The Town of West Springfield

Local Natural Hazards Mitigation Plan

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Adopted by the West Springfield City Council on MONTH, DAY, 2020.

Prepared by:

The West Springfield Natural Hazards Mitigation Planning Committee

and

The Pioneer Valley Planning Commission

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The West Springfield Town Council extends special thanks to the West Springfield Natural Hazards Mitigation Planning Committee as follows:

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The Pioneer Valley Planning Commission

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DRAFT

Table of Contents

DRAFT

DRAFT

1: INTRODUCTION

Planning Requirements under the Federal Disaster Mitigation Act

The Federal Disaster Mitigation Act, passed in 2000, requires that after November 1, 2004, all municipalities that wish to continue to be eligible to receive FEMA funding for hazard mitigation grants, must adopt a local multi-hazard mitigation plan and update this plan in five year intervals. This planning requirement does not affect disaster assistance funding.

Federal hazard mitigation planning and grant programs are administered by the Federal Emergency Management Agency (FEMA) in collaboration with the states. These programs are administered in Massachusetts by the Massachusetts Emergency Management Agency (MEMA) in partnership with the Department of Conservation and Recreation (DCR).

Massachusetts takes a regional approach and has encouraged the regional planning agencies to prepare plans for their member communities. The Town of West Springfield received a grant from the Federal Emergency Management Agency (FEMA) under the Pre-Disaster Mitigation (PDM) Program, to update its local Hazard Mitigation Plan, which was last adopted in 2010, and hired the Pioneer Valley Planning Commission to assist in the development of the plan.

What is a Hazard Mitigation Plan?

The Federal Emergency Management Agency (FEMA) and the Massachusetts Emergency Management Agency (MEMA) define Hazard Mitigation as any sustained action taken to reduce or eliminate long-term risk to people and property from natural hazards such as flooding, storms, high winds, hurricanes, wildfires, earthquakes, etc. Mitigation efforts undertaken by communities will help to minimize damages to buildings and infrastructure, such as water supplies, sewers, and utility transmission lines, as well as natural, cultural and historic resources.

Planning efforts, like the one undertaken by the Town of West Springfield and the Pioneer Valley Planning Commission, make mitigation a proactive process. Pre-disaster planning emphasizes actions that can be taken before a natural disaster occurs. Future property damage and loss of life can be reduced or prevented by a mitigation program that addresses the unique geography, demography, economy, and land use of a community within the context of each of the specific potential natural hazards that may threaten a community.

Preparing a local natural hazard mitigation plan before a disaster occurs can save the community money and facilitate post-disaster funding. Costly repairs or replacement of buildings and infrastructure, as well as the high cost of providing emergency services and rescue/recovery operations, can be avoided or significantly lessened if a community implements the mitigation measures detailed in the plan.

DRAFT

The 2019 West Springfield Hazard Mitigation Plan (HMP) is an update to the previous plan published in 2010. In addition to updating the plan to reflect changes in development, mitigation priorities, and recent hazards in the town, the planning team revised the content, structure, and plan update process. A primary difference between the 2010 and 2020 plans is that this HMP update includes a new focus on climate adaptation. The integrated nature of this plan provides the opportunity to identify climate change impacts, describe the effect climate change is anticipated to have on natural hazards, and prepare an integrated strategy to understand and mitigate risks. Subsequent to the development of this HMP update draft, the undertaking of the town's Municipal Vulnerability Preparedness (MVP) planning process will support the integration of climate impacts into West Springfield's overall mitigation strategy. The results of the MVP Community Resilience Building Workshop, held at the West Springfield Public Library on January 23, 2020, process are included as an attachment to this plan.

In addition to integrating climate change, the structure of the plan was further revised and reorganized based on the integrated nature of the plan and to align with the recently published 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan.

Previous Federal/State Disasters

The Town of West Springfield has experienced 18 natural hazards that triggered federal or state disaster declarations since 1991. These are listed in Table 1 below. The majority of these events involved severe winter weather, while 6 involved flooding, and 5 were due to hurricanes or nor'easters.

Table 1. Previous Federal/State Disaster Declarations

Disaster Name (Date of Event)	Type of Assistance	Declared Areas
March Blizzard, EM-3103 (March 1993)	PA	All 14 Counties
Russell Fire, FSA-2116 (September 1995)	PA	N/A
January Blizzard, DR-1090 (January 1996)	PA	All 14 Counties
February Snowstorm, EM-3175 (Feb 17-18, 2003)	PA	All 14 Counties
Snow EM-3191 (Dec 6-7, 2003)	PA	12 Counties including Hampden
January Blizzard EM-3201 (January 22-23, 2005)	PA	All 14 Counties
Hurricane Katrina, EM-3252 (August 29, 2005)	PA	All 14 Counties
Severe Storms and Flooding, DR-1614 (Oct 7-16, 2005)	IA and PA	9 Counties including Hampden
May Rainstorm/ Flood, DR-1642 (May 12-23, 2006)	IA and PA	Statewide
April Nor'easter, DR-1701 (April 15-27, 2007)	PA	Statewide
Severe Winter Storm, EM-3296/Severe Winter Storm	PA	EM - 9 Counties

DRAFT

Table 1. Previous Federal/State Disaster Declarations		
Disaster Name (Date of Event)	**Type of Assistance**	**Declared Areas**
and Flooding DR-1813 (Dec 11-18, 2008)		including Hampden DR - 7 Counties including Hampden
Severe Winter Storm and Snowstorm, DR-1959 (Jan 11-12, 2011)	PA and HMGP	7 Counties including Hampden
Severe Storms and Tornadoes, DR-1994 (June 01, 2011)	PA and HMGP	
Hurricane Irene, EM-3330 (Aug 26-Sept. 5, 2011) / Tropical Storm Irene, DR-4028 (Au6 27-29, 2011)	EM-3330 - PA DR-4028 - PA and HMGP	EM-3330 – Statewide DR-4028 - 9 Counties including Hampden
Severe Storm, EM-3343 (Oct 29-30, 2011) / Severe Storm and Snowstorm, DR-4051 (Oct 29-30, 2011)	PA and HMGP	EM-3343 - 9 Counties including Hampden DR-4051- 6 counties including Hampden
Hurricane Sandy, EM-3350/DR-4097 (Oct 27-30, 2012)	PA	Statewide
Severe snowstorm and Flooding, DR-4110 (Feb 8-9, 2013)	PA	Statewide

Source: FEMA, 2019

Notes:

HMGP Hazard Mitigation Grant Program
IA FEMA Individual Assistance
PA FEMA Public Assistance Project Grants

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2: LOCAL PROFILE

Community Setting

West Springfield is a suburban community comprised of roughly 17.5 square miles, with a population of nearly 29,000 people. Bordering the Connecticut and Westfield rivers to the east and south, respectively, West Springfield also shares a border with Holyoke to the north and Westfield to the West. Chicopee and Springfield lie to the east on the other side of the Connecticut River, and Agawam lies to the south across the Westfield River.

With an original colonial settlement dating back to 1665, West Springfield was formally established as a town in 1774. The banks of the Connecticut River provided prime soils for farming, and agriculture was an important part of the town's early history. Enduring elements of the town's colonial New England history include the Town Common, framed by towering shade trees, and historic structures like the Josiah Day House, circa 1754, which is believed to the be the oldest structure of its kind in Massachusetts.

Notably, West Springfield is the birthplace of the Morgan Horse and the home of the Eastern States Horse Show, one of the oldest in the country. West Springfield is also the home of the Eastern States Exposition ("The Big E"), a state fair for the New England region and one of the largest agricultural fairs in the nation.

West Springfield is also a major hub and commercial center for the region, being conveniently located at the intersection of Interstates 90 and 91. The Riverdale Street (Route 5) and Memorial Avenue (Route 147) commercial corridors are known for their well-established retail shopping centers and mix of commercial activities. The community is also home to a large intermodal rail yard, and is traversed by active rail lines with spurs servicing many industrial properties in the southern portion of the town.

While mostly suburban, West Springfield has a diverse range of development densities, ranging from semi-rural to urban, and a variety of housing options. Since the beginning of the 2000s, most Western Massachusetts communities have either maintained or lost population, but West Springfield has steadily added to its population and growth is forecast to continue at modest levels.

Infrastructure

West Springfield's infrastructure reflects its early settlement and evolution into a commercial and industrial center.

Roads and Highways

West Springfield's town center is spread from its historic Town Common, home to many civic and historical buildings, to the "Big E" fairgrounds – with much commercial and industrial development between. The key roads include Route 5 (Riverdale Street)

DRAFT

which travels along the western bank of the Connecticut River, and Route 147 (Memorial Avenue) and Route 20 (Park Avenue) both of which span the River to offer a connection to Springfield. Other significant routes include River Road, along the Agawam River; Elm Street and Union Street, which connect and parallel Route 5; Kings Highway, which travels through the town's northern neighborhoods; and Piper Road which runs from the north into downtown and turns into North and then South Boulevard.

Transit

The Pioneer Valley Transit Authority (PVTA) provides bus and shuttle service in and out of West Springfield, and contracts through MV Transportation to also offer paratransit, a door-to-door demand responsive van service.

Rail

CSX Transportation owns and operates rail lines through West Springfield, with a large intermodal transit facility located just northwest of the intersection of Union Street and Memorial Avenue. CSX rail service is exclusively for freight, with no passenger service being offered. The nearest passenger service is from Union Station in neighboring Springfield.

Public Water and Sewer Service

Nearly 100% of the Town is served by a municipal water system comprised of four wells located in Southwick, MA. The wells provide the raw drinking water to the Town's treatment plant from the Great Brook section of the Barne's Aquifer. If required, additional water is purchased from Springfield Water and Sewer Commission which is fed from a surface water supply known as Cobble Mountain Reservoir, located in Blandford, MA. Only a handful of private wells remain in town.

Ninety percent of wastewater is sent to the Springfield Regional Wastewater Treatment Facility located at Bondi's Island in Agawam. Remaining properties in Town utilize individual septic systems.

Natural Resources

West Springfield's physical boundaries consist of three significant features. The Connecticut River to the east provides the community with over five miles of river frontage on New England's largest river. To the south, the Westfield River forms an eight mile boundary, a portion of which is located adjacent to Mittineague Park, West Springfield's largest park. Because West Springfield is located at the confluence of these two rivers, much of the eastern portion of the community is in the floodplain of the two. The landscape then gently slopes to the west where the East Mountain range is physically prominent. East Mountain's summit at 690 feet is the highest point in West Springfield, and provides spectacular view of Springfield, the Connecticut River, and the picturesque valleys and farmland surrounding.

Water Resources

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Sitting on the western banks of the Connecticut River, West Springfield owes much of its historical development to its proximity to this regional water resource. Much of the fresh water in West Springfield is contained in the Westfield and Connecticut Rivers. The Connecticut River runs along the eastern boundary of West Springfield for five miles. The section of the Westfield River that runs along the northern boundary of West Springfield is approximately eight miles long, and runs from the Westfield town line to its confluence with the Connecticut River at Pynchon Point. Both of these water bodies have witnessed dramatic water quality improvement in recent decades, and are considered generally safe for fishing and swimming. However, currents and boat traffic in the Connecticut and water depths in the Westfield make swimming impractical in most locations.

Other water resources in West Springfield are limited but include a variety of brooks, ponds, and wetlands that support diverse habitats. The brooks include Schoolhouse, Goldine, Bagg, and Piper Brook all of which drain into the Connecticut River and Paucatuck, Block and Squassick Brook which are tributaries of the Westfield River. The only other water body of significant size is the Bearhole Reservoir which covers about 15 acres and is located on East Mountain and created by damming the Paucatuck Brook.

Wetlands are located throughout the town, mostly smaller in size, with some larger resource areas in the central and northwestern sections of town. The town's wetlands are classified by the U.S. Department of the Interior Fish and Wildlife Service as mainly Palustrine forested, scrub-shrub or emergent systems. A number state-listed species have been identified in West Springfield and all but one of them depends on its water resources for at least some portion of their lifecycle.

Forests and Fields

Over one third (42%) of the total land cover acreage of West Springfield is forested, approximately 4,738 acres classified as either deciduous forest or evergreen forest, providing important habitat opportunities. Additionally, West Springfield boasts mature street trees within its Town Common and lining several main thoroughfares. These trees are important the maintaining the character of the downtown as well as providing shade and mitigating stormwater run-off. Additionally, there are a few hundred acres of fields, cropland, and orchards scattered throughout West Springfield. These agricultural lands also provide good wildlife habitats. These fields and meadows each have their unique trees and grasses. Furthermore, these forests and fields provide recreational opportunities for town residents.

Land Use and Development Trends

West Springfield's pattern of land use evolved from its rural New England heritage and agricultural beginnings into early 20th century industrialization and late 20th century suburbanization. In turn, West Springfield's topography, soils, and physiography (lakes, rivers, wetlands and watershed areas) shape and constrain these culturally determined land use patterns.

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Existing Land Use

In addition to other factors, zoning and other land use regulations constitute West Springfield's "blueprint" for its future. Land use patterns over time will continue to look more and more like the town's zoning map until the town is finally "built out"—that is, there is no more developable land left. Therefore, in looking forward over time, it is critical that the town focus not on the current use and physical build-out today, but on the potential future uses and build-out that are allowed under the town's zoning map and zoning ordinances. Zoning is the primary land use tool that the town may use to manage development and direct growth to suitable and desired areas while also protecting critical resources and ensuring that development is in keeping with the town's character.

The West Springfield Zoning Ordinance establishes 20 base zones, and 4 overlay zones:

- Five residential zones – Residence A (RA), Residence A-1 (RA-1), Residence A-2 (RA-2), Residence B (RB), Residence C (RC);
- Six commercial (business) zones -- Neighborhood Business (NB), Business A (BA), Business A-1 (BA-1), Business B (BB), Business B-1 (BB-1), Central Business (CB);
- Three industrial zones – Industrial (I), Industrial Park (IP), Industrial Park-Light (IPL);
- Five flexible zones - Special Use Technical (SU-T), Special Use Office (SU-O), Special Use Multi-family (SU-M), Special Use Mobile Home (SU-H), and Planned Unit Development (PUD);
- One Recreation zone – Recreation zone (REC) and
- Five overlay zones – River Protection (RP), Water Supply Protection (WSP), Flood Hazard (FH), Age Restricted Housing (ARH), and Memorial Corridor (MC) overlays.

Appropriate zoning is important to protecting the overall health and safety of the Town residents; however, three of West Springfield's districts are particularly relevant to natural hazard mitigation. These are outlined here:

- Flood Hazard This overlay district was created to reduce public safety threats from flooding, eliminate new hazards to public safety officials, prevent occurrence of water contamination emergencies, avoid the loss of utility services from flooding, eliminate the cost of clean up of flooding conditions, and reduce the damage to public and private property resulting from flooding.
- Recreation This district creates a natural buffer or green belt between the town and the Westfield and Connecticut Rivers. It is intended to protect life, public safety, and property from flooding hazards
- Water Supply Protection District - The purpose of this overlay district is to protect and preserve West Springfield's groundwater resources from potentially damaging pollution or environmental degradation by regulating certain uses within the district. The regulations state specific prohibited and restricted uses,

DRAFT

regulates drainage, details site plan requirements and special permit procedures.

The Zoning Ordinance also establishes a Site Plan/Special Permit Approval procedure for specific uses and structures within West Springfield. This review allows the Special Permit Granting Authority the ability to review development to ensure that the safety and welfare of the people of West Springfield are protected, and includes several specific evaluation criteria that are relevant to natural hazards.

Recent and Projected Development Trends

Today, the majority of West Springfield's 17.6 square miles is a combination of undeveloped land including forest, water, and open land, totaling roughly 3,368 acres, and residential land, totaling 3,968 acres. The two other primary land uses are for transportation (designated as right-of-way) which constitutes approximately 1,415 acres, followed closely by commercial land (including mixed use, primarily commercial and mixed use other) at approximately 1,028 acres. Industrial land covers approximately 681 acres, while recreation land comprises almost 130 acres of land, and agricultural land comprises approximately 35 acres.

Table 2. 2016 Land Use

Land Use Description	Acres	Percent
Agriculture	35.03	0.31%
Commercial	1,024.66	9.15%
Forest	35.00	0.31%
Industrial	680.88	6.08%
Mixed use, other	0.11	0.00%
Mixed use, primarily commercial	2.88	0.03%
Mixed use, primarily residential	1.37	0.01%
Open land	2,869.62	25.63%
Recreation	127.40	1.14%
Residential - multi-family	542.25	4.84%
Residential - other	1.11	0.01%
Residential - single family	3,423.17	30.57%
Right-of-way	1,414.53	12.63%
Tax exempt	575.23	5.14%
Unknown	1.20	0.01%
Water	463.63	4.14%
Grand Total	**11,198.07**	**100.00%**

Source: MassGIS 2016 Land Use Data

Since the last iteration of the Hazard Mitigation Plan, the Town has seen a range of new residential and commercial developments. Significant residential developments include two traditional single-family subdivisions: Mulcahy Drive (13 lots) and Tiara Lane (11 lots), and two age-restricted housing developments: Piper Green Estates (18 condo units) and the Sisters of Providence PACE project (86 income-restricted apartments). Commercial development has been steady and has primarily involved redevelopment of property, including both renovation of existing buildings and demolition with new construction. Significant redevelopment projects have included the Fathers and Sons

Audi Volkswagon dealership on Memorial Avenue which involved the clearing of several blighted properties to make room for the new dealership, a new 110 room hotel on the site of a former billiards hall on Riverdale Street, and the renovation of a former auto body shop into a firearm and bow range on Main Street. Business expansion has also occurred, with notable examples including a new drying tower addition at the Riverdale Street Agri-Mark facility which created 15 new full-time jobs, and the ongoing expansion of Titan Industries on Baldwin Street.

Potential Future Development

Development in Hazard Areas

Most hazards identified in this plan are regional risks, therefore, all new development falls into the hazard area. The exception to this is flooding. According to the Community Information System (CIS) of FEMA, there were 47 National Flood Insurance Policy (NFIP) policies in force in West Springfield in November, 2018, including 27 residential policies and 20 non-residential policies. 14 of those policies are associated with structures located within the Special Flood Hazard Area (SFHA) (shown on the Flood Insurance Rate Maps as zones beginning with the letters 'A' or 'V').

Critical Facilities

A Critical Facility is defined as a building, structure, or location which:

- Is vital to the hazard response effort
- Maintains an existing level of protection from hazards for the community
- Would create a secondary disaster if a hazard were to impact it

Critical Facilities within Hazard Areas

Hazards identified in this plan are regional risks and, as such, all critical facilities fall into the hazard area. The exception to this is flooding. There are several critical facilities that fall within the 100-year floodplain as shown in the table at the end of this section.

The Critical Facilities List for the Town of West Springfield has been identified utilizing a Critical Facilities List provided by the State Hazard Mitigation Officer. West Springfield's Hazard Mitigation Committee has broken up this list of facilities into four categories:

- The first category contains facilities needed for Emergency Response in the event of a disaster.
- The second category contains Non-Emergency Response Facilities that have been identified by the Committee as non-essential. These are not required in an emergency response event, but are considered essential for the everyday operation of West Springfield.
- The third category contains Facilities/Populations that the Committee wishes to protect in the event of a disaster.

DRAFT

- The fourth category contains Potential Resources, which can provide services or supplies in the event of a disaster.

The critical facilities and evacuation routes potentially affected by hazard areas are identified in Table 4-1, following this list. The Past and Potential Hazards/Critical Facilities Map (Appendix D) identifies these facilities.

Category 1 – Emergency Response Services

The Town has identified the Emergency Response Facilities and Services as the highest priority in regards to protection from natural and man-made hazards.

1) Emergency Operations Center

   Primary: City Municipal Office Building- 26 Central St.. New backup power was installed at this facility within the past 5 years, now powering all critical systems in the building. However, the building is located within the 500 yr floodplain.

   Secondary: Westfield Street Station, 1338 Westfield St.

2) Fire Station

   West Springfield Fire Department – 44 Van Deene Ave. This building is located within the 500 yr floodplain.

3) Police Station

   West Springfield Police Department – 26 Central Street

4) Department of Public Works

   Department of Public Works – 430 Westfield Street

   DPW Water Division – 135 Piper Road

5) Emergency Fuel Stations

   Highway Department – 430 Westfield Street

6) Emergency Electrical Power Facility

   Town Office - emergency generator to serve entire building, test run occurs every week. Also, 3 portable generators are available.

7) Emergency Shelters

Official Shelters (equipped with permanent back-up power, showers, and kitchen facilities):

- West Springfield Middle School- 31 Middle School Dr

DRAFT

- West Springfield Senior High School- 425 Piper Road

There are two primary town-owned emergency shelters – the High school and the Middle School – both have showers, kitchens, and sleeping areas though neither is certified as a shelter by the Red Cross. The town used the Middle School as a fully operational shelter in the response to the 2011 tornado. Facilities at the Eastern States Exposition were also used for sheltering for that event; however they had to be equipped with temporary air conditioning units as they are otherwise not cooled.

The Senior Center and Town Library are town-owned facilities that can be used as temporary heating and cooling stations, though the status of backup power at those facilities is unclear.

Potential short-term sheltering, heating, or cooling centers (equipped with portable generators or hookups):

Name	Address	Purpose
St Thomas The Apostle Church	75 Pine Street	
Eastern States Exposition	Memorial Ave.	
Fausey School	784 Amostown Road.	
Tatham School	61 Laurel Road	
John Ashley School	88 Massasoit Ave.	
Memorial Avenue School	201 Norman Street	
Mitt Congregational Church1	1840 Westfield Street	
West Springfield Senior Center	128 Park Ave.	
The Colburn School	115 Southworth Street	
Eastern States Exposition (Big E)		Cooling Shelter
Senior Center	128 Park St	The Senior Center has opened in the past on a Sunday to provide cooling.

8) Water Sources (fire protection only)

- Numerous locations in West Springfield drawing from Southwick supply, any available.
- Eastern States Exposition (does not have its own system)
- Senior High School (pool would be used as water system during an emergency)
- Reservoir-Amostown Road, Block Brook
- Bear Hole (emergency only facility)

9) Transfer Station – Agawam Avenue (On Past & Potential Hazards/Critical Facilities Map)

10) Helicopter Landing Sites (Permitted anywhere feasible)

- High school parking lot
- Mittineague Park
- Eastern States Parking Lot Gate 9

11) Communications

There are a number of cell and radio towers throughout town – see Past & Potential Hazards/Critical Facilities Map.

Tower Location	Tower Type
Interstate drive	cell and radio
Bridge Street	cell
Westfield Road	cell
Prospect Avenue	cell
Tacoa, Winona Drive	radio tower
Pease Ave.	cell tower on water tank
William Franks Drive	radio

12) Primary Evacuation Routes

- Route 90
- Route 5
- Route 20
- Route 91
- Route 147
- Piper Road / Birnie Ave
- Morgan Road
- Dewey Street

13) Bridges/Culverts Located on Evacuation Routes

Bridges

Evacuation Route	Crosses	Owner	Year Built	Year Rebuilt
Route 20 (Westfield Street)	Railroad	Mass Highway	1925	1981
Route 90 (Eastbound)	Access Ramp	Mass Turnpike Authority	1957	1993
Route 90 (Westbound)	Access Ramp	Mass Turnpike Authority	1957	1993
Route 147 (Memorial Avenue)	Route 5	Mass Highway	1953	NA
Route 147 (Memorial	Route 5	Mass Highway	1955	NA

DRAFT

Evacuation Route	Crosses	Owner	Year Built	Year Rebuilt
Avenue)				
Route 20 (Park Ave Rotary)	Route 5	Mass Highway	1952	NA
Route 90 (Eastbound)	Morgan Road	Mass Turnpike Authority	1957	1994
Route 90 (Westbound)	Morgan Road	Mass Turnpike Authority	1957	1994
Route 90	Lane Quarry Road	Mass Turnpike Authority	1957	NA
Route 90 (Eastbound)	Route 5	Mass Turnpike Authority	1957	1982
Ramp to Routes 90 & 91	Route 5	Mass Highway	1953	1997
Route 91 (Northbound)	Route 90	Mass Highway	1967	NA
Route 91 (Southbound)	Route 90	Mass Highway	1967	NA
Route 91 (Northbound)	Prospect Avenue	Mass Highway	1967	NA
Route 91 (Southbound)	Prospect Avenue	Mass Highway	1967	NA
Route 90 & 91 Connector	Prospect Avenue	Mass Highway	1968	NA
Route 90 & 91 Connector	Ramp to Route 90	Mass Highway	1968	NA
Route 91	East Loop	Mass Highway	1966	NA
Route 91	West Loop	Mass Highway	1966	NA
Route 91	Route 5	Mass Highway	1966	NA
Route 90 (Eastbound)	Railroad	Mass Turnpike Authority	1957	1994
Route 90 (Westbound)	Railroad	Mass Turnpike Authority	1957	1994

Category 2 – Non Emergency Response Facilities

The town has identified these facilities as non-emergency facilities; however, they are considered essential for the everyday operation of West Springfield.

1) Problem Culverts

   High priority

   i) Ashley Street near Nelson Circle, culvert (near elderly housing facility) needs maintenance. Drain pipes, new headwalls. Ashley Street is used as a route to access the Vietnam Veterans Memorial Bridge across the Westfield River joining West Springfield and Agawam, MA.

   ii) Union Street underpass at the CSX bridge has a deteriorated full street width storm drain / grate system between the bridge abutments that dumps directly into a stormwater conduit. This area under the CSX RR Tracks, between West School and Bridge Streets experience regular stormwater flooding.

DRAFT

iii) Block Brook - undersized culverts at Route 20/Westfield Street, Plymouth Terrace, Salem Street and Ely Avenue that cause back-up flooding of the brook and feeder streams and infiltration into 1.800 lineal feet of the Town's 18" Sanitary Sewer Main that runs parallel to the brook and feeder streams

iv) Schoolhouse Brook - undersized culverts at and adjacent to Althea Street and Labelle Street that cause back-up flooding of the brook and infiltration into the Town's 10" Sanitary Sewer Main that crosses the brook .

Medium priority

v) Old Westfield Road - Paucatuck brook culvert, falling apart, undersized, flooding out properties and road edges above it falling apart making guardrail maintenance impossible. Also the Town's 24 inch water transmission main had to be run above ground here due to the heavy amount of unsuitable materials under the existing undersized culvert.

vi) 394 Birnie Ave- culvert headwalls are collapsing on both sides and flooding.

vii) 1150 Piper rd.- Goldline brook, undersized culvert, head walls are falling apart

Low Priority

viii) Old Westfield Road under CSX bridge, Drain lines are undersized making road impassable during heavy rain event.

ix) River Road underpass floods frequently under the CSX bridge. The outfall goes through the levee south of the bridge.

x) Cayenne Street at Intersection of Cayenne Street and Morgan Road. Culvert needs maintenance.

xi) Schoolhouse Brook at Massasoit and along west side of Riverdale Street

2) Water Supply

Bear Hole Reservoir – back-up town water supply

Southwick wellfield-transmission line is under-sized

Springfield cross-connection for backup (cross-connections are not mapped for public safety)

Category 3 – Facilities/Populations to Protect

The third category contains people and facilities that need to be protected in event of a disaster.

1) Special Needs Population

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Group Homes – State Department of Mental Health (??) inspects group homes that are licensed by the state. All others are inspected by the town.

Cowing School – 1Park and Elm Streets

2) Elderly Housing/Assisted Living

Facility Name	Address
Housing Authority Properties	
Birch Park Circle (families and some older adults)	
Main Street	
Oxford Place	
LeLang Terrace	
Grove Street Village	
Landmark @ Monastery Heights	
Prospect Ave Nursing Home	
Sisters of Providence	2112 Riverdale

3) Public Buildings/Areas

Name	Address
Senior Center	128 Park Street
Mittineague Park	
Eastern States Exposition Grounds	
Storrowtown Village	
Public Library	200 Park St.

4) Schools

School Name	Address
John Ashley School (Kindergarten)	88 Massasoit Ave.
Cowing School Early Childhood Center	160 Park Street
Coburn Elementary School	115 Southworth Street
Fausey Elementary School	784 Amostown Road
Memorial Elementary School	201 Norman Street
Mittineague Elementary School	Second Street
Tatham Elementary School	61 Laurel Road
West Springfield Middle School	31 Middle School Drive
West Springfield High School	425 Piper Road

DRAFT

School Name	Address
St. Thomas School	75 Pine Street
Mittineague United Methodist Preschool	800 Amostown Road
Montessori-American Children's House of West Springfield	118 Riverdale Street
West Springfield Area Headstart	511 Main Street
Hampden Charter School	511 Main St.
Lower Pioneer Valley Collaborative –	174 Brush Hill Rd.
Twain School –	72 Front St.
Mittineague Children's Center (preschool) –	1840 Westfield St.
May Institute –	48 Capital Dr.

5) Day Care

Day Care Name	Address	Capacity
Mendez, Melanie Sue	56 Burford Avenue	5
Messer, Kathryn S.	208 City View Ave.	8
Mittineague Methodist Community Preschool	800 Amostown Road	76
Mittineague's Children Center	1840 Westfield St.	39
Moran, Marianne	42 Sheridan Ave.	8
Nielsen, Davida L.	550 Amostown Road	6
Orlandi, Gail F.	145 Pease Avenue	9
Parkin, Ellen M.	105 Morton Street	8
Reyes, Maria	48 George St.	6
Robert, Michele L.	39 Glenview Drive	6
Rogers, Sylvia L.	421 Gooseberry Rd	8
Roy, Linda E.	62 Bretton Rd.	6
Sanabria, Rosa A.	394 Morgan Road	8
St. Onge, Debra	70 Chilson Road	6
Stowell, Regina A.	98 Mt. Pleasant Ave.	5
Sullivan, John Timothy	113 Butternut Hollow Road	8
The Kids' Place	915 Memorial Avenue	96
Thomas, Wanda	256 Valley View Circle	6
After School Program of West Springfield	615 Main Street	26
Alevras, Kathleen A.	1790 Westfield Street	6
Argiro, Cindy K.	212 Kings Highway	6
Burgen, Heather	44 Lenny's Way	6
Buteau, Diana M.	92 Garden Street	8
Champiney, Dena M.	181 Hillcrest Avenue	7
Corley, Jennifer L.	208 Sibley Ave	5
Crowell, Rhoda P.	433 Brush Hill Avenue	5
Dirienzo, Cara	43 Warren St.	5
Dombkowski, Susan	103 Beverly Hills Lower	6
Eickelberg, Leslie	320 Poplar Ave.	6

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Day Care Name	Address	Capacity
Feliciano, Iris	78 George St.	7
Fernandez, Carmen Maria	25 Allen St., 2nd floor	6
Florence, Kathleen	254 Greystone Avenue	5
Forney, Patricia A	116 Silver St.	8
French, Colleen P.	52 Janet St.	4
Gonzalez, Celines	70 Irving St.	3
Grace Nursery School	1552 Westfield Street	36
Guiel-Ashe, Laurie A.	396 Morton Street	8
Howard, Christine	86 Woodmont St.	5
Ivers, Dana Lynn	104 Forest Glen	5
Kreuzer, Sharon	47 Warren St.	5
Lynch, Joyce O.	135 Warren Street	6
Maloney, Carol Ann	22 Southworth Street	7
Maltsev, Olga	304 City View Ave.	6
Marquez, Jessica C.	129 Field Street	7
Maslanka, Kelly	79 Ely Ave.	5
McElligott, Cathleen	12 Kerry Lane	8

6) Churches/Religious Institutions

Name	Address
Bible Baptist Church	575 Morgan Road
Church of Christ	61 Upper Church Street
Emmanuel Baptist Church	38 Front Street
Grace Lutheran Church	1552 Westfield Street
Mittineague Congregational Church	1840 Westfield Street
Slavic Pentecostal Church	22 Pleasant Street
Holy Ghost Temple Church	30 Massasoit Avenue
Mittineague United Methodist Church	800 Amostown Road
First United Methodist Church	802 Main Street
First Baptist Church	337 Piper Road
Russian Pentecostal Church Hope	407 Park Street
West Springfield Covenant Community Church	112 Amostown Road
First Congregational Church of West Springfield (now owned by the town, leased to the congregation)	20 Lathrop Street
Church of the Good Shepherd	214 Elm Street
Victory Temple Church of God in Christ	521 Union Street
Bethesda House of Grace	440 Main Street
Gospel Hall	48 Garden Street

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Name	Address
El Amanecer de la Esperanza	27 Sylvan Street

7) Historic Buildings/Sites

Name	Address
St. Thomas Cemetery	47 Pine Street
Beth Israel Cemetery	
Paucatuck Cemetery	
Ashley Cemetery	
Joshua Day House	Park Ave

Note: Cemeteries are shown on Past & Potential Hazards/Critical Facilities Map.

8) Apartment Complexes (inspected by the town, generally more than 8 units)

Name	Address	Units
822 Main Street Apartments	Main St. 822	10 apt
April House - 1374 Memorial	Memorial Ave. 1374	14 apt
April House - 17 Exposition	Exposition Ave. 17	16 apt
April House - 22 Exposition	Exposition Ave. 22	16 apt
Arms Apartments	Mercury Court 27-28	101 apt
Ashley Arms Apartments	Ashley Ave. 131	78 apt
Avon Apartments	Westfield St. 52	32 apt
Bel-Air Apartments	River St. 61-73	29 apt
Beverly Apartments	Beverly Ter. 26	10 apt
Birch Park Housing	Oxford Place 37	
Bonneau Apartments	Prospect Ave. 21-25	9 apt
Bonneau Apartments	Prospect Ave. 31-35	9 apt
Boulevard West	Westfield St. 616	20 apt
Bourque Housing	Oxford Place 37	
Bowling Apartments	Elm St. 195-217	7 apt
Bradford Arms	Bradford Dr. 47-70	39 apt
Burford Apartments	Burford Ave. 21-25	20 apt
Capri Apartments	River St. 97-109	26 apt
Carriage House Apartments	Elm St. 1029	24 apt
Center Court Apartments	Royce Court 12	34 apt
Colby Apartments	Elm St. 1193	6 apt
Colonial Apartments	Bradford Dr. 33	45 apt
Country Club Manor	Elm St. 1295	12 apt
Courtyard Apartments	Westfield St. 1139	70 apt
Craigwood Village	Craig Dr. 24	72 apt

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Name	Address	Units
Crestwood Apartments	Riverdale St. 2149	48 apt
Deville Apartments	Elm St. 1139-1163	82 apt
Eagle Apartments	River St. 21-27	25 apt
Elm House	Elm St. 1144	9 apt
Executive Apartments	Riverdale St. 1438-1440	42 apt
Foster Arms Apartments	Westfield St. 758	14 apt
Grove Village Housing	Oxford Place 37	
Heywood Apartments	Heywood Ave. 101-111	20 apt
Highland Court Apartments	Riverdale St. 2073	72 apt
Hillcrest Arms	Highland Ave. 17-25	72 apt
Hillcrest House Apartments	Westfield St. 1095	36 apt
Hilltop Efficiencies	Westfield St. 443	32 apt
Holiday Apartments	River St. 37-49	46 apt
Imperial Apartments	River St. 131-155	78 apt
Laurel Apartments	Riverdale St. 1343	72 apt
Lee Lang Housing	Oxford Place 37	
Little Castle Apartments	Westfield St. 1967	11 apt
Ludington Court	Elm St. 100-103	48 apt
Memorial Apartments	Baldwin St. 191	22 apt
Myron Court Apartments	Myron St. 24	49 apt
Old Schoolhouse	Kings Hwy 209-215	20 apt
Olympia Manor Apartments	Ashley Ave. 109	64 apt
Oxford Place Housing	Oxford Place 37	100
Park Street Manor	Park St. 370	126 apt
Parkview Apartments	Bliss St. 58	12 apt
Patriot Village	Craig Dr. 55	127 apt
Pilgrim Village	Craig Dr. 65-71	48 apt
Pugliano Apartments	Memorial Ave. 1059-1065	
Riverdale Apartments	Riverdale St. 1715-1721	52 apt
Seville Apartments	Riverdale St. 2024	15 apt
Squires Apartments	Westfield St. 1159-1189	76 apt
Summit Apartments	Upper Church St. 7	39 apt
Timothy Court	Westfield St. 1111	40 apt
Toll House Apartments	Riverdale St. 2034-2040	27 apt
Towne West Apartments	Westfield St. 249	26 apt
VanDeene Manor	Van Deene Ave. 39	109 apt
Westwood Court	Riverdale St. 1583	50 apt
Worthy Apartments	Worthy Ave. 51	12 apt

Source: West Springfield Building Commissioner, 2019

Motels being occupied as long-term housing, due to housing shortage

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Name	Address
Bel Air	387 Riverdale St
Express Inn	1557 Riverdale St
Econo Lodge	1533 Elm St
Red Carpet Inn	560 Riverdale St
Springfield Inn	1573 Riverdale St

Source: West Springfield Council on Aging Director, 2019

9) Employment Centers (≥100 Employees)

Company Name	Address	# of employees	NAICS Code
Eversource Energy	Brush Hill Ave	500-999	2211
Brightside For Families-Child	Riverdale St	250-499	6222
Home Depot	Daggett Dr	250-499	4441
Interim Health Care	Westfield St # 1	250-499	6216
UPS Customer Ctr	Wayside Ave	250-499	5418
A1 Nolan Realty LLC	Westfield St	100-249	5312
Aspen Square Management	Union St # 300	100-249	5312
Atlas Copco Construction Eqpt	Capital Dr	100-249	4238
Big Y World Class Market	Memorial Ave # 1	100-249	4451
Center For Human Devmnt Family	Park St	100-249	6241
Century 21 A-1 Nolan Realty	Westfield St	100-249	5312
Chili's Grill & Bar	Riverdale St	100-249	7225
Clarion-Aqua Lagoon	Riverdale St	100-249	7211
Dinn Brothers Trophies-Plaques	Interstate Dr	100-249	4539
Grinspoon Real Estate	Union St # 300	100-249	5312
Homewatch Caregivers	Union St # 107	100-249	6216
Junior League of Springfield	Riverdale St	100-249	8133
Kohl's	Riverdale St	100-249	4522
Liberty Security Svc	Elm St # 32B	100-249	5616
Neenah Inc	Front St	100-249	3221
New England Fire & Security	Norman St	100-249	4236
Olive Garden Italian Kitchen	Riverdale St	100-249	7225
On the Border Mexican Grill	Border Way	100-249	7225
On the Border Mexican Grill	Riverdale St	100-249	7225
Placon Corp	Union Street Ext	100-249	3261
Professional Dry Wall Constr	Prospect Ave	100-249	2383
Simmons Bedding Co	Jensen Cir	100-249	3379
Staples	Riverdale St	100-249	4532
Sullivan Paper Co Inc	Progress Ave	100-249	3221
Super Stop & Shop	Riverdale St # A1	100-249	4451
Toyota-Lexus	Riverdale St	100-249	4411
West Springfield Automobile	Main St	100-249	4413

Company Name	Address	# of employees	NAICS Code
West Springfield City GIS	Central St	100-249	9211
West Springfield High School	Piper Rd	100-249	6111
West Springfield Middle School	Middle School Dr	100-249	6111
Wingate At West Springfield	Prospect Ave	100-249	6231

Category 4 – Potential Resources

Contains facilities that provide potential resources for services or supplies.

