fires. Of the reported annual fire incidences in Springfield, it is estimated that, approximately, 10 are related to brush or wildland fire (see footnote 11). Although there appears to be an upward trend for the County, this is not the case for Springfield which has remained relatively constant.

TABLE 5: Fire Statistics for Windsor County and Town of Springfield

YEAR	Windsor County[14]			Springfield[15]
	Structure Fire Responses	Wildland Fire Responses	Total	Fire-NFIRS Series 100
2009	177	68	245	-
2010	181	70	251	-
2011	181	70	251	-
2012	201	101	302	56
2013	229	86	315	46
2014	na	na	na	52
2015	239	89	328	55
2016	na	na	na	50

A special report from the *2015 Spring Fire Season Summary* published by the *Vermont Department of Forests, Parks, and Recreation* provides fire statistics shown below. The report indicates that the average number of acres burned per wildfire incident over a 10-year period (2005-2014) was 2.2 acres. Using this average to estimate the extent of potential wildland fire hazard for Springfield would give an annual loss of about 20 acres. This can be compared with large fire activity in the spring of 2015 including a 26-acre forest fire in Andover, Windsor County, caused by a re-kindled brush fire; a 47-acre forest fire in Brattleboro, sparked by a downed powerline; and a 137-acre forest fired in Norwich, also caused by a downed powerline. These incidents occurred during a moderately dry spring for Windsor County when red flag warnings were issued by the National Weather Service.

[12] 2018 Vermont State Hazard Mitigation Plan
[13] 2018 Vermont State Hazard Mitigation Plan
[14] Vermont Annual Report of the State Fire Marshal. As of 2016, this report no longer reports incidents by county.
[15] National Fire Incident Reporting System, per R. Thompson, Springfield Fire Chief.

Fire Statistics

	2015 Fire Statistics		10-Year Average 2005-2014	
Official reports – reports have been verified by warden or FPR				
	#Fires	#Acres	#Fires	#Acres
March	**2**	**1**	**9**	**29**
April	**38**	**50**	**62**	**142**
May	**51**	**284**	**19**	**30**
Year to date	**91**	**335**	**90**	**201**

2015 Spring Fire Season Summary/Vermont Dept. of Forests, Parks and Recreation.

Vulnerable Assets - Structural Fire/Wildfire/Brush Fire

An assessment of town structures vulnerable to structural fire would be based on age and proximate location to other high-risk structures. Community assets are not particularly vulnerable to wildfires as they are typically located in town centers and away from large tracts of forested and vegetative land. However, with expectations of more frequent drought conditions and increased wildfire risk, the town will plan to use available resources, like Firewise outreach programs, to educate community on how to minimize the risk of brush and wildfires and to issue dry weather alerts when the risk wildfire is high.

Springfield, like many other New England communities, offers a conflagration hazard in its downtown area. In many cases, unprotected wood frame and mill construction buildings are situated on the Black River or in an area that does not allow 360° access.

Some of these downtown structures are Brownfields that are vacant and deteriorating making these areas susceptible to loitering where there is a greater potential for accidental fires.

With minimal to no distance between exposures, large fires creating their own energy and wind, coupled with the inability to access all point of propagation leads to the potential for a large fire that could impact multiple buildings in the downtown area.

Higher death rates from fire statistically correlate to population factors including elderly population, adult smokers, poverty rates, and education. The most significant common factor in fire fatalities in Vermont continues to be the absence of a functioning smoke detector in the sleeping area of residential structures. In Vermont, structure fires can be caused by improperly disposing of ashes with live coals from wood stoves, lit cigarettes, failure to clean creosote from solid-fuel heating equipment chimneys, or faulty electrical wiring.

Firewise, a community outreach program through the National Fire Protection Association provides guidance, resources, and training on protecting homes and property from wildfire hazards. The Firewise website (www.firewise.org) is an excellent resource for literature and community mitigation actions. The Vermont Annual Fire Marshal Report also offers informational resources for municipalities and property owners on fire safety.

Although structural and wildfire incidents in Springfield have been flat in recent years, the probability of occurrence remains high with the projection of more extreme temperatures and continued periods of

draught due to climate change. Springfield residents remain particularly vulnerable to structural fires, which are more likely to cause physical harm and damage to homes, because many of the residents heat their homes using wood or pellet burning stoves and other riskier means. Enhanced efforts to inform residents of safe home heating and installation of smoke detectors is the most effective way to help mitigate this threat.

5.2b Flash Flood/Flood/Fluvial Erosion

Riverine flooding, including flash flooding and overbank flooding or inundation, are significant natural hazard events for Windsor County.

The town is susceptible to both flash flooding in higher elevation areas and overbank flooding in some lower lying areas. These events are frequently caused by excessive rainfall over an extended period of time, heavy spring snow runoff, and ice jams.

The damage from a river flood can be widespread as overflow affects rivers and streams downstream and can cause dams and dikes to break, inundating lower lying areas. Fluvial erosion of riverbanks, which often accompanies flood events due to the narrow stream valleys and steeply sloped topography, can severely threaten mountain communities like Springfield. This is because most of rural town development lies in valley areas along rivers and streams.

"Flash flooding is characterized by intense, high velocity torrent of water that occurs in an existing river channel with little or no notice. Flash floods are very dangerous and destructive not only because of the force of the water, but also the hurling debris that is often swept up in flow." [16] This type of flooding threatens high-elevation drainage areas and typically occurs during summer when a large thunderstorm or a series of rain storms result in high volumes of rain over a short period of time, particularly on already saturated soils from a spring melt.

The damage from spring flooding events can vary greatly depending upon the amount of precipitation, snow cover, spring melt, soil saturation, existing erosion and topography. Infrastructure and structures within the narrow stream valleys receive drainage from the higher elevations and are often the most vulnerable to damage from flash flooding. Although flash floods are not frequent events, hazards posed can be significant as seen with the state-wide flooding from Tropical Storm Irene in the summer of 2011.

Overbank flooding occurs in lower lying areas when water levels rise overflowing the banks of a river or stream. In hilly or mountainous areas this typically happens in valley areas when drainage from higher elevations flow to the lower reaches of a watershed carrying debris which can block culverts and the underpass of bridges.

The Federal Emergency Management Agency (FEMA) has designated floodplains in the town for areas including the Connecticut River, Black River main stem, and many smaller tributaries. As defined below, the areas along these rivers are particularly at risk for flooding and are identified by FEMA as 100-year floodplain. Areas within the river corridor are also considered areas of flood and erosion risk as rivers and streams seek equilibrium in accommodating the high flows causing major flood and erosion damage

[16] INTERMAP http://www.intermap.com/risks-of-hazard-blog/three-common-types-of-flood-explained

outside of special flood hazard areas. Vermont Agency of Natural Resources has mapped river corridors for these stream segments along with special flood hazard areas which are shown **in Appendix A, Map #3-Water Resources and Flood Resiliency** and can be found on-line.[17]

Flood Zone Definitions	
Floodway	The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height; also known as the regulatory floodway. As designated and determined by FEMA.
Floodway Fringe or Floodplain	The remaining portion of special flood hazard areas after exclusion of the floodway; also known as floodplain.
Fluvial Erosion	The erosion or scouring of riverbeds and banks during high flow conditions of a river. Fluvial erosion can be catastrophic when a flood event causes a rapid adjustment of the stream channel size and/or location.
Fluvial Erosion Hazard Zone	Includes the stream and adjacent lands necessary to accommodate the slope and plan form requirements of a geomorphically stable channel, and is subject to fluvial erosion as defined by the Vermont Agency of Natural Resources and delineated on the current Fluvial Erosion Hazard Zone Map.
Special Flood Hazard Area	The land in the flood plain within a community subject to a 1 percent or greater chance of flooding in any given year; also known as floodplain. As designated by FEMA.
River Corridor	The land area adjacent to a river that is required to accommodate the dimensions, slope, planform, and buffer of the naturally stable channel and that is necessary for the natural maintenance or natural restoration of a dynamic equilibrium condition and for minimization of fluvial erosion hazards, as delineated by the Agency of Natural Resources in accordance with river corridor protection procedures.

Approximately 4% of town acreage is located within the river corridor, a third of which is also within the floodway (Zone AE) or floodplain/floodway fringe (Zone A). These areas are concentrated in downtown Springfield, North Springfield center and along the Connecticut River. This same analysis identified 283 structures, or 7% of total town structures, located within the river corridor, 48 of which also fall within the floodway (Zone AE) or floodplain/floodway fringe (Zone A).[18]

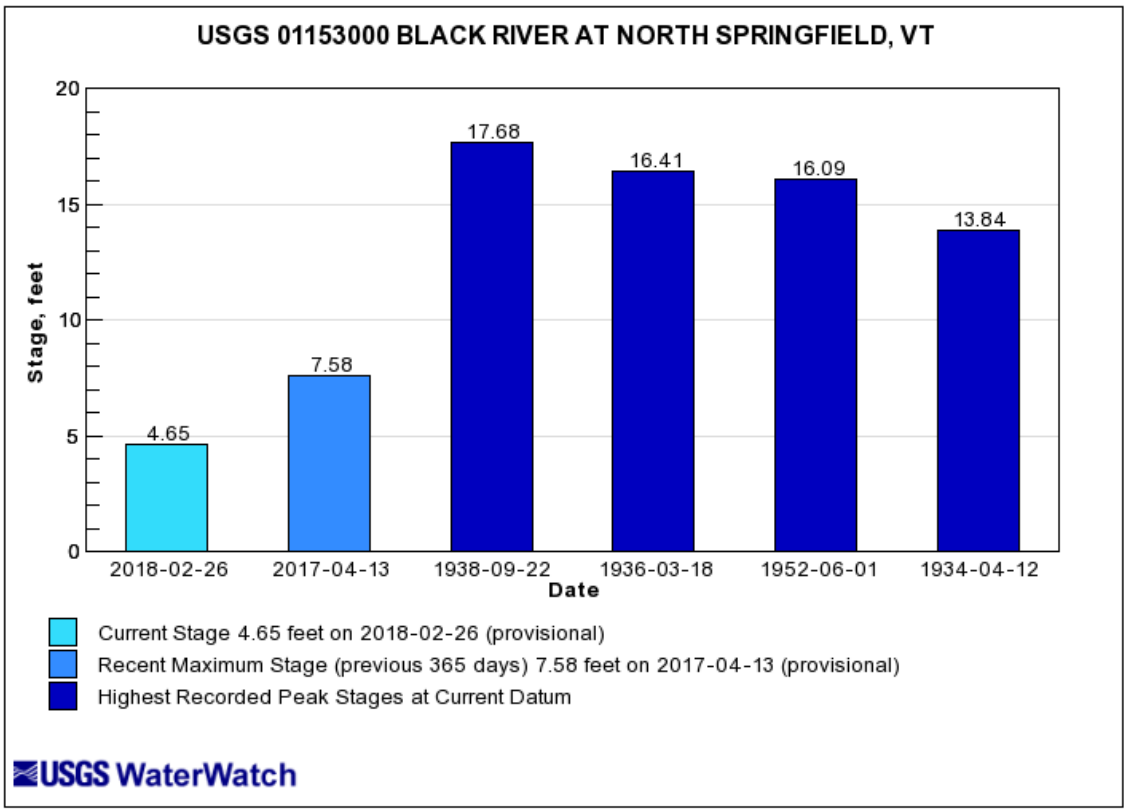
The United States Army Corps of Engineers maintains a series of flood control dams within the Connecticut River watershed, including one within the Town of Springfield, the North Springfield Dam. There are also five additional dams in the Black River that run through the historic downtown area and impound water for the production of hydro-electric power. As can be seen from **Appendix A, Map 5: Road Network Damage from Tropical Storm Irene**, the damage was limited to the outskirts of town while more populated areas of downtown and North Springfield were spared due to the North Springfield Flood Control Dam. More information on dams in Springfield can be found in **Section 5.2e**.

Figure 1 below displays recent and historical data for gage height at a gage site for the Black River at the U.S. Army Corps of Engineers station at the North Springfield dam.

[17] The ANR FLOOD READY link shows river corridors overlays and FEH zones, http://floodready.vermont.gov/assessment/vt_floodready_atlas.

[18] *Analysis using Town Boundaries (VCGI 2016) compared with River Corridors (January 2015) and Floodplains (FEMA 2008).*

Figure 1: Historical and Recent Gage Heights for the North Springfield Dam on the Black River



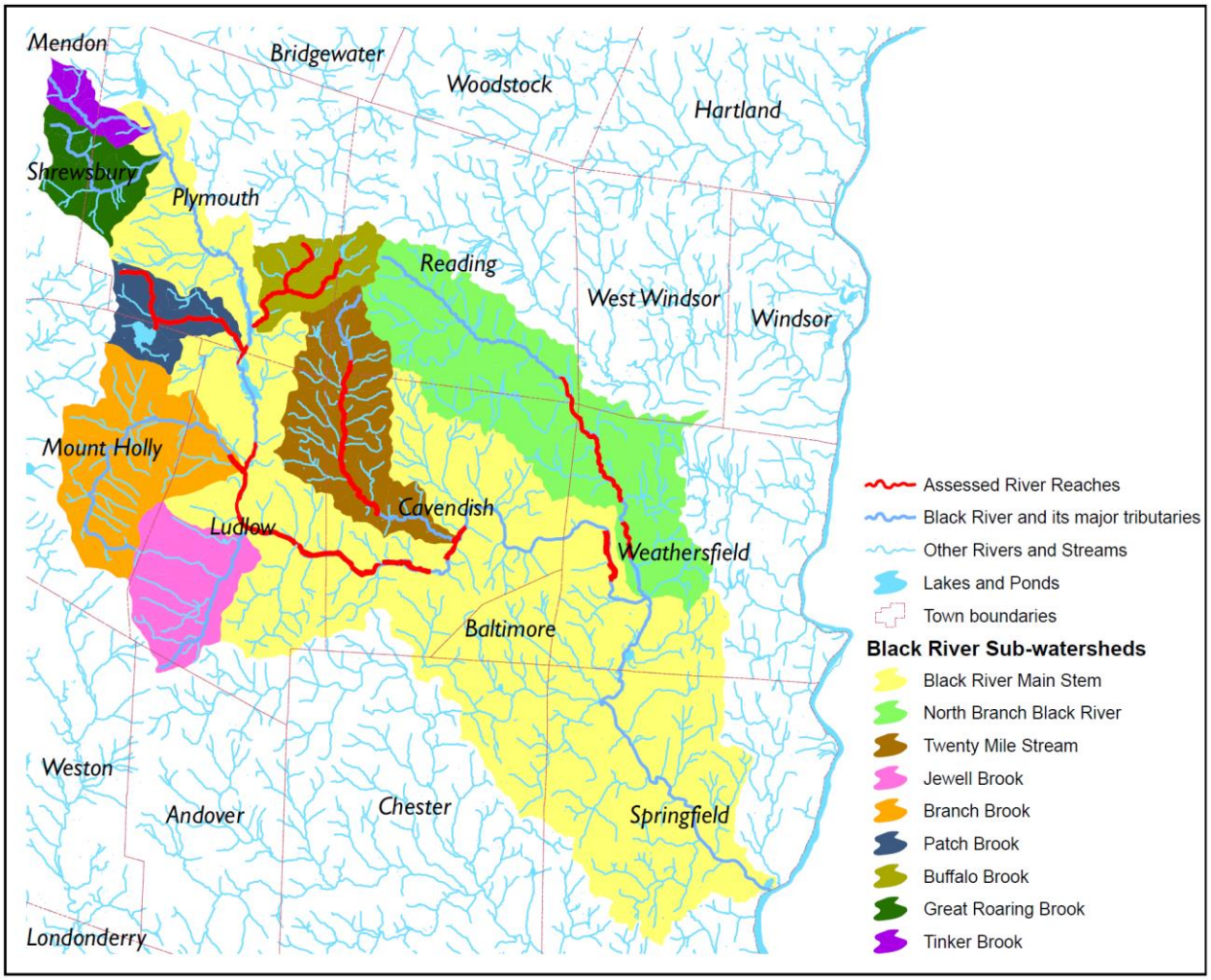
Fluvial Erosion is when sediment becomes detached from a riverbed or riverbank during flash flood events. This type of erosion is caused by waterflow, and can range from gradual bank erosion or massive slope failure to catastrophic changes in river channel location and dimension. The extent of fluvial erosion during high flow conditions depends greatly on flow velocity and duration. While some flood losses are caused by inundation (i.e. when waters rise, fill, and damage low-lying structures), most flood losses in Vermont are caused by fluvial erosion. Reasons are Vermont's topography, extreme climate, deep snows, destructive ice jams and intense rainstorms. Centers of commerce in villages and towns became concentrated along river banks, forests were cleared, and overtime, many rivers moved or channelized to accommodate this development rendering them unstable and prone to fluvial erosion. [19]

Springfield, like many other towns within Southern Windsor County, is at risk for fluvial erosion hazard flooding events due to its steep slope headwaters and narrow valleys and can result in catastrophic damage to property and infrastructure when a rapid adjustment of a stream channel occurs.

[19] Municipal Guide to Fluvial Erosion Hazard Mitigation, Vermont Agency of Natural Resources

Erosion is exacerbated by failure of infrastructure including roads, culverts, bridges and dams. The sediment and stone that is dislodged can expose roots of trees and vegetative buffers which become detached and carried downstream blocking culverts and bridges causing further flood damage.

Figure 2: Black River Watershed and Sub-watersheds



Springfield Watershed Background

The most developed areas of the Town of Springfield lie within the Black River Main Stem, a sub-watershed of the Black River as shown in the map above taken from the river corridor plan.[20] Other sub-watersheds within Springfield include a portion of the Lower Connecticut River Tributaries along the eastern border, including Spencer Brook that runs along Interstate 91, and small finger tributaries of the Williams River in the southwest corner of the town.

[20] Black River Corridor Management Plan, June 2011.

The Black River Phase 1 and 2 Geomorphic Assessments were completed in 2007 and 2009, respectively, with the *Black River Corridor Management Plan* released in 2011. These watershed assessments and management plans focus primarily on hazard mitigation, local water quality and resource conservation. The overarching strategy is to protect the river corridor by giving the stream/river the space needed to find its own natural equilibrium which will minimize, in the long run, hazards related to flooding, flash flooding, fluvial erosion and ice jams.

The Black River Corridor Management Plan recommends that watershed towns consider long term corridor planning to include flood and fluvial erosion hazard ordinances that will prevent encroachment in the floodplain and fluvial erosion hazard zones.[21] The lower main stem of the Black River, which runs through the heart of Springfield, was not assessed for localized strategies as it is protected by the North Springfield Flood Control Dam. However, watershed and town level strategies can be applied to all watershed towns.

As can be seen in **Appendix A, Map 1: Current Land Use,** most of Springfield's population and town infrastructure are concentrated along the Black River main stem. Unlike the steep headwaters, the southern portions within Springfield are flatter but can still be vulnerable to damage from flash flooding and erosion, particularly along the river tributaries and low-lying areas outside the protection of the flood control dam. River Corridor Protection Areas have been mapped and are available online at the Vermont Agency of Natural Resources.[22] Designated River Corridor Protection Areas delineate those areas where development is subject to erosion hazard risks and are also referred to as Fluvial Erosion Hazard (FEH) Zones.

Extent and Historical Trend – Flood and Fluvial Erosion

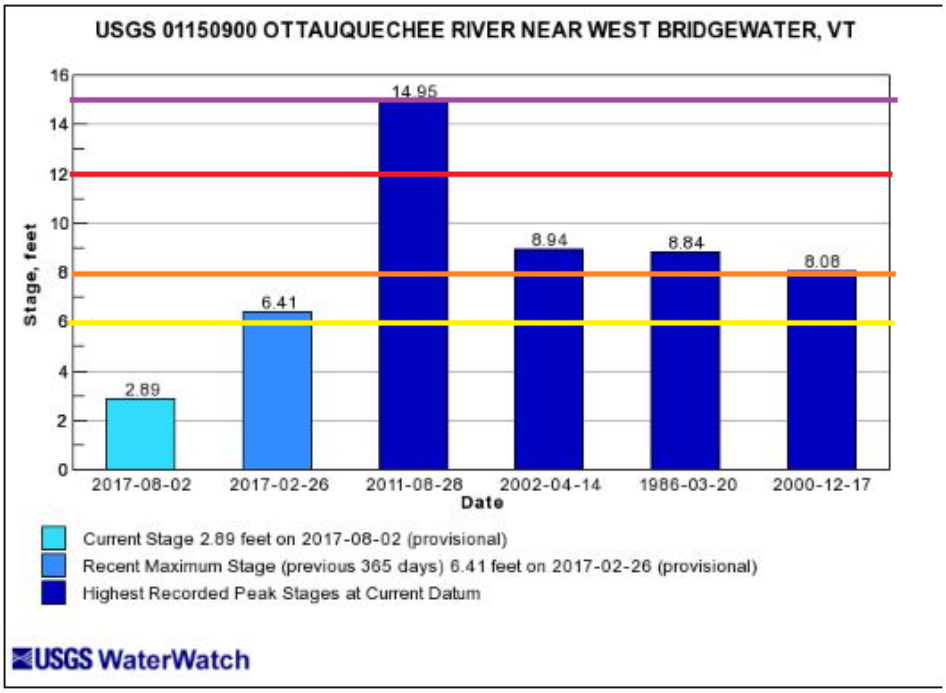
Table 4: **FEMA Disaster Declarations for Windsor County from 1990-2018** shows that of the 29 disaster declarations for Windsor County, 27 were related to flooding. Not all of these events had an impact on Springfield and some less severely than on other towns. One of the worst widespread flood disasters recorded in the State of Vermont that occurred in November, 1927, dropped nearly 10 inches of rain on frozen ground causing extensive damage statewide. Relatively recent widespread flooding occurred in June, 1973, when up to 6 inches of rain fell resulting in $64 million in damage. However, over the past several years, flooding has occurred in limited areas of the State from intense, scattered storm events and ground saturation from persistent and excessive rainfall. This characterized the pattern of flooding in 2011 when four regional disaster declarations were issued in Vermont due to flooding and fluvial erosion. The fourth was Tropical Storm Irene in late August when up to 11 inches of rain fell in some areas of the State. Tropical Storm Irene is also covered under the **"Tropical Storms/Hurricanes" (Section 5.2c)** hazard with additional discussion on the variation in rainfall amounts throughout the State with this storm.

Although Springfield flooding was moderate, river levels elsewhere in the area reached major flood stage during Tropical Storm Irene. The USGS maintains a river gauge on the Ottauquechee River in West

[21] Section 5.2, 2015 River Corridor Plan for Mill Brook for Windsor, Springfield and Reading, Vermont

[22] The ANR FLOOD READY link below shows river corridors overlays comparable to FEH zones
http://maps.vermont.gov/ANR/Html5Viewer/Index.html?configBase=http://maps.vermont.gov/Geocortex/Essentials/ANR/REST/sites/Focus_on_Floods/viewers/FocusOnFloodsHTML/virtualdirectory/Resources/Config/Default

Bridgewater, site #01150900, located within Basin 10, northwest of the Town of Springfield is the closest daily USGS monitored gauge location unimpeded by instream structures. While this data is not specific to the Town, it may be used to estimate the worst-case flooding scenario for rivers and streams without the protection of the flood control dam.



Major Flood Stage:	15
Moderate Flood Stage:	12
Flood Stage:	8
Action Stage:	6

***Note** the gauge height approached 'Major Flood Stage' of 15 feet during Tropical Storm Irene. Prior to Tropical Storm Irene in 2011 and since 2000, the next highest recorded peak stages were at 'Flood Stage' in the range of 8 to 9 feet. Highest recorded stage at this gauge site since 2011 was over 6 feet in 2017.*

The "Flood Tracking Chart" above is for gauge site #01150900 from USGS WaterWatch website, (http://waterwatch.usgs.gov) which displays historic peak data for gauge height, or stage (height of the water in the stream above a reference point). Note the gauge height approached Major Flood Stage, based on National Weather Service Flood Levels, during Tropical Storm Irene.

As stated in the Town Plan,

" Springfield escaped significant, widespread damage from Tropical Storm Irene due to the location of the heaviest rainfall elsewhere and through good management of the North Springfield Dam. However, each storm is different. The community has been impacted by other storms in the past, and continues to be at risk of potentially significant damages from future flooding events." [23]

[23] 2017 Springfield Town Plan, Flood Resiliency Section, pp. 112-120

Since 2011, Windsor County has experienced an additional five Federal Disaster Declarations due to flooding. According to the *2013 State of Vermont Hazard Mitigation Plan*, studies show that areas of the State can expect a greater frequency of flooding with an increase in extreme rainfall amounts.[24]

Springfield is also vulnerable to **fluvial erosion**, particularly along the Black River tributaries, as the mainstem riverbanks have been straightened and armored over the years and its waters are protected by the North Springfield flood control dam. The 2016 Springfield Road Erosion Report has recommended stabilizing eroded stream banks that are threatening road infrastructure. A high priority stabilization project site, located along Carly Road, has an eroded area which is 20 ft. high by 10 ft. wide. Moderate erosion risk sites are located along a 355 ft. long, 8 ft. high, stream side section of Spoonersille Rd. (Appendix F).

The town is, perhaps, most vulnerable to landslides outside of the flood zones triggered by high stormwater flows during heavy rain events and minimal stormwater infrastructure.

Stormwater runoff from extreme rainfall has caused extensive erosion at a number of sites that continue to deteriorate with each rain event. These hazards are covered under **Landslides, Section 5.2h.**

Vulnerable Assets – Flood

Flooding is one of the primary natural disasters in Vermont. According to information provided by the Agency of Natural Resources (ANR) at the 2014 Municipal Day and as stated in the Town Plan Flood Resiliency section, "flooding accounted for 5% of hazard events, but 67% of the hazard losses. . . that occurred statewide between 1960 and 2009. According to the Vermont Economic Resiliency Initiative website, 25% to 40% of businesses affected by a disaster never reopen." [25]

Much of the development in the Black River watershed is typically found in valleys and along waterways which is the case for Springfield.