1) Food/Water

Name	Address
Aldi	903 Riverdale Rd.
Costco	119 Daggett Drive
Stop & Shop	935 Riverdale Street
Big Y	503 Memorial Drive
Price Rite Grocery	Union Street Extension
Convenience Mart	7 Chester Street
Country Store	1022 Amostown Road
Stop and Save	83 Riverdale Street
Parus	766 Main Street
F.L. Roberts Inc & Co.	518 Memorial Avenue
Union Mart	470 Main Street
Dairy Mart	50 Morgan Road
Victory Market	533 Union St.

2) Hospitals/Medical Supplies

Name	Address
Costco	119 Daggett Street
CVS	Century Plaza, Memorial Avenue
CVS	152 Elm Street
Rite Aid	99 Westfield Street
Western Mass Compounding Center	138 Memorial Avenue
Stop & Shop Pharmacy	935 Riverdale Street
Footit Medical Supplies	340 Memorial Ave.
AFC Urgent Care	18 Union St.
CVS	928 Riverdale Rd.

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3) Gas/Heating Oil/Propane

Gasoline

Name	Address
Cumberland Farms	22 Park St.
Cumberland Farms	143 Park Ave.
Sunaco (Fl Roberts)	1130 Riverdale Street
Sunaco (Fl Roberts)	2667 Westfield St.
Sunaco (Fl Roberts)	518 Memorial Ave.
Sunaco (Fl Roberts)	735 Westfield St.
Food Bag	884 Westfield St.
Mobile	562 Westfield St.
Pride	1247 Riverdale St.
Pride	757 Riverdale St
Shell	2044 Riverdale St.
Sparky's	173 Elm St.
Speedway	341 Memorial Ave
Sunny's Convenience	2260 Westfield St.

Heating Oil: None—pick up in Springfield

Propane: Energy USA Propane Inc- 1275 Union St

4) Building Materials Suppliers

Name	Address
Capital Insulation Company	103 Wayside Avenue
Sanford & Hawley	253 Baldwin Street
84 Lumber Co.	38 Monterey Drive
Home Depot	179 Daggett Drive
Tri-County Contractors Supply	153 Wayside Avenue
Springfield Lumber	202 Day Street
Cook Builders Supply	210 Agawam Avenue
Prime Plywood	24 Parkside St.
AC Motor Freight	

5) Heavy & Small Equipment Suppliers

Name	Address
Nutmeg International	Van Deene and Park Ave.
Bart Truck	River Street
Mack Truck	Ashley Ave.
New England Bob cat	Wayside Ave.

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Name	Address
Tri County	Wayside Ave.

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Table 4.1: Critical Facilities and Evacuation Routes Potentially Affected by Hazard Areas			
Hazard Type	**Hazard Area**	**Critical Facilities Affected**	**Evacuation Routes Affected**
Flooding (localized)	Rail underpass-Union/River St.	N/A	Route 5 South would be impassible if flood gates were up. Flood gates were last used in the 1980s, but are deployed regularly as exercises
	Westfield ST./Little Georges	N/A	Route 20
	Amostown St. and Piper Rd.		Piper Rd.
Severe Snow/Ice Storm	Interstate Dr. – this is the primary route to the interstate system	Access to radio tower and water tower	Birnie Ave. exit N.
	Birnie Ave. – this part of the road has sharp curves and steep slopes		
	Route 20		Route 20
	Piper Rd.		Piper Rd.
Hurricane/Severe Wind	Town-wide	All	All
Wildfire/Brushfire	Limited	N/A	N/A
Earthquake	Town-wide	N/A	N/A
Dam Failure	Bear Hole Reservoir	N/A	RRX @ Route 20
Drought	Town-wide	N/A	N/A
Hazardous Materials	I-90, Route 91, Route 5, Route 20, Route 147, and the railroad planned intermodal center and surrounding side streets.	N/A	Route 5, Route 20, Route 147

(Past & Potential Hazards/Critical Facilities Map Located In Appendix D)

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Climate Change Projections

Table 3. Climate Change Projections and Related Natural Hazards		
Climate Changes	**Related Natural Hazards**	**Projections by the end of this century**
Changes in precipitation	– Inland flooding – Drought – Landslide	– Annual precipitation: Increase up to 16% (+7.3 inches) – Days with rainfall accumulation 1+ inch: Increase up to 57% (+4 days) – Consecutive dry days: Increase 18% (+3 days) – Summer precipitation: Decrease
Rising temperatures	– Average/extreme temperatures – Wildfires – Invasive species	– Average annual temperature: Increase up to 23% (+10.8 degrees Fahrenheit) – Days/year with daily minimum temperatures below freezing: Decrease up to 42% (-62 days) – Winter temperatures: Increase at a greater rate than spring, summer, or fall – Long-term average minimum winter temperature: Increase up to 66% (+11.4 degrees Fahrenheit) – Days/year with daily maximum temperatures over 90 degrees Fahrenheit: Increase by up to – 1,280% (+64 days) – Growing degree days: Increase by 23% to 52%
Extreme weather	– Hurricanes/tropical storms – Severe winter storms/ nor'easters – Tornadoes – Other severe weather	– Frequency and magnitude: Increase

Note: This plan also assesses earthquakes and hazardous materials, but there is no established correlation between climate change and these hazards.

Source: Northeast Climate Adaptation Science Center at the University of Massachusetts, Amherst.

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PLANNING PROCESS

The natural hazard mitigation planning process for the Town of West Springfield included the following tasks:

- Identifying the natural hazards that may impact the community.
- Conducting a Vulnerability/Risk Assessment to identify the infrastructure at the highest risk for being damaged by the identified natural hazards, particularly flooding.
- Identifying and assessing the policies, programs, and regulations the community is currently implementing to protect against future disaster damages.
- Identifying deficiencies in the current strategies and establishing goals for updating, revising, or adopting new strategies.
- Adopting and implementing the final Local Natural Hazards Mitigation Plan.

The key product of this process is the development of an Action Plan with a Prioritized Implementation Schedule.

The process for developing West Springfield's Hazard Mitigation Plan 2019 Update is summarized in Table 4.

Table 4. West Springfield's 2019 Hazard Mitigation Plan Update Planning Process

Section	Reviews and Updates
Committee Meetings and Public Meeting	The Local Hazard Mitigation Planning Committee placed an emphasis on public participation for the update of the Hazard Mitigation Plan, discussing strategies to enhance participation opportunities at the first local committee meeting and at subsequent meetings. During plan development, two public meetings were held and the planning process was discussed at a West Springfield Board of Selectmen meeting. Once published, the draft plan was available on the Town's website for public comment. Note public comments here, as appropriate
Section 3: Risk Assessment	PVPC gathered the most recently available hazard and land use data and met with Town staff to identify changes in local hazard areas and development trends. Town staff reviewed critical infrastructure with PVPC staff in order to create an up-to-date list.
Section 3: Risk Assessment	Updated risk assessment format following 2018 SHMCAP methodology of presenting hazards by primary climate change

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Table 4. West Springfield's 2019 Hazard Mitigation Plan Update Planning Process	
Section	**Reviews and Updates**
	interaction.
Hazard Mitigation and Climate Adaptation Strategies	The list of existing mitigation measures was updated to reflect current mitigation activities in the town.
Hazard Mitigation and Climate Adaptation Strategies; Prioritized Implementation Schedule	Mitigation measures from the 2010 plan were reviewed and assessed as to whether they were completed, in progress, or deferred. The Local Hazard Mitigation Planning Committee determined whether to carry forward measures into the 2019 Plan Update or modify or delete them. The Plan Update's hazard mitigation strategy reflects both new measures and measures carried forward from the 2010 plan. The Local Hazard Mitigation Team prioritized all of these measures based on current conditions.
Section 6: Plan Adoption & Maintenance	This section of the plan was updated with a new on-going plan implementation review and five year update process that will assist the Town in incorporating hazard mitigation issues into other Town planning and regulatory review processes and better prepare the Town for the next comprehensive plan update.

2010 Plan Implementation and Maintenance

The 2010 Town of West Springfield Hazard Mitigation Plan contained a risk assessment of identified hazards for the town and mitigation measures to address the risk and vulnerability from these hazards. Since approval of the plan by FEMA and local adoption, progress has been made on implementation of the measures. The Town has advanced a number of projects for implementation, including:

- Completed local debris management plan
- Completed roadway maintenance and culvert upgrades. For example, the upper outlet structure at Amostown and Piper Road where an undersized culvert formerly crossed the road is being replaced in 2019 to mitigate future flooding. Also at 100 Birnie Ave where an undersized culvert crosses the road, new headwalls are being installed in 2019
- Implement the goals and strategies of the West Springfield Open Space and Recreation Plan dealing with protection of floodplain, forests, and farmland. ??
    - The town created a grant writer position to seek out grants for open space and recreation by incorporating into the duties of the Conservation Agent and creating the new title Natural Resources Planner.

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- Preliminary research completed on Transfer of Development Rights zoning
- Identified potentially developable parcels that could be preserved through the preparation of the Community Preservation Plan
- Forest management plans were developed for Bear Hole, Mittineague Park and the Southwick wells as part of the Carbon Sequestration program recently completed 2018-2019
- Town is currently working with Mass Audubon and state DCR in selling a permanent Conservation Restriction over Bear Hole for passive recreation. Also developing maps and trail stewardship for mountain biking and hiking.
- Ongoing since 2015 the Town has acquired approximately 100 acres of new open space in town and 45 around wells in Southwick and Westfield. The Community Preservation Committee, Conservation and Park and Recreation already informally serve as an advisory group relative to land protection. The Town has applied to multiple grant funding sources to assist with land protection

The town has also made progress in other areas related to natural hazard mitigation in the last nine years. Completed projects that were not listed as actions in the previous HMP but that have a positive impact towards mitigating the impacts of climate change and natural hazards are listed below:

- Carbon Sequestration program recently completed 2018-2019
- Implemented a water conservation pilot program
- Participation in Municipal Vulnerability Preparedness planning process, funded by a grant from MA EOEEA, in order to reduce vulnerabilities to climate impacts.

Local Hazard Mitigation Planning Committee

PVPC worked with local community representatives to organize a Local Hazard Mitigation Planning Committee for West Springfield. PVPC briefed the local representatives as to the desired composition of that team as well as the need for public participation in the local planning process.

The Local Hazard Mitigation Planning Committee is central to the planning process as it is the primary body tasked with developing a mitigation strategy for the community. The local team was tasked with working with PVPC to set plan goals, provide information on the hazards that impact the town and existing mitigation measures, and helping to develop new mitigation measures for this plan update. The Local Hazard Mitigation Planning Committee (HMPC) membership is listed below.

Table 5. West Springfield Hazard Mitigation Planning Committee (HMPC)	
Name	**Representing**
Bill Flaherty	TWS EMD, Fire Chief
Allyson Manuel	TWS Planning Administrator
Doug Mattoon	TWS Planning Director
Rob Colson	TWS DPW Director
Scott Moore	TWS Central Maintenance Director
Jeff Auer	TWS Water Superintendent
Laurie Cassidy	TWS Council on Aging Director
Jay Steup	TWS Building Commissioner
Mark Noonan	TWS Conservation Director
Jim Czach	TWS Town Engineer
Jeanne Galloway	TWS Health Department

TWS Town of West Springfield

The West Springfield Planning Board and Conservation Commission are the primary entities responsible for regulating development in town. Feedback from the Planning Board and the Conservation Commission was assured through the participation of members of the local HMPC including Allyson Manuel, Doug Mattoon, and Mark Noonan who regularly interface with those bodies. In addition, PVPC, the State-designated regional planning authority for West Springfield, works with all agencies that regulate development in the region, including the listed municipal entities and state agencies, such as the MassDOT and PVTA.

Committee Meetings

The Local Hazard Mitigation Planning Committee met on the following dates in 2019: June 20; July 16; August 22; October 17, and November 14. The purpose of the early meetings was to introduce the Hazard Mitigation planning program, review and update hazard mitigation goals, and to gather information on local hazard mitigation issues and sites or areas related to these. Later meetings focused on verifying information gathered by PVPC staff and discussion of existing mitigation practices, the status of mitigation measures identified in the 2010 hazard mitigation plan, and potential new or revised mitigation measures. The agendas for these meetings are included in Appendix E.

The Hazard Mitigation Planning Committee was also invited to participate in the West Springfield Municipal Vulnerability Preparedness (MVP) Workshop on January 23, 2020. The HMP committee members brought valuable insight of natural hazards and climate vulnerability to the MVP process, and took note of additional climate change-specific strategies developed during the workshop. The next week, the HMP committee convened for its final committee meeting and updated the mitigation strategy of this draft HMP update to include relevant outcomes form the MVP workshop.

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A mailing was made to each committee member prior to each meeting that contained information from the previous meeting, an agenda sheet, and information to be covered.

Public Meetings

In 2019 the Town of West Springfield received two awards to help the town evaluate its natural hazard risks and vulnerabilities to the impacts of climate change, and to come up with resilience actions. An award from MEMA funded an update of the town's 2010 Hazard Mitigation Plan, and the Massachusetts Executive Office of Energy and Environmental Affairs awarded a Municipal Vulnerability Preparedness (MVP) grant for the town to undertake a stakeholder driven analysis of climate vulnerabilities and resilience actions. The town hired the Pioneer Valley Planning Commission to assist in development of both the Hazard Mitigation Plan update and the MVP planning process. Public engagement for the two plans was coordinated where possible.

March 2, 2020: The West Springfield Town Council Ordinance and Policy Subcommittee reviewed the draft Hazard Mitigation Plan. HMP Committee Member(s) gave a brief overview and answered questions. The Subcommittee voted to recommend approval, and reported their findings to Town Council. The Council then voted to approve the HMP.

Public and Neighboring Jurisdiction Involvement in the Planning Process

In the initial stages of the process for updating this mitigation plan, the Pioneer Valley Planning Commission and the local HMP committee conducted a series of outreach efforts to make the public aware of the scope of the town's mitigation activities. In July, 2019, the committee released a "Town of West Springfield Natural Hazard and Climate Adaptation Survey" to gather input from community members on the perception of natural hazards and climate impacts in West Springfield. The survey remained open throughout the planning process, and collected roughly 90 responses (summary responses available upon request). The HMP committee posted notice of this survey to the Town website and numerous social media outlets including, the Facebook pages for West Springfield Council of Aging, West Springfield Community Forum, and the Friends of West Springfield Senior Center. Committee members and/or PVPC staff made announcements about the plan update process and the survey to the City Council, West Springfield Age Friendly Community planning team, and the Board of Trustees of the West Springfield Boys and Girls Club. It should be noted that, during the time that the HMP update process was underway, the town was or had been undertaking a number of other planning and outreach activities that also involved public surveys. As a result, the community was saturated by surveys during this period of time, so the HMP/MVP survey may not have had as strong a response as it may otherwise have had given the amount of outreach and publicizing completed on behalf of the HMP committee.

During the HMP update process, the Pioneer Valley Planning Commission sent a series of press releases to area media outlets to inform citizens and businesses that the

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planning process for updating West Springfield's HMP had commenced and that all residents of West Springfield were invited to attend plan development sessions.

On August 29th, 2019 the Pioneer Valley Planning Commission sent a press release (see Appendix E) to all area media outlets reminding the public about the public survey, and of the town's ongoing efforts on the HMP update and the Municipal Vulnerability Preparedness (MVP) planning program. This Press Release also linked the HMP and MVP to related concurrent work on the Age and Dementia Friendly West Springfield initiative. This project is focused on an aging population and increasing numbers of people with dementia. As vulnerability preparedness planning also involves planning for these vulnerable populations, some of the listening sessions for the Age and Dementia Friendly West Springfield project would discuss these overlapping areas of concern. The Press Release shared a link for more information about the Age and Dementia Friendly West Springfield initiative, as well as for the HMP public survey.

On February 3, 2020, the West Springfield Planning Department released public notifications (see Appendix E) to all area media outlets, including posting on all town websites and social media accounts, to inform the public that a draft of West Springfield's Hazard Mitigation Plan had had been placed on the Town's website and hard copies were available at the West Springfield Planning Department offices and that all residents, businesses and other concerned parties of West Springfield and adjacent communities were encouraged to comment on the plan. The plans were made available in this manner for 30 days. Citizens from adjacent municipalities were also encouraged to comment on West Springfield's plan.

Additionally, the Western Region Homeland Security Advisory Council (WRHSAC) and the Regional Emergency Planning Committees of western Massachusetts were kept informed of the Hazard Mitigation planning process underway in West Springfield. The WRHSAC includes representatives of all emergency disciplines who are charged with bringing the information they learn at the meetings back to their colleagues. In this way, emergency response professionals, Fire Fighters, Police, Ambulance, municipal officials, dispatch, transit and EMS from all of western Massachusetts were encouraged to review and comment on this plan update.

In addition to media outreach, all public meetings were posted at the West Springfield Municipal Office Building in compliance with the Commonwealth of Massachusetts' open meeting law.

Planning Timeline

Table 6. Planning Timeline

Table 7. Planning Timeline	
June 20, 2019	Meeting of the West Springfield Local Hazard Mitigation Planning Committee
July 16, 2019	Meeting of the West Springfield Local Hazard Mitigation Planning Committee
July 16, 2019	First Public Meeting
August 22, 2019	Meeting of the West Springfield Local Hazard Mitigation Planning Committee

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October 17, 2019	Meeting of the West Springfield Local Hazard Mitigation Planning Committee
November 14, 2019	Meeting of the West Springfield Local Hazard Mitigation Planning Committee
TBD	Draft Plan Update posted to West Springfield website, hard copies available at WHERE
TBD	Public Meeting with West Springfield Town Council
TBD	Draft Plan Update submitted to MEMA

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3: RISK ASSESSMENT: HAZARD IDENTIFICATION & ANALYSIS

Profiling the Natural Hazards

To identify natural hazards of concern for the Hazard Identification and Risk Assessment (HIRA), the Committee and its consulting team reviewed the 2010 West Springfield Hazard Mitigation Plan, the 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan (SHMCAP), available hazard mapping, and other weather-related databases. Historical research and conversations with local officials and emergency management personnel were also used to identify and profile the natural hazards which are most likely to have an impact on West Springfield.

Natural hazards are natural events that threaten lives, property, and other assets. Often, natural hazards can be predicted. They tend to occur repeatedly in the same geographical locations because they are related to weather patterns or physical characteristics of an area. The assessment conducted for the 2010 West Springfield HMP recognized the following 9 natural hazards and one man-made hazard that could potentially impact West Springfield:

- Flooding (100-year)
- Flooding (localized)
- Severe Snow/Ice Storms
- Hurricanes/Severe Wind
- Tornado/Microburst
- Wildfire/Brushfire
- Earthquake
- Dam Failure
- Drought
- Man-Made Hazard: Hazardous Materials

Each of these hazards was assessed by the Committee for location of occurrence, extent, previous occurrences, and probability of future events. (See Appendix C for sources, methodology.) This resulted in a ranking of hazard, by risk, see Table 3.1.

All of the hazards identified and assessed in the 2010 HMP were determined to be relevant for the 2019 Plan Update through a Committee kickoff meeting and subsequent risk assessment methodology development. However, some of these hazards were reclassified and/or regrouped to align with the 2018 SHMCAP (for example, "Flooding (100-year)" and "Flooding (localized)" were combined into a single

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"flood" hazard profile which also includes "dam overtopping" in place of "dam failure," and two new hazards—average/extreme temperatures and invasive species—were added. The natural hazards assessed in this 2019 Plan Update are identified on the following page.

Sectors Assessed

A number of key sectors were evaluated as part of the risk assessment for each of the hazards profiled in the sections below. These sectors are introduced here and are included in the hazard profiles where appropriate and where sufficient data allowed.

Populations

The impacts on human health, particularly vulnerable populations, were considered by the Committee and incorporated into the hazard profiles where possible. The risk analysis relied on U.S. Census data and stakeholder information regarding vulnerable populations (including but not limited to disabled, low-income, communities of color, and low English proficiency populations) that could potentially be more severely impacted by each hazard. Among other factors, these populations may require extra time or outside assistance during evacuations or during events that cause power outages or isolation, and are considered to be more likely to seek or require emergency services. They are also more likely to live in risk-prone areas with poor infrastructure and higher levels of air pollution.

Vulnerability is influenced by three factors: exposure or contact with the hazard; sensitivity or degree to which people or communities are affected by the exposure to the hazard; and capacity to adapt or the ability of communities, institutions, or people to adjust and respond to and recover from potential hazards. As summarized in Table 8, the major health impacts from natural hazards and climate change include:

- Heat-related illnesses and death from an increase in extreme temperatures and poor air quality (SHMCAP, 2018).
- Increases in food and waterborne illnesses and other infectious diseases from altering geographic and seasonal distributions of existing vectors and vector-borne diseases (SHMCAP, 2018).
- Injuries and accidental premature death associated with extreme weather events. Extreme weather events can result in acute health impacts, such as injuries and accidental premature death during an event (e.g., drowning during floods). In addition, health impacts can also occur during disaster preparation and post-event cleanup. Other impacts include damage to property, destruction of assets, loss of infrastructure and public services, social and economic impacts, environmental degradation, and other factors (SHMCAP, 2018).
- Exacerbation of chronic diseases (SHMCAP, 2018).
- Mental health and stress-related disorders ranging from minimal stress and distress symptoms to clinical disorders such as anxiety, depression, post-traumatic stress, and suicidality. Specific groups of people who are at higher risk for distress and other adverse mental health consequences from exposure to climate-related or

weather-related disasters include children, the elderly, women (especially pregnant and post-partum women), people with preexisting mental illness, the economically disadvantaged, the homeless, and first responders. Populations living in areas most susceptible to specific climate change events are at increased risk for adverse mental health outcomes (SHMCAP, 2018).

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Table 8. Populations Vulnerable to Natural Hazards and Climate Change

Vulnerability Category	Vulnerable Population	Heat-related illnesses	Changes in the prevalence and geographical distribution of food- and waterborne illnesses and other infectious diseases	Injuries and accidental premature death	Exacerbation of chronic diseases (respiratory and cardiovascular diseases, diabetes)	Mental health and stress-related disorders
Age	Individuals over 65	X	X	X	X	X
	Individuals over 65 and living alone	X		X	X	X
	Children under 5	X	X	X		
Socioeconomic Status	People living in poverty	X	X	X	X	X
	The homeless	X	X	X	X	X
	People with limited English proficiency	X	X	X	X	X
	People lacking access to air conditioning	X			X	X
Race	Communities of color	X	X	X	X	X
Place	People living in an urban area with limited green space	X			X	X
	People living near high-traffic roadways				X	X
Current Health Status	Adults with chronic diseases (e.g., respiratory and cardiovascular diseases; compromised immune systems)	X	X	X	X	X
	Children with respiratory disease (e.g., asthma)	X			X	X
	Individuals using electricity-dependent medical equipment and/or medications that need refrigeration	X		X	X	X
	Individuals with disabilities or mobility problems	X	X	X	X	X
	Individuals with mental health challenges	X		X		X

Source: SHMCAP, 2018

Built Environment

The built environment sector includes all buildings in West Springfield including critical facilities owned by the municipality and critical infrastructure sectors that provide or link to key lifeline services, social welfare, and economic development. Assessments were based on assessor's data of the total value of all structures in West Springfield ($2,681,497,810 in 2019 according to MassGIS L3 data), along with the median value of a home in West Springfield ($296,494.67). The critical facilities assessed were derived from a combination of a Critical Facilities List provided by the State Hazard Mitigation Officer and critical facilities inventory review by the West Springfield HMP Committee. The facility types include police facilities, fire facilities, hospitals, emergency operation centers, schools, and more. Other critical infrastructure sectors including transportation facilities, water infrastructure, etc. were assessed when applicable and where information was available.

Natural Resources and Environment

The natural resources and environment sector includes land-based assets in the town. It also includes key habitats and natural landscapes documented in the West Springfield's BioMap 2 (Conserving the Biodiversity of Massachusetts in a Changing World) and Areas of Critical Environmental Concern, as well as species identified in the State's Wildlife Action Plan as being present in West Springfield.

Economy

Economic impacts include economic loss resulting from damage to critical facilities, the built environment, municipal resources, natural resources, and other sectors. Many sectors of the economy are dependent on the integrity of natural resources. For example, if a major recreation area is damaged beyond repair by a storm, that property will no longer attract tourists and the local economy may experience a loss of revenue from tourism and recreation.

Climate Change and Natural Hazards

A key distinction between the 2010 HMP and the 2019 Plan Update is the broadened lens through which natural hazards were assessed: climate change, or the statistically significant variation in climate data or patterns over multiple decades due to climate variability or human activity. The Northeast Climate Adaptation Science Center (NE CASC) developed downscaled climate data that was used in the development of the 2018 SHMPCAP, forming a new basis and format for the categorization of natural hazards as they relate to the primary climate change interactions discussed in this section. The risk assessment presented below follows the format of the 2018 SHMCAP and is organized by primary climate change interactions.

A categorization of traditional natural hazards, within the context of climate change, was included to demonstrate the connections between traditional natural hazard analysis and climate change projections. This categorization also aligns with the four climate change categories included on the Commonwealth's resilient MA Climate

Change Clearinghouse website (http://www.resilientma.org/). Those categories are illustrated as follows.

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

Sea Level Rise: Climate change will drive rising sea levels, and rising seas will have wide-ranging impacts on communities, natural resources, and infrastructure along the Commonwealth's 1,519 tidal shoreline miles.

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

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

The hazards presented in this risk assessment, and the order in which they appear, are based on the taxonomy presented in Table 9.

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Table 9. Climate Change and Natural Hazard Taxonomy			
Primary Climate Change Interaction	**Natural Hazard**	**Other Climate Change Interactions**	**Representative Climate Change Impacts**
Changes in Precipitation	Inland Flooding	Extreme Weather	Flash flooding, urban flooding, drainage system impacts (natural and human-made), lack of groundwater recharge, impacts to drinking water supply, public health impacts from mold and worsened indoor air quality, vector-borne diseases from stagnant water, episodic drought, changes in snow-rain ratios, changes in extent and duration of snow cover, degradation of stream channels and wetland
	Drought	Rising Temperatures, Extreme Weather	
	Landslide	Rising Temperatures, Extreme Weather	
Rising Temperatures	Average/Extreme Temperatures	N/A	Shifting in seasons (longer summer, early spring, including earlier timing of spring peak flow), increase in length of growing season, increase of invasive species, ecosystem stress, energy brownouts from higher energy demands, more intense heat waves, public health impacts from high heat exposure and poor outdoor air quality, drying of streams and wetlands, eutrophication of lakes and ponds
	Wildfires	Changes in Precipitation	
	Invasive Species	Changes in Precipitation, Extreme Weather	
Extreme Weather	Hurricanes/Tropical Storms	Rising Temperatures, Changes in Precipitation	Increase in frequency and intensity of extreme weather events, resulting in greater damage to natural resources, property, and infrastructure, as well as increased potential for loss of life
	Severe Winter Storm / Nor'easter		
	Tornadoes		
	Other Severe Weather (Including Strong Wind and Extreme Precipitation)		
Non-Climate-Influenced Hazards	Earthquake	Not Applicable	There is no established correlation between climate change and this hazard
	Hazardous Materials	Not Applicable	There is no established correlation between climate change and this hazard

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NATURAL HAZARD ID AND VULNERABILITY ASSESSMENT

The 2019 hazard profiles for West Springfield are based on a wide range of information and data including best available science and most current information on hazards, impacts, and vulnerability within the town. Detailed descriptions of each of the points of analysis are included in the Hazard Identification and Vulnerability Assessment (below).

The following is a description of natural and manmade disasters, and the areas affected by them, that have or could affect the Town of West Springfield. The *Past and Potential Hazards/Critical Facilities Map* (Appendix D) reflects the contents of this analysis. All hazard profiles were updated for the 2019 Plan Update with any new available information, and data from the 2010 HMP were retained where it was appropriate and still deemed current.

Vulnerability Assessment Methodology

In order to determine estimated losses due to natural hazards in West Springfield, each hazard area was analyzed with results shown below. The data below was calculated using FEMA's *Understanding Your Risks: Identifying Hazards and Estimating Losses*, August 2001.

- Total value of all structures in West Springfield (2019): $2,681,497,810
- Median value of a home in West Springfield (2019): $296,495
- Average household size: 2.3 persons

Human losses are not calculated during this exercise, but could be expected to occur depending on the type and severity of the hazard. Most of these figures exclude both the land value and contents of the structure. The damage calculations are rough estimates and likely reflect worst-case scenarios. Computing more detailed damage assessments based on assessor's records is a labor-intensive task and beyond the scope of this project.

Table 10. Hazard Profiling and Risk Index						
Primary Climate Change Interaction	**Natural Hazard**	**Location**	**Extent**	**Previous Occurrence**	**Probability of Future Events**	**Hazard Risk Index Rating**
Changes in Precipitation	Flooding (including Dam Overtopping and Dam Failure)	Medium (100-year and localized) Small (dam failure)	Limited (100-year) Minor (Localized) Critical (dam failure)	Yes	Low (100-year) Very High (Localized) Very Low (dam failure)	Low (100-year) High (Localized) Medium-Low (dam overtopping/ failure)
	Drought	Large	Minor	Yes	Low	Low
Rising Temperatures	Average/Extreme Temperatures	Large	Critical	Yes	High	High
	Wildfire/Brushfire	Medium	Limited	Yes (only minor events)	Low	Low
	Invasive Species	Medium	Limited	Yes	High	Medium-Low
Extreme Weather	Severe Winter Storm (including Ice Storms) / Nor'easter	Large	Critical	Yes	High	Medium-High
	Hurricanes/ Tropical Storms (including severe wind)	Medium	Limited - Critical	Yes (no direct hit)	Moderate	Medium
	Tornado (including microburst)	Medium	Catastrophic	Yes	Low (tornado) Moderate (micro-burst)	Medium-Low
Non-Climate-Influenced Hazards	Earthquake	Large	Minor	No (none impacting West Springfield)	Very Low	Low
Man-Made Hazard	Hazardous Materials	Small	Limited - Critical	No (only minor spills)	Low	Medium-Low

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Primary Climate Change Interaction: Changes in Precipitation

Flooding

As a non-coastal municipality, the flood hazard in West Springfield focuses on inland flooding, which includes riverine flooding and urban or localized flooding, and the associated impacts of dam overtopping or failure. Inland flooding is the result of moderate precipitation over several days, intense precipitation over a short period, or melting snowpack (U.S. Climate Resilience Toolkit, 2017). Nationally, inland flooding causes more damage annually than any other severe weather event (U.S. Climate Resilience Toolkit, 2017). Between 2007 and 2014, the average annual cost of flood damages in Massachusetts was more than $9.1 million (NOAA, 2014).

Developed, impervious areas can contribute to inland flooding, and increases in precipitation and extreme storm events will result in increased occurrences of inland flooding (U.S. Climate Resilience Toolkit, 2017). Common types of inland flooding are described in the following subsections.

Various types of major storms bring precipitation to West Springfield. Continental storms that originate from the west continually move across the region. These storms are typically low-pressure systems that may be slow-moving frontal systems or more intense, fast-moving storms. Nor'easters are coastal storms that travel into New England from the south generally bringing heavy precipitation. In the late summer or early fall, the most severe type of these coastal storms, hurricanes, may reach Massachusetts and result in significant amounts of rainfall. Finally, thunderstorms that form on warm, humid summer days can cause locally significant rainfall and damage from lightning, hail, or high winds.

Floods can be classified as either *flash floods*, which are the product of heavy, localized precipitation in a short time period over a given location or *general floods*, which are caused by precipitation over a longer time period in a particular river basin. There are several local factors that determine the severity of a flooding event, including: stream and river basin topography, precipitation and weather patterns, recent soil moisture conditions, amount of impervious surface area, and the degree of vegetative clearing. Furthermore, flooding can be influenced by larger, global climate events. Global warming and climate change are shifting rainfall and storm patterns, resulting in increased precipitation and the frequency and intensity of flooding in the region.

Flash flooding events typically occur within minutes or hours after a period of heavy precipitation, after a dam or levee failure, or from a sudden release of water from an ice jam. Most often, flash flooding is the result of a slow-moving thunderstorm or the heavy rains from a hurricane. In rural areas, flash flooding often occurs when small streams spill over their banks. However, in urbanized areas, flash flooding is often the result of clogged storm drains (leaves and other debris) and the higher amount of impervious surface area (roadways, parking lots, roof tops).

In contrast, general flooding events may last for several days. Excessive precipitation within a watershed of a stream or river can result in flooding particularly when

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development in the floodplain has obstructed the natural flow of the water and/or decreased the natural ability of the groundcover to absorb and retain surface water runoff (e.g., the loss of wetlands and the higher amounts of impervious surface area in urban areas).

A floodplain is the relatively flat, lowland area adjacent to a river, lake or stream. Floodplains serve an important function, acting like large "sponges" to absorb and slowly release floodwaters back to surface waters and groundwater. Over time, sediments that are deposited in floodplains develop into fertile, productive farmland like that found in the Connecticut River valley. In the past, floodplain areas were also often seen as prime locations for development. Industries were located on the banks of rivers for access to hydropower. Residential and commercial development occurred in floodplains because of their scenic qualities and proximity to the water. Although periodic flooding of a floodplain area is a natural occurrence, past and current development and alteration of these areas will result in flooding that is a costly and frequent hazard. In addition to damage of buildings directly in the floodplain, development can result in a loss of natural flood storage capacity and can increase the water levels in water bodies. Flood levels may then increase, causing damage to structures not normally in the flood path.

The Floodplain Map for the Town of West Springfield shows the 100-year and 500-year flood zones identified by FEMA flood maps. The 100-year flood zone is the area that will be covered by water as a result of a flood that has a one percent chance of occurring in any given year. Likewise, the 500-year flood has a 0.2 percent chance of occurring in any given year. In West Springfield, there are several floodplain areas – primarily along the Connecticut and Westfield Rivers and Block, Paucatuck, Piper, and Golddine Brooks. There are some smaller 500-year floodplains mapped as well, many associated with the above named water bodies but also in several low-lying areas throughout West Springfield.

The average annual precipitation for West Springfield and surrounding areas in Hampden County is roughly 47 inches[1]. The major floods recorded in Western Massachusetts during the 20th century have been the result of rainfall alone or rainfall combined with snowmelt. West Springfield has experienced many small flooding events over the last decade. Generally, these floods have had minor impacts, temporarily impacting roads and residents' yards.