The areas of high population concentration and services, namely North Springfield and downtown Springfield, are either within or are surrounded by floodplains

or are vulnerable to inundation from a dam breach as shown in **Appendix A, Map #5: Water Resources and Flood Resilience.**

The risk of flood damage is influenced by other factors in addition to location within these designated flood zone areas. Road infrastructure located in the floodplain, including bridges and culverts, particularly those that are undersized or in poor condition, are vulnerable and exacerbate flood risk to surrounding areas. The estimated number of bridges and culverts from the Vermont Online Bridge and Culvert Inventory Tool is 35 bridges and 845 culverts. [26] Other vulnerable structures include, approximately, 8 hazardous waste facilities/sites located within the flood zone as well as several road segments that are currently deemed evacuation routes

[24] 2013 State of Vermont Hazard Mitigation Plan, p 4-9
[25] 2017 Springfield Town Plan, Flood Resiliency Section, pp. 112-120
[26] Vermont Open Geodata Portal, http://geodata.vermont.gov/datasets/a06c53ca7a854408944e39bbff71fd86, access August 6,2018.

A visual of vulnerable structural assets located in flood hazard areas and river corridor of Springfield's most populous areas are shown in **Appendix E** using Vermont Flood Ready Atlas Maps.[27] The following summarizes structures in Springfield at risk in these identified flood hazard areas.

- 14 structures are located within Floodway (Zone AE)
- 34 structures are located within the Floodplain Zone A or Floodway Fringe (Zone AE)
- An additional 235 structures are located within the river corridor;
- 2% of total E-911 structures in Springfield are located within SFHAs;

Some portions of town are not currently mapped but may be at risk of flooding. Town buffer requirements help to prevent new structures from being built too close to smaller streams that do not have mapped flood zones but are subject to periodic flooding.

Currently, Springfield is a participatory, non-sanctioned member of the National Flood Insurance Program and regulates development in the floodplain through the enforcement of the regulations in the Town of Springfield's Zoning By-Laws and Flood Hazard Regulations, adopted November 10, 2014 and are currently being updated. The town either prohibits or strongly discourages development in flood zone areas. There are currently 33 NFIP policy holders in the Town of Springfield with 19 for high risk structures in Zone A and no reported repetitive loss structures.[28] Total claims for losses since 1978 through December 31, 2017, is 10 of which only 4 have closed with a total payment of $12,480.[29]

Vulnerable Assets - Fluvial Erosion

The areas most vulnerable to fluvial erosion, created by Irene and exacerbated by subsequent storms, include bank erosion and slope failures along a number of roadways and riverbanks.

Most of these are identified in the *2016 Springfield Road Erosion Inventory* and some of which are detailed in the *Road Erosion Report*. Some of these have been selected to be included in **Table 7: 2018-2023 Springfield Mitigation/Preparedness Strategies and Actions.** Projects highlighted in the Road Erosion Report are shown in **Appendix A: Map 9** and **Appendix F** is a listing of road erosion projects with a high hazard mitigation potential.

Infrastructure including bridge and culvert inventories are also vulnerable to flood and fluvial erosion damage. The failure of bridges and culverts throughout southern Vermont during Tropical Storm Irene, was primarily due to their being undersized and constricting flow. This resulted in debris jams, increased streambed scour, bank erosion both up and downstream of the crossing and slope failure at some locations. Blocked culverts compromised the structural integrity and safety of the road crossing and

[27] Flood Ready Vermont Atlas, http://floodready.vermont.gov/assessment/vt_floodready_atlas, 1/28/2018
[28] Flood Ready Vermont, FEMA Data Reports on Number of Effective Policies & Repetitive Losses 1/26/2015, http://floodready.vermont.gov/sites/floodready/files/documents/NFIP%20Insurance%20Report%20VT%201.26.15.pdf, http://floodready.vermont.gov/sites/floodready/files/documents/VT%20RL%20Report%201.26.15.pdf
[29] FEMA Policy & Claim Statistics for Flood Insurance -Claim Information by State, https://www.fema.gov/policy-claim-statistics-flood-insurance

resulted in damage to adjacent properties. Factors contributing to debris jams include materials stored in the floodplain and unsecured structures (i.e. hay bales, propane tanks; small sheds; wood piles).

Vermont State has begun to focus its efforts on "hydrologically-connected" road segments to improve overall flood resiliency of roadways as recently adopted as part of the new *Municipal Roads General Permit (MRGP) Standards*. **See Appendix A, Map 7-Hydrologically-connected Road Segments** for roads in Springfield that have been mapped as hydrologically-connected and are more vulnerable to erosion.

Specific Vulnerable Assets – Flood and Fluvial Erosion

Selected flood and erosion hazard mitigation recommendations below from the Flood Resiliency section of the Springfield Town Plan, were based on a culmination of community concerns, damage from Tropical Storm Irene, areas of repeated flood damage or continued erosion, with a focus on the recommendations from new river corridor plan, road erosion inventories, culvert inventories and river corridor map overlays.

The Planning Commission identified the following local areas of concern for flooding risk, as a result of past flooding conditions or proximity of existing development to flood or erosion zones:

- Paddock Road area;
- Erosion of the banks of the Connecticut River;
- North Springfield/Main Street/Elm Street/Fairgrounds Road bank erosion;
- Undersized culverts at bottom of Carley Brook at River Street;
- Bottom of Chester Road; and
- Seavers Brook area.

The Planning Commission also identified the following areas that are important for local economic development initiatives but are complicated by State river management protection.

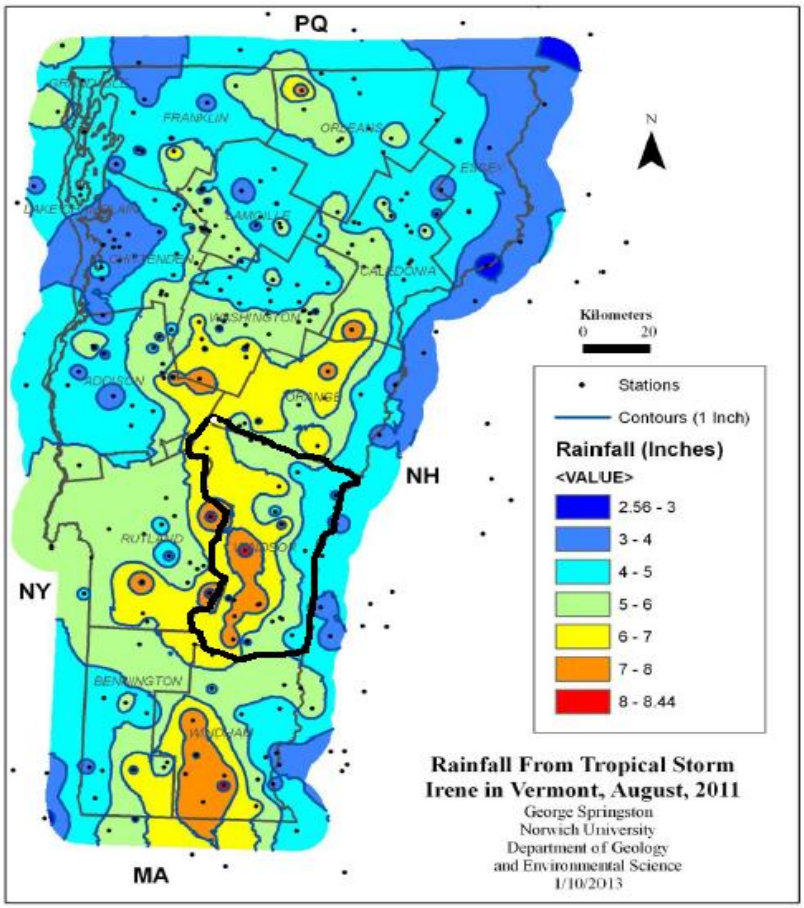
- Main Street
- Clinton Street
- Bridge Street
- Route 106
- River Street
- Valley Street
- Main Street, North Springfield
- Chester Road-Breezy Hill Rd. to Plaza
- Seavers Brook
- Carley Road
- Village of North Springfield

5.2c Hurricanes/Tropical Storms/Microbursts

As a hurricane moves toward the coast, it loses wind speed and may be downgraded to a tropical storm. This is the case for the tropical storms that have reached Vermont as Category 1 storms or below. The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 rating based on a hurricane's sustained wind speed. The scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered major hurricanes because of their potential for significant loss of life and damage. Category 1 and 2 storms are still dangerous, however, and require mitigation.

Extent and Historical Trend – Hurricanes/Tropical Storms/Microbursts

Prior to Tropical Storm Irene in August, 2011, Vermont was impacted by Tropical Storm Floyd in November, 1999, causing major flooding and power outages. However, the Hurricane of 1938 may have been the most powerful tropical storm to hit Vermont in modern times, with sustained winds of 74mph which was claimed to have changed the landscape of the state with the extensive tree damage. The Flood of 1927 termed 'the greatest natural disaster' was caused by a tropical system in Vermont with over 9 inches of rain that caused the most extensive flooding and structural damage and greatest loss of life in recorded history for the state.



Tropical Storm Irene, in late August, 2011 was catastrophic to Vermont. Damage sustained by the Town of Springfield from Tropical Storm Irene, was moderate due to the protection of the North Springfield Flood Control Dam and lesser rainfall amounts. Several roads experienced washouts, culverts were destroyed, and property damage occurred throughout the town with some minor flooding in low-lying areas of town. The counties that fared the worst were located in sub-watersheds with the heaviest rainfall. The map on the left shows the great variation in rainfall amounts

Saffir-Simpson Hurricane Scale		
Category	Wind Speed	
	mph	knots
5	≥156	≥135
4	131-155	114-134
3	111-130	96-113
2	96-110	84-95
1	74-95	65-83
Non-Hurricane Classifications		
Tropical Storm	39-73	34-64
Tropical Depression	0-38	0-33

for Vermont from Tropical Storm Irene from 2 to 9 inches. It can be seen that Windsor County endured some of highest rainfall amounts with the Springfield area receiving 4-5 inches of rain.[30]

According to the 2011 Springfield Annual Report, the town was more fortunate than other towns in the region with an estimated $70,000 in damages, limited primarily to roads, culverts and bridges. These areas included the following:

- Pleasant Valley Rd.
- Lovell Rd.
- Whitney Rd.
- Greeley Rd.
- Putnam Rd.
- Monument Hill Rd.
- Spoonerville Rd.
- Bridge abutments were scoured on Mays Rd. and on Main St. in North Springfield
- Large culvert damage on Walker Rd. and on Litchfield Rd.
- A sewer line that crosses Great Brook near Fairbanks Rd.

After Tropical Storm Floyd in 1999, Springfield was impacted by a localized rainstorm in August, 2009; Tropical Storm Irene in late August, 2011; and localized storms in July, 2013.

Most recently, the town has experienced fluvial erosion and stormwater damage from very localized down pours most recently, in 2017 and 2018.

Vulnerable Assets – Hurricanes/Tropical Storms/Microbursts

Hurricanes and Tropical Storms are infrequent events in Windsor County and Vermont.

More often, Vermont experiences localized **Micro-bursts** and wind shears that tend to knock down trees, powerlines and blow the roofs off barns and other structures. Localized or widespread flooding and power outages from downed trees are the primary risks from this hazard.

Power loss is a function of Vermont's very rural nature with a large segment of its population living in remote locations dependent upon long extensions of the power grid. The impact of these secondary hazards is detailed in **Severe Weather (Section 5.2e**). Most vulnerable community assets to this hazard would be the same as for hazards **Flash Flood/Flood/Fluvial Erosion (Section 5.2b)** and high winds as described in **Severe Weather (Section 5.2e**). Data on occurrences of microbursts and extent of these hazards is not available.

5.2d Ice Jams

Ice jams are common in New England and occur during winter and spring months when river ice begins to break up and flow downstream or when a warm spell occurs midwinter season. Such ice flows can build up against bridge abutments or other obstructions and create a temporary dam impounding large

[30] 2013 State of Vermont Hazard Mitigation Plan, p 4-61

volumes of water that have the potential to flood the surrounding areas and damage infrastructure, including the many bridges within the town. The loss of a bridge could disrupt transportation corridors and isolate residential areas.

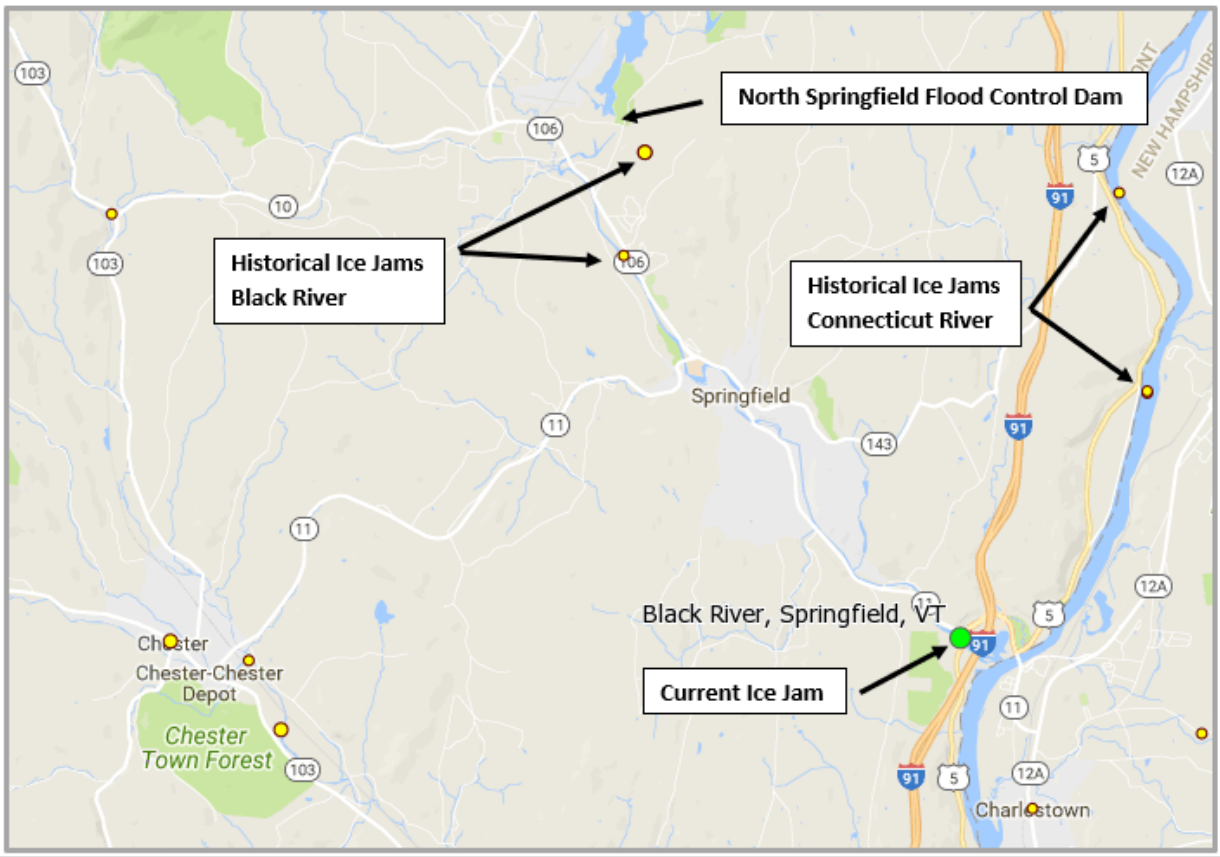
Extent and Historical Trend – Ice Jams

The most devastating winter floods have been associated with a combination of heavy rainfall, warm temperatures, and rapid snowmelt. Winter weather with less than average snowfall can result in greater ice buildup on streams and rivers, potentially resulting in greater ice jam damage.

Extreme changes in temperature during winter months is also a factor causing more frequent ice jams and can be expected more frequently with climate change.

It is difficult to predict changes in ice conditions due to climate change. "Although there is limited research on how climate change may influence the frequency and magnitude of ice jams . . . more frequent rainfall events during the winter months could lead to more frequent ice jamming occurrences." [31]

Figure 3: Springfield Ice Jam Events



[31] 2013 State of Vermont Hazard Mitigation Plan

Vermont ranks tenth with a total of 987 ice jam events in 310 locations between 1/1/1785 and 2/26/2017, according to the US Army Corps of Engineers, Ice Jam Database CRREL State Summary Report. **Figure 3** above identifies the location of ice jam events in Springfield; two on the Connecticut River and three on the Black River, one of which was current (green) as of 3-2-2018. [32]

Vulnerable Assets – Ice Jams

Vulnerabilities are similar to those for flooding. In addition to bridge damage, buildings and facilities along river banks just upstream from blocked bridges and riverside farmland are all at risk for flooding due to ice jams.

The areas in the figure above are at highest risk of future ice jams. The Committee noted that ice blocks build up on the banks along large sections of the Connecticut River as high as 8 ft. and cause erosion and flooding during spring melt. In addition to those indicated on the map, Paddock Rd. which runs along the Black River main stem about two miles upstream from the confluence with the Connecticut River is also vulnerable to ice jams.

Though not identified as a high hazard, ice jams can cause a secondary event of flooding and threaten many of the same properties located within the FEMA Special Flood Hazard Area. When broken river ice begins to flow downstream, ice can build up against bridge abutments, undersized structures, and other obstructions to create a temporary dam impounding water which has the potential to flood surrounding areas. Ice jams threaten many of the same properties as inundation flooding and the damage can be expected to be similar. Discussion on vulnerability of community assets with regards to flooding would apply to ice jams as well and strategies identified for flood mitigation may also apply to mitigating ice jams.

5.2e Dam Failure and Dam Dewatering

"A ***dam failure*** may occur for multiple reasons, such as an overtopping caused by floods that exceed the capacity of the dam, deliberate acts of sabotage, structural failure, movement of the foundation supporting the dam, soil erosion in embankment dams, and inadequate maintenance and upkeep." The Vermont Department of Emergency Management & Homeland Security classifies dams according to the potential impact on loss of life and property damage to downstream areas if it were to fail. The Downstream Classification System used by the State is the same as that used by the U. S. Army Corps of Engineers and is shown below.

Downstream Hazard Classification of Dams

Class	Hazard Category	Potential Loss of Life	Potential Property Damage
3	Low	None expected (No permanent structures for human habitation)	Minimal (Undeveloped to occasional structure or agriculture)

[32] US Army Corps of Engineers, Ice Engineering Research Group Cold Regions Research and Engineering Laboratory, (http://rsgisias.crrel.usace.army.mil/apex/f?p=524:1:25120131971868::::), accessed 3-2-2018

2	Significant	Few (No urban developments and no more than a small number of inhabitable structures)	Appreciable (Notable agriculture, industry, or structures)
1	High	More than few	Excessive (Extensive community, industry, agriculture)

***Dam Dewatering** is the manipulation of waterflow from a dam to reduce pool level and risk of a dam breach and to manage or eliminate flooding damage upstream. Dewatering is regulated for the North Springfield Flood Control Dam*

by the USACE of New England through the Reservoir Control Center based out of the District Office in Concord, MA. Water discharge at the dam normally runs with upstream flows except for high flow events when the pool level is allowed to increase to levels that are managed with flow release rates. Maximum dam dewatering rates during flood or high flow events which are managed by the USACE, have recently increased from 3,500 gallons per minute to 4,500 gallons per minute or more as needed. It is expected that this increase may increase the flood hazard risk for some downstream communities and needs to be assessed.

Extent and Historical Trend – Dam failure and Dam Dewatering

The North Springfield Flood Control Dam, owned and operated by the U. S. Army Corps of Engineers, is one of 40 high hazard dams under the jurisdiction of the State's Agency of Natural Resources' Dam Safety Program and is inspected on a periodic basis. It is located in the northwest corner of town, on the Black River, 8.5 miles up from its confluence with the Connecticut River and provides flood protection for the town and communities downstream along the Connecticut River. The dam, fully constructed by 1960 together with its impoundment, the North Springfield Lake, has a total flood storage area of 1,200 acres which is equivalent to 5.9 inches of water covering its drainage area of 158 square miles.

In addition to the North Springfield Flood Control Dam, there are 12 dams within Springfield which are identified in **Appendix A, Map #5: Water Resources and Flood Resilience.** Five dams in the Black River impounding water for the production of hydro-electric power include Fellows Dam, Factory Falls Dam, Comtu Falls Dam, Slack Dam, and Lovejoy Dam. There are two other dams where hydro-electric power generation is possible: Muckross Dam and Gould Mills Dam.

Normal reservoir pool levels at the North Springfield dam are kept at 15 feet and the spillway top is located at 93.5 feet, therefore, the worst flooding that could be anticipated is above 93.5 feet. The most recent major storm to affect the area was Tropical Storm Irene in August 2011 when Black River gauge heights north of the dam hit major flood levels of 15ft. which would not have entered the spillway.

The risk of flooding downstream of the North Springfield Dam is more likely to be due to flood control management activities by the USACE Reservoir Control Center during periods when conditions require dewatering at the maximum dewatering rates.

The town has not experienced notable flooding as a result of dewatering of the flood control dam, however, with an increase in the frequency and extent of rain events, due to climate change, this hazard risk could be significant.

The Committee has recommended modification of town flood inundation maps and review of emergency response protocol based on the higher maximum dewatering rate.

Vulnerable Assets – Dam failure and Dam Dewatering

According to the Vermont Hazard Mitigation Plan, none of the state's high hazard dams are considered to be in imminent danger of failing. As required by the Dam Safety Program, an Emergency Action Plan (EAP) and Inundation Map are maintained by the Town for the North Springfield Dam. Inundation areas affecting Springfield that are most vulnerable to dam failure would be the flood hazard areas as mapped in **Appendix A, Map #5: Water Resources and Flood Resilience.** Some areas along the Connecticut River are also vulnerable to failure of upstream dam facilities.

The Town does own another dam in the Town of Weathersfield which had previously served as a secondary water supply for Springfield. This site contains an eleven-acre impoundment area and serves as the drainage for 1638 acres. The dam is an earthen embankment with a solid concrete core, although no design records exist. This dam has suffered structural deterioration and continues under daily surveillance for further deterioration. There are currently three residential structures in the FEMA identified 100-year flood zone within one mile downstream of the dam. Any significant failure of the dam would affect these structures along with Reservoir Rd. which serves as a north/south corridor linking Weathersfield and Springfield.

5.2f Severe Weather

For the purposes of this Hazard Mitigation Plan, severe weather is defined as being two or more of the following hazards occurring together: thunderstorms, power failure, high wind, lightning, and hail. Severe Weather hazard scored a '10' in the hazard analysis. Hail, a lesser hazard, was scored separately at '6' and is covered only briefly in this plan. Severe weather hazards are described below with wind hazard profiled in more detail.

Severe Thunderstorms are a relatively common hazard in Vermont and most often seen accompanied by high winds. Thunderstorms and associated hazards can occur anywhere in Vermont at any time of year; however, spring and summer are the most common times for severe thunderstorms.[33]

Although typically short in duration, these can be damaging wind events with the potential for compounding impacts capable of producing heavy rain (Flood & Fluvial Erosion), dangerous lightning (Wildland Fires) and large hail.

[33] 2018 State of Vermont Hazard Mitigation Plan

High Winds from a thunderstorm can gust up to 50 mph and cause property damage and disruption in electric and telecommunication utilities, transportation and commercial businesses. Although difficult to predict, these storms also pose a high risk of injuries and loss of life. The downward draft from these storms can produce ***microbursts*** which are not uncommon in Vermont. These events can come with wind speeds in excess of 80 mph, and pose an additional threat to low flying aircraft making it difficult for them to maintain altitude. Although less common in Vermont, super cell thunderstorms are the largest, longest lasting and most devastating thunderstorms which can produce tornadoes and widespread destruction of crops and property. Tropical storms, hurricanes, nor'easters, and winter storms can also cause high wind damage throughout the state. Tornado hazard scored a '6' and is not profiled in this plan.

The Beaufort Wind Scale shown below can be used to predict damage based upon wind speeds. The National Weather Service issues wind advisories when sustained winds of 31-39 miles per hour are reached for at least one hour or gust between 46-57 miles per hour and High Wind Warming for winds of 58 mph or higher. Thunderstorm winds tend to affect areas of Vermont with significant tree stands as well as areas with exposed property and infrastructure and aboveground utilities. [34]

Beaufort Wind Scale		
Classification #	**Wind Speed**	**Land Conditions**
6	25 to 31 mph	Large branches in motion; whistling in telephone wires
7	32 to 38 mph	Whole trees in motion; inconvenience felt walking against wind
8 to 9	39 to 54 mph	Twigs break off trees; wind generally impedes progress
10 to 11	55 to 73 mph	Damage to chimneys and TV antennas; pushes over shallow rooted trees
12 to 13	74 to 112 mph	Peels surfaces off roofs; windows broken; mobile homes overturned; moving cars pushed off road
14 to 15	113 to 157 mph	Roofs torn off homes; cars lifted off ground

For the purposes of the Hazard Mitigation Plan, the scale is only shown above wind force 5; Data from NOAA

Lightning, the most unpredictable related hazard, can strike up to 50 miles away from a thunderstorm and carry up to 100 million volts of electricity reaching temperatures upward of 50,000°F. It is extremely hazardous to human life, and can also damage infrastructure, buildings and property, and can start forest fires. Lightning is the most unpredictable weather-related event. Although there are no local historical records on the occurrences or impact of this hazard, a combination of a severe lighting storm during a severe drought or dry spring conditions can ignite wildfires which can be devastating. Local data on this hazard is not available.

Hail is a form of precipitation that falls as pellets of ice. The size of hail can typically range in size from pellet to golf ball size, though can be much larger during severe occurrences. Hail can be especially damaging to crops, structures and vehicles, and large hailstones can be deadly to livestock and people caught outside during an event. Local data on this hazard is not available.

Power Failure is a common secondary hazard caused by severe weather and has an annual frequency within Windsor County and much of Vermont. Power outages can occur on a town-wide scale and are typically the result of power lines damaged by high winds or heavy snow or ice storms but may also result from disruptions in the New England or national power grid as indicated by the widespread outages in

[34] 2013 State of Vermont Hazard Mitigation Plan

2003. Dead or dying trees in proximity to power lines pose a particular threat for power failure as these trees are often brought down by triggering events such as winter storms.