Flooding (100-year base flood): Low Risk

NFIP data on flood insurance policies, repetitive loss (RL) properties, and severe repetitive loss (SRL) properties are useful for determining the location of areas vulnerable to flood and severe storm hazards. A RL property is a property for which two

[1] Averaged 1990-2010 amounts from Amherst, East Brimfield Lake, and Knighville Dam in Huntington. https://www.currentresults.com/Weather/Massachusetts/average-yearly-precipitation.php

or more flood insurance claims of more than $1,000 have been paid by the NFIP within any 10-year period since 1978. A SRL property is defined as one that "has incurred flood-related damage for which 4 or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding $5,000 and with cumulative amount of such claims payments exceeding $20,000; or for which at least 2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property" (FEMA). Housing unit projections for 2016 from the U.S. Census were used to represent the total housing units in West Springfield. It should be noted that policy and claim data reflect the time period from 1978 to 2017, while RL and SRL values are calculated using a rolling 10-year period.

Location

FEMA published new flood insurance rate maps for Hampden County in 2013, and the Town of West Springfield adopted the new maps that same year in order to stay compliant with NFIP participation and for residents to remain eligible to buy flood hazard insurance through NFIP. New maps include roughly 1148 acres, or 10.2% of all land in West Springfield, within the FEMA mapped 100-year floodplain, and 505 acres within the 500-year floodplain.

According to the Community Information System (CIS) of FEMA, there were 16 properties insured for flood damages under the National Flood Insurance Program (NFIP) within the Special Flood Hazard Area (SFHA) in West Springfield as of August 2019, the most current records for the Town of West Springfield. Another 33 policies are held outside of the SFHA in the B, C, and X zones. The total NFIP insurance policies in force in West Springfield equal $16,296,600. At this time the Town of West Springfield has no repetitive loss properties as defined by FEMA's NFIP.

A spatial analysis of assessor's data and the NFIP flood hazard layers indicates that there are 110 residential buildings and 87 non-residential buildings within the 100-year floodplain, which is far more than the amount of properties insured for flooding under the NFIP.

There are extensive flood control structures in Town along the Connecticut and Westfield Rivers, which are frequently maintained and has been recently upgraded at select sites. The 2014 Hampden County Flood Insurance Study (FIS) explains that while certified levees are assumed to provide protection from the 1-percent annual-chance flood, some areas protected by these levees will still be affected by flooding during major rain events. This is due to the pump station in the protected area not being able to handle the rate of runoff, which results in flooding of the low lying areas. The accompanying analysis shows that West Springfield has a total of 202 acres in levee protected zones that are vulnerable to flooding during the 1-percent-annual chance event due to insufficient pumping capacity.

Extent

Inland flooding in Massachusetts is forecast and classified by the National Weather Service's (NWS) Northeast River Forecast Center as minor, moderate, or severe based upon the types of impacts that occur. Minor flooding is considered a "nuisance only"

degree of flooding that causes impacts such as road closures and flooding of recreational areas and farmland. Moderate flooding can involve land with structures becoming inundated. Major flooding is a widespread, life-threatening event. River forecasts are made at many locations in the state where there are United States Geological Survey (USGS) river gauges that have established flood elevations and levels corresponding to each of the degrees of flooding.

The extent of 100 year base flooding is Limited (moderate by NWS standards). See information in Location section.

Previous Occurrences

Between 1954 and 2018, Massachusetts has had 22 major flood (or flood-related) events, 8 of which included Hampden County. The historical record indicates Hampden County has experienced 8 flood-related disaster declaration events from 1954 to 2018. Therefore, based on these statistics, West Springfield may experience a flood event of disaster declaration proportions approximately once every 8 years. However, the frequency of flooding varies significantly based on watershed, riverine reach, and location along each reach.

The most significant flood event on record was the flood of March 1936. Direct accounts of the extent of the flooding in West Springfield from this event do not seem to exist, however there is extensive documentation of the flooding in neighboring Springfield and therefore flooding West Springfield can be extrapolated from that information. The account from Springfield is as follows:

An unusually cold and snowy winter, followed by a spell of warm and rainy weather, turned the normal spring rising of the Connecticut River into an unprecedented natural catastrophe. The flood inundated Hadley, Hatfield, Northampton, Holyoke, and Springfield, as well as smaller towns (West Springfield was one) and villages along its course. In Massachusetts alone, the Great Flood killed ten people and left 50,000 homeless. It was an unmatched natural catastrophe for the Bay State, causing over $200,000,000 in damage in 1936 dollars.

Since the 2010 HMP update, a number of other flooding events have impacted West Springfield.

Table 11. Flood Events in West Springfield, 2010-2019

Begin Date	Event Type	Flood Cause	Event Narrative
8/28/2011	Flood	Heavy Rain / Tropical System	After receiving three to eight inches of heavy rain from Tropical Storm Irene, flooding resulted in the closure of Route 20 in West Springfield at Sibley Avenue. $200,000 in property damage reported.
6/2/2013	Flood	Heavy Rain	In West Springfield, Morgan Road was flooded out.
7/27/2014	Flood	Heavy Rain	Portions of Route 20 were flooded and impassable.

Begin Date	Event Type	Flood Cause	Event Narrative
8/2/2016	Flood	Heavy Rain	The intersection of Sylvan and Park Streets was flooded and impassable. The Route 5 tunnel was flooded and traffic was rerouted to the rotary above the tunnel. The Union Street underpass was flooded and impassable with damage to the road. $5,000 in property damage reported.
10/24/2017	Flood	Heavy Rain	River Street underpass in West Springfield was impassable. Shaker Road in Westfield was flooded and impassable; Union Street underpass was flooded and impassable; Manhole covers on Mill Street popped open by 835 PM EST. Feeding Hills Road in Southwick near the Rail Trail was blocked due to flooding.
6/28/2018	Flood	Heavy Rain	At 3:05 PM EST, street flooding was reported up to 1 foot deep at the intersection of Ely Avenue and Verdugo Street in West Springfield.
7/17/2018	Flash Flood	Heavy Rain	At 2 PM EST, a thunderstorm moving over Westfield and West Springfield created downpours over the area. A car was trapped in flood waters on Old Westfield Road in West Springfield. $5,000 in property damage reported.
7/17/2018	Flash Flood	Heavy Rain	At 2:10 PM EST, heavy rain from a thunderstorm flooded and closed U.S. Route 20 in Westfield at the intersection with East Mountain Road. A car was trapped in the flood waters. $5,000 in property damage reported.

Source: NOAA NCDC Storm Events Database

Probability of Future Events

As described above, West Springfield has a very up to date flood management system. The chance of a major flood in the 100-year flood plain is, by definition, 1% in any given year. However, given the age of the studies that estimated the location and extent of the 100-yr floodplain, and given the increased frequency of high-intensity precipitation events brought on by climate change, there is likely a higher probability of that event occurring in the future. Therefore, there is a low chance (1-10% probability in the next year) of major flooding within the 100-year flood plain.

Flooding (localized/urban drainage) – High Risk

In addition to the floodplains mapped by FEMA for the 100-year and 500-year flood, West Springfield often experiences minor flooding at isolated locations due to urban drainage problems, or problem culverts.

Most of the flood hazard areas listed here were identified due to known past occurrence in the respective area. For instance, flooding along Great Brook in 1955 inundated the Southwick Wells, West Springfield's primary drinking water source. There are many areas with no record of previous flood incidents that could be affected in the future by heavy rain and runoff. Additionally, the vast majority of culverts throughout

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town tend to be impacted by beavers, so localized flooding can potentially occur at any culverted road crossing.

Location

Localized street Flooding does occur in low-lying areas of the town during rain and thaw events, including but not limited to the following locations. Please see the list of problem culverts I the Critical Facilities section, above.

- SR 20/Westfield Street
    - Block Brook crossing at Plymouth Terrace. Past flooding events at Plymouth Terrace have also impacted inflow and infiltration of water and sewer pipes running along or under the roadway and stream crossings.
    - Just west of Elm Street and also near Ohio Avenue
- Ashley Street near Nelson Circle, culvert needs maintenance (near elderly housing facility)
- Schoolhouse Brook
    - Labelle Street
    - West side of Riverdale Street
- Morgan Rd.
- SR 5/ Riverdale Street
- River Street underpass
- Memorial Avenue
- Ely Avenue and Verdugo Street
- Old Westfield Road
- Exit ramp from U.S. Route 5 to I-91
- Piper Cross Road
- Union and Side Streets under underpass at the CSX underpass between W. School St and Bridge St.
- Front Street

Extent

There are a number of roads in low-lying areas that do get flooded in severe rain events. However, the flooding lasts only a short time and does not usually cause significant property damage or any physical harm or loss of life. Most localized flooding has a Minor extent, where less than 10% of property in the affected area is damaged or destroyed and a temporary shutdown of facilities (such as roads) for less than 1 day is possible.

Previous Occurrences

Localized floods of lesser magnitude occur at a much higher frequency than major floods; in the last 10 years alone (2009 to 2019), the National Oceanic and Atmospheric Administration (NOAA) Storm Events Database reports that there were 67 flood or flash flood events reported in Hampden County, which is an average of more than six floods per year.

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NOAA NCDC records indicate that minor street flooding routinely occurs in West Springfield during rain and thaw events.

- After receiving three to eight inches of heavy rain from Tropical Storm Irene in August, 2011, flooding resulted in the closure of Route 20 in West Springfield at Sibley Avenue.
- In September, 2011, the remnants of Tropical Storm Lee caused multiple road closures throughout West Springfield.
- In early August, 2012, heavy rains flooded West School Street, making that road impassable. The River Street underpass also was flooded with a car stuck in the floodwaters. Later that month a heavy rain event dumping 1.14 inches of rain in 20 minutes and a total of just under 1.50 inches over 24 hours left a car stuck at a restaurant on Route 5. Water was up to the floor boards of another car on Prospect Street.
- Morgan Road flooded after heavy rain on June 2, 2013.
- Showers and thunderstorms in early July, 2013, brought flood and flash flood conditions to the area. In West Springfield, Route 20 flooded just west of Elm Street and also near Ohio Avenue with nearly two feet of water, and was closed in some spots. Manhole covers also popped off in several places.
- Heavy rain on August 9, 2013 flooded Route 5 (or Riverdale Street) in West Springfield.
- On June 9, 2015, heavy rain led to flooding at the River Street underpass with two to three feet of water.
- On July 18, 2017, portions of Route 20 were flooded and impassible after heavy rains. The southbound U.S. Route 5 tunnel in West Springfield was also flooded and impassable.
- A late fall rain storm on October 24, 2017 flooded and blocked the River Street underpass.
- A winter rain storm in January, 2018, led to up to a foot of street flooding on Memorial Avenue in West Springfield.
- Heavy rain in late June, 2018 caused street flooding up to 1 foot deep at the intersection of Ely Avenue and Verdugo Street. The next month, a thunderstorm moving over Westfield and West Springfield created downpours over the area, creating flash flood conditions in some locations. A car was trapped in flood waters on Old Westfield Road in West Springfield.
- In mid-September, 2018, heavy rain created flood and flash flood conditions in the area. The exit ramp from U.S. Route 5 to I-91 in West Springfield was closed due to flooding, and a car was trapped in floodwaters on the ramp. Later the same month, more heavy precipitation flooded Piper Cross Road, temporarily making it impassable.

Probability of Future Events

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Overall, it is anticipated that the severity of flood-inducing weather events and storms will increase as a result of climate change. Research has shown that rainfall is increasingly concentrated into the most severe events (Easterling, 2017). While trends in overall precipitation are less clear, the increase in severe rainfall events will exacerbate the risk of localized flooding.

The probability of localized flooding in West Springfield is very high (70-100% probability in the next year).

Dam Overtopping (dam failure) – Medium Low Risk

A dam is an artificial barrier that has the ability to impound water, wastewater, or any liquid borne material for the purpose of storage or control of water. Although dams and their associated impoundments provide many benefits to a community, such as water supply, recreation, hydroelectric power generation, and flood control, they also pose a potential risk to lives and property. There are two primary types of dam failure: catastrophic failure, characterized by the sudden, rapid, and uncontrolled release of impounded water, or design failure, which occurs as a result of minor overflow events. Dam overtopping is caused by floods that exceed the capacity of the dam, and it can occur as a result of inadequate spillway design, settlement of the dam crest, blockage of spillways, and other factors such as changes in precipitation patterns. Overtopping accounts for 34 percent of all dam failures in the U.S.

There are a number of ways in which climate change could alter the flow behavior of a river, causing conditions to deviate from what the dam was designed to handle. For example, more extreme precipitation events could increase the frequency of intentional discharges. Dam Overtopping occurs when, due to heavy rain or a blocked or inadequately sized spillway, water flows over the crest of the dam causing erosion and subsequent reduced dam height with time. If overtopping continues for any length of time, it may lead to a total failure of the dam. Deformation of the dam or outlet structures can be caused by excessive expansion and contraction of ice structures, which may lead to a cracking or failure of the dam. Many other climate impacts—including shifts in seasonal and geographic rainfall patterns—could also cause the flow behavior of rivers to deviate from previous hydrographs. When flows are greater than expected, spillway overflow events (often referred to as "design failures") can occur. These overflows result in increased discharges downstream and increased flooding potential. Therefore, although climate change will not increase the probability of catastrophic dam failure, it may increase the probability of design failures.

Many dams in Massachusetts were built in the 19th century without the benefit of modern engineering design and construction oversight. Dams can fail because of structural problems due to age and/or lack of proper maintenance. Dam failure can also be the result of structural damage caused by an earthquake or flooding brought on by severe storm events. Most earthen dam failures occur when floodwaters above overtop and erode the material components of the dam.

The Massachusetts Department of Conservation and Recreation (MA DCR) was the agency responsible for regulating dams in the state (M.G.L. Chapter 253, Section 44 and the implementing regulations 302 CMR 10.00). Until 2002, DCR was also responsible

for conducting dam inspections but then state law was changed to place the responsibility and cost for inspections on the owners of the dams. This means that individual dam owners are now responsible for conducting inspections.

The state has four hazard classifications for dams:

- High Hazard: Dams located where failure or improper operation will likely cause loss of life and serious damage to homes, industrial or commercial facilities, important public utilities, main highways, or railroads.
- Significant Hazard: Dams located where failure or improper operation may cause loss of life and damage to homes, industrial or commercial facilities, secondary highways or railroads or cause interruption of use or service of relatively important facilities.
- Low Hazard: Dams located where failure or improper operation may cause minimal property damage to others. Loss of life is not expected.
- Non-jurisdictional: The storage capacity of the impoundment and height of dam are such that they need not be regulated.

The inspection schedule for dams is as follows:

- Low Hazard dams – 10 years
- Significant Hazard dams – 5 years
- High Hazard dams – 2 years

The time intervals represent the maximum time between inspections. More frequent inspections may be performed at the discretion of the state. Dams and reservoirs licensed and subject to inspection by the Federal Energy Regulatory Commission (FERC) are excluded from the provisions of the state regulations provided that all FERC-approved periodic inspection reports are provided to the DCR. All other dams are subject to the regulations unless exempted in writing by DCR.

Location

According to DCR sources, as well as local knowledge, there are currently six dams in West Springfield. The following table identifies the dams within the town as well as whether they are classified as low, significant, or high hazard.

Table 12. Dams in West Springfield

Dam name/ date built	ID	River	Owner	Purpose	Condition/last inspected/ Regulatory Authority	Hazard Risk
Bearhole Reservoir	MA00073	Paucatuck Brook	Town of West Springfield	Recreation/ Flood Control	Good / 12-2-16 / Mass ODS	Significant

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Dam name/ date built	ID	River	Owner	Purpose	Condition/last inspected/ Regulatory Authority	Hazard Risk
Springfield Country Club Dam-1955	MA00612	Bagg Brook	Springfield Country Club	Recreation/ Flood Control	Satisfactory / 5-11-2017 / Mass ODS	Significant
DSI Dam (formerly Strathmore Paper Company Dam)	MA00611	Westfield River	Fibermark DSL, Inc.	Hydroelectric Power/ Water Supply	Poor / 8-22-2016 / FERC	Significant
Lyncosky Upper Pond Dam-Unknown	MA02695	Unknown	Private	Unknown	Unknown/ Unknown/ N/A	Non-jurisdictional
Lyncosky Lower Pond Dam-Unknown	MA02696	Bagg Brook	Private	Unknown	Unknown/ Unknown/ N/A	Non-jurisdictional
Piper Reservoir Swimming Pool Dam-Unknown	MA02697	Piper Brook	Town of West Springfield	Recreation	Unknown/ Unknown/ N/A	Non-jurisdictional

Sources: USACE National Inventory of Dams, 2019; Mass Oliver, 2019

Extent

Dam failure is not a common occurrence but dams do represent a potentially disastrous hazard. When a dam fails, the potential energy of the stored water behind the dam is released. Often dam breaches lead to catastrophic consequences as the water ultimately rushes in a torrent downstream flooding an area engineers refer to as an "inundation area." The number of casualties and the amount of property damage will depend upon the timing of the warning provided to downstream residents, the number of people living or working in the inundation area, and the number of structures in the inundation area. In many cases, the extent of a total dam failure is critical to catastrophic to the impacted area within the inundation zone.

As part of a previous HMP update, a vulnerability assessment was completed for the inundation area below the three significant risks, Bearhole Reservoir, Springfield Country Club Dam, and DSI Dam.

- 20 homes located in the inundation zones;

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- Assumes 100% damage to 100% of the structures, but does not include costs of repairing or replacing the road, or any power or telephone lines, or the contents of structures;
- Vulnerability assessment estimates $5,929,893 in damages.

In 2019, the town of West Springfield completed a new Emergency Action Plan for the Bear Hole Reservoir Dam, which included an inundation analysis of a sunny day dam breach cause by a sudden and complete failure of the embankment. The analysis shows that failure of the dam would significantly impact the surrounding residential area. Sikes Avenue and sections of Dewey Street and Westfield Street would be closed due to flooding. A list of 27 residences and five commercial properties would be notified via the notification system Swift 911 in case of a failure to alert them of the potential impact to life and property. Contact lists for facilities, structures, and other properties that may be affected by flooding from a failure are maintained annually and a hard copy is kept at the EOC.

Previous Occurrences

West Springfield has no history of any dam failures during recorded time.

Probability of Future Events

Based upon the past events, it is reasonable to say that there is a very low (less than 1% probability in the next year) probability of dam failure in West Springfield.

Secondary Hazards

The most problematic secondary hazards for flooding are fluvial erosion, river bank erosion, and landslides affecting infrastructure and other assets (e.g., agricultural fields) built within historic floodplains. Without the space required along river corridors for natural physical adjustment, such changes in rivers after flood events can be more harmful than the actual flooding. Landslides can occur following flood events when high flows oversaturate soils on steep slopes, causing them to fail. Roadways and bridges are impacted when floods undermine or wash out supporting structures. Dams may fail or be damaged, compounding the flood hazard for downstream communities. Failure of wastewater treatment plants from overflow or overtopping of hazardous material tanks and the dislodging of hazardous waste containers can occur during floods as well, releasing untreated wastewater or hazardous materials directly into storm sewers, rivers, or the ocean. Flooding can also impact public water supplies and the power grid.

Vulnerable Populations

The most vulnerable populations exposed to the flood hazard include people with low socioeconomic status, people over the age of 65, young children, people with medical needs, and those with low English language fluency. Populations that live or work in proximity to facilities that use or store toxic substances are at greater risk of exposure to these substances during a flood event. Many of West Springfield's populations identified by the 2010 Census as minority, low income, and English isolated are located in or near the 1% annual chance flood hazard area, and even more are living in an area

DRAFT

protected by a levee (2010 U.S. Census, FEMA). Furthermore, three day care facilities are located within the SFHA – two on George St. and one on Westfield St.

Advance weather forecasting, blockades, and emergency alerts and warnings help to minimize the total number of injuries and casualties that typically result from riverine flooding. However, even a relatively low-level flood can be hazardous and can result in direct mortality to individuals interacting with the flood zone. For example, while 6 inches of moving water can cause adults to fall, 1 foot to 2 feet of water can sweep cars away. Downed powerlines, sharp objects in the water, or fast-moving debris that may be moving in or near the water all present an immediate danger to individuals in the flood zone. Floodwater can also carry a wide range of infectious organisms from raw sewage and/or chemicals and hazardous materials swept away from containment areas.

Built Environment and Economy

Flooding can cause direct damage to critical facilities and result in roadblocks and inaccessible streets that impact the ability of public safety and emergency vehicles to respond to calls for service.

Buildings, infrastructure, and other elements of the built environment are vulnerable to inland flooding. Buildings within the floodplain are highly vulnerable to inland flooding and are likely to become increasingly vulnerable as riverine flooding increases due to climate change (resilient MA, 2018). There are two gas stations located within the 100-year floodplain – one on Westfield St. and one on Riverdale Rd. These facilities should take precautions to ensure a flood event would not result in facility damage or environmental contamination from a gas spill.

At a neighborhood to regional scale, highly developed areas and areas with high impervious surface coverage may be most vulnerable to flooding. Even moderate development that results in as little as 3 percent impervious cover can lead to flashier flows and river degradation, including channel deepening, widening, and instability (SHMCAP, 2018). Additionally, changes in precipitation will threaten key infrastructure assets with flood and water damage. Climate change has the potential to impact public and private services and business operations.

Natural Resources

Flooding is a natural environmental phenomenon. However, severe flood events can also result in substantial damage to the environment and natural resources, particularly in areas where human development has interfered with natural flood-related processes. As described earlier in this section, severe weather events are expected to become more frequent as a result of climate change; therefore, flooding that exceeds the adaptive capacity of natural systems and the built environment may occur more often.

One common environmental effect of flooding is riverbank and soil erosion. Riverbank erosion occurs when high, fast water flows scour the edges of the river, transporting sediment downstream and reshaping the ecosystem. This process can clog riverbeds and streams, disrupting the water supply to downstream habitats. In West Springfield, the FEMA SFHA overlaps with BioMap2 Critical Natural Landscapes along the banks of

the Westfield River, along Berry Brook near the Holyoke/Westfield border, and along the CT River, and with BioMap2 Core Habitat in various locations in the northeast section of town (above I-90 and west of I-91), as well as along the CT and Westfield rivers. These areas are particularly vulnerable to the impacts of bank destabilization and erosion from flooding.

Drought: Low Risk

Like flooding, drought is a normal, recurrent feature of climate. Drought happens almost everywhere, although its features vary from region to region. Generally, drought originates from a deficiency of precipitation over an extended period of time, resulting in a water shortage for some activity, group, or environmental sector.

Direct impacts of drought include reduced crop and forest productivity; increased fire hazard; reduced water levels; increased livestock and wildlife mortality rates; and damage to wildlife and fish habitat. Since drought is not a local hazard, but rather occurs on a larger regional scale, these impacts often have far-reaching effects throughout the region and even the country.

Location

How a drought is experienced can depend on geographic factors such as land use change, the existence of dams, and water supply withdrawals or diversions. For example, impervious surfaces associated with development can exacerbate the effects of drought due to decreased groundwater recharge. A drought in West Springfield would affect the entire town.

Extent

The severity of a drought would vary among town residents depending on whether the residents' water supply is derived from a private well or the public water system. Approximately 99% of West Springfield's population is served by the town's well-fed municipal supply located in the Barnes Aquifer, and is therefore vulnerable to drought.

When evaluating the region's risk for drought on a national level, utilizing a measure called the Palmer Drought Severity Index, Massachusetts is historically in the lowest percentile for severity and risk of drought. Even so, there have been several years of drought-like conditions in Western Massachusetts: 1940-1952, 1980-1983, 1995-2001, 2010 and 2016. Furthermore, global warming and climate change may have an effect on drought risk in the region. With the projected temperature increases, some scientists think that the global hydrological cycle will also intensify. This would increase the severity and duration of droughts.

The extent of a severe drought in West Springfield would be minor, with very few injuries, if any, only minor property damage and minimal disruption on quality of life, and a temporary shutdown of facilities or limits placed on water usage.

Previous Occurrences

In Massachusetts, six major droughts have occurred statewide since 1930, the most severe in 1960 and the most recent in 2016. Droughts range in severity and length, from

three to eight years. Although it was shorted in duration, the severity of the 2016 drought state-wide was equivalent to that of the 1960s. In many of these droughts, water-supply systems were found to be inadequate. Water was piped in to urban areas, and water-supply systems were modified to permit withdrawals at lower water levels.

West Springfield has had limited experience with severe drought conditions. According to the Massachusetts SHMCAP, between 2001 and 2017 West Springfield experienced up to 49 weeks of Severe Drought and 14 weeks of Extreme Drought, as classified by the U.S. Drought Monitor. The town is generally well below its approved withdrawal rate for most of the year, but withdrawals in July and August often come close to the approved withdrawal rate. The Town has a water conservation plan in place for drought response, and maintains connections to the City of Springfield's system for summer withdrawals.

The town has enforced a mandatory outdoor water use ban three times in four years (2016-2019.) In the summer of 2016, West Springfield experienced drought conditions that were impacting most of the Commonwealth. The lack of adequate rainfall coupled with warm summer temperatures over a span of months prompted authorities to implement immediate water-use restrictions for residents and businesses alike. Restrictions were placed on the allowable time and location for outdoor watering, including the use of hoses and sprinklers. The partial water ban was in accordance with the state's Water Management Act and West Springfield's Public Water Supply Water Management Act permit with MassDEP. Similar bans were enacted and enforced in the summers of 2018 and 2019.

Probability of Future Occurrences

The frequency and intensity of droughts are projected to increase during summer and fall as higher temperatures lead to greater evaporation and earlier winter and spring snowmelt, and precipitation patterns become more variable and extreme. Also due to climate change, the proportion of precipitation falling as rain instead of snow in our region and the extent of time snowpack remains are both expected to decrease. This reduces the period during which snow melt can recharge groundwater supplies, bolster streamflow, and provide water for the growing period.

Though the town has not experienced many threats to its water supply in the past, it has taken steps to prepare for an increase in frequency of severe water shortages. Based upon the past events and anticipated climate changes in future years, it is reasonable to say that there is a low probability (1-10% probability in the next year) of drought in West Springfield.

Secondary Hazards

Another hazard commonly associated with drought is wildfire. A prolonged lack of precipitation dries out soil and vegetation, which becomes increasingly susceptible to ignition as the duration of the drought extends. As a result, a drought may increase the probability of a wildfire occurring. Additional information is provided in the wildfire hazard later in this section.

DRAFT

In West Springfield, the inability to provide sufficient water supply can be secondary to other natural or man-made hazard events - power outage, tornado, building fires, construction/maintenance projects, aging infrastructure, and inadequate water main sizes are the significant causes of water loss to the Town.

Vulnerability

Populations

The entire population of West Springfield would be vulnerable to the impacts of a drought. Residents with a private water supply such as a well, who receive water through a public supplier, and populations with respiratory health conditions are most vulnerable.

Built Environment

Some infrastructure may not be built to operate in drought conditions. Intake pipes may be too high above drought water levels, and wells may be too shallow. Private suppliers or residents with private systems may need to drill deeper wells or find alternative supplies for emergency back-up during severe droughts.

In recent years the town has completed a number of projects to ensure some reliability for drinking water provisions during a drought, but the Deputy Director of Water suggests that more construction work need to be done. Completed projects include:

- New Transmission Main (was a 16" main to a 24" main).
- Source water rehabilitation of wells
- Storage tank rehabilitation and maintenance
- Small water main project
- Expanding the high-pressure zone to new locations
- Larger pump at the lift station, backup generators at two wells and lift station

The Town is only starting to understand that significant infrastructure work is needed through the entire town to weather the effects of a prolonged drought period.

Natural Resources

Prolonged droughts can have severe impacts on groundwater and surface water-dependent ecosystems and natural resources, as most organisms require water throughout their life cycle.

Economy

Economic impacts of drought can be significant in the agriculture, recreation, forestry, and energy sectors. Impacts on the individual level include the need to buy water from an alternative source during a drought emergency. Crop failure can also increase food prices, straining a larger portion of the economy.

DRAFT

Primary Climate Change Interaction: Rising Temperatures

Average/Extreme Temperature: High Risk

What constitutes "extreme cold" or "extreme heat" can vary across different geographies, based on what the population of a particular place is accustomed to. According to the Massachusetts State Hazard Mitigation and Climate Adaptation Plan, extreme heat for Massachusetts is usually defined as a period of 3 or more consecutive days above 90 degrees Fahrenheit (°F), but more generally as a prolonged period of excessively hot weather, which may be accompanied by high humidity. Extreme cold is also considered relative to the normal climatic lows in a region.

More broadly, extreme temperatures can be defined as those that are far outside the normal ranges. The average highs and lows of the hottest and coolest months in the neighboring town of Westfield, the closest site for which data was available, are provided in Table 13 below.

Table 13. Annual Average High and Low Temperatures

	July (Hottest Month)	January (Coldest Month)
Average High (°F)	83	33
Average Low (°F)	59	13

Source: NOAA NWS, 2019. Monthly Climate Normals (1981 – 2010) Westfield Barnes Municipal AP, MA

The highest temperature recorded at the Barnes Municipal Airport in Westfield for the period from 1926 to present[2] was 103°F in on July 6, 2010 (NOAA NOW Data, Boston / Norton Weather Forecast Office, https://w2.weather.gov/climate/xmacis.php?wfo=box).

Projected temperature extremes will shift with climate change, according to research conducted by the Massachusetts Executive office for Energy and Environmental Affairs and the University of Massachusetts, Amherst. By 2050, summer maximum temperatures (including the presumed hottest month of July) are expected to reach 84.9°F in Hampden County, as opposed to a 2001-2005 5-year mean of 79.6°F (resilientma.org).

Extreme cold events are when temperatures drop well below normal in an area. Generally, extreme cold temperatures are characterized by the ambient air temperature dropping to or below 0 degrees Fahrenheit (°F) (National Weather Service [NWS] 2015). When winter temperatures drop significantly below normal, staying warm and safe can become a challenge. Extremely cold temperatures may accompany or follow a winter storm, which may also cause power failures and icy roads. Many homes will be too cold, either due to a power failure or because the heating system is not

[2] https://www.ncdc.noaa.gov/extremes/scec/records

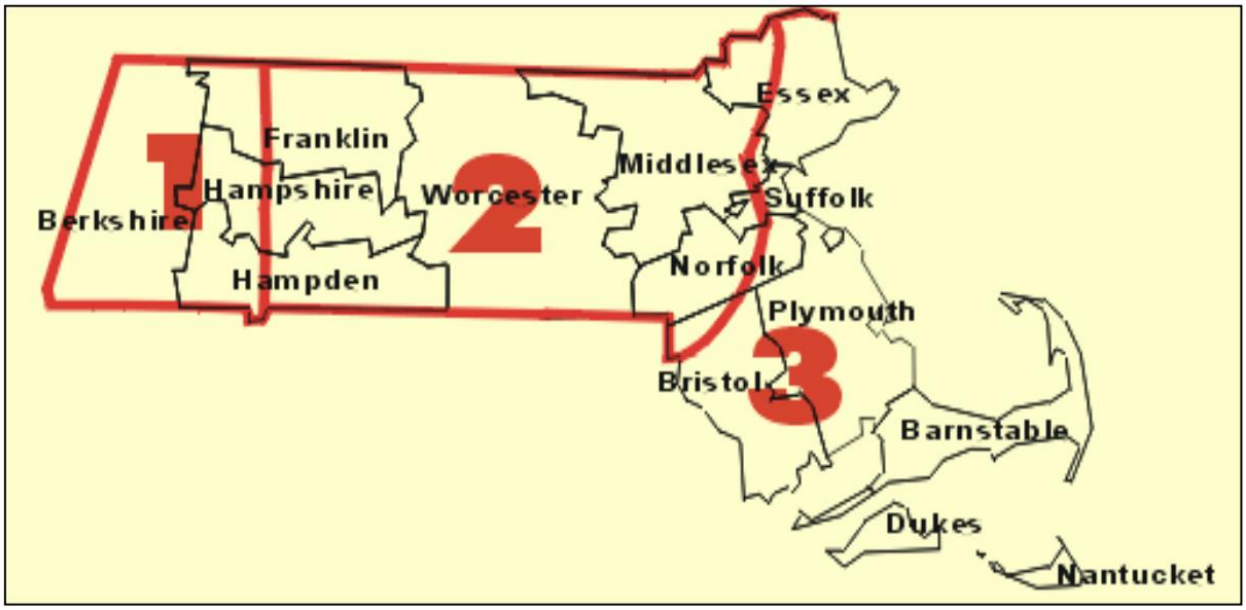
adequate for the weather. Extensive exposure to extreme cold temperatures can cause frostbite or hypothermia and can become life-threatening.

Extreme heat is defined by the Center for Disease Control (CDC) as temperatures which hover 10 degrees or more above the average high temperature for a region and that last for several weeks (CDC 2016). Heat waves cause more fatalities in the U.S. than the total of all other meteorological events combined. Since 1979, more than 9,000 Americans have died from heat-related ailments (EPA, 2016). In Massachusetts, a heat wave is defined as 3 or more days of temperatures of 90°F or above and is often accompanied by high humidity. The designation implies an extended period of unusually high atmosphere-related heat stress, which forces affected populations to make temporary modifications in lifestyle to avoid adverse health consequences (MA HMCAP, 2018).

Location

NOAA divides Massachusetts up into three climate divisions - Western, Central, and Coastal – and average annual temperatures vary slightly over the divisions. Another distinction between the divisions is that extreme temperature events occur more frequently and vary more in the inland regions where temperatures are not moderated by the Atlantic Ocean. West Springfield sits along the western edge of the Central Division, with annual average temperatures of around 49°F.

Figure 1. Climate Divisions of Massachusetts



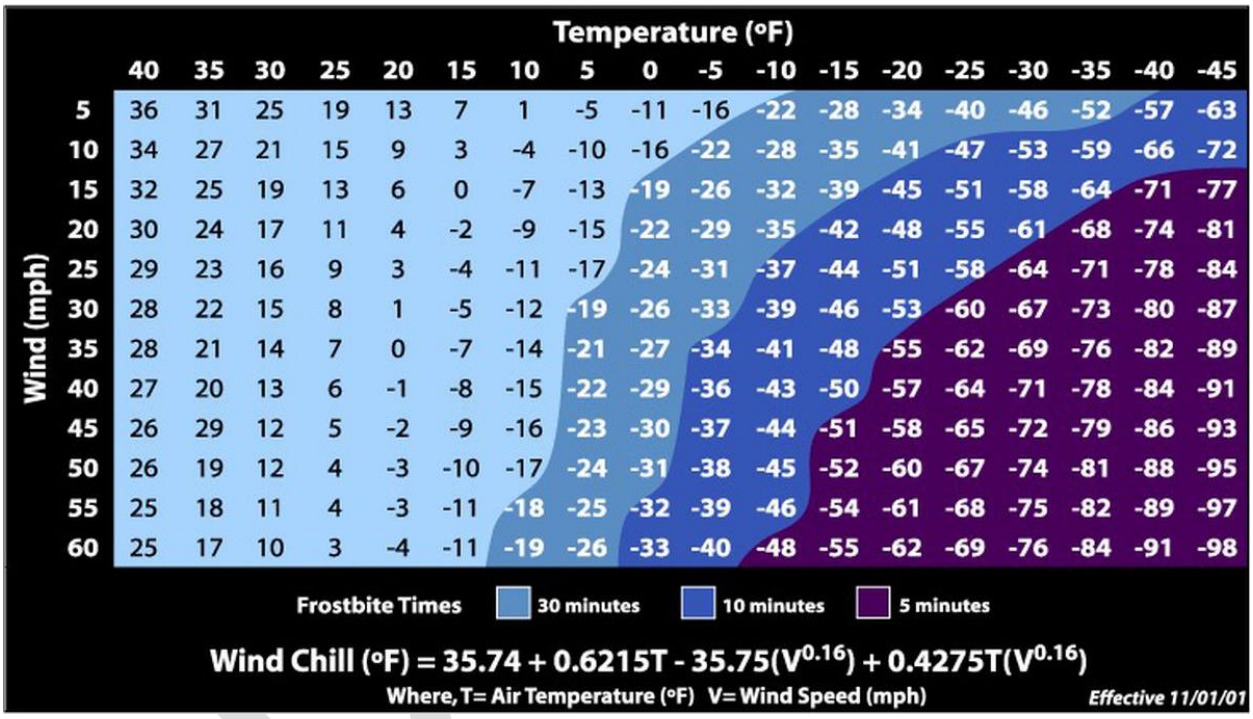
Source: NOAA, n.d.

Extreme temperatures would affect the whole community in West Springfield, resulting in a "large" location of occurrence, or more than 50 percent of total land area affected.