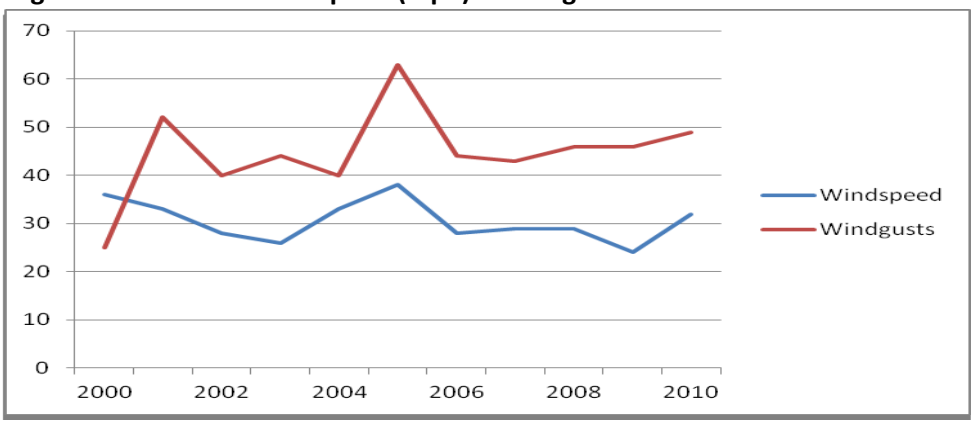
Extent and Historical Trend – Severe Weather

Since 2002 there have been six federally declared wind disasters in Vermont needing public assistance. Of these, only one in April 2007 affected Windsor County and much of southern Vermont. The storm resulted in many downed trees and damage to private homes and infrastructure. Estimated damage from this storm for Vermont was $4.8 million. For Springfield, losses were less than $50,000 but other towns in the county incurred losses of $50,000-$100,000. [35]

Figure 4 displays a historical record of the maximum wind speeds recorded in Reading, a neighboring town. Over the past decade, the highest recorded wind speed approached 40 miles per hour with gusts reaching over 60 miles per hours. No high wind hazard areas have been identified or mapped in our region, and there is no local historical data available for severe weather. However, the Town does have recollection of microbursts occurring in some areas of town. Tornadoes have the potential to cause more significant damage, however, they occur rarely in our area and are not covered in this plan.

The 2014 National Climate Assessment predicts an observable increase in the severity of storms, although changes in frequency or severity of wind events is uncertain. [36]

Figure 4: Maximum Windspeed (mph) Reading Vermont 2000-2010[37]



Hail events are considered an infrequent occurrence in Vermont and generally accompany passing thunderstorms. They are much more frequent during the summer months of June through August with July reporting more than double the number of events compared to June and August. Their extent is difficult to determine but tend to be highly localized, very short in duration with hail size of < 1 inch in diameter, and limited to small relatively small areas.[38] Windsor County reported an event on June 6,2005,

[35] 2018 State of Vermont Hazard Mitigation Plan
[36]https://nca2014.globalchange.gov/report/our-changing-climate/changes-storms
[37]Historical windspeed data from Wundergound: http://www.wunderground.com/
[38] 2013 State of Vermont Hazard Mitigation Plan

with minor damage. As weather events become more extreme with climate change, this hazard may occur more frequently.

Vulnerable Assets – Severe Weather

For the Severe Weather hazard category, all Springfield residential areas are vulnerable to **power outages** from **high wind** events and ice storms as residential areas tend to be more wooded and utility infrastructure is above ground. Town assets are located in developed downtown areas with less trees and are not particularly vulnerable to this hazard. Based on the wind data from **Figure 4**, the expected magnitude for future high wind events will fall between 40 and 50 miles per hour, or Beaufort scale number 8-9, and will likely result in downed trees, power lines, and small damage. However, the possibility does remain for larger high wind events such as the 1998 F3 tornado on the Enhanced Fujita Scale and localized microbursts.

Clearing overhanging, leaning and dying trees near power lines is part of annual town-wide maintenance to minimize impact from high winds.

Potential loss estimates are difficult to predict for power failures as they are typically isolated in geographic area and short in duration. Therefore, power failures often have only minimal impact to people and property. However, longer duration events may result in the loss of perishable items and business losses. Power outages in winter months may result in the loss of home heating, ruptured water pipes and the resulting structural damage. The loss of home heating may be a contributing factor to the increase in structure fires during the winter months. Local data on historical occurrences, extent of outage and associated costs are not available. Burying of power lines for long-term mitigation of both wind and ice events is cost ineffective for most towns.

5.2g Severe Winter Weather/Extreme Cold

Winter storms and **blizzards**, with **snow**, **ice**, wind and **extreme cold** in varying combinations, are fairly commonplace in Springfield and occur town wide. Heavy accumulation of snow accompanied by high winds causes drifting of snow and low visibility and make it difficult to keep roads cleared. Sidewalks, streets, and highways can become extremely hazardous to pedestrians and motorists. Heavy wet snows of early fall and late spring, as well as ice storms, can result in property damage and in loss of electric power, leaving people without adequate heating capability. Power loss is often the result of downed trees, which can also disrupt traffic and emergency response by making roads and driveways impassable.

Severe winter storms in the northeastern United States develop through the combination of weather and atmospheric conditions including the moisture content of the air, direction of airflow, collision of warm air masses coming up from the Gulf Coast, and cold air moving southward from the Arctic.[39]

A winter storm is considered severe when there is a possibility of:

- Six or more inches of snow fall at a given location within 48 hours,
- Property damage, injuries or deaths, or

[39] 2013 State of Vermont Hazard Mitigation Plan

- An ice/glaze storm which causes property damage, injuries or death.

Severe winter storm alerts are communicated based on the terminology in the table below.

Term	Definition
Winter Storm Watch	Snowstorm conditions are possible in the specified area, usually within 36 hours.
Winter Storm Warning	Snowstorm conditions are expected in the specified area, usually within 24 hours.
Blizzard Warning	Sustained winds or gusts of 35 mph occurring in combination with considerable falling/blowing snow for a period of at least three hours are expected.
Heavy Snow Warning	Snow accumulations are expected to approach or exceed 6 inches in 12 hours.

A Nor'easter is a large weather system traveling from South to North, passing along, or near the Atlantic seacoast. As the storm approaches New England and its intensity becomes increasingly apparent, the resulting counterclockwise cyclonic winds impact the coast and inland areas from a northeasterly direction. The sustained winds may meet or exceed hurricane force. There are no standard models or methodologies for estimating loss from winter storm hazards, however, extreme winter weather is considered a way of life in Vermont and many rural Towns are accustomed and prepared for these events.

Blizzards are defined by the National Weather Service as "sustained winds or frequent gusts of 35 mph or greater (and) considerable falling and/or blowing snow reducing visibility frequently to 1/4 mile or less for a period of three hours or more[40]." These storms become a challenge in keeping roads plowed due to the snow drifts that occur.

Ice Storms are defined by the National Weather Service as "occasions when damaging accumulations of ice are expected during freezing rain situations. Significant accumulations of ice pull down trees and utility lines resulting in loss of power and communication. These accumulations of ice make walking and driving extremely dangerous. Significant ice accumulations are usually accumulations of ¼" or greater."[41] Multiple sources state that a ¼ inch of ice accumulation from an ice storm can add 500 pounds of weight on the lines between two power lines.

Extreme Cold temperatures are part of Vermont's climate tendency to stray above or below expected temperature values. What constitutes 'extreme cold' can vary and is based on what a population is accustom to in their respective climates.

This hazard can have a significant effect on human health and on commercial/agricultural businesses, and primary and secondary effects on

[40] National Weather Service Glossary
[41] National Weather Service Glossary

infrastructure including burst water pipes and power failure. Colder than normal temperatures during the grow season can devastate crops and plants. [42]

Extent and Historical Trend –Severe Winter Weather/Extreme Cold

The most recent Federal Disaster Declaration due to a winter storm that affected Windsor County was DR-4207 for an event in December 2014, with prior events in December 2010 and January 2001. The damage assessment from the severe winter storm in December 2014 for Winter County was estimated to be over $200,000. During the writing of this plan, Windsor County just experienced its second Nor'easter in the month of March, 2018, dumping more than 2 feet of snow.

Historical data for snow and temperatures for the Town of Springfield can be found online at U.S. Climate Data from 2008 to current.[43] Selected temperature data for the month of January, which is typically the coldest winter month in Vermont, is shown along with seasonal snowfalls.

TABLE 6: Springfield Winter Temperatures and Snowfall

	January Temperature °F		Snow Fall (inches)				
	Lowest	**Average**	**Dec**	**Jan**	**Feb**	**Mar**	**Total**
2008	-11	10.8	0	17	32	9	58
2009	-18	-0.8	28	30	12	5	75
2010	-4	11	19	9	23	0	51
2011	-20.9	7.4	14	35	30	5	84
2012	-11.9	14.1	0	9	2	13	25
2013	0	8.6	18	11	19	12	59
2014	-18	5.4	20	11	27	10	68
2015	-13	1.2	7	15	31	2	55
2016	0	15	5	4	6	10	25
2017	-5	19.2	23	7	26	13	69
2018	-20.9	8.6	19	13	23	NA*	55
	Average Snowfall		13.9	15	21	7	56
	Normal Average Low		7°F for January				
	* Not Yet Available						

There is no specific region in Vermont that is more vulnerable to ice storms, according to the 2018 Vermont State Hazard Mitigation Plan. The state plan identifies accumulations for ice storms in December 2008 and January 1998 of 1/2-3/4" of ice plus 1-2" of sleet and 3" of ice, respectively. Heavy wet snow can cause similar secondary hazards such as tree damage and power outages. Northwest sections of

[42] 2013 Vermont State Hazard Mitigation Plan

[43] https://www.usclimatedata.com/climate/springfield/vermont/united-states/usvt0505/2018/1

Windsor County were impacted by heavy wet snow during the Federally declared ice and snow disaster in December 2014, DR-4207. Local data for ice storms is not available.

It can be seen that temperature trends reflect a general winter warming with the average low temperature during the month of January above the normal average of 7°F for eight of the last eleven years.

However, the town has also experienced extended periods of extreme cold January temperatures in 2009, 2014 and 2016. In January 2009, Springfield had nine consecutive days and 20 total days of zero or below zero temperatures.

There were 16 days of zero or below zero temperatures in January 2014 and 2016. It is also worth noting that the area is seeing a greater range in temperature extremes which make for more hazardous conditions for flooding and ice jams.

In the current year, 75-degree swings in winter temperatures ranged from -20.9 to 53.1°F° in January and -2.9 to 72.1°F in February.

Snowfall for the town has averaged a total of 57 inches for the winter season from December through March since 2008 with the highest amounts falling during the month of February. Springfield residents can expect at least 60 pounds of weight per square foot on their infrastructure during winter months.

The National Weather Service in Burlington, Vermont, has also recorded the following extreme events. As of August 15, 2012, a maximum recorded snowfall event of 56.7 inches occurred in December, 1970, with a record annual snowfall for that same season of 145.4 inches. The same service recorded extreme cold temperature events as of July 22, 2013 to be, approximately, -30°F in 1/1994, 2/1979, 1/1957 and 12/1933. Since 2013, the Burlington Free Press reported a record low for the area of -37°F. [44]

Vulnerable Assets –Severe Winter Weather/Extreme Cold

Statewide, damage from **blizzards**, **snow** and **ice storms** can vary depending upon wind speeds, snow or ice accumulation, storm duration, tree cover and structural conditions such as heavy snow and ice accumulation on large, flat roofed structures or aged structures in deteriorating condition. "According to the 2014 National Climate Assessment, there is an observable increase in severity of winter storm frequency and intensity since 1950. While the frequency of heavy snowstorms has increased over the past century, there has been an observed decline since 2000 and an overall decline in total seasonal snow fall."[45]

Vermont communities are well prepared to handle heavy snowfall. However, it is typically the secondary hazards that are most concerning to the town. Depending on the event, particularly with heavy, wet snow or ice, electricity may be knocked out for a few hours or days due to downed powerlines from falling trees. This is a time when residents are most vulnerable to structure fire hazard. Extended periods of extreme cold or loss of power during the winter months require continued vigilance on the safety of heating to

[44] http://w2.weather.gov/climate/local_data.php?wfo=BTV
[45] 2018 Vermont State Hazard Mitigation Plan, p. 81

reduce the risk of a structure fire as a secondary hazard. Many residents heat their homes with open flame heating sources including fireplace, wood or pellet stoves, and will supplement with electric or kerosene space heaters.

Green Mountain Power, the utility company that currently serves Springfield, follows a regular tree-trimming schedule in coordination with the Tree Warden. Town officials believe this to be satisfactory to mitigate damages and power outages caused by downed trees and tree limbs during events.

5.2h Landslide/Slope Failure

The following excerpts are taken from the 2013 Vermont State Hazard Mitigation Plan:

'The term "landslide" describes a wide variety of processes that result in the downward and outward movement of slope-forming materials including rock, soil, artificial fill, or a combination of these. The materials may move by falling, toppling, sliding, spreading, or flowing. Landslides are common on clayey to sandy lacustrine deposits throughout Vermont. In many cases, the displaced material has been at least partially eroded away by stream flow.'

Landslides can be triggered by one or a combination of factors, including fluvial erosion, soil saturation, natural geologic weathering processes such as the freezing and thawing of soils, human modification of the bank, increases in loading on top of the slope, surface or near surface drainage patterns, and loss of vegetation. Fluvial erosion, causing bed and bank erosion are associated with water flowing along the toe of the slope, removes bank material to over-steepen and potentially under-cut the slope.

Widespread slope failure occurred throughout much of central and southern Vermont as a result of Tropical Storm Irene. Many of these landslides occurred on the sites of earlier slides that were reactivated by subsequent heavy rains and floodwaters. [46]

While many of these slope failures occurred along riverbanks, others were initiated by strong stormwater flows that found a path of least resistance from impervious surfaces.

<u>Extent of Hazard – Landslides/Slope Failure</u>

Historical data specific to Landslides is minimal as these events typically occur during high rain and erosion events and are incorporated in and associated with these federal disaster declarations.

While significant specific landslides have occurred in Vermont with mitigation costs totaling, approximately, $4 million since 1999, extensive landslides occurred in central Vermont in 2011. This was the result of increased slope instability due to ground saturation from thick snowpack melt and heavy spring rains followed by Tropical Storm Irene in late August. Following Tropical Storm Irene, nine "cliff hanger" properties were purchased state-wide using FEMA HMGP grants for a total of, approximately,

[46] 2013 Vermont State Hazard Mitigation Plan

$1,500,000 due to continued risk from previous landslides. Property damage from seven significant landslides in the State outside of Tropical Storm Irene total, approximately, $4.3MM since 1983. Springfield also suffered slope failures initiated by Irene and exacerbated by subsequent heavy rains and declared flood disasters in 2012 and 2013.

Residential properties on Meadow Drive in Springfield were threatened by a deteriorating embankment on a 75 ft. high slope which had eroded to the point of exposing wastewater systems and encroaching on the roadway. Overtime a two-year period, the crevice which was initially caused by Tropical Storm Irene grew from a length/width/depth of 20'/8'/4' to 50'/20'/8' over a two-year period until it was repaired at a cost of $350,000.

Similar slope failure hazards now exist in town including an eroding gully created by stormwater flow from Lincoln Street above with dimensions estimated to be 10 ft. deep and 150 ft. wide. The deterioration of this slope over time has led to destabilization of the valley wall and is undermining the Healthcare and Rehabilitation Services facility parking lot on Valley St. An additional site located on private property at 12 North Main Street, likely caused by streambank toe erosion, is threatening the town's watermain. Estimated volume of this slide is 525 cubic yards from slide dimensions of 90 ft. slope height, 45 ft. in slope width and 3.5ft. in depth erosion at the top. Previous attempts to control the erosion have not been effective.

Vulnerable Assets – Landslides/Slope Failure

Fluvial erosion and stream toe erosion of steep slopes are considered the most important contributing factors to landslides in Vermont.

Due to the town's topography with development on-top valley walls with minimal stormwater infrastructure, Springfield is particularly susceptible to slope failures triggered by stormwater flow over steep embankments during high rain events.

These vulnerable areas can be located well above the FEMA flood hazard elevations and, therefore, not captured by floodplain mapping. Roads that sit along steep slopes near rivers are especially vulnerable to damage or complete failure from a landslide particularly with increased slope instability due to ground saturation.

The two existing sites described above continue to erode and are at risk of massive failure. Future flooding and high flow rates in local rivers and streams tributaries will continue to scour river banks of the existing vulnerable slopes threatening properties and road infrastructure. These additional vulnerable areas are identified in the 2016 Springfield Road Erosion Inventory Report and summarized in **Appendix F.**

6. MITIGATION PROGRAM

The following sections detail the mitigation goals and potential mitigation strategies identified by the Town and compiled and organized by the Hazard Mitigation Committee to reduce the impact of the hazards assessed in this plan.

The implementation schedule that follows in Table 7 is a comprehensive list of hazard mitigating strategies and actions that the town has targeted for implementation during the five-year cycle of this plan.

6.1 Mitigation Goals and Objectives

Following the Hazard Analysis and the public involvement process for this update, the Hazard Mitigation Committee then reviewed the prior AHMP goals and strategies **(Table 1),** Existing Resources **(Table 2)**, the Town Plan and Regional and State Hazard Mitigation Plans, and formulated the following overarching goals below. Note that the numbers do not indicate goal priority but are used to identify actions that support it.

Hazard Mitigation Goals and Objectives

1. Provide protection to the community from impact of hazardous events.
    a. Reduce the risk of potential loss of life, injuries, negative health impact, and property damage from hazard events, particularly flood, structure fire and erosion.
    b. Maintain and enhance Emergencies Operation Plan.
2. Improve efforts to raise municipal awareness of the Hazard Mitigation Plan.
    a. Incorporate hazard mitigation in the Springfield Town Plan, Flood Hazard By-Laws, Planning and Zoning, Road Standards and Maintenance Programs, and related projects.
    b. Review progress on hazard mitigation plan strategies and actions during publicly noticed meetings (Selectboard or Planning Commission).
    c. Be proactive in seeking funding opportunities for hazard mitigation projects and informing the public on progress made.
3. Increase community awareness and resiliency to hazard events.
    a. Increase efforts to inform residents and businesses of known hazards.
    b. Improve efforts to help minimize and address financial losses due to hazard events incurred by residents and business owners.
4. Improve effectiveness of future Hazard Mitigation Planning efforts.
    a. Improve efforts to identify and inventory vulnerable community assets to future hazards including town infrastructure, and commercial and residential structures and properties.
    b. Develop a process for tracking plan implementation over the plan period.

6.2 2018-2023 Mitigation/Preparedness Strategies and Actions

Strategy Selection and Prioritization Process

Following the update and review process, the Hazard Mitigation Committee has identified the following Mitigation/Preparedness Strategies and Actions for the 2018-2023 planning period as outlined in **Table 7**.

These mitigation actions have been chosen by the committee as the most effective and feasible actions to be taken during this plan period to lessen the impacts of the hazards identified in Section 5. A new column has been added to identify the related goal and objective for each action. It was determined that some of the actions from the previous plan have been carried-over here with some modifications either because they have been expanded or because of their on-going cyclical nature.

Compared to the previous Hazard Mitigation Plan, below are changes in the priority of hazards addressed and approach on formulating goals and actions:

- The Town has chosen to focus on only natural hazards in this update.
- Flood and Erosion hazards scored higher with an expanded number of flood and erosion related strategies to be given higher priorities than in previous years.
- Landslide/Slope Failure hazard was introduced in this update as a high priority hazard due to the continued deterioration of eroded areas caused by TS Irene.
- This is the first plan in which Extreme Cold hazard is specifically profiled given the recent occurrences of extended periods of below zero temperatures.
- Recent dry spells during the spring and late summer, has also raised the hazard score for Structure and Brush Fire compared to previous plans.
- Efforts were made to better identify goals and more specific actions to improve plan effectiveness and clarity in tracking progress. The association of actions to specific goals is also new this plan.

Prioritization of Strategies and Actions

The Committee determined that the method of prioritizing mitigation strategies and actions be changed from a specific numbered priority order of individual action items to a 'categorizing' of priorities based on two categories – High, Moderate, and Low (see color coded legend below). It was decided that a more general prioritization methodology would improve overall progress on implementation for the follow reasons:

- Offers the needed flexibility as priorities can change over time.
- Allows the Committee to take advantage of all funding opportunities as they arise.
- Implies that several actions can progress simultaneously.
- Encourages the Committee to keep all proposed actions in mind.

To assign action priority, a number of criteria were taken together, in addition to the Hazard Analysis Score in Section 5.1 but weighted subjectively. For example, a "High" priority action would typically score higher in the Hazard Analysis and have greater weight for the first two criteria listed below than those with a "Moderate" priority.

Criteria for prioritizing proposed mitigation strategies and actions in **Table 7**:

- Severity or immediacy of need and greatest potential impact. This subjective assessment would consider the potential extent of vulnerability in terms of structural damage repair costs, level of safety risk to residents impacted, and probability of occurrence.
- Number of residents impacted by hazard that would benefit from mitigation.
- Availability of funding and personnel resources to implement the project. Availability of town, state or federal funds, and availability of town or SWCRPC personnel are considered.
- Project Cost related to funding feasibility. Springfield is a small town and does not currently have the capacity to assess the potential damage and cost of repairs for each of the proposed actions. However, prior to pursuing any mitigation project, the Town would consider the costs and benefits of the project using FEMA methodology.

High Priority
Moderate Priority
Low Priority

TABLE 7: 2018-2023 Springfield Mitigation/Preparedness Strategies and Actions

MITIGATION ACTION (Identified in Other Plans)*	TYPE **	HAZARD ADDRESSED	RELATED GOAL/ OBJECTIVE	RESPONSIBLE PARTY*	TIME FRAME	FUNDING SOURCE/ COST TO TOWN***
General Hazard Mitigation Strategies						
Implement Vermont Alert System for the Town to include Training, Data Collection and Program Planning	M, P	All	1b, 4a	Emergency Management, Selectboard, HMC	3Q/2018-2Q/2019	HMGP/EMPG for Data Collection/ Town Match, Moderate Town personnel cost
Work with SWCRPC to incorporate these new Hazard Mitigation Plan Strategies into Other town planning efforts	M	All	2a, 3a, 3b, 4a	Selectboard, Planning Commission, HMC, SWCRPC	2018-2023 As plans are updated	Minimal Town personnel cost
Establish Standard procedures for VT Alert to Inform Residents of Heating Fire Hazards during Extended Extreme Cold events, Brush Fire Hazard during Extended Dry Periods, Evacuation Routes and Emergency Shelters	M, P	Fire, Severe Winter Weather, Flood	1a, 1b, 3a, 4a	Fire Dept., HMC, Emergency Management	1Q/2019-4Q/2019	EMPG, Moderate Town personnel cost
Enhance and update At-Risk Registry for vulnerable populations	M, P	All	1a, 1b, 4a	Emergency Management, Fire Dept.	3Q/2019-2Q/2020	Moderate Town personnel cost

Conduct formal annual monitoring of this HMP and informing the public on progress made	M, P	All	2b, 3a, 4b	HMC	3Q-4Q annually	Minimal Town personnel cost
Become a participating member in the FEMA's Community Rating System	M, P	Flood	2c, 3b	Emergency Management, Selectboard	1Q/2021-4Q/2021	Moderate Town personnel cost
Specific Hazard Mitigation Strategies and Actions						
Mitigate Lincoln Street slope failure	M	Slope Failure	1a, 3b	Public Works, Selectboard, SWCRPC	3Q/2018-4Q/2019	HMGP, FMA, PDM, Town Match
Mitigate North Main Street slope failure	M	Slope Failure	1a, 3b	Public Works, Selectboard, SWCRPC	3Q/2018-4Q/2019	HMGP, FMA, PDM, Town Match
Upgrade Chester Brook culvert bottom of Chester Rd. (STP, Flood Resilience Chapter)	M	Flood, Erosion	1a, 3b	Public Works, Selectboard	2Q/2019	THSGP, BRGP, CWBG, ERGP, HMGP, FMA, Town Capital/ Town Match
Evaluate susceptibility of Seavers Brook residential area to flooding to determine mitigation options or precautions. (STP, Flood Resilience Chapter)	M	Flood, Erosion	1a, 3b, 4a	Planning Commission, Emergency Management	1Q/2021-4Q/2022	HMPG, MHSMP/ Town Match
Upgrade Carly Rd. culvert at bottom of Carly Brook at River St. to mitigate River Street Flooding (STP, Flood Resilience Chapter)	M	Flood, Erosion	1a, 3b	Public Works, Selectboard	2Q/2018	Town Capital, ERGP, BRGP, HMGP, FMA, THSGP/ Town Match

Evaluate susceptibility of Paddock Rd. area to ice jams and flooding to determine mitigation options or precautions. (STP, Flood Resilience Chapter)	M	Flood, Erosion, Erosion, Ice Jams	1a, 3b, 4a	Planning Commission, Public Works, Emergency Management	1Q/2023-4Q/2023	HMGP, MHSMP/ Town Match-low for planning
Assess and Mitigate Fairgrounds Rd. River Bank Erosion (STP, Flood Resilience Chapter)	M	Flood, Erosion, Slope Failure	1a, 3b	Public Works, Selectboard	1Q/2021-4Q/2022	BRGP, VWG, ERGP, CWBC, HMGP/ Town Match (low for engineering, high to implement)
Assess and Mitigate Elm Street/French Meadow Road Bank Erosion (STP, Flood Resilience Chapter)	M	Flood, Erosion	1a, 3b	Public Works, Selectboard	1Q/2021-4Q/2022	BRGP, VWG, ERGP, CWBC, HMGP, FMA / Town Match (low for engineering, high to implement)
Assess and Mitigate Great Brook / Black River Confluence flood issues in North Springfield (STP, Flood Resilience Chapter)	M	Flood, Erosion	1a, 3b	Planning Commission, Public Works, Emergency Management, Selectboard	1Q/2022-4Q/2023	VWG, HMGP, FMA, CWBG, MHSMP / Town Match (low for assessment)
Assess vulnerability of Connecticut River development to flood, erosion, and ice jams (STP, Flood Resilience Chapter)	M	Flood, Erosion, Ice Jams	1a, 3b, 4a	Planning Commission, Public Works, Emergency Management	1Q/2023-4Q/2023	CRC, VWG, HMGP/ Town Match (low for assessment)
Determine stabilization options for the slope failure off of Seavers Brook Rd. (2016 REIR, ID#126)	M	Flood, Slope Failure, Erosion	1a, 3b	SWCRPC, Public Works, Selectboard	2Q/2020-2Q/2021	VWG, ERGP, CWBC, HMGP/ Town Match (low for engineering)

Assess deteriorating condition of sectional bridge on Massey Road, a school bus route. (2016 REI, ID#128)	M	Slope Failure, Erosion	1a, 3b, 4a	SWCRPC, Public Works, Selectboard	2Q/2020-2Q/2021	VWG, THS, ERGP, HMGP, FMA/ Town Match- (low for engineering)
Conduct hydraulics on failing culvert on Walker Rd. a single access road. (2016 REI, ID#106)	M	Flood, Slope Failure, Erosion	1a, 3b	SWCRPC, Public Works, Selectboard	2Q/2019-4Q/2021	VWG, CWBG, ERGP, HMGP, FMA / Town Match-(low for engineering)
Evaluate stabilization options for severe bank erosion threatening utilities along Middle Rd. (2016 REIR, ID#67)	M	Slope Failure, Erosion	1a, 3b	Public Works, Selectboard	2Q/2019-4Q/2021	VWG, BRGP, CWBG, ERGP, HMGP, FMA / Town Match (low for engineering)
Evaluate and prioritize remaining projects in 2016 Road Erosion Inventory Report not listed here. (See Appendix F)	M	Slope Failure, Erosion	1a, 3b, 4a, 2a	Public Works, HMC, SWCRPC	2Q/2019-4Q/2021	BRGP, MRGIA, VTrans, Town Capital, CWBG, /Low Town Personnel cost to plan, moderate-high to implement
Conduct an educational outreach for Seavers Brook community on flood risk and resiliency	M, P	Flood, Erosion	1a, 3a, 3b	Emergency Management, HMC, SWCRPC	2Q/2020	Moderate Town personnel cost
Proactively manage culvert upgrade program by seeking new funding opportunities for Municipal Roads General Permit Standards compliance (MRGP)	M, P	Flood, Erosion	1a, 2c, 3b, 4a	Public Works, Selectboard, SWCRPC	2Q/2018 and annually 2Q	BRGP, MRGIA, ERGP, HMGP, FMA, VTrans, Town Match and Capital
Review and prioritize Black River Corridor Plan for applicable general town and watershed-wide recommendations to reduce flood risk	M	Flood, Erosion	1a, 3b, 4a	HMC	3Q/2019	Low Town personnel cost to review

Develop a long-term plan to address new Municipal Roads General Permit (MRGP) standards on hydrologically-connected roadways	M	Flood, Erosion	1a, 3b, 4a	Public Works, Selectboard, SWCRPC	3Q/2019-4Q/2020	Moderate to high Town personnel cost
Implement MRGP Plan to meet standards; prioritize road segments as funding becomes available	M	Flood, Erosion	1a, 3b	Public Works, Selectboard, SWCRPC	2018-2023 2Q for review, 3Q-4Q to install (annually)	BRGP, MRGIA, VTrans, Town Capital / Low Personnel cost to plan and prioritize, moderate-high to implement
Enhance Annual Fire Safety Awareness Program for residents and landowners on Structural and Wildland Fire Hazards	M	Wildfire, Structure Fire	1a, 3a, 3b	Fire Dept., HMC, Emergency Management	1Q/2020	Moderate Town Personnel cost
Explore, identify, and purchase where possible, conservation easements, funding or other options to restore floodplain access for flood waters for the Black River and its tributaries	M	Flood, Erosion	1a, 2c, 3b	Selectboard, SWCRPC, Planning Commission, VRC, CRC	2019-2023	RCCEG, REP, VLT Private Funds, VRC, CRC, HMGP, FMA, Town Match /Low Cost to Town Personnel to explore, moderate to high to purchase
Continue to work with State and SWCRPC to make progress on River Corridor Maps and in adopting River Corridor regulations	M	Flood, Erosion	1a,2a, 3b	Development Review Board, Planning Commission, P & Z, SWCRPC	2019-2022	ERGP, VWGP/ Town match, Moderate Town personnel cost
Identify and educate property owners located within Special Flood Hazard Areas or River Corridor on flood and erosion risks, mitigation, FHA By-Laws, and the current NFIP	M, P	Flood, Erosion	1a,3a,3b, 4a	Emergency Management, HMC, w/SWCRPC assistance	1Q/2020-1Q/2021	VWG, ERGP, VLT/Low Town Personnel cost, Town Match

Develop and formally adopt an Emergency Response Plan for a North Springfield Dam Breach Event	P	Flood, Erosion	1a, 1b, 2a, 3a, 3b	Emergency Management, HMC	1Q/2021-4Q/2022	Moderate Personnel cost to Town
Develop and formally adopt an Emergency Response Plan for High Dam De-Watering Events	P	Flood, Erosion	1b, 3a, 4a	Emergency Management	1Q/2020-4Q/2021	Moderate Personnel cost to Town
Incorporate Flood Risk and Resiliency outreach (signage) as part of downtown Black River Access and Greenspace plans	M	Flood, Erosion	3a	Planning Commission, HMC, Downtown Design Commission	2019-2023 with downtown development	HMGP / Town Match
Strengthen stormwater infiltration practices recommendations/regulations for new development to improve flood resiliency	M	Flood, Erosion, Ice Jams	1a, 2a, 2b,	P & Z, Zoning Administrator, Selectboard, SWCRPC	2019-2023	Town Match, Moderate Town personnel cost to Town
Develop an evacuation plan for communities for business and residents in identified flood hazard areas and floodplains	P	Flood	1a, 1b, 2a, 3a	Emergency Management, HMC	2Q/2019-3Q/2020	EMPG / Town Match, High personnel cost to Town
Address need for improved Dam out flow readout with an adjustment for impact of ice jams	p	Flood, Ice Jams	1a, 1b, 3a	Emergency Management, HMC	1Q/2020-4Q/2020	EMPG / Town Match, Moderate personnel cost to Town

* STP - 2017 Springfield Town Plan
2016 REIR - 2016 Road Erosion Inventory Report
HMC - Hazard Mitigation Committee
SWCRPC – Southern Windsor County Regional Planning Committee
** M- Mitigation, P- Preparedness
*** Funding Acronyms:
HMGP - Hazard Mitigation Grant Program (VT State Department of Emergency Management)

EMPG – Emergency Management Performance Grant (VT State Department of Emergency Management)
BRGP - Better Roads Grant Program
MRGIA – Municipal Roads Grants-In-Aid
ERGP - Ecosystem Restoration Grant Program
CWBG – Clean Water Block Grant
THSGP – Town Highway Structures Grant Program
THC2RP – Town Highway Class 2 Roadway Program
MHSMP – Municipal Highway Stormwater Mitigation Program
TAP – Transportation Alternatives Program
VWG – Vermont Watershed Grant
VLT – Vermont Land Trust
RCCEG – River Corridor Conservation Easement Grant (ERGP)
CRC – Connecticut River Conservancy
VRC – Vermont River Conservancy
FMA – Flood Mitigation Assistance (FEMA)
PDM – Pre-Disaster Mitigation (FEMA)

6.3 Plan Monitoring and Maintenance Process

Plan Monitoring

The Hazard Mitigation Committee, with guidance from the Southern Windsor County Regional Planning Commission, will be responsible for monitoring this plan as outlined below, to ensure that progress is made and identified mitigation actions are implemented as resources or opportunities become available. This includes identifying funding opportunities and assisting with funding applications.

New this plan update is an effort to formalized a method for monitoring and evaluating the Springfield Local Hazard Mitigation Plan to track progress on action items and improve hazard data collection.

The monitoring process has been identified as an action item to be implemented annually over the plan period and will include a noticed annual meeting of the Hazard Mitigation Committee, in partnership with the SWCRPC, to review and track the following:

- progress on hazard mitigation strategies in **Table 7**;
- improvements in effectiveness of other resources in **Table 2**;
- updates to local, regional or State hazard data occurrences and extent;
- changes in prioritization of identified hazards; and
- whether stated goals are being achieved.

*This formal review process will be conducted annually by the Hazard Mitigation Committee prior to the Town's annual budgeting process each fall and will include completion of **Hazard Mitigation Plan Monitoring Forms** in **Appendix G.***

Completed forms will be made part of this plan, distributed to the Selectboard and Planning Commission for review, and made available for public viewing by posting on the Town website and making copies available at Town Hall.

An opportunity to provide public input will be scheduled for a Selectboard meeting once each year following the annual committee review above. These public meetings will have the Hazard Mitigation Committee provide updates on the progress made on plan strategies and discussion on potential new hazard mitigation strategies. For these scheduled meetings, input will be requested, and involvement encouraged, from representatives of the Planning Commission, Emergency Management, Springfield Fire Department and Public Works, along with local volunteer boards and interested members of the public.

The Southern Windsor County Regional Planning Commission will assist the Hazard Mitigation Committee in encouraging and guiding the Town to consider and incorporate hazard mitigation goals and strategies as part of their planning process for updates to the Town Plan, Planning and Zoning Regulations, and Flood Hazard By-Laws, as well as for future stormwater master planning and community development projects.

The Hazard Mitigation Committee will also be responsible for reviewing the plan to ensure proposed mitigation actions remain in line with current town goals, strategies, and policies.

Plan Maintenance Process

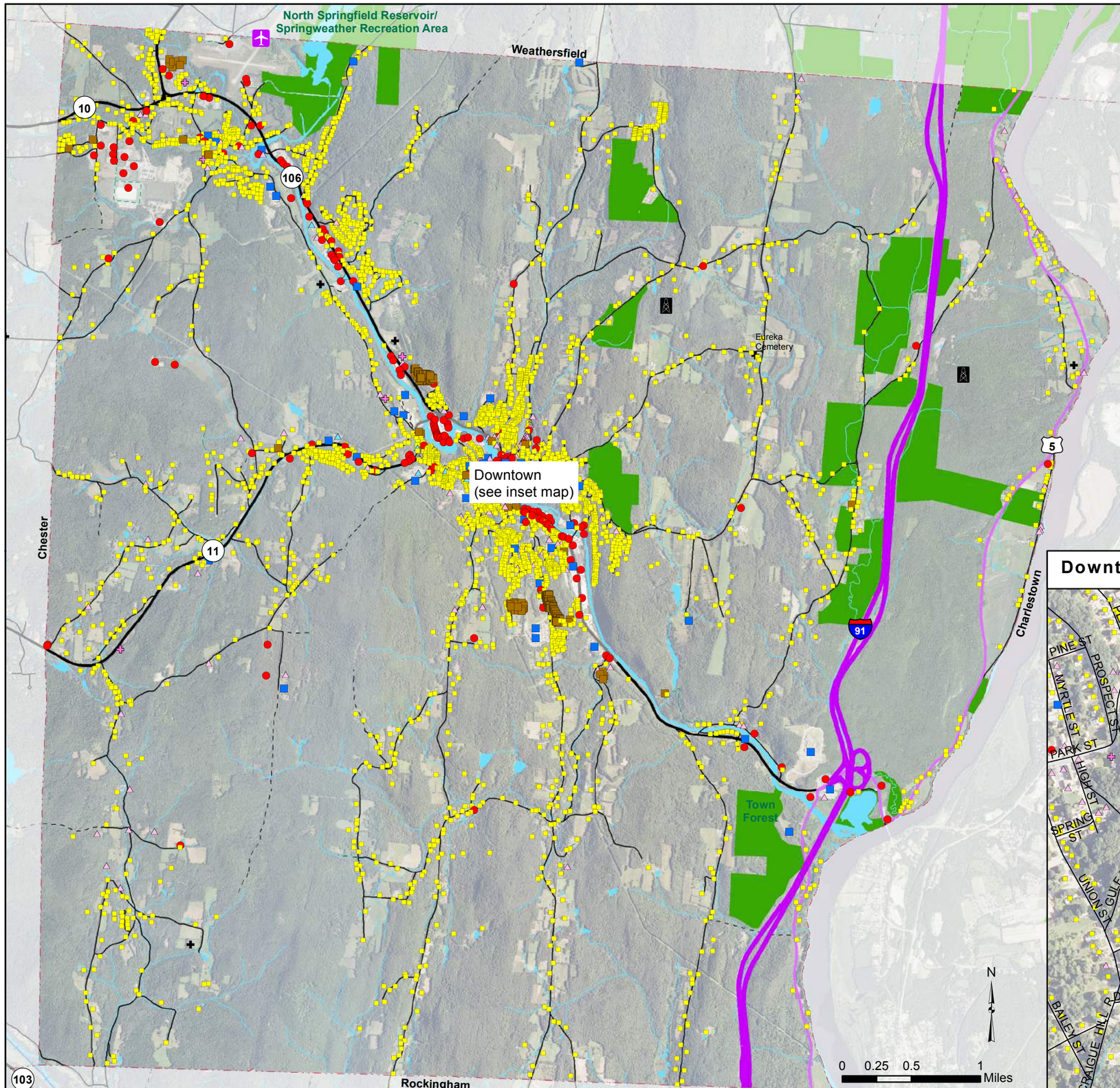
Four years into the five-year plan revision process, the SWCRPC and Local Emergency Planning Committee 3 (LEPC3) will assist the Springfield Hazard Mitigation Committee in revising and updating this plan to incorporate issues, data and progress which have been identified during the ongoing mitigation meetings.

The Springfield Local Hazard Mitigation Plan update process will begin in summer 2022 with the first public meeting of the Hazard Mitigation Committee. All public meetings will be warned following town protocols. These public meetings will discuss the topics outlined in the Process Flow Chart (**Appendix C**).

Following the public meetings, SWCRPC will incorporate updates into a draft plan which will be made available for public comment. The plan will be available on the town and SWCRPC websites (http://www.springfieldvt.govoffice2.com/, www.swcrpc.org), and hard copies will be available at the town office. A second publicly warned meeting will be held no later than Winter 2023 in which any substantial revisions gathered during the public input period will be discussed. The SWCRPC will make all necessary edits to the plan and provide the Hazard Mitigation Committee with a revised version for final review. Subsequently, the plan will be sent to the Vermont State Hazard Mitigation Officer for referral to FEMA for Approval Pending Adoption (APA). Following APA, the town may then adopt the Springfield Local Hazard Mitigation Plan and forward a copy of the adoption resolution for FEMA to complete the plan approval and adoption process.

APPENDIX A

Current Land Use Map
All Hazard Mitigation Plan
Town of Springfield, Vermont



- Civic/ Public
- Commercial and Lodging
- Mixed Use
- Industrial
- Health Care
- Church
- Major Residential
- Residential
- Other
- Cemetery
- Airport
- Telecommunications Tower
- Interstate Highway
- US Highway
- VT State Highway
- Class 1 Town Highway
- Class 2 & 3 Town Highway
- Class 4 Town Hwy & Legal Trail
- Private Road
- Railroads
- Rivers and Streams
- Lakes and Ponds
- Private or Public Conserved Lands
- Town Boundary

VT State Plane, Meters, NAD 83
Data depicted on this map are for planning purposes only and are based on best available information. Some of the data do not line up.

There is no railroad.

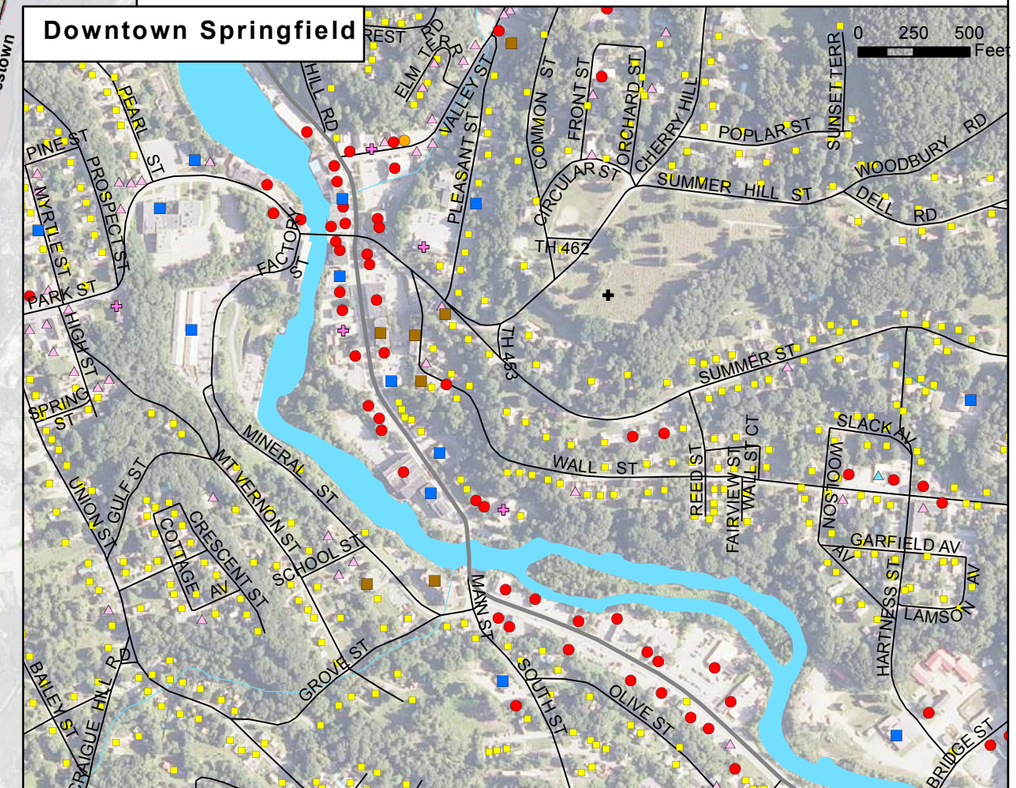
Data Sources:
Buildings (VT E911 April 2013, 2013 Grand list from VT Dept of Taxes, and Town 2015), Telecommunications Tower (Natural Resources Board 2007 and SWCRPC 2013), Cemeteries (VT Agency of Transportation 2001), Railroads (VT Agency of Transportation 2014), Conserved and Protected Lands (VT Agency of Natural Resources 2012, Upper Valley Land Trust 2013, University of Vermont 2010, VT Center for Geographic Information and others 2016), Waterbodies (VT Hydrographic Dataset 2008), Road centerline (VT Agency of Transportation 2014), Airport (VT Agency of Transportation 2014), Town Boundary (Southern Windsor County Regional Planning Commission 2013 using Parcels 2013), Aerial (National Agricultural Imagery Program 2009).

SWCRPC
SOUTHERN WINDSOR COUNTY REGIONAL PLANNING COMMISSION

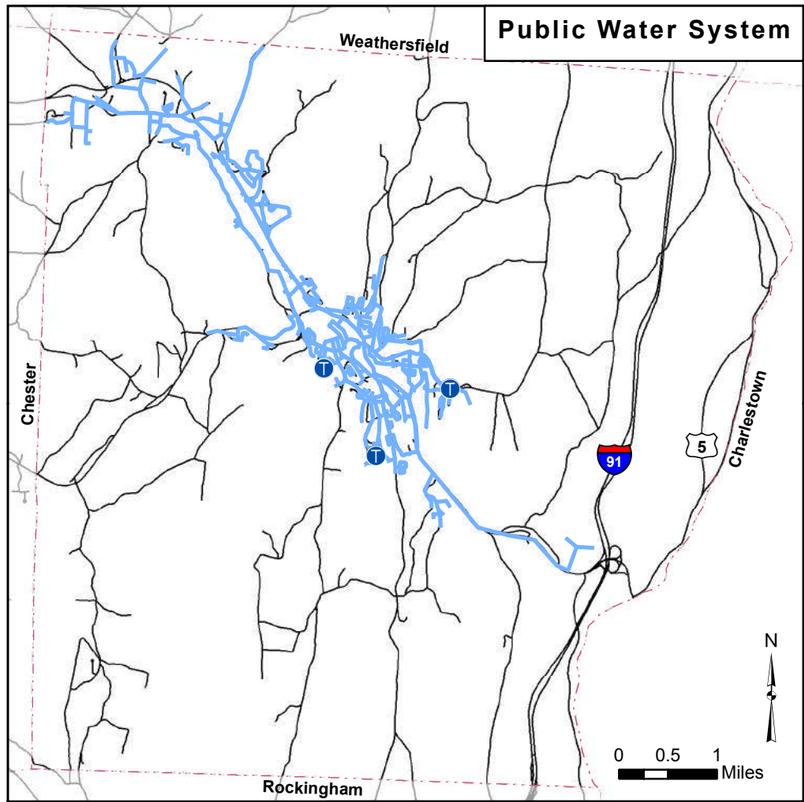
P.O. Box 320, Ascutney, VT 05030
802-674-9201 www.swcrpc.org

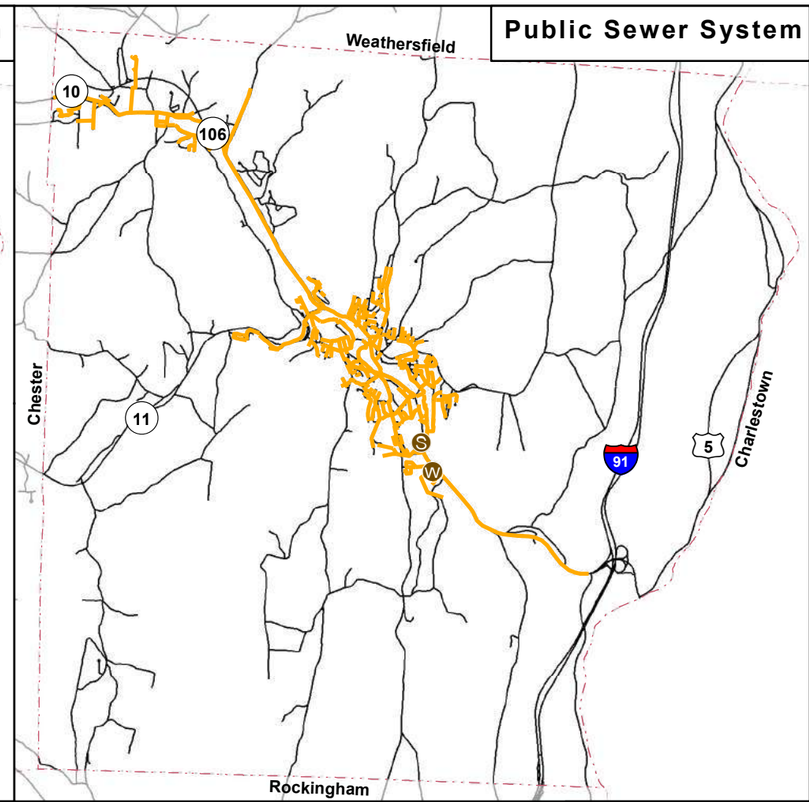
For planning purposes only
Not for regulatory interpretation
Drawn November 28, 2017

Downtown Springfield



Facilities and Utilities Map
All Hazard Mitigation Plan
Town of Springfield, Vermont





- Water Tank
- Wastewater Treatment Facility
- Sewer Pump Station
- Municipal Hydrant
- Dry Hydrant
- Drafting Site for Hydrant
- School/ Educational Facility
- Former Park St School
- Water Line
- Sewer Line
- Electric Transmission Line
- Road
- Town Boundary

VT State Plane, Meters, NAD 83
Data depicted on this map are for planning purposes only and are based on best available information. Some of the data do not line up.

Notes:
Drafting Site - potential water drafting site, fire pond
Dry Hydrant - non-pressurized rural water supply hydrant
Municipal Hydrant - pressurized municipal rural water supply hydrant (pressurized from pond supply being higher than hydrant site)

Data Sources:
Water line and facilities (Aldrich and Elliott Engineers 2012), Sewer line and facilities (Southern Windsor County Regional Planning Commmission (SWCRPC) 2012 draft), Electric Transmission Line (VT Agency of Natural Resources 2003 and SWCRPC 2015), Hydrants (VT E911 data April 2014), Schools (VT E911 data 2013 and SWCRPC 2015), Waterbodies (VT Hydrographic Dataset 2008), Town Boundary (SWCRPC 2013 using Parcels 2013).