Extent

The extent (severity or magnitude) of extreme cold temperatures are generally measured through the Wind Chill Temperature (WCT) Index. Wind Chill Temperature is the temperature that people and animals feel when outside and it is based on the rate of heat loss from exposed skin by the effects of wind and cold. The chart shows three shaded areas of frostbite danger. Each shaded area shows how long a person can be exposed before frostbite develops. In Massachusetts, a wind chill warning is issued by the NWS Taunton Forecast Office when the Wind Chill Temperature Index, based on sustained wind, is –25°F or lower for at least three hours. The WCT is presented in Figure 2.

Figure 2. NWS Wind Chill Index



Source: NWS 2018

The NWS Heat Index is used to measure extremely hot temperatures, combining relative humidity with actual air temperature to determine the risk to humans. The NWS issues a Heat Advisory when the Heat Index is forecast to reach 100-104°F for 2 or more hours, and an Excessive Heat Warning if the Heat Index is forecast to reach 105°F or higher for 2 or more hours. The chart in Figure 3 indicates the relationship between heat index and relative humidity and illustrates the adverse effects that prolonged exposure to heat and humidity can have on an individual.

Figure 3. NWS Heat Index Chart

Relative Humidity (%) \ Temperature (°F)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Category	Heat Index	Health Hazards
Extreme Danger	130 °F – Higher	Heat Stroke or Sunstroke is likely with continued exposure.
Danger	105 °F – 129 °F	Sunstroke, muscle cramps, and/or heat exhaustion possible with prolonged exposure and/or physical activity.
Extreme Caution	90 °F – 105 °F	Sunstroke, muscle cramps, and/or heat exhaustions possible with prolonged exposure and/or physical activity.
Caution	80 °F – 90 °F	Fatigue possible with prolonged exposure and/or physical activity.

Source: National Weather Service (NWS), Heat Index, 2018

According to recent downscaled climate projections for Massachusetts, high, low, and average temperatures in Hampden County are likely to increase significantly over the next century as a result of climate change (resilient MA, 2019). This gradual change will put long-term stress on a variety of social and natural systems, and will exacerbate the influence of discrete events. In the event of an extreme cold or heat event, multiple injuries and health impacts would be possible. Therefore, the extent of this hazard is Critical.

Previous Occurrences

The following are the lowest temperatures recorded in parts of Massachusetts for the period from 1895 to present according to NOAA's State Climate Extremes Committee (SCEC)[3]:

- Taunton: -35°F, January 5, 1904
- Coldbrook: -35°F, February 15, 1943
- Chester: -35°F, January 12, 1981

[3] https://www.ncdc.noaa.gov/extremes/scec/records

Since 1994, there have been 33 cold weather events within the Commonwealth, ranging from Cold/Wind Chill to Extreme Cold/Wind Chill events. In February 2015, a series of snowstorms piled up to 60 inches in some areas in 3 weeks and caused recurrent blizzards across eastern Massachusetts. Temperature gauges across the Commonwealth measured extreme cold, with wind chills as low as -31°F. Four indirect fatalities occurred as a result of this event: two adults died shoveling snow and two adults were hit by snowplows. In February 2016, one cold weather event broke records throughout the state. Extreme cold/wind chill events were declared in 16 climate zones across the Commonwealth (MASHMCAP, 2018).

According to the NOAA's Storm Events Database, there were 43 warm weather events (ranging from Record Warmth/Heat to Excessive Heat events) in Massachusetts between 1995 and 2018, the most recent of which occurred in July 2013. Whenever the heat index values meet or exceed locally or regionally established heat or excessive heat warning thresholds, an event is reported in the database. In 2012, Massachusetts temperatures broke 27 heat records. Most of these records were broken between June 20 and June 22, 2012, during the first major heat wave of the summer to hit Massachusetts and the East Coast. In July 2013, a long period of hot and humid weather occurred throughout New England. One fatality occurred on July 6, when a postal worker collapsed as the Heat Index reached 100°F (MASHMCAP, 2018). None of these events was known to impact individuals in West Springfield.

The lowest temperature recorded at the Barnes Municipal Airport in Westfield for the period from 1926 to present[4] was -20°F on Feb. 9, 1934 (NOAA NOW Data, Boston / Norton Weather Forecast Office, https://w2.weather.gov/climate/xmacis.php?wfo=box).

Between 1954 and 2019, Hampden County was not included in any FEMA declared extreme temperature -related disasters (DR) or emergencies (EM).

Probability of Future Occurrences

The NE CASC data support the trends of an increased frequency of extreme hot weather events and a decreased frequency of extreme cold weather events. Figure 4 and Figure 5 show the projected changes in these variables between 2020 and the end of this century.

[4] https://www.ncdc.noaa.gov/extremes/scec/records

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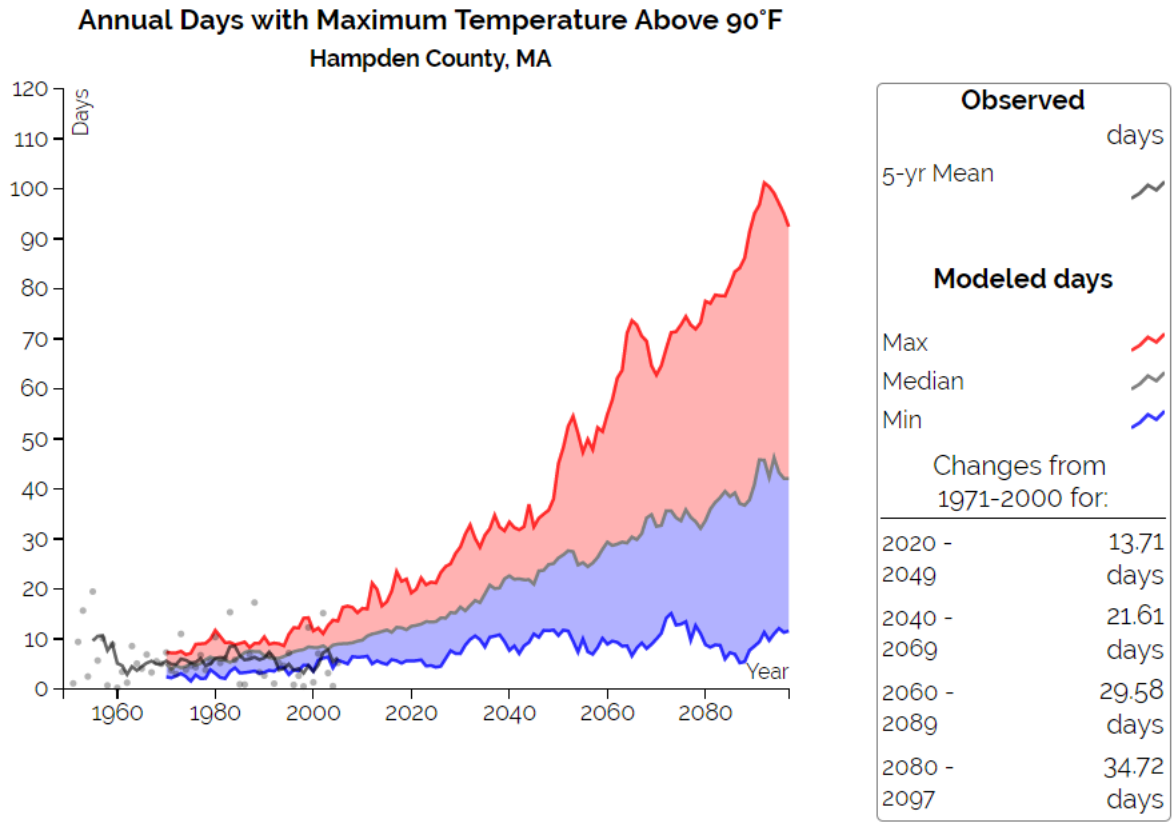
Figure 4. Projected Annual Days with Temperature Above 90°F



Source: resilient MA, 2019

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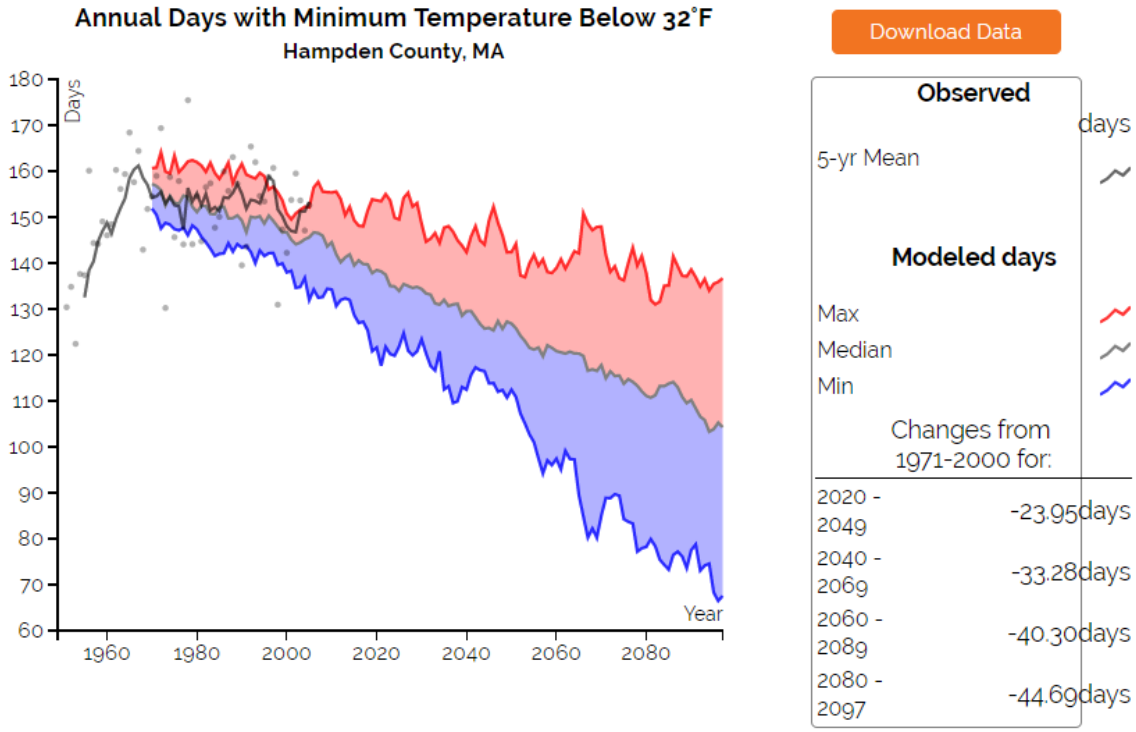
Figure 5. Projected Annual Days with Temperature below 32°F



Source: resilient MA, 2019

The probability of future extreme heat and extreme cold is considered to be "high," or between 40 and 70 percent in any given year.

Secondary Hazard

According to the 2018 SHMCAMP, the most significant secondary hazard associated with extreme temperatures is a severe weather event. Severe heat events are often associated with drought, as evaporation increases with temperature, and with wildfire, as high temperatures can cause vegetation to dry out and become more flammable. Warmer weather will also have an impact on invasive species (see Invasive Species section below for additional detail). More commonly, heat events contribute to poor air quality that can exacerbate asthma and result in an increase in emergency department visits.

Conversely, extreme cold events are primarily associated with severe winter storms. The combination of cold weather with severe winter storm events is especially dangerous because winter weather can knock out heat and power, increasing exposure to extreme cold temperatures. Loss of heat and power may also lead to carbon monoxide poisoning from inappropriate use of combustion-powered generators, heaters, and cooking appliances, and heavy snowfall may block vents for gas dryers and heaters. Similarly, prolonged exposure to extreme heat can compromise power infrastructure, leaving customers without power or the ability to operate air conditioning. Power failure leads to increased use of diesel generators for power and

more wood stoves are used in extreme cold; both situations lead to increasing air pollution and health impacts.

Vulnerability

Extreme temperature can have a significant impact to human health, commercial/agricultural businesses and primary and secondary effects on infrastructure (e.g., burst pipes and power failure).

Population

Extensive exposure to extreme cold temperatures can cause frostbite or hypothermia and can become life-threatening. Extreme cold and extreme heat are dangerous situations that can result in health emergencies for individuals without shelter or some other way to stay cool, or who live in homes that are poorly insulated, or without heat or air conditioning. Power outages may also result in inappropriate use of combustion heaters and other appliances, as discussed under Secondary Impacts above.

Extreme heat events can also contribute to a worsening of air quality, as high temperatures increase the production of ozone from aerosols such as volatile organic compounds. Weather patterns that bring high temperatures can also transport air pollutants from other areas of the continent. Additionally, atmospheric inversions and low wind speeds associated with heat waves allow polluted air to remain in one location for a prolonged period of time (UCI, 2017).

According to the 2018 SHMCAP, the interaction of heat and cardiovascular disease caused approximately 25 percent of the heat related deaths since 1999. The rate of emergency department visits and hospital admissions for heat-related illness under existing conditions in Hampden County and the town of West Springfield is shown in Table 14. In 2012, the annual average age-adjusted rate of hospital admission for heat stress in Hampden County was 14.7 (admissions per 100,000 people). The annual average age-adjusted hospital admissions for heart attacks in Hampden County is unknown, but in West Springfield was 22.3 per 10,000 residents. Of all Massachusetts counties, Hamden County had the highest annual average emergency department visits due to asthma (110.1 to 125.6 visits per 10,000 people) between 2002 and 2012.

Table 14. General Vulnerability Indicators

Location	Estimated Increase in Average Temperature by 2100 (°F)	Proportion of Population Aged 65 or Older	Proportion of Population Aged Younger than 5 Years	Proportion of the Population Living Below Poverty Level
Hampden County	+6.4°	6%	6%	17%
West Springfield	N/A	15.2% (1)	5.7% (1)	12.1 (1)

Notes: (1) 2017 American Community Survey states that estimates are not comparable to other geographic levels due to methodology differences that may exist between different data sources.

Built Environment

With the exception of power infrastructure, most structures and infrastructure within the town are not at risk for damage due to extreme temperatures, but populations that are not prepared to contend with these temperature extremes could be most vulnerable. However, extreme cold temperature events can damage buildings through freezing or bursting pipes and freeze and thaw cycles. Furthermore, secondary impacts of this hazard include extreme temperature fluctuations, which have serious implications for transportation infrastructure life-span and maintenance needs.

Natural Resources

Individual extreme temperature events usually have a limited long-term impact on natural systems, although unusual frost events occurring after plants begin to bloom in the spring can cause significant damage. However, changing average temperatures and the changing frequency of extreme climate events will likely have a major impact on natural resources throughout the Commonwealth and worldwide (2018 SHMCAP).

Changing temperatures will impact the natural environment in many ways. Because the species that exist in a given area have adapted to survive within a specific temperature range, extreme temperature events can place significant stress both on individual species and the ecosystems in which they function.

Massachusetts ecosystems that are expected to be particularly vulnerable to warming temperatures include:

- Coldwater streams and fisheries
- Vernal pools
- Spruce-fir forests
- Northern hardwood (Maple-Beech-Birch) forests, which are economically important due to their role in sugar production
- Hemlock forests, particularly those with the hemlock wooly adelgid
- Urban forests, which will experience extra impacts due to the urban heat island effect (2018 SHMCAP)

Additional impacts of warming temperatures include the increased survival and grazing damage of white-tailed deer, increased invasion rates of invasive plants, and increased survival and productivity of insect pests, which cause damage to forests.

Economy

Extreme temperatures can impact a municipal and regional economy in various ways. West Springfield business owners may be faced with increased financial burdens due to unexpected building repairs (e.g., repairs for burst pipes), higher than normal utility bills, or business interruptions due to power failure (i.e., loss of electricity and telecommunications). There is a loss of productivity and income when the transportation sector is impacted and people and commodities cannot get to their intended destination. Employers with outdoor workers (such as agricultural and construction companies) may have to reduce employees' exposure to the elements by

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reducing or shifting their hours to cooler or warmer periods of the day – these shifts can impact the earnings of both the company and the individual employee.

The agricultural industry is most directly at risk in terms of economic impact and damage due to extreme temperature and drought events. Extreme heat can result in drought and dry conditions, which directly impact livestock and crop production (2018 SHMCAP).

Wildfires/Brushfire: Low Risk

According to FEMA, there are three different classes of wildland fires: surface fires, ground fires and crown fires. The most common type of wildland fire is a surface fire that burns slowly along the floor of a forest, killing or damaging trees. A ground fire burns on or below the forest floor and is usually started by lightening. Crown fires move quickly by jumping along the tops of trees. A crown fire may spread rapidly, especially under windy conditions.

While wildfires or brushfires have not been a significant problem in West Springfield, there is always a possibility that changing land use patterns and weather conditions will increase a community's vulnerability. For example, drought conditions can make forests and other open, vegetated areas more vulnerable to ignition. Once the fire starts, it will burn hotter and be harder to extinguish. Soils and root systems starved for moisture are also vulnerable to fire. Residential growth in rural, forested areas increases the total area that is vulnerable to fire and places homes and neighborhoods closer to areas where wildfires are more likely to occur. Global climate changes may also influence precipitation patterns, making the region more susceptible to drought and therefore, wildfires.

Moderate risk exists for potential wildfire incidents, especially near some of the town's forested, agricultural, and recreational lands.

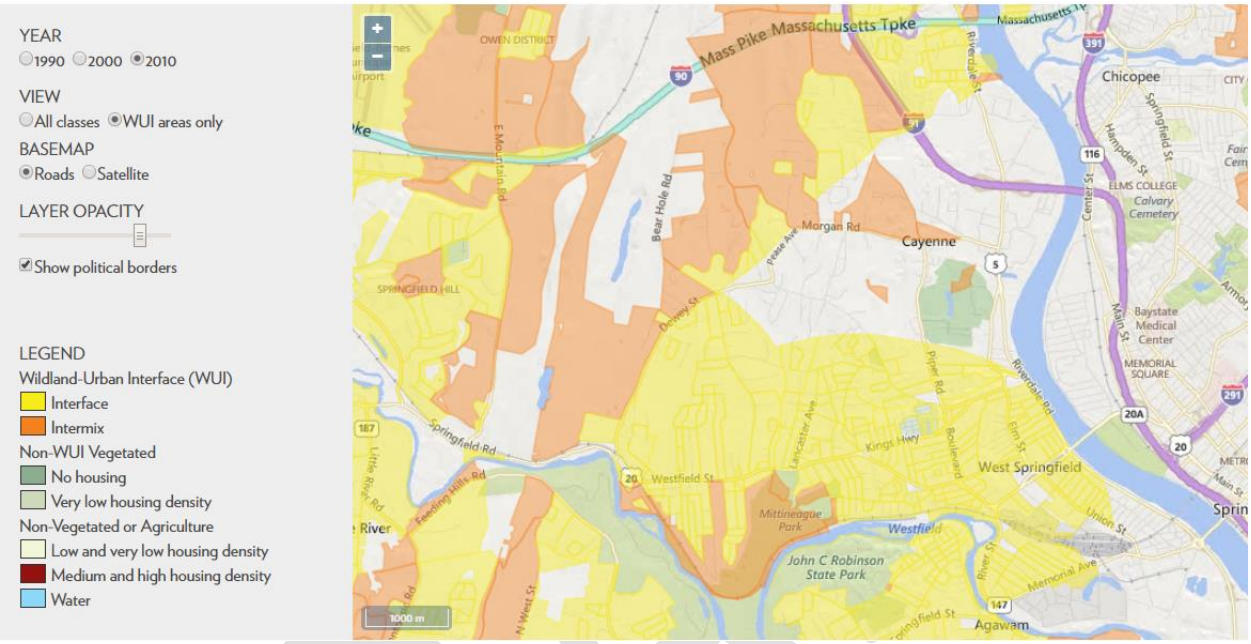
Location

In Massachusetts, the DCR Bureau of Forest Fire Control has been the state agency responsible for providing aid, assistance, and advice to the Commonwealth's cities and towns since 1911. The Bureau provides assistance and cooperation with fire departments, local law enforcement agencies, the Commonwealth's county and statewide civil defense agencies, and mutual aid assistance organizations.

Some portions of West Springfield are more susceptible to wildfire. The SILVIS Lab at the University of Wisconsin-Madison Department of Forest Ecology and Management classifies exposure to wildlife hazard as "interface" or "intermix" based on two components: a) human presence, measured by using data from the block-level housing unit counts from the decennial censuses; and b) wildland vegetation, assessed with the 1992/3 National Land Cover dataset. Two types of wildland-urban interface were defined: (1) intermix, areas where housing (more than one per 40 acres) intermingles with wildland (nonagricultural) vegetation and (2) interface, areas with housing and low-density vegetation within fire's reach (1.5 miles) of a large, contiguous block of wildland vegetation (Radeloff et al. 2004). The greatest potential for significant

damage to life and property from fire exists in areas designated as Wildland-Urban Interface (WUI). West Springfield has large swaths of land classified both as Interface, primarily in the southern part of town, and Intermix in the central and northern parts of town, as shown in Figure 6 below (SILVIS, 2019).

Figure 6. Wildland-Urban Interface 2010



Source: SILVIS, 2019

In West Springfield, approximately 44% of the town's total land area is forested, or about 4,744 acres. Furthermore, roughly 2,543 acres is considered by the SILVIS Lab as Intermix, and 3,730 acres as Wildland Urban Interface, indicating greater risk of damage from forest fire. Forest fires are therefore a potential threat in West Springfield.

Early detection of wildfires is a key part of the Bureau's overall effort. Early detection is achieved by trained Bureau observers who staff the statewide network of 42 operating fire towers. During periods of high fire danger, the Bureau conducts county-based fire patrols in forested areas. These patrols assist cities and towns in prevention efforts and allow for the quick deployment of mobile equipment for suppression of fires during their initial stage.

Extent

The National Wildfire Coordinating Group defines seven classes of wildfires:

- Class A: 0.25 acre or less
- Class B: more than 0.25 acre, but less than 10 acres
- Class C: 10 acres or more, but less than 100 acres
- Class D: 100 acres or more, but less than 300 acres
- Class E: 300 acres or more, but less than 1,000 acres

- Class F: 1,000 acres or more, but less than 5,000 acres
- Class G: 5,000 acres or more.

Unfragmented and heavily forested areas are vulnerable to wildfires, particularly during droughts. Forested and agricultural areas with high fuel content have more potential to burn. In addition, it is often very difficult to access some of the locations to extinguish brush fires. However, the greatest potential for significant damage to life and property from fire exists in areas designated as wildland-urban interface areas. Again, the wildland-urban interface area defines the conditions where highly flammable vegetation is adjacent to developed areas. Based on the total area of this type of condition within town, the extent of a significant wildfire or brushfire in West Springfield is deemed Limited.

Previous Occurrences

The wildfire season in Massachusetts usually begins in late March and typically culminates in early June, corresponding with the driest live fuel moisture periods of the year. April is historically the month in which wildfire danger is the highest. Drought, snowpack level, and local weather conditions can impact the length of the fire season.

Few wildfires have been recorded in the past 100 years in the Pioneer Valley, and none has ever resulted in a FEMA disaster declaration.

As a point of reference, the total number of any type of fire incidence in West Springfield for the last five available years is provided below. The "Total # of Incidents" includes structural and vehicle fires, while incidents classified as "other" could include, but do not necessarily include, brush fires. The West Springfield Fire Department responds to house fires and the few "wildfires" that occur.

Table 15. Total Fire Incidents in West Springfield

Year	Total # of Incidents	"Other Fires"	Dollar Loss
2013	118	36	$1,655,430
2014	124	37	$914,249
2015	129	55	$324,685
2016	91	36	$209,075
2017	90	27	

Source: Massachusetts Fire Incidence Reporting System, County Profiles, 2017 Fire Data Analysis and Annual Fact Sheets, https://www.mass.gov/service-details/fire-data-and-statistics

According to the Hazard Mitigation Planning committee, West Springfield has experienced wildfires in Bear Hole and in Mittineague Park, but these fire events did not meet the State definition of a wildfire.

There are no other records, authenticated or anecdotal, of wildfires in West Springfield.

Probability of Future Events

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Research has found that the frequency of lightning strikes – an occasional cause of wildfire – could increase by approximately 12 percent for every degree Celsius of warming (2018 SHMCAP).

Even with the increased lightning risks, based upon the past events, it is reasonable to say that there is a low probability (1-10% probability in the next year) of wildfires in West Springfield.

Vulnerability

Population

Human health and the lives of residents and responders are at risk from wildfire. The most vulnerable populations include emergency responders and those within a short distance of the interface between the built environment and the wildland environment.

The West Springfield Committee used the interface and intermix hazard areas to estimate the population vulnerable to the wildfire hazard. The Census blocks that included land identified as interface or intermix were used to calculate the estimated population exposed to the wildfire hazard. In total, approximately 8,983 housing units and 33.3% of all land in West Springfield are located within the Wildland-Urban Interface area, and therefor are vulnerable to the wildfire hazard.

Built Environment

For the purposes of this planning effort, all elements of the built environment located in the wildland interface and intermix areas are considered exposed to the wildfire hazard.

- As described above, up to 8,983 housing units in West Springfield fall within the interface area and could be impacted by a wildfire;
- Assuming up to 100% damage to all units within the hazard area, not including costs repairing or replacing any power lines, telephone lines, and contents of structures.

Critical facilities are particularly important for routine town operation and emergency response in case of a sever wildfire. Energy distribution lines are subject to wildfire risk because most poles are made of wood and susceptible to burning. Transmission lines are also at risk to faulting during wildfires, which can result in a broad area outage. Table 16 summarizes the critical facilities, including those serving vulnerable populations, exposed to the wildfire hazard in West Springfield.

Table 16. Critical Facilities Exposed to Wildfire

Table 17. Critical Facilities Exposed to Wildfire			
Type	**Facility Name**	**Interface**	**Intermix**
Emergency Shelters	Tatham School		X
Employment Centers	Dinn Brothers Trophies-		X

Table 17. Critical Facilities Exposed to Wildfire			
Type	**Facility Name**	**Interface**	**Intermix**
	Plaques		
Employment Centers	Simmons Bedding Co		X
Daycares	Sanabria, Rosa A.		X
Daycares	Eickelberg, Leslie		X
Schools	Tatham Elementary School		X
Apartment Complexes	Multiple – 39	x	
Building Materials Suppliers	Multiple – 3	x	
Churches/Religious Institutions	Multiple – 12	x	
Daycares	Multiple – 36	x	
Department of Public Works	Department of Public Works	x	
Elderly Housing	Multiple – 8	x	
Emergency Fuel Stations	Highway Department	x	
Emergency Operations Center	City Municipal Office Building	x	
Emergency Shelters	Multiple – 5	x	
Employment Centers	Multiple – 10	x	
Food/Water	Multiple – 2	x	
Gas/Heating Oil/Propane	Multiple – 8	x	
Heavy & Small Equipment Suppliers	Multiple – 2	x	
Historic Buildings/Sites	Multiple – 3	x	
Hospitals/Medical Supplies	Multiple – 3	x	
Police Station	West Springfield Police Station	x	
Public Buildings/Areas	Multiple – 3	x	
Schools	Multiple – 7	x	
Other Vulnerable Populations	Cowing School	x	

Sources: Radeloff et al. 2005

Natural Resources

Fire can serve important ecological purposes as a natural part of many ecosystems. Functions include facilitating the nutrient cycling from dead and decaying matter, removing diseased plants and pests, and regenerating seeds or stimulating germination of certain plants. Conversely, wildfires can also have significant negative impacts on

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the environment. Specifically, the ash they generate can distort the flow of nutrients through an ecosystem, reducing the biodiversity that can be supported.

Economy

The initial loss of structures and the subsequent loss of revenue from destroyed businesses from a wildfire can have major economic impacts on a community. Individuals and families will face economic challenges if their home is impacted by wildfire. The exposure of homes to this hazard is widespread. According to the characterization of wildland hazard areas by Radeloff et al., the Massachusetts intermix hazard area contains 476,934 housing units (or approximately 17 percent of the total housing units in the Commonwealth). The interface hazard area contains 715,209 housing units (or approximately 26 percent of the total housing units in the Commonwealth).

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Invasive Species: Medium-Low Risk

Invasive species are non-native species that threaten and damage local ecosystems, economies, and/or public health (NISC 2006). The Massachusetts Invasive Plant Advisory Group (MIPAG), a collaborative representing organizations and professionals concerned with the conservation of the Massachusetts landscape, is charged by EOEEA to provide recommendations to the Commonwealth to manage invasive species. MIPAG defines invasive plants as "non-native species that have spread into native or minimally managed plant systems in Massachusetts, causing economic or environmental harm by developing self- sustaining populations and becoming dominant and/or disruptive to those systems" (MIPAG, n.d.).

Invasive terrestrial plants are the most studied and managed typed of invasive, but invasive insects are also relevant to West Springfield. In all cases, these species have biological traits that provide them with competitive advantages over native species, particularly because in a new habitat they are not restricted by the biological controls of their native habitat. As a result, these invasive species can monopolize natural communities, displacing many native species and causing widespread economic and environmental damage.

The spread of invasive species is primarily caused by human activity. Common examples include:

- Wood Products: Insects can get into wood, shipping palettes, and crates that are shipped around the world as well as travel in firewood.
- Ornamental Plants: Some ornamental plants can escape into the wild and become invasive.
- Pet Trade: Some invasive species start as pets that are intentionally or accidentally released.
- Climate change: Warmer temperatures place stress on cold-weather species, while allowing non-native species accustomed to warmer climates to spread northward. As rainfall and snowfall patterns change, certain habitats and species that have specific physiological requirements may be affected. The stresses experienced by native ecosystems as a result of these changes may increase the chances of a successful invasion of non-native species.

Invasive plant species such as Asian honeysuckles, Japanese barberry, autumn olive, burning bush, multiflora rose, garlic mustard, and glossy buckthorn, are considered by the Massachusetts Department of Agricultural Resources, New England Wildflower Society, U.S. Forest Service, and others as some of the worst invaders in the region. Three non-native insects which currently threaten the region are the emerald ash borer (EAB), Asian longhorned beetle (ALB) and hemlock wooly adelgid (HWA). Only hemlock wooly adelgid is currently present in the area; emerald ash borer was identified in Holyoke, Springfield, and Westfield 2018 (and other towns in Hampden County not directly bordering West Springfield), and Asian longhorned beetle populations are currently being quarantined in central Massachusetts.

DRAFT

Location

Invasive species can travel far distances (either via natural mechanisms or accidental human interference) and therefor can propagate rapidly over a large geographic area. Open freshwater ecosystems generally don't have physical barriers to prevent establishment (outside of physiological tolerances) so invasive species can quickly spread once introduced, and find myriad opportunities for transport to new locations (by boats, for example).

In general, invasive species represent the greatest threat to native or minimally managed ecosystems in West Springfield. This includes many of the rivers and streams in town, as well as the town's water supply land around Eastern Mountain and Bear Hole.

Extent and Previous Occurrences

Many invasive species have been identified in West Springfield from 2010 to 2019.

Japanese Knot Weed flourishes near riverbanks and highways, choking out native plants for light and nutrients. Hogweed was last identified in the town in 2006, and West Springfield is listed on the state's hogweed database as "treatment in progress" for eradication of the species.

Hemlock woolly adelgid, a small aphid-type insect, was first detected in Massachusetts in the Forest Park section of Springfield in the late 1980s. The adelgid has been found primarily on Canadian hemlocks and is now fairly widespread in the state. Hemlock woolly adelgid hasn't killed trees outright locally as it has in areas to our south, but it has weakened many of hemlocks to the point that the health of the trees has declined.

The Asian Longhorned Beetle (Anoplophora glabripennis, or ALB) is a major threat to hardwood trees. The species has decimated tree stock in Worcester County, but has not yet spread to western Massachusetts. The ALB has the potential to cause more damage than Dutch elm disease, chestnut blight and gypsy moths combined, destroying millions of acres of America's treasured hardwoods, including national forests and backyard trees. With no current cure, early identification and eradication are critical to its control.

A full list of "Invasive" terrestrial, freshwater, and marine species are available on the MIPAG website (last updated April 2016) https://www.massnrc.org/mipag/speciesreviewed_category.htm and in the 2018 SHMCAP, which also includes details on the nature of the ecological and economic challenges presented by each species as well as information on when and where the species was first detected in Massachusetts.

Despite the presence of these species, their impacts have not been clearly recorded. Anticipated impacts include increased tree mortality leading to more downed trees and power outages during storm events. Based on current understanding of the impact and previous occurrences, the extent of significant impacts West Springfield will likely suffer from invasive species is Limited.

Probability of Future Events

Changes in temperature and precipitation may increase chances of a successful invasion of non-native species. Given this, and the fact that some invasive species are already present in West Springfield, the frequency of occurrence and annual probability of this hazard is High.

Vulnerability

Risk to native or minimally managed ecosystems has increased as dispersion of exotic species has increased.

Invasive species can directly or indirectly cause harm to human health. Some invasive plant species like giant hogweed and wild parsnip have phytophototoxic properties, meaning direct contact of their sap with human skin can cause a chemical reaction that makes skin hypersensitive to ultraviolet light. Another example is that of Japanese barberry, which has been proven to increase the incidence of Lyme disease by providing sheltered habitat that increases the abundance of small rodents, which act as hosts to the ticks that carry Lyme disease pathogens (https://mnfi.anr.msu.edu/invasive-species/JapaneseBarberryBCP.pdf).

The Nature Conservancy reports that invasive species have contributed directly to the decline of 42% of the threatened and endangered species in the United States. Further, the annual cost to the U.S. economy is estimated at $120 billion per year, with more than 100 million acres suffering from invasive plant infestation. Freshwater ecosystems and estuaries are especially vulnerable to invasion, as these areas are very difficult to contain and reverse (the nature conservancy, https://www.nature.org/en-us/about-us/where-we-work/united-states/ohio/stories-in-ohio/invasive-species-protecting-native-plants-and-animals/).

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Primary Climate Change Interaction: Extreme Weather

Severe Winter Storm (Including Ice Storm and Nor'Easter) – Medium-High Risk

Severe winter storms include ice storms, nor'easters, heavy snow, blowing snow, and other extreme forms of winter precipitation.

Snow is characterized as frozen precipitation in the form of six-sided ice crystal. In order for snow to occur, temperatures in the atmosphere (from ground level to cloud level) must be at or below freezing. The strongest form of a severe snow storm is a blizzard. Blizzards are characterized by frequent wind gusts above 35 miles per hour, limited to no visibility due to falling snow and extreme cold that lasts longer than three hours.

Ice storms are liquid rain that falls and freezes upon contact with cold objects. There must be an ice build-up of greater than ¼ inch for it to be considered an ice storm. When more than a ½ inch of ice build-up is forecasted a winter storm warning can be triggered

Nor'easters are among winter's most ferocious storms. They are characterized by a large counter-clockwise wind circulation around a low-pressure center, and are known for producing heavy snow, high winds, and rain. These storms occur most often in late fall and early winter.

Severe winter storms can pose a significant risk to property and human life. The rain, freezing rain, ice, snow, cold temperatures and wind associated with these storms can cause the following hazards:

- Disrupted power and phone service
- Unsafe roadways and increased traffic accidents
- Infrastructure and other property are also at risk from severe winter storms and the associated flooding that can occur following heavy snow melt
- Tree damage and fallen branches that cause utility line damage and roadway blockages
- Damage to telecommunications structures
- Reduced ability of emergency officials to respond promptly to medical emergencies or fires
- Elderly are affected by extreme weather

New England generally experiences at least one or two severe winter storms each year with varying degrees of severity. Research on climate change indicates that there is great potential for stronger, more frequent storms as the global temperature increases. Severe winter storms typically occur during January and February; however, they can occur from late September through late April.

DRAFT

Location

Severe winter weather occurs regionally and therefore would impact the entire town, although several specific locations are more susceptible to damage. These problem areas have been described and assessed for vulnerability.

Piper Road (near High School)

Any severe winter weather incident can cause critical snow and ice hazards at several points along this street in the northern portion of West Springfield. This is due to significant grade and a dangerous turns, causing driving difficulties and impairing visibility.

Birnie Avenue

Severe winter weather incidents of icing can cause critical ice hazards where Birnie Avenue travels under the I-90 highway overpass in the northern portion of West Springfield. This is due to ice build-up along the road and along I-90, causing driving difficulties.

Route 20

Any severe winter weather incident can cause critical snow and ice hazards at several points along Route 20 in West Springfield. This is due to significant grade changes and dips in the road, causing driving difficulties and icing on the road.

Kings Highway

Any severe winter weather incident can cause critical snow and ice hazards at several points along Kings Highway in West Springfield. This is due to significant grade changes and dips in the road, causing driving difficulties and icing on the road.

Brush Hill Road

Any severe winter weather incident can cause critical ice hazards over the I-90 overpass along Brush Hill Road in West Springfield. This is due to significant grade and a dangerous turns, causing driving difficulties and impairing visibility.