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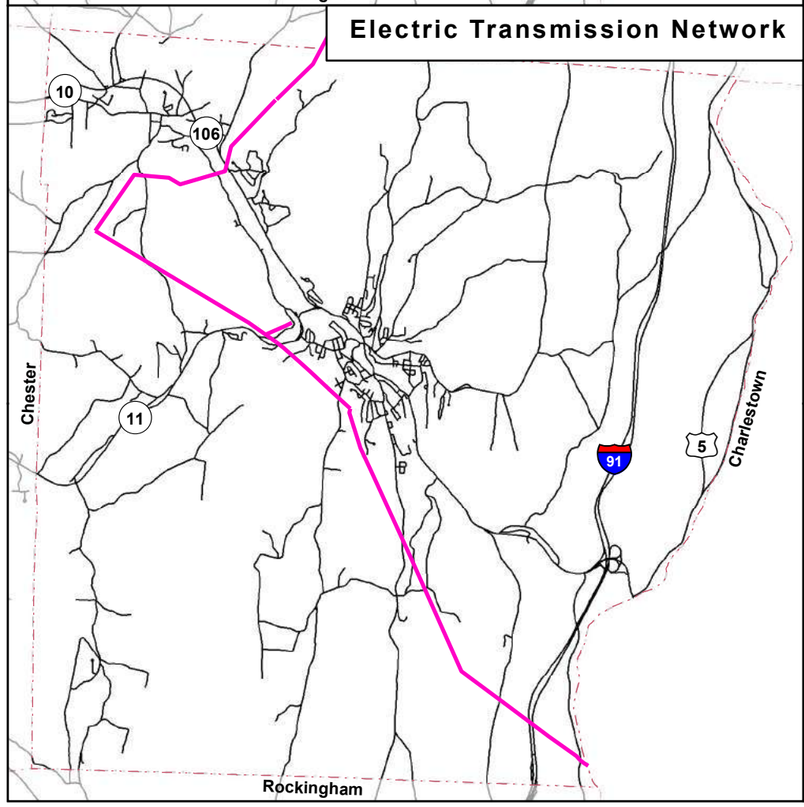
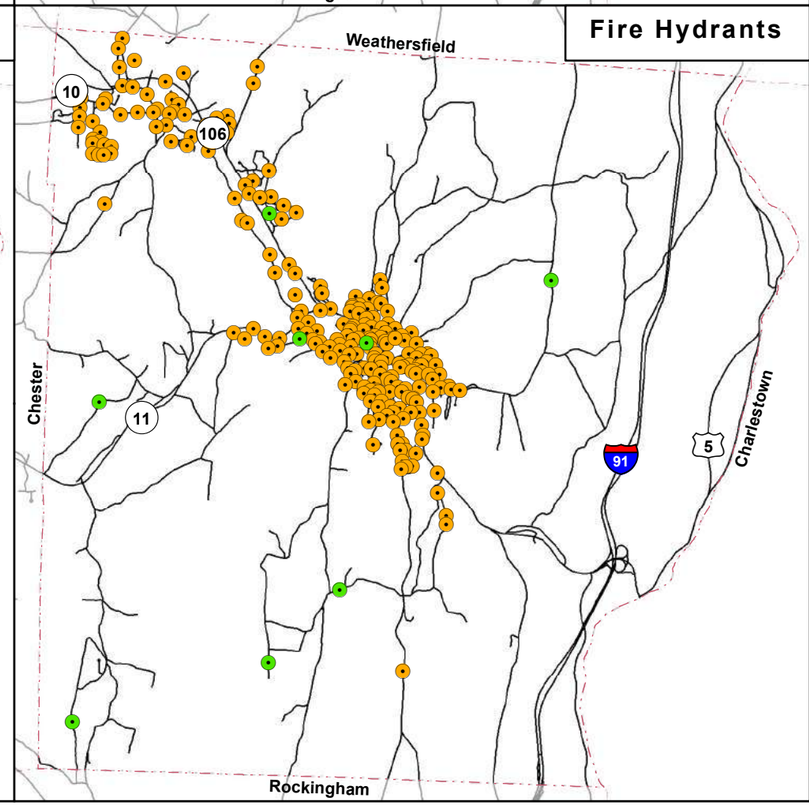
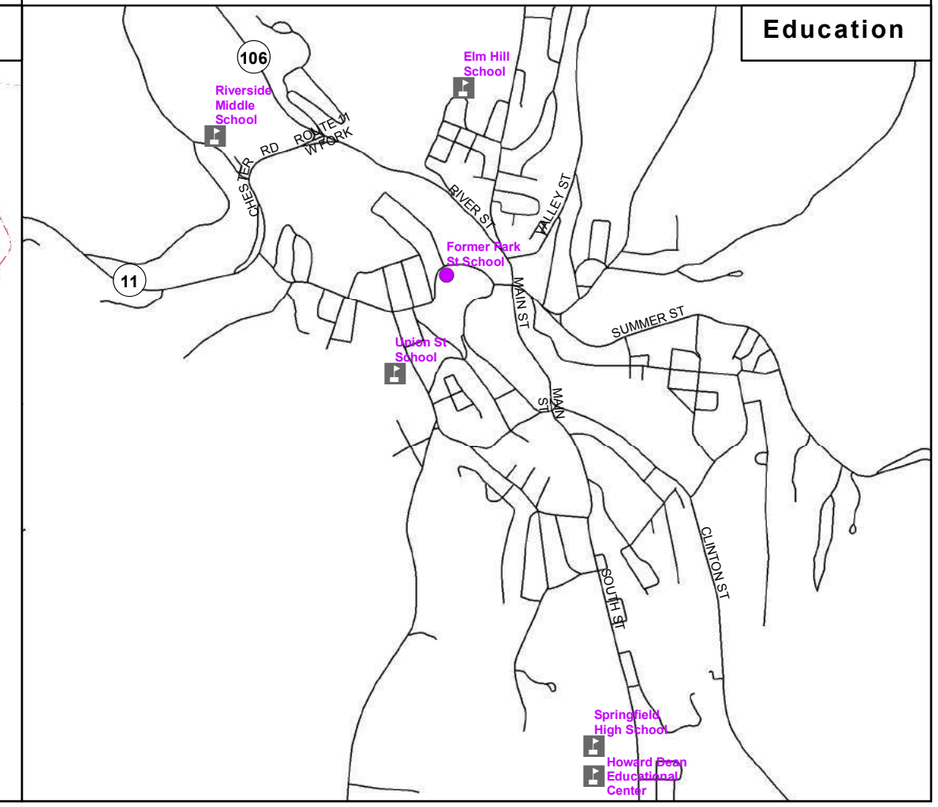






Water Resources and Flood Resilience Map
All Hazard Mitigation Plan
Town of Springfield, Vermont

North Springfield Reservoir

North Springfield Reservoir

Weathersfield

Bloodsucker Pond

North Springfield (see inset map)

Springfield Downtown (see inset map)

Spencer Brook

Chester

Charlestown

Great Brook

Seavers Brook

Gravel Brook

Commissary Brook

Lily Brook

Williams River

Rockingham

10

11

5

91

103

N

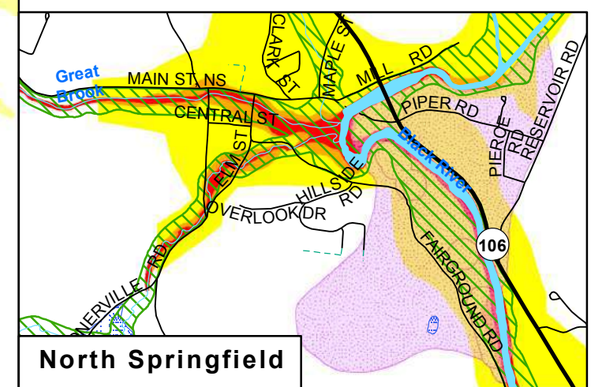
0 0.25 0.5 1 Miles

- Dams
- Floodway
- Floodway fringe (Floodplain)
- Dam Inundation Area
- River Corridor (draft 12/14/2016)
- Wetland
- Groundwater Protection Area
- Rivers and Streams
- Lakes and Ponds
- Interstate Highway
- US Highway
- VT State Highway
- Class 1 Town Highway
- Class 2 & 3 Town Highway
- Class 4 Town Hwy & Legal Trail
- Private Road
- Town Boundary

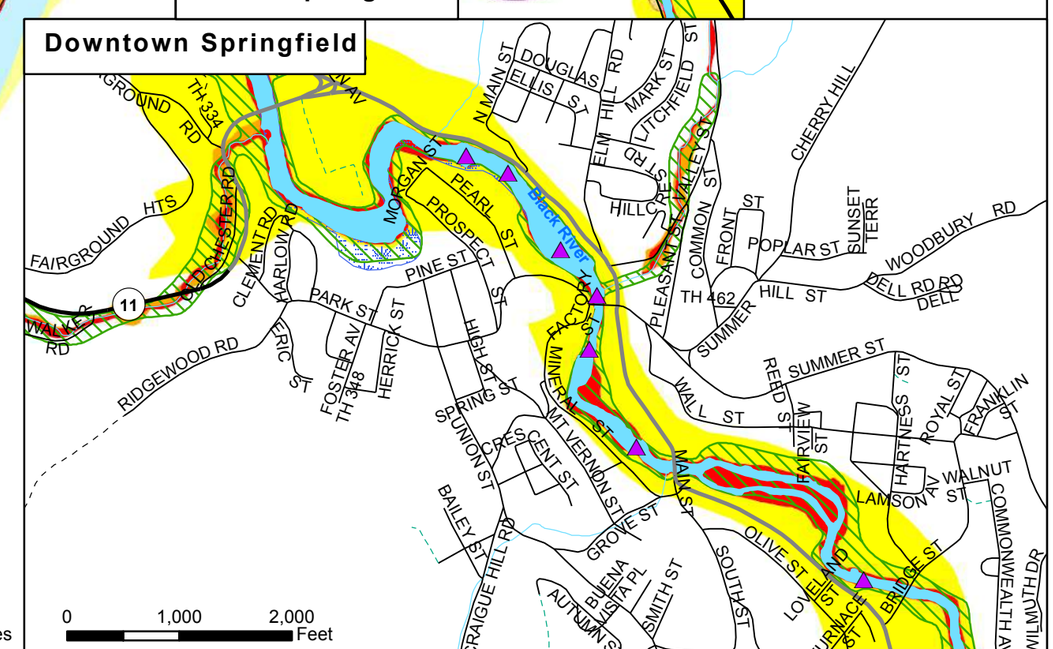
Special Flood Hazard Areas (SFHA), including the Floodway and Floodway Fringe (i.e. Floodplain), are shown on this map for planning purposes only. This is not the official map for regulatory flood hazards.

Notes:
There are no surface water protection areas.

Data Sources:
Dams (VT Agency of Natural Resources 2009), Floodway and Floodway fringe (Floodplain) (Federal Emergency Management Agency 2008), River Corridor (VT Agency of Natural Resources 12/14/16 DRAFT), Wetland (VT Significant Wetlands Inventory 2010), Groundwater Protection Area (VT Agency of Natural Resources 2011), Surface Water Protection Area (VT Agency of Natural Resources 2010), Dam Inundation Area (VT Dept of Emergency Management 2008), Waterbodies (VT Hydrographic Dataset 2008), Road centerline (VT Agency of Transportation 2014), Town Boundary (Southern Windsor County Regional Planning Commission 2013 using Parcels 2013).



North Springfield



Downtown Springfield

0 1,000 2,000 Feet

VT State Plane, Meters, NAD 83
Data depicted on this map are for planning purposes only and are based on best available information. Some of the data do not line up.

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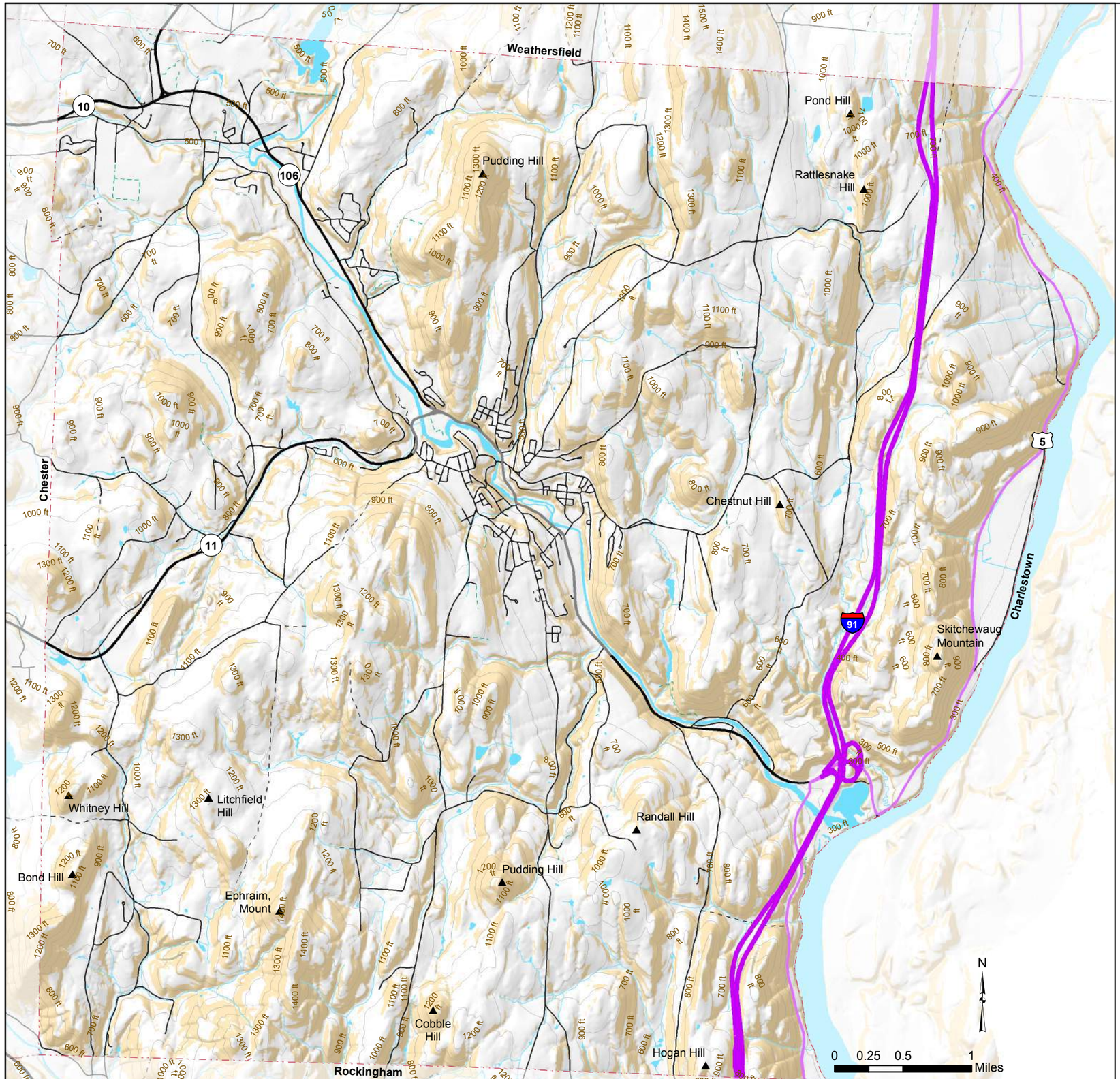
Elevation and Steep Slopes Map
All Hazard Mitigation Plan
Town of Springfield, Vermont



▲ Hill/ Mountain Summit
100ft Contour Line
Slope of 24% or above
Interstate Highway
US Highway
VT State Highway
Class 1 Town Highway
Class 2 & 3 Town Highway
Class 4 Town Hwy & Legal Trail
Private Road
Rivers and Streams
Lakes and Ponds
Town Boundary

VT State Plane, Meters, NAD 83
Data depicted on this map are for planning purposes only and are based on best available information. Some of the data do not line up.

SWCRPC
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Data Sources:
Contours (100ft from 20ft dataset by US Geological Survey (USGS) / VT Center for Geographic Information (VCGI) 2012), Hill and mountain summits (Unknown source), Steep slopes (USGS/VCGI 2012), Waterbodies (VT Hydrographic Dataset 2008), Road centerline (VT Agency of Transportation 2014), Town Boundary (Southern Windsor County Regional Planning Commission 2013 using Parcels 2013).

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For planning purposes only
Not for regulatory interpretation
Drawn November 28, 2017

Emergency Planning Map
All Hazard Mitigation Plan
Town of Springfield, Vermont

North Springfield Reservoir

North Springfield Reservoir

Weathersfield

Bloodsucker Pond

Great Brook

North Springfield (see inset map)

Springfield Downtown (see inset map)

Spencer Brook

Chester

Charlestown

Seavers Brook

Gravel Brook

Commissary Brook

Williams River

Lily Brook

Rockingham

10

11

5

91

103

N

0 0.25 0.5 1 Miles

- Fire Station
- Police Station
- Health Clinic
- Substation
- Town Highway Garage
- Government Office
- School
- Other government building
- Hazardous Waste Site
- Hazardous Waste Facility
- Hazardous Waste Generator
- Rivers and Streams
- Lakes and Ponds
- Interstate Highway
- US Highway
- VT State Highway
- Class 1 Town Highway
- Class 2 & 3 Town Highway
- Class 4 Town Hwy & Legal Trail
- Private Road
- Town Boundary

Data Sources:
Facilities (VT E911 2017), Hydrants (VT E-911 2017), Hazardous Waste Facilities (VT Dept of Environmental Conservation 2006), Hazardous Waste Sites (VT Dept of Environmental Conservation 2017), Hazardous Waste Generators (VT Dept of Environmental Conservation 2015), Waterbodies (VT Hydrographic Dataset 2008), Road centerline (VT Agency of Transportation 2014), Town Boundary (Southern Windsor County Regional Planning Commission 2013 using Parcels 2013).

North Springfield

Great Brook, MAIN ST, NS, CLARK ST, MAPLE ST, MILL RD, PIPER RD, CENTRAL ST, ELM ST, HILLSIDE RD, OVERLOOK DR, Black River, PIERCE RD, RESERVOIR RD, FAIRGROUND RD, 106

VT State Plane, Meters, NAD 83
Data depicted on this map are for planning purposes only and are based on best available information. Some of the data do not line up.

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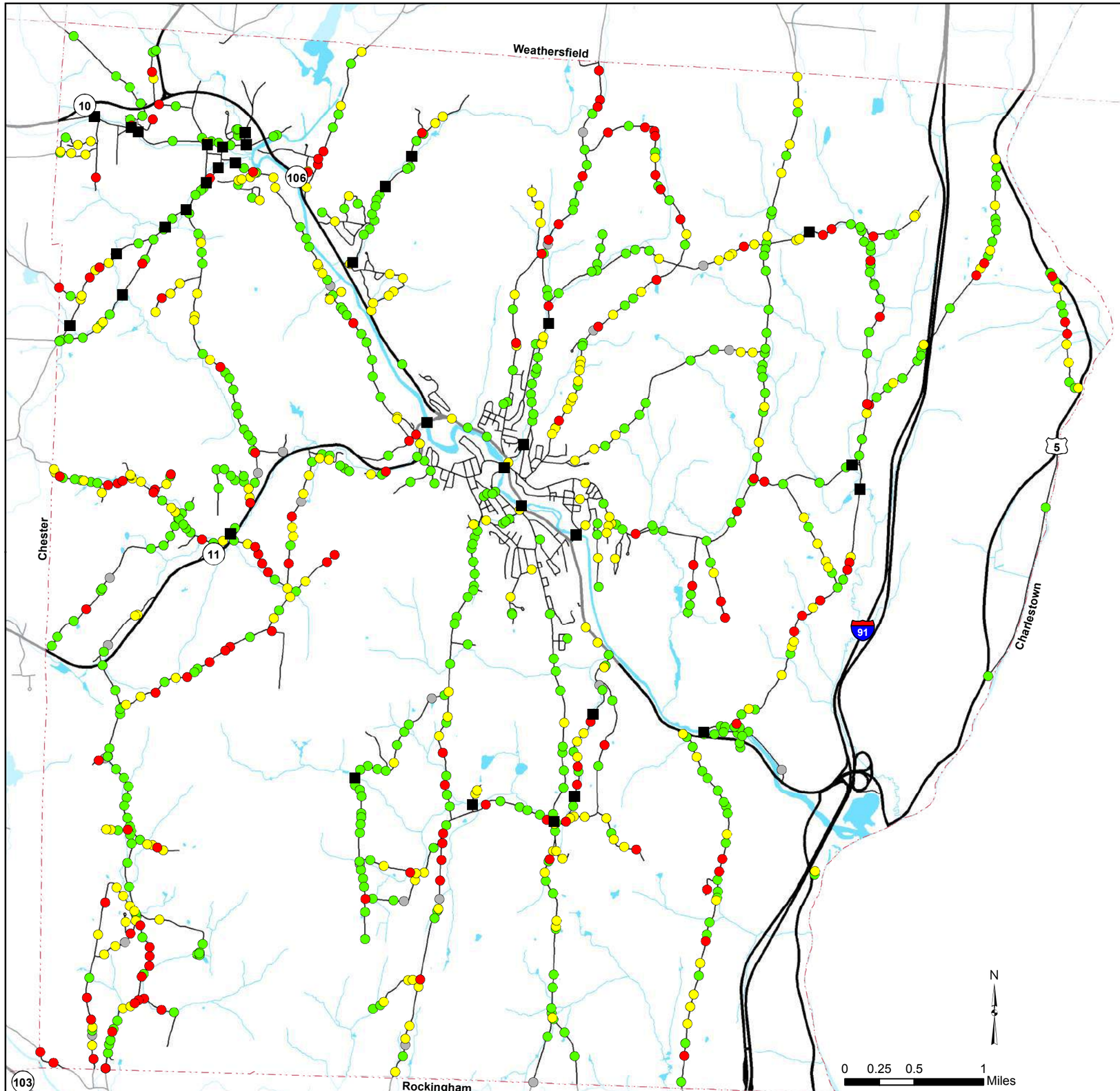
For planning purposes only
Not for regulatory interpretation
Drawn November 28, 2017

Downtown Springfield

0 1,000 2,000 Feet

TH 334, FAIRGROUND RD, FAIRGROUND HTS, WALKER RD, 11, OLD CHESTER RD, RIDGEWOOD RD, CLEMENT RD, HARLOW RD, PARK ST, FOSTER AV, TH 348, HERRICK ST, MORGAN ST, PEARL ST, PROSPECT ST, PINE ST, HIGH ST, SPRING ST, SPUNION ST, BAILEY ST, CRAIGUE HILL RD, Black River, N MAIN ST, DOUGLAS, ELLIS ST, ELM HILL RD, MARK ST, LITCHFIELD ST, HILLCREST, VALLEY ST, COMMON ST, FRONT ST, CHERRY HILL, POPLAR ST, SUNSET TERR, WOODBURY RD, DELL RD, TH 462, SUMMER HILL ST, PLEASANT ST, FACTORY ST, MINERAL ST, MT VERNON ST, CRESCENT ST, GROVE ST, BUENA VISTA PL, SMITH ST, AUTUMN ST, WALL ST, MAIN ST, SOUTH ST, OLIVE ST, LOVELAND ST, FURNACE ST, BRIDGE ST, REED ST, SUMMER ST, FAIRVIEW ST, HARTNESS ST, ROYAL ST, FRANKLIN ST, LAMSON AV, WALNUT ST, COMMONWEALTH AV, WILMUTH DR

Bridge and Culvert Inventory 2016
Town of Springfield, Vermont
Last amended December 2016



- Bridge (Large map only)

Overall culvert condition (Large map only)
- Excellent or Good
- Fair
- Closed, Critical, Urgent or Poor
- Unknown

Culvert erosion issue priority (Small map only)
- High
- Medium
- Low
- None or Unknown

- Interstate, US or VT Highway
- Class 1 Town Highway
- Class 2 & 3 Town Highway
- Rivers and Streams
- Lakes and Ponds
- Town Boundary

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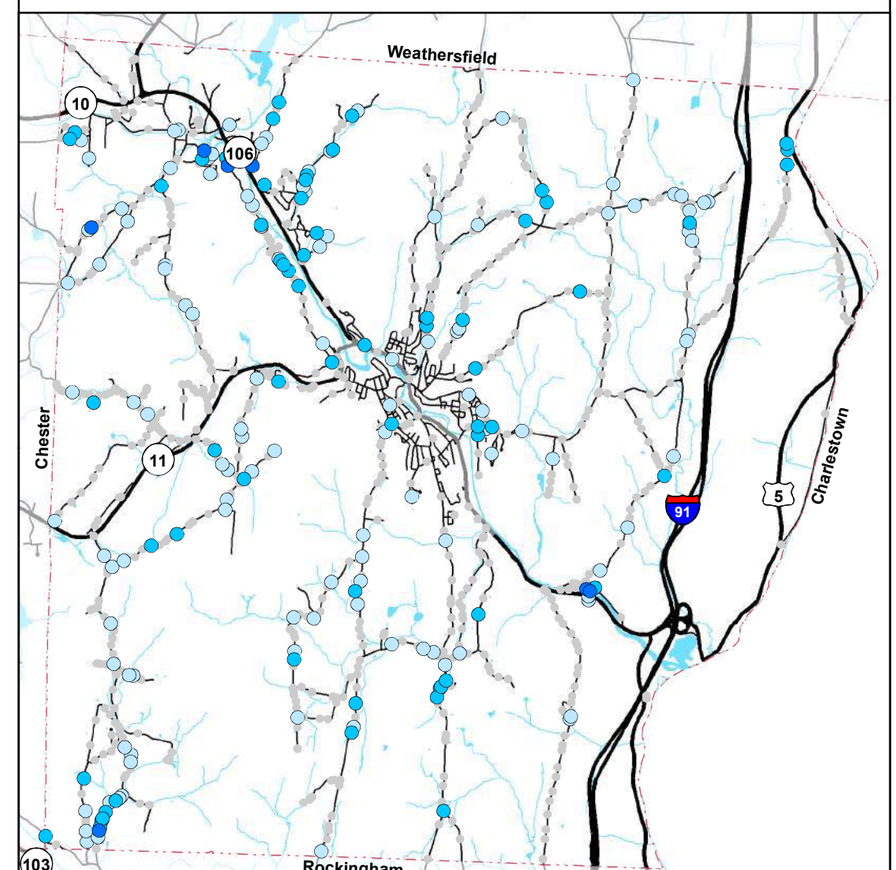
Data Sources:
Bridge and Culvert Inventory (completed by SWCRPC and Town 2016). Available online at www.vtculverts.org), Waterbodies (VT Hydrographic Dataset 2008), Road centerline (VTrans 2014), Town Boundary (SWCRPC 2013 using Parcels 2013)

VT State Plane, Meters, NAD 83
For planning purposes only
Not for regulatory interpretation
Map Drawn December 7, 2016



Hydrologically Connected Road Segments
Data from ANR June 2017
Town of Springfield, Vermont

Hydrologically connected town roadway according to 2017 ANR model

Major Watersheds (Small map only)

- Black River
- North Branch Williams River
- Middle Branch Williams River
- South Charlestown Tributaries of the Connecticut River
- North Charlestown Tributaries of the Connecticut River

- Interstate, US or VT Highway
- Class 1 Town Highway
- Class 2 & 3 Town Highway
- Rivers and Streams
- Lakes and Ponds
- Town Boundary

This map shows whether each 100 meter road segment is potentially hydrologically connected or not, as defined in the June 2017 interim guidance. The June guidance includes the following: Act 64, the Vermont Clean Water Act, requires the Vermont Department of Environmental Conservation (DEC) (part of the Agency of Natural Resources) to develop a draft Municipal Roads General Permit (MRGP) to address road-related runoff impacting waterways. Towns will begin applying for coverage under the permit in summer of 2018 (proposed). As part of the development of the MRGP, new municipal road practice standards will be developed.