Lower Dewey Road

Any severe winter weather incident can cause critical snow and ice hazards at several points along Lower Dewey Road in the northern portion of West Springfield. This is due to significant grade and a dangerous turns, causing snow drifts, driving difficulties and impairing visibility.

Extent

Since 2005, the RSI has become the descriptor of choice for measuring winter events that impact the six climactic regions in the eastern two-thirds of the U.S. The RSI ranks snowstorm impacts on a scale system from 1 to 5 as depicted in the table below. The RSI is similar to the scale used to measure tornadoes (Fujita) or hurricanes (Saffir-Simpson), with the added benefit of considering population as a variable. The RSI is based on three factors: the spatial extent of the storm, the amount of snowfall, and population (NOAA, n.d.). As a regional index, the RSI incorporates region-specific parameters and thresholds for calculating a storm's category. Snowfall thresholds in

DRAFT

Massachusetts (in the Northeast region) are 4, 10, 20, and 30 inches of snowfall, while thresholds in the Southeast U.S. are 2, 5, 10, and 15 inches.

Regional Snowfall Index Categories, Corresponding RSI Values, and Description		
Category	**RSI Value**	**Description**
1	1—3	Notable
2	3—6	Significant
3	6—10	Major
4	10—18	Crippling
5	18.0+	Extreme

Source: NCDC, n.d.

Prior to the RSI, the Northeast Snowfall Impact Scale (NESIS) was the ranking system used. It was developed by Paul Kocin of The Weather Channel and Louis Uccellini of the National Weather Service (Kocin and Uccellini, 2004) characterizes and ranks high-impact Northeast snowstorms. These storms have large areas of 10-inch snowfall accumulations and greater. NESIS has five categories: Extreme, Crippling, Major, Significant, and Notable. The index differs from other meteorological indices in that it uses population information in addition to meteorological measurements. Thus NESIS gives an indication of a storm's societal impacts.

NESIS scores are a function of the area affected by the snowstorm, the amount of snow, and the number of people living in the path of the storm. The aerial distribution of snowfall and population information are combined in an equation that calculates a NESIS score which varies from around one for smaller storms to over ten for extreme storms. The raw score is then converted into one of the five NESIS categories. The largest NESIS values result from storms producing heavy snowfall over large areas that include major metropolitan centers.

Northeast Snowfall Impact Scale Categories		
Category	**NESIS Value**	**Description**
1	1—2.499	Notable
2	2.5—3.99	Significant
3	4—5.99	Major
4	6—9.99	Crippling
5	10.0+	Extreme

Source: http://www.ncdc.noaa.gov/snow-and-ice/rsi/nesis

The Sperry-Piltz Ice Accumulation (SPIA) Index (below) is a prediction tool (algorithm) that can be used in conjunction with National Weather Service data to predict the

impact of winter weather in terms of ice damage. It is currently being tested by the National Weather Service and FEMA in several regions with potential implementation in the future. In the meantime, the index provides an outline of the potential damage impacts of ice storms based on accumulation and wind.

The Sperry-Piltz Ice Accumulation (SPIA) Index	
Ice Damage Index	**Damage and Impact Descriptions**
0	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
2	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
3	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1-5 days.
4	Prolonged and widespread utility interruptions with extensive damage to main distribution feeder lines and come high voltage transmission lines/structures/ Outages lasting 5-10 days.
5	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.

Source: http://www.spia-index.com/images/SPIAIndexDescription.png

The extent of a severe winter storm event would be "Critical," with 25 percent or more of property in the affected area damaged, multiple injuries possible, and a complete shutdown of facilities for more than one week.

Previous Occurrences

New England generally experiences at least one or two severe winter storms each year with varying degrees of severity. Severe winter storms typically occur during January and February; however, they can occur from late September through late April.

There is significant overlap between winter weather disasters and other types of disaster, such as flooding. Based on data available from the National Oceanic and Atmospheric Administration, there were 27 winter storms in the Northeast Urban Corridor since 2010 that have registered on the NESIS scale. Of these, approximately 13 storms resulted in snow falls of at least 10 inches in the Pioneer Valley. These storms are listed in Table 18, in order of their NESIS severity.

DRAFT

Table 18. Winter Storms Producing Over 10 inches of Snow in the Pioneer Valley, 2010-2018			
Date	**NESIS Value**	**NASIS Category**	**NESIS Classification**
2/23/2010	5.46	3	Major
1/29/2015	5.42	3	Major
1/9/2011	5.31	3	Major
2/11/2014	5.28	3	Major
3/12/2017	5.03	3	Major
2/7/2013	4.35	3	Major
3/5/2018	3.45	2	Significant
3/4/2013	3.05	2	Significant
1/25/2015	2.62	2	Significant
3/11/2018	3.16	2	Significant
10/29/2011	1.75	1	Notable
1/3/2018	1.65	1	Notable
2/8/2015	1.32	1	Notable

Source: http://www.ncdc.noaa.gov/snow-and-ice/rsi/nesis

Between 2010 and 2019, Hampden County was included in 3 FEMA declared severe winter storm-related disasters (DR) or emergencies (EM) classified as one or a combination of the following hazards: blizzard, severe winter storm, snowstorm, record snowfall, and snow (See Table 1). West Springfield may not have been impacted by all of these events. It should be noted that because population is used as a criteria for FEMA declarations, the storms that rank higher will be those that impact densely populated areas and regions such as Boston and other large cities and, as such, might not necessarily reflect the storms that impact lightly populated areas. For example, one of the most famous storms in the Commonwealth in modern history was the Blizzard of '78, which dropped over two feet of snow in the Boston area during 65 mph winds that created enormous drifts and stranded hundreds of people on local highways. The storm hit the snow-weary city that was still digging out of a similar two-foot snowstorm 17 days earlier. Although Hampden received snow from this storm, it was not listed in the declaration.

The October Snow Storm in 2011, which caused major damages and disruptions across New England, also impacted West Springfield. Most residents of the town were without electricity for over a week. While this was a severe storm paired with trees sill in full foliage, most winter storms that hit West Springfield are manageable and simply more of a nuisance.

In recent history, there has been no loss of life from snow or ice storms, but each year there are incidences of property damage and personal injuries. There currently isn't good local data on ice storms in West Springfield. According to the 2013 state hazard mitigation plan, there were 19 ice storms in Hampden County between 1971 and 2012. This equates to a major ice storms every two years. The 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan indicates that ice storms of lesser magnitudes occur on at least an annual basis. Areas located in higher elevations are more likely to experience ice storms. Well-known as the most serious storm to impact

Pioneer Valley communities in recent history was the Ice Storm of December 11, 2008. The storm created widespread downed trees and power outages all across New York State, Massachusetts and New Hampshire. Over one million customers were without electricity, with 800,000 without power three days later and some without power weeks later. Challenging living conditions were acerbated by extremely cold temperatures in the days following the event.

Known severe snowstorm and ice storm events, including FEMA disaster declarations, that have impacted West Springfield after 2010, are identified in Table 19. Detailed information on damages and impacts are included when available. Please note that not all events that have occurred in the town are included due to the extent of documentation and the fact that not all sources may have been identified or researched.

Table 19. Severe snowstorm and ice storm events in West Springfield, 2010-2019

Dates of Event	Event Type	FEMA Declaration Number (if applicable)	Losses/Impacts
February 23, 2010	Heavy Snow	N/A	About nineteen inches of snow fell across western Hampden County. The weight of the snow resulted in downed branches and wires, leading to power outages in a few towns.
January 11-12, 2011	Severe winter storm and snowstorm, DR-1959	Yes	A developing nor'easter coastal storm brought up to two feet of snow across Massachusetts in a 24-hour period. Strong winds, combined with heavy snow, produced numerous downed trees and wires and resulted in power outages to 100,000 homes statewide. This event resulted in a federal disaster declaration (FEMA DR-1959) for the following counties: Berkshire, Essex, Hampden, Hampshire, Middlesex, Norfolk, and Suffolk. Those counties received over $25 million in public assistance grants.
February 1, 2011	Winter Storm	N/A	A series of low pressure centers impacted the Southern New England Region with a combination of heavy snows and ice. A total of 10-13 inches of snow fell across Western Hampden County over the two day period. A series of significant heavy snow events occurred between December 26, 2010 and February 2, 2011. Snow for the winter season totaled 86.4 inches, most of which fell during this period. Across Massachusetts, numerous roof collapses due to heavy snow load occurred following the February 2nd storm.

DRAFT

Dates of Event	Event Type	FEMA Declaration Number (if applicable)	Losses/Impacts
October 29-30, 2011	Severe storm and snowstorm, DR-4051	Yes	A rare October nor'easter brought heavy snow to portions of southern New England on October 29. The accumulation of the heavy, wet snow on foliated trees and power lines resulted in widespread tree damage and power outages across central and western Massachusetts. At the peak, approximately 665,000 customers in Massachusetts were without power. Seventy-seven shelters were opened and housed over 2,000 residents. Six fatalities occurred during and in the aftermath of the storm. This event resulted in a federal emergency declaration (FEMA EM-3343) for the following counties: Berkshire, Essex, Franklin, Hampden, Hampshire, Middlesex, Norfolk, and Worcester. $50,000 in damages was reported in Hampshire County.
November 1, 2011	Severe storm, EM-3343	Yes	See DR-4051 above
February 8-9, 2013	Severe Winter Storm, Snowstorm, and Flooding, DR-4110	Yes	An historic winter storm deposited tremendous amounts of snow over all of southern New England, mainly from the mid-afternoon on Friday, February 8 and lasting into the daylight hours of Saturday, February 9. What made this an amazing storm was the widespread coverage of heavy snowfall. Most locations received 2 to 2.5 feet of snow. Isolated thunderstorms were common across the entire region during the height of the snow.
February 5, 2014	Heavy Snow	N/A	This storm spread heavy snow across all of southern New England. Ten to eleven inches of snow fell across western Hampden County.
February 13, 2014	Heavy Snow	N/A	A significant winter storm brought six to twelve inches of snow across much of southern New England. Eight to ten inches of snow fell across western Hampden County.
January 18, 2015	Winter Weather	N/A	Freezing rain occurring across much of western Massachusetts and northern Connecticut. Numerous accidents occurred throughout Hampden County. About a tenth of an inch of ice accreted on roads and other surfaces.

DRAFT

Dates of Event	Event Type	FEMA Declaration Number (if applicable)	Losses/Impacts
March 14, 2017	Heavy Snow	N/A	This storm dropped 12 to nearly 20 inches of snow across much of western, Massachusetts. Snowfall rates of 3 inches per hour were observed in western MA. Gusty winds to 30-50 mph were common in the interior.
January 4, 2018	Winter Storm	N/A	This storm brought heavy snow and damaging winds to Massachusetts with twelve to thirteen inches of snow fell across Western Hampden County.
March 7, 2018	Winter Storm	N/A	From ten to thirteen inches of snow fell on Western Hampden County.
March 13, 2018	Winter Storm	N/A	From nine to fourteen inches of snow fell on Western Hampden County.

Source: NOAA Storm Events Database, 2019

Probability of Future Events

Based on the NESIS scale, West Springfield's risk of a major to extreme winter storm in any given year is slightly less than 50 percent.

Extreme weather events—including extreme precipitation and snowfall levels—are anticipated to occur more frequently as climate change occurs. However, as temperatures throughout the year increase, it is possible that nor'easter events may become more concentrated in the coldest winter months when atmospheric temperatures are still low enough to result in snowfall rather than rain. Therefore, this hazard has a High probability of occurrence (40-70% probability in the next year) in West Springfield.

Vulnerability

Populations

Winter storms are considered deceptive killers because most deaths and other impacts or losses are indirectly related to the storm. They generally bring strong winds which create blizzard conditions with blinding wind-driven snow, drifting snow, and extreme cold temperatures with dangerous wind chill. Injuries and deaths may occur due to traffic accidents on icy roads, heart attacks while shoveling snow, or hypothermia from prolonged exposure to cold. Heavy snow can paralyze a region or town, shutting down transportation, stopping the flow of supplies, and disrupting medical and emergency services. Accumulations of snow can cause buildings to collapse and knock down trees and power lines. Rural populations especially may become isolated by downed trees, blocked roadways, and power outages. Residents may be displaced or require temporary to long-term sheltering.

Elderly populations are particularly susceptible to risks of extreme winter weather such as injury from falls, hypothermia, and overexertion. Low income residents are also susceptible if they are not able to secure housing with adequate insulation and heating.

Built Environment and Economy

The Town of West Springfield's power and communication infrastructure are vulnerable to the impacts of a severe winter storm. This could cause residents and businesses to lose power and could impact the Town's ability to operate normally, impacting the Town's economy. Additionally, buildings with flat roofs are especially vulnerable to damage, especially when the snow is wet and heavy. Lastly, because parts of West Springfield are well forested, a severe snow or ice storm could also cause damage and power outages from downed trees.

To approximate the potential impact to property that could be affected by this hazard, the total value of all property in town, $2,681,497,810, is used.

An estimated 20 percent of damage would occur to 25 percent of structures, resulting in a total of $134,074,890 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Natural Resources

Severe winter weather is common in Massachusetts and native species and habitats are well adapted to withstand most winter weather.

Hurricanes/Tropical Storm/Severe Wind: Medium Risk

Hurricanes and tropical storms are classified as cyclones and defined as any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise in the Northern Hemisphere (or clockwise in the Southern Hemisphere). The primary damaging forces associated with these storms are high-level sustained winds and heavy precipitation. Tropical cyclones (tropical depressions, tropical storms, and hurricanes) form over the warm, moist waters of the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico, and are classified into one of three categories:

- A tropical depression is declared when there is a low-pressure center in the tropics with sustained winds of 25 to 33 mph.
- A tropical storm is a named event defined as having sustained winds from 34 to 73 mph.
- If sustained winds reach 74 mph or greater, the storm becomes a hurricane. The Saffir-Simpson scale ranks hurricanes based on sustained wind speeds—from Category 1 (74 to 95 mph) to Category 5 (156 mph or more). Category 3, 4, and 5 hurricanes are considered "major" hurricanes. Hurricanes are categorized based on sustained winds; wind gusts associated with hurricanes may exceed the sustained winds and cause more severe localized damage (NOAA, n.d.[b]).

DRAFT

Hurricanes are violent rainstorms with strong winds that can reach speeds of up to 200 miles per hour and which generate large amounts of precipitation. Hurricanes generally occur between June and November and can result in flooding and wind damage to structures and above-ground utilities.

Climate change increases the threat of hurricanes and severe wind as oceans and the atmosphere warms. Warmer water fuels more intense and longer-lasting storms and expands the area in which hurricanes can form. Warmer air can hold more moisture than cool air, increasing potential rainfall rates.

Wind is air in motion relative to surface of the earth. For non-tropical events over land, the NWS issues a Wind Advisory (sustained winds of 31 to 39 mph for at least 1 hour or any gusts 46 to 57 mph) or a High Wind Warning (sustained winds 40+ mph or any gusts 58+ mph). For non-tropical events over water, the NWS issues a small craft advisory (sustained winds 25-33 knots), a gale warning (sustained winds 34-47 knots), a storm warning (sustained winds 48 to 63 knots), or a hurricane force wind warning (sustained winds 64+ knots). For tropical systems, the NWS issues a tropical storm warning for any areas (inland or coastal) that are expecting sustained winds from 39 to 73 mph. A hurricane warning is issued for any areas (inland or coastal) that are expecting sustained winds of 74 mph. Effects from high winds can include downed trees and/or power lines and damage to roofs, windows, etc. High winds can cause scattered power outages. High winds are also a hazard for the boating, shipping, and aviation industry sectors.

Location

Because of the hazard's regional nature, all of West Springfield is at risk from hurricanes and tropical storms. However, some locations in town are more susceptible to damage from a hurricane or tropical storm than others, so the location of occurrence in West Springfield is "medium," with between 10 and 50 percent of land area affected by the event in some way. Ridgetops are more susceptible to wind damage and flood-prone areas are susceptible to flooding from heavy rains that usually accompany hurricane.

NOAA's Historical Hurricane Tracks tool is a public interactive mapping application that displays Atlantic Basin and East-Central Pacific Basin tropical cyclone data. This interactive tool catalogs tropical cyclones that have occurred from 1859 and 2017 (earliest and latest dates available from data source). Between 1859 and 2017, 18 tropical cyclones of a tropical storm strength or higher tracked within 50 nautical miles of West Springfield. Figure 7 displays the tropical storm and hurricane tracks that occurred with 50 nautical miles of West Springfield between 1859 and 2017. For reference, labels are provided for those storms that occurred within the last 50 years.

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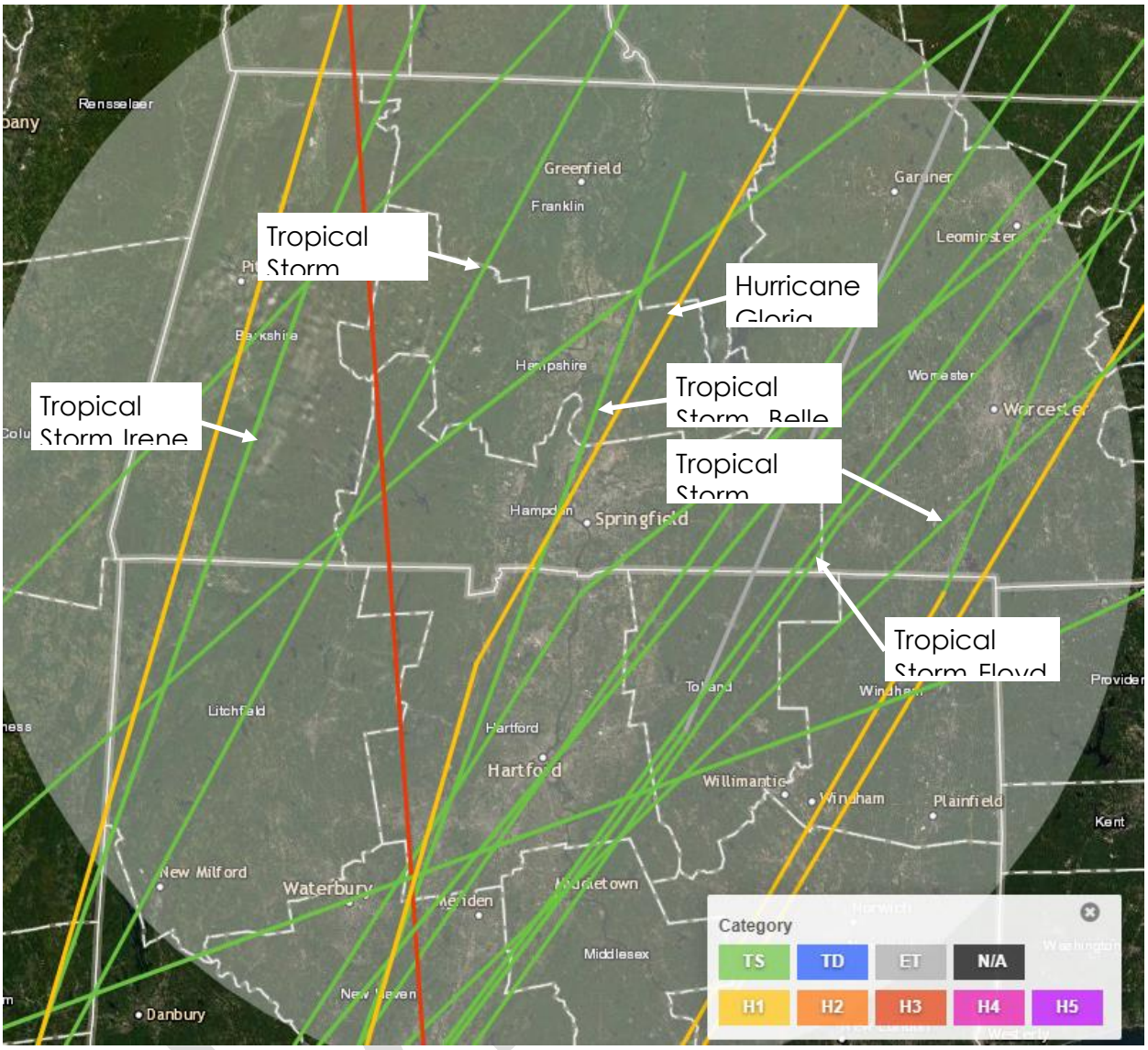
Figure 7. NOAA Hurricane Tracker



Source: NOAA National Hurricane Center, 2019

Extent

As a hurricane develops, barometric pressure (measured in millibars or inches) at its center falls and winds increase. If the atmospheric and oceanic conditions are favorable, it can intensify into a tropical depression. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and is closely monitored by the National Hurricane Center in Miami, Florida. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane. Hurricane intensity is further classified by the Saffir-Simpson Hurricane Wind Scale, which rates hurricane wind intensity on a scale of 1 to 5, with 5 being the most intense.

A description of the damages that could occur due to a hurricane is described by the Saffir-Simpson scale, as shown below.

Hurricane Damage Classifications			
Storm Category	**Damage Level**	**Description of Damages**	**Wind Speed (MPH)**
1	MINIMAL Very dangerous winds will produce some damage	No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Also, some coastal flooding and minor pier damage. An example of a Category 1 hurricane is Hurricane Dolly (2008).	74-95
2	MODERATE Extremely dangerous winds will cause extensive damage	Some roofing material, door, and window damage. Considerable damage to vegetation, mobile homes, etc. Flooding damages piers and small craft in unprotected moorings may break their moorings. An example of a Category 2 hurricane is Hurricane Francis in 2004.	96-110
3	EXTENSIVE Devastating damage will occur	Some structural damage to small residences and utility buildings, with a minor amount of curtain wall failures. Mobile homes are destroyed. Flooding near the coast destroys smaller structures, with larger structures damaged by floating debris. Terrain may be flooded well inland. An example of a Category 3 hurricane is Hurricane Ivan (2004).	111-129
4	EXTREME Catastrophic damage will occur	More extensive curtain wall failures with some complete roof structure failure on small residences. Major erosion of beach areas. Terrain may be flooded well inland. An example of a Category 4 hurricane is Hurricane Charley (2004).	130-156
5	CATASTROPHIC Catastrophic damage will occur	Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Flooding causes major damage to lower floors of all structures near the shoreline. Massive evacuation of residential areas may be required. An example of a Category 5 hurricane is Hurricane Andrew (1992).	157+

Source: National Hurricane Center, 2012

West Springfield's location in Western Massachusetts reduces the risk of extremely high winds that are associated with hurricanes, although it can experience some high wind events. During hurricanes or severe wind events, the Town has experienced small blocks

DRAFT

of downed timber and uprooting of trees onto structures and parked vehicles. Overall, the extent of the impacts of a Hurricane making a direct hit to West Springfield would be "Critical," with multiple injuries possible, more than 25% of property in affected area damaged or destroyed, and a complete shutdown of facilities for more than 1 week.

Previous Occurrences

Between 2010 and 2019, Hampden County was included in 2 FEMA declared severe Hurricane/Tropical Storm-related disasters (DR) or emergencies (EM) classified as one or a combination of the following hazards: hurricane and tropical storm (See Table 1). West Springfield may not have been impacted by all of these events.

According to NOAA's Historical Hurricane Tracks tool, Hurricane Irene is the only hurricane or tropical storm that tracked within 50 nautical miles of West Springfield since 2010. While Hurricane Irene did not track directly through West Springfield, it dropped a significant amount of rain in West Springfield and caused flooding and road closures.

Known hurricane and tropical storm events, including FEMA disaster declarations, which have impacted West Springfield after 2010 are identified in Table 20. Detailed information on damages and impacts are included when available. Please note that not all events that have occurred in the town are included due to the extent of documentation and the fact that not all sources may have been identified or researched. Loss and impact information could vary depending on the source. Therefore, the accuracy of monetary figures discussed is based only on the available information identified during research for this plan.

Table 20. Hurricane/ Tropical Storm Events in West Springfield, 2010-2019

Dates of Event	Event Type	FEMA Declaration Number (if applicable)	Losses/Impacts
August 27-29, 2011	Tropical Storm / Hurricane Irene EM-3330 DR-4028	Yes	Tropical Storm Irene (August 27-29, 2011) produced significant amounts of rain, storm surge, inland and coastal flooding, and wind damage across southern New England and much of the east coast of the U.S. In Massachusetts, rainfall totals ranged between 0.03 inches (Nantucket Memorial Airport) to 9.92 inches (Conway, MA). These heavy rains caused flooding throughout the Commonwealth and a presidential disaster was declared (DR-4028). In Southern New England, the minimum surface pressure recorded was 976.9mb taken at Barnes Municipal Airport in Westfield, Massachusetts. The highest sustained wind speed on land was 38 knots (44 mph) recorded on the Automated Surface Observing Systems at both Barnstable Municipal

Dates of Event	Event Type	FEMA Declaration Number (if applicable)	Losses/Impacts
			Airport in Hyannis, MA (KHYA) and Logan International Airport in Boston, MA (KBOS). Rainfall amounts ranged from nearly zero (0.03 at Nantucket Memorial Airport - ACK) to nearly 10 inches (9.92 in Conway, MA). This rainfall contributed to significant flooding in northwestern Massachusetts where mainstem rivers and their tributaries reached levels not seen since 1987, and in some cases (The Connecticut River at Montague) since 1938. The Deerfield River at West Deerfield set a new flood of record at 23.8 feet, the previous record was 17.71 feet set in April of 1987. The Westfield River reached its highest level since 1980. Tropical Storm Irene was closely followed by the remnants of Tropical Storm Lee, which brought additional heavy rain to Massachusetts and extended flooding. Severe river erosion occurred in northwestern Massachusetts, closing State Route 2. Landslides were also triggered by the heavy rain and wet soil in this area of steep slopes containing layers of glacial lake clay. The Commonwealth received over $31 million in individual and public assistance from FEMA.
Oct 27-Nov 8, 2012	Hurricane Sandy EM-3350	Yes	No damages reported.

Sources: NOAA Storm Events Database, 2019, FEMA 2019

Probability of Future Events

West Springfield's location in western Massachusetts reduces the risk of extremely high winds that are associated with hurricanes, although it can experience some high wind events. Furthermore, the intensity of tropical storms and hurricanes is likely to increase as a result of climate change. Based upon past occurrences, it is reasonable to say that there is a "moderate" probability of hurricanes or tropical storms, or a 10 to 40 percent probability in any given year.

Impact

The location and path of a system can also be a major factor in the severity of storm impact. The Town of West Springfield faces a "limited" impact from hurricanes, with 10

DRAFT

percent or more of property in the affected area damaged, but may face more of a critical impact from other severe wind events.

To approximate the potential impact to property and people that could be affected by this hazard, the total value of all property in town, $2,681,497,810 is used. Wind damage of 5 percent with 10 percent of structures damaged would result in estimated $13,407,489 of damage. Estimated flood damage to 10 percent of the structures with 20 percent damage to each structure would result in $53,629,956 of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Vulnerability

Populations

Populations unable to safely evacuate are most at risk during a Hurricane or Tropical Storm hazard. Low income populations may lack means to evacuate. The elderly often face physical challenges or require regular medical attention. Low-English speaking populations may face challenges receiving and understanding emergency directions.

Built Environment and Economy

The entire town would be vulnerable to the impact of a hurricane. Hurricanes and tropical storms can result in power outages and road closures that impact emergency response. Heavy rains can lead to contamination of well water, septic system failure, and overburdened stormwater systems. Areas prone to flooding are particularly vulnerable. Additionally, high winds could impact the town's communication and energy infrastructure, and damage older buildings.

- Estimated wind damage: 5% of the structures with 10% damage, $13,407,489;
- Estimated flood damage: 10% of the structures with 20% damage, $53,629,956;
- Vulnerability assessment for a hurricane event (both wind and flood damages): $67,037,445;
- Cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included.

Sometimes, wind gusts of only 40 to 45 mph can cause scattered power outages from downed trees and wires. This is especially true after periods of prolonged drought or excessive rainfall, since both are situations that can weaken the root systems and make them more susceptible to the winds' effects. Roads may become impassable due to downed trees or roadway flooding resulting from a severe wind or thunderstorm.

Natural Environment

High winds, flooding, and large quantities of debris can damage the natural environment through contamination of resources, felling trees, scouring riverbeds, and injury and mortality of animals.

DRAFT

Tornadoes/Microbursts: Medium-Low Risk

Tornadoes are swirling columns of air that typically form in the spring and summer during severe thunderstorm events. In a relatively short period of time and with little or no advance warning, a tornado can attain rotational wind speeds in excess of 250 miles per hour and can cause severe devastation along a path that ranges from a few dozen yards to over a mile in width. The path of a tornado may be hard to predict because they can stall or change direction abruptly. Within Massachusetts, tornadoes have occurred most frequently in Worcester County and in communities west of Worcester, including towns in eastern Hampden County. High wind speeds, hail, and debris generated by tornadoes can result in loss of life, downed trees and power lines, and damage to structures and other personal property.

Microbursts often cause tornado-like damage and can be mistaken for tornadoes. In contrast to the upward rush of air in a tornado, air blasts rapidly downward from thunderstorms to create microbursts. Microbursts and tornadoes are expected to become more frequent and more violent as the earth's atmosphere warms, due to predictions of climate change from global warming.

Location

As per the Massachusetts Hazard Mitigation Plan, the entire Town is at risk of tornadoes and microbursts. However, the actual area that would be affected by these hazards is "Medium," or between 10 and 50 percent of total land area.

Extent

The potential for locally catastrophic damage is a factor in any severe weather event. In West Springfield, a tornado that hit residential areas would leave much more damage than a tornado with a travel path that ran along the town's forested areas, where little settlement has occurred.

Microbursts are typically less than three miles across. They can last anywhere from a few seconds to several minutes. Microbursts bring damaging winds up to 170 miles per hour in strength and can be accompanied by precipitation.

Tornadoes are measured using the enhanced F-Scale, shown with the following categories and corresponding descriptions of damage:

Enhanced Fujita Scale Levels and Descriptions of Damage			
EF-Scale Number	**Intensity Phrase**	**3-Second Gust (MPH)**	**Type of Damage Done**
EF0	Gale	65–85	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.

DRAFT

Enhanced Fujita Scale Levels and Descriptions of Damage			
EF-Scale Number	**Intensity Phrase**	**3-Second Gust (MPH)**	**Type of Damage Done**
EF1	Moderate	86–110	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
EF2	Significant	111–135	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
EF3	Severe	136–165	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
EF4	Devastating	166–200	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.

Because tornadoes and microbursts occur irregularly in this part of the country, assessing damages is difficult. Furthermore, buildings have not been built to Zone 2, Design Wind Speed Codes. The entire Town of West Springfield is vulnerable.

- Tornadoes/microburst hazard estimates 20% damage to 10% of structures in Town;
- Vulnerability assessment estimates in damages; $53,629,956;
- Estimated cost does not include building contents, land values or damages to utilities.

Previous Occurrences

Within Massachusetts, tornadoes have occurred most frequently in Worcester County and in communities west of Worcester. The most common months are June, July, and August, but the Great Barrington, MA tornado (1995) occurred in May and the Windsor Locks, CT tornado (1979) occurred in October. Fourteen incidents of tornado activity (F3 or less) have occurred in Hampden County since 1956. In 2011, a tornado ranked F3 (Severe Damage) on the Fujita Scale of Tornado Intensity, blew through the region impacting the towns of Westfield, Springfield, Monson, Wilbraham, Brimfield, Sturbridge, Southbridge, and West Springfield. The tornado and related storm killed 3 people and resulted in hundreds of injuries across the state. The 2011 tornado is the only FEMA declared tornado-related disaster (DR) to have been recorded between 1954 and 2019.

DRAFT

On February 25, 2017, an EF1 tornado touched down in Conway and Goshen, Massachusetts. The tornado damaged dozens of homes, hundreds of trees and left 75% of the residents without power. This was the first tornado in Massachusetts to touch down in February since record keeping stated in the 1950s. Most recently, on July 23, 2019 two EF1 tornados touched down on Cape Cod, damaging tens of thousands of homes and leaving many without power.

No microbursts have ever been officially reported in West Springfield, although some residents recall incidents of large trees being blown down quickly in discreet areas.

Known tornado, and microburst events, including FEMA disaster declarations, which have impacted Hampden County between 1950 and 2019 are identified in Table 21. Detailed information on damages and impacts are included when available. Please note that not all events that have occurred in the town are included due to the extent of documentation and the fact that not all sources may have been identified or researched. Loss and impact information could vary depending on the source. Therefore, the accuracy of monetary figures discussed is based only on the available information identified during research for this plan.

Table 21. Tornado and Microburst Events in West Springfield, 1950-2019

Dates of Event	Event Type	FEMA Declaration Number (if applicable)	Losses/Impacts
6/1/2011	Severe storms & Tornadoes	DR-1994	A supercell thunderstorm developed over western Massachusetts. This storm strengthened and produced a long-lived, very significant tornado that did extensive damage across southwest and south central Massachusetts. This storm will be noted not only for its intensity, but also for the length of the continuous damage path, approximately 38 miles, 31 of which were in Hampden County. In West Springfield the tornado caused extensive damage to industrial buildings and homes. Several buildings had their roofs removed by the tornado, a few structures collapsed, and several multi-story buildings lost their upper stories. Three fatalities were directly attributable to the tornado, two in West Springfield. A thirty-nine year old woman in West Springfield was killed when her house collapsed on her while she sheltered her 15 year old daughter in the bathtub. Also in West Springfield, a twenty-three year old man was killed when his van was crushed by a falling tree. In addition, two hundred people were treated for injuries sustained in the tornado.

Dates of Event	Event Type	FEMA Declaration Number (if applicable)	Losses/Impacts
			It was estimated that 1400 houses and at least 78 businesses were either damaged or destroyed. Of these 1400 houses, roughly 300 of them had been completely destroyed. Two hundred residential buildings were condemned and more than 300 rental units were lost throughout western Massachusetts. Nearly 10,000 acres of woodlands were destroyed with the Massachusetts Forest Landowners Association estimating a clean-up cost of $3.6 million. President Obama issued a Major Disaster Declaration for Hampden County shortly after the tornado. The Massachusetts Division of Insurance reported that 9500 insurance claims were completed by residents as a result of the June 1 tornadoes, adding up to $175 million worth of damage.

Sources: NOAA Storm Events Database, 2019

In Western Massachusetts, the majority of sighted tornadoes have occurred in a swath directly over West Springfield, known as "tornado alley," as shown in the figure below.

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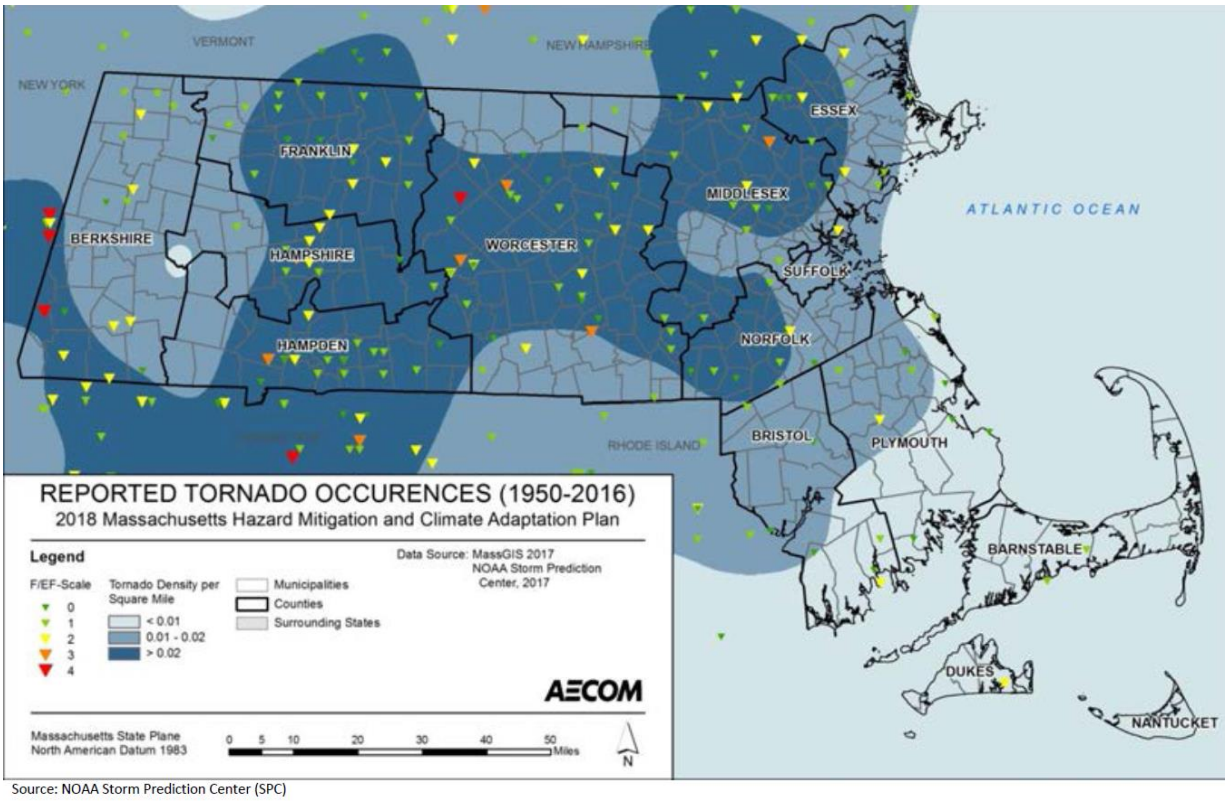
Table 22. Reported Tornado Occurrences in Massachusetts, 1950-20016



Source: NOAA Storm Prediction Center (SPC)

Source: Massachusetts State Hazard Mitigation and Climate Adaptation Plan, 2018

Probability of Future Events

According to the 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan, the area at greatest risk for a tornado touchdown runs from central to northeastern Massachusetts. One measure of tornado activity is the tornado index value. It is calculated based on historical tornado events data using USA.com algorithms. It is an indicator of the tornado level in a region. A higher tornado index value means a higher chance of tornado events. Data was used for Hampden County to determine the Tornado Index Value as shown in the table below. Counter to the statement in the SHMCAP, the Tornado Index suggests that Hampden County has the highest Tornado Index Value in the State of Massachusetts.

Table 23. Tornado Index for Hampden County	
Hampden County	138.23
Massachusetts	87.60
United States	136.45

Source: USA.com, http://www.usa.com/hampden-county-ma-natural-disasters-extremes.htm

Based upon the available historical record, the estimated probability of a tornado in West Springfield is "low," or between 1 and 10 percent in any given year. Based upon local knowledge and the increased prevalence of microburst in surrounding

communities, the estimated probability of a microburst in West Springfield is "moderate,' or between 10 and 40 percent in any given year.

Overall, there is a "Moderate," or 10 to 40 percent, probability that West Springfield will be impact by tornadoes and/or microbursts in a given year.

Vulnerability

The entire town would be vulnerable to the destruction caused by microbursts or tornadoes. Most buildings in town have not been built to Zone 1, Design Wind Speed Codes. The first edition of the Massachusetts State Building Code went into effect on January 1, 1975, with most of the town's housing built before this date. Large hail commonly accompanies a tornado, and can damage cars and buildings as well as cause serious injuries for individuals without shelter.

Populations

Populations unable to safely evacuate are most at risk from tornados. Low income populations may lack means to evacuate. The elderly often face physical challenges or require regular medical attention. Low-English speaking populations may face challenges receiving and understanding emergency directions.

Built Environment and Economy

To approximate the potential impact to property that could be affected by a tornado or microburst, the total value of all property in town, $2,681,497,810 is used. An estimated 100 percent of damage would occur to 1 percent of structures, resulting in a total of $26,814,978 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

- Tornadoes/microburst hazard estimates 20% damage to 10% of structures in Town;
- Vulnerability assessment estimates in damages; $53,629,956;
- Estimated cost does not include building contents, land values or damages to utilities.

The most common problem associated with severe weather is loss of utilities. Downed trees from severe wind storms can create serious impacts on power and aboveground communication lines. Water and sewer systems may not function if power is lost. The vulnerabilities associated with flooding could be present if substantial rain accompanies severe thunderstorms. Additionally, severe wind may damage older buildings. With the notable exception of the Public Safety Complex, many of the town's critical facilities are older and designed to withstand lower wind speeds, meaning they are more vulnerable to damage from high wind events, microbursts of tornadoes.

Sometimes, wind gusts of only 40 to 45 mph can cause scattered power outages from downed trees and wires. This is especially true after periods of prolonged drought or excessive rainfall, since both are situations that can weaken the root systems and make them more susceptible to the winds' effects. Roads may become impassable due to downed trees or roadway flooding resulting from a severe wind or thunderstorm.

Natural Resources

Downed trees and the transportation of small flora and fauna by high winds can cause damage to the natural environment.

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Non-Climate Influenced Hazards

Earthquakes: Low Risk

An earthquake is a sudden, rapid shaking of the ground that is caused by the breaking and shifting of rock beneath the Earth's surface. Ground shaking from earthquakes can rupture gas mains and disrupt other utility service, damage buildings, bridges and roads, and trigger other hazardous events such as avalanches, flash floods (dam failure) and fires. Un-reinforced masonry buildings, buildings with foundations that rest on filled land or unconsolidated, unstable soil, and mobile homes not tied to their foundations are at risk during an earthquake. Earthquakes can occur suddenly, without warning, at any time of the year. New England experiences an average of 30 to 40 earthquakes each year although most are not noticed by people.[5]

Location

In the event of an earthquake, all of West Springfield would be affected with some portions more impacted than others, depending on the magnitude of the earthquake, population density, predominant building type, and underlying soil types.

Although the zone of greatest seismic activity in the United States is along the Pacific Coast in Alaska and California, a number of damaging earthquakes have occurred in New England. In fact, New Englanders feel an average of six earthquakes each year. Due to differing geology, earthquakes in New England have different characteristics than those on the West Coast. New England is situated in the middle of the North American Plate and earthquakes in the region are the result of the compression of this plate as it is slowly squeezed by its neighboring plates. Because of this, earthquakes can occur throughout New England independent of fault lines and particular geology. Additionally, due to geological differences, earthquakes in New England tend to have a significantly wider impact area than those on the West Coast.

Extent

The magnitude of an earthquake is measured using the Richter Scale, which measures the energy of an earthquake by determining the size of the greatest vibrations recorded on the seismogram. On this scale, one step up in magnitude (from 5.0 to 6.0, for example) increases the energy more than 30 times.

[5] Northeast States Emergency Consortium Web site: *http://nesec.org/earthquakes-hazards/*.

Richter Scale Magnitudes and Effects	
Magnitude	**Effects**
< 3.5	Generally not felt, but recorded.
3.5 - 5.4	Often felt, but rarely causes damage.
5.4 - 6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1 - 6.9	Can be destructive in areas up to about 100 kilometers across where people live.
7.0 - 7.9	Major earthquake. Can cause serious damage over larger areas.
8 or >	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

The intensity of an earthquake is measured using the Modified Mercalli Scale. This scale quantifies the effects of an earthquake on the Earth's surface, humans, objects of nature, and man-made structures on a scale of I through XII, with I denoting a weak earthquake and XII denoting an earthquake that causes almost complete destruction.

Modified Mercalli Intensity Scale for and Effects			
Scale	**Intensity**	**Description Of Effects**	**Corresponding Richter Scale Magnitude**
I	Instrumental	Detected only on seismographs.	
II	Feeble	Some people feel it.	< 4.2
III	Slight	Felt by people resting; like a truck rumbling by.	
IV	Moderate	Felt by people walking.	
V	Slightly Strong	Sleepers awake; church bells ring.	< 4.8
VI	Strong	Trees sway; suspended objects swing, objects fall off shelves.	< 5.4
VII	Very Strong	Mild alarm; walls crack; plaster falls.	< 6.1
VIII	Destructive	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged.	
IX	Ruinous	Some houses collapse; ground cracks; pipes break open.	< 6.9

DRAFT

Modified Mercalli Intensity Scale for and Effects			
Scale	**Intensity**	**Description Of Effects**	**Corresponding Richter Scale Magnitude**
X	Disastrous	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread.	< 7.3
XI	Very Disastrous	Most buildings and bridges collapse; roads, railways, pipes and cables destroyed; general triggering of other hazards.	< 8.1
XII	Catastrophic	Total destruction; trees fall; ground rises and falls in waves.	> 8.1

Source: Federal Emergency Management Agency

The extent of earthquakes likely to impact West Springfield would be "Minor."

Previous Occurrences

Nineteen earthquakes, intensity V (Modified Mercalli scale) or greater, have centered in Massachusetts since it was colonized by Europeans. A shock in 1755 reached intensity VIII at Boston and was felt across the State. In addition, Massachusetts was affected by some of the more severe Canadian shocks plus the earthquake of 1929 that centered on Grand Banks of Newfoundland.

In addition to the earthquakes from within the region, Massachusetts also has been strongly affected by a number of earthquakes that were centered outside of New England. Most recently, the magnitude 5.8 earthquake on August 23, 2011 centered at Mineral, VA was felt throughout Massachusetts, but no damage was reported.

Between 1954 and 2019, Hampden County was not included in any FEMA earthquake - related disasters (DR) or emergencies (EM). No known seismic events have impacted West Springfield between 1950 and 2019. Please note that not all events that have occurred in the town are included due to the extent of documentation and the fact that not all sources may have been identified or researched.

According to the Northeast States Emergency Consortium, only one magnitude 4 or higher earthquake has occurred in New England since 2010. This was a 4.6 magnitude earthquake centered at Hollis Center Maine, on October 16, 2012. This earthquake was not noted to cause any damage in West Springfield or the surrounding area.

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Table 24. Number of Felt Earthquakes in New England States

State	Years of Record	Number Of Earthquakes
Connecticut	1678 - 2016	115
Maine	1766 - 2016	454
Massachusetts	1668 - 2016	408
New Hampshire	1638 - 2016	320
Rhode Island	1766 - 2016	34
Vermont	1843 - 2016	50
New York	1737-2016	551
Total Earthquakes in New England (1568-2007)		1,932

Source: Northeast States Emergency Consortium, 2019 website: www.nesec.org/hazards/earthquakes.cfm

Probability of Future Events

One measure of earthquake activity is the Earthquake Index Value. It is calculated based on historical earthquake events data using USA.com algorithms. It is an indicator of the earthquake activity level in a region. A higher earthquake index value means a higher chance of earthquake events. Data was used for Hampden County to determine the Earthquake Index Value as shown in the table below.

Table 25. Earthquake Index for Hampden County

Hampden County	0.24
Massachusetts	0.70
United States	1.81

Based upon existing records, there is a "very low" frequency of earthquakes in Plainfield, with less than a 1 percent chance of an earthquake in any given year.

Vulnerability

Massachusetts introduced earthquake design requirements into their building code in 1975 and improved building code for seismic reasons in the 1980s. However, these specifications apply only to new buildings or to extensively-modified existing buildings. Buildings, bridges, water supply lines, electrical power lines and facilities built before the 1980s may not have been designed to withstand the forces of an earthquake. The seismic standards have also been upgraded with the 1997 revision of the State Building Code. Liquefaction of the land near water could also lead to extensive destruction.

Populations

Socially vulnerable populations are at the highest risk from earthquakes. These populations may lack the means physically or financially to respond to an earthquake. They may not be able to prepare and live self-sufficiently in the aftermath of an earthquake. Low-income populations are more likely to live in structurally compromised buildings.

Built Environment and Economy

Older buildings are particularly vulnerable to earthquakes because their construction pre-dates building codes that included strong seismic consideration. The town has a number of historical buildings that could be damaged or destroyed if a large enough earthquake were to happen. A loss of these historic buildings could represent a loss of West Springfield's history and culture. There have been no studies done to determine how West Springfield's critical infrastructure, such as the Town Hall, would fair in an earthquake. The town's Public Safety Complex was built recently and would likely withstand an earthquake with little or no damage.

To approximate the potential impact to property and people that could be affected by this hazard, the total value of all property in town, $2,681,497,810 is used. An estimated 25 percent of damage would occur to 25 percent of structures, resulting in a total of $16,759,361 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

- Moderate potential for serious damage in downtown West Springfield;
- Structures are mostly wood frame construction, so loss estimates predict 25%damage to 25% of town assessed value, not including Costs of repairing or replacing roads, bridges, power lines, telephone lines, or the contents of the structures;

There are many ways in which West Springfield's structures, infrastructure, and individuals would be vulnerable to earthquakes. Road closures could isolate populations and keep people from getting to work, and loss of utilities could impact populations that suffered no direct damage from the earthquake itself. Following a severe earthquake, damage to roadways, bridges or underpasses that serve as evacuation routes would limit access to emergency services and hospitals.

Natural Resources

A strong earthquake can cause trees to fall and cliffs to collapse. Such environmental damage can impact the balance within a habitat or ecosystem leading to increased vulnerability to invasive species.

DRAFT

Man-Made Hazards – Hazardous Materials: Medium-Low Risk

Hazardous materials are chemical substances, which if released or misused can pose a threat to the environment or health. These chemicals come in the form of explosives, flammable and combustible substances, poisons, and radioactive materials. Hazardous materials in various forms can cause death, serious injury, long-lasting health effects, and damage to buildings, homes, and other property. Many products containing hazardous chemicals are used and stored in homes and businesses routinely. These products are also shipped daily on the nation's highways, railroads, waterways, and pipelines.

The Toxics Release Inventory (TRI), a publicly available EPA database that contains information on specific toxic chemical releases and other waste management activities reported annually by certain covered industry groups as well as federal facilities. Additional information on toxic users is available for Massachusetts on the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA) website.

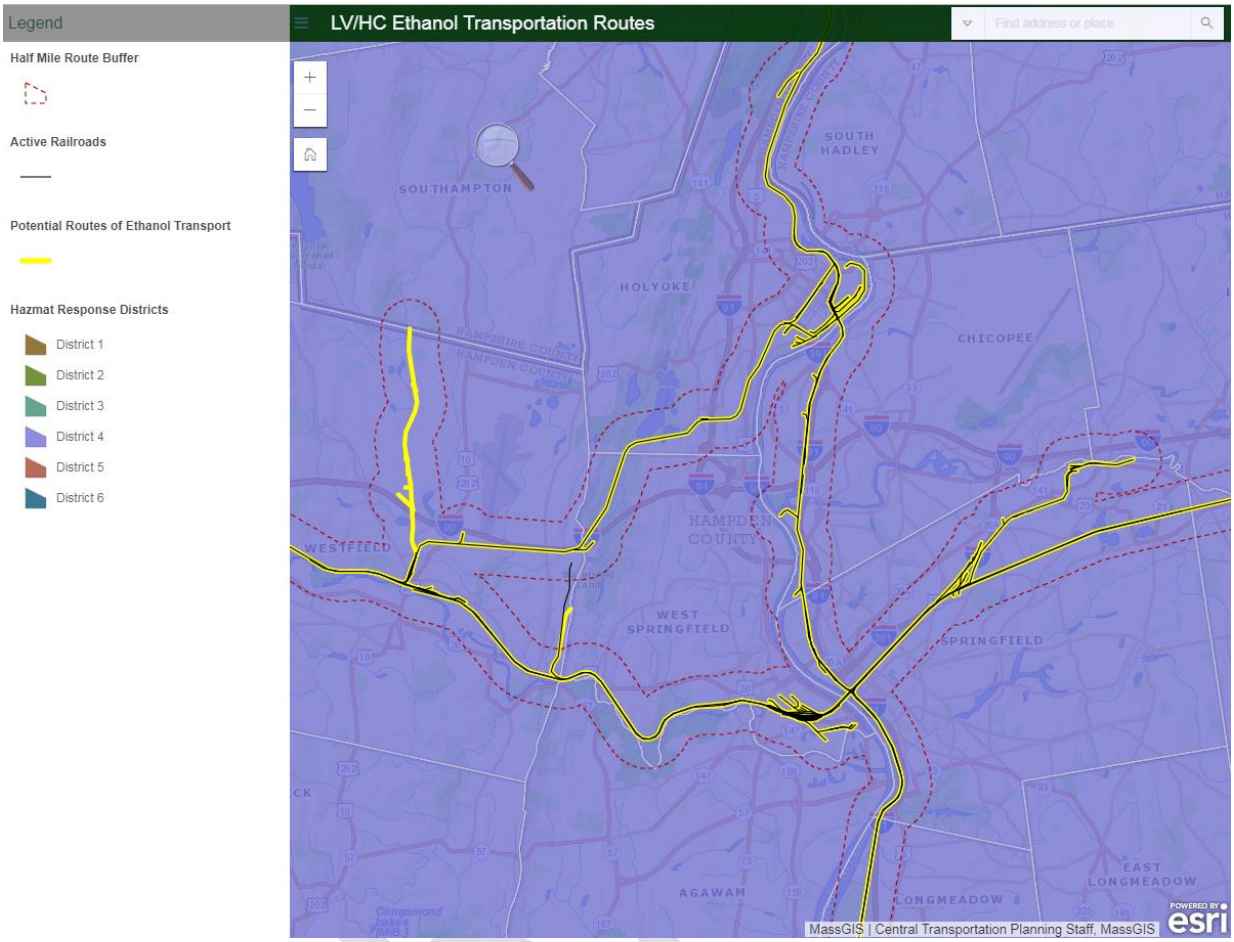
Location

According to EOEEA, there were 32 Tier II facilities located in West Springfield in 2016. There were also 16 sites with Massachusetts or EPA regulated hazardous waste and 6 sites with a large quantity toxic user. A Tier II facility is a site where hazardous substances are present in quantities over the thresholds established by the EPA. These facilities are required to report on a variety of factors including the types and quantities of hazardous materials on site.

In addition, varying quantities of hazardous materials are manufactured, used, or stored at an estimated 4.5 million facilities in the United States--from major industrial plants to local dry cleaning establishments or gardening supply stores (http://nesec.org/haz-mat/). These hazardous materials are transported regularly over our highways and by rail and if released can spread quickly to any community. Incidents can occur at any time without warning. Human error is the probable cause of most transportation incidents and associated consequences involving the release of hazardous materials. The image below shows potential routes of ethanol transport via railways in West Springfield.

DRAFT

Figure 8. Ethanol Transport Routes



Source: MEMA, 2019, page updated May 7, 2018

The Commonwealth is divided into six hazardous materials emergency response regions by fire district, and West Springfield relies on District #4's HazMat team based in Chicopee for responding to incidents involving hazardous materials through a mutual aid agreement. There is a history of accidents involving some sort of oil or chemical spill. Transportation of chemicals and bio-hazardous materials by vehicle transport on I-90, I-91, Route 5, Route 20, Route 147, side streets and the CSX Rail Road is a concern. Small areas of hazardous materials storage increase the potential for future incidents. Areas of concern include I-90, Route 91, Route 5, Route 20, routes 147, and the railroad planned intermodal center and surrounding side streets.

Extent

The extent of hazardous chemical release is not predictable as it is dependent on the location including whether it is from a stationary or moving source, amount and type of chemical released, and weather conditions at the time of the release, but given the range of chemicals present Tier II storage sites in West Springfield as well as the large number of trains carrying hazardous chemicals that move through the city, the extent could range from limited to critical.

Previous Occurrences

Previous releases have had relatively limited impacts on the town. The 2010 West Springfield HMP reported an average of 14 releases of hazardous materials (total) from these sites per year from 1998-2003, though there was no property damage or loss of life associated with those releases. More recent data on hazardous materials release in town was not available.

Probability of Future Events

Given available data there are likely to be about 14 releases of hazardous chemicals each year, however the likelihood of a catastrophic release is low.

Vulnerability

Populations

While the entire town could be vulnerable to the impact of a chemical release, such an incident would most likely focus around existing hazardous material facilities or transportation corridors. Therefore, vulnerable populations would include low-income residents who are more likely to live in proximity to industrial and potentially hazardous sites.

Built Environment and Economy

Impacts to the built environment would likely be limited due to the limited impact area of such an event. Such an incident could lead to closure along transportation lines or in hazardous material facilities. Such closures could have a limited impact on the Town's economy.

Natural Resources

Damage to natural resources would depend on the location and scope of the incident. Certain hazardous materials could lead to contamination of natural resources.

DRAFT

4: HAZARD MITIGATION AND CLIMATE ADAPTATION STRATEGIES

One of the steps of this Natural Hazard Mitigation Plan is to evaluate all of the town's existing policies and practices related to natural hazards and identify potential gaps in protection. Once these gaps in protection are identified, future mitigation strategies can be crafted and recommended. This is done by evaluating existing and future measures in comparison to the Town's goal statement for natural hazard mitigation.

2019 West Springfield Hazard Mitigation Goals

1: To minimize loss of life, damage to property, and the disruption of governmental services and general business activities due to natural disasters.
2: To provide adequate notification and information to all residents and businesses leading up to and during a natural disaster.
3: (NEW) To build climate resilience into all municipal programs, policies, projects and infrastructure.

For the extent of this analysis, the Committee reviewed the following Town documents:

- Zoning Ordinance
- Rules and Regulations Governing the Subdivision of Land
- West Springfield Community Development Plan
- West Springfield Master Plan 2009
- West Springfield Open Space and Recreation Plan
- CEM Plan
- Other relevant Ordinances as identified (Code, etc.)

This section of the plan serves to identify current mitigation strategies and recommend future mitigation strategies. This is done both generally, and by hazard type.

DRAFT

General Mitigation Measures

Several of the recommended mitigation measures have multiple benefits because, if implemented, they will mitigate or prevent damages from more than one type of natural hazard. These do not fall under one hazard type, but could be put into place for facilitation of better natural hazard protection generally. West Springfield is well situated to address hazards and does not need to add any general mitigation measures.

What's the CEM Plan?

An important existing general preparedness and response tool is West Springfield's Comprehensive Emergency Management Plan (CEM Plan). Although the CEM Plan is focused on the procedural response to an emergency, it organizes information, includes supply and information inventories, and outlines

Flooding

The key factors in flooding are the water capacity of water bodies and waterways, the regulation of waterways by flood control structures, and the preservation of flood storage areas and wetlands. As more land is developed, more flood storage is demanded of the town's water bodies and waterways.

Current Mitigation Measures

The Town currently addresses this problem with a variety of mitigation tools and strategies. Flood-related regulations and strategies are included in the Town's zoning ordinances, subdivision regulations, as well as a proposed stormwater management by-law. Relevant goals are included in the adopted Open Space and Recreation Plan. Infrastructure like dams and culverts are in place to manage the flow of water. These current mitigation strategies are outlined in the following table.

DRAFT

Table 26. Existing Flood Hazard Mitigation Measures			
Existing Strategy	**Description**	**Effectiveness**	**Potential Changes**
Flood Control Structures	Six dams and numerous levees.	Extremely effective, although closure of some flood control structures including the one on Rt. 5 would impact evacuation routes.	Ensure private dam owners realize their responsibility to inspect the dams. Identify dams in town that are privately owned and have not been inspected, and do outreach to owners.
Culvert Replacement	The town maintains a list of priority culvert replacements and other construction projects that are needed to effectively manage flooding. (See critical facilities section for a list of problem culverts.)	Somewhat effective for managing flooding. The upper outlet structure at Amostown and Piper Rd. is being replaced in 2019 and a new headwall being installed on the Birnie Ave culvert to mitigate future flooding. There are a number of areas that still need improvement, such as on Labelle St. and at Block Brook and SR 20/Westfield St. (See location section of flood profile for a complete list of flood-prone crossings.)	Seek funding from HMGP, MVP, and MassDER CRMA for top-priority projects.

DRAFT

Table 26. Existing Flood Hazard Mitigation Measures				
Existing Strategy		**Description**	**Effectiveness**	**Potential Changes**
Zoning	Water Supply Protection District	Overlay district to protect groundwater resources by regulating certain uses, drainage, and performance guarantees.	Was effective for preventing surface water contamination and for controlling stormwater runoff; however the district will be removed in 2020 as the surface reservoir at Bear Hole will no longer be used for back-up drinking water supply. While the Water Supply Protection District designation will be lifted, the property within Bear Hole recreation area will go under a conservation restriction. There may still be private residences with wells operating in the area, which will no longer be protected from development.	Consider replacing this designation to a watershed protection district. Consider removing the dam at the Bear Hole reservoir to restore habitat. Continue to work with land owners on strategies to protect rather than develop land in this area.
	Special Use Districts/ Planned Unit Development District	These districts encourage the flexible, orderly and rational development of larger parcels of land, i.e. five acres or more. Encourages preservation of environmental features.	Somewhat effective, but doesn't prohibit development that could create new flood problems. This element of the code does not work well to encourage more open space.	

DRAFT

Table 26. Existing Flood Hazard Mitigation Measures				
Existing Strategy		**Description**	**Effectiveness**	**Potential Changes**
	Drainage	For residential lots, all impervious surface run-off must be recharged on site.	Effective for new subdivisions. Many ditches and swales from legacy developments are within the floodplain.	
	Alteration and Relocation of Streams	No river or stream shall be altered or relocated in such a way as to reduce its carrying capacity for flood waters.	Effective – part of town zoning and compliance with state law	
	Cluster Development	Provides regulations for cluster subdivision development by special permit. Allows protection of contiguous open space.	Somewhat effective for minimizing impervious surface, allowing for more groundwater infiltration, however this option is almost never used by developers. The provision does not present a significant incentive (no density bonus) and it is not well explained.	Rewrite this part of the code to provide better incentives for developers to choose cluster development. See Open Space Development regulations.
	Common Driveway	Provides for minor development without additional roads thereby lessening environmental impact.	Effective for minimizing impervious surface, allowing more groundwater infiltration, but often presents maintenance problems when none of the co-owners takes the lead to ensure equitable contribution to maintenance costs and/or labor.	

DRAFT

Table 26. Existing Flood Hazard Mitigation Measures				
Existing Strategy		**Description**	**Effectiveness**	**Potential Changes**
	Special Permit Approval	Proposed use must not impact the land, surface water and subsurface water, and their ability to sustain such use without degradation.	Somewhat effective, as some review criteria are performance-based.	
	Site Plan Approval	Proposed uses must meet requirements for drainage and preventing erosion and pollution to waterbodies.	Somewhat effective for preventing incompatible development and reducing flood impacts.	Design storms use data from past events. Designing to that standard could be inadequate in the future as rainfall intensity increases. Consider requiring site plans to be designed to future precipitation conditions to account for climate change.
Subdivision Regulations	Preliminary and Definitive Plans	Plans must include significant natural features.	Somewhat effective for protecting sensitive lands including natural flood retention areas.	
	A Plan for More than one Building for Dwelling Purposes per Lot	Grading Plan	Somewhat effective at preventing reduction of flood storage capacity.	
		Erosion Control		
		Suitability of Land Analysis		
	Design Standards	Protects significant natural features, specifically includes 100-yr floodplain.	Effective for preventing incompatible development.	

DRAFT

Table 26. Existing Flood Hazard Mitigation Measures				
Existing Strategy		**Description**	**Effectiveness**	**Potential Changes**
	Sewerage	Includes details for management of storm drainage and surface water run-off.	Effective.	
West Springfield Open Space and Recreation Plan		Inventories natural features and promotes natural resource preservation in the town, including areas in the floodplain; such as wetlands, groundwater recharge areas, farms and open space, rivers, streams and brooks.	Effective in identifying sensitive resource areas, including floodplains. Encourages forest, farmland protection, help conserve the town's flood storage capacity. Since 2015 the Town has acquired approximately 100 acres of new open space in town and 45 acres around wells in Southwick and Westfield and has applied to multiple grant funding sources to assist with land protection "Green Certification" Forest management plans created for Bear Hole Watershed, Mittineague Park and the Southwick wells as part of the Carbon Sequestration program, recently completed in 2019.	Continue work to implement relevant goals and policies in Plan, specifically with regards to acquiring and protecting open space within the floodplain.
2009 West Springfield Master Plan		Created a land use suitability map, and water supply analysis. Also implemented two recommendations	Effective.	Work to implement relevant goals and policies in Plan.

DRAFT

Table 26. Existing Flood Hazard Mitigation Measures			
Existing Strategy	**Description**	**Effectiveness**	**Potential Changes**
	from the town's existing Open Space and Recreation Plan and the Master Plan—that of creating and implementing a town policy on land acquisition and refining the Town's flood insurance rate maps.		
National Flood Insurance Program Participation	As of 2019, there were 47 properties (27 residential and 20 nonresidential) in West Springfield with flood insurance policies	Somewhat effective, provided that the town remains enrolled in the National Flood Insurance Program.	Consider joining the Community Rating System. Review the area around Block Brook south of Plymouth Terrace and north of SR 20/Westfield St. that was recently removed from the SFHA. Increase education and outreach about the benefits of the NFIP.
Public Health Mosquito Sampling Sites and Education	The Pioneer Valley Mosquito Control District conducts regular testing of ponds and swamps to determine whether mosquitos are carrying diseases. They also conduct outreach and education to encourage community members to minimize the breading areas. The city DPW keeps the storm drains and ditches clear to help with mosquito control.	Somewhat effective, however urban residential areas where standing water collects in gutters, discarded tires, and other debris are still at the greatest risk for mosquito-borne disease.	Town could increase outreach and education efforts, potentially expanding materials in multiple languages.

DRAFT

In 2019, West Springfield joined Holyoke and Westfield to create the Tri-City Public Carbon Sequestration Program, an agreement between the three municipalities to preserve more than 15,000 acres of trees surrounding their water sheds. The cities are selling their tree stock, but the trees won't be cut down. Instead, they will be exchanged for a "carbon credit" worth $10 per credit. These credits will presumable be sold to large companies undertaking new development, such as building a new office or warehouse, to offset some of the environmental impacts of that construction. The money collected from the carbon credits will go back into conservation-type projects for the cities, which could include protecting floodplains. Furthermore, protecting forests from development will effectively serve to reduce the risk of exacerbating future stormwater flooding, as well as associated risks of erosion and landslides.

Since the development of the Town's last Open Space and Recreation Plan, Planning and Conservation staff have counseled landowners on options available other than development when they inquire about development requirements and zoning restrictions on high value parcels for conservation. The Town has also acquired and protected a number of high value parcels at risk for development, including the Tessier, Thomas, Popowich, Pride, Merrick Drug and Lutheran Social Service property. Attempted acquisition of the Strauss, Pohl, Larivee and Valentino properties were unsuccessful.

Future Mitigation Measures

Several potential changes to the Town's current strategies have been identified in the above table, and these, as well as recommendations for other future mitigation strategies, are compiled below:

- Replace top priorities on culvert replacement list—Ashley Street, Union Street, Block Brook at Plymouth Terrace, Salem Street, and Ely Avenue, and Schoolhouse Brook at Althea and Labelle Streets, among others. Seek funding from HMGP, MVP, and MassDER CRMA for top-priority projects.
- Ensure private dam owners realize their responsibility to inspect the dams. Identify dams in town that are privately owned and have not been inspected, and do outreach to owners.
- Implement the goals and strategies of the West Springfield Open Space and Recreation Plan dealing with protection of floodplain, forests, and farmland, including:
    - Draft changes to subdivision regulations to promote cluster development. Rewrite this part of the code to provide better incentives for developers to choose cluster development. See Open Space Development regulations.
    - Work on repaving plan for Mittineague Park including stormwater management
    - Maintain Bear Hole Watershed as a passive recreation area
    - Identify potential funding sources for land protection
- Bear Hole mitigation

DRAFT

    - Consider replacing the Water Supply Protection District designation to a watershed protection district.
    - Consider removing the dam at the Bear Hole reservoir to restore habitat.
    - Continue to work with land owners on strategies to protect rather than develop land in this area
- Consider requiring site plans to be designed to future precipitation conditions to account for climate change.
- Evaluate whether to become a part of FEMA's Community Rating System.
- NFIP Education and Outreach
    - Educate citizens living in the floodplain about the NFIP as part of digital FIRM update.
    - Increase education and outreach about the benefits of the NFIP, and to holding flood insurance even for residents located in Zone x (outside the SFHA).
- Work with FEMA and the MA State Floodplain Manager to review the area around Block Brook and Plymouth Terrace that was recently removed from the SFHA.
- Explore opportunities to implement a stormwater utility to reduce future flood risk (by 2022).
- Educate the public and business owners about the health risks associated with standing water for vector-borne diseases.

Dam Overtopping (dam failure)

Dam failure is a highly infrequent occurrence, but a severe incident could prove catastrophic. In addition, dam failure most often coincides with flooding, so its impacts can be multiplied, as the additional water has nowhere to flow.

Current Mitigation Measures

The only mitigation measures currently in place are the state regulations governing the construction, inspection, and maintenance of dams. This is managed through the Office of Dam Safety at the Department of Conservation and Recreation.

DRAFT

Table 27. Existing Dam Overtopping (dam failure) Hazard Mitigation Measures			
Existing Strategy	**Description**	**Effectiveness**	**Potential Changes**
New Dam Construction Permits	State law requires a permit for the construction of any dam.	Effective. Ensures dams are adequately designed.	None.
Dam Inspections	DCR has an inspection schedule that is based on the hazard rating of the dam (low, medium, high hazard).	Low. The responsibility for this is now on dam owners, who may not have sufficient funding to comply.	Identify sources of funding for dam safety inspections. Incorporate dam safety into development review process.

Future Mitigation Measures

Recent changes in legislation have shifted some of the responsibility of dam safety onto dam owners. The Town recognizes the need to adjust to this change. Several potential changes to the Town's current strategies have been identified in the above table, and these, as well as recommendations for other future mitigation strategies, are compiled below:

- Identify sources of funding for dam safety inspections.
- Incorporate dam safety into development review process, especially for privately property with existing old, unused dams, and incentivize dam removal.
- Identify potential dam removal sites for natural hazard risk reduction and habitat restoration

Drought

Although Massachusetts does not face extreme droughts like many other places in the country, it is susceptible to dry spells and drought. And unlike other places, drought can most likely be effectively mitigated in regions like the Pioneer Valley if measures are put into place.

Current Mitigation Measures

West Springfield has several water protection regulations in place, as evidenced in the section on flooding. Additional regulations and mitigation options, specific to drought mitigation, are included here.

DRAFT

Table 28. Existing Drought Hazard Mitigation Measures				
Existing Strategy		**Description**	**Effectiveness**	**Potential Changes**
Zoning Ordinance	Alteration and Relocation of Streams	Watercourses shall not be altered unless it can be shown that there is no impact to their water quality/supply.	Effective on an as-needed basis.	
	Site Plan	The project must be served by adequate water supply, approved by BOH.	Effective.	
Subdivision Regulations	Preliminary and Definitive Plans	Water supply systems must be shown on plans, prove adequate supply.	Effective.	
	Sewage	All lots must be served by public water supply where feasible, approved by Water Department	Effective.	
	Construction Standards	When applicable, private wells are regulated so as not to locate too close to leach fields, sewer lines, etc.	Effective.	
West Springfield Open Space and Recreation Plan		Promotes natural resource preservation in the town, including wetlands and groundwater recharge areas.	Helps conserve the town's capacity for groundwater recharge and retention. Since 2015 the Town has acquired approximately 100 acres of new open space in town and 45 around wells in Southwick and Westfield and has applied to multiple grant funding sources to assist with land protection Forest management plan created for Bear Hole Watershed, Mittineague Park and the Southwick wells as part of the Carbon Sequestration program, recently	Continue work to implement relevant goals and policies in Plan, specifically with regards to acquiring and protecting open space to protect ground water recharge.

DRAFT

Table 28. Existing Drought Hazard Mitigation Measures			
Existing Strategy	**Description**	**Effectiveness**	**Potential Changes**
		completed in 2019.	
West Springfield Master Plan	Makes recommendations for protecting West Springfield's water quality/supply.	Somewhat effective for raising awareness about protecting water quality, supply, and conservation.	Implement plan goals.

DRAFT

Future Mitigation Measures

Potential changes to the Town's current strategies have been identified in the above table, and these, as well as recommendations for other future mitigation strategies, are compiled below:

- In regards to the West Springfield Master Plan, implement the goals and strategies dealing with protection of waterbodies and forestland.
- Continue work to implement relevant OSRP goals and policies in Plan, specifically with regards to acquiring and protecting open space within critical drinking water recharge areas.

Average/Extreme Temperatures

Extreme temperature can have a significant impact to human health, and climate projections show a very strong likelihood that these events will become more frequent in the coming years. Predominantly paved urban environments can be particularly deadly places during a heat wave, especially for those residents who live there without access to air conditioning at home. Expanding park space and urban tree canopy cover in these areas can reduce the risk to residents in the area. Extreme cold temperature events can damage buildings through freezing or bursting pipes and freeze and thaw cycles. Therefore, it is important to take steps to keep West Springfield residents, workers, visitors, and built environment safe during extreme temperature events.

Current Mitigation Measures

Recommendations from the Town's OSRP to identify private-public partnership opportunities for recreation space acquisition and improvement in underserved neighborhoods led to discussions between the Park Department and the YMCA owners of Camp Webber, the Boys and Girls club, and the soccer association to improve access to park space in underserved neighborhoods. The result has been expanded use of Riverfront Park and the Centralized Recreation Project on Morgan Road. Further, the OSRP committee identified parcels in Merrick-Memorial neighborhood that could be suitable for recreational use and eventual purchase. The town's CDBG program purchased the former Lutheran Social Services property and tore down the defunct building to improve recreational facilities and parking at the Boys and Girls Club, as well as the building next to Alice Corson Playground, which will be used by Parks and Recreation, Community Police, and Community Development (1 day per week). The Refugee Resource Center also utilizes space in that building.