For more information about the Municipal Roads General Permit see http://dec.vermont.gov/watershed/stormwater/permit-information-applications-fees/municipal-roads-program

Data Sources:
Hydrologically connected road segments (ANR June 2017), Waterbodies (VT Hydrographic Dataset 2008), Road centerline (VTrans 2014), Town Boundary (SWCRPC 2013 using Parcels 2013)

SWCRPC
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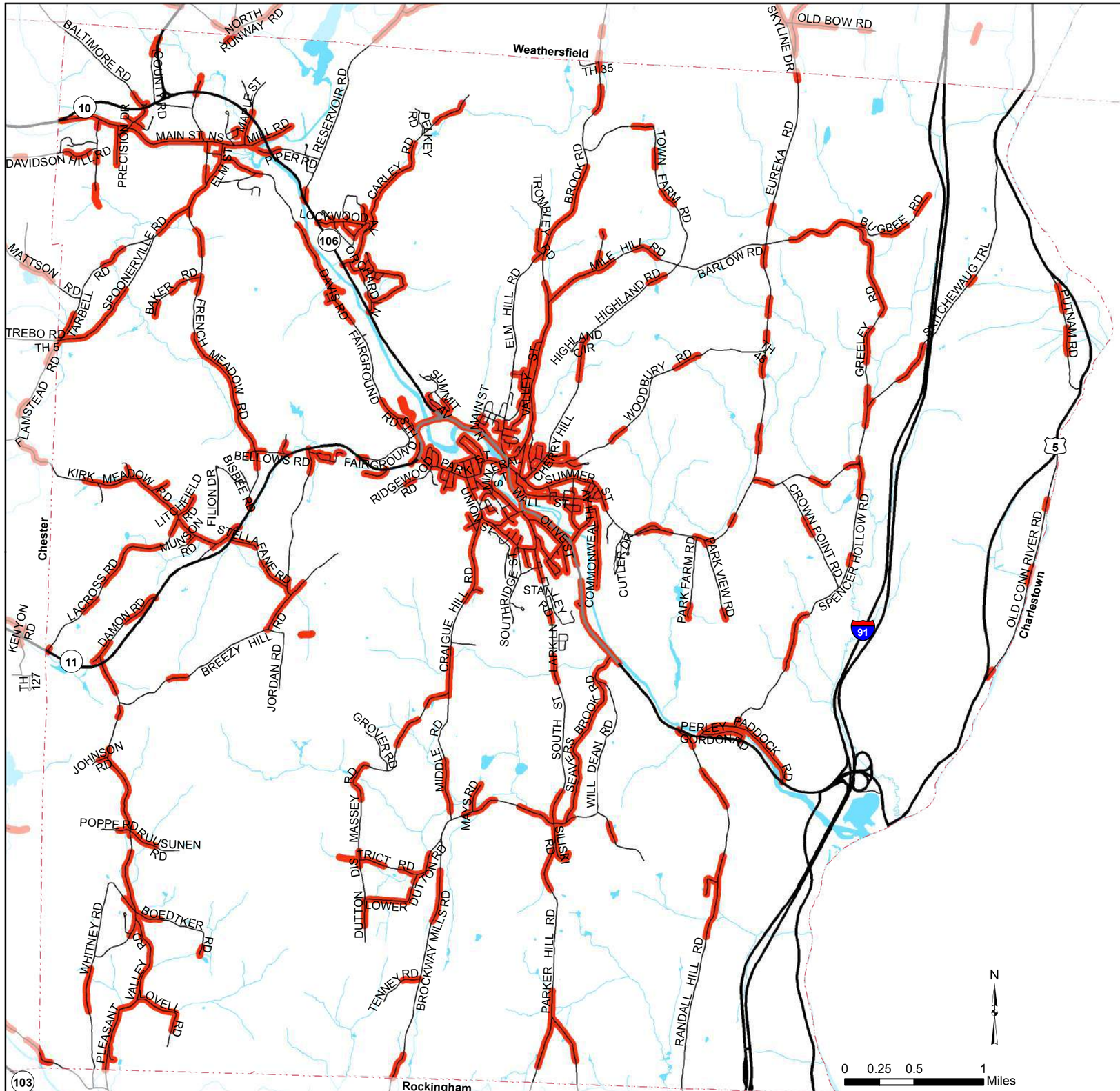
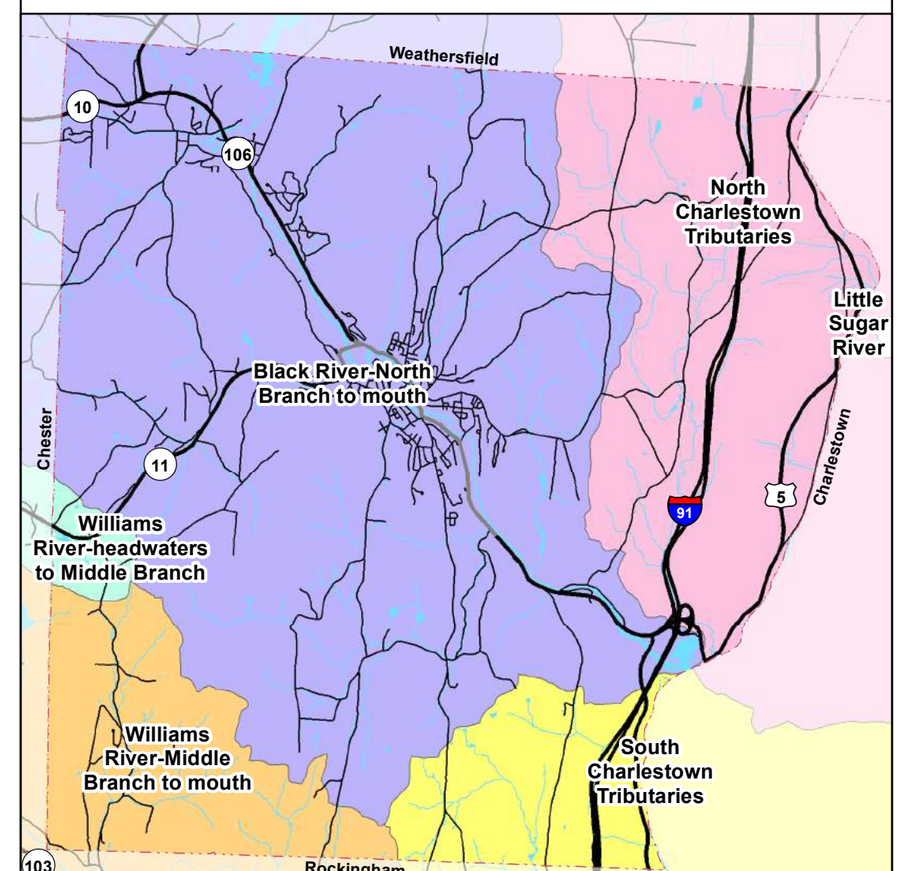
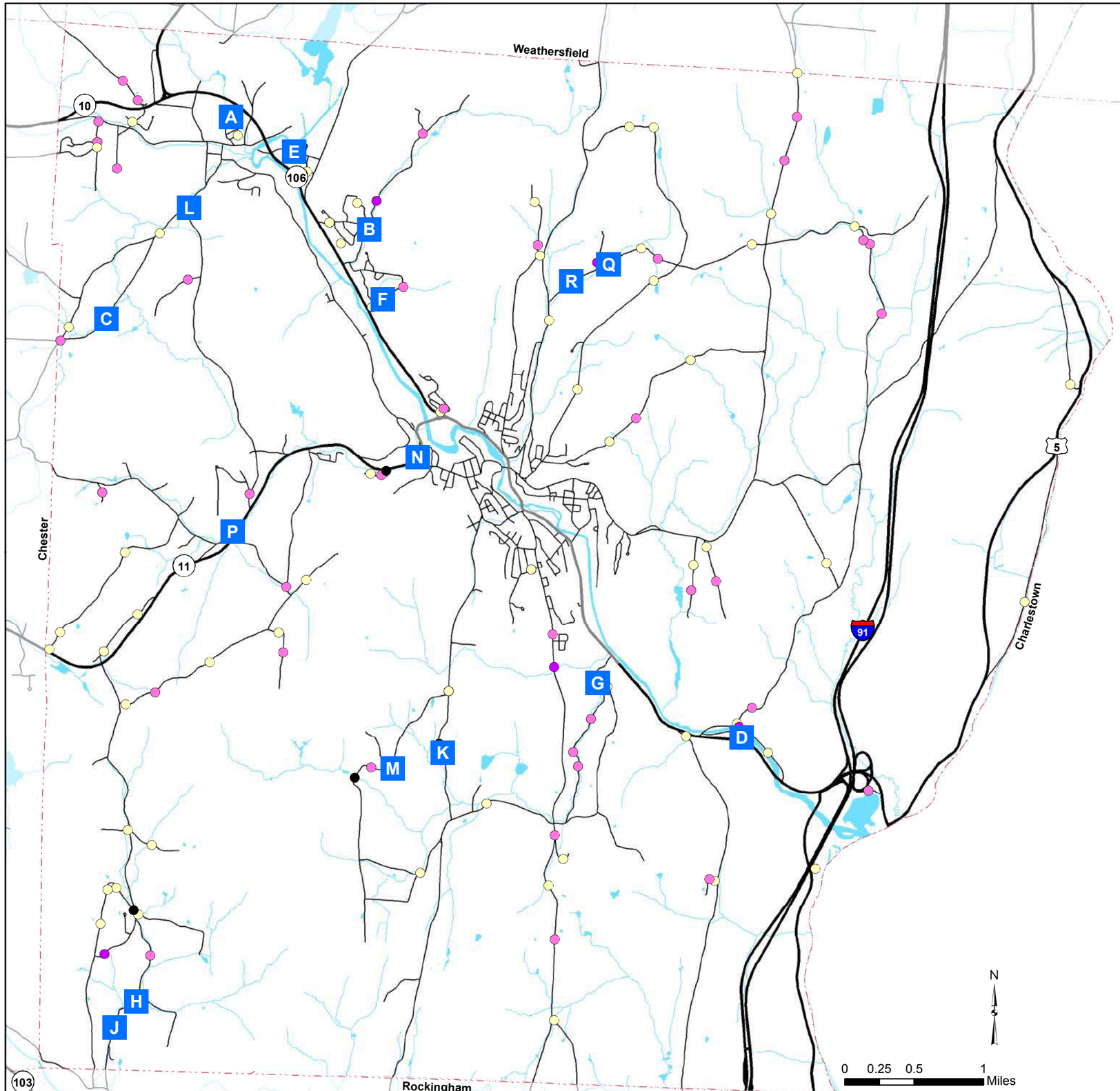
VT State Plane, Meters, NAD 83
For planning purposes only
Not for regulatory interpretation
Map Drawn July 26, 2017





Road Erosion Inventory 2016
Town of Springfield, Vermont
Last Amended December 2016



Major road erosion site included in 2016 Road Erosion Report

2016 Road Erosion Inventory Priority (Large map only)

- High
- Medium
- Low
- None

2012 Road Erosion Inventory Priority (Small map only)

- Severe or High
- Low or Culvert Placement Issue

- Interstate, US or VT Highway
- Class 1 Town Highway
- Class 2 & 3 Town Highway
- Rivers and Streams
- Lakes and Ponds
- Town Boundary

SWCRPC
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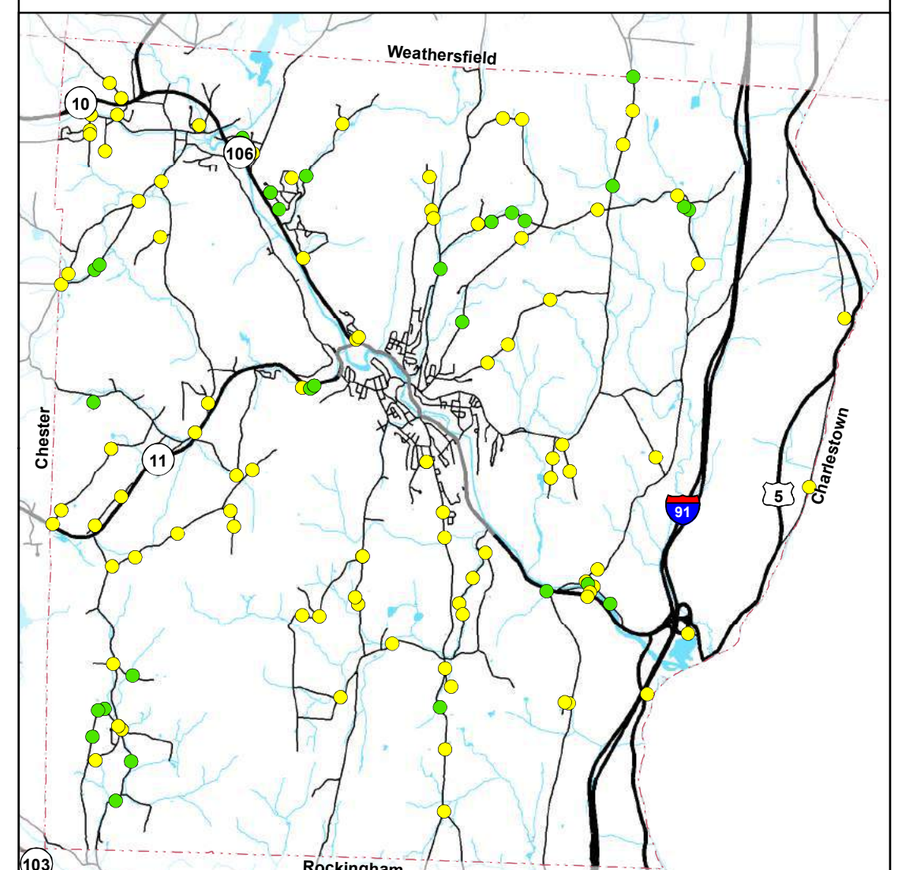
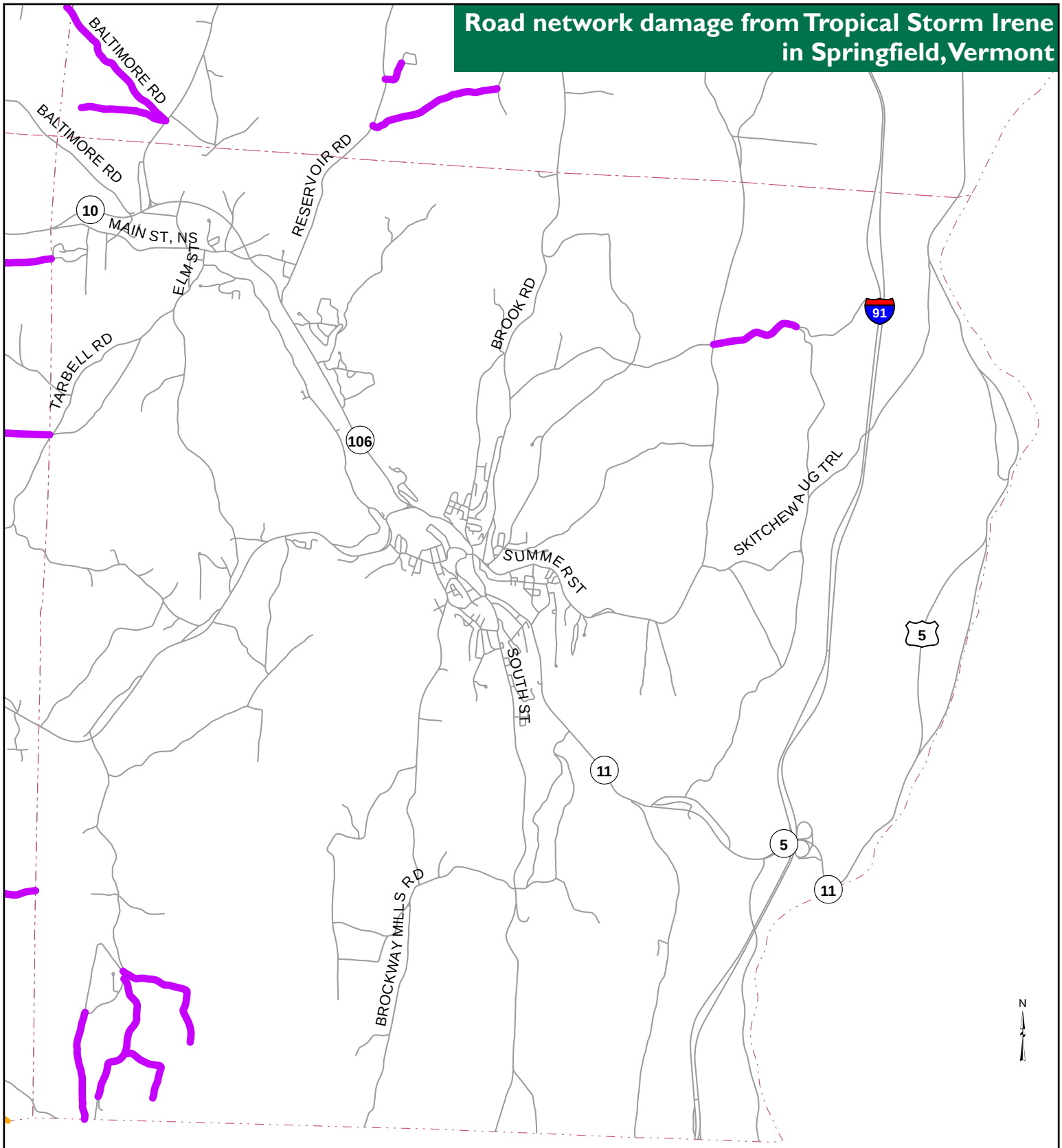
Data Sources:
Road Erosion Inventory (SWCRPC and Town 2016 and 2012), Road centerline (VTrans 2014), Town Boundary (SWCRPC 2013 using Parcels 2013)

VT State Plane, Meters, NAD 83
For planning purposes only
Not for regulatory interpretation
Map Drawn December 7, 2016



Road network damage from Tropical Storm Irene in Springfield, Vermont



0 1 2 Miles

- Class 1 Local Road Damage
- State Road Damage
- Local Road Damage
- Insignificant damage or undamaged road
- Town boundary

Data sources:
Road centerline (VTrans 2010)
Town boundary (VCGI 2010)
Town road damage (from Town staff collected by SWCRPC Sept- Oct 2011)
State road damage (from VTrans, 2011 TS_Irene_BridgeAndHighwayClosureData.mdb)

Map drawn January 13, 2012

Map for planning purposes only. Not for regulatory interpretation.

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www.swcrpc.org

APPENDIX B

TOWN OF SPRINGFIELD
SPRINGFIELD FIRE DEPARTMENT
77 HARTNESS HOUSE
SPRINGFIELD, VERMONT

HAZARD MITIGATION COMMITTEE
FRIDAY, DECEMBER 8, 2017 @ 10:30 AM

AGENDA

A. CALL MEETING TO ORDER & ROLL CALL:

B. MINUTES:
No previous meeting minutes to review.

C. ANY REQUESTED ADDITIONS TO THIS AGENDA:

D. NEW BUSINESS:
ITEM #1: Overview of Hazard Mitigation Plan Process and Public Outreach
ITEM #2: Review List of Hazards for Analysis
ITEM #3: Discuss Methodology for Scoring Hazards
ITEM #4: Complete Preliminary Scoring Exercise
ITEM #5: Perform Initial Mapping Exercise to Identify Vulnerabilities
ITEM #6: Draft Community Asset Vulnerability Chart

E. FUTURE AGENDA ITEM PROPOSALS:

F. CITIZEN'S COMMENTS:

G. ADJOURN

VOLUNTEER FORM TO DOCUMENT IN-KIND SERVICES - MATCH INFORMATION

PROGRAM: Springfield Hazard Mitigation Committee
DATE OF MEETING: December 8, 2017
MEETING LOCATION: Springfield Fire Department
TOPIC: Hazard Mitigation Plan
MEETING TIME: 10:30 AM

VOLUNTEER ATTENDEES - CLAIMED

No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE	TOTAL TIME
					0.545	$20.00
1	Tom Yennerell	Town Manager, Springfield		2	-	40.00
2	Russ Thompson	Fire Chief, Emergency Management Director, Springfield		2	-	40.00
3	William Kearns	Zoning Administrator		2	-	40.00
4					-	-
5					-	-
6					-	-
7					-	-
8					-	-
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
		Sub Total	**0.00**	**6.00**	**$0.00**	**$120.00**

FEDERALLY SUPPORTED PERSONNEL - CAN NOT CLAIM

No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE (08/01/08-)	TOTAL TIME
					0.545	$20.00
1	Cindy Ingersoll	staff, SWCRPC	33	2	17.99	
2						
3						
4						
5						
6						
7						
8						
9						
10						
		Sub Total	**33.00**	**8.00**	**$17.99**	**$0.00**

TOTAL MATCH	**#REF!**
TOTAL Non-Volunteer Match	**#REF!**
TOTAL VOLUNTEER MATCH	**#REF!**

SPRINGFIELD HAZARD MITIGATION COMMITTEE MEETING
2018-2022 LOCAL HAZARD MITIGATION PLAN UPDATE

December 8, 2017 at 10:30AM
Springfield Town Hall

MINUTES

Present: Cindy Ingersoll (SWCRPC), Bill Kearns (Springfield Zoning Administrator), Russ Thompson (EMD, Fire Chief), Tom Yennerell (Town Manager)

A. Call Meeting to Order & Roll Call:

Meeting was called to order at 10:30 AM and attendees introduced themselves.

B. Minutes:

No previous minutes.

C. Any Requested Additions to the Agenda:

No additions were made to the agenda.

D. New Business:

Item #1: Overview of Local Hazard Mitigation Plan Process and Public Outreach:

Cindy Ingersoll reviewed the process for updating the Town's Local Hazard Mitigation Plan (LHMP) with Hazard Mitigation Committee (HMC) members, Bill Kearns, Russ Thompson, and Tom Yennerell. Overview included discussion on tasks, responsibilities of parties involved, and timeline:

> Plan input and relevant local data, if available, will be gathered from the Hazard Mitigation Committee members, other town staff, and the public during HMC meetings and through email or other correspondence. Discussions on town input will based on the topics as outlined in the attached process flow chart.
>
> Cindy Ingersoll from SWCRPC, as contracted with the Town, will oversee the HMC meetings, compile input and update plan data, draft the Hazard Mitigation Plan and shepherd the draft through the public, State and FEMA review process to its final adoption by the town.
>
> The Town will conduct outreach through its notice process and procedures to include posting of meeting agendas on the Town website, Town Office, Springfield Town Library, and the North Springfield Post Office. Meeting Minutes and other related planning documents with be posted and made available on the Town website and at the Town Hall Office.
>
> The Town Manager will keep the Selectboard briefed on the LHMP update process. A final draft will be circulated by Cindy Ingersoll to the Selectboard and

other planning boards for review and comment prior to the final FEMA submission and review. A presentation to the Board will be made by SWCRPC if requested by the Town.

Cindy Ingersoll anticipates there will be 4-6 meetings and that the entire process should conclude with adoption by late winter/early spring.

ITEM #2: Review List of Hazards for Analysis
ITEM #3: Discuss Methodology for Scoring Hazards
ITEM #4: Complete Preliminary Scoring Exercise

Cindy Ingersoll presented a large format table listing the hazards to be considered for analysis and reviewed the methodology for scoring the relevant hazards. Committee members discussed each hazard and determined hazard scores which were tallied and are attached. These are preliminary scores which may be edited as discussions proceed.

ITEM #5: Perform Initial Mapping Exercise to Identify Vulnerabilities
ITEM #6: Draft Community Asset Vulnerability Chart

During the discussion and exercise of scoring hazards, members began to identify community asset vulnerabilities which were marked on a large format map and recorded for drafting a Community Asset Vulnerability Chart. This task of identifying and mapping vulnerabilities will continue throughout the update process resulting in a final table of vulnerable town assets, areas and structures.

E. Future Agenda Item Proposals:

Cindy Ingersoll outlined the next steps in the LHMP update process for discussion. These will include a review of the previous plan strategies to determine their status and a review of current policies, programs and other related to hazard mitigation.

F. Citizen's Comment:

None. No citizens were present.

G. Adjourn:

Meeting was adjourned at 12:30 PM and the next meeting scheduled for December 15, 2017, at 10:00 AM at the Springfield Fire Department.