The town's Senior Center and Public Library currently serve as comfort stations, offering heated or cooled areas for residents during extreme cold periods or heat waves, respectively. Both facilities are equipped with cell phone charging stations and lockboxes for residents without power who need to charge their devices. On one occasion, the Senior Center has opened its doors on a Sunday, outside of normal hours of operation, to provide cooling to residents in need. Despite these efforts, town employees report that very few residents actually utilize these facilities for these

DRAFT

purposes. The movie theater on Riverdale Ave has also opened its doors during a heatwave, inviting residents to cool off in the facility's lobby even without a ticket purchase.

The West Springfield Council on Aging promotes emergency preparedness and strategizing for the future during their meetings with clients at the senior center and during in-home visits. The COA also provides educational materials on preparedness, and has hosted public information sessions on preparedness in partnership with Hampden County Medical Reserve Corps.

Future Mitigation Measures

Update the town's Emergency Operations Plan to include inventory and deployment protocol for warming and cooling stations/comfort centers around the town.

Wildfire/Brushfire

Although somewhat common, the vast majority of brushfires in West Springfield are small and quickly contained. However, as with any illegal fire or brushfire, there is always the risk that a small brushfire could grow into a larger, more dangerous wildfire, especially if conditions are right. Therefore, it is important to take steps to prevent wildfires and brushfires from turning into natural disasters.

Current Mitigation Measures

The following table identifies what the Town is currently doing to manage brushfires and makes some suggested potential changes and recommendations for decreasing the Town's likelihood of being heavily impacted by a wildfire or brushfire.

DRAFT

Table 29. Existing Wildfire/Brushfire Hazard Mitigation Measures				
Existing Strategy		**Description**	**Effectiveness**	**Potential Changes**
Zoning Ordinance	Water Supply Protection District	Some uses need to be approved by the Fire Department (ie, storage of liquid petroleum products)	Effective by Town Ordinance, but this is also state regulated.	
	Site Plan and Special Permit Approval	Planning Board requests Fire Department inspection/review of all plans.	Effective.	
Subdivision Regulations	Definitive Plan	Must be reviewed by Fire Department for approval.	Effective.	
	Design Standards	Street layout must be able to accommodate fire vehicles.	Effective.	
Public Education/ Outreach		Fire Department has an ongoing educational program in the schools. Outreach materials are borrowed from state Fire Academy.	Somewhat effective, but only reaches children.	Look into getting materials translated for non-English speaking homes. Potential to partner with Ascentria Care Alliance to create and distribute materials.
Carbon Project and Forest Management Plans		Forest management plans were developed for Bear Hole, Mittineague Park and the Southwick wells as part of the Carbon Sequestration program recently completed 2018-2019. Plans consider tree stock throughout the town with the goal of preventing accidental natural conversion (aka forest fire)	Effective	
Outdoor Burning Ordinance		New ordinance allowing for controlled outdoor burns and specifying the conditions for safety.	Effective, in combination with Fire Department actively responding to calls	

DRAFT

Future Mitigation Measures

The Town will continue to enact its current strategies identified as effective in the table above, and will pursue the following new recommendations for future mitigation:

- Create fire safety educational materials translated for non-English speaking homes. Potential to partner with Ascentria Care Alliance to create and distribute materials.

Severe Winter Storm (including Ice Storm and Nor'Easter)

Winter storms can be especially challenging for emergency management personnel. The Massachusetts Emergency Management Agency (MEMA) serves as the primary coordinating entity in the statewide management of all types of winter storms and monitors the National Weather Service (NWS) alerting systems during periods when winter storms are expected. Even though the storm has usually been forecast, there is no certain way for predicting its length, size or severity. Therefore, mitigation strategies must focus on preparedness prior to a severe snow/ice storm.

Current Mitigation Measures

The Town's current mitigation tools and strategies focus on preparedness, with many regulations and standards established based on safety during storm events. These current mitigation strategies are outlined in the following table.

Note: To the extent that some of the damages from a winter storm can be caused by flooding, all of the flood protection mitigation measures described in

DRAFT

Table 26. Existing Flood Hazard Mitigation Measures

above can also be considered as mitigation measures for severe snow/ice storms.

DRAFT

Table 30. Existing Severe Snow/Ice Storm Hazard Mitigation Measures				
Existing Strategy		**Description**	**Effectiveness**	**Potential Changes**
Zoning Ordinance	Off-Street Parking Standards	Requires some off-street parking for certain uses; prevents excessive street parking; prohibit street parking for businesses	Somewhat effective for maintain adequate roadway width for emergency vehicles, but some people still don't move cars during snow emergencies. City has made efforts to improve mass communications systems to push notifications. There may be a language barrier to access messaging. Also, there is a lack of parking capacity in the Merrick neighborhood, making it difficult for residents to comply with the standard.	Improve accessibility of messaging across languages, and evaluate off-street parking alternatives for residents in the Merrick neighborhood.
Subdivision Regulations	Construction Standards	Utilities must be placed underground	Effective for preventing power loss on a neighborhood scale, and for preventing roadway hazards.	
	Design Standards	Standards include street grade regulations (collectors 5% max; all others 8% max); and intersection regulations (minimum 60 angle).	Effective for reducing automobile accidents during snow/ice events.	
		Street right-of-way must include room for storage of snow from plowing.	Effective for new subdivisions.	
State Building Code		The Town of West Springfield has adopted the Massachusetts State Building Code and the Stretch Code.	Effective. 2019 ISO BCEGS classification for the town is 4.	

DRAFT

Table 30. Existing Severe Snow/Ice Storm Hazard Mitigation Measures			
Existing Strategy	**Description**	**Effectiveness**	**Potential Changes**
Backup Electric Power	Shelters have backup power. See Critical Facilities section.	Very effective in case of power loss. Middle school back-up generator powers critical functions enabling that facility to serve as an emergency shelter (though not Red Cross-certified). The High School back-up system was designed to power all critical facility functions, but the system hasn't been tested recently and so functionality cannot be verified at this time.	
Tree Management	Eversource keeps track of dangerous trees and is relatively proactive in taking down hazardous individuals. The town arborist speaks with Eversource on a regular basis.	Very effective, preventative collaboration.	
Debris Management Plan	The Town has a local Debris Management Plan that was created with the support of the Western Regional Homeland Security Advisory Committee (WRHSAC))	Somewhat effective. Western Region Homeland Security Advisory Committee (WRHSAC) is still working on a regional debris management plan to include mutual aid and Memoranda of Understanding with neighboring municipalities. Furthermore, West Springfield Central Maintenance Department is looking into regional forest management planning.	Continue to evaluate opportunities and seek funding to develop and implement a regional forest management plan.

BCEGS Building Code Effectiveness Grading Schedule

DRAFT

Future Mitigation Measures

Several potential changes to the Town's current strategies have been identified in the above table, and these, as well as recommendations for other future mitigation strategies, are compiled below:

- Update the town's Emergency Operations Plan to include inventory of emergency shelters and warming and cooling stations/comfort centers around the town, with note of which facilities are equipped with sufficient back-up power to maintain those critical services during a power outage.
- Update the town-wide emergency sheltering plan and conduct exercises for staff and volunteers to expand understanding of plan operations and broaden understanding of NIMS and ICS.
- Ensure both town-owned emergency shelters have sufficient back-up power to support necessary service areas of their buildings. Replace or upgrade if not effective.
- Ensure roadways across town remain accessible during and after heavy snow events
    - Increase education and enforcement of restrictions prohibiting residents from plowing snow into the road. (Police Department)
    - Improve accessibility of messaging across languages, and evaluate off-street parking alternatives for residents in the Merrick neighborhood.
- Participate in the creation of a Regional Debris Management Plan.

What is a Regional Debris Management Plan?

Natural disasters can precipitate a variety of debris, including trees, construction and demolition materials and personal property. After a natural disaster, potential threats to the health, safety and welfare of impacted citizens can be minimized through the implementation of a debris management plan. Such a plan can be critical to recovery efforts after a disaster, including facilitating the receipt of FEMA funds for debris clearance, removal and disposal.

Hurricanes/Tropical Storm/Severe Wind (and Tornadoes/ Microbursts)

Of all the natural disasters that could potentially impact West Springfield, hurricanes provide the most lead warning time because of the relative ease in predicting the storm's track and potential landfall. MEMA assumes "standby status" when a hurricane's location is 35 degrees North Latitude (Cape Hatteras) and "alert status" when the storm reaches 40 degrees North Latitude (Long Island). Even with significant warning, hurricanes can do significant damage – both due to flooding and severe wind.

The flooding associated with hurricanes can be a major source of damage to buildings, infrastructure and a potential threat to human lives. Therefore, all of the flood protection mitigation measures described in Table 26 can also be considered hurricane mitigation measures.

The high winds that oftentimes accompany hurricanes can also damage buildings and infrastructure. But regulations can be put into place to help minimize the extent of wind damages.

The location and extent of potential damaging impacts of a tornado are completely unpredictable. Most damage from tornadoes or microbursts comes from high winds that can fell trees and electrical wires, generate hurtling debris and, possibly, hail. According to the Institute for Business and Home Safety, the wind speeds in most tornadoes are at or below design speeds that are used in current building codes. In addition, current land development regulations can also help prevent wind damages.

Current Mitigation Measures

The following table outlines the Town's existing mitigation strategies that help prevent wind damages, whether from hurricanes, tornadoes, microbursts, or any other event.

DRAFT

Table 31. Existing Hurricanes/Tropical Storm/Severe Wind (and Tornadoes/ Microbursts) Hazard Mitigation Measures				
Existing Strategy		Description	Effectiveness	Potential Changes
	Wireless Communications Facilities	Wireless communication towers/facilities standards restrict height and setbacks.	Somewhat effective for preventing damage to nearby property	
Subdiv Regs	Improvements	Utilities must be placed underground	Effective for preventing power loss at the neighborhood scale, and for preventing roadway hazards.	
State Building Code		The Town has adopted the MA State Building Code and the Stretch Code.	Effective. 2019 ISO BCEGS classification for the town is 4.	
Tree Management		List of dangerous trees continuously maintained for Eversource.	Somewhat effective, preventative collaboration.	Conduct a town-wide hazard tree assessment, including a public education component.
Property Maintenance Regulations		Adopted in 2019, these regulations reduce the hazard potential from dilapidated properties.	Presumed effective	

Future Mitigation Measures

Several potential changes to the Town's current strategies have been identified in the above table, and these, as well as recommendations for other future mitigation strategies, are compiled below:

- Conduct a town-wide hazard tree assessment, including a public education component.
- Participate in the creation of a Regional Debris Management Plan.

Earthquake

Although there are five mapped seismological faults in Massachusetts, there is no discernable pattern of previous earthquakes along these faults nor is there a reliable

DRAFT

way to predict future earthquakes along these faults or in any other areas of the state. Consequently, earthquakes are arguably the most difficult natural hazard to plan for.

Most buildings and structures in the state were constructed without specific earthquake resistant design features. In addition, earthquakes precipitate several potential devastating secondary effects such as building collapse, utility pipeline rupture, water contamination, and extended power outages. Therefore, many of the mitigation efforts for other natural hazards identified in this plan may be applicable during the Town's recovery from an earthquake.

Current Mitigation Measures

The Town's most relevant existing mitigation measures are described in the following table.

Table 32. Existing Earthquake Hazard Mitigation Measures

Existing Strategy		Description	Effectiveness	Potential Changes
Zoning Ordinance	Wireless Communications Facilities	Wireless communication towers/facilities standards restrict height and setbacks.	Somewhat effective for preventing damage to nearby property	
State Building Code		The Town of West Springfield has adopted the State Building Code.	Effective for new buildings only.	Consider evaluating older structures categorized as critical facilities to determine if they are earthquake resistant, or provide incentive for private owners to do self-evaluations. Seek State or Federal grants, or work with UMass.
Debris Management Plan		A debris management plan could be developed.	Effective.	Consider participation in the creation of a Regional Debris Management Plan.

Future Mitigation Measures

Potential changes to the Town's current strategies have been identified in the above table, and these are compiled below:

DRAFT

- Consider evaluating older structures categorized as critical facilities to determine if they are earthquake resistant, or provide incentive for private owners to do self-evaluations. Seek State or Federal grants, or work with UMass.
- Participate in the creation of a Regional Debris Management Plan.

Hazardous Materials

Hazardous materials are in existence throughout Town, and are constantly being moved on West Springfield's roads and highways. However, there is no way to anticipate where and when a hazardous materials spill or explosion could take place. Therefore, it makes is somewhat difficult to determine mitigation strategies, but West Springfield has some regulations currently in place to mitigate the impacts of a hazardous materials disaster.

Current Mitigation Measures

Table 33. Existing Hazardous Materials Hazard Mitigation Measures

Existing Strategy		Description	Effectiveness	Potential Changes
Zoning Ordinance	Water Supply Protection District	No hazardous materials permitted within areas delineated as recharge areas for groundwater aquifers. Other substances regulated by Fire Department.	Very effective for preventing groundwater contamination.	Prohibit all haz-mats similar to Water Supply Protection District.

In addition to the above, the town runs an annual Hazardous Waste Collection Day, and the regional HazaMat team conducts exercises to train for railroad derailments. Finally, donation boxes, such as those used to collect clothes and shoes for charity, are prohibited within the mapped floodplain.

Future Mitigation Measures

Potential changes to the Town's current strategies have been identified in the above table, and these are compiled below:

- Conduct a public campaign about protecting one's self and neighbors from hazardous chemical spills during weather events by taking measures such as securing propane tanks.

DRAFT

5: PRIORITIZED IMPLEMENTATION PLAN

The Hazard Mitigation Committee identified several strategies that are currently being pursued, and other strategies that will require additional resources to implement. Strategies are based on previous experience, as well as the hazard identification and risk assessment in this plan.

Prioritization Methodology

The West Springfield Hazard Mitigation Planning Committee reviewed and prioritized a list of mitigation strategies using the following criteria:

- **Application to multiple hazards** – Strategies are given a higher priority if they assist in the mitigation of several natural hazards.
- **Time required for completion** – Projects that are faster to implement, either due to the nature of the permitting process or other regulatory procedures, or because of the time it takes to secure funding, are given higher priority.
- **Estimated benefit** – Strategies which would provide the highest degree of reduction in loss of property and life are given a higher priority. This estimate is based on the Hazard Identification and Analysis Chapter, particularly with regard to how much of each hazard's impact would be mitigated.
- **Cost effectiveness** – in order to maximize the effect of mitigation efforts using limited funds, priority is given to low-cost strategies. For example, regular tree maintenance is a relatively low-cost operational strategy that can significantly reduce the length of time of power outages during a winter storm. Strategies that have identified potential funding streams, such as the Hazard Mitigation Grant Program, are also given higher priority.
- **Eligibility Under Hazard Mitigation Grant Program –** The Hazard Mitigation Grant Program (HMGP) provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. Funding is made available through FEMA by the Massachusetts Emergency Management Agency. Municipalities apply for grants to fund specific mitigation projects under MEMA requirements

The following categories are used to define the priority of each mitigation strategy:

DRAFT

- **Low** – Strategies that would not have a significant benefit to property or people, address only one or two hazards, or would require funding and time resources that are impractical

- **Medium** – Strategies that would have some benefit to people and property and are somewhat cost effective at reducing damage to property and people

- **High** – Strategies that provide mitigation of several hazards and have a large benefit that warrants their cost and time to complete

- **Very High** – extremely beneficial projects that will greatly contribute to mitigation of multiple hazards and the protection of people and property.

In addition to the definitions above, the West Springfield Hazard Mitigation Planning Committee reviewed each of the proposed mitigation measures using the following factors to determine level of priority:

- Ability to reduce loss of life
- Ability to reduce disaster damage
- Social acceptability
- Ability to complete or be combined w/other actions
- Technical feasibility / potential success
- Impact on the environment
- Administrative workability
- Ability to meet regulations
- Political acceptability
- Ability to save or protect historic structures
- Legal implementation
- Ability to meet other community objectives
- Economic impact
- The duration of its implementation period
- Environmental compatibility

Cost Estimates

Each of the following implementation strategies is provided with a cost estimate. Projects that already have secured funding are noted as such. Where precise financial estimates are not currently available, categories were used with the following assigned dollar ranges, or marked as "unknown":

- **Low** – cost less than $10,000

- **Medium** – cost between $10,000 – $100,000

- **High** – cost over $100,000

DRAFT

Cost estimates take into account the following resources:

- Town staff time for grant application and administration (at a rate of $25 per hour)
- Consultant design and construction cost (based on estimates for projects obtained from town and general knowledge of previous work in town)
- Town staff time for construction, maintenance, and operation activities (at a rate of $25 per hour)

Project Timeline

The following chart is a completed list of projects recommended by the Committee. The following action plan identifies Responsibility, Funding and a Time Frame for the mitigation projects recommended. The actions will begin as soon as the plan is approved and the community is eligible for funding, unless otherwise stated, and will be completed as noted in the implementation date column in the table below (called "Timeframe" in table).

Note: As additional information becomes available regarding project leadership, timeline, funding sources, and/or cost estimates, the Plan will be reviewed and amended accordingly.

DRAFT

WEST SPRINGFIELD 2019 HAZARD MITIGATION STRATEGIES

Table 34: Prioritized Implementation Schedule – Action Plan								
#	**Type**	**Description**	**Hazards Addressed**	**Responsible Department / Board**	**Timeline**	**Funding Source/ Estimated Cost**	**Incorporation into Existing Plans**	**Priority**
1	SIP	Replace top priorities on culvert replacement list—Ashley, Union, Block Brook, Schoolhouse Brook, etc.	Flood	DPW	Ongoing	Grants and Town Tax funds, FEMA HMGP High	MVP Summary of Findings (SOF)	Very High
2	EAP	Ensure private dam owners realize their responsibility to inspect the dams. Identify dams in town that are privately owned and have not been inspected, and do outreach to owners.	Flood	DPW	Short	MEMA Low	OSRP, Master Plan	High
3	NSP / LPR	Implement the goals and strategies of the West Springfield Open Space and Recreation Plan dealing with protection of floodplain, forests, and farmland, including: Draft changes to subdivision regulations to promote cluster	Flood, Drought	Conservation Commission, City Council, Planning and Zoning, Parks and Rec	Ongoing	MA DCR Low - Medium	OSRP	Med

DRAFT

Table 34: Prioritized Implementation Schedule – Action Plan								
#	**Type**	**Description**	**Hazards Addressed**	**Responsible Department / Board**	**Timeline**	**Funding Source/ Estimated Cost**	**Incorporation into Existing Plans**	**Priority**
		development. Rewrite this part of the code to provide better incentives for developers to choose cluster development. See Open Space Development regulations.						
4	NSP / LPR	Implement OSRP: Maintain Bear Hole Watershed as a passive recreation area	Flood, Drought	DPW	Ongoing	MA DCR and Audubon Low - Medium	OSRP, Master Plan	High
5	NSP	Implement OSRP: Identify potential funding sources for land protection	Flood, Drought	Conservation	Short	Grants/CPA Low	OSRP	Med
6	NSP	Implement OSRP: Acquire and protect open space within critical drinking water recharge areas.	Drought	Conservation Commission, Planning, Mayor, Town Council, Community Preservation Committtee, Land Trusts	Ongoing	Grants, CPA / Community Preservation Committee High	OSRP, MVP SOF, Master Plan	Med

DRAFT

Table 34: Prioritized Implementation Schedule – Action Plan								
#	**Type**	**Description**	**Hazards Addressed**	**Responsible Department / Board**	**Timeline**	**Funding Source/ Estimated Cost**	**Incorporation into Existing Plans**	**Priority**
7	NSP	Bear Hole Mitigation: Consider replacing the Water Supply Protection District designation to a watershed protection district.	Flood, Drought	Conservation, Planning, Mayor, Town Council	Short	MA DCR and Audubon Low	OSRP, MVP SOF, Master Plan	High
8	NSP / SIP	Bear Hole Mitigation: Consider removing the dam at the Bear Hole reservoir to restore habitat.	Flood, Drought	DPW	Ongoing	Grants High	OSRP, MVP SOF, Master Plan	Med
9	EAP / NSP	Bear Hole Mitigation: Continue to work with land owners on strategies to protect rather than develop land in this area	Flood, Drought	DPW, Conservation, Planning	Ongoing	In-kind Low	OSRP	Med
10	LPR	Consider requiring site plans to be designed to future precipitation conditions to account for climate change.	Flood, Hurricane/Tropical Storm	Planning Dept., Town Engineer	Short	In-kind Low	MVP SOF, Master Plan	Med
11	LPR	Evaluate whether to become a part of FEMA's Community Rating System.	Flood	Mayor	Short	In-kind Low		Med
12	EAP	NFIP Education and Outreach: Educate citizens living in	Flood	Conservation Commission, Building	Short, Ongoing	In-kind Low -		Med

DRAFT

Table 34: Prioritized Implementation Schedule – Action Plan								
#	Type	Description	Hazards Addressed	Responsible Department / Board	Timeline	Funding Source/ Estimated Cost	Incorporation into Existing Plans	Priority
		the floodplain about the NFIP as part of digital FIRM update Increase education and outreach about the benefits of the NFIP, and to holding flood insurance even for residents located in Zone x (outside the SFHA).		Department		Medium		
13	EAP	Work with FEMA and the MA State Floodplain Manager to review the area around Block Brook and Plymouth Terrace that was recently removed from the SFHA.	Flood	Floodplain Manager, Conservation Agent, Building Inspector	Short	In-kind Medium		Med
14	LPR	Develop and adopt new stormwater regulations to limit impervious surfaces on buildings and landscape, and promote more low impact development. Also, establish a stormwater utility fee to reduce future flood risk and create a	Flood	Planning Department, Public Works, Mayor, Town Council	Short (2022)	DPW Low-Medium	MVP SOF, Master Plan	Med

DRAFT

Table 34: Prioritized Implementation Schedule – Action Plan								
#	**Type**	**Description**	**Hazards Addressed**	**Responsible Department / Board**	**Timeline**	**Funding Source/ Estimated Cost**	**Incorporation into Existing Plans**	**Priority**
		new revenue stream for the town.						
15	EAP	Educate the public and business owners about the health risks associated with standing water for vector-borne diseases.	Flood, Invasive Species	Health Department	Ongoing	In-kind Low		Med
16	SIP	Identify sources of funding for dam safety inspections.	Flood, Dam Overtopping (dam failure)	Conservation Commission, Public Works	Short	DPW Low - Medium		Med
17	LPR	Incorporate dam safety into development review process, especially for privately property with existing old, unused dams, and incentivize dam removal.	Flood, Dam Overtopping (dam failure)	Planning Department, Conservation Commission	Short-Long	Developers Low	Master Plan, MVP	Med
18	SIP	Identify potential dam removal sites for natural hazard risk reduction and habitat restoration	Flood, Dam Overtopping (dam failure), Drought	Conservation Commission, DEP	Short	Grants Medium	MVP SOF	Low
19	NSP	Implement top priority recommendations of Master Plan dealing with protection of waterbodies	Drought	Planning Dept.	Ongoing	Various Medium	Master Plan	Med

DRAFT

Table 34: Prioritized Implementation Schedule – Action Plan								
#	Type	Description	Hazards Addressed	Responsible Department / Board	Timeline	Funding Source/ Estimated Cost	Incorporation into Existing Plans	Priority
		and forestland.						
20	LPR	Update the town's Emergency Operations Plan to include inventory and deployment protocol for emergency shelters and warming and cooling stations/comfort centers around the town. Include note of which facilities are equipped with sufficient back-up power to maintain those critical services during a power outage.	Average/Extreme Temperatures, Severe Winter Storm	EMD, Public Health	Short	In-kind Low - Medium		High
21	EAP	Create fire safety educational materials translated for non-English speaking homes. Potential to partner with Ascentria Care Alliance to create and distribute materials.	Wildfire/Brushfire	Fire Department	Short	MVP, other grants Low - Medium	MVP	Med
22	LPR	Update the town-wide emergency sheltering plan and conduct exercises for	Severe Winter Storm	EMD, Public Health	Ongoing	In-kind Low -		High

DRAFT

Table 34: Prioritized Implementation Schedule – Action Plan								
#	**Type**	**Description**	**Hazards Addressed**	**Responsible Department / Board**	**Timeline**	**Funding Source/ Estimated Cost**	**Incorporation into Existing Plans**	**Priority**
		staff and volunteers to expand understanding of plan operations and broaden understanding of NIMS and ICS.				Medium		
23	SIP	Ensure both town-owned emergency shelters and other critical facilities have sufficient back-up power to support necessary service areas of their buildings. Replace or upgrade if not effective, and consider using solar voltaic and battery storage solutions.	Average/Extreme Temperatures, Severe Winter Storm	EMD, Building Inspector	Long	Grants Medium - High	MVP SOF	High
24	EAP	Ensure roadways across town remain accessible during and after heavy snow events: 1. Increase education and enforcement of restrictions prohibiting residents from plowing snow into the road. 2. Improve accessibility of	Severe Winter Storm	DPW, Police Department, Fire Department, EMD, Public Health, Ascentria	Short	DPW, Police Medium	MVP	High

DRAFT

Table 34: Prioritized Implementation Schedule – Action Plan								
#	**Type**	**Description**	**Hazards Addressed**	**Responsible Department / Board**	**Timeline**	**Funding Source/ Estimated Cost**	**Incorporation into Existing Plans**	**Priority**
		messaging across languages, and 3. evaluate off-street parking alternatives for residents in the Merrick neighborhood.						
25	LPR	Participate in regional Debris Management Plan	Severe Winter Storm, Hurricane/ Tropical Storm, Severe Wind, Tornadoes/ Microbursts, Earthquake	EMD, DPW	2010-or when it happens	DHS, CMD Budget Low - Medium	Master Plan	Med
26	EAP / NSP	Assess overall urban forest to understand tree health and resilience, including a hazard tree assessment and a public education component.	Hurricanes/Tropical Storm/Severe Wind, Tornadoes/ Microbursts	CMD, Tree Warden	Short-Long and Ongoing	MVP Action Grant Medium - High	MVP	High
27	EAP / SIP	Consider evaluating older structures categorized as critical facilities to determine if they are earthquake resistant, or provide incentive for private owners to do self-evaluations. Seek State or	Earthquake	Building Inspector, EMD	Short	Unknown Medium - High		Med

DRAFT

Table 34: Prioritized Implementation Schedule – Action Plan								
#	**Type**	**Description**	**Hazards Addressed**	**Responsible Department / Board**	**Timeline**	**Funding Source/ Estimated Cost**	**Incorporation into Existing Plans**	**Priority**
		Federal grants, or work with UMass.						
28	EAP / NSP	Conduct a public campaign about protecting one's self and neighbors from hazardous chemical spills during weather events by taking measures such as securing propane tanks.	Hazardous Materials, Flood, Earthquake, Hurricanes/Tropical Storm/Severe Wind	EMD, Public Health, Building Inspector	Short	In-kind Low - Medium		Med
29	LPR	Improve upon existing town-wide bridge and culvert inventory, assessing culvert size and capacity against new volume and velocity estimates associated with climate change projections.	Flood	DPW	Ongoing	Grants and Town Tax funds, FEMA HMGP High	MVP SOF	High
30	EAP	Coordinate with community groups to undertake a public information and outreach campaign for climate resilience. Include town website, TIPS, and NIXLE improvements; addressing	Al hazards	EMD, Public Health, Conservation Agent	Short	In-kind Low - Medium	MVP SOF	High

DRAFT

Table 34: Prioritized Implementation Schedule – Action Plan								
#	**Type**	**Description**	**Hazards Addressed**	**Responsible Department / Board**	**Timeline**	**Funding Source/ Estimated Cost**	**Incorporation into Existing Plans**	**Priority**
		climate-change influenced mental health needs; and educating on invasive species and personal preparedness.						

Notes: "All Hazards" indicates all hazards profiled in this plan.

Acronyms and Abbreviations:

COA	Council on Aging
DPW	Department of Public Works
DLTA	District Local Technical Assistance
FEMA	Federal Emergency Management Agency
FPA	Floodplain Administrator
HMA	Hazard Mitigation Assistance
N/A	Not applicable
NFIP	National Flood Insurance Program
MEMA	Massachusetts Office of Emergency Management
MVP	Municipal Vulnerability Preparedness Program

Timeline:

Short	1 to 5 years
Long	5 years or greater
OG	On-going program
DOF	Depending on funding

Costs:

Where actual project costs have been reasonably estimated:

Low	< $10,000
Med	$10,000 to $100,000
High	> $100,000

Where actual costs cannot reasonably be established at this time:

Low	Possible to fund under existing budget. Project is part of, or can be part of an existing on-going program.
Med	Could budget for under existing work plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
High	Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed project.

Mitigation Category:

- Local Plans and Regulations (LPR) – These actions include government authorities, policies, or codes that influence the way land and buildings are being developed and built.
- Structure and Infrastructure Project (SIP) - These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This action could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.

DRAFT

- Natural Systems Protection (NSP) – These actions minimize damage and losses and also preserve or restore the functions of natural systems.
- Education and Awareness Programs (EAP) – These actions inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady and Firewise Communities

DRAFT

6: PLAN ADOPTION & IMPLEMENTATION

Plan Adoption

Upon completion, copies of the Draft Local Hazards Mitigation Plan for the Town of West Springfield were distributed to the Mayor, town boards for their review and comment. A public meeting was held by the West Springfield Town Council to present the draft copy of the West Springfield Local Natural Hazards Mitigation Plan to town officials and residents and to request comments from this committee and the general public. The Natural Hazards Mitigation Plan was formally approved by the Town Council and forwarded to the Massachusetts Emergency Management Agency (MEMA) and the Federal Emergency Management Agency (FEMA) for their approval.

Plan Implementation

The implementation of the West Springfield Natural Hazards Mitigation Plan will begin following its formal adoption by the West Springfield Town Council and approval by MEMA and FEMA. Specific town departments and boards will be responsible for ensuring the development of policies, ordinance revisions, and programs as described in Sections 5 and 6 of this plan. The West Springfield Natural Hazards Planning Committee will oversee the implementation of the plan.

Incorporation of Plan Requirements into other Planning Mechanisms/ Documents

At times when the Town of West Springfield is considering creation of or changes to local planning documents or procedures including, but not limited to comprehensive plans, capital improvement plans, zoning and building codes site reviews and permitting processes the information and recommendations contained in this plan will be reviewed by the people and committees involved in those processes and, when appropriate, will incorporate those recommendations into the new planning procedures.

Plan Monitoring and Evaluation

The measure of success of the West Springfield Local Natural Hazards Mitigation Plan will be the number of identified mitigation strategies implemented. In order for the town to become more climate-resilient and better equipped to respond to natural disasters, there must be a coordinated effort between elected officials, appointed bodies, town employees, regional and state agencies involved in disaster mitigation, and the general public.

The West Springfield Natural Hazards Planning Committee will meet on an annual basis or as needed (i.e., following a natural disaster) to monitor the progress of implementation, evaluate the success or failure of implemented recommendations, and brainstorm strategies to remove obstacles to implementation. The parties noted in Section 6 of the plan, who are assuming responsibility for implementation of different

prioritized actions, will oversee implementation and integrate recommended actions into existing and future plans. Following these discussions, it is anticipated that the committee may decide to reassign the roles and responsibilities for implementing mitigation strategies to different town departments and/or revise the goals and objectives contained in the plan.

At a minimum, the committee will review and update the plan every five years, beginning in the spring of 2024. The meetings of the committee will be organized and facilitated by the Emergency Management Director or designee. Outreach to the public, surrounding communities, agencies, businesses, academia, non-profits, or other interested parties outside of the town of West Springfield will be done in advance of each yearly committee meeting in order to solicit their participation in assessment of the plan. The approved West Springfield Hazard Mitigation Plan will be available for ongoing public review and comment at the Municipal Office Building, the public library and at the Pioneer Valley Planning Comission offices.

DRAFT

APPENDICES

Appendix A – Technical Resources

1) Agencies

Massachusetts Emergency Management Agency (MEMA)……...508/820-2000

Hazard Mitigation Section 617/626-1356

Federal Emergency Management Agency (FEMA) 617/223-4175

MA Regional Planning Commissions:

Berkshire Regional Planning Commission (BRPC)……...413/442-1521

Cape Cod Commission (CCC)…….....508/362-3828

Central Massachusetts Regional Planning Commission (CMRPC)…….. 508/693-3453

Franklin Regional Council of Governments (FRCOG)……..…..413/774-3167

Martha's Vineyard Commission (MVC)……..……..…508/693-3453

Merrimack Valley Planning Commission (MVPC)……..…...978/374-0519

Metropolitan Area Planning Council (MAPC)……..…...617/451-2770

Montachusett Regional Planning Commission (MRPC)……..……978/345-7376

Nantucket Planning and Economic Development Commission (NP&EDC)……..……508/228-7236

Northern Middlesex Council of Governments (NMCOG)……..……978/454-8021

Old Colony Planning Council (OCPC)……..……...508/583-1833

Pioneer Valley Planning Commission (PVPC)……..……...413/781-6045

Southeastern Regional Planning and Economic Development District (SRPEDD)……..……..508/823-1803

MA Board of Building Regulations & Standards (BBRS)……..……617/227-1754

MA Coastal Zone Management (CZM)……..……617/626-1200

DCR Water Supply Protection……..……617/626-1379

DCR Waterways……..……617/626-1371

DCR Office of Dam Safety……..……...508/792-7716

DRAFT

DFW Riverways……617/626-1540

MA Dept. of Housing & Community Development……617/573-1100

Woods Hole Oceanographic Institute……508/457-2180

UMass-Amherst Cooperative Extension……413/545-4800

National Fire Protection Association (NFPA)……617/770-3000

New England Disaster Recovery Information X-Change (NEDRIX – an association of private companies & industries involved in disaster recovery planning)……781/485-0279

MA Board of Library Commissioners……617/725-1860

MA Highway Dept, District 2……413/582-0599

MA Division of Marine Fisheries……617/626-1520

MA Division of Capital & Asset Management (DCAM)……617/727-4050

University of Massachusetts/Amherst……413/545-0111

Natural Resources Conservation Services (NRCS)……413/253-4350

MA Historical Commission……617/727-8470

U.S. Army Corps of Engineers……978/318-8502

Northeast States Emergency Consortium, Inc. (NESEC)……781/224-9876

National Oceanic and Atmospheric Administration: National Weather Service; Tauton, MA……508/824-5116

US Department of the Interior: US Fish and Wildlife Service ……413/253-8200

US Geological Survey ……508/490-5000

2) Mitigation Funding Resources

404 Hazard Mitigation Grant Program (HMGP) ……Massachusetts Emergency Management Agency

406 Public Assistance and Hazard Mitigation ……Massachusetts Emergency Management Agency

Community Development Block Grant (CDBG)……DHCD, also refer to RPC

Dam Safety Program……MA Division of Conservation and Recreation

Disaster Preparedness Improvement Grant (DPIG) ……Massachusetts Emergency Management Agency

Emergency Generators Program by NESEC‡ ……Massachusetts Emergency Management Agency

Emergency Watershed Protection (EWP) Program……USDA, Natural Resources Conservation Service Flood Mitigation Assistance Program (FMAP) ……Massachusetts Emergency Management Agency

DRAFT

Flood Plain Management Services (FPMS).....US Army Corps of Engineers

Mitigation Assistance Planning (MAP).....Massachusetts Emergency Management Agency

Mutual Aid for Public Works.....Western Massachusetts Regional Homeland Security Advisory Council

National Flood Insurance Program (NFIP) † .....Massachusetts Emergency Management Agency

Power of Prevention Grant by NESEC‡ .....Massachusetts Emergency Management Agency

Roadway Repair & Maintenance Program(s).....Massachusetts Highway Department

Section 14 Emergency Stream Bank Erosion & Shoreline Protection .....US Army Corps of Engineers

Section 103 Beach Erosion.....US Army Corps of Engineers

Section 205 Flood Damage Reduction.....US Army Corps of Engineers

Section 208 Snagging and Clearing .....US Army Corps of Engineers

Shoreline Protection Program.....MA Department of Conservation and Recreation

Various Forest and Lands Program(s).....MA Department of Environmental Protection

Wetlands Programs .....MA Department of Environmental Protection

‡NESEC – Northeast States Emergency Consortium, Inc. is a 501(c)(3), not-for-profit natural disaster, multi-hazard mitigation and emergency management organization located in Wakefield, Massachusetts. Please, contact NESEC for more information.

† Note regarding National Flood Insurance Program (NFIP) and Community Rating System (CRS): The National Flood Insurance Program has developed suggested floodplain management activities for those communities who wish to more thoroughly manage or reduce the impact of flooding in their jurisdiction. Through use of a rating system (CRS rating), a community's floodplain management efforts can be evaluated for effectiveness. The rating, which indicates an above average floodplain management effort, is then factored into the premium cost for flood insurance policies sold in the community. The higher the rating achieved in that community, the greater the reduction in flood insurance premium costs for local property owners. MEMA can provide additional information regarding participation in the NFIP-CRS Program.