TOWN OF SPRINGFIELD
SPRINGFIELD FIRE DEPARTMENT
77 HARTNESS HOUSE
SPRINGFIELD, VERMONT

HAZARD MITIGATION COMMITTEE
FRIDAY, DECEMBER 8, 2017 @ 10:30 AM

AGENDA

A. CALL MEETING TO ORDER & ROLL CALL:

B. MINUTES:
No previous meeting minutes to review.

C. ANY REQUESTED ADDITIONS TO THIS AGENDA:

D. NEW BUSINESS:
ITEM #1: Overview of Hazard Mitigation Plan Process and Public Outreach
ITEM #2: Review List of Hazards for Analysis
ITEM #3: Discuss Methodology for Scoring Hazards
ITEM #4: Complete Preliminary Scoring Exercise
ITEM #5: Perform Initial Mapping Exercise to Identify Vulnerabilities
ITEM #6: Draft Community Asset Vulnerability Chart

E. FUTURE AGENDA ITEM PROPOSALS:

F. CITIZEN'S COMMENTS:

G. ADJOURN

VOLUNTEER FORM TO DOCUMENT IN-KIND SERVICES - MATCH INFORMATION

PROGRAM: Springfield Hazard Mitigation Committee
DATE OF MEETING: January 8, 2018
MEETING LOCATION: Springfield Fire Department
TOPIC: Hazard Mitigation Plan
MEETING TIME: 1:30 PM

VOLUNTEER ATTENDEES - CLAIMED

No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE	TOTAL TIME
					0.545	$20.00
1					-	-
2	Russ Thompson	Fire Chief, Emergency Management Director, Springfield		2	-	40.00
3	William Kearns	Zoning Administrator		2	-	40.00
4					-	-
5					-	-
6					-	-
7					-	-
8					-	-
9						
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21						
22						
23						
24						
		Sub Total	**0.00**	**4.00**	**$0.00**	**$80.00**

FEDERALLY SUPPORTED PERSONNEL - CAN NOT CLAIM

No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE (08/01/08-)	TOTAL TIME
					0.545	$20.00
1	Cindy Ingersoll	staff, SWCRPC	33	2	17.99	
2						
3						
4						
5						
6						
7						
8						
9						
10						
		Sub Total	**33.00**	**6.00**	**$17.99**	**$0.00**

TOTAL MATCH	**#REF!**
TOTAL Non-Volunteer Match	**#REF!**
TOTAL VOLUNTEER MATCH	**#REF!**

SPRINGFIELD HAZARD MITIGATION COMMITTEE MEETING
2018-2022 LOCAL HAZARD MITIGATION PLAN UPDATE

January 8, 2017 at 1:30PM
Springfield Fire Department

MINUTES

Present: Cindy Ingersoll (SWCRPC), Bill Kearns (Springfield Zoning Administrator), Russ Thompson (EMD, Fire Chief)

A. Call Meeting to Order & Roll Call:

Meeting was called to order at 1:30 PM and attendees introduced themselves.

B. Minutes:

Minutes of December 8, 2017, were approved without changes.

C. Any Requested Additions to the Agenda:

No additions were made to the agenda. Last agenda item was removed.

D. New Business:

Item #1: Status of Past Mitigation Strategies:

The Committee reviewed the previous 2014 Hazard Mitigation Plan and the past strategies identified in Table 16. A new Table was created indicating the status of each of these strategies and is attached. Some of these strategies have been completed, others dropped or are on-going, and a few will be modified or enhanced and added to this year's plan. This new table will be included in the plan update.

ITEM #2: Status of Current Policies Program and Other Resources

The Committee reviewed Table 15 of the previous 2014 Hazard Mitigation Plan. This Table was updated to include the additional resources, Road Erosion Report and Black River Stream Geomorphic Study and River Corridor Plan. Opportunities for improvement or enhancement of these resources were identified. This new table is attached and will be included in the plan update.

ITEM #3: Review Town Plans and Other Resources

There was no time to discuss this item which will be added to the next agenda. Cindy Ingersoll distributed materials on this topic to Committee members for review prior to the next meeting.

E. Future Agenda Item Proposals:

Cindy Ingersoll outlined the next steps in the LHMP update process for discussion. These will include a review of the Town Plan, Zoning and Flood Hazard Regulations, the Flood Resiliency Addendum to the Town Plan, Black River Corridor Plan and the Road Erosion Report. Identification of new strategies and vulnerable assets will also be discussed.

F. Citizen's Comment:

None. No citizens were present.

G. Adjourn:

Meeting was adjourned at 3:20 PM and the next meeting scheduled for January 15, 2018, at 1:30 PM at the Springfield Fire Department.

TOWN OF SPRINGFIELD
SPRINGFIELD FIRE DEPARTMENT
77 HARTNESS HOUSE
SPRINGFIELD, VERMONT

HAZARD MITIGATION COMMITTEE
TUESDAY, JANUARY 16, 2018 @ 1:30 PM

AGENDA

A. CALL MEETING TO ORDER & ROLL CALL:

B. MINUTES:

C. ANY REQUESTED ADDITIONS TO THIS AGENDA:

D. NEW BUSINESS:

ITEM #1: Review Town Plan Recommendations (2014 & 2017)
ITEM #2: Review Zoning By-Laws (2014 plus updates)
ITEM #3: Review Flood Hazard Regulations/New Draft
ITEM #4: Review River Corridor Regulations/New Draft
ITEM #5: Review Black River Corridor Plan Site Specific Project Recommendations
ITEM #6: Draft Community Asset Vulnerability Chart

E. FUTURE AGENDA ITEM PROPOSALS:

F. CITIZEN'S COMMENTS:

G. ADJOURN

VOLUNTEER FORM TO DOCUMENT IN-KIND SERVICES - MATCH INFORMATION

PROGRAM: Springfield Hazard Mitigation Committee
DATE OF MEETING: January 16, 2018
MEETING LOCATION: Springfield Fire Department
TOPIC: Hazard Mitigation Plan
MEETING TIME: 1:30 PM

VOLUNTEER ATTENDEES - CLAIMED

No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE	TOTAL TIME
					0.545	$20.00
1					-	-
2	Russ Thompson	Fire Chief, Emergency Management Director, Springfield		1.5	-	30.00
3	William Kearns	Zoning Administrator		1.5	-	30.00
4					-	-
5					-	-
6					-	-
7					-	-
8					-	-
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21						
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23						
24						
		Sub Total	**0.00**	**3.00**	**$0.00**	**$60.00**

FEDERALLY SUPPORTED PERSONNEL - CAN NOT CLAIM

No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE (08/01/08-)	TOTAL TIME
					0.545	$20.00
1	Cindy Ingersoll	staff, SWCRPC	33	1.5	17.99	
2						
3						
4						
5						
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8						
9						
10						
		Sub Total	**33.00**	**4.50**	**$17.99**	**$0.00**

TOTAL MATCH	**#REF!**
TOTAL Non-Volunteer Match	**#REF!**
TOTAL VOLUNTEER MATCH	**#REF!**

SPRINGFIELD HAZARD MITIGATION COMMITTEE MEETING
2018-2022 LOCAL HAZARD MITIGATION PLAN UPDATE

January 16, 2017 at 1:30PM
Springfield Fire Department

DRAFT MINUTES

Present: Cindy Ingersoll (SWCRPC), Bill Kearns (Springfield Zoning Administrator), Russ Thompson (EMD, Fire Chief)

A. Call Meeting to Order & Roll Call:

Meeting was called to order at 1:30 PM and attendees introduced themselves.

B. Minutes:

Minutes of January 8, 2017, were approved with edits to the Existing Resources Table.

C. Any Requested Additions to the Agenda:

No additions were made to the agenda.

D. New Business:

Items #1, #2, #3 and #4: Review Town Plan Recommendations, Zoning By-Laws, Flood Hazard Regulations and Draft River Corridor Regulations

The Committee reviewed and discussed the above documents to identify potential new strategies for implementation.

ITEM #5: Review Black River Corridor Plan Site Specific Project Recommendations

Cindy Ingersoll will compile a more comprehensive list of these recommendations and circulate to the Committee for their review and possible inclusion for implementation in this update.

ITEM #6: Draft Community Asset Vulnerability Chart

Vulnerable community assets were identified throughout this meeting and were noted to include in the chart.

E. Future Agenda Item Proposals:

Cindy Ingersoll will draft a table of the suggested new Hazard Mitigation Strategies for Implementation and a Community Asset Vulnerability Chart for this update and will circulate to Committee members for review. The Committee will re-convene after SWCRPC has completed a first draft of the plan.

F. Citizen's Comment:

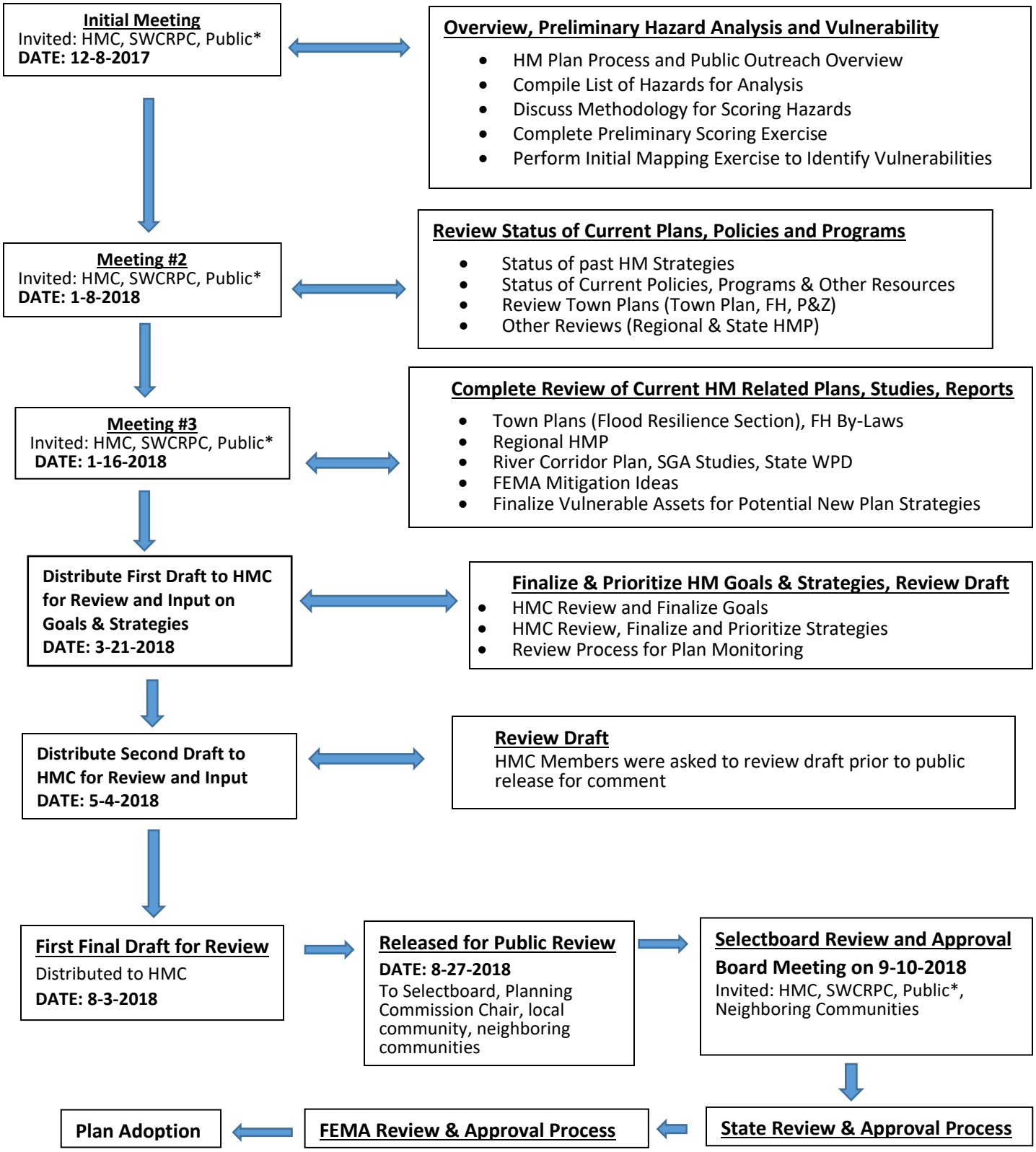
None. No citizens were present.

G. Adjourn:

Meeting was adjourned at 3:00 PM and a follow-up meeting was not scheduled.

APPENDIX C

APPENDIX C
Town of Springfield
2018-2022 Hazard Mitigation Plan Process



**Public refers to the local Springfield Community*

APPENDIX D

APPENDIX D

Springfield 2017 Town Plan Review
Identified Policies and Recommendations Related to Hazard Mitigation

Land Use (p. 23)

Goals:

- Enhance the overlay districts that protect the farmland along the Connecticut River, and create an overlay district for development next to the Black River.
- Encourage the creation of a Conservation Commission to oversee the protection of important natural and scenic areas.

Objectives:

- Examine current land use patterns, to determine future land use from a long term, cost/benefit perspective, in order to avoid additional costs to the town's infrastructure, unwanted sprawl, and the loss of cultural, historic, economic, agricultural, scenic and aesthetic resources. Ensure that the town's "Green Book" (Well Being) and Emergency Operations Plan are updated annually by the Emergency Management Coordinator.

Natural Resource Planning (p. 19)

Goals:

- Develop programs to improve the Black and Connecticut Rivers in order to maximize their scenic and recreational resource values and their visibility, access and use; in doing so the Town shall endeavor to act consistently with the various river corridor management plans developed by State and Regional authorities.
- Participate in watershed level planning activities for the Black and Connecticut River watersheds.
- Protect public water supplies from contamination and plan for potential future public water supply needs.
- Develop a plan for the establishment of Green Corridors.

Objectives:

- Maintain buffer areas of vegetation next to rivers and streams wherever appropriate and necessary. Steeper slopes and unstable soils require larger buffer areas in order to prevent erosion and ensure the greatest amount of infiltration before overland flow reaches surface waters.
- Investigate whether the retention of the Springfield Reservoir as a potential future water supply is justified.
- Efforts should be continued to ensure protection of wellhead areas and locating a viable secondary drinking water supply.
- Conserve and protect important open spaces outside the developed portions of the Town.
- The Town should continue to investigate areas to allow for public access and enjoyment of the Black and Connecticut Rivers, and should prioritize areas for conservation in order to protect the

natural and scenic resource values coupled with efforts to increase the visibility and use of these rivers.

Transportation (p.62)

Objectives:

- Continue to update the computerized database, which evaluates road maintenance needs based on the municipal road construction standards, municipal road maintenance methods, and municipal road maintenance priorities.
- Maintain and utilize a yearly construction schedule providing for improvement of the town's entire road network.

Facilities and Utilities (p. 70)

Goals:

- Maintain the highway system in a safe condition and to the Vermont Local Road and Bridge Standards as adopted by the Town.
- Develop a maintenance program for sidewalks, bridges, guardrails, retaining walls, and all other accessory infrastructure in a safe and economic manner through scheduled maintenance and replacement.

Objectives:

- Develop and implement a plan which will ensure there is adequate capacity for municipal storm water collection, treatment and discharge, and which will meet federal, state and local standards and regulations.
- Maintain close communication with public utilities that provide electric power, telephone service and television cable to coordinate projects including tree cutting, underground cable lying and installation of new utility poles and lights, to ensure that duplication of efforts and expenditures are avoided.

Flood Resiliency Addendum (p. 118)

Goals:

- To encourage flood resilient communities.
- To encourage community appreciation of the rivers flowing through Springfield as assets of the community which need to be seen, accessed, and used by the Town's residents and visitors.

Policies:

- If new development is to be built in flood hazard areas and river corridors, it should comply with the Flood Hazard Review Procedures in Section 5.6 of the Springfield Zoning Regulations, unless there are mitigating circumstances such as a channelized stream making it unlikely the river will move.
- Any development or redevelopment within the flood hazard areas or river corridors is subject to the Flood Hazard Review Procedures in Section 5.6 of the Springfield Zoning Regulations.

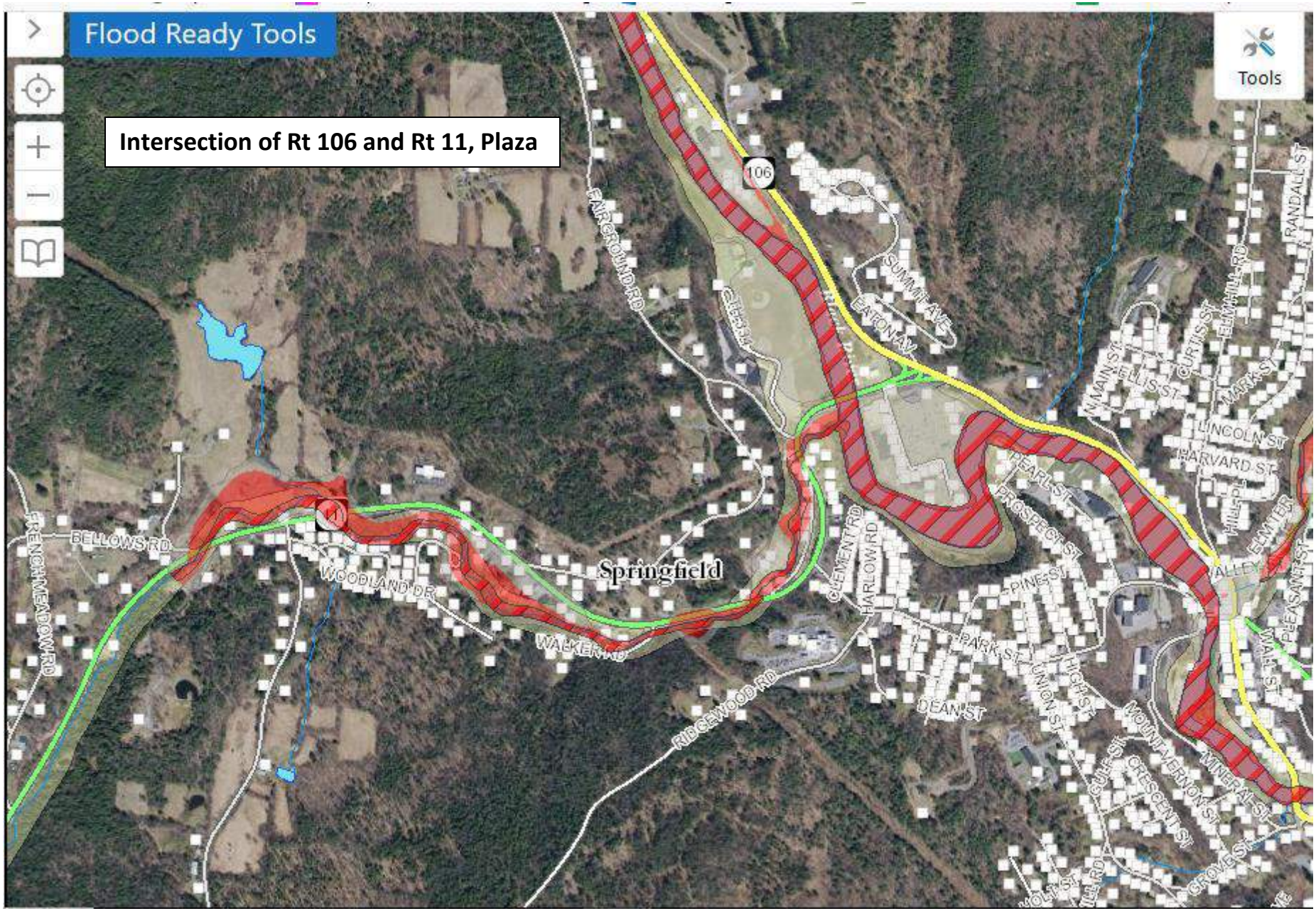
- The protection and restoration of floodplains and upland forested areas, or in the alternative projects in mitigation of negative side effects of permitted development that attenuate and moderate flooding and fluvial erosion, should be encouraged.
- Maintain buffer areas of native or historically related vegetation along rivers, streams and wetlands as specified in the Springfield Zoning Regulations. Provide reasonable flexibility with these buffer standards in order to allow for recreational uses (e.g. water access, multi-use paths), water crossings (e.g. roads, driveways and utilities), and management activities (e.g. removal of hazardous trees, eradicating exotic invasive species or contaminated soil remediation).
- Maximize onsite stormwater infiltration to help promote flood resiliency.
- Preserve the flood retention functionality of wetlands that serve as important components of local flood resilience efforts.
- Springfield's *All Hazard Mitigation Plan*, as most currently amended, is hereby adopted by reference as a component of this Town Plan.
- It is understood that development along the Black River is critically important to the economic prosperity of Springfield due to the Town's topographical configuration. Buffer zones should be regulated in the Zoning Regulations, but should not be considered "no touch" zones especially along the Black River below the flood control dam.
- All corridor and buffer regulation along the Black River below the flood control dam should be in accordance with the Town's stated economic development strategies of increasing the view, access and human use of the Black River.

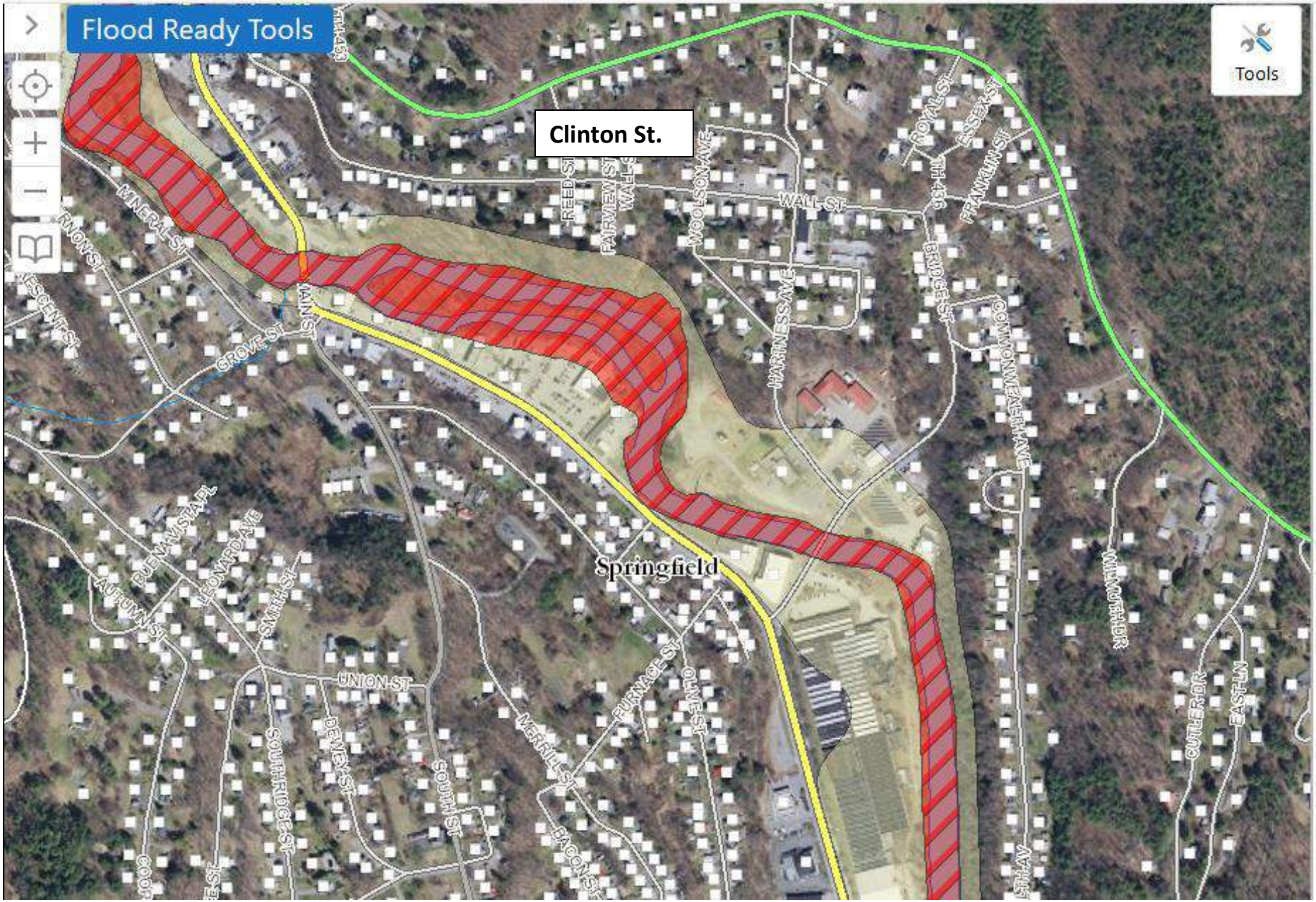
<u>Strategies:</u>

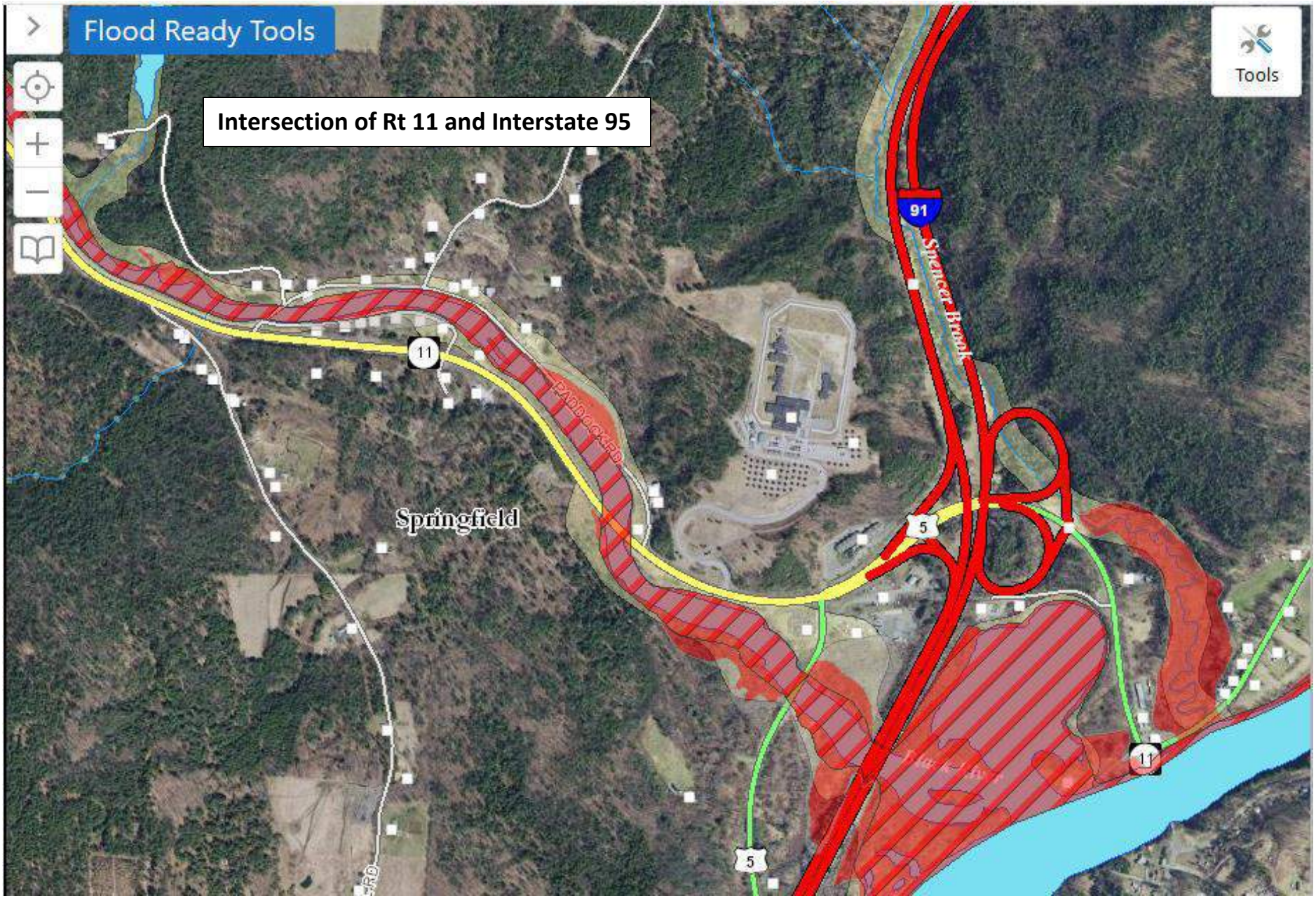
- Implement a town wide education program on promoting flood resilience.
- The Town should develop adequate emergency preparedness and response planning including, but not limited to:
    a) Maintaining an up to date Local Emergency Operations Plan;
    b) Updating the Local All Hazard Mitigation Plan on a five-year timeframe, or as needed;
    c) Develop and adopt Incident Action Plans for the North Springfield Dam and Weathersfield Reservoir;
    d) Develop an evacuation plan for businesses and residents within the identified hazard areas (i.e. flood hazard, river corridor and dam inundation).
- Evaluate existing regulations and standards to ensure that the goals and policies of this Chapter are adequately addressed.
- Maintain enrollment in the National Flood Insurance Program.
- Update the bridge and culvert inventory and condition assessment, and maintain an annual culvert upgrade and maintenance program to address the priority needs identified in the inventory.
- Encourage flood resiliency by prioritizing land conservation efforts for those lands that serve important flood retention or attenuation functions.
- Support the proposition that encouraging the public viewing, accessing, and use of the rivers is the best protection for their future, including appropriate trails, beautification efforts, and permacultured parklands.
- Mitigate risks in the Downtown and other vulnerable areas by:
    a) Including strategic infrastructure investments in the capital improvement plan (e.g. upgrades to bridges, culverts and storm drainage systems);
    b) Avoiding new critical facilities from locating within flood hazard or river corridors;