DRAFT

3) Internet Resources

Sponsor	Internet Address	Summary of Contents
Natural Hazards Research Center, U. of Colorado	http://www.colorado.edu/litbase/ha zards/	Searchable database of references and links to many disaster-related websites.
Atlantic Hurricane Tracking Data by Year	http://wxp.eas.purdue.edu/hurricane	Hurricane track maps for each year, 1886 – 1996
National Emergency Management Association	http://nemaweb.org	Association of state emergency management directors; list of mitigation projects.
NASA – Goddard Space Flight Center "Disaster Finder:	http://www.gsfc.nasa.gov/ndrd/dis aster/	Searchable database of sites that encompass a wide range of natural disasters.
NASA Natural Disaster Reference Database	http://ltpwww.gsfc.nasa.gov/ndrd/main/html	Searchable database of worldwide natural disasters.
U.S. State & Local Gateway	http://www.statelocal.gov/	General information through the federal-state partnership.
National Weather Service	http://nws.noaa.gov/	Central page for National Weather Warnings, updated every 60 seconds.
USGS Real Time Hydrologic Data	http://h20.usgs.gov/public/realtime.html	Provisional hydrological data
Dartmouth Flood Observatory	http://www.dartmouth.edu/artsci/g eog/floods/	Observations of flooding situations.
FEMA, National Flood Insurance Program, Community Status Book	http://www.fema.gov/fema/csb.html	Searchable site for access of Community Status Books

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Sponsor	Internet Address	Summary of Contents
Florida State University Atlantic Hurricane Site	http://www.met.fsu.edu/explores/tropical.html	Tracking and NWS warnings for Atlantic Hurricanes and other links
The Tornado Project Online	http://www.tornadoroject.com/	Information on tornadoes, including details of recent impacts.
National Severe Storms Laboratory	http://www.nssl.uoknor.edu/	Information about and tracking of severe storms.
Independent Insurance Agents of America IIAA Natural Disaster Risk Map	http://www.iiaa.iix.com/ndcmap.html	A multi-disaster risk map.
Earth Satellite Corporation	http://www.earthsat.com/	Flood risk maps searchable by state.
USDA Forest Service Web	http://www.fs.fed.us/land	Information on forest fires and land management.

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Appendix B – List of Acronyms

FEMA	Federal Emergency Management Agency
MEMA	Massachusetts Emergency Management Agency
PVPC	Pioneer Valley Planning Commission
EPA	Environmental Protection Agency
DEP	Massachusetts' Department of Environmental Protection
NWS	National Weather Service
HMGP	Hazard Mitigation Grant Program
FMA	Flood Mitigation Assistance Program
SFHA	Special Flood Hazard Area
CIS	Community Information System
DCR	Massachusetts Department of Conservation and Recreation
FERC	Federal Energy Regulatory Commission
FIRM	Flood Insurance Rate Map
NFIP	National Flood Insurance Program
CRS	Community Rating System
BOH	Board of Health
EMD	Emergency Management Director
EOC	Emergency Operations Center
CEMP	Comprehensive Emergency Management Plan
HAZMAT	Hazardous Materials

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Appendix C – Natural Hazard Profiling Methodology[6]

In order to adeptly profile each of the hazards, a Hazard Identification and Analysis Matrix was prepared to organize the information that was gathered for this project.

The matrix is organized into the following sections: Type of Hazard, Location of Occurrence, Extent of Impacts, Previous Occurrences, Probability of Future Occurrence, and Hazard Index. The Hazard Index was completed to rank the hazards according to the frequency of occurrence and the amount of potential damage likely to occur. The Hazard Index forms the basis for concentrating the future mitigation efforts outlined in this plan. A description of each of the matrix categories is provided below. The completed Matrix is shown as Table 10 (Section 3, page 38).

Location of Occurrence

The classifications are based on the area of the Town of West Springfield that would potentially be affected by the hazard. The following scale was used:

Table C.1: Location of Occurrence, Percentage of Town Impacted of Given Natural Hazard	
Location of Occurrence	Percentage of Town Impacted
Large	More than 50% of the town affected
Medium	10 to 50% of the town affected
Small	Less than 10% of the town affected

Extent of Impacts

The extent of direct impacts an affected area could potentially suffer were classified according to the following scale:

Table C.2: Extent of Impacts, Magnitude of Multiple Impacts of Given Natural Hazard	
Extent of Impacts	Magnitude of Multiple Impacts
Catastrophic	Multiple deaths and injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of facilities for 30 days or more.

[6] Source: information adapted from Town of Holden Beach, NC Community-Based Hazard Mitigation Plan, July 15, 2003, and Hyde County, NC Multi-Hazard Mitigation Plan, Sept 2002; and the Massachusetts Emergency Management Agency (MEMA).

Critical	Multiple injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than 1 week.
Limited	Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than 1 day.
Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of facilities.

Previous Occurrences

Whether or not previous hazard events had occurred is also included, with detailed descriptions of specific previous occurrences within the hazard identification and vulnerability assessments, if necessary.

Probability of Future Occurrence

The likelihood of a future event for each natural hazard was classified according to the following scale:

Table C.3: Frequency of Occurrence and Annual Probability of Given Natural Hazard

Frequency of Occurrence	Probability of Future Event
Very High	70-100% probability in the next year
High	40-70% probability in the next year
Moderate	10-40% probability in the next year
Low	1-10% probability in the next year
Very Low	Less than 1% probability in the next year

Hazard Index

The hazard index ratings were determined after assessing the frequency, location and impact classifications for each hazard. The hazard index ratings are based on a scale of 1 (highest risk) through 5 (lowest risk). The ranking is qualitative and is based, in part, on local knowledge of past experiences with each type of hazard. The size and impacts of a natural hazard can be unpredictable however; many of the mitigation strategies currently in place and many of those proposed for implementation can be applied to the expected natural hazards, regardless of their unpredictability.

The Hazard Ratings are labeled as follows:

1 – High Risk

2 – Medium-High Risk

3 – Medium Risk

4 – Medium Low Risk

5 – Low Risk

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Appendix D – Past & Potential Hazards/Critical Facilities Map

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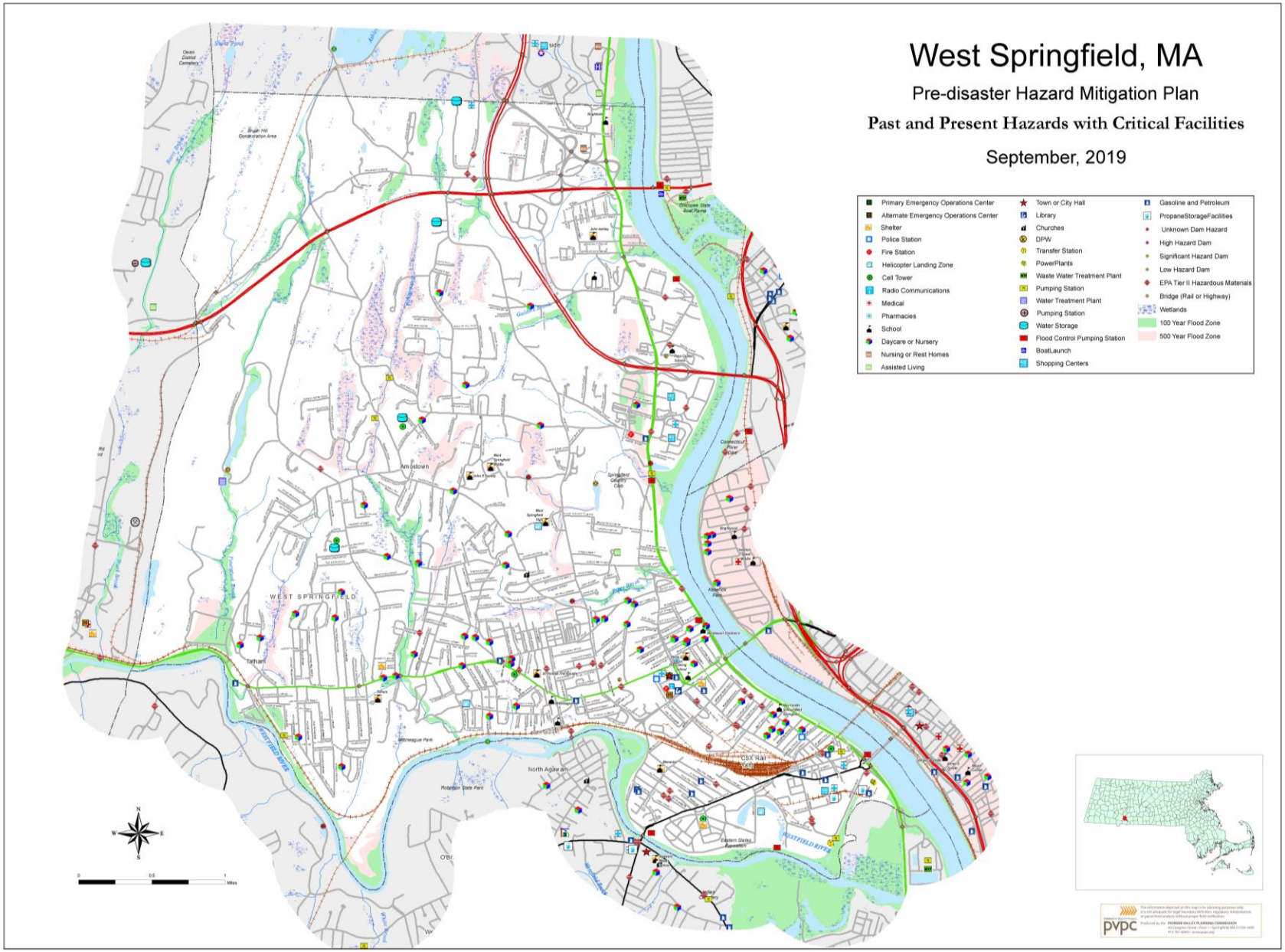
West Springfield, MA
Pre-disaster Hazard Mitigation Plan
Past and Present Hazards with Critical Facilities
September, 2019
Primary Emergency Operations Center
Alternate Emergency Operations Center
Shelter
Police Station
Fire Station
Helicopter Landing Zone
Cell Tower
Radio Communications
Medical
Pharmacies
School
Daycare or Nursery
Nursing or Rest Homes
Assisted Living
Town or City Hall
Library
Churches
DPW
Transfer Station
PowerPlants
Waste Water Treatment Plant
Pumping Station
Water Treatment Plant
Pumping Station
Water Storage
Flood Control Pumping Station
BoatLaunch
Shopping Centers
Gasoline and Petroleum
PropaneStorageFacilities
Unknown Dam Hazard
High Hazard Dam
Significant Hazard Dam
Low Hazard Dam
EPA Tier II Hazardous Materials
Bridge (Rail or Highway)
Wetlands
100 Year Flood Zone
500 Year Flood Zone
WEST SPRINGFIELD
Amostown
Tatham
North Agawam
pvpc

Appendix E – Documentation of the Planning Process

West Springfield Hazard Mitigation Committee
Meeting #1 Agenda

West Springfield Town Hall Merrick Room
Thursday, June 20, 2019 10am - 12pm (EDT)

1. Introductions
    a. Affirm local Hazard Committee membership

2. Overview of Hazard Mitigation Planning Process
    a. Background on Hazard Mitigation Planning
    b. Planning process and requirements
        i. 3-5 committee meetings, 2 public outreach meetings
        ii. MEMA / FEMA review and conditional approval
        iii. Select Board adoption
        iv. FEMA final approval
    c. Schedule for committee and public outreach meetings

3. Identify/update local hazards
    a. Flood Hazard Areas
    b. Dam Hazards

4. Identify/Update Potential New Development Sites

5. Update Critical Facilities Inventory and Mapping

West Springfield Hazard Mitigation Plan Update
Public Engagement Event #1

Merrick Room, Town Hall
Tue. July 16th, 9 am to 10 pm

1. Overview and benefits of hazard mitigation
2. Plan development process
3. Identified hazards and vulnerability assessment
4. Next steps, questions, and discussion

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West Springfield Hazard Mitigation Committee
Meeting #2 Agenda

Merrick Room, Town Hall
Tue. July 16th, 10 am to 12 pm

1. Update on where we are in planning process - Hazards Analysis
2. Finish Critical Facilities Inventory and Mapping Updates
3. Identify/Update Potential New Development Sites
4. Complete Capabilities Worksheet
5. Next Steps
    a. Homework: Review Community Profile chapters

West Springfield Hazard Mitigation Committee
Meeting #3 Agenda

Merrick Room
8/22/19, 10:00am

1. Update on where we are in planning process
    a. Critical Facilities Inventory and Mapping Updates nearing completion
        i. Need emergency shelter info from public health
        ii. Need updated list of problem culverts
        iii. Need list of apartment complexes of 8 or more units
    b. Appendix E - Capability Assessment Worksheet
        i. Only 1 or 2 edits on google doc
2. Review Mitigation Goals and update as needed – add climate component
3. Review original existing mitigation measures from 2010 plan
    a. Confirm effectiveness
    b. Note any needed changes
4. Review recommended mitigation measures from 2010 plan

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a. current status
b. decide which to carry forward into 2019 plan
c. add new mitigation actions
d. evaluate priority

5. Next Steps

a. Review/revisions of plan sections
b. Next committee meeting
c. Public engagement
    i. post draft plan for review
    ii. MVP integration and age-friendly/healthy Hampshire integration – focus groups
    iii. 2nd public meeting

West Springfield Hazard Mitigation Committee
Meeting #4 Agenda

Merrick Room
10/17/19, 10:00am

1. Update on where we are in planning process

    a. Review updates made to plan since last meeting, incl. Vulnerability Assessment Methodology and Potential Loss Estimates

2. Review recommended mitigation measures from 2010 plan

    a. decide which to carry forward into 2019 plan

3. Establish Mitigation Goals and Objectives

4. Propose New Hazard Mitigation Strategies for 2019 Plan

5. Evaluate priority of 2019 mitigation measures

6. Next Steps

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West Springfield Hazard Mitigation Committee
Meeting #5 Agenda

Merrick Room
January 30, 2020

6. Final Review of plan
7. Affirm Action Plan of Hazard Mitigation Strategies
    a. Include any additional strategies from the MVP workshop
8. Review Plan Adoption and Implementation
9. Next Steps

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Appendix F – Public Outreach

PRESS RELEASE

8/29/2019 2:11 PM

WEST SPRINGFIELD SEEKS PUBLIC'S INPUT IN PURSUIT OF MORE CLIMATE RESILIENT COMMUNITY

The Town of West Springfield is collaborating with residents and stakeholders on two important planning initiatives - an update of the town's Natural **Hazard Mitigation Plan** (**HMP**) and the **Municipal Vulnerability Preparedness** (**MVP**) planning program.

Both efforts rely on stakeholder and public input to come up with strategies that will be most effective in West Springfield to mitigate natural hazards, reduce vulnerability and adapt to our changing climate.

The results of these processes will inform future town spending on mitigation and adaptation.

As part of a public outreach process, an online survey is available for residents here: https://www.surveymonkey.com/r/W_Springfield.

This survey is one opportunity for you have your voice heard about why natural hazard mitigation and climate change adaptation matter, what actions you are taking to reduce personal risk, and what you think the Town should do to increase preparedness and reduce vulnerability to natural hazards and the impacts of climate change.

Future public sessions (time and date TBD) will focus on gathering input on hazard mitigation strategies, climate vulnerabilities and recommended solutions.

Pioneer Valley Planning Commission staff is also working with the West Springfield Council on Aging to gather community input for the Age and Dementia Friendly West Springfield initiative. This project is focused on an aging population and increasing numbers of people with dementia. As vulnerability preparedness planning also involves planning for these vulnerable populations, some of the listening sessions for the Age and Dementia Friendly West Springfield project will discuss these overlapping areas of concern. For more information about the Age and Dementia Friendly West Springfield initiative, see https://www.thereminder.com/localnews/west-springfield/council-on-aging-conducts-listening-sessions-to-ma/.

For more information, please contact PVPC's Emily Slotnick at eslotnick@pvpc.org or (413) 781-6045.

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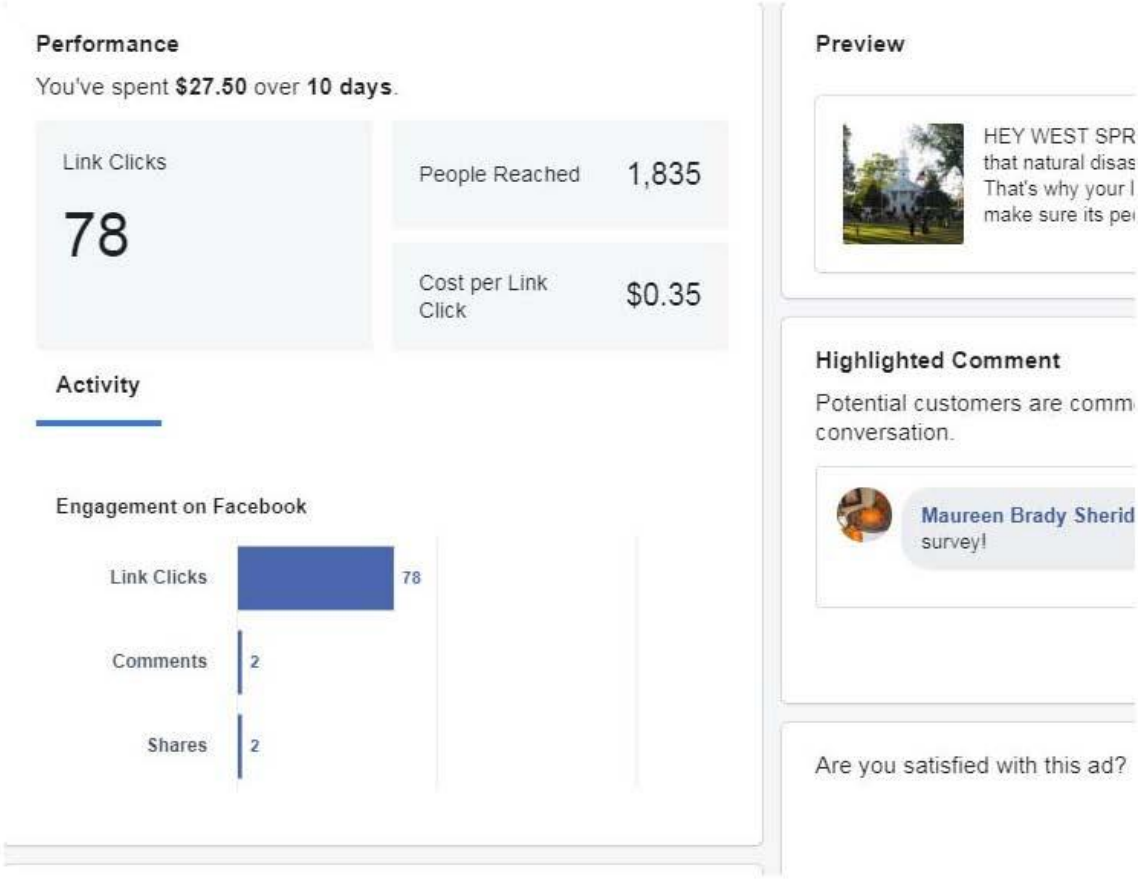
Emily Slotnick

From: Patrick Beaudry
Sent: Tuesday, September 17, 2019 4:01 PM
To: Emily Slotnick
Subject: west side survey boost results

Follow Up Flag: Follow up
Flag Status: Flagged

Not sure a more clever way to share the results of our boost, but here is what I've clipped off our account.

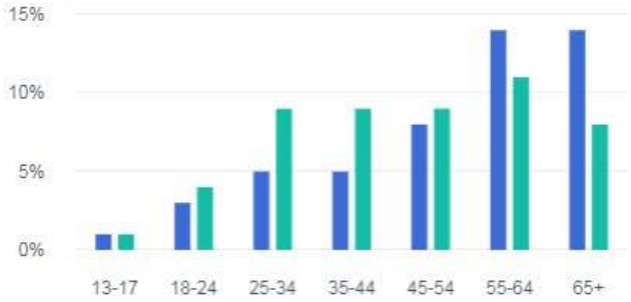


Audience ...

This ad reached **1,835** people in your audience.

People Placements Locations

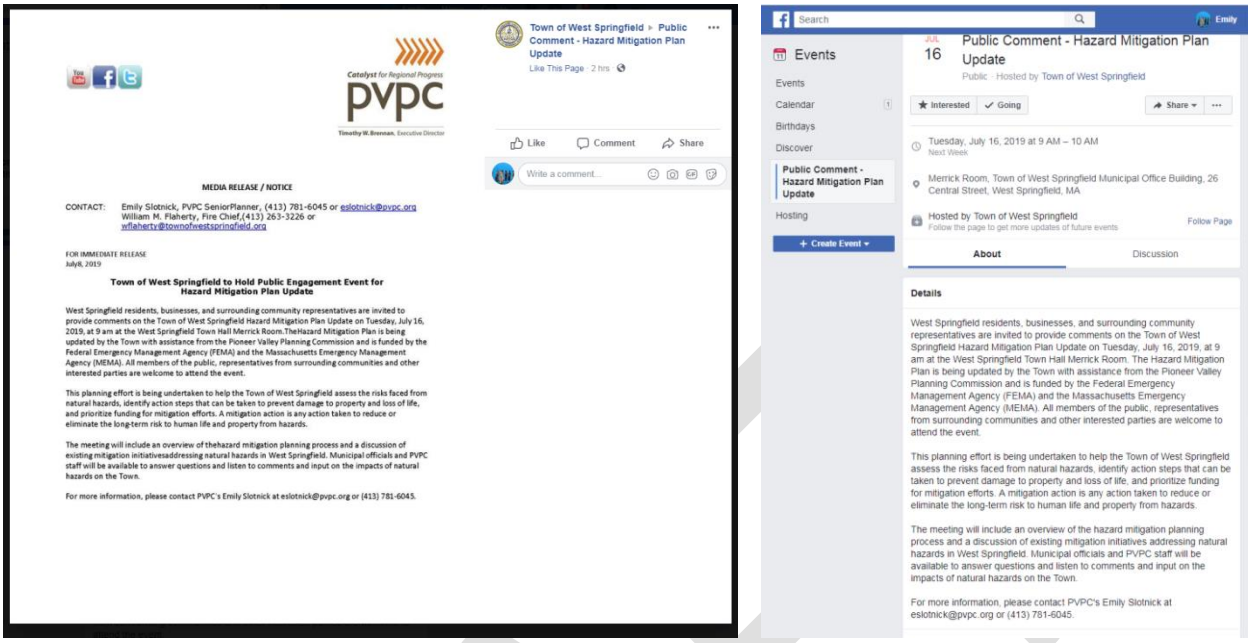
49.3% Women **50.7% Men**



Audience Name West Springfield

Patrick B. Beaudry
Manager of Public Affairs
Pioneer Valley Planning Commission
60 Congress Street, First Floor
Springfield, MA 01104
Office: (413) 781-6045, ext. 355
Cell: (413) 210-4658

2



MEDIA RELEASE / NOTICE

CONTACT: Emily Slotnick, PVPC SeniorPlanner, (413) 781-6045 or eslotnick@pvpc.org
William M. Flaherty, Fire Chief,(413) 263-3226 or wflaherty@townofwestspringfield.org

FOR IMMEDIATE RELEASE
July8, 2019

Town of West Springfield to Hold Public Engagement Event for Hazard Mitigation Plan Update

West Springfield residents, businesses, and surrounding community representatives are invited to provide comments on the Town of West Springfield Hazard Mitigation Plan Update on Tuesday, July 16, 2019, at 9 am at the West Springfield Town Hall Merrick Room.TheHazard Mitigation Plan is being updated by the Town with assistance from the Pioneer Valley Planning Commission and is funded by the Federal Emergency Management Agency (FEMA) and the Massachusetts Emergency Management Agency (MEMA). All members of the public, representatives from surrounding communities and other interested parties are welcome to attend the event.

This planning effort is being undertaken to help the Town of West Springfield assess the risks faced from natural hazards, identify action steps that can be taken to prevent damage to property and loss of life, and prioritize funding for mitigation efforts. A mitigation action is any action taken to reduce or eliminate the long-term risk to human life and property from hazards.

The meeting will include an overview of thehazard mitigation planning process and a discussion of existing mitigation initiativesaddressing natural hazards in West Springfield. Municipal officials and PVPC staff will be available to answer questions and listen to comments and input on the impacts of natural hazards on the Town.

For more information, please contact PVPC's Emily Slotnick at eslotnick@pvpc.org or (413) 781-6045.

Town of West Springfield ▸ Public Comment - Hazard Mitigation Plan Update
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Public · Hosted by Town of West Springfield

Interested Going Share

Tuesday, July 16, 2019 at 9 AM – 10 AM
Next Week

Merrick Room, Town of West Springfield Municipal Office Building, 26 Central Street, West Springfield, MA

Hosted by Town of West Springfield
Follow the page to get more updates of future events
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About Discussion

Details

West Springfield residents, businesses, and surrounding community representatives are invited to provide comments on the Town of West Springfield Hazard Mitigation Plan Update on Tuesday, July 16, 2019, at 9 am at the West Springfield Town Hall Merrick Room. The Hazard Mitigation Plan is being updated by the Town with assistance from the Pioneer Valley Planning Commission and is funded by the Federal Emergency Management Agency (FEMA) and the Massachusetts Emergency Management Agency (MEMA). All members of the public, representatives from surrounding communities and other interested parties are welcome to attend the event.

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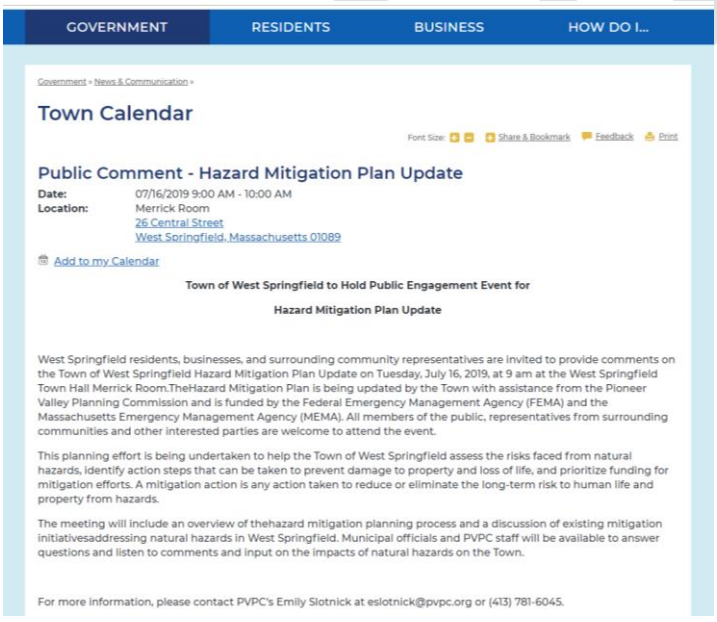
West Springfield Facebook page notifications of Public Meeting #1



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Town Calendar

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Public Comment - Hazard Mitigation Plan Update

Date: 07/16/2019 9:00 AM - 10:00 AM
Location: Merrick Room
26 Central Street
West Springfield, Massachusetts 01089

Add to my Calendar

Town of West Springfield to Hold Public Engagement Event for Hazard Mitigation Plan Update

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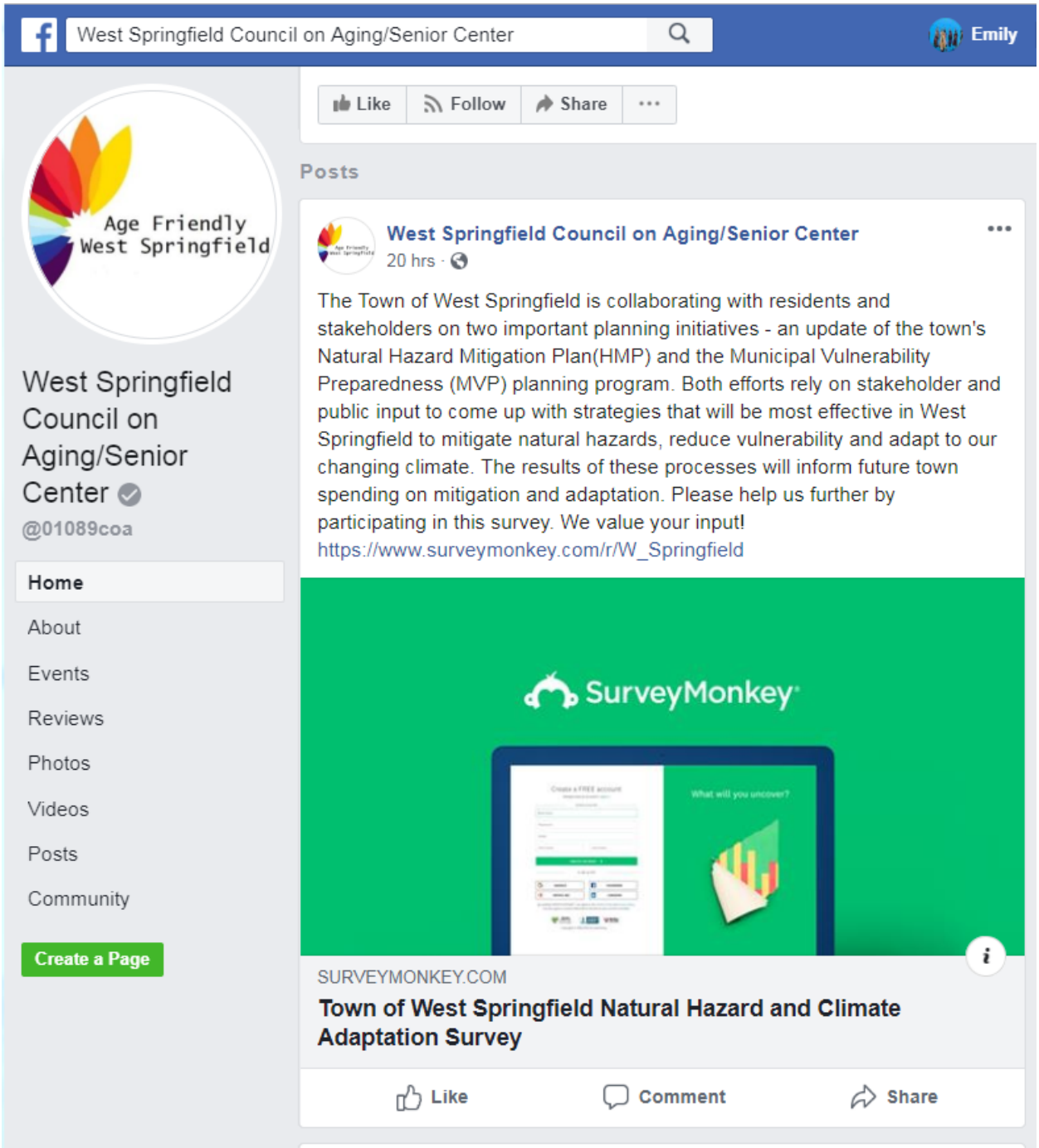
West Springfield Town website notification of Public Meeting #1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The Town of West Springfield is collaborating with residents and stakeholders on two important planning initiatives - an update of the town's Natural **Hazard Mitigation Plan**(**HMP**) and the **Municipal Vulnerability Preparedness** (**MVP**) planning program. Both efforts rely on stakeholder and public input to come up with strategies that will be most effective in West Springfield to mitigate natural hazards, reduce vulnerability and adapt to our changing climate. The results of these processes will inform future town spending on mitigation and adaptation. Please help us further by participating in this survey. We value your input!
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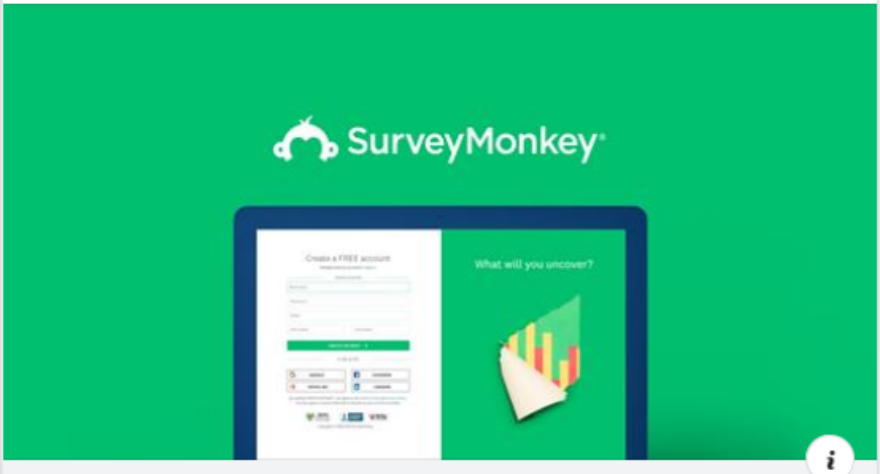

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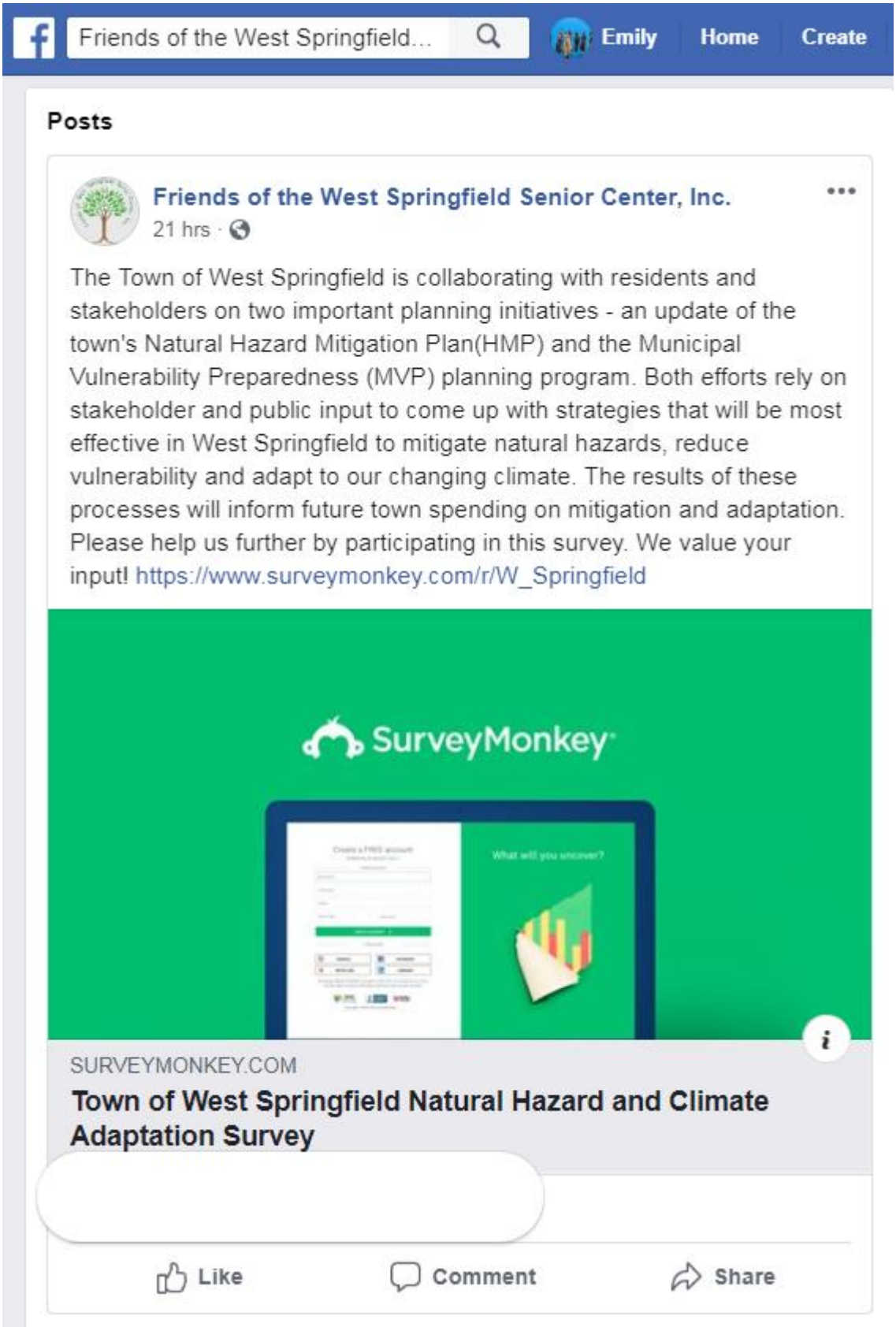
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