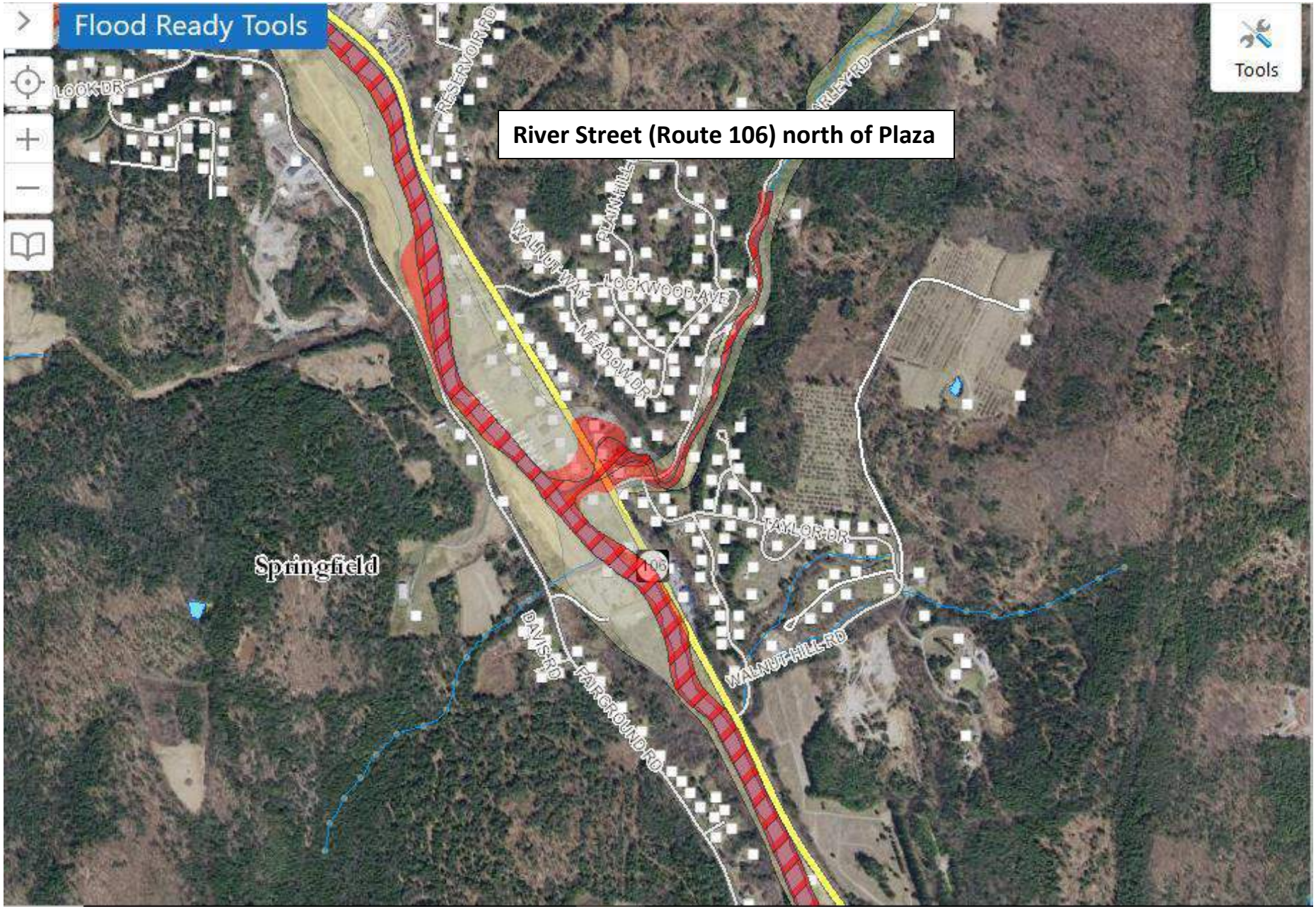
APPENDIX E

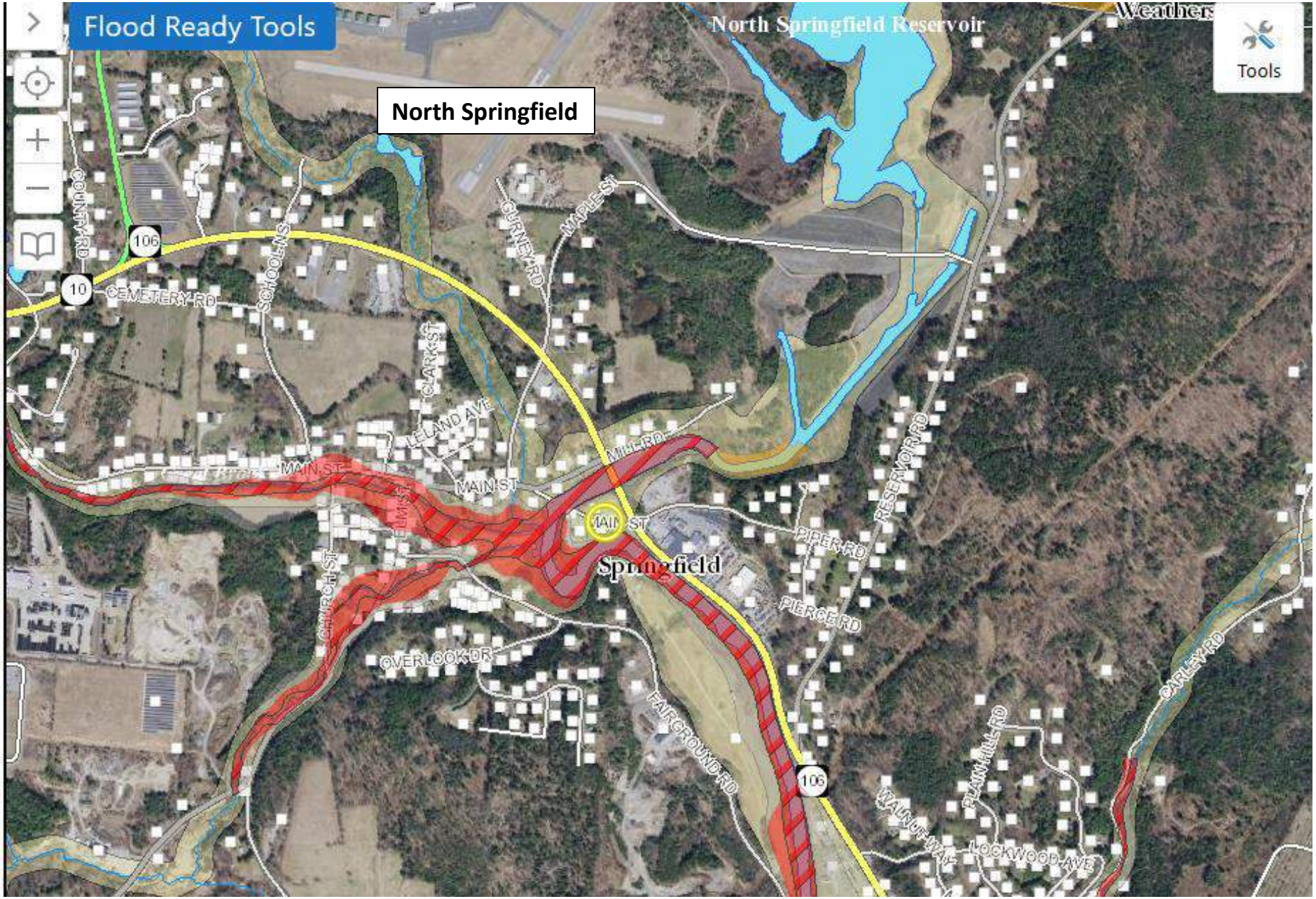
Flood Ready Tools
Tools
Downtown Springfield, Main St.
106
11
CHESTER RD
FAIRGROUND RD
FAIRGROUND MS
EATON AV
SHEEHAN AV
SUMMIT AV
DOUGLAS ST
ELLIS ST
BELLVUE ST
LINCOLN ST
LINCHFIELD ST
MARY ST
HARVARD ST
HILLCREST RD
ELM HILL
MORGAN ST
PEARL ST
PROSPECT ST
Springfield
QUEMENE RD
HARLOW RD
RIDGEWOOD RD
ERICA ST
GOODYEAR AVE
FOSTER AVE
HENRICK ST
DEAN ST
LEWIS ST
PARK ST
PINE ST
WHITCOMB ST
MYRTLE ST
HIGH ST
WALL ST


Flood Ready Tools
Tools
Intersection of Rt 106 and Rt 11, Plaza
106
Springfield
FAIRGROUND RD
SUMMIT AVE
EATON AV
BELLOWS RD
WOODLAND DR
WALKER RD
RIDGEWOOD RD
FRENCH MEADOW RD
CLEMENT RD
HARLOW RD
PEARL ST
PROSPECT ST
PINE ST
PARK ST
UNION ST
HIGH ST
DEAN ST
MOUNT VERNON ST
CRESCENT ST
MINERAL ST
GROVE ST
VALLEY
WALL ST
PLEASANT ST
ELMER
HILL RD
LINCOLN ST
HARVARD ST
MARK ST
ELMHILL RD
CURTIS ST
ELLIS ST
N MAIN ST
RANDALL ST


Flood Ready Tools
Tools
Clinton St.
Springfield
WALL ST
MAIN ST
MINERAL ST
GROVE ST
FAIRVIEW ST
REED ST
WOOLSON AVE
HARTNESS AVE
BRIDGE ST
ROYAL ST
FRANKLIN ST
COMMONWEALTH AVE
WILMUTH DR
CUTLER DR
EAST LN
ATLAS
FURNACE ST
COLONEL ST
MERRILL ST
BACON ST
SOUTH ST
SOUTH RIDGE ST
DEWEY ST
UNION ST
SMITH ST
LEONARD AVE
DUNNAMSTAPL
AUTUMN ST
MYRON ST
MESSENGER ST
COOP


Flood Ready Tools
Tools
Intersection of Rt 11 and Interstate 95
91
Spencer Brook
11
Springfield
5
11
5


Flood Ready Tools
Tools
River Street (Route 106) north of Plaza
RESERVOIR RD
WALNUT WAY
LOCKWOOD AVE
MEADOW DR
TAYLOR DR
Springfield
DAVIS RD
FAIRGROUND RD
WALNUT HILL RD


Flood Ready Tools
North Springfield
North Springfield Reservoir
Tools
COUNTY RD
106
10
CEMETERY RD
SCHOOL ST
CURNEY RD
MAPLE ST
CLARK ST
LELAND AVE
MILL RD
MAIN ST
Springfield
RESERVOIR RD
PIPER RD
PIERCE RD
CHURCH ST
OVERLOOK DR
FAIRGROUND RD
WALNUT AVE
LOCKWOOD AVE
CARLEY RD

APPENDIX F

APPENDIX F

Springfield Road Erosion and Slope Failure Priorities

2016 Springfield Road Erosion Inventory (Last amended 12/06/2016)

ID	Road Name	LAT	LONG	Erosion Issue?	Priority	Description of issues and other notes	Site# in 2016 RE Report?	Priority in 2016 Report?
10	Mile Hill	43.320433		Major	High	Major road-side ditch erosion leading to sedimentation in perennial stream. (Sites 10 and 131 are the same site). See Road Erosion Report for more information.		
11	Baskevich Rd	43.32013	-72.469251	Major	Medium	Major road-side ditch erosion leading to sedimentation in perennial stream - Stone lining ditches and additional culverts to divert some of the runoff load could help address this issue		
50	Carley Rd	43.326608	-72.500925	Major	Medium	Bank slumping on opposite side of the road from a perennial stream: eroded sediment captured by culverts which run under the road and direct discharge to stream		
51	Piper Rd	43.331742	-72.512688	Major	Medium	Bank erosion - Has been rip-rapped since 2012 inventory but the rip-rap needs to extend further down the hill. See Road Erosion Report for more information.	E	Medium
53	Elm St	43.325894	-72.527743	Major	Medium	Water traveling too far down steep section at end of French Meadow Road and gaining erosive force - eroding banks and undermining trees on side of Elm St and on private property. See Road Erosion Report for more information.	L	High

67	Middle Rd	43.268882	-72.491361	Severe	High	Major ditch and bank erosion is occurring along a fairly extensive segment of Middle Road. Tree roots are heavily exposed and trees may threaten road and utility wires if they fall. (Sites 67 & 68 are the same site). See Road Erosion Report for more information.	K	Medium
74	South St	43.277828	-72.475465	Major	Medium	Bank erosion encroaching on roadway - has since been partially stabilized with hotmix and concrete slabs but erosion is persisting		
80	Pleasant valley Rd	43.242386	-72.536119	Major	High	A short segment of streambank along Pleasant Valley Road next to Lovell Rd is undercutting. Erosion may extend into roadway if not stabilized. See Road Erosion Report for more information.	H	Medium
82	Whitney Rd	43.252413	-72.535636	Major	High	A perennial stream conveyance culvert was installed at an angle which is not consistent with the position of the stream channel. This leads to erosion at the upstream end of the culvert which may threaten the roadway during the next large storm event. Culvert needs realignment, hydraulics study to assess adequate size and to be longer.	No	
106	Walker Rd	43.29836	-72.499485	Major	High	Large failing culvert - if it completely fails people will be stranded as this is a single access road - Major hazard concern. Culvert was damaged during Irene and not replaced. Culvert needs a hydraulics study.	No	
121	Clark St	43.335424	-72.521705	Severe	High	Severe gully erosion forming below the discharge end of an undersized culvert. Runoff is captured from catch basin(s) in roadway. Surface waters downhill from the gully may be impacted. Project is located behind a residence. See Road Erosion Report for more information.	A	Urgent
122	Carley Rd	43.323626	-72.501915	Major	High	Moderate-severe gully is forming below the discharge end of perched culvert. Eroded sediment from the gully is feeding into a second downhill culvert which travels under the road and direct discharges into a stream. The banks and ditch on the opposite side of the road from the stream are eroding and washing. Much of this eroded sediment is also ending up feeding into the direct discharge culvert. Moderate stream bank erosion is occurring which may present a minor river-road conflict. See Road Erosion Report for more information.	B	High

c) Implement flood-proofing improvements when making major reinvestments in municipal buildings within flood hazard or river corridors;
d) Prevent the storage of important public records (e.g. Town archives, library collections) in flood-prone areas;
e) Aggressively defend against unreasonable or inflexible stream or river buffer restrictions, especially within the portion of the Black River protected by the flood control dam.

123	Spoonerville Rd	43.314276	-72.539553	Major	High	Stream banks are unstable and actively eroding into the roadway. The stream banks are currently covered with a layer of loose ditch material taken from the other side of the road, presenting an additional water quality issue (sediment deposition). See Road Erosion Report for more information.	C	Low
125	Walnut Hill Rd	43.316326	-72.500027	Major	High	Vertical stream banks next to road may continue to erode into the roadway. Erosion resulting in sediment deposition to stream. See Road Erosion Report for more information.	F	Medium
126	Seavers Brook Rd	43.276149	-72.469238	Severe	High	A short segment of Seavers Brook Road runs along a very steep valley brook and is beginning to show signs that it may collapse into the steep bank. The side of the road that runs along the valley wall is beginning to slump and the guardrails are very visibly leaning. See Road Erosion Report for more information.	G	Medium
127	Pleasant valley Rd	43.240128	-72.538398	Severe	High	A fairly extensive segment of of Pleasant Valley Road currently runs along a tall, vertical, raw bank which is beginning to show signs of failure. Eroded sediment is deposited into a stream. See Road Erosion Report for more information	J	High
128	Massey Rd	43.266267	-72.503986	Severe	High	An old concrete sectional bridge is beginning to fail on Massey Road. Guard rails are collapsing, wing-walls are beginning to undercut and the concrete sectional structure is failing. Important for school bus route. Bridge needs to be replaced.	No	
131	Mile Hill Rd	43.319964	-72.467597	Major	High	Major road-side ditch erosion leading to sedimentation in perennial stream. (Sites 10 and 131 are the same site). See Road Erosion Report for more information.	Q	High

APPENDIX G

2018-2022 Springfield Hazard Mitigation Plan
Annual Monitoring Form
Progress on Mitigation Strategies & Actions (Table 7)

Period Covered: _____
Date: _____

High Priority
Moderate Priority
Low Priority

MITIGATION ACTION	PROGRESS MADE*	FUNDING SOUGHT	NEXT STEPS	RESPONSIBLE PARTY	TIME FRAME
Implement Vermont Alert System for the Town to include Training, Data Collection and Program Planning					
Work with SWCRPC to incorporate these new Hazard Mitigation Plan Strategies into Other town planning efforts					
Establish Standard procedures for VT Alert to Inform Residents of Heating Fire Hazards during Extended Extreme Cold events, Brush Fire Hazard during Extended Dry Periods, Evacuation Routes and Emergency Shelters					
Enhance and update At-Risk Registry for vulnerable populations					

Conduct formal annual monitoring of this HMP and informing the public on progress made					
Become a participating member in the FEMA's Community Rating System					
Mitigate Lincoln Street slope failure					
Mitigate North Main Street slope failure					
Upgrade Chester Brook culvert bottom of Chester Rd. (STP, Flood Resilience Chapter)					
Evaluate susceptibility of Seavers Brook residential area to flooding to determine mitigation options or precautions. (STP, Flood Resilience Chapter)					
Upgrade Carly Rd. culvert at bottom of Carly Brook at River St. to mitigate River Street Flooding (STP, Flood Resilience Chapter)					
Evaluate susceptibility of Paddock Rd. area to ice jams and flooding to determine mitigation options or precautions. (STP, Flood Resilience Chapter)					
Assess and Mitigate Fairgrounds Rd. River Bank Erosion (STP, Flood Resilience Chapter)					
Assess and Mitigate Elm Street/French Meadow Road Bank Erosion (STP, Flood Resilience Chapter)					

Assess and Mitigate Great Brook / Black River Confluence flood issues in North Springfield (STP, Flood Resilience Chapter)					
Assess vulnerability of Connecticut River development to flood, erosion, and ice jams (STP, Flood Resilience Chapter)					
Determine stabilization options for the slope failure off of Seavers Brook Rd. (2016 REIR, ID#126)					
Assess deteriorating condition of sectional bridge on Massey Road, a school bus route. (2016 REI, ID#128)					
Conduct hydraulics on failing culvert on Walker Rd. a single access road. (2016 REI, ID#106)					
Evaluate stabilization options for severe bank erosion threatening utilities along Middle Rd. (2016 REIR, ID#67)					
Evaluate and prioritize remaining projects in 2016 Road Erosion Inventory Report not listed here. (See Appendix F)					
Conduct an educational outreach for Seavers Brook community on flood risk and resiliency					
Proactively manage culvert upgrade program by seeking new funding opportunities for Municipal Roads General Permit Standards compliance (MRGP)					

Review and prioritize Black River Corridor Plan for applicable general town and watershed-wide recommendations to reduce flood risk					
Develop a long-term plan to address new Municipal Roads General Permit (MRGP) standards on hydrologically-connected roadways					
Implement MRGP Plan to meet standards; prioritize road segments as funding becomes available					
Enhance Annual Fire Safety Awareness Program for residents and landowners on Structural and Wildland Fire Hazards					
Explore, identify, and purchase where possible, conservation easements, funding or other options to restore floodplain access for flood waters for the Black River and its tributaries					
Continue to work with State and SWCRPC to make progress on River Corridor Maps and in adopting River Corridor regulations					
Identify and educate property owners located within Special Flood Hazard Areas or River Corridor on flood and erosion risks, mitigation, FHA By-Laws, and the current NFIP					
Develop a long-term plan to address new Municipal Roads General Permit (MRGP) standards on hydrologically-connected roadways					

Implement MRGP Plan to meet standards; prioritize road segments as funding becomes available					
Develop and formally adopt an Emergency Response Plan for a North Springfield Dam Breach Event					
Develop and formally adopt an Emergency Response Plan for High Dam De-Watering Events					
Incorporate Flood Risk and Resiliency outreach (signage) as part of downtown Black River Access and Greenspace plans					
Strengthen stormwater infiltration practices recommendations/regulations for new development to improve flood resiliency					
Develop an evacuation plan for communities for business and residents in identified flood hazard areas and floodplains					
Address need for improved Dam out flow readout with an adjustment for impact of ice jams					

2018-2022 Springfield Hazard Mitigation Plan
Annual Monitoring Form
Progress on Existing Resources (TABLE 2)

Period Covered: _____
Date: _____

Resource	Opportunities for Improving Effectiveness	Progress Made/ Document Date Update
2017 Town Plan	Plan is updated on a five-year cycle or as plan elements are required. It can be strengthened to be more effective by incorporating HMP strategies.	
Town Plan Addendum on Flood Resilience	Can be more effective if incorporated into hazard mitigation planning and zoning and flood hazard by-laws	
Town of Springfield Basic Emergency Operations Plan	Plan is updated every year following town meeting. The update requirements have recently been revised to allow towns more flexibility in responding to emergencies.	
School Emergency Response Plan	Now coordinated with the Basic EOP. Addition of crisis teams and improved training has increased effectiveness.	
Mutual Aid – Emergency Services	None Identified	
Mutual Aid – Public Works	None Identified	
State Road Standards	Greater consideration of hydrological nature of road segments with new MRGP standards will improve effectiveness	
Subdivision Regulations	Continued updates and enforcement are important for continued effectiveness	
Zoning By-Laws & Flood Hazard Area Regulations	Flood Hazard Area Regulations could be revised to be easier to understand and enforce	
Development Review Board -Site Plan Review Process	Continued use of this tool will help prevent additional hazards	

National Flood Insurance Program (NFIP)	Flood maps should be revised as needed, town could pursue CRS rating	
Annual Road Maintenance Programs	New State Road Erosion Inventories and Planning requirements will improve effectiveness over the next five years	
Access Permits	Continued enforcement of access permit regulations and incorporating FHA requirements as updated, remain critical in maintaining effectiveness.	
Local Emergency Planning Committee 3	Greater town participation at the regional level may be beneficial if core mission is better identified	
Southern Windsor County RPC	The RPC can help improve effectiveness by encouraging coordination of all planning efforts, goals and recommendations, improving the planning process and investigate additional sources of historical and statistical data for identified hazards	
Road Erosion Reports	This report is most effective when considered for capital budgeting, infrastructure upgrades and planning	
Black River Stream Geomorphic Assessments and River Corridor Plan	Effectiveness can be improved if these documents are consulted for project implementation on a periodic basis and incorporate these projects into other town planning activities	
Flood Hazard Prevention Regulations (April, 2017 DRAFT)	Due to flooding and flood related hazards Ensures design construction and development, minimizes or eliminates	
2017 River Corridor Regulations (March 2017, DRAFT)	Town adoption of River Corridor Regulations will allow opportunities for further refinement	

2018-2022 Springfield Hazard Mitigation Plan Monitoring Form
Annual Hazard Occurrences Over Plan Period

Period Covered: _____
Date: _____

Hazard	Occurrence Date	Extent (degrees, inches, levels)	Impact (Area Impacted, roadway, infrastructure, buildings, property, $ in damage)
Flood/Flash Flood			
Fluvial Erosion			
Landslide/Slope Failure			
Severe Weather*			
Hurricanes/Tropical Storms			
Extreme Temperatures (H/C)			
Structure Fire			
Brush Fire			
Wildland Fire			
Severe Winter Weather **			
Ice Jams			
Other:			